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COLLECTION OF EXPERIMENTAL DATA FOR  
FUSION NEUTRONICS BENCHMARK

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(Ed.) Sub Working Group of  
Fusion Reactor Physics Subcommittee

日本原子力研究所  
Japan Atomic Energy Research Institute

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Collection of Experimental Data for Fusion  
Neutronics Benchmark

(Ed.) Sub Working Group of  
Fusion Reactor Physics Subcommittee

Department of Reactor Engineering  
Tokai Research Establishment  
Japan Atomic Energy Research Institute  
Tokai-mura, Naka-gun, Ibaraki-ken

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During the recent ten years or more, many benchmark experiments for fusion neutronics have been carried out at two principal D-T neutron sources, FNS at JAERI and OKTAVIAN at Osaka University, and precious experimental data have been accumulated. Under an activity of Fusion Reactor Physics Subcommittee of Reactor Physics Committee, these experimental data are compiled in this report.

Keywords : Fusion Neutronics, Benchmark Problem, D-T Neutrons, FNS, OKTAVIAN, Tritium Breeding Ratio, Neutron, Gamma-ray

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核融合中性子工学ベンチマーク実験データ集

日本原子力研究所東海研究所原子炉工学部  
(編)核融合炉専門部会サブワーキンググループ

(1994年1月20日受理)

この10年余りの間、原研FNSと大阪大学OKTAVIANの2つの主要なD-T中性子源を使用して、核融合中性子工学のためのベンチマーク実験が数多く行われ、貴重な実験データが蓄積されてきた。本レポートは炉物理委員会の核融合炉専門部会の活動の一環として、これらの実験データを集積したものである。

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# Forward

## General

Fusion Neutronics has been recognized one of key issues in the fusion reactor development. Various nuclear parameters are the subject to the fusion neutronics study. In particular, tritium breeding ratio (TBR), is the most critical parameter for the fuel self-sufficiency point of view. The D-T neutrons interact with all materials consisted, resulting in nuclear heating, induced radioactivity production, etc., along with tritium breeding. Recent concerns of the fusion reactor design have addressed to the radiation shielding against to the nuclear heating, and displacement damages at a superconducting magnet region. Another critical issue stressed is the induced radioactivity consideration in terms of dose rate, after heat and long-lived radioactive waste management. Their evaluations are essential for the licensing of the machine construction from radiation safety point of view. All parameters of importance are products of the neutron interaction with the materials. Nuclear design of the fusion reactor rely on the currently available calculation codes and data. They are the transport calculation codes, 1-d to 3-d Sn codes, Monte Carlo codes, and associated data libraries in terms of neutron cross sections, photon production cross section, activation cross sections, KERMA factors, etc. In order to arrive at the accurate estimation of the nuclear parameters mentioned above, it is definitely required to validate the code and data to be applied in the design calculations.

In Japan, the activity on the fusion neutronics has initiated in early 1980. Both intense D-T neutron facilities at JAERI and Osaka University, namely FNS and OKTAVIAN, respectively, have been the leading facilities in the world to provide the experimental data relevant to the fusion neutronics study. Remarkable achievement has been accomplished during the last decade to now in terms of basic benchmark integral experiments, focusing on the nuclear data validation for the fusion applications. Those integral experiments were incorporated with a D-T neutron source. The experiments were conducted under configurations with simple geometry and simple materials. The major concern was placed on the neutron flux spectrum characteristics along with the direct tritium production rate. Based on the experimental data, the data and methods were tested on all such occasions whenever they were available. The nuclear data, in particular, are the subject to be revised with the new data in the time being. In the future, the endeavor should be continued on updating data and methods directing to the better accuracy in the nuclear design. It is, in general, required to validate the data. For this purpose, the experimental data plays the important role for the validation. Fortunately, as described above, we have a wealth of experimental data as the

results of the Japanese long sighted activities on the fusion neutronics. It is worthwhile, at the present moment, to make a documentation of all available experimental data for the systematic data validation in the future.

Viewing these rather urgent requirement, a Working Group was organized under the Fusion Reactor Physics Subcommittee, assigning four people to devote to this Task: reviewing all experimental efforts, collecting the experimental data and documenting all in detail in one report. The four were Y. Ikeda (JAERI), J. Yamamoto (Osaka University), C. Ichihara (Kyoto University Research Reactor Institute) and K. Ueki (Shipment Research Institute). At the last moment of this endeavor, F. Maekawa (JAERI) joined the WG to make contribution for the assembly of the report.

## General Structure of Document

This report aims to compile existing integral benchmark experimental data for general use, in particular, focusing on the validation of data & methods for the fusion application. All information needed for the user are to be documented as precisely as possible. In order to make this data compilation to serve as a standard data base for benchmarking the data & methods in the future, we standardized the structure of contents for every problems. The structure is given in the following **Table X**.

**Table X**

Structure of the present benchmark collection.
Title
Author(s)
Organization(s)
Facility
Date
Measured Quantity
Experimental Method
Neutron Source Characteristics
Material / Geometry / Configuration
Experimental Data with Errors
Error Assessment
Example of Experimental Analysis
Comment and So Forth
References

Numerical data are given with experimental errors along with the full description of experimental arrangement, and procedure how to interpret the data for analysis. Each experiments is given in a separated section. Data described here are fully documented so that any person could do the experimental analysis with the data given in the present format. For the sake of convenience,



some examples for the calculation input are attached at the last part of each description. An electrical-format data file of this document is available to be distributed to the users. Please ask to Mr. Fujio Maekawa.\*

The members of WG hope that this issue will be of helpful in data validation of any version of nuclear data file, serving as the standard benchmark problems and exercises for the D-T fusion reactor applications. The effort is to be continued whenever new experiments will be available. Also, endeavor should be extended to data available not only in Japan, but also in the world.

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## 1. Benchmark Experimental Data

## 1.1 Tritium Breeding Ratio in Li, Pb-Li, Pb-Li-C, Be-Li, Be-Li-C. Spheres Measured with $\text{Li}_2\text{CO}_3$ Pellets and/or LiF TLDs

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**Facility** OKTAVIAN, Osaka University

**Date** Experiments with lithium pellets -1987  
TLD experiments: February 1990, November 1990

### **Measured Quantities**

Local tritium production rate by lithium carbonate pellets ( $\text{Li}_2\text{CO}_3$ ) was measured. Responses of LiF TLDs namely UD136N combined with UD137N were measured and then used to estimate local tritium production rate (TPR). The Nb foil activity was measured to determine the neutron source strength by means of the 'Large Solid Angle Activation Foil Method'<sup>1)</sup>.

### **Experimental Method**

Several experiments were carried out to measure tritium breeding ratio (TBR) in various lithium spheres combined with lead or beryllium neutron multiplier and optionally graphite reflector. The tritium production rate distributions inside the lithium spheres were measured with lithium carbonate pellets ( $\text{Li}_2\text{CO}_3$ ) or with LiF TLDs. Determination of TBR from TLD measurements was done using the least squares method employing covariance matrixes of nuclear data. The measured values of TBR were compared with theoretical ones obtained by neutron transport calculation using the ANISN code with the nuclear library JENDL-3.

The direct measurement of local TPR by lithium carbonates pellets is widely known. This technique was applied to bare Li(50cm) assembly as well as to Pb(10cm)+Li(40cm) one. Derivation of TBR by integrating the local TPR over the whole lithium zone was assisted by its theoretical distribution to overcome problems with step space dependencies of measured values. In case of TLD application to TBR measurements, additional effort is necessary to obtain local TPR from TLD measurements. This technique was used for remaining systems. Now this method will be briefly described.

Idea of the measurement is based on the fact that TLDs UD-136N and UD-137N consist of the same material apart from isotope of lithium. In the former case it is  ${}^6\text{Li}$ , in the latter  ${}^7\text{Li}$ . Detectors of  ${}^6\text{Li}$  are sensitive for neutrons mainly due to reaction  ${}^6\text{Li}(n,\alpha)\text{T}$ , thus the response function to neutrons is similar to tritium production cross section. Both detectors has the same sensitivity for gamma radiation. If we take difference of responses from UD-136N and UD-137N, it will be the response only for neutrons. In this case the presence of gamma radiation will not disturb the measurement. But since the difference response function of TLDs (TLDD response function) differs from the tritium production cross section an influence of a neutron spectrum uncertainty on the TPR derivation from TLD responses must be of concern. For this purpose the neutron spectrum is treated as a variable. When the neutron flux and cross sections are presented in the group structure one can write equations:

$$\text{TPR} = \sum \phi \cdot \Sigma_{\text{TP}} \quad (1)$$

$$\text{TLDD} = \sum \phi \cdot \mathbf{f}_{\text{TLDD}} \quad (2)$$

where  $\phi$  is the neutron flux at measured point,  $\Sigma_{\text{TP}}$  is the macroscopic tritium production cross section and  $\mathbf{f}_{\text{TLDD}}$  is the difference of TLDs response function. To solve the equations (1) and (2) the general least squares method was used. Generally, it minimizes function (3) conserving side equations (1) and (2) expressing TPR and TLDD responses at each point of measurement.

$$M = [\vec{y} - \vec{y}^{\text{m}}]^{\text{T}} \cdot \mathbf{G}_y \cdot [\vec{y} - \vec{y}^{\text{m}}] \quad (3)$$

where  $\vec{y}$  and  $\vec{y}^{\text{m}}$  denote true and measured values vectors,  $\mathbf{G}_y$  is the weight matrix equal to reverse covariance matrix of measurements.

During the experiment, TLD responses in lithium zone and source strength were measured. Measured values of TLD response functions with their covariance matrixes were prepared from direct measurements<sup>2,3)</sup>.

Macroscopic tritium breeding cross section and its covariance matrix were prepared

from  ${}^6\text{Li}(n,\alpha)\text{T}$  and  ${}^7\text{Li}(n,n'\alpha)\text{T}$  cross section and uncertainty data from <sup>4). Neutron flux obtained from transport calculation is treated as a measured one but uncertainty of these data was chosen large since direct measurement of flux is not performed. This treatment gives us an information about the impact of flux spectrum uncertainty on the final uncertainty of TBR. It can be also noticed that this method imposes some correlation of TPR measured in different points what is physically understandable due to a fact that mean free path of neutrons in the system is comparable with the size of the lithium zone.</sup>

The neutron spectrum is treated as uncertain to take into consideration errors imposed by differences between shape of TLDD response function and tritium production cross section. Condition of the positive value of neutron spectrum sets limit on relative standard deviation. It was chosen equal to 80% and correlations between group values were set at the level leading to TBR uncertainty obtained only from transport calculation equal to about 40%. This way final TBR uncertainty derived from TLD measurements is not strongly affected by additional a priori information concerning neutron spectrum.

### **Neutron Source Characteristics**

In the first experiments (with Li pellets) the pulse beam line was used with the neutron source strength of order  $10^{11}$  n/s. In this case angular distribution of source neutron increases errors of strength estimation. In next series experiments (with TLD) the neutron strength was of order  $10^9$  n/s, with improved angular distribution and reduced size of the target.

### **Material / Geometry / Configuration**

Calculations and measurements of TBR were carried out for the following structures of the spherical assemblies:

1. Li(50cm)
2. Li(50cm)+C(20cm)
3. Pb(10cm)+Li(40cm)
4. Pb(10cm)+Li(40cm)+C(20cm)
5. Be(11.65cm)+Li(40cm)
6. Be(11.65cm)+Li(40cm)+C(20cm).

Figure 1.1 presents the systems with the neutron multiplier and the graphite reflector.

### **Experimental Data with Errors**

Experimental data with errors are shown in Tables 1.1 - 1.16. For experiments applying TLD units are: TLD responses; [Co-60 equivalent Roentgen/ source neutron] and TPR; [ $1/\text{source neutron}/\text{cm}^3$ ]. For experiments with carbonate pellets and foil activation

method TPR and reaction rate are given as a reaction rate per source neutron.

### **Error Assessment**

In experiments with lithium carbonate pellets the given errors of local TPR consist of an uncorrelated statistical error of measured production rates and here called systematic error from source strength estimation.

In case of TLD experiments local TPR errors are correlated not only by source measurements but also TLD response function, TPR cross sections, and neutron spectrum uncertainty. Correlation matrixes are attached with experimental data. Importance of each source of errors can be deduced from Table 1.1 and 1.2 calculated for total TBR integrated over the lithium zone.

In the latter experiments improved neutron strength error consist of: error of the Nb cap position; c.a. 2%, counting statistics less than 1%, others errors including cross section of Nb about 1%.

### **Example of Experimental Analysis**

Experimental analysis can be made in the similar method described in the next chapter. One-dimensional transport codes such as ANISN may be used.

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Fig.1.1 Pb(Be)-Li-C combined spherical system.



Table 1.1 Comparison of TBR experimental and theoretical values.

	Exp. TBR	Theor. TBR	C/E	RSD
Li	0.685	0.672	0.98	5.6 %
LiC	1.13	1.03	0.91	16. %
PbLi	0.530	0.527	0.99	6.0 %
PbLiC	1.16	1.11	0.96	8.5 %
BeLi	0.848	0.935	1.1	16. %
BeLiC	1.51	1.45	0.96	9.1 %

Table 1.2 Partial errors forming uncertainty of total TBR [%].

	Source strength	Detectors meas.	TPR cross sec.	TLD resp. funct.	Neutron spectrum
Li	5.3	1.0			
LiC	2.6	8.0	1.5	7.0	10.0
PbLi	5.3	2.0			
PbLiC	3.0	2.0	1.0	5.0	6.0
BeLi	2.6	9.0	1.0	6.0	9.0
BeLiC	2.5	3.5	1.0	4.5	6.0

Table 1.3 Experimental and calculational data for Pb(10)-Li(40)-C(10) system.

	Position [cm]	TLDD calc.	TLDD exp.	UD136N exp. [Roentg./n]	UD137N exp. [Roentg./n]	TPR calc. 1/n/cm <sup>3</sup>	TPR exp.
1.	2.055e+1	1.407e-13	1.406e-13	4.58e-13	3.167e-13	2.955e-6	2.940e-6
2.	2.6e+1	9.613e-14	7.645e-14	2.589e-13	1.83e-13	1.809e-6	2.021e-6
3.	3.145e+1	7.705e-14	8.804e-14	1.88e-13	9.99e-14	1.752e-6	1.602e-6
4.	3.69e+1	6.113e-14	6.211e-14	1.4e-13	7.76e-14	1.277e-6	1.25e-6
5.	4.24e+1	5.466e-14	5.114e-14	1.02e-13	5.11e-14	1.068e-6	1.108e-6
6.	4.785e+1	5.005e-14	4.42e-14	8.205e-14	3.78e-14	9.25e-7	1.007e-6
7.	5.23e+1	5.075e-14	5.694e-14	9.43e-14	3.73e-14	1.138e-6	1.02e-6
8.	5.335e+1	5.16e-14	4.95e-14	8.024e-14	3.07e-14	1.02e-6	1.038e-6
9.	5.435e+1	5.295e-14	5.223e-14	9.03e-14	3.81e-14	1.073e-6	1.067e-6
10.	5.645e+1	5.771e-14	6.97e-14	1.07e-13	3.73e-14	1.398e-6	1.171e-6
11.	5.72e+1	6.044e-14	8.129e-14	1.177e-13	3.631e-14	1.603e-6	1.233e-6
12.	5.85e+1	6.9e-13	9.538e-14	1.31e-13	3.54e-14	1.939e-6	1.448e-6
13.	5.885e+1	7.796e-14	8.709e-14	1.14e-13	2.73e-14	1.96e-6	1.733e-6
14.	5.94e+1	1.468e-13	1.790e-13	2.065e-13	2.74e-14	5.286e-6	4.486e-6

Table 1.4 Experimental and calculational data for Pb(10)-Li(40)-C(10) system.

R.S.D of TLDD (Difference between UD136N and UD137N) and correlation matrix.  
Correlated part results from neutron strength estimation, uncorrelated part is.

r.s.d [%]	Correlation (upper part of a symmetric matrix)														
1.	21.0	1.0	.05	.07	.07	.07	.08	.06	.08	.08	.07	.07	.07	.10	.08
2.	22.1		1.0	.07	.06	.07	.07	.06	.08	.08	.07	.07	.07	.10	.08
3.	13.2			1.0	.09	.10	.11	.09	.12	.12	.10	.10	.11	.14	.12
4.	14.0				1.0	.10	.10	.09	.12	.11	.09	.10	.11	.14	.12
5.	12.3					1.0	.10	.10	.09	.12	.10	.11	.11	.15	.13
6.	11.3						1.0	.10	.14	.13	.11	.11	.12	.16	.14
7.	11.9							1.0	.11	.11	.09	.09	.10	.13	.11
8.	9.82								1.0	.15	.12	.13	.13	.18	.16
9.	9.14									1.0	.12	.12	.13	.18	.15
10.	10.9										1.0	.10	.11	.14	.12
11.	10.3											1.0	.11	.15	.13
12.	9.68												1.0	.14	.16
13.	7.95													1.0	.19
14.	8.12														1.0

Table 1.5 Experimental and calculational data for Pb(10)-Li(40)-C(10) system.

R.S.D of TPR (derived from TLDD) and correlation matrix. Increased correlations result from response function and TPR cross section uncertainty.

r.s.d [%]	Correlation (upper part of a symmetric matrix)														
1.	24.8	1.0	.43	.41	.37	.35	.30	.21	.24	.23	.16	.15	.13	.15	.07
2.	23.8		1.0	.42	.38	.36	.31	.22	.26	.25	.17	.16	.14	.16	.07
3.	16.9			1.0	.38	.37	.33	.24	.27	.26	.19	.17	.16	.17	.08
4.	15.8				1.0	.35	.32	.24	.27	.26	.19	.18	.16	.17	.09
5.	14.3					1.0	.32	.25	.28	.28	.20	.19	.17	.19	.09
6.	12.6						1.0	.24	.28	.28	.21	.20	.19	.20	.09
7.	11.7							1.0	.23	.24	.19	.18	.17	.17	.08
8.	10.5								1.0	.27	.22	.21	.20	.21	.10
9.	9.88									1.0	.22	.22	.21	.22	.10
10.	10.5										1.0	.19	.18	.18	.08
11.	9.88											1.0	.19	.19	.08
12.	9.38												1.0	.22	.11
13.	8.85													1.0	.20
14.	11.9														1.0

Table 1.6 Experimental and calculational data for Be(10)-Li(40)-C(10) system.

	Position [cm]	TLDD calc.	TLDD exp.	UD136N exp. [Roentg./n]	UD137N exp. [Roentg./n]	TPR calc. 1/n/cm <sup>3</sup>	TPR exp.
1.	2.03e+1	2.01e-12	1.67e-12	1.90e-12	2.23e-13	1.484e-4	1.23e-4
2.	2.14e+1	4.39e-13	4.72e-13	6.614e-13	2.00e-13	1.488e-5	1.61e-5
3.	2.42e+1	1.87e-13	2.11e-13	3.88e-13	1.77e-13	4.581e-6	5.06e-6
4.	2.57e+1	1.47e-13	1.86e-13	3.59e-13	1.73e-13	3.56e-6	4.29e-6
5.	3.12e+1	8.62e-14	7.86e-14	2.00e-13	1.22e-13	2.049e-6	1.92e-6
6.	3.67e+1	6.30e-14	7.06e-14	1.46e-13	7.55e-14	1.45e-6	1.58e-6
7.	4.22e+1	5.14e-14	5.073e-14	1.10e-13	5.9e-14	1.14e-6	1.13e-6
8.	4.77e+1	4.57e-14	4.78e-14	9.23e-14	4.45e-14	9.86e-7	1.02e-6
9.	5.32e+1	4.54e-14	5.06e-14	8.54e-14	3.48e-14	9.57e-7	1.05e-6
10.	5.57e+1	4.84e-14	5.24e-14	8.61e-14	3.37e-14	1.017e-6	1.10e-6
11.	5.82e+1	5.89e-14	8.83e-14	1.80e-13	2.961e-14	1.27e-6	1.84e-6
12.	5.97e+1	1.49e-13	1.807e-13	2.105e-13	2.98e-14	7.537e-6	7.67e-6

Table 1.7 Experimental and calculational data for Be(10)-Li(40)-C(10) system.

R.S.D of TLDD (Difference between UD136N and UD137N) and correlation matrix.  
Correlated part results from neutron strength estimation, uncorrelated part is originated from random error of TLD readings.

	r.s.d [%]		Correlation (upper part of a symmetric matrix)										
1.	4.92	1.0	.20	.16	.13	.10	.12	.12	.13	.15	.16	.19	.21
2.	7.31		1.0	.16	.14	.11	.13	.13	.14	.16	.16	.20	.22
3.	9.42			1.0	.12	.09	.11	.11	.12	.13	.13	.16	.18
4.	8.61				1.0	.09	.10	.10	.11	.12	.12	.14	.16
5.	12.0					1.0	.08	.08	.09	.10	.10	.11	.12
6.	9.36						1.0	.09	.10	.11	.11	.13	.15
7.	9.88							1.0	.10	.11	.11	.13	.14
8.	8.61								1.0	.12	.12	.14	.16
9.	7.32									1.0	.13	.16	.17
10.	7.10										1.0	.16	.18
11.	5.59											1.0	.21
12.	4.85												1.0

Table 1.8 Experimental and calculational data for Be(10)-Li(40)-C(10) system.

R.S.D of TPR (derived from TLDD) and correlation matrix. Increased correlations result from response function and TPR cross section uncertainty.

	r.s.d [%]		Correlation (upper part of a symmetric matrix)										
1.	13.7	1.0	.56	.15	.13	.09	.10	.09	.11	.14	.16	.21	.10
2.	16.2		1.0	.40	.36	.25	.20	.16	.15	.15	.16	.19	.09
3.	15.8			1.0	.75	.51	.38	.28	.22	.19	.18	.19	.06
4.	15.7				1.0	.57	.41	.30	.23	.19	.18	.18	.05
5.	21.2					1.0	.57	.39	.28	.21	.19	.17	.04
6.	17.0						1.0	.56	.39	.28	.25	.21	.05
7.	16.7							1.0	.53	.37	.32	.26	.05
8.	13.7								1.0	.50	.42	.34	.07
9.	10.7									1.0	.57	.45	.09
10.	9.77										1.0	.52	.09
11.	7.24											1.0	.07
12.	20.6												1.0

Table 1.9 Experimental and calculational data for Be(10)-Li(40) system.

	Position [cm]	TLDD calc.	TLDD exp.	UD136N exp. [Roentg./n]	UD137N exp. [Roentg./n]	TPR calc. 1/n/cm <sup>3</sup>	TPR exp.
1.	2.03e+1	1.94e-12	1.62e-12	1.85e-12	2.23e-13	1.44e-4	1.20e-4
2.	2.14e+1	4.11e-13	4.37e-13	6.30e-13	1.98e-13	1.43e-5	1.514e-5
3.	2.42e+1	1.66e-13	1.813e-13	3.57e-13	1.75e-13	4.48e-6	4.55e-6
4.	2.67e+1	1.10e-13	9.94e-14	2.40e-13	1.404e-13	2.76e-6	2.484e-6
5.	2.78e+1	9.61e-14	8.69e-14	1.87e-13	9.956e-14	2.41e-6	2.18e-6
6.	3.02e+1	7.425e-14	6.41e-14	1.74e-13	1.096e-13	1.86e-6	1.603e-6
7.	3.56e+1	4.705e-14	4.32e-14	1.217e-13	7.85e-14	1.16e-6	1.068e-6
8.	4.11e+1	3.22e-14	2.87e-14	7.884e-14	5.018e-14	7.80e-7	6.395e-7
9.	4.66e+1	2.27e-14	1.615e-14	5.39e-14	3.76e-14	5.43e-7	3.86e-7
10.	5.20e+1	1.63e-14	1.451e-14	4.03e-14	2.58e-14	3.86e-7	3.44e-7
11.	5.75e+1	1.14e-14	9.044e-15	2.73e-14	1.827e-14	2.70e-7	2.149e-7

Table 1.10 Experimental and calculational data for Be(10)-Li(40) system.

R.S.D of TLDD (Difference between UD136N and UD137N) and correlation matrix.  
Correlated part results from neutron strength estimation, uncorrelated part is originated from random error of TLD readings.

r.s.d [%]		Correlation (upper part of a symmetric matrix)										
1.	7.12	1.0	.19	.15	.12	.13	.11	.10	.11	.09	.10	.10
2.	7.52		1.0	.15	.12	.14	.11	.11	.11	.09	.11	.10
3.	10.2			1.0	.10	.11	.09	.09	.09	.08	.09	.08
4.	13.1				1.0	.09	.08	.07	.08	.07	.07	.07
5.	11.3					1.0	.08	.08	.08	.07	.08	.08
6.	15.1						1.0	.07	.07	.06	.07	.06
7.	15.8							1.0	.07	.06	.07	.06
8.	15.3								1.0	.06	.07	.06
9.	19.3									1.0	.06	.06
10.	15.5										1.0	.06
11.	17.2											1.0

Table 1.11 Experimental and calculational data for Be(10)-Li(40) system.

R.S.D of TPR (derived from TLDD) and correlation matrix. Increased correlations result from response function and TPR cross section uncertainty.

r.s.d [%]		Correlation (upper part of a symmetric matrix)										
1.	13.8	1.0	.55	.11	.09	.09	.07	.06	.06	.05	.05	.04
2.	15.8		1.0	.39	.33	.31	.26	.19	.14	.11	.09	.07
3.	17.5			1.0	.70	.66	.54	.38	.28	.20	.16	.12
4.	22.8				1.0	.82	.66	.46	.33	.23	.18	.13
5.	23.3					1.0	.74	.50	.36	.25	.19	.14
6.	26.0						1.0	.58	.40	.28	.21	.15
7.	26.2							1.0	.57	.39	.28	.20
8.	26.5								1.0	.57	.40	.28
9.	30.5									1.0	.57	.39
10.	26.1										1.0	.56
11.	27.7											1.0

Table 1.12 Experimental and calculational data for Li(50)-C(20) system.

	Position [cm]	TLDD calc.	TLDD exp.	UD136N exp. [Roentg./n]	UD137N exp. [Roentg./n]	TPR calc. 1/n/cm <sup>3</sup>	TPR exp.
1.	2.02e+1	8.76e-14	1.62e-12	6.08e-13	5.2e-13	3.11e-6	3.62e-6
2.	2.57e+1	9.13e-14	4.37e-13	3.57e-13	2.65e-13	2.00e-6	2.58e-6
3.	3.12e+1	3.51e-14	1.813e-13	2.19e-13	1.84e-13	1.433e-6	1.35e-6
4.	3.67e+1	3.06e-14	9.94e-14	1.61e-13	1.30e-13	1.102e-6	9.79e-7
5.	4.22e+1	3.69e-14	8.69e-14	1.30e-13	9.11e-14	9.00e-7	9.40e-7
6.	4.77e+1	3.60e-14	6.41e-14	9.40e-14	5.75e-14	7.83e-7	8.49e-7
7.	5.32e+1	2.45e-14	4.32e-14	7.67e-14	5.20e-14	7.48e-7	6.25e-7
8.	5.87e+1	7.21e-14	2.87e-14	1.12e-13	4.18e-14	1.096e-6	1.63e-6

Table 1.13 Experimental and calculational data for Li(50)-C(20) system.

R.S.D of TLDD (Difference between UD136N and UD137N) and correlation matrix. Correlated part results from neutron strength estimation, uncorrelated part is originated from random error of TLD readings.

r.s.d [%]		Correlation (upper part of a symmetric matrix)							
1.	35.4	1.0	.05	.04	.04	.05	.06	.05	.07
2.	18.5		1.0	.05	.05	.06	.07	.06	.09
3.	31.6			1.0	.05	.05	.06	.05	.07
4.	25.9				1.0	.05	.06	.06	.08
5.	16.3					1.0	.07	.07	.10
6.	11.3						1.0	.08	.12
7.	14.2							1.0	.11
8.	5.94								1.0

Table 1.14 Experimental and calculational data for Li(50)-C(20) system.

R.S.D of TPR (derived from TLDD) and correlation matrix. Increased correlations result from response function and TPR cross section uncertainty.

r.s.d [%]		Correlation (upper part of a symmetric matrix)							
1.	35.4	1.0	.59	.38	.26	.19	.15	.11	.08
2.	18.5		1.0	.59	.39	.28	.21	.15	.11
3.	31.6			1.0	.58	.39	.28	.20	.13
4.	25.9				1.0	.57	.39	.27	.17
5.	16.3					1.0	.56	.37	.23
6.	11.3						1.0	.54	.31
7.	14.2							1.0	.40
8.	5.94								1.0

Table 1.15 Measured reaction rates (R.R.) in Li(50 cm t) sphere. Units are [ $\times 10^{-24}$  reactions/ source neutron/ atom] for R.R and [%] for error.

Radius [cm]	${}^6\text{Li}(n,\alpha)\text{T}$		${}^7\text{Li}(n,n'\alpha)\text{T}$		${}^{93}\text{Nb}(n,2n){}^{92\text{m}}\text{Nb}$		${}^{27}\text{Al}(n,\alpha){}^{24}\text{Na}$		${}^{115}\text{In}(n,n'){}^{115\text{m}}\text{In}$	
	R.R.	error	R.R.	error	R.R.	error	R.R.	error	R.R.	error
10.0	2.942e-4	5.4	2.343e-4	5.3	3.672e-4	6.2	9.356e-5	6.0	1.789e-4	6.4
20.3	1.751e-4	5.4	5.492e-5	6.0	7.002e-5	6.2	1.947e-5	6.1	5.254e-5	6.2
30.8	1.058e-4	5.5	2.060e-5	6.0	2.352e-5	6.3	6.777e-6	6.3	2.370e-5	6.2
41.4	6.788e-5	5.4	9.866e-6	10.5	9.645e-6	6.2	2.926e-6	6.4	1.248e-5	6.3
52.1	4.488e-5	5.5	5.218e-6	10.4	4.558e-6	6.3	1.469e-6	6.4	6.633e-6	6.3
57.7	4.151e-5	5.7	3.425e-6	10.4	3.180e-6	6.3	1.023e-6	6.4	4.290e-6	6.3
63.3			2.144e-6	15.6						

Table 1.16 Measured reaction rates (R.R.) in Pb(10 cm t)+Li(40cm t) sphere. Units are [ $\times 10^{-24}$  reactions/ source neutron/ atom] for R.R and [%] for error.

Radius [cm]	${}^6\text{Li}(n,\alpha)\text{T}$		${}^7\text{Li}(n,n'\alpha)\text{T}$		${}^{93}\text{Nb}(n,2n){}^{92\text{m}}\text{Nb}$		${}^{27}\text{Al}(n,\alpha){}^{24}\text{Na}$		${}^{115}\text{In}(n,n){}^{115\text{m}}\text{In}$	
	R.R.	error	R.R.	error	R.R.	error	R.R.	error	R.R.	error
10.0	1.155e-3	5.3	2.635e-4	5.4	4.081e-4	6.2	1.013e-4	6.1	3.337e-4	6.4
20.3	4.517e-4	5.4	3.260e-5	6.1	4.124e-5	6.3	1.122e-5	6.2	7.687e-5	6.2
30.8	2.128e-4	5.4	1.158e-5	9.3	1.360e-5	6.3	3.952e-6	6.3	2.422e-5	6.2
41.4	1.234e-4	5.8	5.335e-6	16.4	5.598e-6	6.3	1.630e-6	6.4	1.021e-5	6.3
52.1	7.726e-5	5.8	2.815e-6	30.7	2.642e-6	6.3	8.302e-7	6.4	4.867e-6	6.3
57.7	6.704e-5	5.8	1.846e-6	43.6	1.939e-6	6.3	5.852e-7	6.4	3.115e-6	6.4

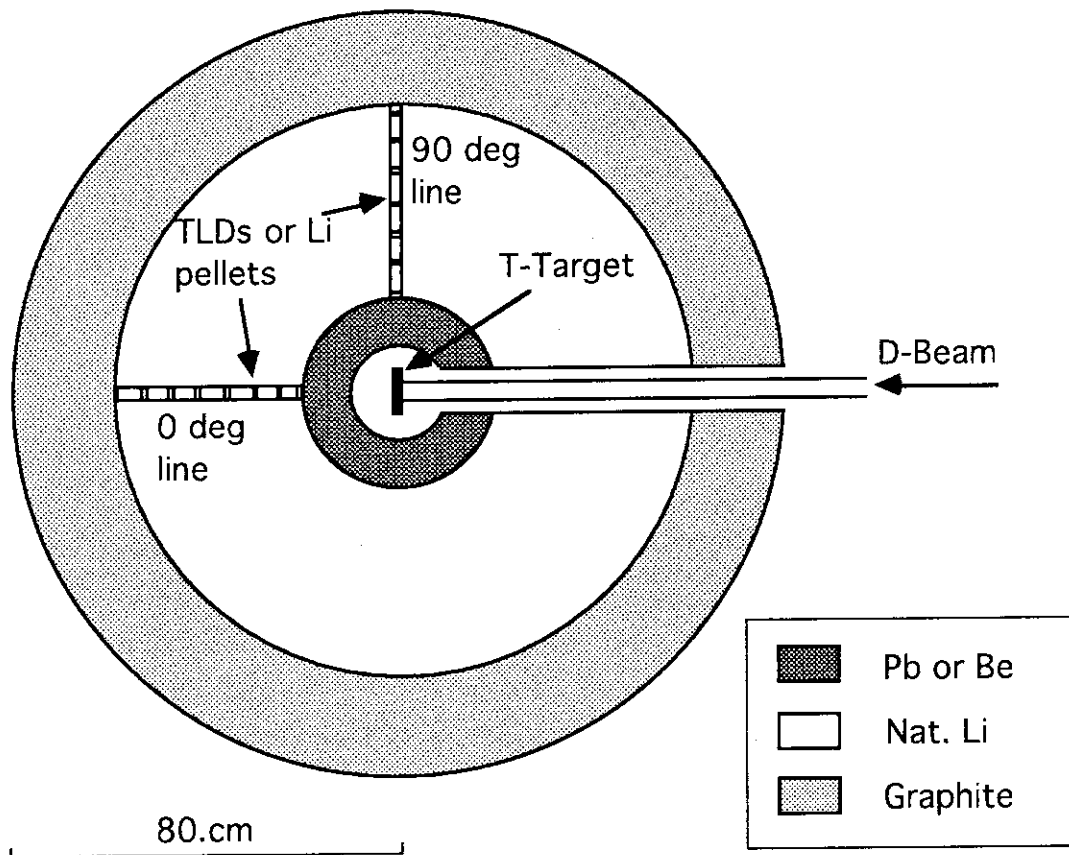


Fig. 1.1 Pb(Be)-Li-C combined spherical system.

## 1.2 Leakage Spectra from Beryllium Sphere and Beryllium-lithium Sphere

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**Facility** OKTAVIAN, Osaka University

**Date** Feb. 6-20, 1991 and Apr. 22 - Jun. 5, 1991

**Measured Quantities**

Leakage neutrons / Source neutrons <sup>1)</sup>

**Experimental Method**

Time of Flight Method <sup>2)</sup>

**Neutron Source Characteristics**

Pulsed D-T neutrons of 2 nsec width and 0.5 MHz repetition rate by OKTAVIAN.  
The data list and spectrum are shown in Table 2.1 and Fig. 2.1.

**Material** Beryllium, Beryllium + Lithium

**Geometry / Configuration**

Shell	(1) inner radius	57 mm,	outer radius	173.5 mm
	(2)	69 mm,		173.5 mm
	(3)	97 mm,		173.5 mm
	(4)	128 mm,		173.5 mm
	(5)	Beryllium (1) + Lithium (400 mm thickness)		
	(6)	Beryllium (4) + Lithium (400 mm thickness)		

**Experimental Data with Errors**

Experimental data with errors are shown in Table 2.2 to Table 2.7 and Fig. 2.2 to Fig. 2.7.

### Error Assessment

The error shown in Table 2.2 to Table 2.7 are only statistic ones. The uncertainty in normalization of neutron intensity must be added. It is estimated to be 6.7 - 8.4 %<sup>3)</sup>

### Example of Experimental Analysis

- |                     |   |
|---------------------|---|
| 1. Calculation Code | NITRAN-1 <sup>4)</sup>                                |
| 2. Nuclear Data     | JENDL-3   |
| 3. Input data       | The data are shown in Fig. 2.8 as a JCL of NITRAN.    |
| 4. Result           | Shown in Fig. 2.2 to Fig. 2.7 with experimental data. |

### References

- (1) Sumita K., et al.: "Integral Benchmark Experiments on Be-Li-Graphite Systems for Tritium Breeding Blanket Design," Proc. of 2nd Intern Symposium on Fusion Nuclear Technology, June 3-7 1991, Karlsruhe, FRG (1991).
- (2) Takahashi A., et al.: Proc. of the 12th Symposium on Fusion Technol., Sept. 13-17 1982, Julich, Vol. I, pp. 687-692.
- (3) Iguchi T.: "Experimental Research of High-Accuracy TBR Evaluation for Fusion Reactor Neutronics," Univ. of Tokyo (in Japanese, 1986).
- (4) Maekawa F.: "NITRAN Manual," OKTAVIAN Rep. A-90-01 (1990).



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Fig. 2.6 Leakage spectra from Be (116.5 mm) - Li sphere.  
Fig. 2.7 Leakage spectra from Be (45.5 mm) - Li sphere.  
Fig. 2.8 JCL of NITRAN-1 for Beryllium analysis.

Table 2.1 D-T source neutron spectrum.

Energy boundary (MeV)		n/Source_n	error	Energy boundary (MeV)		n/Source_n	error
upper	lower			upper	lower		
1.640E+1*	1.611E+1	6.661E-3	0.548E-3	6.242E+0	5.995E+0	5.706E-3	0.646E-3
1.611E+1	1.583E+1	6.125E-2	0.162E-2	5.995E+0	5.757E+0	6.899E-3	0.745E-3
1.583E+1	1.555E+1	6.294E-2	0.166E-2	5.757E+0	5.529E+0	6.566E-3	0.733E-3
1.555E+1	1.527E+1	6.464E-2	0.170E-2	5.529E+0	5.310E+0	6.926E-3	0.796E-3
1.527E+1	1.500E+1	3.544E-1	0.040E-1	5.310E+0	5.099E+0	5.977E-3	0.725E-3
1.500E+1	1.474E+1	3.641E-1	0.041E-1	5.099E+0	4.897E+0	6.346E-3	0.785E-3
1.474E+1	1.447E+1	3.740E-1	0.042E-1	4.897E+0	4.703E+0	6.816E-3	0.812E-3
1.447E+1	1.422E+1	3.758E-1	0.042E-1	4.703E+0	4.516E+0	8.892E-3	0.922E-3
1.422E+1	1.397E+1	3.862E-1	0.043E-1	4.516E+0	4.337E+0	8.914E-3	0.936E-3
1.397E+1	1.372E+1	3.966E-1	0.044E-1	4.337E+0	4.165E+0	1.260E-2	0.113E-2
1.372E+1	1.348E+1	2.350E-1	0.034E-1	4.165E+0	4.000E+0	1.005E-2	0.110E-2
1.348E+1	1.324E+1	2.414E-1	0.035E-1	4.000E+0	3.699E+0	1.146E-2	0.085E-2
1.324E+1	1.301E+1	2.480E-1	0.036E-1	3.699E+0	3.419E+0	1.273E-2	0.093E-2
1.301E+1	1.278E+1	7.799E-2	0.204E-2	3.419E+0	3.162E+0	1.241E-2	0.093E-2
1.278E+1	1.255E+1	8.012E-2	0.208E-2	3.162E+0	2.924E+0	1.696E-2	0.107E-2
1.255E+1	1.218E+1	2.116E-2	0.085E-2	2.924E+0	2.704E+0	1.811E-2	0.115E-2
1.218E+1	1.183E+1	2.214E-2	0.088E-2	2.704E+0	2.500E+0	3.856E-2	0.159E-2
1.183E+1	1.148E+1	1.431E-2	0.073E-2	2.500E+0	2.270E+0	3.192E-2	0.138E-2
1.148E+1	1.114E+1	1.496E-2	0.076E-2	2.270E+0	2.061E+0	2.926E-2	0.143E-2
1.114E+1	1.082E+1	1.172E-2	0.068E-2	2.061E+0	1.871E+0	2.667E-2	0.139E-2
1.082E+1	1.050E+1	9.884E-3	0.643E-3	1.871E+0	1.698E+0	2.289E-2	0.136E-2
1.050E+1	1.009E+1	1.042E-2	0.058E-2	1.698E+0	1.542E+0	2.866E-2	0.161E-2
1.009E+1	9.693E+0	8.635E-3	0.544E-3	1.542E+0	1.400E+0	3.143E-2	0.171E-2
9.693E+0	9.314E+0	7.709E-3	0.530E-3	1.400E+0	1.275E+0	3.746E-2	0.196E-2
9.314E+0	8.949E+0	6.572E-3	0.506E-3	1.275E+0	1.162E+0	2.780E-2	0.187E-2
8.949E+0	8.598E+0	6.032E-3	0.500E-3	1.162E+0	1.058E+0	3.855E-2	0.227E-2
8.598E+0	8.261E+0	6.520E-3	0.530E-3	1.058E+0	9.640E-1	3.713E-2	0.247E-2
8.261E+0	7.938E+0	5.856E-3	0.520E-3	9.640E+0	8.780E-1	5.392E-2	0.287E-2
7.938E+0	7.627E+0	5.882E-3	0.534E-3	8.780E-1	8.000E-1	5.892E-2	0.310E-2
7.627E+0	7.327E+0	5.133E-3	0.519E-3	8.000E-1	7.130E-1	4.512E-2	0.273E-2
7.327E+0	7.041E+0	4.647E-3	0.515E-3	7.130E-1	6.350E-1	4.800E-2	0.310E-2
7.041E+0	6.765E+0	5.739E-3	0.572E-3	6.350E-1	5.660E-1	2.412E-2	0.287E-2
6.765E+0	6.500E+0	5.328E-3	0.586E-3	5.660E-1	5.040E-1	5.657E-2	0.414E-2
6.500E+0	6.242E+0	6.649E-3	0.679E-3				

\*1.640E+1 = 1.640 x 10<sup>1</sup>

Table 2.2 Leakage spectra from beryllium sphere (ir=57mm or=173.5mm).

Energy boundary (MeV)		n/Source_n	error	Energy boundary (MeV)		n/Source_n	error
upper	lower			upper	lower		
1.697E+1*	1.673E+1	8.303E-4	0.848E-4	3.412E+0	3.133E+0	3.876E-2	0.052E-2
1.673E+1	1.650E+1	8.529E-4	0.865E-4	3.133E+0	2.889E+0	3.656E-2	0.052E-2
1.650E+1	1.626E+1	6.670E-3	0.226E-3	2.889E+0	2.674E+0	3.431E-2	0.050E-2
1.626E+1	1.598E+1	6.851E-3	0.231E-3	2.674E+0	2.462E+0	6.302E-2	0.062E-2
1.598E+1	1.572E+1	4.766E-2	0.061E-2	2.462E+0	2.251E+0	7.858E-2	0.069E-2
1.572E+1	1.542E+1	4.896E-2	0.062E-2	2.251E+0	2.050E+0	1.048E-1	0.008E-1
1.542E+1	1.513E+1	1.788E-1	0.012E-1	2.250E+0	1.861E+0	1.308E-1	0.010E-1
1.513E+1	1.494E+1	1.837E-1	0.012E-1	1.861E+0	1.685E+0	1.500E-1	0.011E-1
1.494E+1	1.477E+1	1.888E-1	0.013E-1	1.685E+0	1.524E+0	1.609E-1	0.012E-1
1.477E+1	1.462E+1	1.411E-1	0.011E-1	1.524E+0	1.379E+0	1.713E-1	0.012E-1
1.462E+1	1.453E+1	1.450E-1	0.011E-1	1.379E+0	1.250E+0	1.771E-1	0.013E-1
1.453E+1	1.442E+1	7.962E-2	0.084E-2	1.250E+0	1.134E+0	1.865E-1	0.014E-1
1.442E+1	1.431E+1	8.180E-2	0.085E-2	1.134E+0	1.029E+0	1.891E-1	0.015E-1
1.431E+1	1.419E+1	5.044E-2	0.068E-2	1.029E+0	9.340E-1	1.860E-1	0.015E-1
1.419E+1	1.401E+1	5.183E-2	0.069E-2	9.340E-1	8.453E-1	2.067E-1	0.017E-1
1.401E+1	1.369E+1	3.375E-2	0.044E-2	8.453E-1	7.569E-1	1.951E-1	0.126E-1
1.369E+1	1.325E+1	2.700E-2	0.040E-2	7.569E-1	6.708E-1	2.631E-1	0.186E-1
1.325E+1	1.279E+1	2.824E-2	0.041E-2	6.708E-1	5.960E-1	2.437E-1	0.160E-1
1.279E+1	1.237E+1	2.671E-2	0.041E-2	5.960E-1	5.313E-1	2.269E-1	0.162E-1
1.237E+1	1.201E+1	2.614E-2	0.041E-2	5.313E-1	4.729E-1	3.007E-1	0.171E-1
1.201E+1	1.164E+1	2.596E-2	0.042E-2	4.729E-1	4.208E-1	3.580E-1	0.166E-1
1.164E+1	1.123E+1	2.524E-2	0.036E-2	4.208E-1	3.743E-1	4.144E-1	0.159E-1
1.123E+1	1.081E+1	2.573E-2	0.037E-2	3.743E-1	3.330E-1	4.084E-1	0.155E-1
1.081E+1	1.040E+1	2.484E-2	0.037E-2	3.330E-1	2.966E-1	4.329E-1	0.149E-1
1.040E+1	9.994E+0	2.329E-2	0.037E-2	2.966E-1	2.641E-1	5.902E-1	0.177E-1
9.994E+0	9.599E+0	2.220E-2	0.037E-2	2.641E-1	2.348E-1	6.286E-1	0.174E-1
9.599E+0	9.211E+0	2.193E-2	0.037E-2	2.348E-1	2.091E-1	7.337E-1	0.209E-1
9.211E+0	8.834E+0	2.260E-2	0.039E-2	2.091E-1	1.862E-1	5.466E-1	0.190E-1
8.834E+0	8.470E+0	2.157E-2	0.037E-2	1.862E-1	1.657E-1	5.086E-1	0.215E-1
8.470E+0	8.122E+0	2.397E-2	0.041E-2	1.657E-1	1.473E-1	6.056E-1	0.323E-1
8.122E+0	7.792E+0	2.795E-2	0.048E-2	1.473E-1	1.312E-1	6.329E-1	0.436E-1
7.792E+0	7.477E+0	3.041E-2	0.052E-2	1.312E-1	1.168E-1	5.833E-1	0.454E-1
7.477E+0	7.172E+0	3.070E-2	0.052E-2	1.168E-1	1.010E-1	8.019E-1	0.590E-1
7.172E+0	6.877E+0	3.054E-2	0.052E-2	1.010E-1	8.148E-2	7.191E-1	0.394E-1
6.877E+0	6.594E+0	3.303E-2	0.057E-2	8.148E-2	6.295E-2	9.050E-1	0.538E-1
6.594E+0	6.325E+0	3.399E-2	0.058E-2	6.295E-2	4.867E-2	9.548E-1	0.621E-1
6.325E+0	6.069E+0	3.279E-2	0.057E-2	4.867E-2	3.763E-2	1.346E+0	0.098E+0
6.069E+0	5.824E+0	3.479E-2	0.060E-2	3.763E-2	2.907E-2	1.618E+0	0.109E+0
5.824E+0	5.591E+0	3.263E-2	0.058E-2	2.907E-2	2.251E-2	1.765E+0	0.137E+0
5.591E+0	5.368E+0	3.471E-2	0.060E-2	2.251E-2	1.742E-2	2.402E+0	0.186E+0
5.368E+0	5.152E+0	3.278E-2	0.058E-2	1.742E-2	1.344E-2	2.666E+0	0.223E+0
5.152E+0	4.943E+0	3.717E-2	0.065E-2	1.344E-2	1.042E-2	3.122E+0	0.312E+0
4.943E+0	4.745E+0	3.535E-2	0.063E-2	1.042E-2	8.008E-3	4.098E+0	0.387E+0
4.745E+0	4.559E+0	3.575E-2	0.064E-2	8.008E-3	6.216E-3	4.564E+0	0.437E+0
4.559E+0	4.333E+0	3.515E-2	0.063E-2	6.216E-3	4.816E-3	6.601E+0	0.658E+0
4.333E+0	4.033E+0	3.856E-2	0.050E-2	4.816E-3	3.640E-3	6.413E+0	0.744E+0
4.033E+0	3.711E+0	3.898E-2	0.050E-2	3.640E-3	2.856E-3	6.441E+0	0.853E+0
3.711E+0	3.412E+0	4.072E-2	0.054E-2	2.856E-3	2.240E-3	7.014E+0	1.168E+0

\*1.697E+1 = 1.697 x 10<sup>1</sup>

Table 2.3 Leakage spectra from beryllium sphere (ir=69mm or=173.5mm).

Energy boundary (MeV)		n/Source_n	error	Energy boundary (MeV)		n/Source_n	error
upper	lower			upper	lower		
1.697E+1*	1.673E+1	2.660E-3	0.149E-3	3.421E+0	3.140E+0	4.300E-2	0.058E-2
1.673E+1	1.650E+1	2.733E-3	0.152E-3	3.140E+0	2.895E+0	4.465E-2	0.060E-2
1.650E+1	1.626E+1	1.370E-2	0.034E-2	2.895E+0	2.682E+0	3.922E-2	0.055E-2
1.626E+1	1.598E+1	1.407E-2	0.034E-2	2.682E+0	2.471E+0	6.258E-2	0.064E-2
1.598E+1	1.572E+1	6.936E-2	0.076E-2	2.471E+0	2.259E+0	8.743E-2	0.076E-2
1.572E+1	1.541E+1	7.125E-2	0.078E-2	2.259E+0	2.058E+0	1.066E-1	0.009E-1
1.541E+1	1.512E+1	7.321E-2	0.080E-2	2.058E+0	1.868E+0	1.367E-1	0.010E-1
1.512E+1	1.495E+1	2.264E-1	0.014E-1	1.868E+0	1.690E+0	1.538E-1	0.011E-1
1.495E+1	1.478E+1	2.326E-1	0.014E-1	1.690E+0	1.528E+0	1.715E-1	0.012E-1
1.478E+1	1.464E+1	1.608E-1	0.012E-1	1.528E+0	1.383E+0	1.749E-1	0.013E-1
1.464E+1	1.457E+1	1.652E-1	0.012E-1	1.383E+0	1.253E+0	1.849E-1	0.014E-1
1.457E+1	1.448E+1	8.689E-2	0.091E-2	1.253E+0	1.136E+0	1.955E-1	0.015E-1
1.448E+1	1.438E+1	8.927E-2	0.093E-2	1.136E+0	1.031E+0	1.955E-1	0.016E-1
1.438E+1	1.428E+1	5.375E-2	0.073E-2	1.031E+0	9.359E-1	1.956E-1	0.016E-1
1.428E+1	1.410E+1	5.523E-2	0.075E-2	9.359E-1	8.470E-1	2.152E-1	0.018E-1
1.410E+1	1.377E+1	3.595E-2	0.047E-2	8.470E-1	7.584E-1	1.854E-1	0.124E-1
1.377E+1	1.331E+1	3.760E-2	0.049E-2	7.584E-1	6.720E-1	3.143E-1	0.190E-1
1.331E+1	1.284E+1	3.099E-2	0.045E-2	6.720E-1	5.970E-1	2.413E-1	0.159E-1
1.284E+1	1.243E+1	2.968E-2	0.045E-2	5.970E-1	5.323E-1	2.182E-1	0.160E-1
1.243E+1	1.207E+1	2.773E-2	0.044E-2	5.323E-1	4.737E-1	2.578E-1	0.164E-1
1.207E+1	1.171E+1	2.810E-2	0.045E-2	4.737E-1	4.216E-1	3.563E-1	0.165E-1
1.171E+1	1.130E+1	2.800E-2	0.040E-2	4.216E-1	3.751E-1	3.987E-1	0.157E-1
1.130E+1	1.087E+1	2.666E-2	0.039E-2	3.751E-1	3.337E-1	4.163E-1	0.155E-1
1.087E+1	1.046E+1	2.650E-2	0.040E-2	3.337E-1	2.972E-1	4.535E-1	0.150E-1
1.046E+1	1.005E+1	2.544E-2	0.040E-2	2.972E-1	2.645E-1	5.851E-1	0.177E-1
1.005E+1	9.657E+0	2.415E-2	0.040E-2	2.645E-1	2.352E-1	6.352E-1	0.174E-1
9.657E+0	9.266E+0	2.413E-2	0.041E-2	2.352E-1	2.094E-1	7.421E-1	0.209E-1
9.266E+0	8.884E+0	2.418E-2	0.042E-2	2.094E-1	1.865E-1	5.250E-1	0.187E-1
8.884E+0	8.515E+0	2.258E-2	0.040E-2	1.865E-1	1.660E-1	4.966E-1	0.212E-1
8.515E+0	8.164E+0	2.503E-2	0.044E-2	1.660E-1	1.477E-1	6.135E-1	0.320E-1
8.164E+0	7.831E+0	2.970E-2	0.052E-2	1.477E-1	1.314E-1	7.496E-1	0.441E-1
7.831E+0	7.513E+0	3.277E-2	0.056E-2	1.314E-1	1.170E-1	6.538E-1	0.454E-1
7.513E+0	7.206E+0	3.325E-2	0.057E-2	1.170E-1	1.011E-1	6.711E-1	0.571E-1
7.206E+0	6.909E+0	3.258E-2	0.056E-2	1.011E-1	8.160E-2	6.953E-1	0.387E-1
6.909E+0	6.623E+0	3.629E-2	0.062E-2	8.160E-2	6.306E-2	8.353E-1	0.526E-1
6.623E+0	6.352E+0	3.614E-2	0.062E-2	6.306E-2	4.878E-2	8.366E-1	0.605E-1
6.352E+0	6.095E+0	3.513E-2	0.061E-2	4.878E-2	3.775E-2	1.165E+0	0.095E+0
6.095E+0	5.849E+0	3.614E-2	0.064E-2	3.775E-2	2.918E-2	1.429E+0	0.107E+0
5.849E+0	5.615E+0	3.480E-2	0.062E-2	2.918E-2	2.257E-2	1.541E+0	0.134E+0
5.615E+0	5.391E+0	3.522E-2	0.063E-2	2.257E-2	1.747E-2	2.035E+0	0.181E+0
5.391E+0	5.174E+0	3.553E-2	0.063E-2	1.747E-2	1.350E-2	2.122E+0	0.217E+0
5.174E+0	4.963E+0	4.042E-2	0.071E-2	1.350E-2	1.042E-2	2.888E+0	0.306E+0
4.963E+0	4.765E+0	3.875E-2	0.069E-2	1.042E-2	8.008E-3	2.643E+0	0.374E+0
4.765E+0	4.577E+0	4.011E-2	0.071E-2	8.008E-3	6.216E-3	3.571E+0	0.426E+0
4.577E+0	4.350E+0	3.834E-2	0.069E-2	6.216E-3	4.816E-3	5.050E+0	0.641E+0
4.350E+0	4.047E+0	4.244E-2	0.054E-2	4.816E-3	3.696E-3	6.219E+0	0.729E+0
4.047E+0	3.723E+0	4.130E-2	0.054E-2	3.696E-3	2.912E-3	5.217E+0	0.833E+0
3.723E+0	3.421E+0	4.311E-2	0.057E-2	2.912E-3	2.240E-3	7.640E+0	1.146E+0

\*1.697E+1 = 1.697 x 10<sup>1</sup>

Table 2.4 Leakage spectra from beryllium sphere (ir=97mm or=173.5mm).

Energy boundary (MeV)		n/Source_n	error	Energy boundary (MeV)		n/Source_n	error
upper	lower			upper	lower		
1.679E+1*	1.650E+1	7.166E-3	0.318E-3	2.998E+0	2.789E+0	4.227E-2	0.074E-2
1.650E+1	1.623E+1	7.364E-3	0.325E-3	2.789E+0	2.580E+0	6.919E-2	0.087E-2
1.623E+1	1.591E+1	7.564E-3	0.332E-3	2.580E+0	2.363E+0	8.897E-2	0.099E-2
1.591E+1	1.560E+1	6.539E-2	0.097E-2	2.363E+0	2.153E+0	1.146E-1	0.012E-1
1.560E+1	1.546E+1	6.717E-2	0.099E-2	2.153E+0	1.953E+0	1.398E-1	0.013E-1
1.546E+1	1.532E+1	3.618E-1	0.023E-1	1.953E+0	1.766E+0	1.557E-1	0.015E-1
1.532E+1	1.522E+1	3.716E-1	0.024E-1	1.766E+0	1.594E+0	1.723E-1	0.016E-1
1.522E+1	1.524E+1	2.633E-1	0.020E-1	1.594E+0	1.440E+0	1.834E-1	0.017E-1
1.524E+1	1.522E+1	2.704E-1	0.021E-1	1.440E+0	1.302E+0	1.857E-1	0.019E-1
1.522E+1	1.516E+1	1.156E-1	0.014E-1	1.302E+0	1.177E+0	2.107E-1	0.020E-1
1.516E+1	1.508E+1	1.188E-1	0.014E-1	1.177E+0	1.067E+0	2.089E-1	0.021E-1
1.508E+1	1.489E+1	6.739E-2	0.106E-2	1.067E+0	9.671E-1	2.014E-1	0.021E-1
1.489E+1	1.451E+1	6.985E-2	0.085E-2	9.671E-1	8.752E-1	2.176E-1	0.023E-1
1.451E+1	1.400E+1	4.339E-2	0.068E-2	8.752E-1	7.837E-1	2.064E-1	0.096E-1
1.400E+1	1.350E+1	3.445E-2	0.061E-2	7.837E-1	6.918E-1	2.969E-1	0.143E-1
1.350E+1	1.307E+1	3.264E-2	0.061E-2	6.918E-1	6.140E-1	2.621E-1	0.122E-1
1.307E+1	1.270E+1	3.413E-2	0.063E-2	6.140E-1	5.489E-1	2.420E-1	0.123E-1
1.270E+1	1.232E+1	3.127E-2	0.061E-2	5.489E-1	4.890E-1	3.169E-1	0.130E-1
1.232E+1	1.188E+1	3.317E-2	0.055E-2	4.890E-1	4.352E-1	3.366E-1	0.125E-1
1.188E+1	1.142E+1	3.307E-2	0.056E-2	4.352E-1	3.871E-1	4.009E-1	0.121E-1
1.142E+1	1.098E+1	2.857E-2	0.054E-2	3.871E-1	3.445E-1	4.122E-1	0.120E-1
1.098E+1	1.055E+1	2.755E-2	0.054E-2	3.445E-1	3.069E-1	4.421E-1	0.116E-1
1.055E+1	1.012E+1	2.704E-2	0.054E-2	3.069E-1	2.732E-1	5.891E-1	0.138E-1
1.012E+1	9.702E+0	2.604E-2	0.054E-2	2.732E-1	2.429E-1	6.204E-1	0.135E-1
9.702E+0	9.293E+0	2.549E-2	0.055E-2	2.429E-1	2.162E-1	7.634E-1	0.165E-1
9.293E+0	8.899E+0	2.408E-2	0.053E-2	2.162E-1	1.926E-1	5.767E-1	0.148E-1
8.899E+0	8.527E+0	2.783E-2	0.059E-2	1.926E-1	1.714E-1	4.916E-1	0.161E-1
8.527E+0	8.178E+0	3.234E-2	0.069E-2	1.714E-1	1.524E-1	5.992E-1	0.240E-1
8.178E+0	7.845E+0	3.510E-2	0.075E-2	1.524E-1	1.356E-1	6.394E-1	0.320E-1
7.845E+0	7.524E+0	3.527E-2	0.075E-2	1.356E-1	1.208E-1	6.299E-1	0.334E-1
7.524E+0	7.211E+0	3.579E-2	0.076E-2	1.208E-1	1.044E-1	7.802E-1	0.428E-1
7.211E+0	6.911E+0	3.980E-2	0.084E-2	1.044E-1	8.428E-2	6.546E-1	0.282E-1
6.911E+0	6.629E+0	3.870E-2	0.083E-2	8.428E-2	6.513E-2	8.106E-1	0.382E-1
6.629E+0	6.360E+0	3.868E-2	0.083E-2	6.513E-2	5.035E-2	9.037E-1	0.442E-1
6.360E+0	6.103E+0	3.978E-2	0.086E-2	5.035E-2	3.892E-2	1.283E+0	0.069E+0
6.103E+0	5.859E+0	3.779E-2	0.083E-2	3.892E-2	3.007E-2	1.249E+0	0.076E+0
5.859E+0	5.624E+0	3.726E-2	0.084E-2	3.007E-2	2.324E-2	1.559E+0	0.096E+0
5.624E+0	5.396E+0	3.617E-2	0.082E-2	2.324E-2	1.798E-2	1.980E+0	0.130E+0
5.396E+0	5.176E+0	4.111E-2	0.092E-2	1.798E-2	1.394E-2	2.104E+0	0.155E+0
5.176E+0	4.970E+0	4.220E-2	0.093E-2	1.394E-2	1.081E-2	2.951E+0	0.219E+0
4.970E+0	4.776E+0	4.186E-2	0.093E-2	1.081E-2	8.288E-3	2.954E+0	0.268E+0
4.776E+0	4.538E+0	3.901E-2	0.090E-2	8.288E-3	6.384E-3	3.173E+0	0.302E+0
4.538E+0	4.218E+0	4.571E-2	0.073E-2	6.384E-3	4.984E-3	4.604E+0	0.455E+0
4.218E+0	3.876E+0	4.459E-2	0.072E-2	4.984E-3	3.864E-3	4.537E+0	0.514E+0
3.876E+0	3.555E+0	4.695E-2	0.077E-2	3.864E-3	2.968E-3	4.650E+0	0.590E+0
3.555E+0	3.253E+0	4.741E-2	0.078E-2	2.968E-3	2.296E-3	5.667E+0	0.809E+0
3.253E+0	2.998E+0	4.527E-2	0.078E-2				

\*1.697E+1 = 1.697 x 10<sup>1</sup>

Table 2.5 Leakage spectra from beryllium sphere (ir=128mm or=173.5mm).

Energy boundary (MeV)		n/Source_n	error	Energy boundary (MeV)		n/Source_n	error
upper	lower			upper	lower		
1.640E+1*	1.611E+1	8.339E-5	8.658E-5	3.162E+0	2.924E+0	3.059E-2	0.077E-2
1.611E+1	1.583E+1	8.566E-5	8.837E-5	2.924E+0	2.704E+0	3.536E-2	0.085E-2
1.583E+1	1.555E+1	2.123E-3	0.219E-3	2.704E+0	2.500E+0	3.541E-2	0.083E-2
1.555E+1	1.527E+1	2.180E-3	0.224E-3	2.500E+0	2.270E+0	5.277E-2	0.093E-2
1.527E+1	1.500E+1	8.493E-2	0.131E-2	2.270E+0	2.061E+0	5.883E-2	0.099E-2
1.500E+1	1.474E+1	8.724E-2	0.134E-2	2.061E+0	1.871E+0	7.327E-2	0.114E-2
1.474E+1	1.447E+1	4.672E-1	0.031E-1	1.871E+0	1.698E+0	9.162E-2	0.133E-2
1.447E+1	1.422E+1	4.799E-1	0.032E-1	1.698E+0	1.542E+0	1.014E-1	0.015E-1
1.422E+1	1.397E+1	4.931E-1	0.033E-1	1.542E+0	1.400E+0	1.103E-1	0.016E-1
1.397E+1	1.372E+1	2.338E-1	0.023E-1	1.400E+0	1.275E+0	1.105E-1	0.016E-1
1.372E+1	1.348E+1	2.402E-1	0.023E-1	1.275E+0	1.162E+0	1.196E-1	0.018E-1
1.348E+1	1.324E+1	8.465E-2	0.140E-2	1.162E+0	1.058E+0	1.407E-1	0.020E-1
1.324E+1	1.301E+1	8.696E-2	0.143E-2	1.058E+0	9.640E-1	1.387E-1	0.021E-1
1.301E+1	1.278E+1	4.600E-2	0.105E-2	9.640E-1	8.780E-1	1.435E-1	0.022E-1
1.278E+1	1.255E+1	4.726E-2	0.107E-2	8.780E-1	8.000E-1	1.473E-1	0.024E-1
1.255E+1	1.218E+1	2.897E-2	0.066E-2	8.000E-1	7.130E-1	1.371E-1	0.122E-1
1.218E+1	1.183E+1	2.408E-2	0.061E-2	7.130E-1	6.350E-1	2.181E-1	0.186E-1
1.183E+1	1.148E+1	2.518E-2	0.064E-2	6.350E-1	5.660E-1	1.468E-1	0.152E-1
1.148E+1	1.114E+1	2.519E-2	0.065E-2	5.660E-1	5.040E-1	1.738E-1	0.160E-1
1.114E+1	1.082E+1	2.127E-2	0.060E-2	5.040E-1	4.490E-1	2.062E-1	0.165E-1
1.082E+1	1.050E+1	2.174E-2	0.062E-2	4.490E-1	4.000E-1	2.855E-1	0.165E-1
1.050E+1	1.009E+1	2.128E-2	0.054E-2	4.000E-1	3.560E-1	2.781E-1	0.151E-1
1.009E+1	9.693E+0	1.935E-2	0.053E-2	3.560E-1	3.170E-1	2.773E-1	0.149E-1
9.693E+0	9.314E+0	1.951E-2	0.054E-2	3.170E-1	2.830E-1	2.789E-1	0.140E-1
9.314E+0	8.949E+0	1.721E-2	0.052E-2	2.830E-1	2.520E-1	3.689E-1	0.166E-1
8.949E+0	8.598E+0	1.714E-2	0.053E-2	2.520E-1	2.240E-1	3.912E-1	0.162E-1
8.598E+0	8.261E+0	1.767E-2	0.055E-2	2.240E-1	2.000E-1	4.135E-1	0.190E-1
8.261E+0	7.938E+0	1.878E-2	0.058E-2	2.000E-1	1.780E-1	3.049E-1	0.175E-1
7.938E+0	7.627E+0	1.667E-2	0.054E-2	1.780E-1	1.590E-1	2.744E-1	0.200E-1
7.627E+0	7.327E+0	1.762E-2	0.058E-2	1.590E-1	1.410E-1	3.406E-1	0.306E-1
7.327E+0	7.041E+0	2.192E-2	0.070E-2	1.410E-1	1.260E-1	4.078E-1	0.423E-1
7.041E+0	6.765E+0	2.285E-2	0.074E-2	1.260E-1	1.120E-1	3.741E-1	0.442E-1
6.765E+0	6.500E+0	2.574E-2	0.079E-2	1.120E-1	1.000E-1	3.669E-1	0.558E-1
6.500E+0	6.242E+0	2.298E-2	0.074E-2	1.000E-1	7.740E-2	4.409E-1	0.383E-1
6.242E+0	5.995E+0	2.492E-2	0.082E-2	7.740E-2	5.990E-2	5.958E-1	0.527E-1
5.995E+0	5.757E+0	2.425E-2	0.080E-2	5.990E-2	4.640E-2	5.087E-1	0.602E-1
5.757E+0	5.529E+0	2.283E-2	0.078E-2	4.640E-2	3.590E-2	7.350E-1	0.954E-1
5.529E+0	5.310E+0	2.467E-2	0.083E-2	3.590E-2	2.780E-2	7.778E-1	1.061E-1
5.310E+0	5.099E+0	2.544E-2	0.084E-2	2.780E-2	2.150E-2	9.932E-1	1.346E-1
5.099E+0	4.897E+0	2.353E-2	0.082E-2	2.150E-2	1.670E-2	1.154E+0	0.181E+0
4.897E+0	4.703E+0	2.508E-2	0.084E-2	1.670E-2	1.290E-2	9.104E-1	2.167E-1
4.703E+0	4.516E+0	2.714E-2	0.092E-2	1.290E-2	1.000E-2	1.288E+0	0.306E+0
4.516E+0	4.337E+0	2.452E-2	0.087E-2	1.000E-2	7.740E-3	1.199E+0	0.377E+0
4.337E+0	4.165E+0	2.669E-2	0.092E-2	7.740E-3	5.990E-3	1.532E+0	0.427E+0
4.165E+0	4.000E+0	2.663E-2	0.091E-2	5.990E-3	4.640E-3	1.312E+0	0.641E+0
4.000E+0	3.699E+0	2.841E-2	0.071E-2	4.640E-3	3.590E-3	1.681E+0	0.729E+0
3.699E+0	3.419E+0	2.863E-2	0.072E-2	3.590E-3	2.780E-3	2.352E+0	0.841E+0
3.419E+0	3.162E+0	3.280E-2	0.080E-2	2.856E-3	2.240E-3	7.014E+0	1.168E+0

\*1.697E+1 = 1.697 x 10<sup>1</sup>

Table 2.6 Leakage spectra from beryllium-lithium sphere ( Be 116.5 mm, Li 400.0 mm).

Energy boundary (MeV)		n/Source_n	error	Energy boundary (MeV)		n/Source_n	error
upper	lower			upper	lower		
1.640E+1*	1.612E+1	1.221E-2	0.048E-2	3.505E+0	3.238E+0	1.987E-2	0.071E-2
1.612E+1	1.584E+1	1.255E-2	0.049E-2	3.238E+0	2.992E+0	2.644E-2	0.083E-2
1.584E+1	1.557E+1	1.289E-2	0.050E-2	2.992E+0	2.765E+0	2.874E-2	0.089E-2
1.557E+1	1.531E+1	1.883E-2	0.061E-2	2.765E+0	2.546E+0	3.138E-2	0.095E-2
1.531E+1	1.508E+1	1.935E-2	0.062E-2	2.546E+0	2.324E+0	4.105E-2	0.100E-2
1.508E+1	1.485E+1	1.988E-2	0.064E-2	2.324E+0	2.111E+0	4.811E-2	0.114E-2
1.485E+1	1.462E+1	2.007E-2	0.065E-2	2.111E+0	1.918E+0	5.476E-2	0.121E-2
1.462E+1	1.441E+1	2.062E-2	0.066E-2	1.918E+0	1.741E+0	6.764E-2	0.136E-2
1.441E+1	1.420E+1	2.118E-2	0.068E-2	1.741E+0	1.580E+0	9.121E-2	0.168E-2
1.420E+1	1.399E+1	1.925E-2	0.065E-2	1.580E+0	1.435E+0	9.137E-2	0.171E-2
1.399E+1	1.378E+1	1.977E-2	0.067E-2	1.435E+0	1.305E+0	1.026E-1	0.019E-1
1.378E+1	1.357E+1	1.513E-2	0.059E-2	1.305E+0	1.188E+0	1.024E-1	0.020E-1
1.357E+1	1.336E+1	1.554E-2	0.060E-2	1.188E+0	1.082E+0	1.267E-1	0.023E-1
1.336E+1	1.316E+1	1.596E-2	0.062E-2	1.082E+0	9.849E-1	1.451E-1	0.027E-1
1.316E+1	1.292E+1	1.337E-2	0.057E-2	9.849E-1	8.969E-1	1.603E-1	0.029E-1
1.292E+1	1.261E+1	1.385E-2	0.046E-2	8.969E-1	8.130E-1	1.946E-1	0.032E-1
1.261E+1	1.226E+1	1.183E-2	0.043E-2	8.130E-1	7.288E-1	2.135E-1	0.234E-1
1.226E+1	1.191E+1	1.237E-2	0.045E-2	7.288E-1	6.488E-1	3.246E-1	0.353E-1
1.191E+1	1.156E+1	9.926E-3	0.409E-3	6.488E-1	5.777E-1	3.305E-1	0.308E-1
1.156E+1	1.122E+1	9.657E-3	0.411E-3	5.777E-1	5.145E-1	4.520E-1	0.334E-1
1.122E+1	1.086E+1	1.010E-2	0.043E-2	5.145E-1	4.581E-1	5.009E-1	0.340E-1
1.086E+1	1.045E+1	1.034E-2	0.038E-2	4.581E-1	4.078E-1	4.895E-1	0.317E-1
1.045E+1	1.004E+1	9.881E-3	0.379E-3	4.078E-1	3.627E-1	4.648E-1	0.290E-1
1.004E+1	9.642E+0	1.026E-2	0.040E-2	3.627E-1	3.226E-1	3.744E-1	0.274E-1
9.642E+0	9.261E+0	9.597E-3	0.391E-3	3.226E-1	2.871E-1	2.632E-1	0.244E-1
9.261E+0	8.896E+0	1.027E-2	0.041E-2	2.871E-1	2.555E-1	1.956E-1	0.267E-1
8.896E+0	8.545E+0	9.880E-3	0.415E-3	2.555E-1	2.275E-1	1.482E-1	0.251E-1
8.545E+0	8.208E+0	1.008E-2	0.043E-2	2.275E-1	2.030E-1	3.544E-1	0.327E-1
8.208E+0	7.884E+0	9.830E-3	0.433E-3	2.030E-1	1.811E-1	6.096E-1	0.348E-1
7.884E+0	7.571E+0	1.109E-2	0.047E-2	1.811E-1	1.613E-1	9.039E-1	0.434E-1
7.571E+0	7.271E+0	1.074E-2	0.047E-2	1.613E-1	1.436E-1	1.357E+0	0.068E+0
7.271E+0	6.983E+0	1.012E-2	0.047E-2	1.436E-1	1.279E-1	1.493E+0	0.091E+0
6.983E+0	6.705E+0	1.206E-2	0.053E-2	1.279E-1	1.139E-1	1.545E+0	0.096E+0
6.705E+0	6.436E+0	1.229E-2	0.057E-2	1.139E-1	9.857E-2	1.614E+0	0.120E+0
6.436E+0	6.177E+0	1.196E-2	0.056E-2	9.857E-2	7.964E-2	1.361E+0	0.079E+0
6.177E+0	5.929E+0	1.212E-2	0.060E-2	7.964E-2	6.160E-2	1.451E+0	0.107E+0
5.929E+0	5.691E+0	1.173E-2	0.060E-2	6.160E-2	4.771E-2	1.524E+0	0.123E+0
5.691E+0	5.462E+0	1.557E-2	0.071E-2	4.771E-2	3.696E-2	2.186E+0	0.194E+0
5.462E+0	5.241E+0	1.209E-2	0.061E-2	3.696E-2	2.862E-2	1.970E+0	0.214E+0
5.241E+0	5.030E+0	1.311E-2	0.067E-2	2.862E-2	2.218E-2	2.077E+0	0.269E+0
5.030E+0	4.828E+0	1.327E-2	0.068E-2	2.218E-2	1.714E-2	2.405E+0	0.362E+0
4.828E+0	4.633E+0	1.233E-2	0.068E-2	1.714E-2	1.327E-2	2.529E+0	0.435E+0
4.633E+0	4.447E+0	1.224E-2	0.068E-2	1.327E-2	1.030E-2	3.698E+0	0.615E+0
4.447E+0	4.270E+0	1.319E-2	0.074E-2	1.030E-2	7.952E-3	2.963E+0	0.753E+0
4.270E+0	4.063E+0	1.380E-2	0.080E-2	7.952E-3	6.160E-3	2.978E+0	0.852E+0
4.063E+0	3.793E+0	1.414E-2	0.060E-2	6.160E-3	4.760E-3	3.536E+0	1.282E+0
3.793E+0	3.505E+0	1.864E-2	0.069E-2	4.760E-3	3.640E-3	1.972E+0	1.450E+0

\*1.640E+1 = 1.640 x 10<sup>1</sup>

Table 2.7 Leakage spectra from beryllium-lithium sphere ( Be 45.5 mm, Li 400.0 mm).

Energy boundary (MeV)		n/Source_n	error	Energy boundary (MeV)		n/Source_n	error
upper	lower			upper	lower		
1.640E+1*	1.612E+1	7.695E-4	1.366E-4	3.503E+0	3.238E+0	3.016E-2	0.081E-2
1.612E+1	1.584E+1	7.905E-4	1.394E-4	3.238E+0	2.992E+0	3.200E-2	0.085E-2
1.584E+1	1.558E+1	2.575E-2	0.067E-2	2.992E+0	2.766E+0	4.183E-2	0.099E-2
1.558E+1	1.534E+1	2.645E-2	0.068E-2	2.766E+0	2.547E+0	4.249E-2	0.102E-2
1.534E+1	1.512E+1	2.718E-2	0.070E-2	2.547E+0	2.325E+0	5.418E-2	0.107E-2
1.512E+1	1.491E+1	4.378E-2	0.089E-2	2.325E+0	2.112E+0	6.437E-2	0.123E-2
1.491E+1	1.469E+1	4.498E-2	0.091E-2	2.112E+0	1.919E+0	7.448E-2	0.131E-2
1.469E+1	1.448E+1	4.620E-2	0.093E-2	1.919E+0	1.742E+0	8.742E-2	0.144E-2
1.448E+1	1.427E+1	4.805E-2	0.096E-2	1.742E+0	1.581E+0	1.100E-1	0.017E-1
1.427E+1	1.406E+1	4.935E-2	0.098E-2	1.581E+0	1.436E+0	1.182E-1	0.018E-1
1.406E+1	1.385E+1	5.071E-2	0.100E-2	1.436E+0	1.306E+0	1.276E-1	0.020E-1
1.385E+1	1.365E+1	4.189E-2	0.092E-2	1.306E+0	1.190E+0	1.407E-1	0.022E-1
1.365E+1	1.344E+1	4.304E-2	0.094E-2	1.190E+0	1.083E+0	1.655E-1	0.025E-1
1.344E+1	1.323E+1	4.421E-2	0.096E-2	1.083E+0	9.869E-1	1.825E-1	0.028E-1
1.323E+1	1.299E+1	3.318E-2	0.084E-2	9.869E-1	8.994E-1	2.005E-1	0.030E-1
1.299E+1	1.267E+1	3.439E-2	0.067E-2	8.994E-1	8.160E-1	2.135E-1	0.032E-1
1.267E+1	1.232E+1	2.574E-2	0.059E-2	8.160E-1	7.323E-1	2.522E-1	0.032E-1
1.232E+1	1.196E+1	2.692E-2	0.062E-2	7.323E-1	6.522E-1	3.608E-1	0.041E-1
1.196E+1	1.159E+1	2.116E-2	0.056E-2	6.522E-1	5.810E-1	4.111E-1	0.046E-1
1.159E+1	1.124E+1	1.793E-2	0.052E-2	5.810E-1	5.180E-1	5.400E-1	0.058E-1
1.124E+1	1.086E+1	1.876E-2	0.054E-2	5.180E-1	4.614E-1	4.633E-1	0.337E-1
1.086E+1	1.044E+1	1.633E-2	0.044E-2	4.614E-1	4.106E-1	5.158E-1	0.322E-1
1.044E+1	1.002E+1	1.641E-2	0.045E-2	4.106E-1	3.649E-1	4.596E-1	0.291E-1
1.002E+1	9.627E+0	1.608E-2	0.046E-2	3.649E-1	3.241E-1	4.104E-1	0.279E-1
9.627E+0	9.247E+0	1.708E-2	0.048E-2	3.241E-1	2.881E-1	2.793E-1	0.247E-1
9.247E+0	8.883E+0	1.656E-2	0.049E-2	2.881E-1	2.563E-1	1.899E-1	0.267E-1
8.883E+0	8.534E+0	1.801E-2	0.052E-2	2.563E-1	2.284E-1	1.829E-1	0.256E-1
8.534E+0	8.198E+0	1.780E-2	0.053E-2	2.284E-1	2.040E-1	4.912E-1	0.344E-1
8.198E+0	7.875E+0	1.953E-2	0.056E-2	2.040E-1	1.823E-1	6.713E-1	0.357E-1
7.875E+0	7.564E+0	1.801E-2	0.055E-2	1.823E-1	1.627E-1	8.482E-1	0.431E-1
7.564E+0	7.264E+0	1.873E-2	0.058E-2	1.627E-1	1.449E-1	1.171E+0	0.066E+0
7.264E+0	6.976E+0	1.737E-2	0.057E-2	1.449E-1	1.292E-1	1.453E+0	0.091E+0
6.976E+0	6.698E+0	1.916E-2	0.062E-2	1.292E-1	1.152E-1	1.390E+0	0.095E+0
6.698E+0	6.430E+0	2.033E-2	0.067E-2	1.152E-1	9.974E-2	1.567E+0	0.120E+0
6.430E+0	6.171E+0	1.974E-2	0.067E-2	9.974E-2	8.070E-2	1.294E+0	0.079E+0
6.171E+0	5.923E+0	1.981E-2	0.071E-2	8.070E-2	6.256E-2	1.530E+0	0.107E+0
5.923E+0	5.686E+0	2.079E-2	0.073E-2	6.256E-2	4.855E-2	1.472E+0	0.123E+0
5.686E+0	5.457E+0	2.199E-2	0.078E-2	4.855E-2	3.769E-2	2.106E+0	0.194E+0
5.457E+0	5.236E+0	2.046E-2	0.073E-2	3.769E-2	2.918E-2	1.763E+0	0.213E+0
5.236E+0	5.025E+0	2.126E-2	0.078E-2	2.918E-2	2.257E-2	2.226E+0	0.270E+0
5.025E+0	4.823E+0	2.022E-2	0.077E-2	2.257E-2	1.753E-2	2.405E+0	0.362E+0
4.823E+0	4.628E+0	1.970E-2	0.078E-2	1.753E-2	1.361E-2	2.578E+0	0.436E+0
4.628E+0	4.442E+0	1.866E-2	0.077E-2	1.361E-2	1.053E-2	3.615E+0	0.615E+0
4.442E+0	4.265E+0	2.351E-2	0.090E-2	1.053E-2	8.120E-3	3.684E+0	0.757E+0
4.265E+0	4.059E+0	2.152E-2	0.091E-2	8.120E-3	6.272E-3	1.530E+0	0.847E+0
4.059E+0	3.790E+0	2.222E-2	0.068E-2	6.272E-3	4.872E-3	5.260E+0	1.289E+0
3.790E+0	3.503E+0	2.514E-2	0.074E-2	4.872E-3	3.752E-3	2.155E+0	1.451E+0

\*1.640E+1 = 1.640 x 10<sup>1</sup>



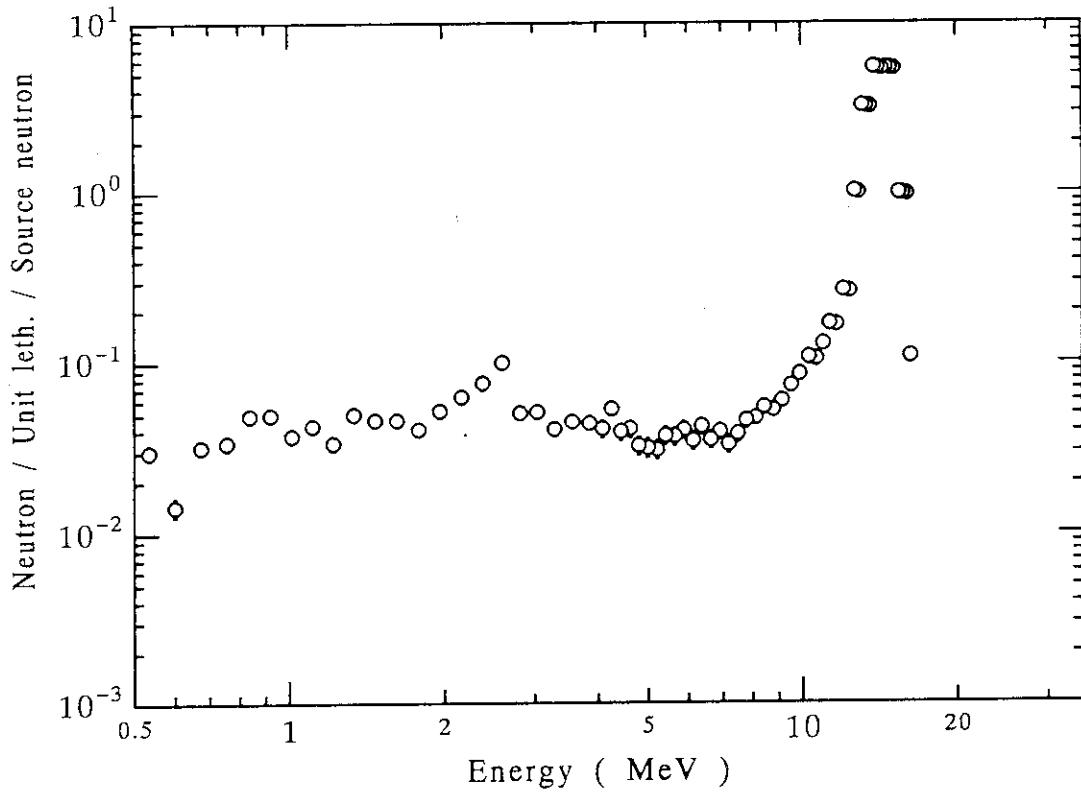


Fig. 2.1 D-T source neutron spectrum.

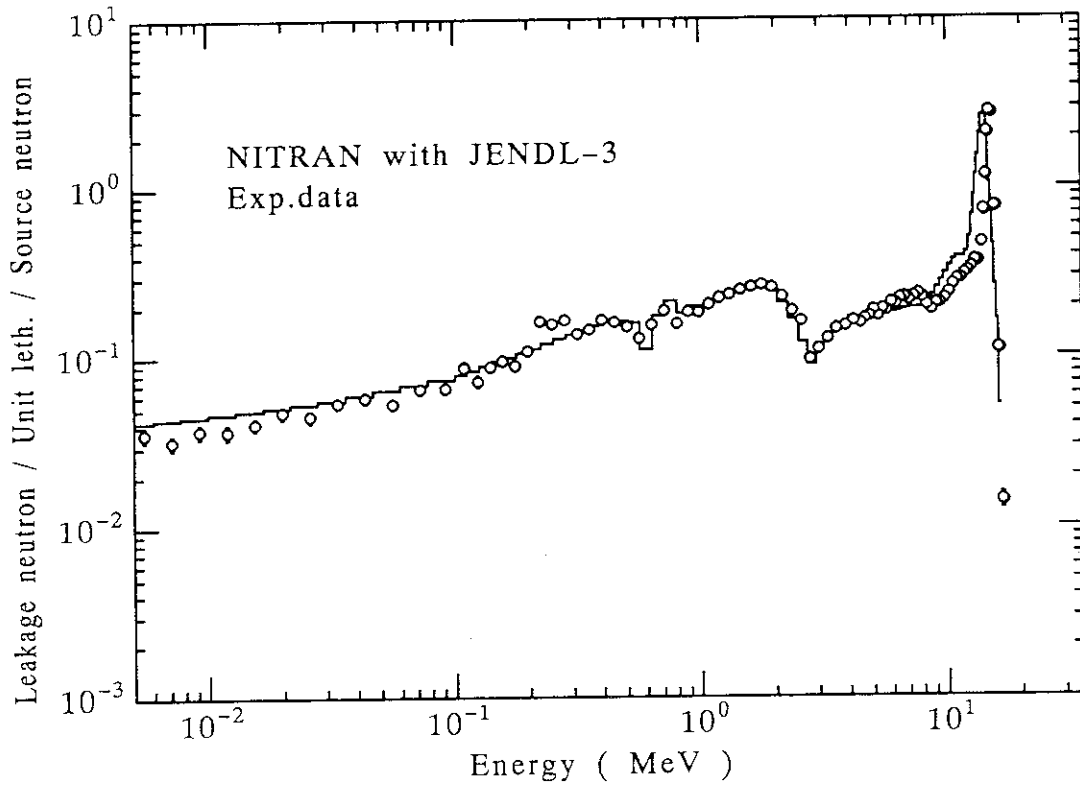


Fig. 2.2 Leakage spectra from Be (116.5 mm) sphere.

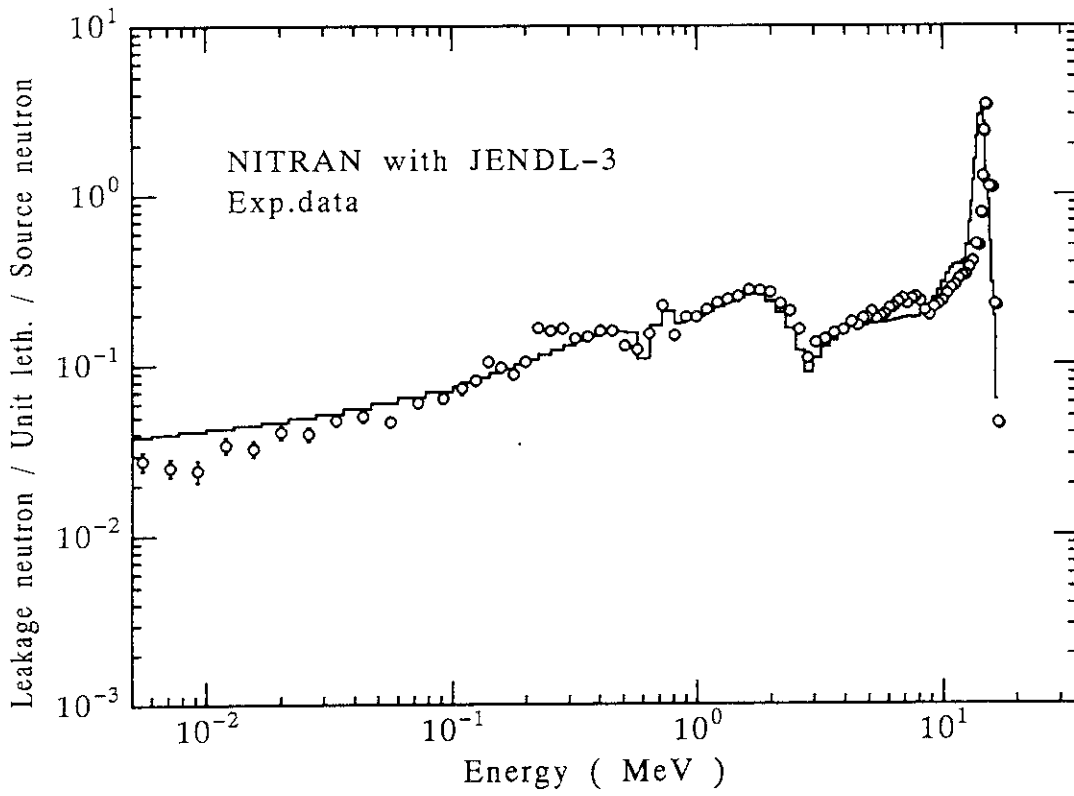


Fig. 2.3 Leakage spectra from Be (104.5 mm) sphere.

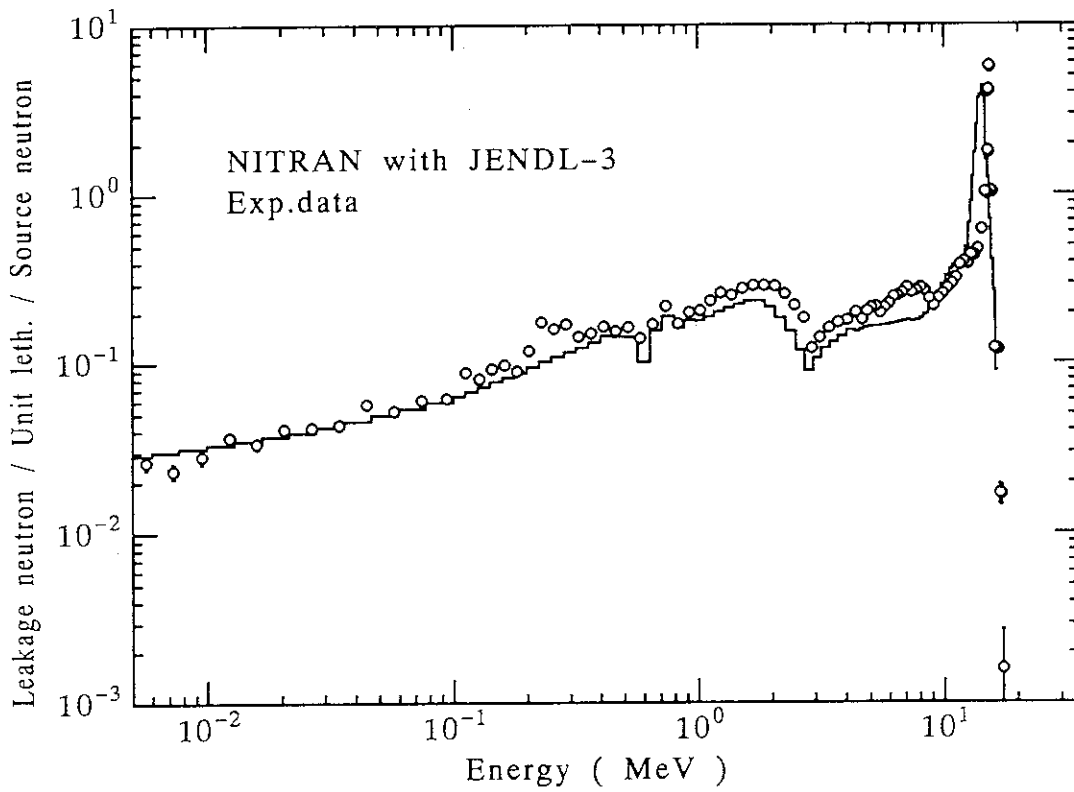


Fig. 2.4 Leakage spectra from Be (76.5 mm) sphere.

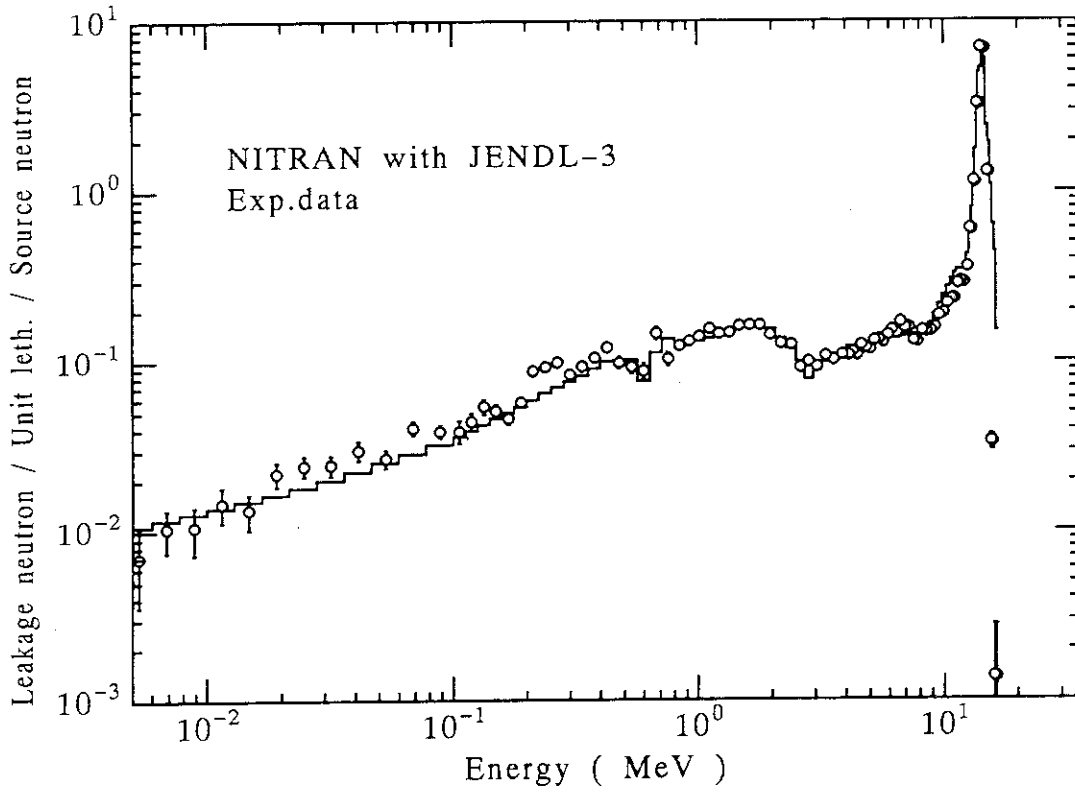


Fig. 2.5 Leakage spectra from Be (45.5 mm) sphere.

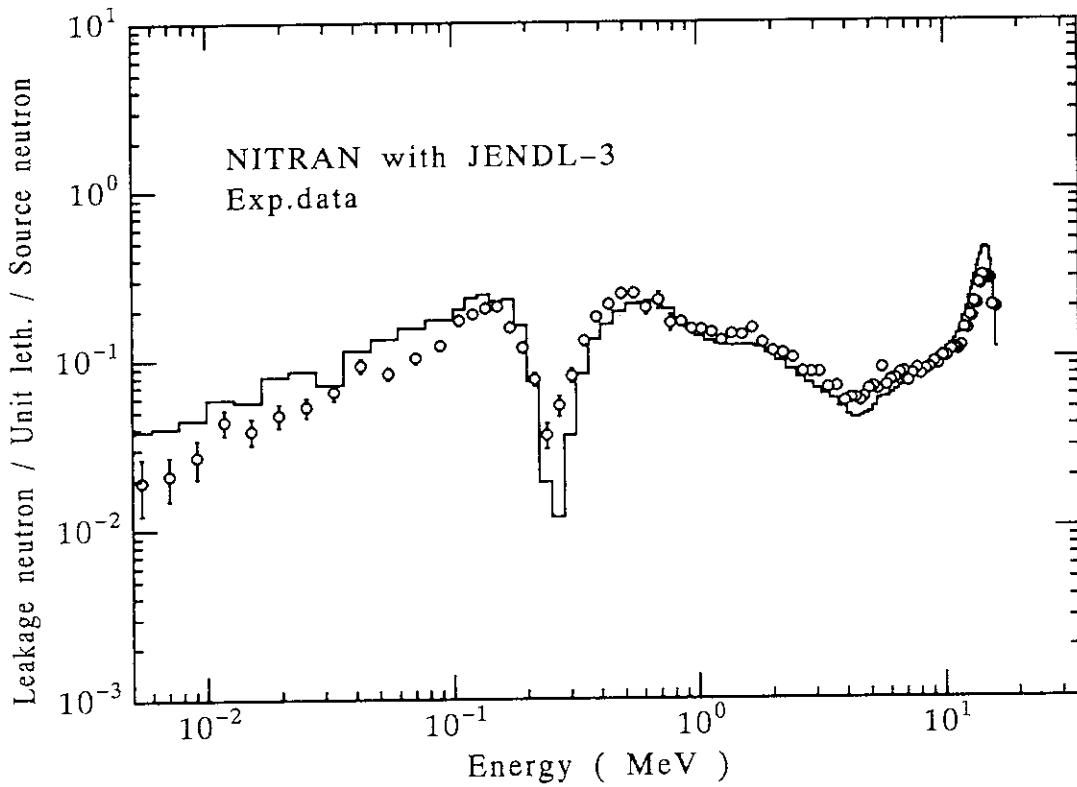


Fig. 2.6 Leakage spectra from Be (116.5 mm)-Li sphere.

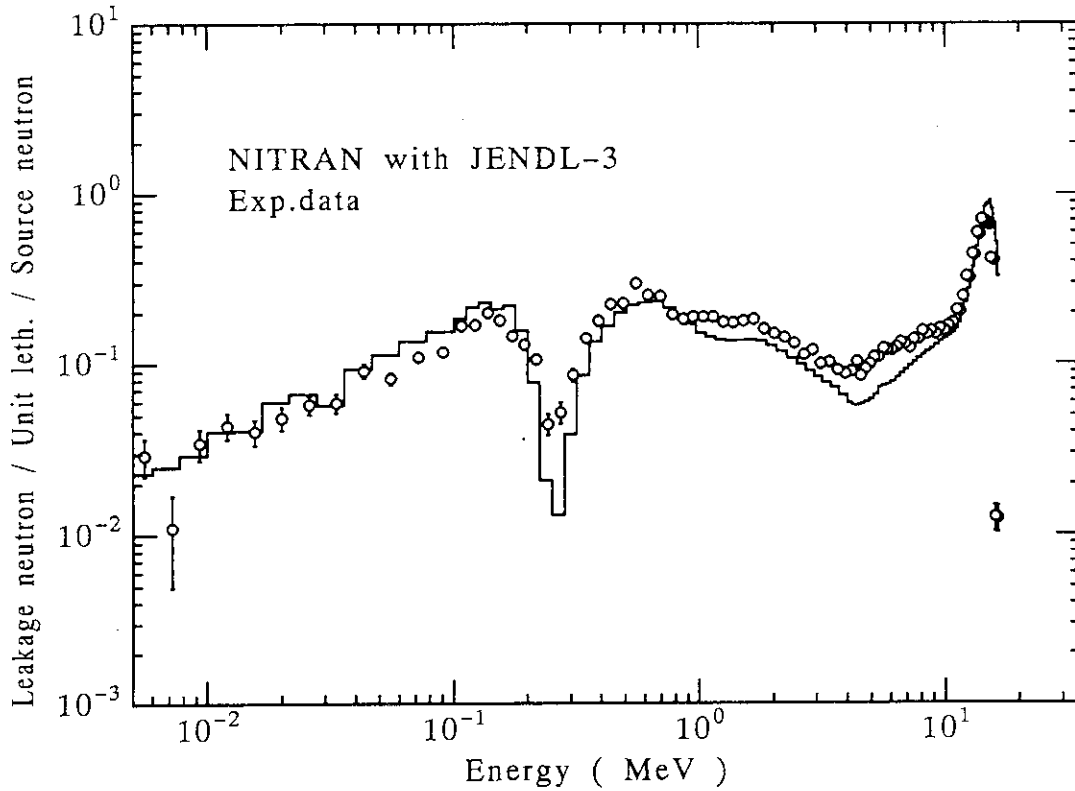


Fig. 2.7 Leakage spectra from Be (45.5 mm)-Li sphere.

```

0010$:JOB: ,A,NIT-J3,R,,JPA4
0020$:FRT77:OPT=3,IAP(256)
0030$:LIMITS:05,236K,-3K,50000
0040$:FILE:P*,NULL
0050$:PRMFL:S*,R,S,A63010/PRO/NIT1MS
0060$:GO
0070$:LIMITS:05,236K,-3K,50000
0080$:PRMFL:01,W,S,A63010/MURA/FLUXS/BE57173           :output (scalar flux)
0090$:PRMFL:02,W,S,A63010/MURA/FLUXA/BE57173           :output (angular flux)
0100$:PRMFL:11,R,S,D63182/YAMA/KERN/BE-J3               :kernel of Beryllium
0110 BE ( 57MM-173.5MM) SPHERE BY NIT1MS S-19 135G FROM JENDL-3
0120 135 36 0 2 1 200 1 -1 0 0 0 0 0
0130 0 0 0 0 0.0
0140$:SELECT:A63010/MURA/MESH/BE57173                   :geometry mesh
0150 13 36
0160 0 1
0170 VACUUM ( 5.70 CM )
0180 BERYLLIUM ( 17.35 CM ) JENDL-3
0190 1.0E-4 1.0 10000.0
0200 1 135
0210 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
0220 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
0230 0.0 0.0 0.0 1.0
0240$:SELECT:A63010/MURA/DT-S/MAY                       :Source neutron
0250 0.12295 135                                         :spectra
0260$:SELECT:A63010/XSEC/ST/BE-J3                       :Total cross section
0270GO                                                    :of Beryllium
0280$:ENDJOB
    
```

Fig. 2.8 JCL of NITRAN-1 for Beryllium analysis.

### 1.3 Gamma-ray Energy Spectra Emitted from Spheres with 14 MeV Neutron Source

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**Facility** OKTAVIAN, Osaka University

**Date** From June, 1987 to September, 1989

#### **Measured Quantity**

Energy spectra of gamma-rays were measured using a 14 MeV neutron source. The gamma-rays were produced from (n,x $\gamma$ ) reactions in spheres and emitted from the spherical samples. The measured quantity was a "leakage current spectrum."

#### **Experimental Method**

Gamma-rays were detected with a cylindrical NaI crystal and the energy spectra were obtained from the unfolding process of the gamma-ray pulse-height spectra, using a response matrix of the NaI detector.

The detector was located at 5.8 m distance from the neutron source and counted the gamma-rays emitted from the sphere. Time spectra of neutrons and gamma-rays from the sphere were measured simultaneously with the pulse-height spectra by means of a TOF technique. OKTAVIAN was run in the pulsed mode with the repetition frequency of 500 kHz. The pulse width was 3 ns in FWHM and the difference in flight times between the 14 MeV neutrons and the prompt gamma-rays was about 90 ns from the sphere to the detector. Since those were enough to separate the gamma-rays from the neutron background in the TOF spectra, the desired gamma-rays could be discriminated from a neutron background.

The emission spectra were dominated by the gamma-rays from (n,n') and (n,2n) reactions rather than the gamma-rays from (n, $\gamma$ ) reaction. The data are therefore available to the assessment in the nuclear data for energy distributions of gamma-rays from non-elastic scattering by high energy neutrons.

### **Neutron Source Characteristics**

Pulses of 14 MeV neutrons were generated by D-T reaction. A 370 GBq TiT target was bombarded with pulsed D<sup>+</sup> beam at 243 keV. The following information is available: Energy spectrum of emission neutrons, the neutron yield as a function of emission angle and the production of gamma-rays at the source.

The neutron energy spectrum was same as that given in Ref. (1). The other information about the emission neutrons is given elsewhere<sup>2)</sup>. The energy spectrum of gamma-rays at the source is shown in Table 3.1 and Fig. 3.1.

### **Material / Geometry / Configuration**

The samples in use were Al, Si, Ti, Cr, Mn, Co, Cu, Nb, Mo, W, Pb, LiF and CF<sub>2</sub> (Teflon). All samples except Pb were same as those for neutron spectra measurement shown in Table 4.1. As for Pb, inner and outer diameters are 10 and 20 cm, and the pile has an opening of 10 cm diameter for the beam duct. The pile is made of natural lead and its density is 11.34 g/cm<sup>3</sup>.

### **Experimental Data with Errors**

Experimental data with errors are shown in Figs. 3.6 - 3.19. Numerical values of the spectra are given in Tables 3.2 - 3.15.

### **Error Assessment**

The following error sources were included in the errors.

- (a) Uncertainty in monitoring absolute fluxes of the source neutrons
- (b) Errors of the response matrix
- (c) Statistical deviation ( $1\sigma$ )

### **Examples of Experimental Analysis**

MCNP + JENDL-3

Some results are compared with the experimental data in the figures. Input data for a graphite sphere of 30 cm in diameter are shown in Fig. 3.20. Configuration is shown in Fig. 3.4 and the result is shown in Fig. 3.5 in comparison with the measured energy spectrum.

### **Comments and So Forth**

Both the leakage spectra of neutron and gamma-ray can be compared with transport calculations, because of the same condition with regard to the spherical samples and the neutron source. (See Ref. 1)

In the present experiment the period to measure the prompt gamma-rays from the

sphere was 60 to 80 ns after the source neutrons generating, so that it was necessary to compute the gamma-ray fluxes in the spheres by using time-dependent transport calculations. However, steady state transport calculations were applicable under the compatible condition with the experimental one by a simple method, in which the neutron-mean-emission times from the sphere were investigated as a function of neutron energy to estimate neutron slowing down times in the spheres.

Some examples of calculated emission times are shown in Figs. 3.2 and 3.3. The calculations were done by MCNP.

The periods of measurement of the prompt gamma-ray spectrum after the source neutrons generation are i) 56 ns for Cr and W, ii) 65 ns for Mn, Cu, Nb, Mo and LiF, iii) 69 ns for Al and iv) 70 ns for Si and Ti. As for Co and CF<sub>2</sub>, the periods are not given. Typical period, i. e., 65 ns, can be used instead because the measured spectra are less sensitive to the small difference of the period.

In numerical tables of the experimental data, each energy spectrum was normalized in a leakage current flux from a whole surface of the sphere per a source neutron.

### **References**

- (1) Ichihara C., et al.: "Leakage Neutron Spectra from Various Sphere Piles with 14 MeV Neutrons", chapter 4 in this issue.
- (2) Yamamoto J., et al.: "Numerical Tables and Graphs of Leakage Neutron Spectra from Slabs of Typical Shielding Materials with D-T Neutron Source", OKTAVIAN-Report A-8305, Dept. of Nuclear Eng., Osaka University (1983).
- (3) Yamamoto J., et al.: "Gamma-Ray Emission Spectra from Spheres with 14 MeV Neutron Source", JAERI-M 89-026, 232 (1989).
- (4) Yamamoto J.: "Integral Experiment on Gamma-Ray Production at OKTAVIAN", JAERI-M 91-062, 118 (1991).

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Table 3.1 The energy spectrum of gamma-rays at the source

Gamma-ray Energy [MeV]	Data [photons/sr./MeV/source neutron]
14.0 - 12.0	0.0
12.0 - 10.0	0.0
10.0 - 9.0	3.8E-5
9.0 - 8.0	7.0E-5
8.0 - 7.5	1.2E-4
7.5 - 7.0	1.5E-4
7.0 - 6.5	2.0E-4
6.5 - 6.0	2.3E-4
6.0 - 5.5	2.3E-4
5.5 - 5.0	3.0E-4
5.0 - 4.5	3.0E-4
4.5 - 4.0	5.0E-4
4.0 - 3.5	5.0E-4
3.5 - 3.0	7.0E-4
3.0 - 2.5	7.0E-4
2.5 - 2.25	8.5E-4
2.25 - 2.00	9.5E-4
2.00 - 1.75	1.0E-3
1.75 - 1.50	1.4E-3
1.50 - 1.38	2.8E-3
1.38 - 1.25	3.8E-3
1.25 - 1.13	4.0E-3
1.13 - 1.00	3.0E-3
1.00 - 0.90	3.5E-3
0.90 - 0.80	7.5E-3
0.80 - 0.70	3.8E-3
0.70 - 0.60	2.3E-3
0.60 - 0.52	5.0E-3
0.52 - 0.50	5.0E-3

Table 3.2 Measured gamma-ray leakage spectrum from an Al sphere of 40 cm diameter.

Lower Energy [MeV]	Upper Energy [MeV]	Energy Spectrum [/MeV/S.n.]	Error
5.000E-01	6.000E-01	2.025E-01	5.000E-04
6.000E-01	7.000E-01	1.810E-01	5.000E-04
7.000E-01	8.000E-01	1.655E-01	4.000E-04
8.000E-01	9.000E-01	2.199E-01	4.000E-04
9.000E-01	1.000E+00	2.042E-01	4.000E-04
1.000E+00	1.100E+00	1.810E-01	5.000E-04
1.100E+00	1.200E+00	1.364E-01	4.000E-04
1.200E+00	1.300E+00	1.203E-01	4.000E-04
1.300E+00	1.400E+00	1.159E-01	4.000E-04
1.400E+00	1.500E+00	1.033E-01	5.000E-04
1.500E+00	1.600E+00	8.601E-02	6.200E-04
1.600E+00	1.700E+00	8.412E-02	5.200E-04
1.700E+00	1.800E+00	1.108E-01	6.000E-04
1.800E+00	1.900E+00	1.251E-01	6.000E-04
1.900E+00	2.000E+00	9.976E-02	4.200E-04
2.000E+00	2.100E+00	7.944E-02	5.200E-04
2.100E+00	2.200E+00	9.377E-02	7.100E-04
2.200E+00	2.300E+00	1.112E-01	7.000E-04
2.300E+00	2.400E+00	9.630E-02	6.900E-04
2.400E+00	2.500E+00	6.832E-02	1.050E-03
2.500E+00	2.600E+00	5.362E-02	8.800E-04
2.600E+00	2.700E+00	4.855E-02	5.400E-04
2.700E+00	2.800E+00	4.804E-02	9.900E-04
2.800E+00	2.900E+00	5.524E-02	1.010E-03
2.900E+00	3.000E+00	6.851E-02	8.100E-04
3.000E+00	3.100E+00	7.359E-02	8.100E-04
3.100E+00	3.200E+00	6.203E-02	7.500E-04
3.200E+00	3.300E+00	4.470E-02	6.100E-04
3.300E+00	3.400E+00	3.335E-02	6.900E-04
3.400E+00	3.500E+00	2.885E-02	9.100E-04
3.500E+00	3.600E+00	2.788E-02	9.600E-04
3.600E+00	3.700E+00	2.800E-02	9.700E-04
3.700E+00	3.800E+00	2.814E-02	8.600E-04
3.800E+00	3.900E+00	2.828E-02	7.400E-04
3.900E+00	4.000E+00	2.817E-02	9.600E-04
4.000E+00	4.100E+00	2.716E-02	1.220E-03
4.100E+00	4.200E+00	2.539E-02	1.440E-03
4.200E+00	4.300E+00	2.371E-02	2.030E-03
4.300E+00	4.400E+00	2.253E-02	2.610E-03
4.400E+00	4.500E+00	2.190E-02	2.450E-03
4.500E+00	4.600E+00	2.213E-02	1.620E-03
4.600E+00	4.700E+00	2.346E-02	2.550E-03
4.700E+00	4.800E+00	2.536E-02	4.650E-03
4.800E+00	4.900E+00	2.654E-02	5.470E-03
4.900E+00	5.000E+00	2.550E-02	3.830E-03
5.000E+00	5.500E+00	1.596E-02	2.320E-03
5.500E+00	6.000E+00	1.899E-02	1.860E-03
6.000E+00	6.500E+00	1.630E-02	1.360E-03
6.500E+00	7.000E+00	6.569E-03	2.461E-03
7.000E+00	7.500E+00	1.641E-02	2.300E-03
7.500E+00	8.000E+00	4.856E-03	1.785E-03
8.000E+00	8.500E+00	9.137E-03	1.409E-03
8.500E+00	9.000E+00	5.316E-03	6.960E-04
9.000E+00	9.500E+00	1.660E-03	5.890E-04
9.500E+00	1.000E+01	3.036E-03	4.050E-04
1.000E+01	1.050E+01	1.489E-03	2.410E-04
1.050E+01	1.100E+01	6.201E-04	1.409E-04

Table 3.3 Measured gamma-ray leakage spectrum from a Si sphere of 40 cm diameter.

Lower Energy [MeV]	Upper Energy [MeV]	Energy Spectrum [/MeV/S.n.]	Error
5.000E-01	6.000E-01	1.846E-01	6.000E-04
6.000E-01	7.000E-01	1.583E-01	6.000E-04
7.000E-01	8.000E-01	1.234E-01	5.000E-04
8.000E-01	9.000E-01	1.447E-01	5.000E-04
9.000E-01	1.000E+00	1.368E-01	5.000E-04
1.000E+00	1.100E+00	1.113E-01	7.000E-04
1.100E+00	1.200E+00	9.339E-02	5.200E-04
1.200E+00	1.300E+00	9.897E-02	5.800E-04
1.300E+00	1.400E+00	1.001E-01	5.000E-04
1.400E+00	1.500E+00	8.920E-02	7.000E-04
1.500E+00	1.600E+00	8.325E-02	8.000E-04
1.600E+00	1.700E+00	1.081E-01	6.000E-04
1.700E+00	1.800E+00	1.601E-01	8.000E-04
1.800E+00	1.900E+00	1.512E-01	8.000E-04
1.900E+00	2.000E+00	8.648E-02	5.300E-04
2.000E+00	2.100E+00	4.784E-02	6.700E-04
2.100E+00	2.200E+00	4.142E-02	9.500E-04
2.200E+00	2.300E+00	3.984E-02	9.000E-04
2.300E+00	2.400E+00	3.550E-02	9.100E-04
2.400E+00	2.500E+00	3.186E-02	1.430E-03
2.500E+00	2.600E+00	3.158E-02	1.200E-03
2.600E+00	2.700E+00	3.426E-02	7.600E-04
2.700E+00	2.800E+00	3.896E-02	1.370E-03
2.800E+00	2.900E+00	4.033E-02	1.360E-03
2.900E+00	3.000E+00	3.466E-02	1.110E-03
3.000E+00	3.100E+00	2.756E-02	1.170E-03
3.100E+00	3.200E+00	2.470E-02	1.090E-03
3.200E+00	3.300E+00	2.512E-02	8.800E-04
3.300E+00	3.400E+00	2.622E-02	1.030E-03
3.400E+00	3.500E+00	2.660E-02	1.310E-03
3.500E+00	3.600E+00	2.577E-02	1.290E-03
3.600E+00	3.700E+00	2.431E-02	1.280E-03
3.700E+00	3.800E+00	2.292E-02	1.160E-03
3.800E+00	3.900E+00	2.131E-02	1.020E-03
3.900E+00	4.000E+00	1.901E-02	1.360E-03
4.000E+00	4.500E+00	1.811E-02	1.240E-03
4.500E+00	5.000E+00	1.892E-02	2.400E-03
5.000E+00	5.500E+00	1.750E-02	3.150E-03
5.500E+00	6.000E+00	9.814E-03	2.557E-03
6.000E+00	7.000E+00	1.616E-02	2.130E-03
7.000E+00	8.000E+00	1.044E-02	2.320E-03
8.000E+00	9.000E+00	4.279E-03	1.348E-03
9.000E+00	1.000E+01	4.596E-03	7.420E-04
1.000E+01	1.100E+01	2.011E-03	2.210E-04

Table 3.4 Measured gamma-ray leakage spectrum from a Si sphere of 60 cm diameter.

Lower Energy [MeV]	Upper Energy [MeV]	Energy Spectrum [/MeV/S.n.]	Error
3.000E-01	4.000E-01	3.171E-01	1.100E-03
4.000E-01	5.000E-01	2.046E-01	1.200E-03
5.000E-01	6.000E-01	2.024E-01	1.200E-03
6.000E-01	7.000E-01	2.642E-01	1.200E-03
7.000E-01	8.000E-01	2.235E-01	1.000E-03
8.000E-01	9.000E-01	1.737E-01	1.000E-03
9.000E-01	1.000E+00	1.673E-01	9.000E-04
1.000E+00	1.100E+00	1.877E-01	1.400E-03
1.100E+00	1.200E+00	1.775E-01	1.000E-03
1.200E+00	1.300E+00	1.490E-01	1.200E-03
1.300E+00	1.400E+00	1.452E-01	1.100E-03
1.400E+00	1.500E+00	2.002E-01	1.400E-03
1.500E+00	1.600E+00	2.768E-01	1.700E-03
1.600E+00	1.700E+00	2.157E-01	1.400E-03
1.700E+00	1.800E+00	1.129E-01	1.400E-03
1.800E+00	1.900E+00	7.780E-02	1.480E-03
1.900E+00	2.000E+00	7.483E-02	1.050E-03
2.000E+00	2.100E+00	7.143E-02	1.280E-03
2.100E+00	2.200E+00	6.256E-02	1.780E-03
2.200E+00	2.300E+00	5.549E-02	1.730E-03
2.300E+00	2.400E+00	5.570E-02	1.870E-03
2.400E+00	2.500E+00	6.197E-02	2.840E-03
2.500E+00	2.600E+00	7.099E-02	2.260E-03
2.600E+00	2.700E+00	7.256E-02	1.360E-03
2.700E+00	2.800E+00	6.235E-02	2.710E-03
2.800E+00	2.900E+00	5.096E-02	2.610E-03
2.900E+00	3.000E+00	4.654E-02	2.040E-03
3.000E+00	3.100E+00	4.716E-02	2.380E-03
3.100E+00	3.200E+00	4.806E-02	2.290E-03
3.200E+00	3.300E+00	4.650E-02	1.880E-03
3.300E+00	3.400E+00	4.326E-02	2.070E-03
3.400E+00	3.500E+00	4.034E-02	2.880E-03
3.500E+00	3.600E+00	3.816E-02	3.400E-03
3.600E+00	3.700E+00	3.663E-02	3.530E-03
3.700E+00	3.800E+00	3.548E-02	2.860E-03
3.800E+00	3.900E+00	3.412E-02	2.080E-03
3.900E+00	4.000E+00	3.316E-02	3.030E-03
4.000E+00	4.500E+00	3.524E-02	2.590E-03
4.500E+00	5.000E+00	3.200E-02	4.740E-03
5.000E+00	5.500E+00	2.468E-02	6.310E-03
5.500E+00	6.000E+00	1.774E-02	5.460E-03
6.000E+00	6.500E+00	2.177E-02	4.500E-03
6.500E+00	7.000E+00	2.841E-02	6.830E-03
7.000E+00	7.500E+00	1.684E-02	6.270E-03
7.500E+00	8.000E+00	1.946E-02	5.280E-03
8.000E+00	8.500E+00	1.683E-03	4.963E-03
8.500E+00	9.000E+00	2.284E-02	4.910E-03
9.000E+00	9.500E+00	1.723E-03	5.981E-03
9.500E+00	1.000E+01	2.039E-02	6.670E-03
1.000E+01	1.050E+01	1.288E-03	5.512E-03
1.050E+01	1.100E+01	1.078E-02	4.330E-03

Table 3.5 Measured gamma-ray leakage spectrum from a Ti sphere of 40 cm diameter.

Lower Energy [MeV]	Upper Energy [MeV]	Energy Spectrum [/MeV/S.n.]	Error
5.000E-01	6.000E-01	2.639E-01	6.000E-04
6.000E-01	7.000E-01	3.119E-01	6.000E-04
7.000E-01	8.000E-01	2.299E-01	5.000E-04
8.000E-01	9.000E-01	1.903E-01	5.000E-04
9.000E-01	1.000E+00	2.267E-01	5.000E-04
1.000E+00	1.100E+00	3.149E-01	8.000E-04
1.100E+00	1.200E+00	3.934E-01	6.000E-04
1.200E+00	1.300E+00	2.654E-01	6.000E-04
1.300E+00	1.400E+00	1.617E-01	5.000E-04
1.400E+00	1.500E+00	1.787E-01	7.000E-04
1.500E+00	1.600E+00	1.888E-01	8.000E-04
1.600E+00	1.700E+00	1.478E-01	6.000E-04
1.700E+00	1.800E+00	1.048E-01	7.000E-04
1.800E+00	1.900E+00	8.068E-02	8.200E-04
1.900E+00	2.000E+00	6.858E-02	5.100E-04
2.000E+00	2.100E+00	6.272E-02	6.600E-04
2.100E+00	2.200E+00	5.657E-02	9.300E-04
2.200E+00	2.300E+00	5.111E-02	8.800E-04
2.300E+00	2.400E+00	4.970E-02	8.800E-04
2.400E+00	2.500E+00	5.086E-02	1.410E-03
2.500E+00	2.600E+00	5.447E-02	1.200E-03
2.600E+00	2.700E+00	5.876E-02	7.600E-04
2.700E+00	2.800E+00	5.790E-02	1.340E-03
2.800E+00	2.900E+00	5.167E-02	1.360E-03
2.900E+00	3.000E+00	4.599E-02	1.100E-03
3.000E+00	3.100E+00	4.261E-02	1.130E-03
3.100E+00	3.200E+00	3.979E-02	1.070E-03
3.200E+00	3.300E+00	3.736E-02	8.500E-04
3.300E+00	3.400E+00	3.549E-02	9.600E-04
3.400E+00	3.500E+00	3.426E-02	1.230E-03
3.500E+00	3.600E+00	3.341E-02	1.220E-03
3.600E+00	3.700E+00	3.206E-02	1.220E-03
3.700E+00	3.800E+00	3.033E-02	1.100E-03
3.800E+00	3.900E+00	2.926E-02	9.700E-04
3.900E+00	4.000E+00	2.936E-02	1.360E-03
4.000E+00	4.200E+00	3.001E-02	1.320E-03
4.200E+00	4.400E+00	2.619E-02	2.160E-03
4.400E+00	4.600E+00	1.893E-02	2.270E-03
4.600E+00	4.800E+00	1.839E-02	3.510E-03
4.800E+00	5.000E+00	2.203E-02	4.640E-03
5.000E+00	5.200E+00	2.046E-02	3.370E-03
5.200E+00	5.400E+00	1.551E-02	6.590E-03
5.400E+00	5.600E+00	1.601E-02	2.730E-03
5.600E+00	5.800E+00	1.774E-02	4.900E-03
5.800E+00	6.000E+00	1.458E-02	3.670E-03
6.000E+00	7.000E+00	1.230E-02	2.170E-03
7.000E+00	8.000E+00	1.107E-02	2.380E-03
8.000E+00	9.000E+00	8.202E-03	1.431E-03
9.000E+00	1.000E+01	4.622E-03	7.990E-04
1.000E+01	1.100E+01	2.541E-03	3.760E-04

Table 3.6 Measured gamma-ray leakage spectrum from a Cr sphere of 40 cm diameter.

Lower Energy [MeV]	Upper Energy [MeV]	Energy Spectrum [/MeV/S.n.]	Error
3.000E-01	4.000E-01	3.118E-01	7.000E-04
4.000E-01	5.000E-01	2.426E-01	7.000E-04
5.000E-01	6.000E-01	2.289E-01	7.000E-04
6.000E-01	7.000E-01	2.653E-01	7.000E-04
7.000E-01	8.000E-01	2.439E-01	6.000E-04
8.000E-01	9.000E-01	1.847E-01	6.000E-04
9.000E-01	1.000E+00	1.652E-01	6.000E-04
1.000E+00	1.100E+00	1.993E-01	7.000E-04
1.100E+00	1.200E+00	2.911E-01	6.000E-04
1.200E+00	1.300E+00	3.086E-01	7.000E-04
1.300E+00	1.400E+00	1.781E-01	6.000E-04
1.400E+00	1.500E+00	8.858E-02	7.100E-04
1.500E+00	1.600E+00	6.908E-02	8.300E-04
1.600E+00	1.700E+00	5.855E-02	6.400E-04
1.700E+00	1.800E+00	5.379E-02	6.800E-04
1.800E+00	1.900E+00	5.306E-02	7.500E-04
1.900E+00	2.000E+00	5.115E-02	5.800E-04
2.000E+00	2.100E+00	5.037E-02	6.500E-04
2.100E+00	2.200E+00	4.927E-02	8.700E-04
2.200E+00	2.300E+00	4.579E-02	8.400E-04
2.300E+00	2.400E+00	4.241E-02	9.400E-04
2.400E+00	2.500E+00	4.034E-02	1.380E-03
2.500E+00	2.600E+00	3.836E-02	1.110E-03
2.600E+00	2.700E+00	3.648E-02	6.800E-04
2.700E+00	2.800E+00	3.708E-02	1.330E-03
2.800E+00	2.900E+00	4.043E-02	1.300E-03
2.900E+00	3.000E+00	4.272E-02	9.600E-04
3.000E+00	3.100E+00	4.087E-02	1.090E-03
3.100E+00	3.200E+00	3.636E-02	1.080E-03
3.200E+00	3.300E+00	3.256E-02	8.900E-04
3.300E+00	3.400E+00	3.056E-02	9.400E-04
3.400E+00	3.500E+00	2.952E-02	1.300E-03
3.500E+00	3.600E+00	2.865E-02	1.530E-03
3.600E+00	3.700E+00	2.749E-02	1.580E-03
3.700E+00	3.800E+00	2.577E-02	1.330E-03
3.800E+00	3.900E+00	2.409E-02	1.030E-03
3.900E+00	4.000E+00	2.348E-02	1.350E-03
4.000E+00	4.100E+00	2.414E-02	1.800E-03
4.100E+00	4.200E+00	2.523E-02	2.250E-03
4.200E+00	4.300E+00	2.588E-02	3.010E-03
4.300E+00	4.400E+00	2.542E-02	3.510E-03
4.400E+00	4.500E+00	2.337E-02	2.990E-03
4.500E+00	4.600E+00	1.982E-02	1.940E-03
4.600E+00	4.700E+00	1.566E-02	3.690E-03
4.700E+00	4.800E+00	1.259E-02	6.380E-03
4.800E+00	4.900E+00	1.229E-02	7.210E-03
4.900E+00	5.000E+00	1.537E-02	4.920E-03
5.000E+00	5.500E+00	2.539E-02	3.140E-03
5.500E+00	6.000E+00	1.121E-02	2.580E-03
6.000E+00	6.500E+00	1.618E-02	1.670E-03
6.500E+00	7.000E+00	1.440E-02	2.730E-03
7.000E+00	7.500E+00	8.613E-03	2.529E-03
7.500E+00	8.000E+00	8.949E-03	2.054E-03
8.000E+00	8.500E+00	4.834E-03	1.861E-03
8.500E+00	9.000E+00	5.793E-03	1.442E-03
9.000E+00	9.500E+00	1.244E-03	1.622E-03
9.500E+00	1.000E+01	3.757E-03	1.743E-03
1.000E+01	1.050E+01	1.319E-04	1.445E-03
1.050E+01	1.100E+01	1.554E-03	1.152E-03

Table 3.7 Measured gamma-ray leakage spectrum from a Mn sphere of 60 cm diameter.

Lower Energy [MeV]	Upper Energy [MeV]	Energy Spectrum [/MeV/S.n.]	Error
5.000E-01	6.000E-01	2.442E-01	6.300E-03
6.000E-01	7.000E-01	1.431E-01	2.500E-03
7.000E-01	8.000E-01	1.401E-01	1.100E-03
8.000E-01	9.000E-01	1.805E-01	5.000E-04
9.000E-01	1.000E+00	1.460E-01	3.000E-04
1.000E+00	1.100E+00	9.851E-02	5.100E-04
1.100E+00	1.200E+00	8.547E-02	1.000E-03
1.200E+00	1.300E+00	7.995E-02	1.600E-03
1.300E+00	1.400E+00	7.166E-02	1.340E-03
1.400E+00	1.500E+00	6.640E-02	5.600E-04
1.500E+00	1.600E+00	6.275E-02	1.410E-03
1.600E+00	1.700E+00	5.628E-02	1.800E-03
1.700E+00	1.800E+00	5.080E-02	1.520E-03
1.800E+00	1.900E+00	4.776E-02	1.050E-03
1.900E+00	2.000E+00	4.381E-02	6.700E-04
2.000E+00	2.100E+00	3.987E-02	7.700E-04
2.100E+00	2.200E+00	3.866E-02	1.120E-03
2.200E+00	2.300E+00	3.851E-02	1.460E-03
2.300E+00	2.400E+00	3.610E-02	1.810E-03
2.400E+00	2.500E+00	3.196E-02	1.810E-03
2.500E+00	2.600E+00	2.901E-02	1.180E-03
2.600E+00	2.700E+00	2.785E-02	5.700E-04
2.700E+00	2.800E+00	2.689E-02	9.100E-04
2.800E+00	2.900E+00	2.515E-02	1.300E-03
2.900E+00	3.000E+00	2.307E-02	1.670E-03
3.000E+00	3.100E+00	2.134E-02	1.940E-03
3.100E+00	3.200E+00	2.024E-02	1.850E-03
3.200E+00	3.300E+00	1.962E-02	1.230E-03
3.300E+00	3.400E+00	1.908E-02	1.040E-03
3.400E+00	3.500E+00	1.821E-02	2.630E-03
3.500E+00	3.600E+00	1.684E-02	4.110E-03
3.600E+00	3.700E+00	1.522E-02	4.500E-03
3.700E+00	3.800E+00	1.385E-02	3.300E-03
3.800E+00	3.900E+00	1.310E-02	1.250E-03
3.900E+00	4.000E+00	1.303E-02	3.230E-03
4.000E+00	4.500E+00	1.166E-02	2.150E-03
4.500E+00	5.000E+00	6.997E-03	2.122E-03
5.000E+00	5.500E+00	7.462E-03	2.314E-03
5.500E+00	6.000E+00	8.395E-03	1.444E-03
6.000E+00	6.500E+00	3.611E-03	9.850E-04
6.500E+00	7.000E+00	8.556E-03	1.059E-03
7.000E+00	7.500E+00	1.266E-03	8.560E-04
7.500E+00	8.000E+00	3.423E-03	6.490E-04
8.000E+00	8.500E+00	1.867E-03	5.420E-04
8.500E+00	9.000E+00	1.175E-03	3.190E-04
9.000E+00	9.500E+00	1.364E-03	2.020E-04
9.500E+00	1.000E+01	1.034E-03	1.540E-04
1.000E+01	1.050E+01	3.320E-04	8.230E-05
1.050E+01	1.100E+01	1.135E-04	3.250E-05



Table 3.8 Measured gamma-ray leakage spectrum from a Co sphere of 40 cm diameter.

Lower Energy [MeV]	Upper Energy [MeV]	Energy Spectrum [/MeV/S.n.]	Error
2.000E-01	3.000E-01	1.681E-01	9.000E-04
3.000E-01	4.000E-01	3.046E-01	9.000E-04
4.000E-01	5.000E-01	2.485E-01	9.000E-04
5.000E-01	6.000E-01	2.007E-01	7.000E-04
6.000E-01	7.000E-01	2.250E-01	8.000E-04
7.000E-01	8.000E-01	2.181E-01	7.000E-04
8.000E-01	9.000E-01	1.927E-01	7.000E-04
9.000E-01	1.000E+00	1.933E-01	7.000E-04
1.000E+00	1.100E+00	2.054E-01	7.000E-04
1.100E+00	1.200E+00	1.764E-01	6.000E-04
1.200E+00	1.300E+00	1.512E-01	7.000E-04
1.300E+00	1.400E+00	1.362E-01	6.000E-04
1.400E+00	1.500E+00	1.019E-01	7.000E-04
1.500E+00	1.600E+00	7.746E-02	7.900E-04
1.600E+00	1.700E+00	6.857E-02	6.800E-04
1.700E+00	1.800E+00	5.999E-02	6.600E-04
1.800E+00	1.900E+00	5.309E-02	6.800E-04
1.900E+00	2.000E+00	4.879E-02	6.300E-04
2.000E+00	2.100E+00	4.534E-02	6.700E-04
2.100E+00	2.200E+00	4.342E-02	7.800E-04
2.200E+00	2.300E+00	4.279E-02	8.000E-04
2.300E+00	2.400E+00	4.197E-02	8.800E-04
2.400E+00	2.500E+00	4.041E-02	1.010E-03
2.500E+00	2.600E+00	3.791E-02	8.200E-04
2.600E+00	2.700E+00	3.477E-02	6.900E-04
2.700E+00	2.800E+00	3.190E-02	1.000E-03
2.800E+00	2.900E+00	2.991E-02	9.400E-04
2.900E+00	3.000E+00	2.873E-02	8.100E-04
3.000E+00	3.100E+00	2.804E-02	9.800E-04
3.100E+00	3.200E+00	2.757E-02	9.800E-04
3.200E+00	3.300E+00	2.695E-02	8.200E-04
3.300E+00	3.400E+00	2.600E-02	8.300E-04
3.400E+00	3.500E+00	2.494E-02	1.140E-03
3.500E+00	3.600E+00	2.394E-02	1.400E-03
3.600E+00	3.700E+00	2.280E-02	1.430E-03
3.700E+00	3.800E+00	2.142E-02	1.190E-03
3.800E+00	3.900E+00	2.008E-02	9.400E-04
3.900E+00	4.000E+00	1.911E-02	1.140E-03
4.000E+00	4.200E+00	1.851E-02	1.310E-03
4.200E+00	4.400E+00	1.757E-02	1.780E-03
4.400E+00	4.600E+00	1.478E-02	1.180E-03
4.600E+00	4.800E+00	1.229E-02	2.720E-03
4.800E+00	5.000E+00	1.263E-02	2.660E-03
5.000E+00	5.200E+00	1.552E-02	2.530E-03
5.200E+00	5.400E+00	1.633E-02	4.420E-03
5.400E+00	5.600E+00	1.238E-02	1.930E-03
5.600E+00	5.800E+00	8.061E-03	3.060E-03
5.800E+00	6.000E+00	7.517E-03	3.079E-03
6.000E+00	6.500E+00	9.080E-03	9.080E-04
6.500E+00	7.000E+00	9.394E-03	1.115E-03
7.000E+00	7.500E+00	4.306E-03	9.360E-04
7.500E+00	8.000E+00	4.850E-03	7.490E-04
8.000E+00	8.500E+00	2.359E-03	6.300E-04
8.500E+00	9.000E+00	2.359E-03	3.340E-04
9.000E+00	9.500E+00	6.343E-04	3.008E-04
9.500E+00	1.000E+01	1.250E-03	2.940E-04
1.000E+01	1.050E+01	2.130E-04	2.535E-04
1.050E+01	1.100E+01	7.436E-04	2.225E-04

Table 3.9 Measured gamma-ray leakage spectrum from a Cu sphere of 60 cm diameter.

Lower Energy [MeV]	Upper Energy [MeV]	Energy Spectrum [/MeV/S.n.]	Error
5.000E-01	6.000E-01	1.380E+00	4.300E-02
6.000E-01	7.000E-01	8.962E-01	1.700E-02
7.000E-01	8.000E-01	8.176E-01	7.000E-03
8.000E-01	9.000E-01	9.066E-01	2.600E-03
9.000E-01	1.000E+00	8.468E-01	1.700E-03
1.000E+00	1.100E+00	6.704E-01	2.100E-03
1.100E+00	1.200E+00	5.573E-01	4.000E-03
1.200E+00	1.300E+00	4.923E-01	6.200E-03
1.300E+00	1.400E+00	4.327E-01	5.000E-03
1.400E+00	1.500E+00	3.661E-01	2.100E-03
1.500E+00	1.600E+00	2.952E-01	5.500E-03
1.600E+00	1.700E+00	2.413E-01	7.100E-03
1.700E+00	1.800E+00	2.109E-01	6.000E-03
1.800E+00	1.900E+00	1.951E-01	4.100E-03
1.900E+00	2.000E+00	1.805E-01	2.400E-03
2.000E+00	2.100E+00	1.637E-01	2.800E-03
2.100E+00	2.200E+00	1.470E-01	4.100E-03
2.200E+00	2.300E+00	1.314E-01	5.500E-03
2.300E+00	2.400E+00	1.187E-01	7.000E-03
2.400E+00	2.500E+00	1.100E-01	7.000E-03
2.500E+00	2.600E+00	1.043E-01	4.600E-03
2.600E+00	2.700E+00	1.001E-01	2.000E-03
2.700E+00	2.800E+00	9.698E-02	3.420E-03
2.800E+00	2.900E+00	9.421E-02	5.180E-03
2.900E+00	3.000E+00	9.031E-02	6.610E-03
3.000E+00	3.100E+00	8.453E-02	7.360E-03
3.100E+00	3.200E+00	7.791E-02	6.770E-03
3.200E+00	3.300E+00	7.213E-02	4.330E-03
3.300E+00	3.400E+00	6.788E-02	3.850E-03
3.400E+00	3.500E+00	6.496E-02	1.008E-02
3.500E+00	3.600E+00	6.245E-02	1.597E-02
3.600E+00	3.700E+00	5.997E-02	1.764E-02
3.700E+00	3.800E+00	5.770E-02	1.300E-02
3.800E+00	3.900E+00	5.597E-02	4.750E-03
3.900E+00	4.000E+00	5.494E-02	1.218E-02
4.000E+00	4.500E+00	4.869E-02	8.390E-03
4.500E+00	5.000E+00	2.953E-02	8.000E-03
5.000E+00	5.500E+00	3.094E-02	8.520E-03
5.500E+00	6.000E+00	2.406E-02	4.900E-03
6.000E+00	6.500E+00	2.093E-02	3.200E-03
6.500E+00	7.000E+00	1.397E-02	3.110E-03
7.000E+00	7.500E+00	1.564E-02	2.330E-03
7.500E+00	8.000E+00	1.047E-02	1.560E-03
8.000E+00	8.500E+00	3.402E-03	1.241E-03
8.500E+00	9.000E+00	6.043E-03	6.560E-04
9.000E+00	9.500E+00	1.134E-03	4.260E-04
9.500E+00	1.000E+01	7.879E-04	2.452E-04
1.000E+01	1.050E+01	1.124E-03	1.640E-04
1.050E+01	1.100E+01	2.081E-04	7.030E-05

Table 3.10 Measured gamma-ray leakage spectrum from a Nb sphere of 28 cm diameter.

Lower Energy [MeV]	Upper Energy [MeV]	Energy Spectrum [/MeV/S.n.]	Error
5.000E-01	6.000E-01	6.126E-01	8.300E-03
6.000E-01	7.000E-01	3.887E-01	3.300E-03
7.000E-01	8.000E-01	3.372E-01	1.500E-03
8.000E-01	9.000E-01	3.758E-01	7.000E-04
9.000E-01	1.000E+00	3.547E-01	5.000E-04
1.000E+00	1.100E+00	2.833E-01	6.000E-04
1.100E+00	1.200E+00	2.129E-01	1.200E-03
1.200E+00	1.300E+00	1.793E-01	1.800E-03
1.300E+00	1.400E+00	1.634E-01	1.500E-03
1.400E+00	1.500E+00	1.482E-01	6.000E-04
1.500E+00	1.600E+00	1.305E-01	1.600E-03
1.600E+00	1.700E+00	1.131E-01	2.100E-03
1.700E+00	1.800E+00	1.014E-01	1.700E-03
1.800E+00	1.900E+00	9.516E-02	1.200E-03
1.900E+00	2.000E+00	9.162E-02	7.500E-04
2.000E+00	2.100E+00	8.976E-02	8.500E-04
2.100E+00	2.200E+00	8.674E-02	1.230E-03
2.200E+00	2.300E+00	7.921E-02	1.640E-03
2.300E+00	2.400E+00	6.840E-02	2.070E-03
2.400E+00	2.500E+00	5.853E-02	2.080E-03
2.500E+00	2.600E+00	5.181E-02	1.370E-03
2.600E+00	2.700E+00	4.774E-02	6.500E-04
2.700E+00	2.800E+00	4.509E-02	1.020E-03
2.800E+00	2.900E+00	4.301E-02	1.530E-03
2.900E+00	3.000E+00	4.087E-02	1.960E-03
3.000E+00	3.100E+00	3.813E-02	2.210E-03
3.100E+00	3.200E+00	3.466E-02	2.070E-03
3.200E+00	3.300E+00	3.098E-02	1.350E-03
3.300E+00	3.400E+00	2.774E-02	1.200E-03
3.400E+00	3.500E+00	2.535E-02	3.030E-03
3.500E+00	3.600E+00	2.387E-02	4.760E-03
3.600E+00	3.700E+00	2.309E-02	5.250E-03
3.700E+00	3.800E+00	2.272E-02	3.870E-03
3.800E+00	3.900E+00	2.243E-02	1.420E-03
3.900E+00	4.000E+00	2.197E-02	3.640E-03
4.000E+00	4.500E+00	1.639E-02	2.500E-03
4.500E+00	5.000E+00	9.383E-03	2.402E-03
5.000E+00	5.500E+00	1.081E-02	2.590E-03
5.500E+00	6.000E+00	8.120E-03	1.502E-03
6.000E+00	6.500E+00	6.642E-03	1.002E-03
6.500E+00	7.000E+00	4.718E-03	1.006E-03
7.000E+00	7.500E+00	4.308E-03	7.880E-04
7.500E+00	8.000E+00	2.145E-03	5.740E-04
8.000E+00	8.500E+00	2.807E-03	4.810E-04
8.500E+00	9.000E+00	8.306E-04	2.942E-04
9.000E+00	9.500E+00	1.202E-03	2.010E-04
9.500E+00	1.000E+01	3.918E-04	1.567E-04
1.000E+01	1.050E+01	4.331E-04	1.131E-04
1.050E+01	1.100E+01	2.169E-04	5.372E-05

Table 3.11 Measured gamma-ray leakage spectrum from a Mo sphere of 60 cm diameter.

Lower Energy [MeV]	Upper Energy [MeV]	Energy Spectrum [/MeV/S.n.]	Error
5.000E-01	6.000E-01	5.591E-01	1.080E-02
6.000E-01	7.000E-01	3.766E-01	4.200E-03
7.000E-01	8.000E-01	3.860E-01	1.700E-03
8.000E-01	9.000E-01	4.088E-01	6.000E-04
9.000E-01	1.000E+00	3.071E-01	4.000E-04
1.000E+00	1.100E+00	2.165E-01	4.000E-04
1.100E+00	1.200E+00	1.811E-01	9.000E-04
1.200E+00	1.300E+00	1.623E-01	1.400E-03
1.300E+00	1.400E+00	1.442E-01	1.200E-03
1.400E+00	1.500E+00	1.288E-01	5.000E-04
1.500E+00	1.600E+00	1.135E-01	1.300E-03
1.600E+00	1.700E+00	9.452E-02	1.640E-03
1.700E+00	1.800E+00	7.849E-02	1.348E-03
1.800E+00	1.900E+00	6.932E-02	9.100E-04
1.900E+00	2.000E+00	6.412E-02	5.900E-04
2.000E+00	2.100E+00	6.046E-02	6.900E-04
2.100E+00	2.200E+00	5.673E-02	9.800E-04
2.200E+00	2.300E+00	5.220E-02	1.280E-03
2.300E+00	2.400E+00	4.776E-02	1.600E-03
2.400E+00	2.500E+00	4.416E-02	1.620E-03
2.500E+00	2.600E+00	4.100E-02	1.070E-03
2.600E+00	2.700E+00	3.765E-02	5.200E-04
2.700E+00	2.800E+00	3.422E-02	7.900E-04
2.800E+00	2.900E+00	3.133E-02	1.150E-03
2.900E+00	3.000E+00	2.936E-02	1.520E-03
3.000E+00	3.100E+00	2.812E-02	1.800E-03
3.100E+00	3.200E+00	2.711E-02	1.720E-03
3.200E+00	3.300E+00	2.593E-02	1.100E-03
3.300E+00	3.400E+00	2.458E-02	9.200E-04
3.400E+00	3.500E+00	2.331E-02	2.450E-03
3.500E+00	3.600E+00	2.218E-02	3.820E-03
3.600E+00	3.700E+00	2.086E-02	4.150E-03
3.700E+00	3.800E+00	1.906E-02	3.000E-03
3.800E+00	3.900E+00	1.681E-02	1.060E-03
3.900E+00	4.000E+00	1.446E-02	2.970E-03
4.000E+00	4.200E+00	1.181E-02	3.980E-03
4.200E+00	4.400E+00	1.102E-02	2.800E-03
4.400E+00	4.600E+00	1.184E-02	2.500E-03
4.600E+00	4.800E+00	1.079E-02	3.920E-03
4.800E+00	5.000E+00	8.580E-03	1.871E-03
5.000E+00	5.500E+00	7.651E-03	2.181E-03
5.500E+00	6.000E+00	4.846E-03	1.278E-03
6.000E+00	6.500E+00	6.191E-03	8.500E-04
6.500E+00	7.000E+00	3.833E-03	8.740E-04
7.000E+00	7.500E+00	3.266E-03	7.050E-04
7.500E+00	8.000E+00	2.567E-03	5.300E-04
8.000E+00	8.500E+00	1.749E-03	4.410E-04
8.500E+00	9.000E+00	1.296E-03	2.710E-04
9.000E+00	9.500E+00	9.457E-04	1.895E-04
9.500E+00	1.000E+01	3.341E-04	1.601E-04
1.000E+01	1.050E+01	6.341E-04	1.053E-04
1.050E+01	1.100E+01	1.515E-04	4.950E-05

Table 3.12 Measured gamma-ray leakage spectrum from a W sphere of 40 cm diameter.

Lower Energy [MeV]	Upper Energy [MeV]	Energy Spectrum [/MeV/S.n.]	Error
3.000E-01	4.000E-01	1.420E-01	3.000E-04
4.000E-01	5.000E-01	1.019E-01	3.000E-04
5.000E-01	6.000E-01	1.104E-01	2.000E-04
6.000E-01	7.000E-01	1.494E-01	3.000E-04
7.000E-01	8.000E-01	1.283E-01	2.000E-04
8.000E-01	9.000E-01	1.072E-01	2.000E-04
9.000E-01	1.000E+00	1.074E-01	2.000E-04
1.000E+00	1.100E+00	1.137E-01	2.000E-04
1.100E+00	1.200E+00	1.037E-01	2.000E-04
1.200E+00	1.300E+00	8.927E-02	2.700E-04
1.300E+00	1.400E+00	7.513E-02	2.600E-04
1.400E+00	1.500E+00	6.712E-02	2.700E-04
1.500E+00	1.600E+00	6.409E-02	2.900E-04
1.600E+00	1.700E+00	6.050E-02	2.600E-04
1.700E+00	1.800E+00	5.554E-02	2.600E-04
1.800E+00	1.900E+00	5.191E-02	2.700E-04
1.900E+00	2.000E+00	4.947E-02	2.500E-04
2.000E+00	2.100E+00	4.716E-02	2.600E-04
2.100E+00	2.200E+00	4.489E-02	2.800E-04
2.200E+00	2.300E+00	4.251E-02	2.800E-04
2.300E+00	2.400E+00	3.970E-02	2.900E-04
2.400E+00	2.500E+00	3.642E-02	3.300E-04
2.500E+00	2.600E+00	3.327E-02	2.900E-04
2.600E+00	2.700E+00	3.080E-02	2.500E-04
2.700E+00	2.800E+00	2.889E-02	3.200E-04
2.800E+00	2.900E+00	2.714E-02	3.100E-04
2.900E+00	3.000E+00	2.537E-02	2.700E-04
3.000E+00	3.100E+00	2.354E-02	3.000E-04
3.100E+00	3.200E+00	2.164E-02	3.000E-04
3.200E+00	3.300E+00	1.974E-02	2.600E-04
3.300E+00	3.400E+00	1.792E-02	2.600E-04
3.400E+00	3.500E+00	1.626E-02	3.300E-04
3.500E+00	3.600E+00	1.478E-02	3.800E-04
3.600E+00	3.700E+00	1.345E-02	3.900E-04
3.700E+00	3.800E+00	1.222E-02	3.400E-04
3.800E+00	3.900E+00	1.120E-02	2.700E-04
3.900E+00	4.000E+00	1.048E-02	3.200E-04
4.000E+00	4.100E+00	9.991E-03	4.270E-04
4.100E+00	4.200E+00	9.499E-03	5.370E-04
4.200E+00	4.300E+00	8.719E-03	6.660E-04
4.300E+00	4.400E+00	7.607E-03	6.960E-04
4.400E+00	4.500E+00	6.430E-03	5.410E-04
4.500E+00	4.600E+00	5.466E-03	4.220E-04
4.600E+00	4.700E+00	4.880E-03	7.940E-04
4.700E+00	4.800E+00	4.757E-03	1.225E-03
4.800E+00	4.900E+00	4.945E-03	1.305E-03
4.900E+00	5.000E+00	5.061E-03	8.550E-04
5.000E+00	5.500E+00	3.586E-03	5.960E-04
5.500E+00	6.000E+00	2.673E-03	4.880E-04
6.000E+00	6.500E+00	2.548E-03	2.790E-04
6.500E+00	7.000E+00	1.277E-03	3.730E-04
7.000E+00	7.500E+00	1.651E-03	3.420E-04
7.500E+00	8.000E+00	9.984E-04	2.980E-04
8.000E+00	8.500E+00	1.113E-03	2.650E-04
8.500E+00	9.000E+00	4.566E-04	1.861E-04
9.000E+00	9.500E+00	4.841E-04	1.894E-04
9.500E+00	1.000E+01	2.774E-04	1.971E-04
1.000E+01	1.050E+01	3.672E-05	1.720E-04
1.050E+01	1.100E+01	1.371E-04	1.412E-04

Table 3.13 Measured gamma-ray leakage spectrum from a Pb sphere of 40 cm diameter.

Lower Energy [MeV]	Upper Energy [MeV]	Energy Spectrum [./MeV/S.n.]	Error
6.000E-01	7.000E-01	6.386E-02	6.190E-03
7.000E-01	8.000E-01	5.678E-02	2.380E-03
8.000E-01	9.000E-01	7.840E-02	6.100E-04
9.000E-01	1.000E+00	6.535E-02	2.000E-04
1.000E+00	1.100E+00	4.269E-02	2.100E-04
1.100E+00	1.200E+00	3.377E-02	3.400E-04
1.200E+00	1.300E+00	3.107E-02	4.600E-04
1.300E+00	1.400E+00	2.835E-02	3.700E-04
1.400E+00	1.500E+00	2.564E-02	2.000E-04
1.500E+00	1.600E+00	2.423E-02	4.200E-04
1.600E+00	1.700E+00	2.425E-02	5.500E-04
1.700E+00	1.800E+00	2.478E-02	4.900E-04
1.800E+00	1.900E+00	2.392E-02	3.600E-04
1.900E+00	2.000E+00	2.157E-02	2.200E-04
2.000E+00	2.100E+00	1.946E-02	2.100E-04
2.100E+00	2.200E+00	1.780E-02	3.200E-04
2.200E+00	2.300E+00	1.599E-02	4.400E-04
2.300E+00	2.400E+00	1.511E-02	5.700E-04
2.400E+00	2.500E+00	1.687E-02	5.800E-04
2.500E+00	2.600E+00	2.064E-02	4.000E-04
2.600E+00	2.700E+00	2.281E-02	1.900E-04
2.700E+00	2.800E+00	2.048E-02	3.200E-04
2.800E+00	2.900E+00	1.503E-02	5.200E-04
2.900E+00	3.000E+00	1.006E-02	6.200E-04
3.000E+00	3.100E+00	7.349E-03	5.930E-04
3.100E+00	3.200E+00	6.336E-03	4.840E-04
3.200E+00	3.300E+00	5.976E-03	3.640E-04
3.300E+00	3.400E+00	5.771E-03	3.750E-04
3.400E+00	3.500E+00	5.690E-03	7.600E-04
3.500E+00	3.600E+00	5.744E-03	1.231E-03
3.600E+00	3.700E+00	5.791E-03	1.444E-03
3.700E+00	3.800E+00	5.662E-03	1.161E-03
3.800E+00	3.900E+00	5.352E-03	5.060E-04
3.900E+00	4.000E+00	4.994E-03	8.320E-04
4.000E+00	4.200E+00	4.587E-03	1.288E-03
4.200E+00	4.400E+00	4.271E-03	9.750E-04
4.400E+00	4.600E+00	3.869E-03	7.240E-04
4.600E+00	4.800E+00	3.150E-03	1.100E-03
4.800E+00	5.000E+00	2.796E-03	5.080E-04
5.000E+00	5.500E+00	1.653E-03	5.400E-04
5.500E+00	6.000E+00	1.040E-03	3.200E-04
6.000E+00	6.500E+00	1.147E-03	2.220E-04
6.500E+00	7.000E+00	1.103E-03	1.930E-04
7.000E+00	7.500E+00	4.657E-04	1.426E-04
7.500E+00	8.000E+00	3.516E-04	1.086E-04
8.000E+00	8.500E+00	3.173E-04	9.390E-05
8.500E+00	9.000E+00	1.219E-04	5.730E-05
9.000E+00	9.500E+00	2.174E-04	3.890E-05
9.500E+00	1.000E+01	1.072E-04	2.490E-05
1.000E+01	1.050E+01	5.485E-05	1.940E-05
1.050E+01	1.100E+01	2.378E-05	1.000E-05

Table 3.14 Measured gamma-ray leakage spectrum from a LiF sphere of 40 cm diameter.

Lower Energy [MeV]	Upper Energy [MeV]	Energy Spectrum [/MeV/S.n.]	Error
5.000E-01	6.000E-01	2.606E-01	6.300E-03
6.000E-01	7.000E-01	1.303E-01	2.500E-03
7.000E-01	8.000E-01	1.259E-01	1.100E-03
8.000E-01	9.000E-01	1.480E-01	4.000E-04
9.000E-01	1.000E+00	1.274E-01	3.000E-04
1.000E+00	1.100E+00	1.008E-01	4.000E-04
1.100E+00	1.200E+00	1.025E-01	9.000E-04
1.200E+00	1.300E+00	1.226E-01	1.500E-03
1.300E+00	1.400E+00	1.288E-01	1.200E-03
1.400E+00	1.500E+00	1.006E-01	4.000E-04
1.500E+00	1.600E+00	6.201E-02	1.350E-03
1.600E+00	1.700E+00	3.994E-02	1.700E-03
1.700E+00	1.800E+00	3.388E-02	1.360E-03
1.800E+00	1.900E+00	3.465E-02	8.650E-04
1.900E+00	2.000E+00	3.617E-02	5.400E-04
2.000E+00	2.100E+00	3.452E-02	6.400E-04
2.100E+00	2.200E+00	2.983E-02	9.200E-04
2.200E+00	2.300E+00	2.582E-02	1.250E-03
2.300E+00	2.400E+00	2.519E-02	1.620E-03
2.400E+00	2.500E+00	2.758E-02	1.670E-03
2.500E+00	2.600E+00	3.022E-02	1.120E-03
2.600E+00	2.700E+00	2.966E-02	4.800E-04
2.700E+00	2.800E+00	2.524E-02	7.500E-04
2.800E+00	2.900E+00	1.997E-02	1.190E-03
2.900E+00	3.000E+00	1.693E-02	1.590E-03
3.000E+00	3.100E+00	1.651E-02	1.860E-03
3.100E+00	3.200E+00	1.728E-02	1.770E-03
3.200E+00	3.300E+00	1.795E-02	1.110E-03
3.300E+00	3.400E+00	1.797E-02	9.500E-04
3.400E+00	3.500E+00	1.748E-02	2.580E-03
3.500E+00	3.600E+00	1.682E-02	4.050E-03
3.600E+00	3.700E+00	1.617E-02	4.400E-03
3.700E+00	3.800E+00	1.537E-02	3.190E-03
3.800E+00	3.900E+00	1.427E-02	1.080E-03
3.900E+00	4.000E+00	1.305E-02	3.070E-03
4.000E+00	4.500E+00	1.362E-02	2.100E-03
4.500E+00	5.000E+00	1.337E-02	2.030E-03
5.000E+00	5.500E+00	1.171E-02	2.220E-03
5.500E+00	6.000E+00	6.479E-03	1.116E-03
6.000E+00	6.500E+00	4.436E-03	7.570E-04
6.500E+00	7.000E+00	3.308E-03	7.880E-04
7.000E+00	7.500E+00	2.820E-03	6.360E-04
7.500E+00	8.000E+00	1.950E-03	4.830E-04
8.000E+00	8.500E+00	1.935E-03	4.070E-04
8.500E+00	9.000E+00	8.525E-04	2.534E-04
9.000E+00	9.500E+00	8.657E-04	1.765E-04
9.500E+00	1.000E+01	4.385E-04	1.515E-04
1.000E+01	1.050E+01	3.208E-04	9.910E-05
1.050E+01	1.100E+01	1.246E-04	4.790E-05

Table 3.15 Measured gamma-ray leakage spectrum from a CF<sub>2</sub> sphere of 40 cm diameter.

Lower Energy [MeV]	Upper Energy [MeV]	Energy Spectrum [/MeV/S.n.]	Error
2.000E-01	3.000E-01	6.650E-02	4.400E-04
3.000E-01	4.000E-01	1.318E-01	4.000E-04
4.000E-01	5.000E-01	1.142E-01	4.000E-04
5.000E-01	6.000E-01	9.011E-02	3.900E-04
6.000E-01	7.000E-01	1.199E-01	4.000E-04
7.000E-01	8.000E-01	1.461E-01	4.000E-04
8.000E-01	9.000E-01	1.099E-01	3.000E-04
9.000E-01	1.000E+00	8.152E-02	3.800E-04
1.000E+00	1.100E+00	9.708E-02	4.300E-04
1.100E+00	1.200E+00	1.253E-01	4.000E-04
1.200E+00	1.300E+00	1.225E-01	4.000E-04
1.300E+00	1.400E+00	8.449E-02	3.800E-04
1.400E+00	1.500E+00	5.035E-02	4.000E-04
1.500E+00	1.600E+00	3.696E-02	4.500E-04
1.600E+00	1.700E+00	3.523E-02	3.900E-04
1.700E+00	1.800E+00	3.896E-02	4.000E-04
1.800E+00	1.900E+00	4.255E-02	4.200E-04
1.900E+00	2.000E+00	3.834E-02	3.800E-04
2.000E+00	2.100E+00	2.962E-02	4.000E-04
2.100E+00	2.200E+00	2.421E-02	4.700E-04
2.200E+00	2.300E+00	2.401E-02	4.800E-04
2.300E+00	2.400E+00	2.762E-02	5.400E-04
2.400E+00	2.500E+00	3.092E-02	6.300E-04
2.500E+00	2.600E+00	2.905E-02	5.300E-04
2.600E+00	2.700E+00	2.287E-02	4.400E-04
2.700E+00	2.800E+00	1.765E-02	6.200E-04
2.800E+00	2.900E+00	1.601E-02	6.100E-04
2.900E+00	3.000E+00	1.679E-02	5.500E-04
3.000E+00	3.100E+00	1.806E-02	6.300E-04
3.100E+00	3.200E+00	1.865E-02	6.400E-04
3.200E+00	3.300E+00	1.811E-02	5.900E-04
3.300E+00	3.400E+00	1.701E-02	6.200E-04
3.400E+00	3.500E+00	1.672E-02	7.500E-04
3.500E+00	3.600E+00	1.779E-02	8.700E-04
3.600E+00	3.700E+00	1.915E-02	9.000E-04
3.700E+00	3.800E+00	1.963E-02	8.000E-04
3.800E+00	3.900E+00	1.969E-02	6.800E-04
3.900E+00	4.000E+00	2.157E-02	7.500E-04
4.000E+00	4.100E+00	2.777E-02	9.600E-04
4.100E+00	4.200E+00	3.779E-02	1.230E-03
4.200E+00	4.300E+00	4.642E-02	1.490E-03
4.300E+00	4.400E+00	4.749E-02	1.500E-03
4.400E+00	4.500E+00	3.982E-02	1.120E-03
4.500E+00	4.600E+00	2.822E-02	9.100E-04
4.600E+00	4.700E+00	1.851E-02	1.700E-03
4.700E+00	4.800E+00	1.338E-02	2.660E-03
4.800E+00	4.900E+00	1.254E-02	2.730E-03
4.900E+00	5.000E+00	1.454E-02	1.730E-03
5.000E+00	5.500E+00	1.614E-02	1.270E-03
5.500E+00	6.000E+00	5.416E-03	1.041E-03
6.000E+00	6.500E+00	6.630E-03	5.740E-04
6.500E+00	7.000E+00	3.436E-03	7.680E-04
7.000E+00	7.500E+00	4.963E-03	6.750E-04
7.500E+00	8.000E+00	6.290E-04	5.857E-04
8.000E+00	8.500E+00	3.458E-03	5.240E-04
8.500E+00	9.000E+00	1.123E-03	3.450E-04
9.000E+00	9.500E+00	7.546E-04	3.384E-04
9.500E+00	1.000E+01	9.663E-04	3.498E-04
1.000E+01	1.050E+01	2.017E-04	2.984E-04
1.050E+01	1.100E+01	2.381E-04	2.521E-04



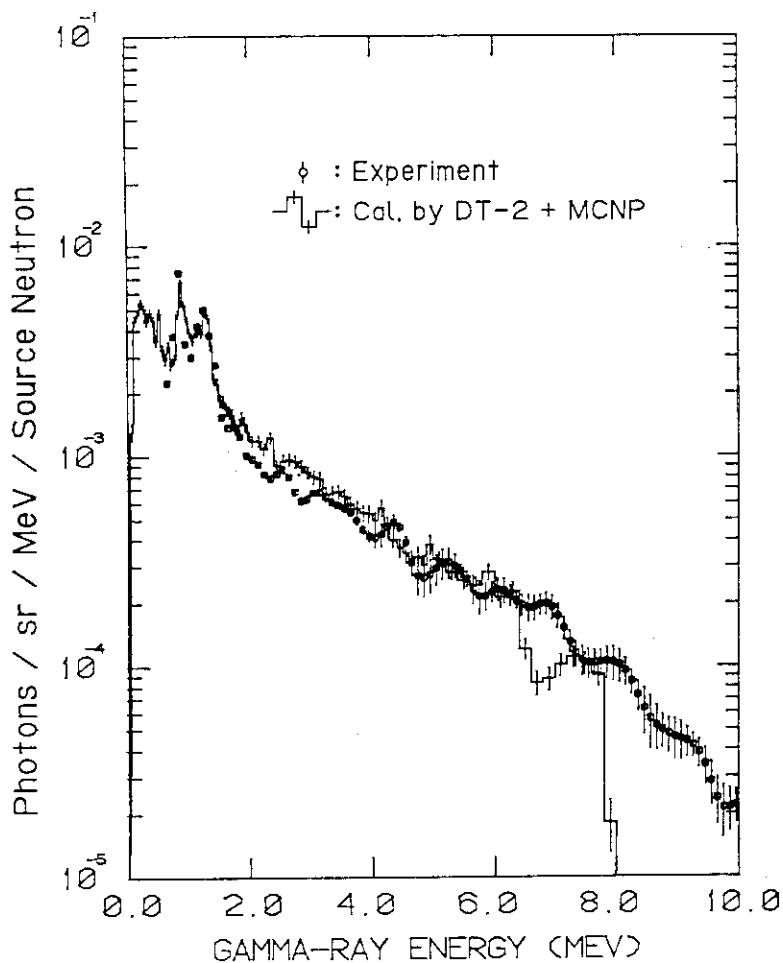


Fig. 3.1 Gamma-ray emission spectrum from the neutron source.

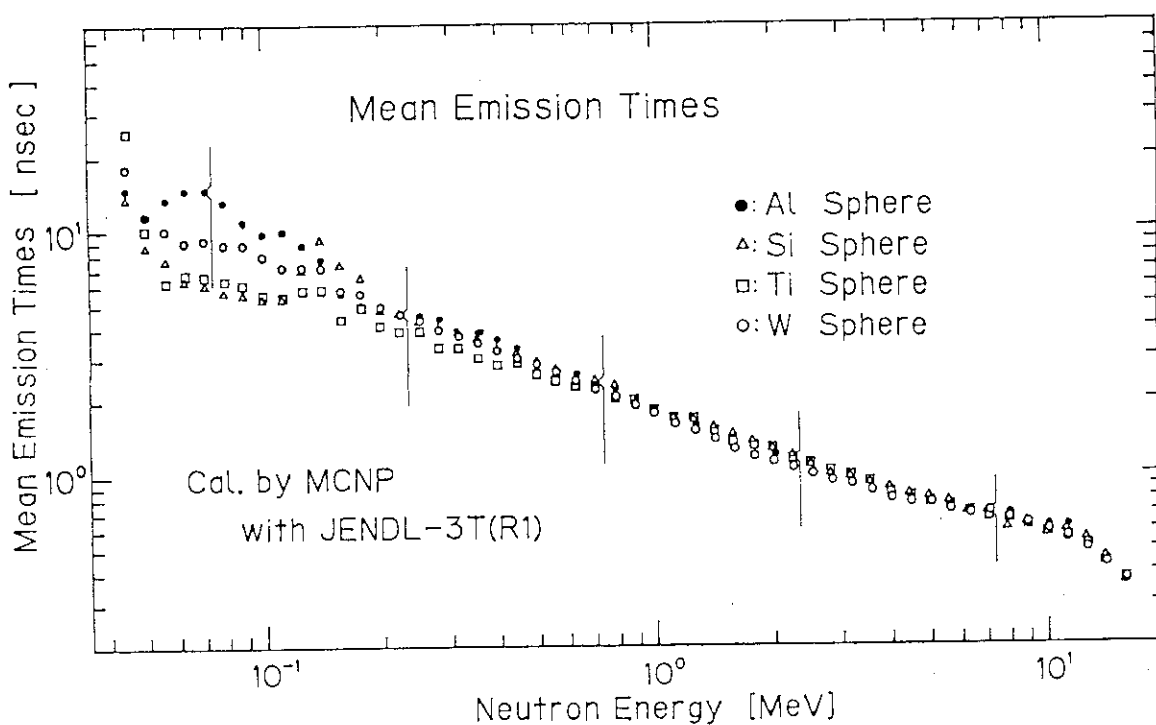


Fig. 3.2 Mean-emission-times from the sphere of 40 cm in diameter.

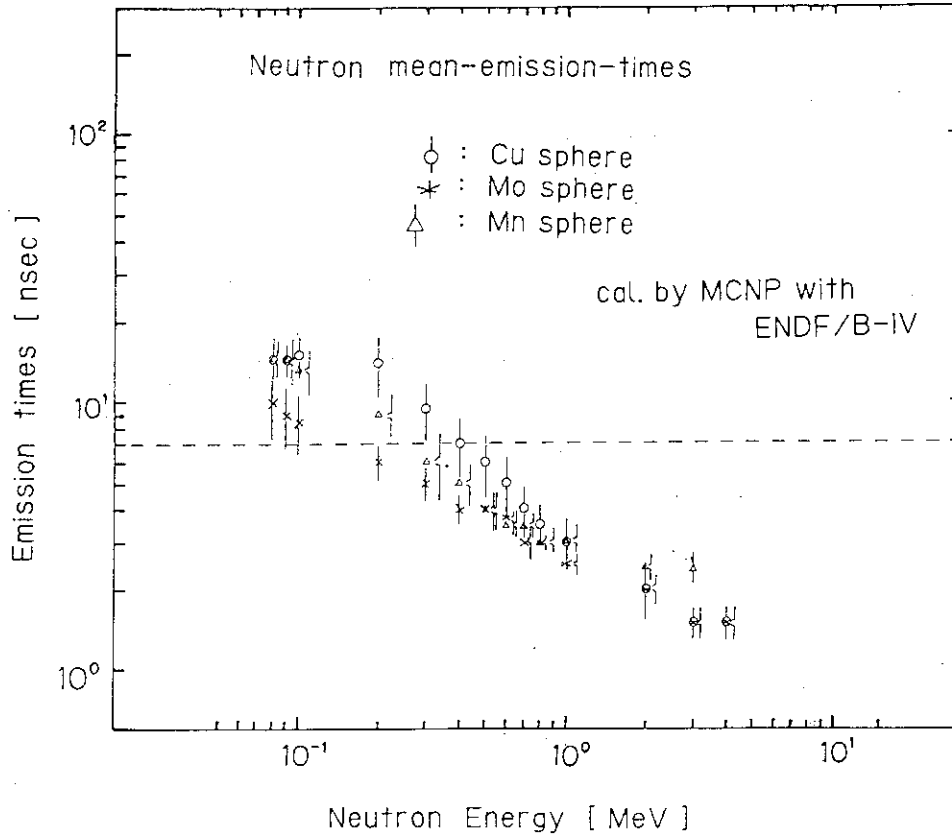


Fig. 3.3 Mean-emission-times from the sphere of 60 cm in diameter.

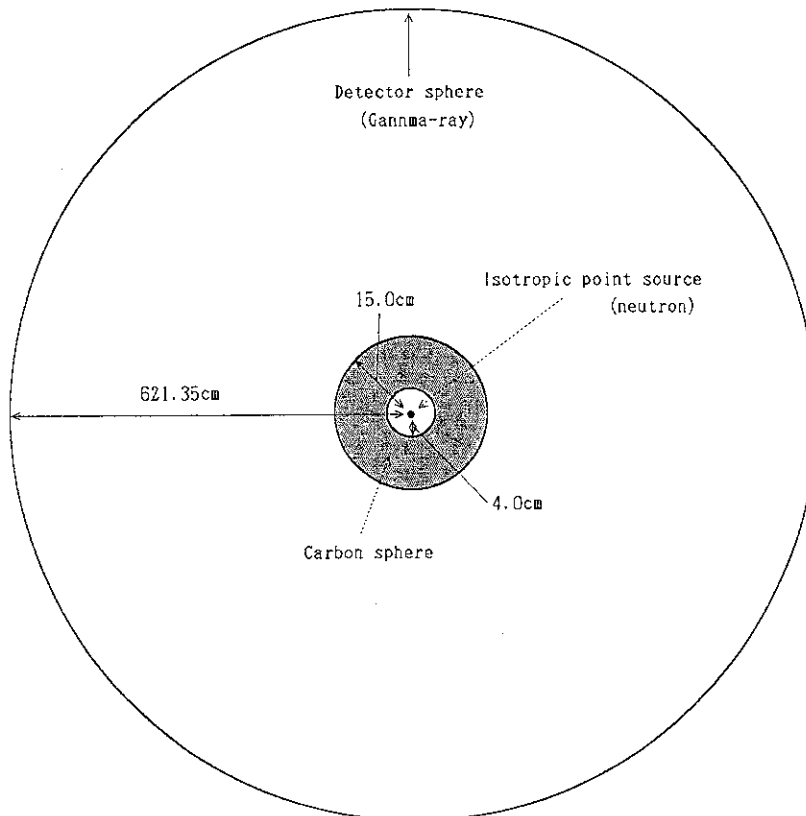


Fig. 3.4 Schematics of the calculation model.

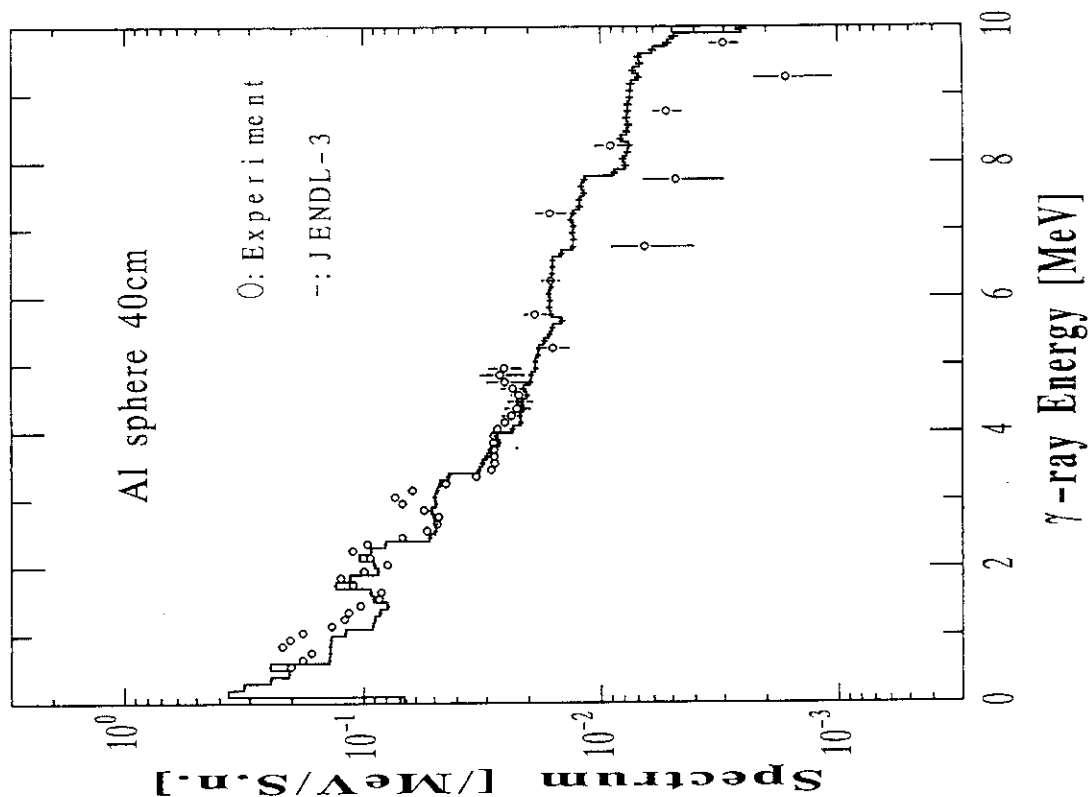


Fig. 3.6 Energy spectra from Al sphere.

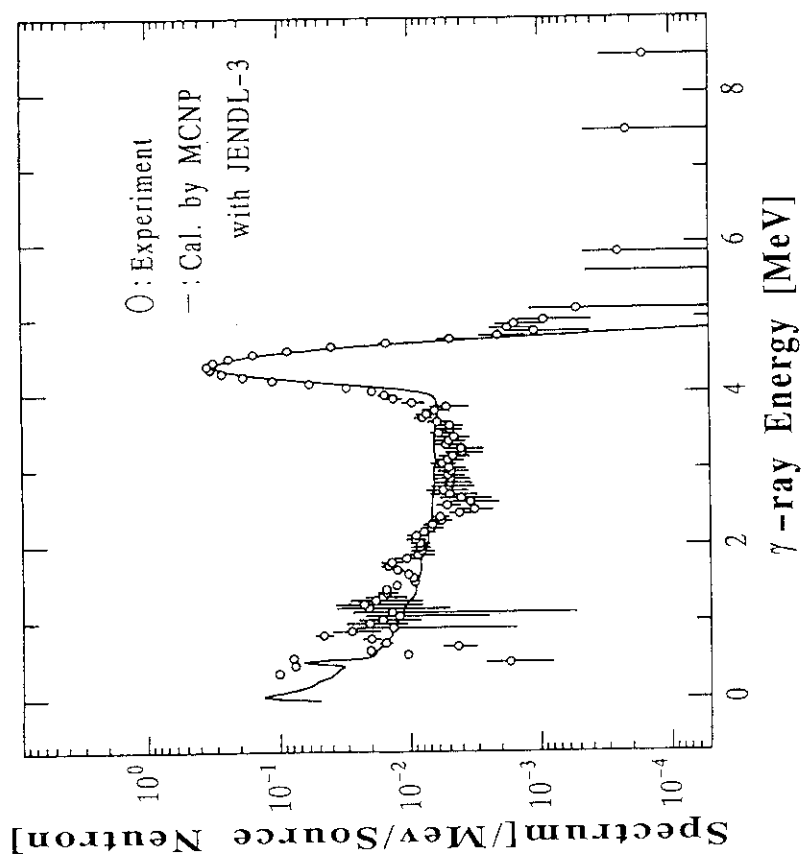


Fig. 3.5 Calculated energy spectrum of leakage gamma-ray from the graphite sphere in comparison with the measured spectrum.

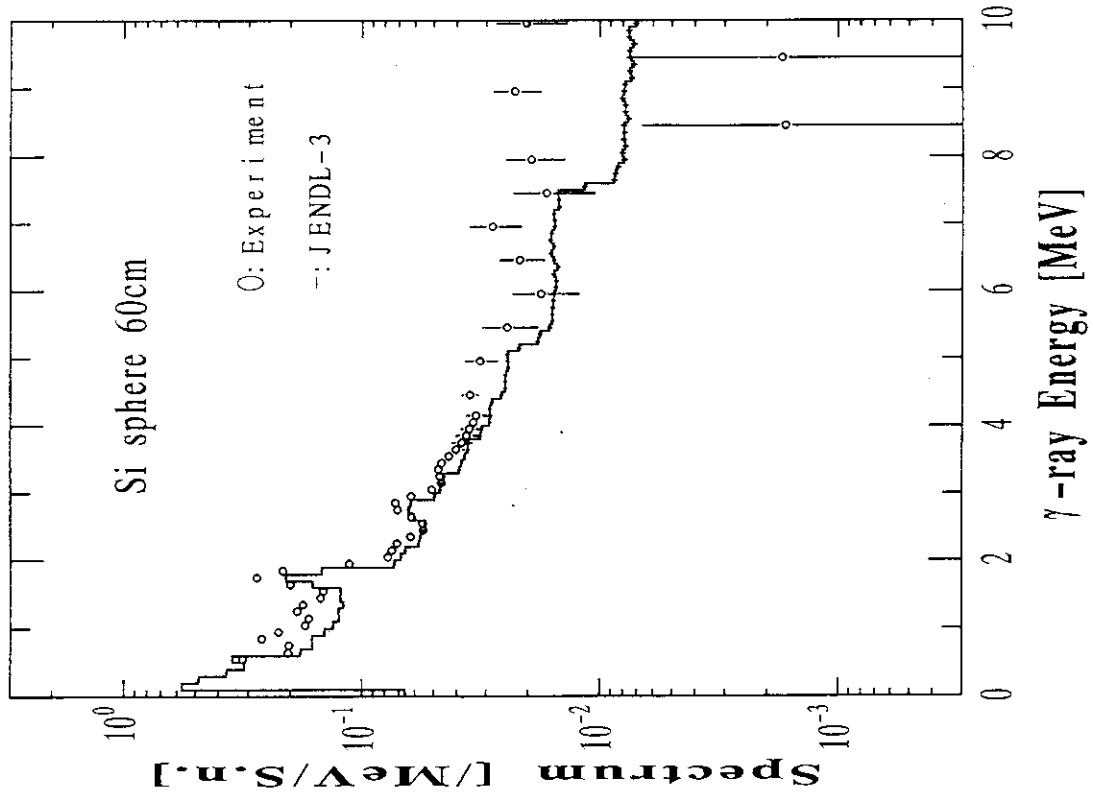


Fig. 3.8 Energy spectra from Si sphere of 60 cm diameter.

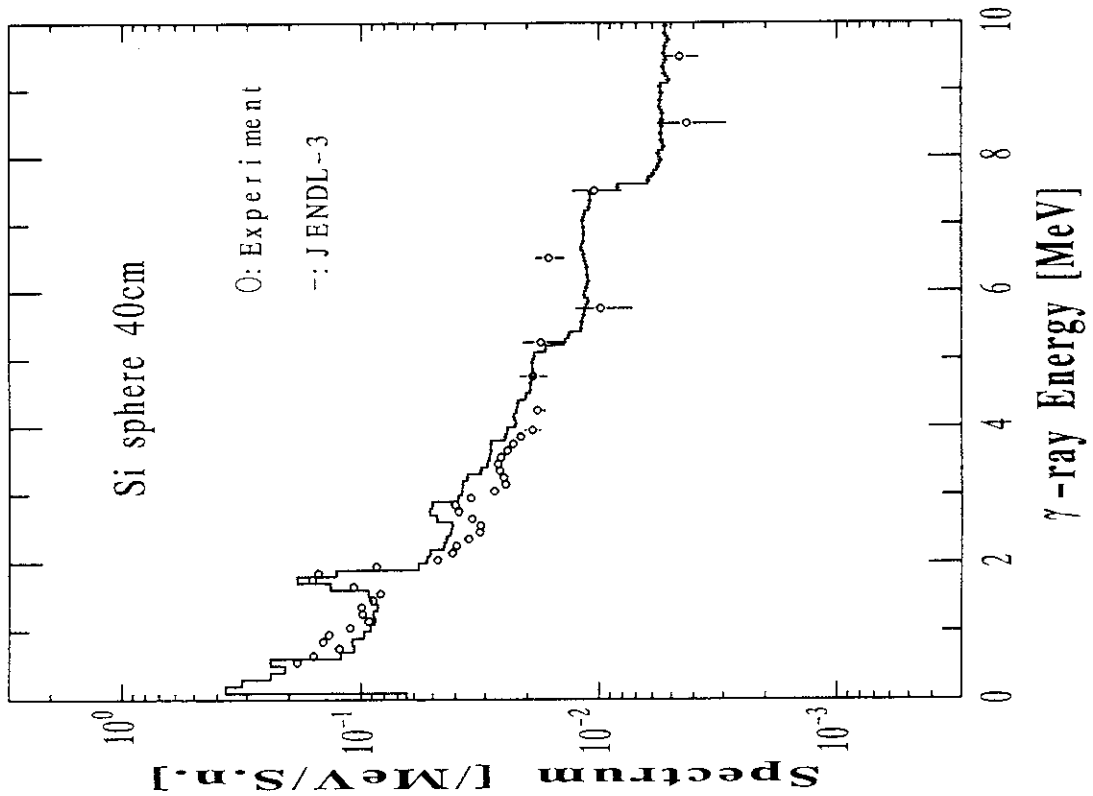


Fig. 3.7 Energy spectra from Si sphere of 40 cm diameter.

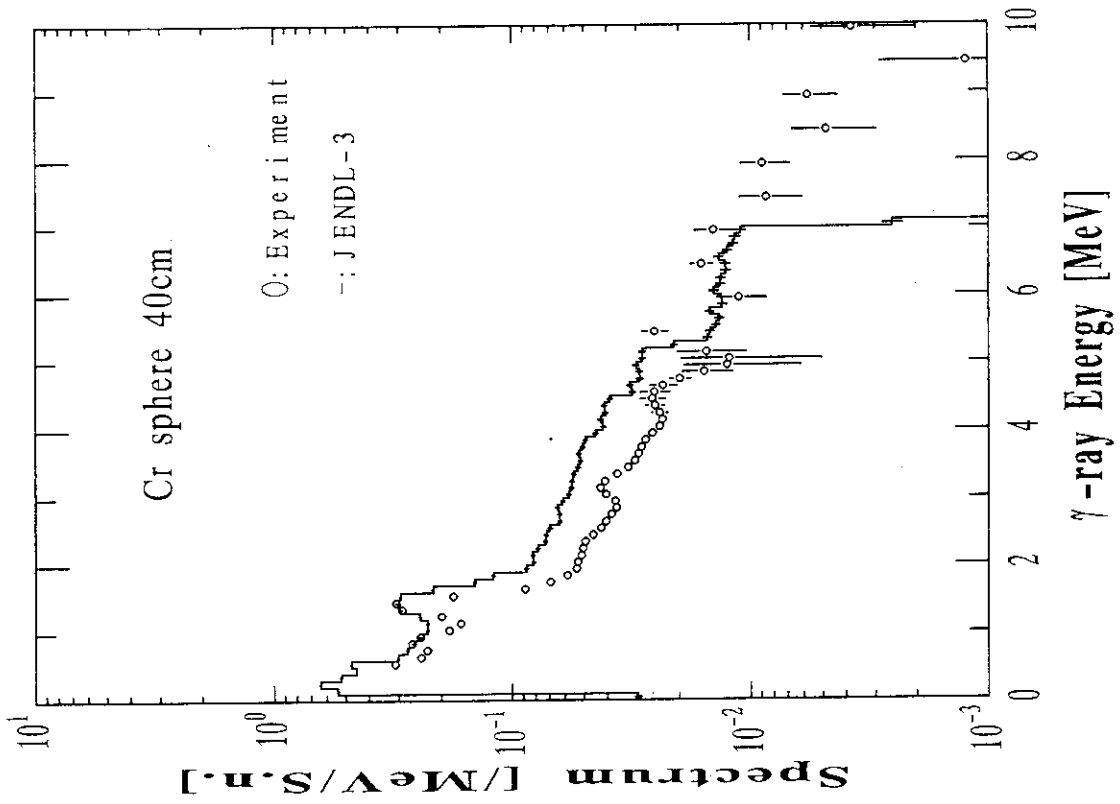


Fig. 3.10 Energy spectra from Cr sphere.

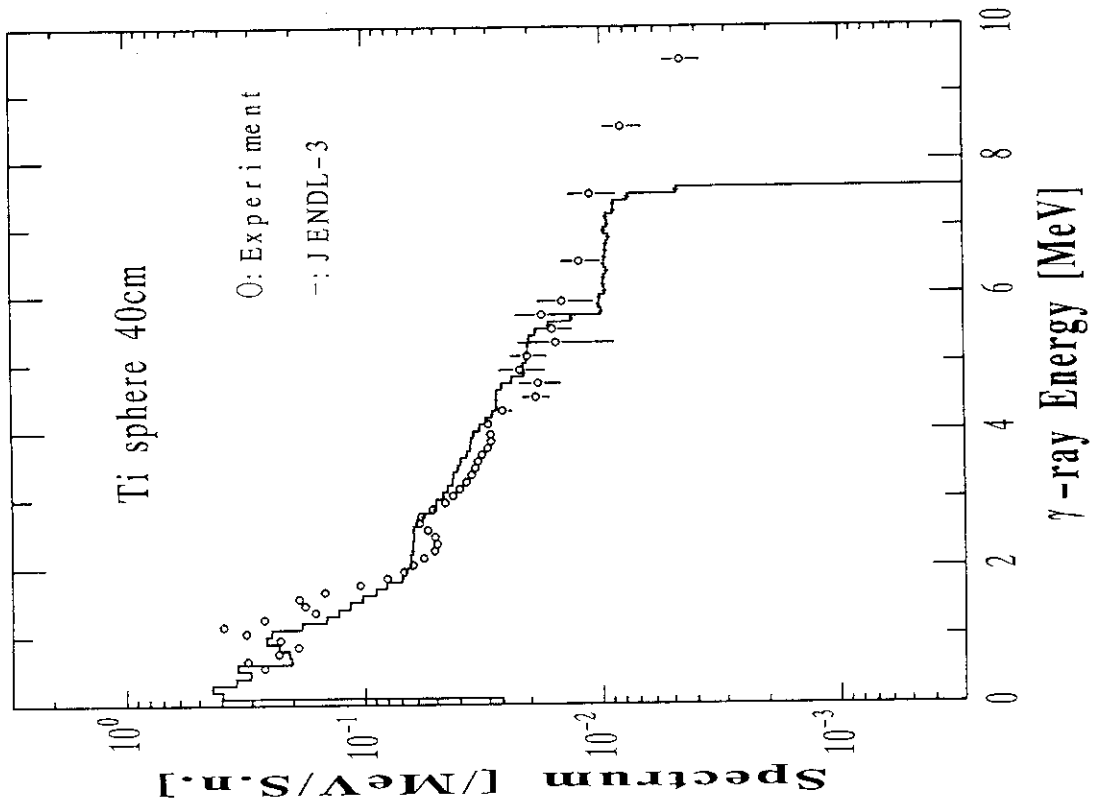


Fig. 3.9 Energy spectra from Ti sphere.

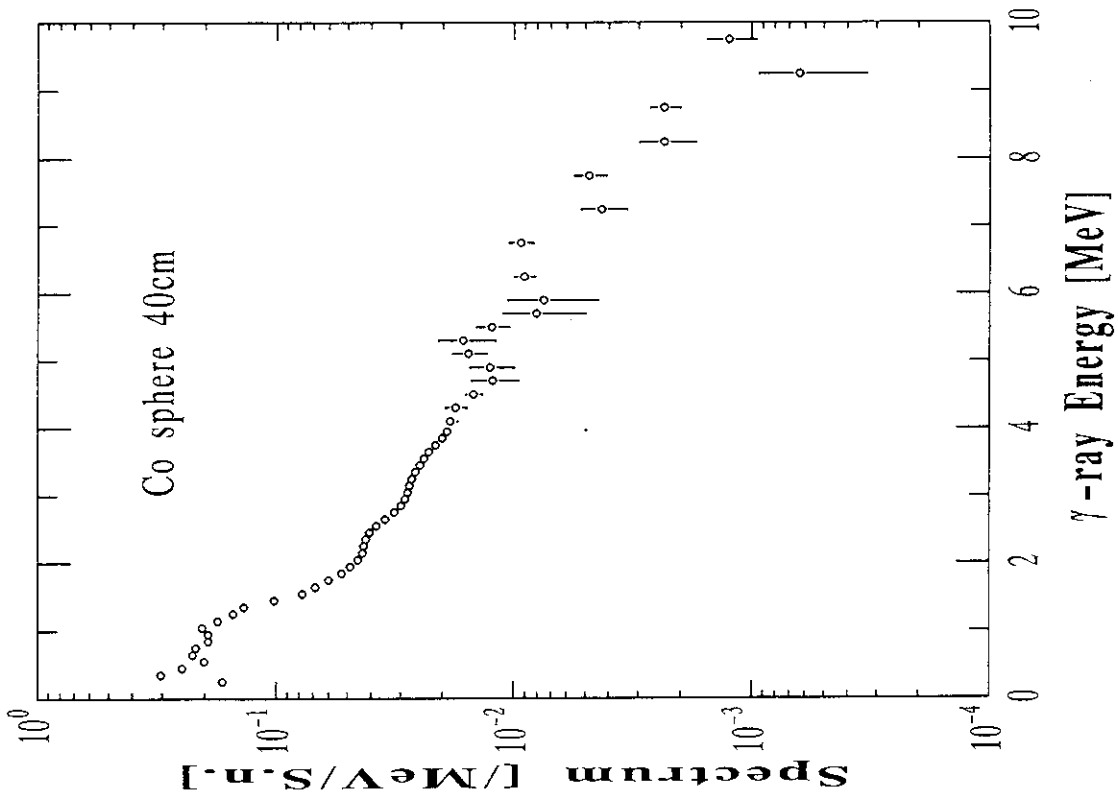


Fig. 3.12 Energy spectrum from Co sphere.

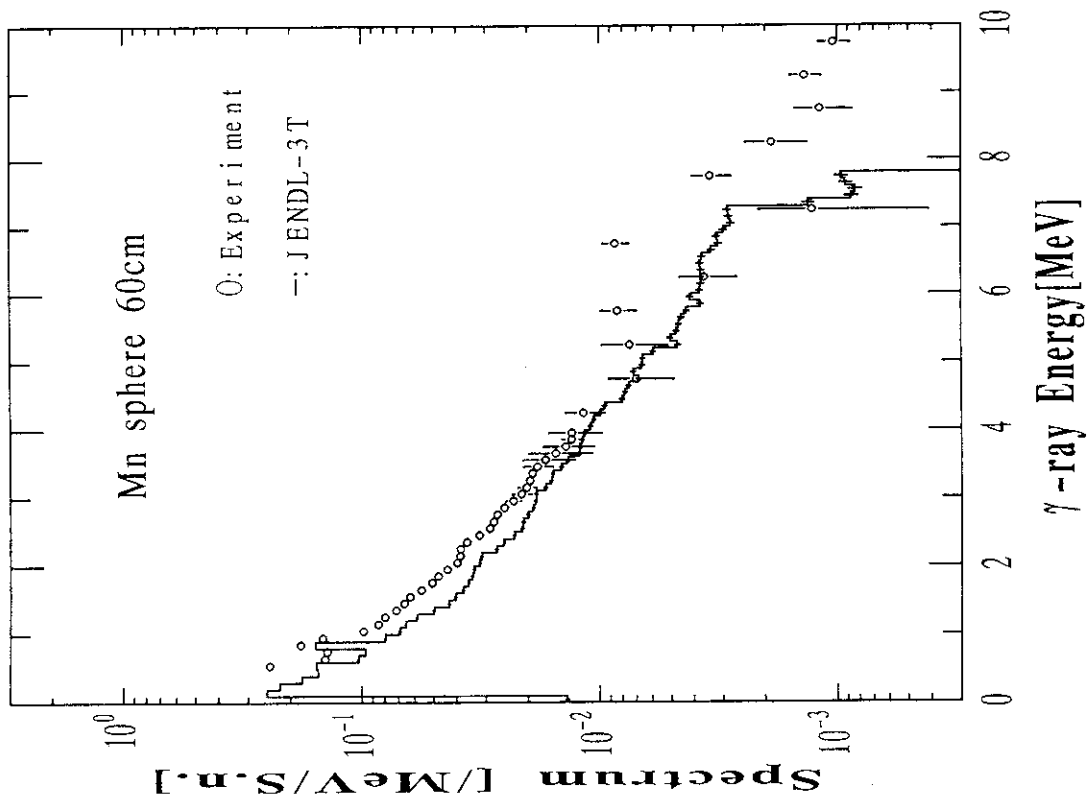


Fig. 3.11 Energy spectra from Mn sphere.

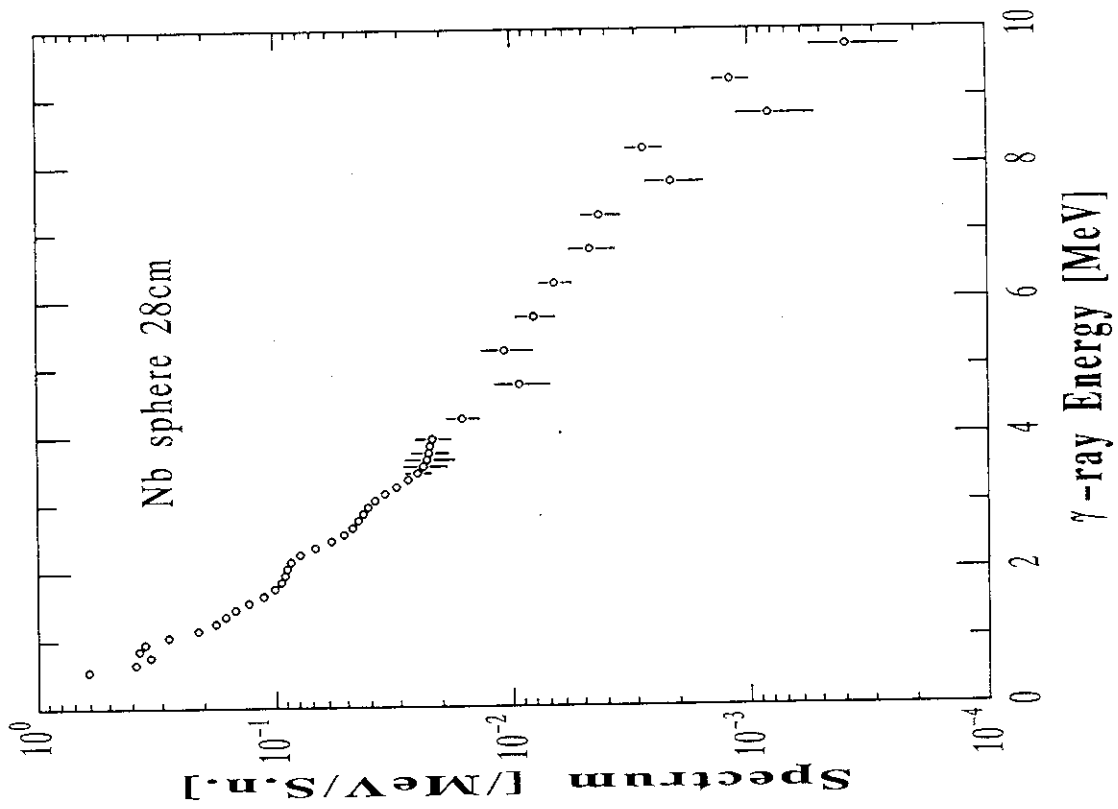


Fig. 3.14 Energy spectrum from Nb sphere.

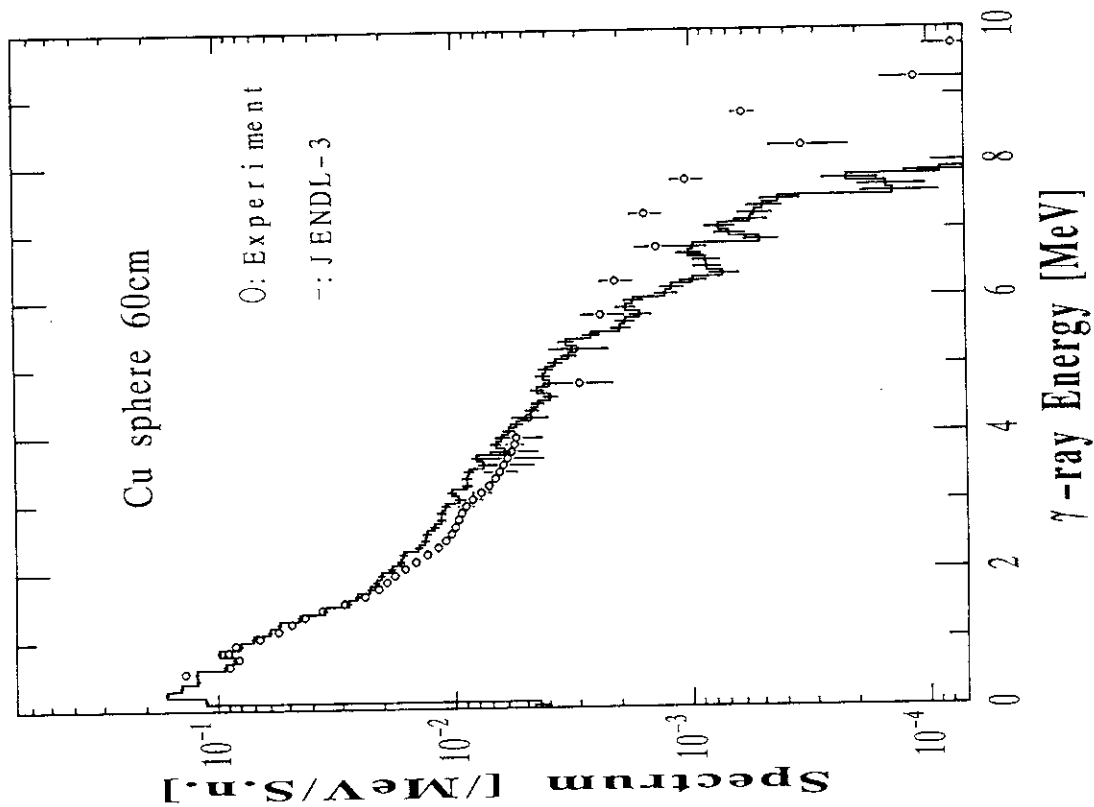


Fig. 3.13 Energy spectra from Cu sphere.

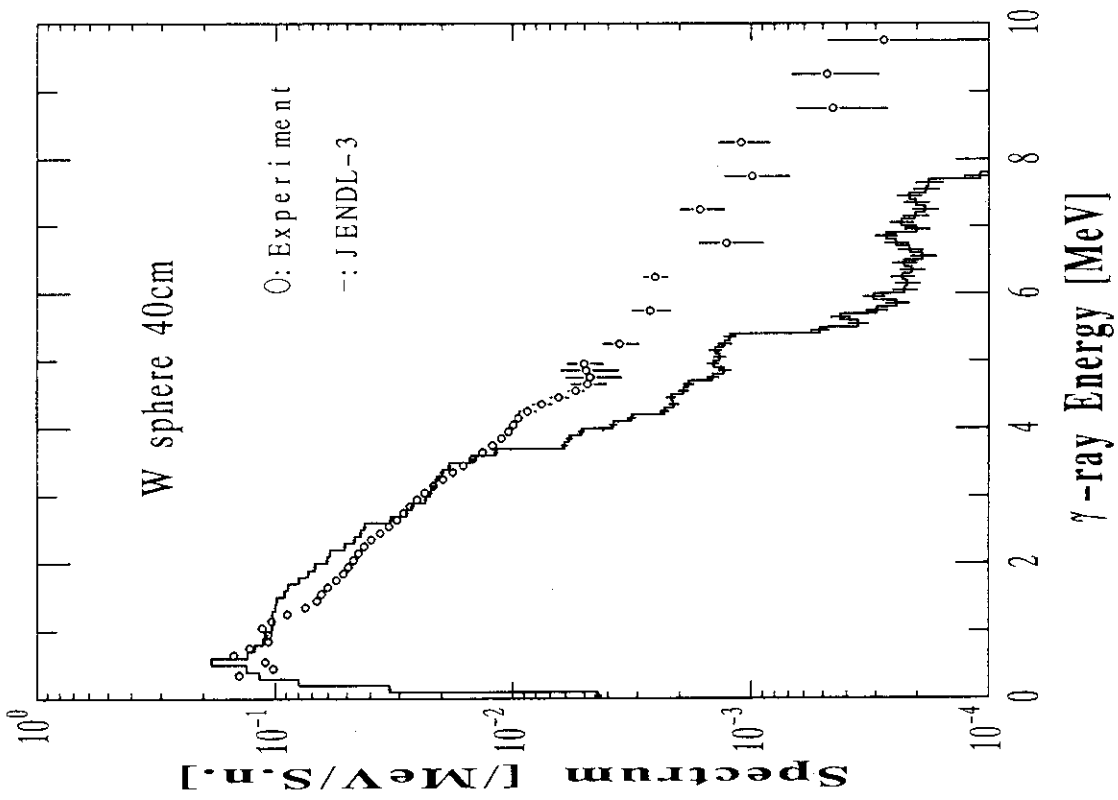


Fig. 3.16 Energy spectra from W sphere.

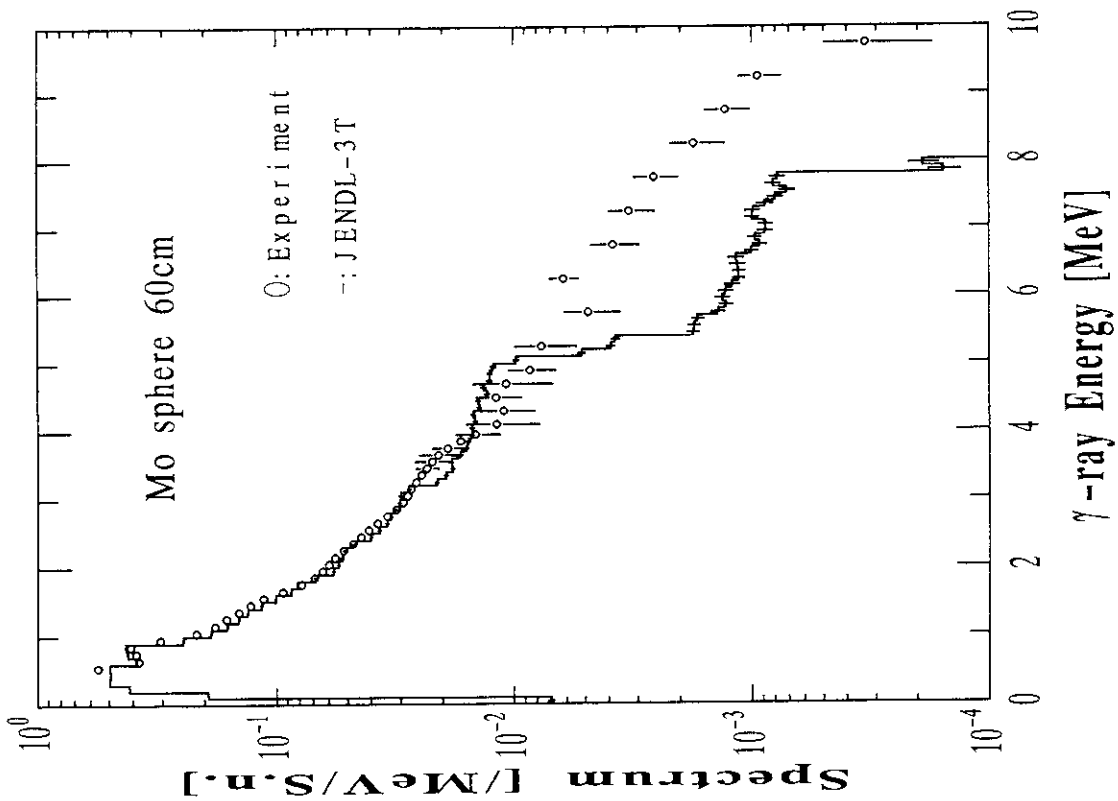


Fig. 3.15 Energy spectra from Mo sphere.



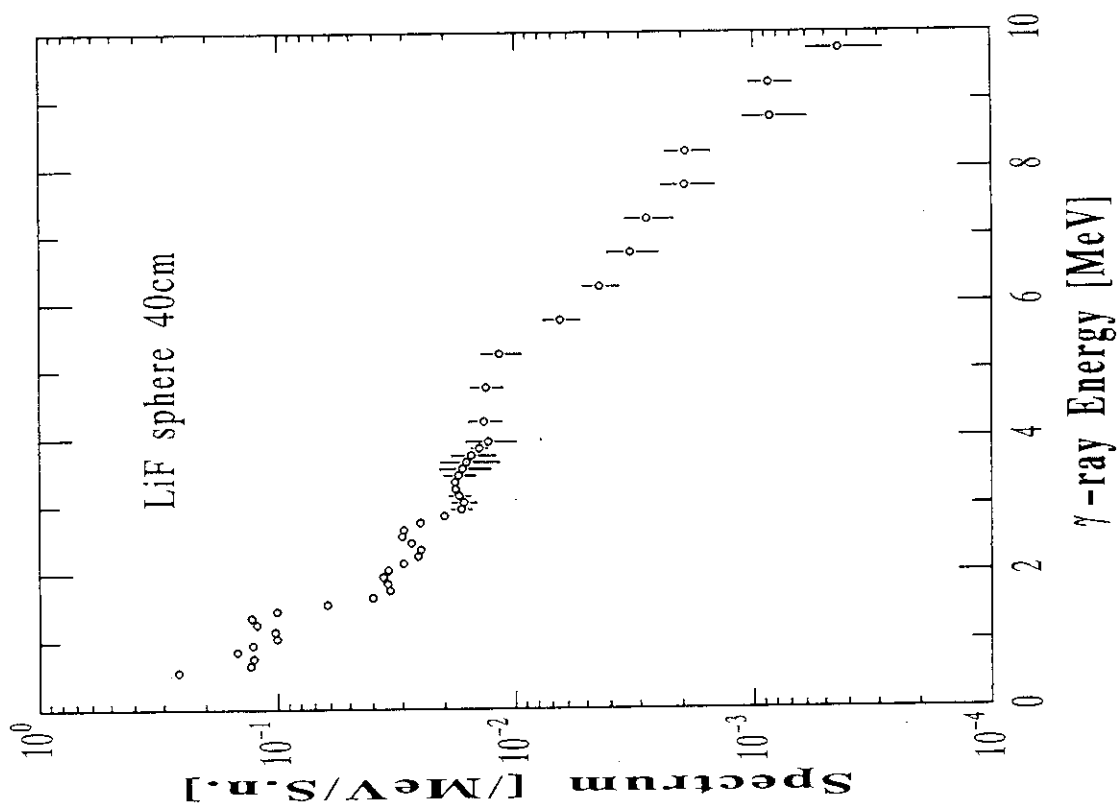


Fig. 3.18 Energy spectrum from LiF sphere.

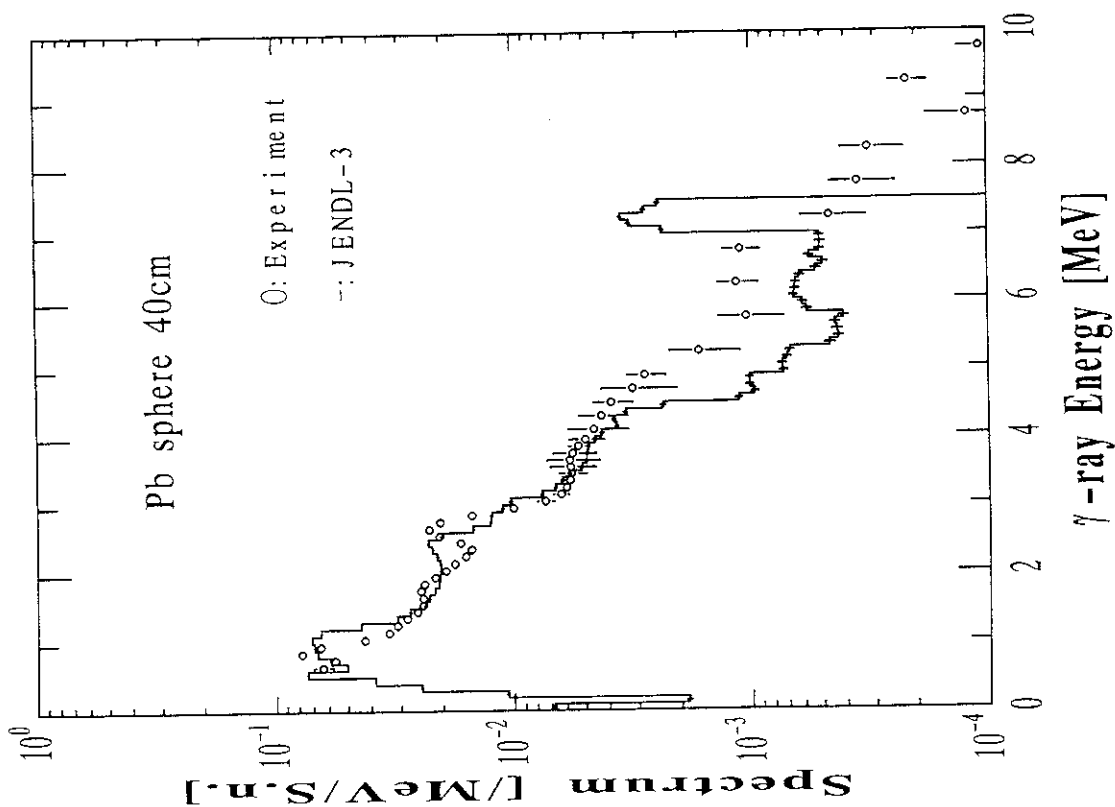


Fig. 3.17 Energy spectra from Pb sphere.

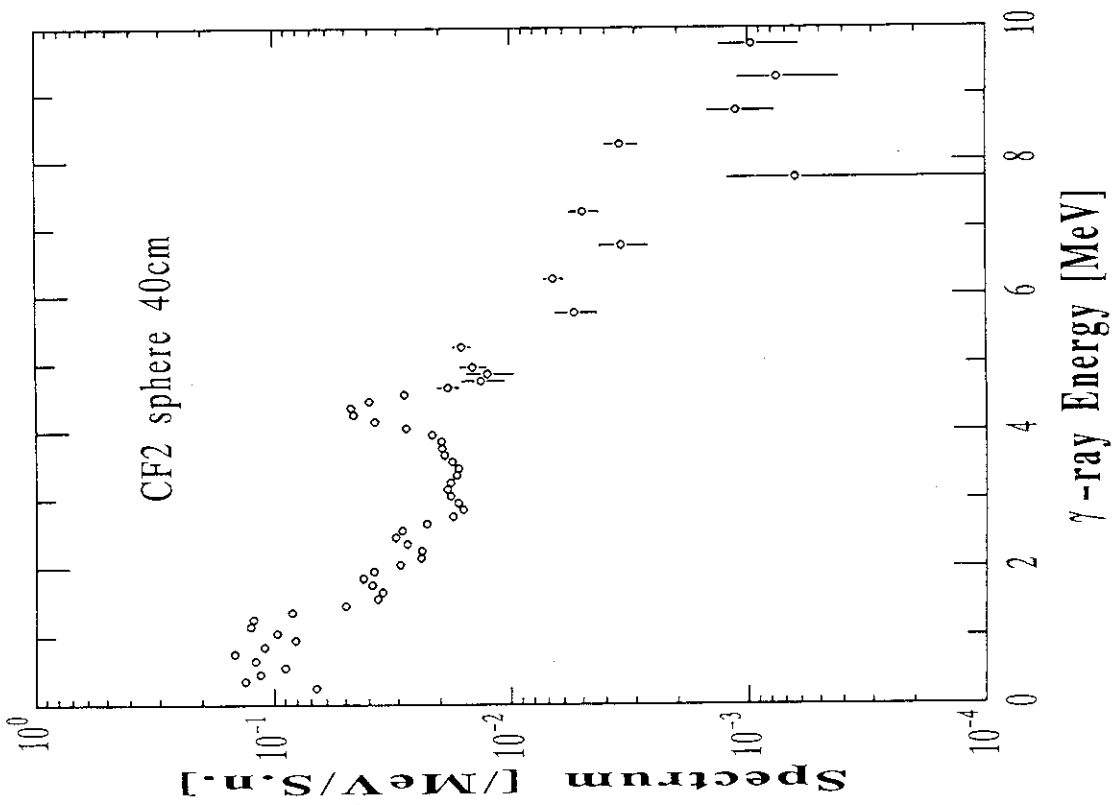


Fig. 3.19 Energy spectrum from CF<sub>2</sub> sphere.

```

TALLY CARD FOR BE EXPERIMENT ANALYSIS BY MCNP JENDL3 (1991,9)
C ***** CELL CARDS *****
1      0      -2
2      1     -1.800     -1  2
3      0      -3  1
4      0      3

C ***** SURFACE CARDS *****
1      SO     15.00
2      SO      4.0
3      SO    621.35

C ***** DATA CARDS *****
MODE   N P
SDEF   ERG=D1 POS=0.0 0.0 0.0
IMP:N   1 1 1 0
IMP:P   1 1 1 0
C ***** ENERGY BIN FOR SOURCE NEUTRON ***
SI1 H  0.10580E+01 0.11620E+01 0.12750E+01 0.14000E+01 0.15420E+01
        0.16980E+01 0.18710E+01 0.20610E+01 0.22700E+01 0.25000E+01
        0.27040E+01 0.29240E+01 0.31620E+01 0.34190E+01 0.36990E+01
        0.40000E+01 0.41650E+01 0.43370E+01 0.45160E+01 0.47030E+01
        0.48970E+01 0.50990E+01 0.53100E+01 0.55290E+01 0.57570E+01
        0.59950E+01 0.62420E+01 0.65000E+01 0.67650E+01 0.70410E+01
        0.73270E+01 0.76270E+01 0.79380E+01 0.82610E+01 0.85980E+01
        0.89490E+01 0.93140E+01 0.96930E+01 0.10089E+02 0.10500E+02
        0.10817E+02 0.11143E+02 0.11479E+02 0.11825E+02 0.12182E+02
        0.12549E+02 0.12775E+02 0.13005E+02 0.13239E+02 0.13477E+02
        0.13720E+02 0.13967E+02 0.14218E+02 0.14474E+02 0.14735E+02
        0.15000E+02 0.15270E+02 0.15545E+02 0.15825E+02 0.16110E+02
        0.16399E+02
C ***** SOURCE DISTRIBUTION *****
SP1 D  0.00000E+00 0.43294E-01 0.32540E-01 0.42945E-01 0.40272E-01
        0.27926E-01 0.34186E-01 0.34042E-01 0.23955E-01 0.31569E-01
        0.43807E-01 0.41738E-01 0.17916E-01 0.17044E-01 0.13307E-01
        0.13417E-01 0.11811E-01 0.11526E-01 0.97991E-02 0.12098E-01
        0.91486E-02 0.87084E-02 0.64650E-02 0.68528E-02 0.59667E-02
        0.62186E-02 0.64940E-02 0.62448E-02 0.55632E-02 0.62477E-02
        0.53803E-02 0.51710E-02 0.55622E-02 0.53794E-02 0.61662E-02
        0.61352E-02 0.68313E-02 0.63205E-02 0.68856E-02 0.80788E-02
        0.76653E-02 0.87169E-02 0.10680E-01 0.10213E-01 0.12114E-01
        0.15459E-01 0.14916E-01 0.14518E-01 0.22867E-01 0.22260E-01
        0.85022E-01 0.82752E-01 0.80572E-01 0.25612E+00 0.24935E+00
        0.24271E+00 0.40968E+00 0.39870E+00 0.38819E+00 0.38627E+00
        0.37601E+00
C ***** MATERIAL CARDS *****
M1     6012.33 1
C ***** TALLY CARDS *****
F21:P  3
C ***** TIME DISTRIBUTION ( UPPER BOUND ) 1=10 nsec *****
T21    10.0889 1.0E4
C ***** ENERGY BIN *****
E21    0.05 0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.45 0.50
        0.55 0.60 0.65 0.70 0.75 0.80 0.85 0.90 0.95 1.00
        1.05 1.10 1.15 1.20 1.25 1.30 1.35 1.40 1.45 1.50
        1.55 1.60 1.65 1.70 1.75 1.80 1.85 1.90 1.95 2.00
        2.05 2.10 2.15 2.20 2.25 2.30 2.35 2.40 2.45 2.50
        2.55 2.60 2.65 2.70 2.75 2.80 2.85 2.90 2.95 3.00
        3.05 3.10 3.15 3.20 3.25 3.30 3.35 3.40 3.45 3.50
        3.55 3.60 3.65 3.70 3.75 3.80 3.85 3.90 3.95 4.00
        4.05 4.10 4.15 4.20 4.25 4.30 4.35 4.40 4.45 4.50
        4.55 4.60 4.65 4.70 4.75 4.80 4.85 4.90 4.95 5.00
        5.05 5.10 5.15 5.20 5.25 5.30 5.35 5.40 5.45 5.50
        5.55 5.60 5.65 5.70 5.75 5.80 5.85 5.90 5.95 6.00
        6.05 6.10 6.15 6.20 6.25 6.30 6.35 6.40 6.45 6.50
        6.55 6.60 6.65 6.70 6.75 6.80 6.85 6.90 6.95 7.00
        7.05 7.10 7.15 7.20 7.25 7.30 7.35 7.40 7.45 7.50
        7.55 7.60 7.65 7.70 7.75 7.80 7.85 7.90 7.95 8.00
        8.05 8.10 8.15 8.20 8.25 8.30 8.35 8.40 8.45 8.50
        8.55 8.60 8.65 8.70 8.75 8.80 8.85 8.90 8.95 9.00
        9.05 9.10 9.15 9.20 9.25 9.30 9.35 9.40 9.45 9.50
        9.55 9.60 9.65 9.70 9.75 9.80 9.85 9.90 9.95 10.0
C ***** CUT OFF CARD *****
CUT:N   1.0E+4 1.0E-8 0.01
CUT:P   1.0E+4 1.0E-2 0.01
C ***** NEUTRON HISTORY *****
NPS     1600000
PRINT

```

Fig. 3.20 An example of input data of MCNP for a graphite sphere of 30 cm in diameter.

#### 1.4 Leakage Neutron Spectra from Various Sphere Piles with 14 MeV Neutrons

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2-1, Yamada-oka, Suita, Osaka 565, Japan

**Facility** OKTAVIAN, Osaka University

**Date** From 1984 to 1988

#### **Measured Quantity**

The leakage current spectrum from the outer surface of the sphere pile with 14 MeV neutrons normalized per source neutron was measured for each sample. See Ref. 1 and 2.

#### **Experimental Method**

The experiment was performed with the time-of-flight (TOF) technique using the intense 14 MeV neutron source facility OKTAVIAN<sup>3)</sup> at Osaka University. A tritium neutron producing target was placed at the center of the pile. A cylindrical liquid organic scintillator NE-218 (12.7 cm-diam - 5.1 cm-long) was used as a neutron detector, which was located about 11 m from the tritium target, and 55° with respect to the deuteron beam axis. A pre-collimator made of polyethylene-iron multi-layers was set between the pile and the detector in order to reduce the background neutrons. The aperture size of this collimator was determined so that the whole surface of the piles facing the detector could be viewed. The experimental arrangement is given in Fig. 4.1.

The detector efficiency was determined by combining, 1) the Monte Carlo calculation, 2) the measured efficiency derived from the TOF measurement of <sup>252</sup>Cf spontaneous fission

spectrum and the Watt's spectrum, and 3) the measured efficiency from the leakage spectrum from a graphite sphere, 30 cm in diameter with the similar detection system.

To monitor the absolute number of the spectrum per source neutron, a cylindrical niobium foil was set in front of the tritium target and irradiated during the TOF experiment. From the gamma-ray intensity of the induced activity,  $^{92m}\text{Nb}$  and the integrated counts of the source neutron spectrum, the absolute neutron leakage spectrum can be obtained. The formulation of this procedure is stated elsewhere<sup>4)</sup>.

### Neutron Source Characteristics

The pulsed beam line of OKTAVIAN was used. Neutrons were produced by bombarding a 370 GBq tritium target with 250 keV deuteron beam. The energy spectrum of the neutron source is measured by using the same detection system as the each leakage spectrum measurement. The spatial distribution of the emitted neutrons were measured for each target assembly. The theoretical calculations were performed assuming the isotropical neutron source distribution. The neutron source spectra are given in Tables 4.2 to 4.8.

### Material / Geometry / Configuration

#### *Sample Piles*

Sample piles were made by filling spherical vessels with sample powder or flakes. Four different types of vessels were used, as the followings.

#### 1) 61 cm diameter shell (Type-I)

This type of vessels are used for the LiF, Mn, Cu, Zr and Mo piles. These are made of stainless steel (JIS SUS-304) for LiF and Zr pile, and Soft steel (JIS SS-41) for the Mn, Cu and Mo piles. Inner diameter, wall thickness of the vessels, are 60 cm and 0.5 cm, respectively. A reentrant hole for a beam duct is equipped, the diameter of which is 5.1 cm up to the center of the vessel as shown in Fig. 4.2.

#### 2) 40 cm diameter vessel (Type-II)

This stainless steel (JIS SUS-304) vessels are used for the TEFLON, Al, Ti, Cr, Co, As, Se and W piles. This is equipped with a 20 cm diameter void at its center and a 11 cm diameter reentrant hole for the target beam duct. The thickness is 0.2 cm everywhere (Fig. 4.3).

#### 3) 60 cm diameter vessel (Type-III)

This is made of 0.5 cm thick stainless steel (JIS SUS-304) and is used only for silicon pile. This vessel has a void and a re-entrant hole of same size as the 40 cm vessel (Fig. 4.4).

#### 4) 28 cm diameter vessel (Type-IV)

This is made of 0.3 cm thick stainless steel (JIS SUS-304) and is used for Nb pile

only. Similar reentrant hole is equipped as the type-I vessel (Fig. 4.5).

Table 4.1 shows the diameters, sample weight, apparent densities, sample thickness in units of centimeters and mean free paths for 14 MeV neutrons. Detailed descriptions of each pile are given in Appendix of this chapter.

### **Experimental Data with Errors**

Experimental data are shown in Tables 4.7 - 4.21 and Figs. 4.6 - 4.20.

### **Error Assessment**

The experimental errors include only statistical deviation ( $1\sigma$ ) in the measurement of neutrons. The relative error to measure the niobium activation foils is less than 1 % (0.4 to 1 %), which is not included here.

### **Example of Experimental Analysis**

The theoretical calculations were performed using MCNP<sup>5)</sup>, which is a three-dimensional continuous energy Monte Carlo transport code. The continuous libraries for MCNP were FSXLIB-J3<sup>6)</sup> derived from JENDL-3<sup>7)</sup>. In addition to this JENDL-3 based library, BMCCS, and ENDL-85 attached with MCNP code were also used for the reference.

In all these calculations, neutron room returns, scattered neutrons from the collimator, etc. are not taken into account.

An example of the input data for the MCNP calculation are given in Fig. 4.21.

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**APPENDIX** Detailed Description of Experimental Piles**1. Lithium Fluoride Pile**

1-1 Pile

Sample: Lithium Fluoride powder, 198 kg

## Chemical Composition

LiF	98.07 %	F	1.83 %
Fe	0.005 %	HF	0.02 %
H <sub>2</sub> O	0.008 %	Li <sub>2</sub> SiF <sub>6</sub>	0.04 %
(6Li: 7.463 ± 0.038 %)			

Container: 61 cm stainless steel vessel (Type-I)

Apparent density: 1.79 g/cm<sup>3</sup>

Sample thickness: 3.5 mean free paths for 14 MeV neutrons

1-2 Date of experiment

Jul. 9, 1987

1-3 Neutron Source spectrum

Neutron energy spectrum is given in the Table 4.2.

1-4 Experimental data

Numerical data are given in Table 4.7. Measured spectrum and the calculated ones with MCNP code are shown in the Fig. 4.6. The MCNP calculations were performed with FSXLIB-J3 and BMCCS. BMCCS library adopted LASL-subset for lithium and ENDF/B-IV for fluorine.

**2. TEFLON (Polytetrafluoroethylene)**

2-1 Pile

Sample: TEFLON ( Polytetrafluoroethylene; (CF<sub>2</sub>)<sub>n</sub> ) pellets 2 mm in diameter and 2 mm long, 34.7 kg

## Chemical composition

CF <sub>2</sub>	> 99.9 %	Cl	0.087 %
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Container: 40 cm diameter stainless steel vessel (Type -II)  
 Apparent density: 1.30 g/cm<sup>3</sup>  
 Sample thickness: 0.7 mean free paths for 14 MeV neutrons

#### 2-2 Date of the expedient

Mar. 12, 1987

#### 2-3 Neutron source spectrum

Neutron source spectrum is given in the Table 4.3.

#### 2-4 Experimental data

Numerical data are given in Table 4.8. Measured spectrum and the calculated ones with MCNP code are shown in the Fig. 4.7. The MCNP calculations were performed with FSXLIB-J3 and BMCCS. BMCCS library adopted LASL-subset for carbon and ENDF/B-IV for fluorine.

### 3. Aluminum

#### 3-1 Pile

Sample: Aluminum metal powder (grain size: 80 % between 0.2 and 1.0 mm),  
 32.8 kg

#### Chemical composition

Al	> 99.7 %	Si	< 0.15 %
Fe	< 0.20 %	Cu	< 0.01 %

Container: 40 cm stainless steel vessel (Type-II)  
 Apparent density: 1.22 g/cm<sup>3</sup>  
 Sample thickness: 0.5 mean free paths for 14 MeV neutrons

#### 3-2 Date of experiment

Dec. 22, 1988

#### 3-3 Neutron Source spectrum

Neutron source spectrum is given in the Table 4.4.



### 3-4 Experimental data

Numerical data are given in Table 4.9. Measured spectrum and the calculated ones with MCNP code are shown in the Fig. 4.8. The MCNP calculations were performed with FSXLIB-J3 and BMCCS. BMCCS library adopted ENDF/B-IV for aluminum.

## 4. Silicon

### 4-1 Pile

Sample: Silicon granular (purity 99.9 %), 138.05 kg  
 Container: 60 cm stainless steel vessel (Type-III)  
 Apparent density: 1.29 g/cm<sup>3</sup>  
 Sample thickness: 1.1 mean free paths for 14 MeV neutrons

### 4-2 Date of experiment

Mar. 13, 1987

### 4-3 Neutron source spectrum

Neutron source spectrum is given in the Table 4.3.

### 4-4 Experimental data

Numerical data are given in Table 4.10. Measured spectrum and the calculated ones with MCNP code are shown in the Fig. 4.9. The MCNP calculations were performed with FSXLIB-J3 and BMCCS. BMCCS library adopted ENDF/B-III for silicon.

## 5. Titanium

### 5-1 Pile

Sample: Titanium metal powder (10-20 mesh), 41.2 kg

#### Chemical composition

Ti	> 99.4 %	Mg	0.029 %
Fe	0.084 %	N	0.002 %
Si	< 0.01 %	C	0.006 %
Cl	0.084 %	H	< 0.003 %
Mn	0.002 %	O	0.061 %

Container: 40 cm stainless steel vessel (Type-II)

Apparent density: 1.54 g/cm<sup>3</sup>  
 Sample thickness: 0.5 mean free paths for 14 MeV neutrons

#### 5-2 Date of experiment

Aug. 31, 1988

#### 5-3 Neutron source spectrum

Neutron source spectrum id given in the Table 4.5.

#### 5-4 Experimental data

Numerical data are given in Table 4.11. Measured spectrum and the calculated ones with MCNP code are shown in the Fig. 4.10. The MCNP calculations were performed with FSXLIB-J3 and BMCCS. BMCCS library adopted ENDF/B-IV for titanium.

### 6. Chromium

#### 6-1 Pile

Sample: Chromium metal powder, 99.7 kg

##### Chemical composition

Cr	> 99.78 %	Fe	0.16 %
C	0.021 %	Si	0.007 %

Container: 40 cm stainless steel vessel (Type-II)  
 Apparent density: 3.72 g/cm<sup>3</sup>  
 Sample thickness: 0.7 mean free paths for 14 MeV neutrons

#### 6-2 Date of experiment

Aug. 21, 1986

#### 6-3 Neutron source spectrum

Neutron source spectrum is given in the Table 4.6.

#### 6-4 Experimental data

Numerical data are given in Table 4.12. Measured spectrum and the calculated ones with MCNP code are shown in the Fig. 4.11. The MCNP calculations were performed with FSXLIB-J3 and BMCCS. BMCCS library adopted ENDF/B-IV for chromium.

## 7. Manganese

### 7-1 Pile

Sample: Manganese metal powder, 490.5 kg

#### Chemical composition

Mn	99.95 %	C	0.005 %
Si	0.002 %	P	0.0001 %
S	0.022 %	Fe	0.020 %

Container: 61 cm steel vessel

Apparent density: 4.37 g/cm<sup>3</sup>

Sample thickness: 3.4 mean free paths for 14 MeV neutrons

### 7-2 Date of experiment

Jul. 8, 1987

### 7-3 Neutron source spectrum

Neutron source spectrum is given in the Table 4.2.

### 7-4 Experimental data

Numerical data are given in Table 4.13. Measured spectrum and the calculated ones with MCNP code are shown in the Fig. 4.12. The MCNP calculations were performed with FSXLIB-J3 and BMCCS. BMCCS library adopted ENDF/B-IV for manganese.

## 8. Cobalt

### 8-1 Pile

Sample: Cobalt metal powder (300 mesh), 52.0 kg

#### Chemical composition

Co	> 99.50 %	Zn	0.003 %
Ni	0.15 %	Si	0.04 %
Fe	0.12 %	Ca	0.03 %
Mn	0.02 %	S	0.008%
Cu	0.01 %	C	0.03 %
Pb	0.002%		

Container: 40 cm stainless steel vessel  
 Apparent density: 1.94 g/cm<sup>3</sup>  
 Sample thickness: 0.5 mean free paths for 14 MeV neutrons

#### 8-2 Date of experiment

Mar. 12, 1987

#### 8-3 Neutron source spectrum

Neutron source spectrum is given in the Table 4.3.

#### 8-4 Experimental data

Numerical data are given in Table 4.14. Measured spectrum and the calculated ones with MCNP code are shown in the Fig. 4.13. The MCNP calculations were performed with FSXLIB-J3 and ENDL-85, the 85 version of the ENDL<sup>8)</sup>.

### 9 Copper

#### 9-1 Pile

Sample: Copper metal powder (100 mesh), 675.0 kg

#### Chemical composition

Cu	99.993 %	S	10 ppm
As	0.6 ppm	Pb	0.3 ppm
Sb	0.2 ppm	Fe	2 ppm
Bi	< 0.1 ppm		

Container: 61 cm normal steel vessel (Type-I)  
 Apparent density: 6.23 g/cm<sup>3</sup>  
 Sample thickness: 4.7 mean free paths for 14 MeV neutrons

#### 9-2 Date of experiment

Jul. 8, 1987

#### 9-3 Neutron source spectrum

Neutron source spectrum is given in the Table 4.2.

#### 9-4 Experimental data

Numerical data are given in Table 4.15. Measured spectrum and the calculated ones with MCNP code are shown in the Fig. 4.14. The MCNP calculations were performed with FSXLIB-J3 and BMCCS. BMCCS library adopted ENDF/B-IV for copper.

### 10 Arsenic

#### 10-1 Pile

Sample: Arsenic metal powder, 82.9 kg

##### Chemical composition

As	> 99.999 %	Fe	0.3 %
Mg	< 0.01 %	Cu	< 0.01 %
S	< 0.05 %		

Container: 40 cm stainless steel vessel (Type-II)  
 Apparent density: 3.09 g/cm<sup>3</sup>  
 Sample thickness: 0.8 mean free paths for 14 MeV neutrons

#### 10-2 Date of experiment

Sep. 1, 1988

#### 10-3 Neutron source spectrum

Neutron source spectrum is given in the Table 4.5.

#### 10-4 Experimental data

Numerical data are given in Table 4.16. Measured spectrum and the calculated ones with MCNP code are shown in the Fig. 4.15. The MCNP calculations were performed with ENDL-85 library for arsenic.

### 11 Selenium

#### 11-1 Pile

Sample: Selenium powder, 61.4 kg

##### Chemical composition

Se	> 99.9 %
----	----------

Te	45 ppm	Na	15 ppm
SiO <sub>2</sub>	16 ppm	S	6 ppm
Hg	4 ppm	F	3 ppm

Container: 40 cm stainless steel vessel (Type-II)  
 Apparent density: 2.29 g/cm<sup>3</sup>  
 Sample thickness: 0.6 mean free paths for 14 MeV neutrons

#### 11-2 Date of experiment

Sep. 2, 1988

#### 11-3 Neutron source spectrum

Neutron source spectrum is given in the Table 4.5.

#### 11-4 Experimental data

Numerical data are given in Table 4.17. Measured spectrum and the calculated ones with MCNP code are shown in the Fig. 4.16. The calculation was not conducted because no nuclear data have been available for the MCNP calculation.

## 12 Zirconium

#### 12-1 Pile

Sample: Zirconium metal flakes, 311.9 kg  
 Container: 61 cm stainless steel vessel (Type-I)  
 Apparent density: 2.84 g/cm<sup>3</sup>  
 Sample thickness: 2.0 mean free paths for 14 MeV neutrons

#### 12-2 Date of experiment

Sep. 2, 1988

#### 12-3 Neutron source spectrum

Neutron source spectrum is given in the Table 4.5.

#### 12-4 Experimental data

Numerical data are given in Table 4.18. Measured spectrum and the calculated ones with MCNP code are shown in the Fig. 4.17. The MCNP calculations were performed with FSXLIB-J3 and ENDL-85 for zirconium.

**13 Niobium**

## 13-1 Pile

Sample: Niobium metal powder (60-200 mesh), 47.7 kg

## Chemical composition

Nb	> 99.8 %	Ta	0.1 %
O	0.07 %	W	< 0.01 %
H	0.002 %	Zr	< 0.01 %

Container: 28 cm stainless steel vessel (Type-IV)

Apparent density: 4.39 g/cm<sup>3</sup>

Sample thickness: 1.1 mean free paths for 14 MeV neutrons

## 13-2 Date of experiment

Aug. 21, 1986

## 13-3 Neutron source spectrum

Neutron source spectrum is given in the Table 4.6.

## 13-4 Experimental data

Numerical data are given in Table 4.19. Measured spectrum and the calculated ones with MCNP code are shown in the Fig. 4.18. The MCNP calculations were performed with FSXLIB-J3 and BMCCS. BMCCS adopted ENDL-76 evaluation, 1976 version of ENDL for niobium.

**14 Molybdenum**

## 14-1 Pile

Sample: Molybdenum metal powder (4.2 $\mu$ m), 236.0 kg

## Chemical composition

Mo	> 99.9 %	F	0.003 %
H <sub>2</sub> O	< 0.03 %		

Container: 61 cm stainless steel vessel (Type-I)

Apparent density: 2.15 g/cm<sup>3</sup>

Sample thickness: 1.5 mean free paths for 14 MeV neutrons

#### 14-2 Date of experiment

Jul. 9, 1987

#### 14-3 Neutron source spectrum

Neutron source spectrum is given in the Table 4.2.

#### 14-4 Experimental data

Numerical data are given in Table 4.20. Measured spectrum and the calculated ones with MCNP code are shown in the Fig. 4.19. The MCNP calculations were performed with FSXLIB-J3 and ENDL-85 for cobalt.

### 15 Tungsten

#### 15-1 Pile

Sample: Tungsten metal powder, 118.6 kg

##### Chemical composition

C	12 ppm	N	< 3 ppm
Fe	45 ppm	O	230 ppm
S	12 ppm	Si	< 10 ppm

Container: 40 cm stainless steel vessel (Type-II)

Apparent density: 4.43 g/cm<sup>3</sup>

Sample thickness: 0.8 mean free paths for 14 MeV neutrons

#### 15-2 Date of experiment

Jul. 9, 1987

#### 15-3 Neutron source spectrum

Neutron source spectrum is given in the Table 4.2.

#### 15-4 Experimental data

Numerical data are given in Table 4.21. Measured spectrum and the calculated ones with MCNP code are shown in the Fig. 4.20. The MCNP calculations were performed with FSXLIB-J3 and ENDL-85 for tungsten.



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Table 4.1 Characteristic parameters of the sample piles

Pile	Diam. (cm)	Sample Weight (kg)	Apparent Density (g/cm <sup>3</sup> )	Thickness	
				(cm)	(MFPs)
LiF	61	198.0	1.79	27.5	3.5
TEFLON	40	34.7	1.30	9.8	0.7
Al	40	32.8	1.22	9.8	0.5
Si	60	138.05	1.29	20.0	1.1
Ti	40	41.20	1.54	9.8	0.5
Cr	40	99.7	3.72	9.8	0.7
Mn	61	480.0	4.37	27.5	3.4
Co	40	52.0	1.94	9.8	0.5
Cu	61	675.0	6.23	27.5	4.7
As	40	82.9	3.09	9.8	0.8
Se	40	61.4	2.29	9.8	0.6
Zr	61	311.9	2.84	27.5	2.0
Nb	28	47.7	4.39	11.2	1.1
Mo	61	236.0	2.15	27.5	1.5
W	40	118.6	4.43	9.8	0.8

Table 4.2 Neutron source spectrum for LiF, Mn, Cu, Mo and W.

Lower Energy (MeV)	Upper Energy (MeV)	Lethargy Flux (1/MeV/n)	Error
1.8323E+01	2.0250E+01	8.0240E-04	5.4400E-04
1.6579E+01	1.8323E+01	3.2070E-03	6.7210E-04
1.5002E+01	1.6579E+01	2.4850E+00	1.2160E-02
1.3574E+01	1.5002E+01	6.5260E+00	1.9780E-02
1.2282E+01	1.3574E+01	1.3510E-01	3.9130E-03
1.1113E+01	1.2282E+01	5.0880E-02	1.8430E-03
1.0056E+01	1.1113E+01	3.0860E-02	1.4510E-03
9.0989E+00	1.0056E+01	2.3540E-02	1.2570E-03
8.2330E+00	9.0989E+00	1.7990E-02	1.1080E-03
7.4496E+00	8.2330E+00	1.5640E-02	1.0220E-03
6.7406E+00	7.4496E+00	1.5780E-02	1.0060E-03
6.0992E+00	6.7406E+00	1.7340E-02	1.0260E-03
5.5188E+00	6.0992E+00	1.7930E-02	1.0250E-03
4.9936E+00	5.5188E+00	1.8360E-02	1.0130E-03
4.5184E+00	4.9936E+00	2.0440E-02	1.0320E-03
4.0884E+00	4.5184E+00	2.2130E-02	1.0450E-03
3.6993E+00	4.0884E+00	2.4330E-02	1.0680E-03
3.3473E+00	3.6993E+00	2.5480E-02	1.0610E-03
3.0288E+00	3.3473E+00	2.6990E-02	1.0580E-03
2.7405E+00	3.0288E+00	3.2490E-02	1.1180E-03
2.4797E+00	2.7405E+00	3.4730E-02	1.1290E-03
2.2438E+00	2.4797E+00	2.8860E-02	1.0320E-03
2.0302E+00	2.2438E+00	3.1340E-02	1.0590E-03
1.8370E+00	2.0302E+00	2.9550E-02	1.0270E-03
1.6622E+00	1.8370E+00	2.9740E-02	1.0240E-03
1.5040E+00	1.6622E+00	3.0440E-02	1.0300E-03
1.3609E+00	1.5040E+00	3.0190E-02	1.0250E-03
1.2314E+00	1.3609E+00	2.7970E-02	9.9390E-04
1.1142E+00	1.2314E+00	2.9060E-02	1.0090E-03
1.0082E+00	1.1142E+00	2.7260E-02	9.8140E-04
9.1225E-01	1.0082E+00	2.4160E-02	9.3480E-04
8.2544E-01	9.1225E-01	2.2850E-02	9.1430E-04
7.4689E-01	8.2544E-01	2.1490E-02	8.9430E-04

6.7581E-01	7.4689E-01	1.9240E-02	8.7000E-04
6.1150E-01	6.7581E-01	1.8130E-02	8.6600E-04
5.5331E-01	6.1150E-01	1.7090E-02	8.6300E-04
5.0065E-01	5.5331E-01	1.4640E-02	8.3790E-04
4.5301E-01	5.0065E-01	1.3790E-02	8.3610E-04
4.0990E-01	4.5301E-01	8.6970E-03	7.6210E-04
3.7089E-01	4.0990E-01	9.5660E-03	7.8980E-04
3.3560E-01	3.7089E-01	7.8440E-03	7.9370E-04
3.0366E-01	3.3560E-01	6.6080E-03	8.2520E-04
2.7476E-01	3.0366E-01	6.1700E-03	8.7260E-04
2.4862E-01	2.7476E-01	6.7080E-03	9.3870E-04
2.2496E-01	2.4862E-01	3.7490E-03	9.9020E-04
2.0355E-01	2.2496E-01	2.7650E-03	1.1400E-03
1.8418E-01	2.0355E-01	5.4770E-03	1.3620E-03
1.6665E-01	1.8418E-01	2.1220E-03	1.4790E-03
1.5079E-01	1.6665E-01	1.4210E-03	1.7600E-03
1.3644E-01	1.5079E-01	1.9360E-03	2.2820E-03

Table 4.3 Neutron source spectrum for TEFLON, Si and Co.

Lower Energy (MeV)	Upper Energy (MeV)	Lethargy Flux (1/MeV/n)	Error
1.9072E+01	2.0660E+01	5.9638E-04	4.3050E-04
1.7605E+01	1.9072E+01	1.0422E-03	4.6837E-04
1.6252E+01	1.7605E+01	7.9903E-02	2.2684E-03
1.5002E+01	1.6252E+01	3.8974E+00	1.5597E-02
1.3849E+01	1.5002E+01	7.5085E+00	2.1739E-02
1.2784E+01	1.3849E+01	1.9762E-01	3.5648E-03
1.1801E+01	1.2784E+01	7.4357E-02	2.2188E-03
1.0894E+01	1.1801E+01	4.2723E-02	1.7033E-03
1.0056E+01	1.0894E+01	3.1142E-02	1.4372E-03
9.2831E+00	1.0056E+01	2.1824E-02	1.1971E-03
8.5694E+00	9.2831E+00	1.9816E-02	1.1336E-03
7.9106E+00	8.5694E+00	1.7296E-02	1.0440E-03
7.3024E+00	7.9106E+00	1.5981E-02	1.0079E-03
6.7410E+00	7.3024E+00	1.3074E-02	9.2335E-04
6.2227E+00	6.7410E+00	1.3690E-02	9.3339E-04
5.7443E+00	6.2227E+00	1.4827E-02	9.5018E-04
5.3026E+00	5.7443E+00	1.2886E-02	8.7326E-04
4.8949E+00	5.3026E+00	1.4827E-02	9.0197E-04
4.5186E+00	4.8949E+00	1.5829E-02	9.0793E-04
4.1712E+00	4.5186E+00	1.7314E-02	9.2590E-04
3.8505E+00	4.1712E+00	1.6312E-02	8.9241E-04
3.5545E+00	3.8505E+00	1.8050E-02	9.2711E-04
3.2812E+00	3.5545E+00	1.7735E-02	9.1735E-04
3.0289E+00	3.2812E+00	1.8735E-02	9.1496E-04
2.7960E+00	3.0289E+00	3.5940E-02	1.1845E-03
2.5811E+00	2.7960E+00	3.8688E-02	1.1967E-03
2.3826E+00	2.5811E+00	2.0972E-02	8.9446E-04
2.1994E+00	2.3826E+00	2.0388E-02	8.6898E-04
2.0303E+00	2.1994E+00	2.0197E-02	8.5990E-04
1.8742E+00	2.0303E+00	2.1026E-02	8.7188E-04
1.7301E+00	1.8742E+00	1.8760E-02	8.2791E-04
1.5971E+00	1.7301E+00	1.9198E-02	8.3130E-04
1.4743E+00	1.5971E+00	1.9903E-02	8.4003E-04
1.3610E+00	1.4743E+00	1.9635E-02	8.2933E-04
1.2563E+00	1.3610E+00	1.8923E-02	8.1136E-04
1.1598E+00	1.2563E+00	1.9196E-02	8.1314E-04
1.0706E+00	1.1598E+00	1.8680E-02	8.0529E-04
9.8827E-01	1.0706E+00	1.4834E-02	7.3749E-04
9.1229E-01	9.8827E-01	1.5870E-02	7.4464E-04
8.4215E-01	9.1229E-01	1.4000E-02	6.9678E-04
7.7740E-01	8.4215E-01	1.3629E-02	6.8183E-04
7.1763E-01	7.7740E-01	1.1392E-02	6.3905E-04
6.6246E-01	7.1763E-01	1.1344E-02	6.3850E-04
6.1153E-01	6.6246E-01	1.0160E-02	6.1814E-04
5.6451E-01	6.1153E-01	9.3554E-03	6.0566E-04

5.2111E-01	5.6451E-01	8.5601E-03	5.9818E-04
4.8104E-01	5.2111E-01	8.3229E-03	6.1382E-04
4.4406E-01	4.8104E-01	6.9568E-03	6.0548E-04
4.0992E-01	4.4406E-01	6.6226E-03	6.2084E-04
3.7840E-01	4.0992E-01	5.8809E-03	6.2829E-04
3.4931E-01	3.7840E-01	5.8653E-03	6.5494E-04
3.2245E-01	3.4931E-01	3.7316E-03	6.3750E-04
2.9766E-01	3.2245E-01	4.3191E-03	6.8646E-04
2.7478E-01	2.9766E-01	4.4708E-03	7.4560E-04
2.5365E-01	2.7478E-01	3.6779E-03	7.9344E-04
2.3415E-01	2.5365E-01	2.6244E-03	8.4902E-04
2.1615E-01	2.3415E-01	1.6672E-03	9.3685E-04
1.9953E-01	2.1615E-01	4.0529E-03	1.1263E-03
1.8419E-01	1.9953E-01	1.9073E-03	1.1995E-03
1.7003E-01	1.8419E-01	9.4240E-04	1.3108E-03
1.5696E-01	1.7003E-01	5.6324E-04	1.5061E-03
1.4489E-01	1.5696E-01	6.9063E-04	1.9711E-03

Table 4.4 Neutron source spectrum for Al.

Lower Energy (MeV)	Upper Energy (MeV)	Lethargy Flux (1/MeV/n)	Error
1.8323E+01	2.0250E+01	1.9260E-04	2.3920E-04
1.6579E+01	1.8323E+01	6.0260E-03	3.8700E-04
1.5002E+01	1.6579E+01	2.9560E+00	6.7470E-03
1.3574E+01	1.5002E+01	6.2130E+00	9.8250E-03
1.2282E+01	1.3574E+01	2.0720E-01	1.8200E-03
1.1113E+01	1.2282E+01	4.6410E-02	8.9260E-04
1.0056E+01	1.1113E+01	2.5470E-02	6.7210E-04
9.0989E+00	1.0056E+01	1.9110E-02	5.7860E-04
8.2330E+00	9.0989E+00	1.4960E-02	5.1850E-04
7.4496E+00	8.2330E+00	1.3600E-02	4.9350E-04
6.7406E+00	7.4496E+00	1.2540E-02	4.6740E-04
6.0992E+00	6.7406E+00	1.3790E-02	4.6950E-04
5.5188E+00	6.0992E+00	1.3060E-02	4.4880E-04
4.9936E+00	5.5188E+00	1.4050E-02	4.5230E-04
4.5184E+00	4.9936E+00	1.5430E-02	4.6750E-04
4.0884E+00	4.5184E+00	1.6440E-02	4.7830E-04
3.6993E+00	4.0884E+00	1.7800E-02	4.9030E-04
3.3473E+00	3.6993E+00	1.8240E-02	4.7360E-04
3.0288E+00	3.3473E+00	1.7690E-02	4.5140E-04
2.7405E+00	3.0288E+00	3.4900E-02	5.8170E-04
2.4797E+00	2.7405E+00	2.7990E-02	5.2580E-04
2.2438E+00	2.4797E+00	2.1380E-02	4.6850E-04
2.0302E+00	2.2438E+00	2.0870E-02	4.6190E-04
1.8370E+00	2.0302E+00	2.1140E-02	4.5790E-04
1.6622E+00	1.8370E+00	2.0290E-02	4.4550E-04
1.5040E+00	1.6622E+00	2.0180E-02	4.4130E-04
1.3609E+00	1.5040E+00	1.9440E-02	4.3850E-04
1.2314E+00	1.3609E+00	1.9430E-02	4.4190E-04
1.1142E+00	1.2314E+00	1.9780E-02	4.4790E-04
1.0082E+00	1.1142E+00	1.7880E-02	4.2730E-04
9.1225E-01	1.0082E+00	1.8240E-02	4.1830E-04
8.2544E-01	9.1225E-01	1.6270E-02	4.0760E-04
7.4689E-01	8.2544E-01	1.5300E-02	3.9840E-04
6.7581E-01	7.4689E-01	1.2930E-02	3.7740E-04
6.1150E-01	6.7581E-01	1.1500E-02	3.6490E-04
5.5331E-01	6.1150E-01	9.6970E-03	3.4920E-04
5.0065E-01	5.5331E-01	9.5770E-03	3.4950E-04
4.5301E-01	5.0065E-01	7.3460E-03	3.3120E-04
4.0990E-01	4.5301E-01	5.7080E-03	3.2660E-04
3.7089E-01	4.0990E-01	6.3080E-03	3.4440E-04
3.3560E-01	3.7089E-01	5.2100E-03	3.4610E-04
3.0366E-01	3.3560E-01	5.1230E-03	3.6370E-04
2.7476E-01	3.0366E-01	3.7550E-03	3.6880E-04
2.4862E-01	2.7476E-01	3.0070E-03	3.8260E-04
2.2496E-01	2.4862E-01	3.8170E-03	4.3270E-04

2.0355E-01	2.2496E-01	2.0560E-03	4.6180E-04
1.8418E-01	2.0355E-01	2.1010E-03	5.1720E-04
1.6665E-01	1.8418E-01	3.0630E-03	6.1650E-04
1.5079E-01	1.6665E-01	2.8080E-04	7.0060E-04
1.3644E-01	1.5079E-01	9.6510E-04	8.4910E-04
1.2346E-01	1.3644E-01	3.0100E-04	1.0580E-03

Table 4.5 Neutron source spectrum for Ti, As, Se and Zr.

Lower Energy (MeV)	Upper Energy (MeV)	Lethargy Flux (1/MeV/n)	Error
1.8323E+01	2.0250E+01	8.5210E-04	4.9700E-04
1.6579E+01	1.8323E+01	7.3980E-03	7.5650E-04
1.5002E+01	1.6579E+01	3.0480E+00	1.2110E-02
1.3574E+01	1.5002E+01	5.2090E+00	1.5780E-02
1.2282E+01	1.3574E+01	3.1820E-01	3.8420E-03
1.1113E+01	1.2282E+01	5.7600E-02	1.6710E-03
1.0056E+01	1.1113E+01	3.3970E-02	1.3080E-03
9.0989E+00	1.0056E+01	2.7110E-02	1.1690E-03
8.2330E+00	9.0989E+00	2.1230E-02	1.0390E-03
7.4496E+00	8.2330E+00	1.9520E-02	9.8360E-04
6.7406E+00	7.4496E+00	1.8390E-02	9.4700E-04
6.0992E+00	6.7406E+00	1.8500E-02	9.3990E-04
5.5188E+00	6.0992E+00	1.9540E-02	9.5230E-04
4.9936E+00	5.5188E+00	1.9840E-02	9.4860E-04
4.5184E+00	4.9936E+00	2.1800E-02	9.5030E-04
4.0884E+00	4.5184E+00	2.2430E-02	9.3400E-04
3.6993E+00	4.0884E+00	2.3140E-02	9.2330E-04
3.3473E+00	3.6993E+00	2.5600E-02	9.3280E-04
3.0288E+00	3.3473E+00	2.4330E-02	8.9160E-04
2.7405E+00	3.0288E+00	4.8600E-02	1.1730E-03
2.4797E+00	2.7405E+00	3.4110E-02	9.9500E-04
2.2438E+00	2.4797E+00	2.6910E-02	8.9400E-04
2.0302E+00	2.2438E+00	2.6310E-02	8.7980E-04
1.8370E+00	2.0302E+00	2.6640E-02	8.7660E-04
1.6622E+00	1.8370E+00	2.5950E-02	8.6310E-04
1.5040E+00	1.6622E+00	2.7550E-02	8.7870E-04
1.3609E+00	1.5040E+00	2.5270E-02	8.3850E-04
1.2314E+00	1.3609E+00	2.6230E-02	8.4180E-04
1.1142E+00	1.2314E+00	2.5560E-02	8.2620E-04
1.0082E+00	1.1142E+00	2.2460E-02	7.8160E-04
9.1225E-01	1.0082E+00	2.1490E-02	7.6540E-04
8.2544E-01	9.1225E-01	2.0260E-02	7.4640E-04
7.4689E-01	8.2544E-01	1.8070E-02	7.1140E-04
6.7581E-01	7.4689E-01	1.7000E-02	6.9280E-04
6.1150E-01	6.7581E-01	1.4440E-02	6.5390E-04
5.5331E-01	6.1150E-01	1.2660E-02	6.1700E-04
5.0065E-01	5.5331E-01	1.0160E-02	5.7230E-04
4.5301E-01	5.0065E-01	9.6910E-03	5.6050E-04
4.0990E-01	4.5301E-01	7.8450E-03	5.4010E-04
3.7089E-01	4.0990E-01	7.9410E-03	5.4900E-04
3.3560E-01	3.7089E-01	5.8960E-03	5.2630E-04
3.0366E-01	3.3560E-01	5.8060E-03	5.3810E-04
2.7476E-01	3.0366E-01	5.7410E-03	5.5040E-04
2.4862E-01	2.7476E-01	3.5090E-03	5.3130E-04
2.2496E-01	2.4862E-01	3.6500E-03	5.6750E-04
2.0355E-01	2.2496E-01	4.5690E-03	6.1670E-04
1.8418E-01	2.0355E-01	2.9960E-03	6.3180E-04
1.6665E-01	1.8418E-01	3.0180E-04	6.9590E-04
1.5079E-01	1.6665E-01	3.9150E-03	7.7890E-04
1.3644E-01	1.5079E-01	4.0100E-04	8.0300E-04
1.2346E-01	1.3644E-01	3.2820E-03	9.3210E-04
1.1171E-01	1.2346E-01	1.3190E-03	9.9830E-04
1.0108E-01	1.1171E-01	2.7870E-03	1.1260E-03
9.1461E-02	1.0108E-01	8.6330E-05	1.2880E-03
8.2757E-02	9.1461E-02	1.6870E-03	1.5580E-03
7.4882E-02	8.2757E-02	2.2860E-03	1.8850E-03

6.7756E-02	7.4882E-02	4.4540E-03	2.3850E-03
6.1308E-02	6.7756E-02	4.3580E-04	2.9990E-03
5.5474E-02	6.1308E-02	4.1570E-03	4.0280E-03
5.0195E-02	5.5474E-02	2.3470E-04	5.4320E-03

Table 4.6 Neutron source spectrum for Cr and Nb.

Lower Energy (MeV)	Upper Energy (MeV)	Lethargy Flux (1/MeV/n)	Error
1.9851E+01	2.1290E+01	5.6528E-04	7.6934E-05
1.8509E+01	1.9851E+01	8.9187E-04	9.1009E-05
1.7257E+01	1.8509E+01	6.2716E-03	2.1460E-04
1.6091E+01	1.7257E+01	2.5845E-02	4.2836E-04
1.5003E+01	1.6091E+01	1.5107E+00	3.2555E-03
1.3989E+01	1.5003E+01	1.0173E+01	8.4874E-03
1.3043E+01	1.3989E+01	1.1774E+00	2.8681E-03
1.2161E+01	1.3043E+01	2.3692E-01	1.2753E-03
1.1339E+01	1.2161E+01	1.1093E-01	8.7561E-04
1.0572E+01	1.1339E+01	6.7508E-02	6.8220E-04
9.8576E+00	1.0572E+01	4.3770E-02	5.3107E-04
9.1911E+00	9.8576E+00	3.3211E-02	4.5984E-04
8.5697E+00	9.1911E+00	2.9003E-02	4.2457E-04
7.9904E+00	8.5697E+00	2.1512E-02	3.5464E-04
7.4502E+00	7.9904E+00	1.8452E-02	3.1954E-04
6.9465E+00	7.4502E+00	1.7686E-02	3.0679E-04
6.4769E+00	6.9465E+00	1.8390E-02	3.0820E-04
6.0390E+00	6.4769E+00	1.7823E-02	2.9963E-04
5.6307E+00	6.0390E+00	1.7977E-02	2.9699E-04
5.2501E+00	5.6307E+00	1.8432E-02	2.9710E-04
4.8951E+00	5.2501E+00	2.0260E-02	3.0781E-04
4.5642E+00	4.8951E+00	2.0650E-02	3.0109E-04
4.2556E+00	4.5642E+00	2.0475E-02	2.9066E-04
3.9679E+00	4.2556E+00	2.0855E-02	2.8544E-04
3.6997E+00	3.9679E+00	2.1243E-02	2.8255E-04
3.4495E+00	3.6997E+00	2.2556E-02	2.8604E-04
3.2163E+00	3.4495E+00	2.3450E-02	2.8686E-04
2.9989E+00	3.2163E+00	2.3214E-02	2.7990E-04
2.7961E+00	2.9989E+00	2.5287E-02	2.8682E-04
2.6071E+00	2.7961E+00	2.7205E-02	2.9285E-04
2.4308E+00	2.6071E+00	2.5341E-02	2.7960E-04
2.2665E+00	2.4308E+00	2.4825E-02	2.7385E-04
2.1133E+00	2.2665E+00	2.5031E-02	2.7199E-04
1.9704E+00	2.1133E+00	2.4625E-02	2.6646E-04
1.8372E+00	1.9704E+00	2.4426E-02	2.6272E-04
1.7130E+00	1.8372E+00	2.4443E-02	2.6130E-04
1.5972E+00	1.7130E+00	2.4628E-02	2.6167E-04
1.4892E+00	1.5972E+00	2.4120E-02	2.5849E-04
1.3885E+00	1.4892E+00	2.4115E-02	2.5755E-04
1.2947E+00	1.3885E+00	2.3317E-02	2.5222E-04
1.2071E+00	1.2947E+00	2.3842E-02	2.5406E-04
1.1255E+00	1.2071E+00	2.3898E-02	2.5274E-04
1.0494E+00	1.1255E+00	2.1836E-02	2.4054E-04
9.7847E-01	1.0494E+00	2.0025E-02	2.2935E-04
9.1232E-01	9.7847E-01	2.0373E-02	2.3143E-04
8.5064E-01	9.1232E-01	1.8970E-02	2.2381E-04
7.9314E-01	8.5064E-01	1.8197E-02	2.1994E-04
7.3952E-01	7.9314E-01	1.7442E-02	2.1856E-04
6.8952E-01	7.3952E-01	1.6948E-02	2.1850E-04
6.4290E-01	6.8952E-01	1.5096E-02	2.1026E-04
5.9944E-01	6.4290E-01	1.4809E-02	2.1399E-04
5.5891E-01	5.9944E-01	1.3402E-02	2.0943E-04
5.2113E-01	5.5891E-01	1.1994E-02	2.0688E-04
4.8590E-01	5.2113E-01	1.0816E-02	2.0815E-04
4.5305E-01	4.8590E-01	1.0554E-02	2.1788E-04
4.2242E-01	4.5305E-01	9.0655E-03	2.1817E-04
3.9386E-01	4.2242E-01	9.3138E-03	2.3884E-04
3.6723E-01	3.9386E-01	9.1826E-03	2.5881E-04

3.4241E-01	3.6723E-01	7.3661E-03	2.5891E-04
3.1926E-01	3.4241E-01	6.2065E-03	2.6745E-04
2.9767E-01	3.1926E-01	5.9811E-03	2.9443E-04
2.7755E-01	2.9767E-01	5.7234E-03	3.2673E-04
2.5878E-01	2.7755E-01	5.6127E-03	3.7221E-04
2.4129E-01	2.5878E-01	5.0132E-03	4.2506E-04
2.2498E-01	2.4129E-01	4.3433E-03	4.5321E-04
2.0977E-01	2.2498E-01	4.3453E-03	5.0127E-04
1.9559E-01	2.0977E-01	5.4237E-03	6.1372E-04
1.8236E-01	1.9559E-01	4.8982E-03	7.8557E-04
1.7003E-01	1.8236E-01	2.9865E-03	1.0623E-03
1.5854E-01	1.7003E-01	2.6089E-04	1.4566E-03
1.4782E-01	1.5854E-01	3.9903E-03	1.8749E-03
1.3783E-01	1.4782E-01	4.5304E-03	2.3566E-03
1.2851E-01	1.3783E-01	5.1923E-03	3.0776E-03
1.1982E-01	1.2851E-01	1.2950E-02	4.4153E-03
1.1172E-01	1.1982E-01	2.8607E-02	7.0492E-03
1.0417E-01	1.1172E-01	0.0000E+00	1.2781E-02
9.7125E-02	1.0417E-01	2.0059E-02	1.6848E-01

Table 4.7 Numerical data of measured leakage current spectrum from LiF pile of 61 cm.

Lower Energy (MeV)	Upper Energy (MeV)	Lethargy Flux (1/MeV/n)	Error
1.9850E+01	2.0660E+01	2.2400E-03	1.2340E-03
1.9072E+01	1.9850E+01	1.4360E-03	1.1750E-03
1.8324E+01	1.9072E+01	2.9690E-03	1.3110E-03
1.7605E+01	1.8324E+01	2.6690E-03	1.2960E-03
1.6915E+01	1.7605E+01	1.7330E-03	1.2290E-03
1.6252E+01	1.6915E+01	5.3070E-03	1.5070E-03
1.5615E+01	1.6252E+01	2.0560E-02	2.3330E-03
1.5002E+01	1.5615E+01	2.5700E-01	7.3640E-03
1.4414E+01	1.5002E+01	1.0990E+00	1.5130E-03
1.3849E+01	1.4414E+01	8.8970E-01	1.3670E-03
1.3306E+01	1.3849E+01	5.5550E-01	1.0850E-02
1.2784E+01	1.3306E+01	4.2880E-01	9.5600E-03
1.2283E+01	1.2784E+01	3.5080E-01	8.6640E-03
1.1801E+01	1.2283E+01	2.7820E-01	7.7360E-03
1.1339E+01	1.1801E+01	2.1740E-01	6.8500E-03
1.0894E+01	1.1339E+01	1.6760E-01	6.0320E-03
1.0467E+01	1.0894E+01	1.3530E-01	5.3690E-03
1.0056E+01	1.0467E+01	1.1930E-01	4.9710E-03
9.6620E+00	1.0056E+01	1.1470E-01	4.8180E-03
9.2832E+00	9.6620E+00	1.0430E-01	4.5800E-03
8.9192E+00	9.2832E+00	1.0910E-01	4.6520E-03
8.5694E+00	8.9192E+00	1.1370E-01	4.6910E-03
8.2334E+00	8.5694E+00	1.0600E-01	4.4850E-03
7.9106E+00	8.2334E+00	1.0380E-01	4.3920E-03
7.6004E+00	7.9106E+00	9.9750E-02	4.2710E-03
7.3024E+00	7.6004E+00	9.5160E-02	4.1430E-03
7.0161E+00	7.3024E+00	9.4420E-02	4.0960E-03
6.7410E+00	7.0161E+00	9.3170E-02	4.0410E-03
6.4766E+00	6.7410E+00	9.7540E-02	4.1000E-03
6.2227E+00	6.4766E+00	9.1360E-02	3.9510E-03
5.9787E+00	6.2227E+00	8.2030E-02	3.7370E-03
5.7443E+00	5.9787E+00	9.0440E-02	3.8860E-03
5.5190E+00	5.7443E+00	8.6480E-02	3.7860E-03
5.3026E+00	5.5190E+00	8.6540E-02	3.7470E-03
5.0947E+00	5.3026E+00	7.7030E-02	3.5170E-03
4.8949E+00	5.0947E+00	8.3230E-02	3.6100E-03
4.7030E+00	4.8949E+00	7.5640E-02	3.4260E-03
4.5186E+00	4.7030E+00	7.7000E-02	3.4250E-03
4.3414E+00	4.5186E+00	7.7660E-02	3.4120E-03
4.1712E+00	4.3414E+00	7.1980E-02	3.2730E-03
4.0076E+00	4.1712E+00	7.6380E-02	3.3390E-03
3.8505E+00	4.0076E+00	8.4750E-02	3.4790E-03
3.6995E+00	3.8505E+00	8.3460E-02	3.4340E-03



3.5545E+00	3.6995E+00	9.5120E-02	3.6040E-03
3.4151E+00	3.5545E+00	8.8610E-02	3.4480E-03
3.2812E+00	3.4151E+00	9.0930E-02	3.4520E-03
3.1525E+00	3.2812E+00	9.1740E-02	3.4310E-03
3.0289E+00	3.1525E+00	9.8790E-02	3.5170E-03
2.9101E+00	3.0289E+00	1.0180E-01	3.5360E-03
2.7960E+00	2.9101E+00	1.0210E-01	3.5110E-03
2.6864E+00	2.7960E+00	1.0300E-01	3.4970E-03
2.5811E+00	2.6864E+00	1.0550E-01	3.5120E-03
2.4799E+00	2.5811E+00	1.0160E-01	3.4260E-03
2.3826E+00	2.4799E+00	9.8720E-02	3.3650E-03
2.2892E+00	2.3826E+00	1.0850E-01	3.5020E-03
2.1994E+00	2.2892E+00	1.1210E-01	3.5410E-03
2.1132E+00	2.1994E+00	1.0980E-01	3.4930E-03
2.0303E+00	2.1132E+00	1.1240E-01	3.5190E-03
1.9507E+00	2.0303E+00	1.1950E-01	3.6070E-03
1.8742E+00	1.9507E+00	1.1090E-01	3.4740E-03
1.8008E+00	1.8742E+00	1.1660E-01	3.5450E-03
1.7301E+00	1.8008E+00	1.2490E-01	3.6490E-03
1.6623E+00	1.7301E+00	1.2830E-01	3.6850E-03
1.5971E+00	1.6623E+00	1.2430E-01	3.6240E-03
1.5345E+00	1.5971E+00	1.2200E-01	3.5860E-03
1.4743E+00	1.5345E+00	1.1760E-01	3.5190E-03
1.4165E+00	1.4743E+00	1.2580E-01	3.6260E-03
1.3610E+00	1.4165E+00	1.2850E-01	3.6570E-03
1.3076E+00	1.3610E+00	1.3310E-01	3.7130E-03
1.2563E+00	1.3076E+00	1.2270E-01	3.5700E-03
1.2071E+00	1.2563E+00	1.1920E-01	3.5190E-03
1.1598E+00	1.2071E+00	1.1780E-01	3.4960E-03
1.1143E+00	1.1598E+00	1.2140E-01	3.5410E-03
1.0706E+00	1.1143E+00	1.3360E-01	3.6910E-03
1.0286E+00	1.0706E+00	1.3730E-01	3.7270E-03
9.8827E-01	1.0286E+00	1.4170E-01	3.7770E-03
9.4952E-01	9.8827E-01	1.4220E-01	3.7700E-03
9.1229E-01	9.4952E-01	1.4690E-01	3.8180E-03
8.7652E-01	9.1229E-01	1.5200E-01	3.8710E-03
8.4215E-01	8.7652E-01	1.4710E-01	3.8050E-03
8.0913E-01	8.4215E-01	1.4570E-01	3.7810E-03
7.7740E-01	8.0913E-01	1.4280E-01	3.7390E-03
7.4692E-01	7.7740E-01	1.3390E-01	3.6240E-03
7.1763E-01	7.4692E-01	1.1990E-01	3.4560E-03
6.8950E-01	7.1763E-01	1.2920E-01	3.5860E-03
6.6246E-01	6.8950E-01	1.4940E-01	3.8440E-03
6.3648E-01	6.6246E-01	1.5950E-01	3.9720E-03
6.1153E-01	6.3648E-01	1.6930E-01	4.0940E-03
5.8755E-01	6.1153E-01	1.7720E-01	4.1920E-03
5.6451E-01	5.8755E-01	1.6310E-01	4.0450E-03
5.4238E-01	5.6451E-01	1.5800E-01	3.9950E-03
5.2111E-01	5.4238E-01	1.5400E-01	3.9580E-03
5.0068E-01	5.2111E-01	1.5150E-01	3.9380E-03
4.8105E-01	5.0068E-01	1.3280E-01	3.7160E-03
4.6218E-01	4.8105E-01	1.1730E-01	3.5220E-03
4.4406E-01	4.6218E-01	1.1640E-01	3.5150E-03
4.2665E-01	4.4406E-01	9.9790E-02	3.2930E-03
4.0992E-01	4.2665E-01	8.2930E-02	3.0510E-03
3.9385E-01	4.0992E-01	6.1850E-02	2.7150E-03
3.7840E-01	3.9385E-01	5.6420E-02	2.6270E-03
3.6357E-01	3.7840E-01	4.9140E-02	2.5070E-03
3.4931E-01	3.6357E-01	4.6390E-02	2.4990E-03
3.3561E-01	3.4931E-01	4.7190E-02	2.5610E-03
3.2245E-01	3.3561E-01	4.6740E-02	2.5980E-03
3.0981E-01	3.2245E-01	3.6810E-02	2.4440E-03
2.9766E-01	3.0981E-01	3.7390E-02	2.5030E-03
2.8599E-01	2.9766E-01	3.1310E-02	2.4160E-03
2.7478E-01	2.8599E-01	2.8270E-02	2.3930E-03
2.6400E-01	2.7478E-01	1.7460E-02	2.1770E-03
2.5365E-01	2.6400E-01	1.4840E-02	2.1550E-03
2.4371E-01	2.5365E-01	1.5490E-02	2.2300E-03
2.3415E-01	2.4371E-01	1.3700E-02	2.3010E-03
2.2497E-01	2.3415E-01	1.1770E-02	2.3770E-03
2.1615E-01	2.2497E-01	1.2020E-02	2.5240E-03
2.0767E-01	2.1615E-01	2.1100E-02	2.9150E-03
1.9953E-01	2.0767E-01	2.8480E-02	3.2550E-03
1.9171E-01	1.9953E-01	4.2040E-02	3.6980E-03

1.8419E-01	1.9171E-01	5.0720E-02	4.0250E-03
1.7697E-01	1.8419E-01	5.6250E-02	4.2890E-03
1.7003E-01	1.7697E-01	7.0860E-02	4.7400E-03
1.6336E-01	1.7003E-01	8.3140E-02	5.1510E-03
1.5696E-01	1.6336E-01	7.1650E-02	5.2650E-03
1.5080E-01	1.5696E-01	8.8320E-02	5.9770E-03
1.4489E-01	1.5080E-01	1.0140E-01	6.6760E-03
1.3921E-01	1.4489E-01	1.1540E-01	7.4670E-03
1.3375E-01	1.3921E-01	1.0750E-01	7.9270E-03
1.2850E-01	1.3375E-01	8.6560E-02	8.1090E-03
1.2347E-01	1.2850E-01	9.1240E-02	8.9100E-03
1.1862E-01	1.2347E-01	9.8430E-02	9.8290E-03
1.1397E-01	1.1862E-01	9.7880E-02	1.0870E-02
1.0950E-01	1.1397E-01	1.1660E-01	1.2490E-02
1.0521E-01	1.0950E-01	1.0850E-01	1.3950E-02
1.0109E-01	1.0521E-01	3.3630E-02	1.4330E-02
9.7122E-02	1.0109E-01	2.0250E-02	1.6870E-02

Table 4.8 Numerical data of measured leakage current spectrum from Teflon pile of 40 cm.

Lower Energy (MeV)	Upper Energy (MeV)	Lethargy Flux (1/MeV/n)	Error
1.9262E+01	2.0250E+01	1.6587E-03	7.6219E-04
1.8323E+01	1.9262E+01	2.9053E-03	8.4811E-04
1.7429E+01	1.8323E+01	3.6360E-03	8.9738E-04
1.6579E+01	1.7429E+01	5.2236E-03	9.8946E-04
1.5771E+01	1.6579E+01	6.5541E-02	2.6770E-03
1.5002E+01	1.5771E+01	1.7371E+00	1.3354E-02
1.4270E+01	1.5002E+01	1.0793E+01	3.3341E-02
1.3574E+01	1.4270E+01	2.6661E+00	1.6665E-02
1.2912E+01	1.3574E+01	8.3894E-01	9.3721E-03
1.2282E+01	1.2912E+01	6.2280E-01	8.0898E-03
1.1683E+01	1.2282E+01	4.4275E-01	6.8396E-03
1.1113E+01	1.1683E+01	3.2302E-01	5.8369E-03
1.0571E+01	1.1113E+01	2.6227E-01	5.2237E-03
1.0056E+01	1.0571E+01	2.1988E-01	4.6885E-03
9.5654E+00	1.0056E+01	2.4360E-01	4.8524E-03
9.0989E+00	9.5654E+00	2.1520E-01	4.5308E-03
8.6552E+00	9.0989E+00	1.9281E-01	4.2530E-03
8.2330E+00	8.6552E+00	1.5757E-01	3.7990E-03
7.8315E+00	8.2330E+00	1.4129E-01	3.5551E-03
7.4496E+00	7.8315E+00	1.3180E-01	3.4467E-03
7.0862E+00	7.4496E+00	1.2915E-01	3.4057E-03
6.7406E+00	7.0862E+00	1.3647E-01	3.4740E-03
6.4119E+00	6.7406E+00	1.4718E-01	3.5801E-03
6.0992E+00	6.4119E+00	1.4557E-01	3.5419E-03
5.8017E+00	6.0992E+00	1.5340E-01	3.5846E-03
5.5188E+00	5.8017E+00	1.3964E-01	3.3684E-03
5.2496E+00	5.5188E+00	1.3154E-01	3.2224E-03
4.9936E+00	5.2496E+00	1.3075E-01	3.1672E-03
4.7501E+00	4.9936E+00	1.4172E-01	3.2490E-03
4.5184E+00	4.7501E+00	1.4139E-01	3.2064E-03
4.2980E+00	4.5184E+00	1.4203E-01	3.1779E-03
4.0884E+00	4.2980E+00	1.4186E-01	3.1436E-03
3.8890E+00	4.0884E+00	1.4814E-01	3.1898E-03
3.6993E+00	3.8890E+00	1.5218E-01	3.2197E-03
3.5189E+00	3.6993E+00	1.5281E-01	3.2150E-03
3.3473E+00	3.5189E+00	1.4234E-01	3.0977E-03
3.1841E+00	3.3473E+00	1.4457E-01	3.0822E-03
3.0288E+00	3.1841E+00	1.4976E-01	3.0782E-03
2.8811E+00	3.0288E+00	1.5333E-01	3.0613E-03
2.7405E+00	2.8811E+00	1.5454E-01	3.0272E-03
2.6069E+00	2.7405E+00	1.6160E-01	3.0507E-03
2.4798E+00	2.6069E+00	1.5029E-01	2.9096E-03
2.3588E+00	2.4798E+00	1.4753E-01	2.8499E-03
2.2438E+00	2.3588E+00	1.5170E-01	2.8582E-03
2.1343E+00	2.2438E+00	1.4820E-01	2.8086E-03

2.0302E+00	2.1343E+00	1.4726E-01	2.7902E-03
1.9312E+00	2.0302E+00	1.3695E-01	2.6878E-03
1.8370E+00	1.9312E+00	1.3854E-01	2.6943E-03
1.7475E+00	1.8370E+00	1.4030E-01	2.6991E-03
1.6622E+00	1.7475E+00	1.4479E-01	2.7295E-03
1.5812E+00	1.6622E+00	1.3955E-01	2.6709E-03
1.5040E+00	1.5812E+00	1.2944E-01	2.5669E-03
1.4307E+00	1.5040E+00	1.3331E-01	2.5899E-03
1.3609E+00	1.4307E+00	1.3497E-01	2.5906E-03
1.2945E+00	1.3609E+00	1.3045E-01	2.5359E-03
1.2314E+00	1.2945E+00	1.1992E-01	2.4261E-03
1.1714E+00	1.2314E+00	1.2326E-01	2.4521E-03
1.1142E+00	1.1714E+00	1.2285E-01	2.4467E-03
1.0599E+00	1.1142E+00	1.2142E-01	2.4317E-03
1.0082E+00	1.0599E+00	1.2067E-01	2.4238E-03
9.5902E-01	1.0082E+00	1.1843E-01	2.3843E-03
9.1225E-01	9.5902E-01	1.1415E-01	2.3138E-03
8.6776E-01	9.1225E-01	1.0662E-01	2.2143E-03
8.2544E-01	8.6776E-01	1.0549E-01	2.1792E-03
7.8518E-01	8.2544E-01	9.4463E-02	2.0592E-03
7.4689E-01	7.8518E-01	8.9703E-02	2.0070E-03
7.1046E-01	7.4689E-01	7.8187E-02	1.8814E-03
6.7581E-01	7.1046E-01	8.2552E-02	1.9248E-03
6.4285E-01	6.7581E-01	8.6702E-02	1.9674E-03
6.1150E-01	6.4285E-01	8.5609E-02	1.9580E-03
5.8168E-01	6.1150E-01	7.9168E-02	1.8918E-03
5.5331E-01	5.8168E-01	7.2526E-02	1.8211E-03
5.2632E-01	5.5331E-01	7.2821E-02	1.8408E-03
5.0065E-01	5.2632E-01	6.2748E-02	1.7500E-03
4.7624E-01	5.0065E-01	5.9151E-02	1.7315E-03
4.5301E-01	4.7624E-01	5.6127E-02	1.7182E-03
4.3092E-01	4.5301E-01	5.2859E-02	1.7025E-03
4.0990E-01	4.3092E-01	4.3134E-02	1.5959E-03
3.8991E-01	4.0990E-01	3.1653E-02	1.4473E-03
3.7089E-01	3.8991E-01	2.7891E-02	1.4105E-03
3.5280E-01	3.7089E-01	2.8061E-02	1.4449E-03
3.3560E-01	3.5280E-01	2.4404E-02	1.4157E-03
3.1923E-01	3.3560E-01	2.1167E-02	1.3922E-03
3.0366E-01	3.1923E-01	2.1892E-02	1.4417E-03
2.8885E-01	3.0366E-01	2.4678E-02	1.5447E-03
2.7476E-01	2.8885E-01	2.5887E-02	1.6331E-03
2.6136E-01	2.7476E-01	1.8057E-02	1.5556E-03
2.4862E-01	2.6136E-01	1.8711E-02	1.6429E-03
2.3649E-01	2.4862E-01	1.9045E-02	1.7440E-03
2.2496E-01	2.3649E-01	1.7134E-02	1.8193E-03
2.1399E-01	2.2496E-01	1.7229E-02	1.9472E-03
2.0355E-01	2.1399E-01	2.1712E-02	2.1775E-03
1.9362E-01	2.0355E-01	2.5300E-02	2.3791E-03
1.8418E-01	1.9362E-01	2.0987E-02	2.4236E-03
1.7520E-01	1.8418E-01	1.7865E-02	2.4995E-03
1.6665E-01	1.7520E-01	1.8528E-02	2.6613E-03
1.5853E-01	1.6665E-01	2.0779E-02	2.9819E-03
1.5079E-01	1.5853E-01	2.9478E-02	3.6082E-03
1.4344E-01	1.5079E-01	2.1670E-02	4.0530E-03
1.3644E-01	1.4344E-01	1.6457E-02	4.7678E-03
1.2979E-01	1.3644E-01	1.8303E-02	5.7173E-03
1.2346E-01	1.2979E-01	3.1112E-02	6.9631E-03
1.1744E-01	1.2346E-01	3.3304E-02	8.3183E-03
1.1171E-01	1.1744E-01	2.9732E-02	1.0077E-02
1.0626E-01	1.1171E-01	1.6054E-02	1.2468E-02

Table 4.9 Numerical data of measured leakage current spectrum from Al pile of 40 cm.

Lower Energy (MeV)	Upper Energy (MeV)	Lethargy Flux (1/MeV/n)	Error
1.9850E+01	2.0660E+01	4.4100E-04	3.8120E-04
1.9072E+01	1.9850E+01	4.7150E-04	3.8610E-04
1.8324E+01	1.9072E+01	1.2590E-03	4.2520E-04
1.7605E+01	1.8324E+01	2.4310E-03	4.7610E-04
1.6915E+01	1.7605E+01	3.0600E-03	5.0260E-04
1.6252E+01	1.6915E+01	2.4320E-02	1.0180E-03
1.5615E+01	1.6252E+01	4.8530E-01	4.2400E-03
1.5002E+01	1.5615E+01	3.5000E+00	1.1350E-02
1.4414E+01	1.5002E+01	6.4400E+00	1.5420E-02
1.3849E+01	1.4414E+01	3.7670E+00	1.1840E-02
1.3306E+01	1.3849E+01	1.0260E+00	6.2000E-03
1.2784E+01	1.3306E+01	4.4520E-01	4.1010E-03
1.2283E+01	1.2784E+01	3.1800E-01	3.4740E-03
1.1801E+01	1.2283E+01	2.4860E-01	3.0780E-03
1.1339E+01	1.1801E+01	2.1270E-01	2.8470E-03
1.0894E+01	1.1339E+01	1.7100E-01	2.5550E-03
1.0467E+01	1.0894E+01	1.2340E-01	2.1510E-03
1.0056E+01	1.0467E+01	1.0220E-01	1.9310E-03
9.6620E+00	1.0056E+01	8.6920E-02	1.7650E-03
9.2832E+00	9.6620E+00	8.2390E-02	1.7110E-03
8.9192E+00	9.2832E+00	7.7910E-02	1.6570E-03
8.5694E+00	8.9192E+00	7.2180E-02	1.5880E-03
8.2334E+00	8.5694E+00	6.2820E-02	1.4790E-03
7.9106E+00	8.2334E+00	6.1950E-02	1.4600E-03
7.6004E+00	7.9106E+00	6.3150E-02	1.4650E-03
7.3024E+00	7.6004E+00	6.1450E-02	1.4370E-03
7.0161E+00	7.3024E+00	6.4830E-02	1.4530E-03
6.7410E+00	7.0161E+00	6.8680E-02	1.4740E-03
6.4766E+00	6.7410E+00	7.0710E-02	1.4760E-03
6.2227E+00	6.4766E+00	6.9480E-02	1.4480E-03
5.9787E+00	6.2227E+00	7.1350E-02	1.4510E-03
5.7443E+00	5.9787E+00	7.1290E-02	1.4370E-03
5.5190E+00	5.7443E+00	7.4790E-02	1.4560E-03
5.3026E+00	5.5190E+00	7.6400E-02	1.4580E-03
5.0947E+00	5.3026E+00	7.6660E-02	1.4530E-03
4.8949E+00	5.0947E+00	8.0600E-02	1.4840E-03
4.7030E+00	4.8949E+00	7.9460E-02	1.4710E-03
4.5186E+00	4.7030E+00	8.4070E-02	1.5080E-03
4.3414E+00	4.5186E+00	8.9860E-02	1.5530E-03
4.1712E+00	4.3414E+00	8.7750E-02	1.5320E-03
4.0076E+00	4.1712E+00	8.9390E-02	1.5430E-03
3.8505E+00	4.0076E+00	9.1690E-02	1.5590E-03
3.6995E+00	3.8505E+00	9.1630E-02	1.5310E-03
3.5545E+00	3.6995E+00	9.3260E-02	1.5180E-03
3.4151E+00	3.5545E+00	8.8510E-02	1.4590E-03
3.2812E+00	3.4151E+00	8.8120E-02	1.4350E-03
3.1525E+00	3.2812E+00	9.0100E-02	1.4310E-03
3.0289E+00	3.1525E+00	9.1880E-02	1.4270E-03
2.9101E+00	3.0289E+00	9.2330E-02	1.4130E-03
2.7960E+00	2.9101E+00	9.7100E-02	1.4370E-03
2.6864E+00	2.7960E+00	1.0320E-01	1.4740E-03
2.5811E+00	2.6864E+00	1.0020E-01	1.4490E-03
2.4799E+00	2.5811E+00	9.4170E-02	1.4030E-03
2.3826E+00	2.4799E+00	9.5640E-02	1.4100E-03
2.2892E+00	2.3826E+00	1.0120E-01	1.4440E-03
2.1994E+00	2.2892E+00	1.0010E-01	1.4330E-03
2.1132E+00	2.1994E+00	9.9160E-02	1.4230E-03
2.0303E+00	2.1132E+00	1.0060E-01	1.4230E-03
1.9507E+00	2.0303E+00	9.7230E-02	1.3920E-03
1.8742E+00	1.9507E+00	9.8950E-02	1.3960E-03
1.8008E+00	1.8742E+00	9.8520E-02	1.3850E-03
1.7301E+00	1.8008E+00	9.9880E-02	1.3870E-03
1.6623E+00	1.7301E+00	9.5600E-02	1.3520E-03
1.5971E+00	1.6623E+00	9.4480E-02	1.3390E-03
1.5345E+00	1.5971E+00	9.4170E-02	1.3350E-03
1.4743E+00	1.5345E+00	9.0990E-02	1.3150E-03
1.4165E+00	1.4743E+00	8.8820E-02	1.3020E-03
1.3610E+00	1.4165E+00	8.5420E-02	1.2810E-03

1.3076E+00	1.3610E+00	8.7100E-02	1.2940E-03
1.2563E+00	1.3076E+00	9.0310E-02	1.3180E-03
1.2071E+00	1.2563E+00	8.8180E-02	1.3050E-03
1.1598E+00	1.2071E+00	8.6900E-02	1.2980E-03
1.1143E+00	1.1598E+00	8.1400E-02	1.2530E-03
1.0706E+00	1.1143E+00	7.9530E-02	1.2330E-03
1.0286E+00	1.0706E+00	8.2550E-02	1.2490E-03
9.8827E-01	1.0286E+00	7.8000E-02	1.2110E-03
9.4952E-01	9.8827E-01	7.3510E-02	1.1740E-03
9.1229E-01	9.4952E-01	7.7290E-02	1.1960E-03
8.7652E-01	9.1229E-01	7.8110E-02	1.1980E-03
8.4215E-01	8.7652E-01	7.2780E-02	1.1560E-03
8.0913E-01	8.4215E-01	6.5880E-02	1.1030E-03
7.7740E-01	8.0913E-01	6.0700E-02	1.0610E-03
7.4692E-01	7.7740E-01	5.4960E-02	1.0140E-03
7.1763E-01	7.4692E-01	5.6510E-02	1.0240E-03
6.8950E-01	7.1763E-01	5.9710E-02	1.0470E-03
6.6246E-01	6.8950E-01	5.7720E-02	1.0300E-03
6.3648E-01	6.6246E-01	5.7230E-02	1.0250E-03
6.1153E-01	6.3648E-01	4.9570E-02	9.6200E-04
5.8755E-01	6.1153E-01	4.9600E-02	9.6100E-04
5.6451E-01	5.8755E-01	5.1140E-02	9.7260E-04
5.4238E-01	5.6451E-01	4.5820E-02	9.2770E-04
5.2111E-01	5.4238E-01	4.6200E-02	9.3030E-04
5.0068E-01	5.2111E-01	4.0380E-02	8.7980E-04
4.8105E-01	5.0068E-01	3.9540E-02	8.7210E-04
4.6218E-01	4.8105E-01	3.6310E-02	8.4690E-04
4.4406E-01	4.6218E-01	3.2370E-02	8.1710E-04
4.2665E-01	4.4406E-01	3.0780E-02	8.0870E-04
4.0992E-01	4.2665E-01	2.4120E-02	7.4750E-04
3.9385E-01	4.0992E-01	2.4760E-02	7.6130E-04
3.7840E-01	3.9385E-01	2.7790E-02	7.9990E-04
3.6357E-01	3.7840E-01	3.0730E-02	8.3620E-04
3.4931E-01	3.6357E-01	2.9440E-02	8.3050E-04
3.3561E-01	3.4931E-01	3.0680E-02	8.5430E-04
3.2245E-01	3.3561E-01	3.1110E-02	8.6990E-04
3.0981E-01	3.2245E-01	2.7880E-02	8.4890E-04
2.9766E-01	3.0981E-01	2.1340E-02	7.9040E-04
2.8599E-01	2.9766E-01	1.8880E-02	7.7380E-04
2.7478E-01	2.8599E-01	1.6380E-02	7.5580E-04
2.6400E-01	2.7478E-01	1.3600E-02	7.3320E-04
2.5365E-01	2.6400E-01	2.0910E-02	8.3840E-04
2.4371E-01	2.5365E-01	2.2570E-02	8.8300E-04
2.3415E-01	2.4371E-01	2.1660E-02	8.9980E-04
2.2497E-01	2.3415E-01	1.8890E-02	8.9590E-04
2.1615E-01	2.2497E-01	1.5470E-02	8.8370E-04
2.0767E-01	2.1615E-01	1.2310E-02	8.7400E-04
1.9953E-01	2.0767E-01	8.2570E-03	8.5140E-04
1.9171E-01	1.9953E-01	7.3140E-03	8.7200E-04
1.8419E-01	1.9171E-01	8.6530E-03	9.4200E-04
1.7697E-01	1.8419E-01	1.2390E-02	1.0480E-03
1.7003E-01	1.7697E-01	1.1980E-02	1.1030E-03
1.6336E-01	1.7003E-01	1.3210E-02	1.1850E-03
1.5696E-01	1.6336E-01	1.0150E-02	1.2170E-03
1.5080E-01	1.5696E-01	3.6150E-03	1.2060E-03
1.4489E-01	1.5080E-01	4.6570E-03	1.3070E-03
1.3921E-01	1.4489E-01	4.1720E-03	1.4040E-03
1.3375E-01	1.3921E-01	5.6020E-03	1.5500E-03
1.2850E-01	1.3375E-01	9.4260E-03	1.7440E-03
1.2347E-01	1.2850E-01	1.1490E-02	1.9350E-03
1.1862E-01	1.2347E-01	9.4350E-03	2.0970E-03
1.1397E-01	1.1862E-01	8.8380E-03	2.3090E-03
1.0950E-01	1.1397E-01	8.5440E-03	2.5640E-03
1.0521E-01	1.0950E-01	1.1590E-02	2.9120E-03
1.0109E-01	1.0521E-01	1.2890E-02	3.2570E-03
9.7122E-02	1.0109E-01	6.2300E-03	3.5570E-03

Table 4.10 Numerical data of measured leakage current spectrum from Si pile of 60 cm.

Lower Energy (MeV)	Upper Energy (MeV)	Lethargy Flux (1/MeV/n)	Error
1.9262E+01	2.0250E+01	8.1335E-04	6.6222E-04
1.8323E+01	1.9262E+01	9.6518E-04	6.8179E-04
1.7429E+01	1.8323E+01	5.9867E-04	6.5426E-04
1.6579E+01	1.7429E+01	1.9181E-03	7.7606E-04
1.5771E+01	1.6579E+01	8.6973E-02	3.3531E-03
1.5002E+01	1.5771E+01	2.8511E+00	1.8895E-02
1.4270E+01	1.5002E+01	4.6557E+00	2.4208E-02
1.3574E+01	1.4270E+01	7.1086E-01	9.5240E-03
1.2912E+01	1.3574E+01	3.9610E-01	7.1234E-03
1.2282E+01	1.2912E+01	3.2538E-01	6.4673E-03
1.1683E+01	1.2282E+01	2.1964E-01	5.3334E-03
1.1113E+01	1.1683E+01	1.6482E-01	4.6185E-03
1.0571E+01	1.1113E+01	1.0885E-01	3.7416E-03
1.0056E+01	1.0571E+01	9.4420E-02	3.4169E-03
9.5654E+00	1.0056E+01	9.1877E-02	3.3190E-03
9.0989E+00	9.5654E+00	6.7527E-02	2.8426E-03
8.6552E+00	9.0989E+00	4.9392E-02	2.4297E-03
8.2330E+00	8.6552E+00	4.6502E-02	2.3272E-03
7.8315E+00	8.2330E+00	4.6812E-02	2.3020E-03
7.4496E+00	7.8315E+00	5.8152E-02	2.5558E-03
7.0862E+00	7.4496E+00	5.9597E-02	2.5794E-03
6.7406E+00	7.0862E+00	6.3686E-02	2.6444E-03
6.4119E+00	6.7406E+00	7.4049E-02	2.8232E-03
6.0992E+00	6.4119E+00	7.5567E-02	2.8344E-03
5.8017E+00	6.0992E+00	7.6344E-02	2.8116E-03
5.5188E+00	5.8017E+00	7.7715E-02	2.7877E-03
5.2496E+00	5.5188E+00	8.0602E-02	2.7923E-03
4.9936E+00	5.2496E+00	8.4097E-02	2.8082E-03
4.7501E+00	4.9936E+00	7.8632E-02	2.6844E-03
4.5184E+00	4.7501E+00	8.6939E-02	2.7829E-03
4.2980E+00	4.5184E+00	8.4593E-02	2.7159E-03
4.0884E+00	4.2980E+00	8.7135E-02	2.7264E-03
3.8890E+00	4.0884E+00	1.0502E-01	2.9640E-03
3.6993E+00	3.8890E+00	1.0654E-01	2.9742E-03
3.5189E+00	3.6993E+00	1.1318E-01	3.0515E-03
3.3473E+00	3.5189E+00	1.1247E-01	3.0325E-03
3.1841E+00	3.3473E+00	1.1430E-01	3.0185E-03
3.0288E+00	3.1841E+00	1.0925E-01	2.8999E-03
2.8811E+00	3.0288E+00	1.1217E-01	2.8885E-03
2.7405E+00	2.8811E+00	1.1707E-01	2.9036E-03
2.6069E+00	2.7405E+00	1.1165E-01	2.7994E-03
2.4798E+00	2.6069E+00	1.0273E-01	2.6553E-03
2.3588E+00	2.4798E+00	1.0522E-01	2.6564E-03
2.2438E+00	2.3588E+00	1.0947E-01	2.6787E-03
2.1343E+00	2.2438E+00	1.1768E-01	2.7560E-03
2.0302E+00	2.1343E+00	1.0542E-01	2.6049E-03
1.9312E+00	2.0302E+00	1.1132E-01	2.6660E-03
1.8370E+00	1.9312E+00	1.0726E-01	2.6114E-03
1.7475E+00	1.8370E+00	1.0474E-01	2.5719E-03
1.6622E+00	1.7475E+00	1.1833E-01	2.7141E-03
1.5812E+00	1.6622E+00	1.0546E-01	2.5574E-03
1.5040E+00	1.5812E+00	8.9502E-02	2.3556E-03
1.4307E+00	1.5040E+00	9.5143E-02	2.4138E-03
1.3609E+00	1.4307E+00	1.0082E-01	2.4678E-03
1.2945E+00	1.3609E+00	1.1575E-01	2.6222E-03
1.2314E+00	1.2945E+00	1.1397E-01	2.5903E-03
1.1714E+00	1.2314E+00	1.1744E-01	2.6215E-03
1.1142E+00	1.1714E+00	1.2217E-01	2.6696E-03
1.0599E+00	1.1142E+00	1.1534E-01	2.5948E-03
1.0082E+00	1.0599E+00	1.1313E-01	2.5696E-03
9.5902E-01	1.0082E+00	9.5558E-02	2.3538E-03
9.1225E-01	9.5902E-01	7.9707E-02	2.1333E-03
8.6776E-01	9.1225E-01	7.4947E-02	2.0479E-03
8.2544E-01	8.6776E-01	7.3883E-02	2.0115E-03
7.8518E-01	8.2544E-01	6.4497E-02	1.8788E-03
7.4689E-01	7.8518E-01	6.5289E-02	1.8852E-03
7.1046E-01	7.4689E-01	6.7053E-02	1.9040E-03
6.7581E-01	7.1046E-01	6.8967E-02	1.9255E-03

6.4285E-01	6.7581E-01	7.1933E-02	1.9628E-03
6.1150E-01	6.4285E-01	6.8864E-02	1.9242E-03
5.8168E-01	6.1150E-01	6.9920E-02	1.9389E-03
5.5331E-01	5.8168E-01	6.5943E-02	1.8892E-03
5.2632E-01	5.5331E-01	5.0143E-02	1.6848E-03
5.0065E-01	5.2632E-01	4.9526E-02	1.6991E-03
4.7624E-01	5.0065E-01	4.3867E-02	1.6348E-03
4.5301E-01	4.7624E-01	4.4897E-02	1.6745E-03
4.3092E-01	4.5301E-01	4.7290E-02	1.7365E-03
4.0990E-01	4.3092E-01	4.3008E-02	1.6938E-03
3.8991E-01	4.0990E-01	3.8659E-02	1.6456E-03
3.7089E-01	3.8991E-01	3.9371E-02	1.6833E-03
3.5280E-01	3.7089E-01	3.3380E-02	1.6059E-03
3.3560E-01	3.5280E-01	3.0751E-02	1.5895E-03
3.1923E-01	3.3560E-01	2.8832E-02	1.5853E-03
3.0366E-01	3.1923E-01	2.9186E-02	1.6267E-03
2.8885E-01	3.0366E-01	2.9051E-02	1.6738E-03
2.7476E-01	2.8885E-01	3.0012E-02	1.7568E-03
2.6136E-01	2.7476E-01	2.4265E-02	1.7011E-03
2.4862E-01	2.6136E-01	2.1480E-02	1.7072E-03
2.3649E-01	2.4862E-01	1.6161E-02	1.6649E-03
2.2496E-01	2.3649E-01	1.7088E-02	1.7923E-03
2.1399E-01	2.2496E-01	1.4463E-02	1.8388E-03
2.0355E-01	2.1399E-01	1.2835E-02	1.9217E-03
1.9362E-01	2.0355E-01	1.1093E-02	1.9918E-03
1.8418E-01	1.9362E-01	6.2261E-03	1.9665E-03
1.7520E-01	1.8418E-01	5.7034E-03	2.0772E-03
1.6665E-01	1.7520E-01	5.4970E-03	2.2066E-03
1.5853E-01	1.6665E-01	8.3084E-03	2.5364E-03
1.5079E-01	1.5853E-01	2.0322E-02	3.2757E-03
1.4344E-01	1.5079E-01	3.9015E-02	4.2884E-03
1.3644E-01	1.4344E-01	4.3661E-02	5.1596E-03
1.2979E-01	1.3644E-01	5.3765E-02	6.2378E-03
1.2346E-01	1.2979E-01	5.4461E-02	7.1543E-03
1.1744E-01	1.2346E-01	3.9833E-02	7.9810E-03
1.1171E-01	1.1744E-01	3.6664E-02	9.5567E-03
1.0626E-01	1.1171E-01	3.5071E-02	1.1934E-02
1.0108E-01	1.0626E-01	2.8768E-03	1.4908E-02
9.6150E-02	1.0108E-01	1.3214E-02	2.2455E-02
9.1461E-02	9.6150E-02	2.2889E-02	4.1134E-02

Table 4.11 Numerical data of measured leakage current spectrum from Ti pile of 40 cm.

Lower Energy (MeV)	Upper Energy (MeV)	Lethargy Flux (1/MeV/n)	Error
1.9850E+01	2.0660E+01	1.3920E-03	5.1940E-04
1.9072E+01	1.9850E+01	1.1980E-03	5.1280E-04
1.8324E+01	1.9072E+01	2.1870E-03	5.6750E-04
1.7605E+01	1.8324E+01	2.5330E-03	5.8780E-04
1.6915E+01	1.7605E+01	6.6970E-03	7.6250E-04
1.6252E+01	1.6915E+01	1.0800E-01	2.4940E-03
1.5615E+01	1.6252E+01	1.2090E+00	8.2140E-03
1.5002E+01	1.5615E+01	3.3110E+00	1.3580E-02
1.4414E+01	1.5002E+01	4.4970E+00	1.5800E-02
1.3849E+01	1.4414E+01	3.2600E+00	1.3430E-02
1.3306E+01	1.3849E+01	1.2670E+00	8.3020E-03
1.2784E+01	1.3306E+01	4.3400E-01	4.8230E-03
1.2283E+01	1.2784E+01	2.5480E-01	3.6820E-03
1.1801E+01	1.2283E+01	1.7250E-01	3.0240E-03
1.1339E+01	1.1801E+01	1.3340E-01	2.6630E-03
1.0894E+01	1.1339E+01	1.0700E-01	2.3910E-03
1.0467E+01	1.0894E+01	9.4200E-02	2.2350E-03
1.0056E+01	1.0467E+01	7.9530E-02	2.0460E-03
9.6620E+00	1.0056E+01	7.5220E-02	1.9790E-03
9.2832E+00	9.6620E+00	6.4880E-02	1.8340E-03
8.9192E+00	9.2832E+00	6.1410E-02	1.7770E-03
8.5694E+00	8.9192E+00	5.5740E-02	1.6840E-03

8.2334E+00	8.5694E+00	5.2270E-02	1.6200E-03
7.9106E+00	8.2334E+00	4.8320E-02	1.5490E-03
7.6004E+00	7.9106E+00	4.8620E-02	1.5400E-03
7.3024E+00	7.6004E+00	4.8410E-02	1.5260E-03
7.0161E+00	7.3024E+00	4.9700E-02	1.5360E-03
6.7410E+00	7.0161E+00	5.1490E-02	1.5530E-03
6.4766E+00	6.7410E+00	4.9450E-02	1.5180E-03
6.2227E+00	6.4766E+00	5.1380E-02	1.5380E-03
5.9787E+00	6.2227E+00	5.4850E-02	1.5780E-03
5.7443E+00	5.9787E+00	5.6790E-02	1.5970E-03
5.5190E+00	5.7443E+00	5.6640E-02	1.5900E-03
5.3026E+00	5.5190E+00	5.8150E-02	1.6030E-03
5.0947E+00	5.3026E+00	5.8380E-02	1.5910E-03
4.8949E+00	5.0947E+00	6.0670E-02	1.5980E-03
4.7030E+00	4.8949E+00	6.1230E-02	1.5840E-03
4.5186E+00	4.7030E+00	6.5500E-02	1.6150E-03
4.3414E+00	4.5186E+00	6.7200E-02	1.6160E-03
4.1712E+00	4.3414E+00	6.9190E-02	1.6210E-03
4.0076E+00	4.1712E+00	7.0210E-02	1.6160E-03
3.8505E+00	4.0076E+00	7.1730E-02	1.6170E-03
3.6995E+00	3.8505E+00	7.4030E-02	1.6210E-03
3.5545E+00	3.6995E+00	7.5070E-02	1.6130E-03
3.4151E+00	3.5545E+00	7.5550E-02	1.6000E-03
3.2812E+00	3.4151E+00	8.0030E-02	1.6270E-03
3.1525E+00	3.2812E+00	7.8760E-02	1.6000E-03
3.0289E+00	3.1525E+00	8.5010E-02	1.6440E-03
2.9101E+00	3.0289E+00	8.9580E-02	1.6710E-03
2.7960E+00	2.9101E+00	1.0190E-01	1.7650E-03
2.6864E+00	2.7960E+00	1.0450E-01	1.7770E-03
2.5811E+00	2.6864E+00	9.6080E-02	1.7000E-03
2.4799E+00	2.5811E+00	9.4650E-02	1.6810E-03
2.3826E+00	2.4799E+00	9.1760E-02	1.6500E-03
2.2892E+00	2.3826E+00	9.8290E-02	1.6980E-03
2.1994E+00	2.2892E+00	1.0070E-01	1.7110E-03
2.1132E+00	2.1994E+00	1.0340E-01	1.7270E-03
2.0303E+00	2.1132E+00	1.0190E-01	1.7080E-03
1.9507E+00	2.0303E+00	1.0330E-01	1.7120E-03
1.8742E+00	1.9507E+00	1.0330E-01	1.7060E-03
1.8008E+00	1.8742E+00	1.0350E-01	1.7020E-03
1.7301E+00	1.8008E+00	1.0720E-01	1.7240E-03
1.6623E+00	1.7301E+00	1.0820E-01	1.7260E-03
1.5971E+00	1.6623E+00	1.1710E-01	1.7880E-03
1.5345E+00	1.5971E+00	1.1210E-01	1.7430E-03
1.4743E+00	1.5345E+00	1.0800E-01	1.7020E-03
1.4165E+00	1.4743E+00	1.0720E-01	1.6860E-03
1.3610E+00	1.4165E+00	1.0790E-01	1.6830E-03
1.3076E+00	1.3610E+00	1.0680E-01	1.6660E-03
1.2563E+00	1.3076E+00	1.0840E-01	1.6700E-03
1.2071E+00	1.2563E+00	1.0910E-01	1.6670E-03
1.1598E+00	1.2071E+00	1.0940E-01	1.6620E-03
1.1143E+00	1.1598E+00	1.1240E-01	1.6770E-03
1.0706E+00	1.1143E+00	1.0700E-01	1.6320E-03
1.0286E+00	1.0706E+00	1.0110E-01	1.5840E-03
9.8827E-01	1.0286E+00	9.5870E-02	1.5400E-03
9.4952E-01	9.8827E-01	9.2940E-02	1.5130E-03
9.1229E-01	9.4952E-01	9.5140E-02	1.5250E-03
8.7652E-01	9.1229E-01	9.4590E-02	1.5170E-03
8.4215E-01	8.7652E-01	9.1350E-02	1.4870E-03
8.0913E-01	8.4215E-01	9.1290E-02	1.4800E-03
7.7740E-01	8.0913E-01	9.5420E-02	1.5040E-03
7.4692E-01	7.7740E-01	8.4970E-02	1.4190E-03
7.1763E-01	7.4692E-01	7.5550E-02	1.3390E-03
6.8950E-01	7.1763E-01	7.0860E-02	1.2960E-03
6.6246E-01	6.8950E-01	6.9030E-02	1.2770E-03
6.3648E-01	6.6246E-01	7.1000E-02	1.2890E-03
6.1153E-01	6.3648E-01	7.0880E-02	1.2770E-03
5.8755E-01	6.1153E-01	7.0410E-02	1.2630E-03
5.6451E-01	5.8755E-01	6.1850E-02	1.1830E-03
5.4238E-01	5.6451E-01	5.8160E-02	1.1430E-03
5.2111E-01	5.4238E-01	5.6170E-02	1.1180E-03
5.0068E-01	5.2111E-01	5.3520E-02	1.0880E-03
4.8105E-01	5.0068E-01	4.6380E-02	1.0170E-03
4.6218E-01	4.8105E-01	4.2620E-02	9.7930E-04
4.4406E-01	4.6218E-01	3.8400E-02	9.3900E-04



4.2665E-01	4.4406E-01	3.8070E-02	9.3710E-04
4.0992E-01	4.2665E-01	3.4600E-02	9.0300E-04
3.9385E-01	4.0992E-01	3.5640E-02	9.1550E-04
3.7840E-01	3.9385E-01	3.5010E-02	9.1070E-04
3.6357E-01	3.7840E-01	3.6230E-02	9.2500E-04
3.4931E-01	3.6357E-01	3.2160E-02	8.8420E-04
3.3561E-01	3.4931E-01	2.8210E-02	8.4500E-04
3.2245E-01	3.3561E-01	2.5690E-02	8.2030E-04
3.0981E-01	3.2245E-01	2.7080E-02	8.4600E-06
2.9766E-01	3.0981E-01	2.4650E-02	8.1670E-04
2.8599E-01	2.9766E-01	2.7170E-02	8.5010E-04
2.7478E-01	2.8599E-01	2.3570E-02	8.1240E-04
2.6400E-01	2.7478E-01	1.7960E-02	7.4670E-04
2.5365E-01	2.6400E-01	1.8200E-02	7.5840E-04
2.4371E-01	2.5365E-01	1.7570E-02	7.6320E-04
2.3415E-01	2.4371E-01	1.7070E-02	7.6960E-04
2.2497E-01	2.3415E-01	2.1290E-02	8.3710E-04
2.1615E-01	2.2497E-01	2.1840E-02	8.5720E-04
2.0767E-01	2.1615E-01	1.8890E-02	8.3350E-04
1.9953E-01	2.0767E-01	1.6860E-02	8.2040E-04
1.9171E-01	1.9953E-01	1.3290E-02	7.8550E-04
1.8419E-01	1.9171E-01	8.5270E-03	7.3840E-04
1.7697E-01	1.8419E-01	9.1120E-03	7.7210E-04
1.7003E-01	1.7697E-01	1.3770E-02	8.6640E-04
1.6336E-01	1.7003E-01	1.4730E-02	9.0640E-04
1.5696E-01	1.6336E-01	1.4890E-02	9.3590E-04
1.5080E-01	1.5696E-01	1.3030E-02	9.3790E-04
1.4489E-01	1.5080E-01	9.7490E-03	9.1880E-04
1.3921E-01	1.4489E-01	8.8640E-03	9.3620E-04
1.3375E-01	1.3921E-01	7.6470E-03	9.5010E-04
1.2850E-01	1.3375E-01	1.1140E-02	1.0370E-03
1.2347E-01	1.2850E-01	1.1280E-02	1.0740E-03
1.1862E-01	1.2347E-01	9.5950E-03	1.0850E-03
1.1397E-01	1.1862E-01	7.1420E-03	1.0850E-03
1.0950E-01	1.1397E-01	5.1300E-03	1.0930E-03
1.0521E-01	1.0950E-01	5.6830E-03	1.1420E-03
1.0109E-01	1.0521E-01	1.0560E-02	1.2850E-03
9.7122E-02	1.0109E-01	8.9110E-03	1.3380E-03
9.3313E-02	9.7122E-02	6.6430E-03	1.3890E-03
8.9655E-02	9.3313E-02	5.5560E-03	1.4640E-03
8.6139E-02	8.9655E-02	2.4540E-03	1.5170E-03
8.2762E-02	8.6139E-02	6.7860E-03	1.6940E-03
7.9516E-02	8.2762E-02	6.1950E-03	1.8070E-03
7.6399E-02	7.9516E-02	9.3570E-03	2.0000E-03

Table 4.12 Numerical data of measured leakage current spectrum from Cr pile of 40 cm.

Lower Energy (MeV)	Upper Energy (MeV)	Lethargy Flux (1/MeV/n)	Error
1.9652E+01	2.0250E+01	4.6440E-04	1.2300E-04
1.9071E+01	1.9652E+01	4.9770E-04	1.2590E-04
1.8507E+01	1.9071E+01	9.8580E-04	1.5370E-04
1.7960E+01	1.8507E+01	1.6090E-03	1.8990E-04
1.7429E+01	1.7960E+01	3.5810E-03	2.6770E-04
1.6914E+01	1.7429E+01	6.1250E-03	3.4300E-04
1.6414E+01	1.6914E+01	9.1450E-03	4.1490E-04
1.5929E+01	1.6414E+01	3.5700E-02	8.0650E-04
1.5458E+01	1.5929E+01	2.0460E-01	1.9210E-03
1.5002E+01	1.5458E+01	1.2140E+00	4.6770E-03
1.4558E+01	1.5002E+01	4.2520E+00	8.7690E-03
1.4128E+01	1.4558E+01	6.6360E+00	1.1000E-02
1.3710E+01	1.4128E+01	3.2940E+00	7.7590E-03
1.3305E+01	1.3710E+01	8.7740E-01	3.9680E-03
1.2912E+01	1.3305E+01	4.8630E-01	2.9280E-03
1.2530E+01	1.2912E+01	3.3510E-01	2.4280E-03
1.2160E+01	1.2530E+01	2.4880E-01	2.0960E-03
1.1801E+01	1.2160E+01	1.8790E-01	1.8250E-03

1.1452E+01	1.1801E+01	1.3710E-01	1.5600E-03
1.1113E+01	1.1452E+01	1.0740E-01	1.3810E-03
1.0785E+01	1.1113E+01	8.9640E-02	1.2590E-03
1.0466E+01	1.0785E+01	7.8640E-02	1.1620E-03
1.0157E+01	1.0466E+01	6.9710E-02	1.0780E-03
9.8567E+00	1.0157E+01	6.3220E-02	1.0130E-03
9.5654E+00	9.8567E+00	6.5970E-02	1.0360E-03
9.2827E+00	9.5654E+00	6.6560E-02	1.0420E-03
9.0084E+00	9.2827E+00	6.3730E-02	1.0210E-03
8.7422E+00	9.0084E+00	5.8860E-02	9.6660E-04
8.4838E+00	8.7422E+00	5.4050E-02	9.1330E-04
8.2331E+00	8.4838E+00	5.1720E-02	8.8140E-04
7.9897E+00	8.2331E+00	5.1810E-02	8.7080E-04
7.7536E+00	7.9897E+00	4.9140E-02	8.3800E-04
7.5244E+00	7.7536E+00	5.2220E-02	8.5360E-04
7.3021E+00	7.5244E+00	5.1960E-02	8.4340E-04
7.0863E+00	7.3021E+00	5.2140E-02	8.3930E-04
6.8768E+00	7.0863E+00	5.3250E-02	8.4270E-04
6.6736E+00	6.8768E+00	5.4770E-02	8.4940E-04
6.4764E+00	6.6736E+00	5.5090E-02	8.4690E-04
6.2849E+00	6.4764E+00	5.7600E-02	8.6100E-04
6.0992E+00	6.2849E+00	5.9810E-02	8.7250E-04
5.9189E+00	6.0992E+00	6.1890E-02	8.8250E-04
5.7440E+00	5.9189E+00	6.2800E-02	8.8400E-04
5.5742E+00	5.7440E+00	6.3490E-02	8.8410E-04
5.4095E+00	5.5742E+00	6.7030E-02	9.0350E-04
5.2496E+00	5.4095E+00	6.6380E-02	8.9480E-04
5.0945E+00	5.2496E+00	7.0950E-02	9.2050E-04
4.9439E+00	5.0945E+00	7.2800E-02	9.2810E-04
4.7978E+00	4.9439E+00	7.5320E-02	9.2940E-04
4.6560E+00	4.7978E+00	7.6920E-02	9.2560E-04
4.5184E+00	4.6560E+00	7.7620E-02	9.1720E-04
4.3849E+00	4.5184E+00	8.1280E-02	9.2630E-04
4.2553E+00	4.3849E+00	8.3350E-02	9.2660E-04
4.1295E+00	4.2553E+00	8.3680E-02	9.1770E-04
4.0075E+00	4.1295E+00	8.4950E-02	9.1520E-04
3.8890E+00	4.0075E+00	8.5790E-02	9.1200E-04
3.7741E+00	3.8890E+00	8.9430E-02	9.2370E-04
3.6625E+00	3.7741E+00	9.1550E-02	9.2740E-04
3.5543E+00	3.6625E+00	9.4580E-02	9.3570E-04
3.4493E+00	3.5543E+00	9.9790E-02	9.5440E-04
3.3473E+00	3.4493E+00	9.8610E-02	9.4240E-04
3.2484E+00	3.3473E+00	1.0320E-01	9.5650E-04
3.1524E+00	3.2484E+00	1.0450E-01	9.5440E-04
3.0592E+00	3.1524E+00	1.0710E-01	9.5790E-04
2.9688E+00	3.0592E+00	1.1110E-01	9.6790E-04
2.8811E+00	2.9688E+00	1.1450E-01	9.7530E-04
2.7959E+00	2.8811E+00	1.1540E-01	9.7250E-04
2.7133E+00	2.7959E+00	1.1710E-01	9.7280E-04
2.6331E+00	2.7133E+00	1.1940E-01	9.7720E-04
2.5553E+00	2.6331E+00	1.1980E-01	9.7350E-04
2.4798E+00	2.5553E+00	1.2560E-01	9.9210E-04
2.4065E+00	2.4798E+00	1.2860E-01	9.9900E-04
2.3353E+00	2.4065E+00	1.2840E-01	9.9390E-04
2.2663E+00	2.3353E+00	1.3720E-01	1.0230E-03
2.1993E+00	2.2663E+00	1.4280E-01	1.0390E-03
2.1343E+00	2.1993E+00	1.3880E-01	1.0190E-03
2.0713E+00	2.1343E+00	1.3380E-01	9.9500E-04
2.0101E+00	2.0713E+00	1.4010E-01	1.0130E-03
1.9506E+00	2.0101E+00	1.4670E-01	1.0320E-03
1.8930E+00	1.9506E+00	1.5190E-01	1.0450E-03
1.8371E+00	1.8930E+00	1.5590E-01	1.0540E-03
1.7828E+00	1.8371E+00	1.5550E-01	1.0510E-03
1.7301E+00	1.7828E+00	1.5840E-01	1.0590E-03
1.6789E+00	1.7301E+00	1.5590E-01	1.0500E-03
1.6293E+00	1.6789E+00	1.6400E-01	1.0750E-03
1.5812E+00	1.6293E+00	1.7170E-01	1.0990E-03
1.5344E+00	1.5812E+00	1.6910E-01	1.0900E-03
1.4891E+00	1.5344E+00	1.7210E-01	1.0980E-03
1.4451E+00	1.4891E+00	1.7090E-01	1.0920E-03
1.4024E+00	1.4451E+00	1.6610E-01	1.0750E-03
1.3609E+00	1.4024E+00	1.6580E-01	1.0720E-03
1.3207E+00	1.3609E+00	1.8100E-01	1.1170E-03
1.2817E+00	1.3207E+00	1.9070E-01	1.1450E-03

1.2438E+00	1.2817E+00	1.9010E-01	1.1410E-03
1.2070E+00	1.2438E+00	1.8860E-01	1.1340E-03
1.1714E+00	1.2070E+00	1.8580E-01	1.1230E-03
1.1367E+00	1.1714E+00	2.0560E-01	1.1780E-03
1.1031E+00	1.1367E+00	2.2170E-01	1.2200E-03
1.0705E+00	1.1031E+00	2.1790E-01	1.2060E-03
1.0389E+00	1.0705E+00	1.9900E-01	1.1500E-03
1.0082E+00	1.0389E+00	1.9120E-01	1.1250E-03
9.7840E-01	1.0082E+00	1.9500E-01	1.1350E-03
9.4948E-01	9.7840E-01	1.8510E-01	1.1070E-03
9.2142E-01	9.4948E-01	1.8040E-01	1.0930E-03
8.9419E-01	9.2142E-01	1.8790E-01	1.1160E-03
8.6776E-01	8.9419E-01	1.7460E-01	1.0760E-03
8.4211E-01	8.6776E-01	1.6140E-01	1.0350E-03
8.1723E-01	8.4211E-01	1.6120E-01	1.0350E-03
7.9307E-01	8.1723E-01	1.6680E-01	1.0590E-03
7.6963E-01	7.9307E-01	1.6770E-01	1.0670E-03
7.4689E-01	7.6963E-01	1.7870E-01	1.1080E-03
7.2481E-01	7.4689E-01	1.6930E-01	1.0850E-03
7.0339E-01	7.2481E-01	1.5960E-01	1.0590E-03
6.8260E-01	7.0339E-01	1.6620E-01	1.0860E-03
6.6243E-01	6.8260E-01	1.7990E-01	1.1380E-03
6.4285E-01	6.6243E-01	1.8330E-01	1.1610E-03
6.2385E-01	6.4285E-01	1.7120E-01	1.1350E-03
6.0542E-01	6.2385E-01	1.4280E-01	1.0480E-03
5.8752E-01	6.0542E-01	1.2460E-01	9.8990E-04
5.7016E-01	5.8752E-01	1.4640E-01	1.0840E-03
5.5331E-01	5.7016E-01	1.5590E-01	1.1300E-03
5.3696E-01	5.5331E-01	1.4670E-01	1.1180E-03
5.2109E-01	5.3696E-01	1.2270E-01	1.0450E-03
5.0569E-01	5.2109E-01	1.1730E-01	1.0440E-03
4.9074E-01	5.0569E-01	1.2390E-01	1.0960E-03
4.7624E-01	4.9074E-01	1.1280E-01	1.0700E-03
4.6216E-01	4.7624E-01	9.4530E-02	1.0030E-03
4.4850E-01	4.6216E-01	8.1640E-02	9.5610E-04
4.3525E-01	4.4850E-01	9.5740E-02	1.0630E-03
4.2238E-01	4.3525E-01	1.0990E-01	1.1710E-03
4.0990E-01	4.2238E-01	9.1010E-02	1.1000E-03
3.9779E-01	4.0990E-01	7.9290E-02	1.0600E-03
3.8603E-01	3.9779E-01	7.1870E-02	1.0440E-03
3.7462E-01	3.8603E-01	9.0820E-02	1.2080E-03
3.6355E-01	3.7462E-01	1.1490E-01	1.4020E-03
3.5281E-01	3.6355E-01	1.0500E-01	1.3820E-03
3.4238E-01	3.5281E-01	1.0240E-01	1.4090E-03
3.3226E-01	3.4238E-01	9.7640E-02	1.4220E-03
3.2244E-01	3.3226E-01	8.2060E-02	1.3520E-03
3.1291E-01	3.2244E-01	6.3550E-02	1.2400E-03
3.0366E-01	3.1291E-01	6.4190E-02	1.2930E-03
2.9469E-01	3.0366E-01	7.4970E-02	1.4420E-03
2.8598E-01	2.9469E-01	8.0500E-02	1.5490E-03
2.7753E-01	2.8598E-01	7.8960E-02	1.5970E-03
2.6932E-01	2.7753E-01	7.0170E-02	1.5760E-03
2.6137E-01	2.6932E-01	6.4160E-02	1.5820E-03
2.5364E-01	2.6137E-01	5.9930E-02	1.6090E-03
2.4614E-01	2.5364E-01	5.3540E-02	1.6110E-03
2.3887E-01	2.4614E-01	4.1330E-02	1.4820E-03
2.3181E-01	2.3887E-01	3.2390E-02	1.3830E-03
2.2496E-01	2.3181E-01	3.0360E-02	1.3900E-03
2.1831E-01	2.2496E-01	2.6980E-02	1.3730E-03
2.1186E-01	2.1831E-01	2.6540E-02	1.4110E-03
2.0560E-01	2.1186E-01	2.8200E-02	1.5020E-03
1.9952E-01	2.0560E-01	3.1480E-02	1.6790E-03
1.9362E-01	1.9952E-01	3.0690E-02	1.8040E-03
1.8790E-01	1.9362E-01	3.0950E-02	1.9800E-03
1.8235E-01	1.8790E-01	2.8030E-02	2.1320E-03
1.7696E-01	1.8235E-01	2.8830E-02	2.4280E-03
1.7173E-01	1.7696E-01	2.4150E-02	2.6940E-03
1.6665E-01	1.7173E-01	3.0320E-02	3.3230E-03
1.6173E-01	1.6665E-01	2.9040E-02	3.5070E-03
1.5695E-01	1.6173E-01	2.6130E-02	3.6770E-03
1.5231E-01	1.5695E-01	2.5630E-02	3.9420E-03
1.4781E-01	1.5231E-01	2.8750E-02	4.3430E-03
1.4344E-01	1.4781E-01	2.3470E-02	4.5760E-03
1.3920E-01	1.4344E-01	1.9210E-02	4.8980E-03

1.3509E-01	1.3920E-01	2.3790E-02	5.5470E-03
1.3109E-01	1.3509E-01	3.2890E-02	6.4290E-03
1.2722E-01	1.3109E-01	2.8910E-02	7.1110E-03
1.2346E-01	1.2722E-01	4.9800E-02	8.6660E-03
1.1981E-01	1.2346E-01	5.6990E-02	1.0170E-02
1.1627E-01	1.1981E-01	4.6600E-02	1.1700E-02
1.1283E-01	1.1627E-01	6.7650E-02	1.4850E-02
1.0950E-01	1.1283E-01	5.2690E-02	1.8520E-02
1.0626E-01	1.0950E-01	5.8350E-02	2.5980E-02
1.0312E-01	1.0626E-01	7.6730E-02	4.3370E-02
1.0008E-01	1.0312E-01	2.4160E-01	1.2920E-01

Table 4.13 Numerical data of measured leakage current spectrum from Mn pile of 61 cm.

Lower Energy (MeV)	Upper Energy (MeV)	Lethargy Flux (1/MeV/n)	Error
1.9850E+01	2.0660E+01	1.0000E-38	5.4970E-04
1.9072E+01	1.9850E+01	1.0000E-38	5.4610E-04
1.8324E+01	1.9072E+01	1.0000E-38	5.5470E-04
1.7605E+01	1.8324E+01	1.0000E-38	5.6610E-04
1.6915E+01	1.7605E+01	1.0000E-38	5.6090E-04
1.6252E+01	1.6915E+01	9.9370E-04	7.0700E-04
1.5615E+01	1.6252E+01	8.6690E-02	2.7320E-03
1.5002E+01	1.5615E+01	1.0300E+00	9.1650E-03
1.4414E+01	1.5002E+01	1.6120E+00	1.1480E-02
1.3849E+01	1.4414E+01	4.8390E-01	6.3390E-03
1.3306E+01	1.3849E+01	1.9550E-01	4.0720E-03
1.2784E+01	1.3306E+01	1.2950E-01	3.3450E-03
1.2283E+01	1.2784E+01	8.6480E-02	2.7650E-03
1.1801E+01	1.2283E+01	6.1970E-02	2.3730E-03
1.1339E+01	1.1801E+01	4.4980E-02	2.0540E-03
1.0894E+01	1.1339E+01	4.1550E-02	1.9820E-03
1.0467E+01	1.0894E+01	3.7820E-02	1.8760E-03
1.0056E+01	1.0467E+01	3.9390E-02	1.8750E-03
9.6620E+00	1.0056E+01	3.8230E-02	1.8280E-03
9.2832E+00	9.6620E+00	3.7910E-02	1.8110E-03
8.9192E+00	9.2832E+00	3.8160E-02	1.8060E-03
8.5694E+00	8.9192E+00	3.4380E-02	1.7090E-03
8.2334E+00	8.5694E+00	3.6970E-02	1.7410E-03
7.9106E+00	8.2334E+00	3.7590E-02	1.7340E-03
7.6004E+00	7.9106E+00	3.8300E-02	1.7320E-03
7.3024E+00	7.6004E+00	3.5430E-02	1.6620E-03
7.0161E+00	7.3024E+00	3.5500E-02	1.6500E-03
6.7410E+00	7.0161E+00	3.6600E-02	1.6600E-03
6.4766E+00	6.7410E+00	4.0680E-02	1.7260E-03
6.2227E+00	6.4766E+00	4.0650E-02	1.7140E-03
5.9787E+00	6.2227E+00	4.3730E-02	1.7590E-03
5.7443E+00	5.9787E+00	4.2670E-02	1.7310E-03
5.5190E+00	5.7443E+00	4.6080E-02	1.7800E-03
5.3026E+00	5.5190E+00	4.6570E-02	1.7700E-03
5.0947E+00	5.3026E+00	4.9380E-02	1.7980E-03
4.8949E+00	5.0947E+00	5.3080E-02	1.8390E-03
4.7030E+00	4.8949E+00	5.3000E-02	1.8220E-03
4.5186E+00	4.7030E+00	5.8150E-02	1.8830E-03
4.3414E+00	4.5186E+00	5.5120E-02	1.8250E-03
4.1712E+00	4.3414E+00	5.4900E-02	1.8080E-03
4.0076E+00	4.1712E+00	5.9440E-02	1.8610E-03
3.8505E+00	4.0076E+00	6.2650E-02	1.8940E-03
3.6995E+00	3.8505E+00	6.9340E-02	1.9710E-03
3.5545E+00	3.6995E+00	6.7640E-02	1.9250E-03
3.4151E+00	3.5545E+00	7.3500E-02	1.9770E-03
3.2812E+00	3.4151E+00	7.8380E-02	2.0140E-03
3.1525E+00	3.2812E+00	7.8930E-02	2.0000E-03
3.0289E+00	3.1525E+00	8.5610E-02	2.0570E-03
2.9101E+00	3.0289E+00	9.2080E-02	2.1090E-03
2.7960E+00	2.9101E+00	9.9960E-02	2.1730E-03
2.6864E+00	2.7960E+00	1.0840E-01	2.2400E-03

2.5811E+00	2.6864E+00	1.1290E-01	2.2660E-03
2.4799E+00	2.5811E+00	1.2150E-01	2.3300E-03
2.3826E+00	2.4799E+00	1.2610E-01	2.3600E-03
2.2892E+00	2.3826E+00	1.3470E-01	2.4240E-03
2.1994E+00	2.2892E+00	1.4750E-01	2.5210E-03
2.1132E+00	2.1994E+00	1.5910E-01	2.6030E-03
2.0303E+00	2.1132E+00	1.6740E-01	2.6570E-03
1.9507E+00	2.0303E+00	1.7650E-01	2.7160E-03
1.8742E+00	1.9507E+00	1.8870E-01	2.7950E-03
1.8008E+00	1.8742E+00	1.9450E-01	2.8260E-03
1.7301E+00	1.8008E+00	2.0140E-01	2.8650E-03
1.6623E+00	1.7301E+00	2.1680E-01	2.9600E-03
1.5971E+00	1.6623E+00	2.2750E-01	3.0240E-03
1.5345E+00	1.5971E+00	2.3530E-01	3.0670E-03
1.4743E+00	1.5345E+00	2.4710E-01	3.1340E-03
1.4165E+00	1.4743E+00	2.5680E-01	3.1880E-03
1.3610E+00	1.4165E+00	2.6440E-01	3.2270E-03
1.3076E+00	1.3610E+00	2.8100E-01	3.3180E-03
1.2563E+00	1.3076E+00	2.9290E-01	3.3800E-03
1.2071E+00	1.2563E+00	3.0450E-01	3.4390E-03
1.1598E+00	1.2071E+00	3.1080E-01	3.4690E-03
1.1143E+00	1.1598E+00	3.2050E-01	3.5160E-03
1.0706E+00	1.1143E+00	3.3140E-01	3.5620E-03
1.0286E+00	1.0706E+00	3.6860E-01	3.7400E-03
9.8827E-01	1.0286E+00	3.6780E-01	3.7250E-03
9.4952E-01	9.8827E-01	3.6030E-01	3.6780E-03
9.1229E-01	9.4952E-01	3.8130E-01	3.7710E-03
8.7652E-01	9.1229E-01	4.0490E-01	3.8740E-03
8.4215E-01	8.7652E-01	3.9870E-01	3.8350E-03
8.0913E-01	8.4215E-01	3.9040E-01	3.7880E-03
7.7740E-01	8.0913E-01	4.2630E-01	3.9450E-03
7.4692E-01	7.7740E-01	4.4980E-01	4.0420E-03
7.1763E-01	7.4692E-01	4.6270E-01	4.1070E-03
6.8950E-01	7.1763E-01	4.4400E-01	4.0340E-03
6.6246E-01	6.8950E-01	4.4490E-01	4.0470E-03
6.3648E-01	6.6246E-01	4.4110E-01	4.0380E-03
6.1153E-01	6.3648E-01	4.2020E-01	3.9510E-03
5.8755E-01	6.1153E-01	4.2530E-01	3.9820E-03
5.6451E-01	5.8755E-01	4.6690E-01	4.1750E-03
5.4238E-01	5.6451E-01	4.6990E-01	4.1960E-03
5.2111E-01	5.4238E-01	4.8020E-01	4.2480E-03
5.0068E-01	5.2111E-01	4.7690E-01	4.2410E-03
4.8105E-01	5.0068E-01	4.3340E-01	4.0520E-03
4.6218E-01	4.8105E-01	3.5720E-01	3.6930E-03
4.4406E-01	4.6218E-01	2.9830E-01	3.3900E-03
4.2665E-01	4.4406E-01	2.7060E-01	3.2400E-03
4.0992E-01	4.2665E-01	2.6840E-01	3.2300E-03
3.9385E-01	4.0992E-01	2.4360E-01	3.0890E-03
3.7840E-01	3.9385E-01	2.3460E-01	3.1380E-03
3.6357E-01	3.7840E-01	2.3720E-01	3.0620E-03
3.4931E-01	3.6357E-01	2.6170E-01	3.2490E-03
3.3561E-01	3.4931E-01	2.9490E-01	3.4830E-03
3.2245E-01	3.3561E-01	3.1100E-01	3.6170E-03
3.0981E-01	3.2245E-01	3.1450E-01	3.6830E-03
2.9766E-01	3.0981E-01	2.8950E-01	3.5860E-03
2.8599E-01	2.9766E-01	2.6080E-01	3.4570E-03
2.7478E-01	2.8599E-01	2.3130E-01	3.3100E-03
2.6400E-01	2.7478E-01	2.0700E-01	3.1840E-03
2.5365E-01	2.6400E-01	2.3780E-01	3.4310E-03
2.4371E-01	2.5365E-01	2.8140E-01	3.7580E-03
2.3415E-01	2.4371E-01	2.8130E-01	3.8750E-03
2.2497E-01	2.3415E-01	2.3750E-01	3.7060E-03
2.1615E-01	2.2497E-01	1.8980E-01	3.4730E-03
2.0767E-01	2.1615E-01	1.6890E-01	3.4230E-03
1.9953E-01	2.0767E-01	1.6300E-01	3.4930E-03
1.9171E-01	1.9953E-01	1.7110E-01	3.6600E-03
1.8419E-01	1.9171E-01	2.0440E-01	4.0450E-03
1.7697E-01	1.8419E-01	1.8900E-01	4.0230E-03
1.7003E-01	1.7697E-01	1.7580E-01	4.0160E-03
1.6336E-01	1.7003E-01	1.6410E-01	4.0270E-03
1.5696E-01	1.6336E-01	1.6490E-01	4.2620E-03
1.5080E-01	1.5696E-01	1.6700E-01	4.5400E-03
1.4489E-01	1.5080E-01	1.9220E-01	5.0850E-03
1.3921E-01	1.4489E-01	2.1020E-01	5.6100E-03

1.3375E-01	1.3921E-01	1.8400E-01	5.7390E-03
1.2850E-01	1.3375E-01	1.2500E-01	5.4460E-03
1.2347E-01	1.2850E-01	9.0180E-02	5.4230E-03
1.1862E-01	1.2347E-01	1.2430E-01	6.3740E-03
1.1397E-01	1.1862E-01	1.8550E-01	7.7390E-03
1.0950E-01	1.1397E-01	2.1700E-01	8.8680E-03
1.0521E-01	1.0950E-01	1.9510E-01	9.6200E-03
1.0109E-01	1.0521E-01	1.7610E-01	1.0680E-02
9.7122E-02	1.0109E-01	2.2550E-01	1.3090E-02
9.3313E-02	9.7122E-02	3.3920E-01	1.7080E-02
8.9655E-02	9.3313E-02	5.0230E-01	2.2930E-02
8.6139E-02	8.9655E-02	5.1200E-01	2.7960E-02
8.2762E-02	8.6139E-02	4.0920E-01	3.4790E-02
7.9516E-02	8.2762E-02	2.2230E-01	4.8620E-02
7.6399E-02	7.9516E-02	6.2960E-01	1.0810E-01

Table 4.14 Numerical data of measured leakage current spectrum from Co pile of 40 cm.

Lower Energy (MeV)	Upper Energy (MeV)	Lethargy Flux (1/MeV/n)	Error
1.9262E+01	2.0250E+01	4.3602E-04	6.5373E-04
1.8323E+01	1.9262E+01	5.4705E-04	6.6995E-04
1.7429E+01	1.8323E+01	2.4812E-03	8.1300E-04
1.6579E+01	1.7429E+01	5.3138E-03	9.8334E-04
1.5771E+01	1.6579E+01	2.0170E-01	4.6358E-03
1.5002E+01	1.5771E+01	3.5327E+00	1.9218E-02
1.4270E+01	1.5002E+01	8.3206E+00	2.9565E-02
1.3574E+01	1.4270E+01	1.1931E+00	1.1271E-02
1.2912E+01	1.3574E+01	4.5026E-01	6.9473E-03
1.2282E+01	1.2912E+01	3.0749E-01	5.7594E-03
1.1683E+01	1.2282E+01	2.0191E-01	4.6912E-03
1.1113E+01	1.1683E+01	1.3689E-01	3.8730E-03
1.0571E+01	1.1113E+01	1.0701E-01	3.4109E-03
1.0056E+01	1.0571E+01	9.8793E-02	3.2116E-03
9.5654E+00	1.0056E+01	9.2299E-02	3.0609E-03
9.0989E+00	9.5654E+00	9.0774E-02	3.0134E-03
8.6552E+00	9.0989E+00	8.3027E-02	2.8611E-03
8.2330E+00	8.6552E+00	7.2265E-02	2.6396E-03
7.8315E+00	8.2330E+00	6.8411E-02	2.5374E-03
7.4496E+00	7.8315E+00	6.8635E-02	2.5497E-03
7.0862E+00	7.4496E+00	7.1109E-02	2.5859E-03
6.7406E+00	7.0862E+00	7.3904E-02	2.6160E-03
6.4119E+00	6.7406E+00	7.7337E-02	2.6568E-03
6.0992E+00	6.4119E+00	7.9821E-02	2.6818E-03
5.8017E+00	6.0992E+00	8.4258E-02	2.7152E-03
5.5188E+00	5.8017E+00	8.2357E-02	2.6405E-03
5.2496E+00	5.5188E+00	8.5286E-02	2.6420E-03
4.9936E+00	5.2496E+00	9.0857E-02	2.6832E-03
4.7501E+00	4.9936E+00	9.6706E-02	2.7278E-03
4.5184E+00	4.7501E+00	1.0033E-01	2.7426E-03
4.2980E+00	4.5184E+00	1.0192E-01	2.7326E-03
4.0884E+00	4.2980E+00	1.0353E-01	2.7247E-03
3.8890E+00	4.0884E+00	1.1089E-01	2.7981E-03
3.6993E+00	3.8890E+00	1.2096E-01	2.9067E-03
3.5189E+00	3.6993E+00	1.2838E-01	2.9804E-03
3.3473E+00	3.5189E+00	1.3032E-01	2.9926E-03
3.1841E+00	3.3473E+00	1.4023E-01	3.0616E-03
3.0288E+00	3.1841E+00	1.4569E-01	3.0617E-03
2.8811E+00	3.0288E+00	1.5330E-01	3.0850E-03
2.7405E+00	2.8811E+00	1.6797E-01	3.1762E-03
2.6069E+00	2.7405E+00	1.7435E-01	3.1897E-03
2.4798E+00	2.6069E+00	1.7412E-01	3.1487E-03
2.3588E+00	2.4798E+00	1.7090E-01	3.0846E-03
2.2438E+00	2.3588E+00	1.8829E-01	3.1988E-03
2.1343E+00	2.2438E+00	1.8314E-01	3.1369E-03
2.0302E+00	2.1343E+00	1.9161E-01	3.1942E-03
1.9312E+00	2.0302E+00	2.0679E-01	3.3038E-03

1.8370E+00	1.9312E+00	2.1253E-01	3.3386E-03
1.7475E+00	1.8370E+00	2.0503E-01	3.2673E-03
1.6622E+00	1.7475E+00	2.1924E-01	3.3603E-03
1.5812E+00	1.6622E+00	2.2152E-01	3.3634E-03
1.5040E+00	1.5812E+00	2.2075E-01	3.3444E-03
1.4307E+00	1.5040E+00	2.2920E-01	3.3881E-03
1.3609E+00	1.4307E+00	2.3561E-01	3.4155E-03
1.2945E+00	1.3609E+00	2.4841E-01	3.4865E-03
1.2314E+00	1.2945E+00	2.4729E-01	3.4605E-03
1.1714E+00	1.2314E+00	2.4893E-01	3.4636E-03
1.1142E+00	1.1714E+00	2.6490E-01	3.5655E-03
1.0599E+00	1.1142E+00	2.6187E-01	3.5427E-03
1.0082E+00	1.0599E+00	2.6472E-01	3.5582E-03
9.5902E-01	1.0082E+00	2.5859E-01	3.4908E-03
9.1225E-01	9.5902E-01	2.4635E-01	3.3664E-03
8.6776E-01	9.1225E-01	2.4119E-01	3.2921E-03
8.2544E-01	8.6776E-01	2.3679E-01	3.2272E-03
7.8518E-01	8.2544E-01	2.2001E-01	3.0956E-03
7.4689E-01	7.8518E-01	2.2713E-01	3.1354E-03
7.1046E-01	7.4689E-01	2.1197E-01	3.0255E-03
6.7581E-01	7.1046E-01	1.9609E-01	2.9070E-03
6.4285E-01	6.7581E-01	1.8343E-01	2.8134E-03
6.1150E-01	6.4285E-01	1.7912E-01	2.7815E-03
5.8168E-01	6.1150E-01	1.7051E-01	2.7175E-03
5.5331E-01	5.8168E-01	1.6395E-01	2.6678E-03
5.2632E-01	5.5331E-01	1.5752E-01	2.6375E-03
5.0065E-01	5.2632E-01	1.5461E-01	2.6470E-03
4.7624E-01	5.0065E-01	1.3335E-01	2.5013E-03
4.5301E-01	4.7624E-01	1.2317E-01	2.4407E-03
4.3092E-01	4.5301E-01	1.1129E-01	2.3601E-03
4.0990E-01	4.3092E-01	1.0346E-01	2.3152E-03
3.8991E-01	4.0990E-01	1.0626E-01	2.3746E-03
3.7089E-01	3.8991E-01	1.1633E-01	2.5061E-03
3.5280E-01	3.7089E-01	9.5455E-02	2.3317E-03
3.3560E-01	3.5280E-01	8.8838E-02	2.3010E-03
3.1923E-01	3.3560E-01	9.0858E-02	2.3653E-03
3.0366E-01	3.1923E-01	8.0633E-02	2.2891E-03
2.8885E-01	3.0366E-01	9.2046E-02	2.4841E-03
2.7476E-01	2.8885E-01	8.4062E-02	2.4689E-03
2.6136E-01	2.7476E-01	6.5514E-02	2.3101E-03
2.4862E-01	2.6136E-01	6.0152E-02	2.3161E-03
2.3649E-01	2.4862E-01	6.0469E-02	2.4224E-03
2.2496E-01	2.3649E-01	5.6412E-02	2.4826E-03
2.1399E-01	2.2496E-01	5.6756E-02	2.6205E-03
2.0355E-01	2.1399E-01	5.2881E-02	2.7036E-03
1.9362E-01	2.0355E-01	4.5317E-02	2.7107E-03
1.8418E-01	1.9362E-01	3.8479E-02	2.7145E-03
1.7520E-01	1.8418E-01	3.5561E-02	2.7960E-03
1.6665E-01	1.7520E-01	4.3124E-02	3.0801E-03
1.5853E-01	1.6665E-01	4.5704E-02	3.3981E-03
1.5079E-01	1.5853E-01	3.6794E-02	3.6763E-03
1.4344E-01	1.5079E-01	4.4443E-02	4.4105E-03
1.3644E-01	1.4344E-01	3.9477E-02	5.1148E-03
1.2979E-01	1.3644E-01	2.4613E-02	5.6840E-03
1.2346E-01	1.2979E-01	2.5591E-02	6.6504E-03
1.1744E-01	1.2346E-01	3.7388E-02	8.1665E-03
1.1171E-01	1.1744E-01	2.5023E-02	9.6656E-03
1.0626E-01	1.1171E-01	1.6588E-02	1.2065E-02

Table 4.15 Numerical data of measured leakage current spectrum from Cu pile of 61 cm.

Lower Energy (MeV)	Upper Energy (MeV)	Lethargy Flux (1/MeV/n)	Error
1.9850E+01	2.0660E+01	1.0000E-38	5.3730E-04
1.9072E+01	1.9850E+01	1.0000E-38	5.3700E-04
1.8324E+01	1.9072E+01	1.0000E-38	5.6600E-04
1.7605E+01	1.8324E+01	1.0000E-38	5.6960E-04

1.6915E+01	1.7605E+01	1.0000E-38	5.6850E-04
1.6252E+01	1.6915E+01	3.8850E-04	6.6010E-04
1.5615E+01	1.6252E+01	3.6300E-02	1.8060E-03
1.5002E+01	1.5615E+01	4.7230E-01	6.1220E-03
1.4414E+01	1.5002E+01	8.2610E-01	8.0930E-03
1.3849E+01	1.4414E+01	2.7540E-01	4.7240E-03
1.3306E+01	1.3849E+01	1.0960E-01	3.0320E-03
1.2784E+01	1.3306E+01	7.7040E-02	2.5740E-03
1.2283E+01	1.2784E+01	5.1940E-02	2.1530E-03
1.1801E+01	1.2283E+01	3.6370E-02	1.8440E-03
1.1339E+01	1.1801E+01	3.0240E-02	1.7050E-03
1.0894E+01	1.1339E+01	2.6500E-02	1.6150E-03
1.0467E+01	1.0894E+01	2.1510E-02	1.4650E-03
1.0056E+01	1.0467E+01	1.8790E-02	1.3660E-03
9.6620E+00	1.0056E+01	2.2280E-02	1.4390E-03
9.2832E+00	9.6620E+00	1.7610E-02	1.3090E-03
8.9192E+00	9.2832E+00	1.9470E-02	1.3520E-03
8.5694E+00	8.9192E+00	1.9860E-02	1.3480E-03
8.2334E+00	8.5694E+00	1.9770E-02	1.3290E-03
7.9106E+00	8.2334E+00	1.7500E-02	1.2550E-03
7.6004E+00	7.9106E+00	1.6610E-02	1.2200E-03
7.3024E+00	7.6004E+00	1.7400E-02	1.2320E-03
7.0161E+00	7.3024E+00	1.7240E-02	1.2180E-03
6.7410E+00	7.0161E+00	1.6300E-02	1.1860E-03
6.4766E+00	6.7410E+00	1.8600E-02	1.2370E-03
6.2227E+00	6.4766E+00	1.6830E-02	1.1850E-03
5.9787E+00	6.2227E+00	1.9650E-02	1.2480E-03
5.7443E+00	5.9787E+00	2.1060E-02	1.2750E-03
5.5190E+00	5.7443E+00	2.0760E-02	1.2620E-03
5.3026E+00	5.5190E+00	2.3010E-02	1.2990E-03
5.0947E+00	5.3026E+00	2.1820E-02	1.2600E-03
4.8949E+00	5.0947E+00	2.3400E-02	1.2820E-03
4.7030E+00	4.8949E+00	2.4970E-02	1.3040E-03
4.5186E+00	4.7030E+00	2.5060E-02	1.2960E-03
4.3414E+00	4.5186E+00	2.6640E-02	1.3180E-03
4.1712E+00	4.3414E+00	2.7570E-02	1.3270E-03
4.0076E+00	4.1712E+00	2.8500E-02	1.3360E-03
3.8505E+00	4.0076E+00	2.9690E-02	1.3500E-03
3.6995E+00	3.8505E+00	3.2750E-02	1.3970E-03
3.5545E+00	3.6995E+00	3.3360E-02	1.3910E-03
3.4151E+00	3.5545E+00	3.3570E-02	1.3780E-03
3.2812E+00	3.4151E+00	3.9150E-02	1.4550E-03
3.1525E+00	3.2812E+00	4.1840E-02	1.4820E-03
3.0289E+00	3.1525E+00	4.2780E-02	1.4820E-03
2.9101E+00	3.0289E+00	4.4750E-02	1.4980E-03
2.7960E+00	2.9101E+00	5.0140E-02	1.5610E-03
2.6864E+00	2.7960E+00	5.4260E-02	1.6040E-03
2.5811E+00	2.6864E+00	5.6970E-02	1.6270E-03
2.4799E+00	2.5811E+00	6.2460E-02	1.6840E-03
2.3826E+00	2.4799E+00	6.5160E-02	1.7090E-03
2.2892E+00	2.3826E+00	6.6680E-02	1.7200E-03
2.1994E+00	2.2892E+00	7.3740E-02	1.7930E-03
2.1132E+00	2.1994E+00	7.7940E-02	1.8320E-03
2.0303E+00	2.1132E+00	8.3960E-02	1.8890E-03
1.9507E+00	2.0303E+00	8.8200E-02	1.9260E-03
1.8742E+00	1.9507E+00	9.0660E-02	1.9440E-03
1.8008E+00	1.8742E+00	9.3360E-02	1.9650E-03
1.7301E+00	1.8008E+00	9.8110E-02	2.0040E-03
1.6623E+00	1.7301E+00	1.0710E-01	2.0820E-03
1.5971E+00	1.6623E+00	1.1210E-01	2.1230E-03
1.5345E+00	1.5971E+00	1.1730E-01	2.1650E-03
1.4743E+00	1.5345E+00	1.2740E-01	2.2460E-03
1.4165E+00	1.4743E+00	1.3840E-01	2.3220E-03
1.3610E+00	1.4165E+00	1.4780E-01	2.4020E-03
1.3076E+00	1.3610E+00	1.4990E-01	2.4140E-03
1.2563E+00	1.3076E+00	1.6100E-01	2.4940E-03
1.2071E+00	1.2563E+00	1.7320E-01	2.5780E-03
1.1598E+00	1.2071E+00	1.7990E-01	2.6210E-03
1.1143E+00	1.1598E+00	1.9580E-01	2.7260E-03
1.0706E+00	1.1143E+00	2.1010E-01	2.8100E-03
1.0286E+00	1.0706E+00	2.2280E-01	2.8830E-03
9.8827E-01	1.0286E+00	2.3440E-01	2.9450E-03
9.4952E-01	9.8827E-01	2.3290E-01	2.9280E-03
9.1229E-01	9.4952E-01	2.4720E-01	3.0060E-03



8.7652E-01	9.1229E-01	2.6340E-01	3.0920E-03
8.4215E-01	8.7652E-01	2.9150E-01	3.2390E-03
8.0913E-01	8.4215E-01	2.9800E-01	3.2670E-03
7.7740E-01	8.0913E-01	2.9640E-01	3.2520E-03
7.4692E-01	7.7740E-01	3.0330E-01	3.2810E-03
7.1763E-01	7.4692E-01	3.1420E-01	3.3460E-03
6.8950E-01	7.1763E-01	3.1990E-01	3.3830E-03
6.6246E-01	6.8950E-01	3.3780E-01	3.4800E-03
6.3648E-01	6.6246E-01	3.4540E-01	3.5260E-03
6.1153E-01	6.3648E-01	3.5690E-01	3.5890E-03
5.8755E-01	6.1153E-01	3.7460E-01	3.6820E-03
5.6451E-01	5.8755E-01	3.8390E-01	3.7330E-03
5.4238E-01	5.6451E-01	3.8710E-01	3.7550E-03
5.2111E-01	5.4238E-01	3.8240E-01	3.7400E-03
5.0068E-01	5.2111E-01	3.6890E-01	3.6830E-03
4.8105E-01	5.0068E-01	3.6040E-01	3.6440E-03
4.6218E-01	4.8105E-01	3.4640E-01	3.5780E-03
4.4406E-01	4.6218E-01	3.3540E-01	3.5260E-03
4.2665E-01	4.4406E-01	3.1860E-01	3.4430E-03
4.0992E-01	4.2665E-01	3.0210E-01	3.3600E-03
3.9385E-01	4.0992E-01	2.9760E-01	3.3390E-03
3.7840E-01	3.9385E-01	3.0590E-01	3.3850E-03
3.6357E-01	3.7840E-01	3.1430E-01	3.4380E-03
3.4931E-01	3.6357E-01	3.2940E-01	3.5620E-03
3.3561E-01	3.4931E-01	3.3980E-01	3.6620E-03
3.2245E-01	3.3561E-01	3.4250E-01	3.7230E-03
3.0981E-01	3.2245E-01	3.3090E-01	3.7090E-03
2.9766E-01	3.0981E-01	3.2070E-01	3.7000E-03
2.8599E-01	2.9766E-01	2.9160E-01	3.5810E-03
2.7478E-01	2.8599E-01	2.8160E-01	3.5640E-03
2.6400E-01	2.7478E-01	2.6110E-01	3.4810E-03
2.5365E-01	2.6400E-01	2.7240E-01	3.5900E-03
2.4371E-01	2.5365E-01	2.7690E-01	3.6680E-03
2.3415E-01	2.4371E-01	2.6800E-01	3.7270E-03
2.2497E-01	2.3415E-01	2.5640E-01	3.7720E-03
2.1615E-01	2.2497E-01	2.4130E-01	3.7930E-03
2.0767E-01	2.1615E-01	2.3280E-01	3.8620E-03
1.9953E-01	2.0767E-01	2.3740E-01	4.0260E-03
1.9171E-01	1.9953E-01	2.4140E-01	4.1590E-03
1.8419E-01	1.9171E-01	2.3650E-01	4.2300E-03
1.7697E-01	1.8419E-01	2.3760E-01	4.3500E-03
1.7003E-01	1.7697E-01	2.2720E-01	4.3830E-03
1.6336E-01	1.7003E-01	2.1810E-01	4.4320E-03
1.5696E-01	1.6336E-01	2.1090E-01	4.6090E-03
1.5080E-01	1.5696E-01	2.2450E-01	4.9950E-03
1.4489E-01	1.5080E-01	2.4270E-01	5.4640E-03
1.3921E-01	1.4489E-01	2.4820E-01	5.8700E-03
1.3375E-01	1.3921E-01	2.3600E-01	6.1620E-03
1.2850E-01	1.3375E-01	2.1450E-01	6.3430E-03
1.2347E-01	1.2850E-01	1.9650E-01	6.6020E-03
1.1862E-01	1.2347E-01	1.9450E-01	7.0990E-03
1.1397E-01	1.1862E-01	2.1580E-01	7.9550E-03
1.0950E-01	1.1397E-01	2.6870E-01	9.2950E-03
1.0521E-01	1.0950E-01	2.9900E-01	1.0650E-02
1.0109E-01	1.0521E-01	2.8020E-01	1.1770E-02
9.7122E-02	1.0109E-01	2.9870E-01	1.3770E-02
9.3313E-02	9.7122E-02	3.0910E-01	1.6430E-02
8.9655E-02	9.3313E-02	3.6790E-01	2.0930E-02
8.6139E-02	8.9655E-02	3.4770E-01	2.5410E-02
8.2762E-02	8.6139E-02	3.1910E-01	3.2970E-03
7.9516E-02	8.2762E-02	3.2200E-01	4.9280E-02

Table 4.16 Numerical data of measured leakage current spectrum from As pile of 40 cm.

Lower Energy (MeV)	Upper Energy (MeV)	Lethargy Flux (1/MeV/n)	Error
1.9850E+01	2.0660E+01	2.1890E-03	7.1820E-04

1.9072E+01	1.9850E+01	2.6780E-03	7.5060E-04
1.8324E+01	1.9072E+01	4.3820E-03	8.4400E-04
1.7605E+01	1.8324E+01	3.4750E-03	8.0250E-04
1.6915E+01	1.7605E+01	4.7780E-03	8.7170E-01
1.6252E+01	1.6915E+01	7.4010E-02	2.5560E-03
1.5615E+01	1.6252E+01	1.0280E+00	9.2710E-03
1.5002E+01	1.5615E+01	3.3370E+00	1.6680E-02
1.4414E+01	1.5002E+01	4.6140E+00	1.9590E-02
1.3849E+01	1.4414E+01	3.3210E+00	1.6590E-02
1.3306E+01	1.3849E+01	1.2160E+00	9.9570E-03
1.2784E+01	1.3306E+01	4.3160E-01	5.8890E-03
1.2283E+01	1.2784E+01	2.5830E-01	4.5410E-03
1.1801E+01	1.2283E+01	1.8680E-01	3.8520E-03
1.1339E+01	1.1801E+01	1.4350E-01	3.3830E-03
1.0894E+01	1.1339E+01	1.1980E-01	3.0980E-03
1.0467E+01	1.0894E+01	1.0670E-01	2.9120E-03
1.0056E+01	1.0467E+01	8.7840E-02	2.6340E-03
9.6620E+00	1.0056E+01	7.9280E-02	2.4920E-03
9.2832E+00	9.6620E+00	7.3320E-02	2.3880E-03
8.9192E+00	9.2832E+00	6.5850E-02	2.2580E-03
8.5694E+00	8.9192E+00	6.2700E-02	2.1880E-03
8.2334E+00	8.5694E+00	5.8760E-02	2.1030E-03
7.9106E+00	8.2334E+00	5.1460E-02	1.6920E-03
7.6004E+00	7.9106E+00	5.2930E-02	1.9710E-03
7.3024E+00	7.6004E+00	5.2540E-02	1.9500E-03
7.0161E+00	7.3024E+00	5.2500E-02	1.9390E-03
6.7410E+00	7.0161E+00	5.3620E-02	1.9480E-03
6.4766E+00	6.7410E+00	5.2400E-02	1.9190E-03
6.2227E+00	6.4766E+00	5.7450E-02	1.9930E-03
5.9787E+00	6.2227E+00	6.2010E-02	2.0550E-03
5.7443E+00	5.9787E+00	6.4000E-02	2.0770E-03
5.5190E+00	5.7443E+00	6.1540E-02	2.0330E-03
5.3026E+00	5.5190E+00	6.5820E-02	2.0890E-03
5.0947E+00	5.3026E+00	6.7620E-02	2.0950E-03
4.8949E+00	5.0947E+00	7.3670E-02	2.1500E-03
4.7030E+00	4.8949E+00	7.5450E-02	2.1460E-03
4.5186E+00	4.7030E+00	7.5210E-02	2.1170E-03
4.3414E+00	4.5186E+00	7.7010E-02	2.1170E-03
4.1712E+00	4.3414E+00	8.0470E-02	2.1380E-03
4.0076E+00	4.1712E+00	8.1670E-02	2.1320E-03
3.8505E+00	4.0076E+00	8.6340E-02	2.1680E-03
3.6995E+00	3.8505E+00	8.9930E-02	2.1820E-03
3.5545E+00	3.6995E+00	8.7320E-02	2.1280E-03
3.4151E+00	3.5545E+00	9.2150E-02	2.1590E-03
3.2812E+00	3.4151E+00	9.3810E-02	2.1550E-03
3.1525E+00	3.2812E+00	9.7390E-02	2.1730E-03
3.0289E+00	3.1525E+00	9.9030E-02	2.1700E-03
2.9101E+00	3.0289E+00	1.0690E-01	2.2320E-03
2.7960E+00	2.9101E+00	1.2000E-01	2.3420E-03
2.6864E+00	2.7960E+00	1.2300E-01	2.3590E-03
2.5811E+00	2.6864E+00	1.2280E-01	2.3460E-03
2.4799E+00	2.5811E+00	1.1910E-01	2.3020E-03
2.3826E+00	2.4799E+00	1.1990E-01	2.3000E-03
2.2892E+00	2.3826E+00	1.2650E-01	2.3510E-03
2.1994E+00	2.2892E+00	1.2480E-01	2.3270E-03
2.1132E+00	2.1994E+00	1.2870E-01	2.3530E-03
2.0303E+00	2.1132E+00	1.3540E-01	2.4010E-03
1.9507E+00	2.0303E+00	1.3830E-01	2.4160E-03
1.8742E+00	1.9507E+00	1.4380E-01	2.4530E-03
1.8008E+00	1.8742E+00	1.3980E-01	2.4110E-03
1.7301E+00	1.8008E+00	1.4040E-01	2.4080E-03
1.6623E+00	1.7301E+00	1.4740E-01	2.4560E-03
1.5971E+00	1.6623E+00	1.5090E-01	2.4770E-03
1.5345E+00	1.5971E+00	1.5010E-01	2.4590E-03
1.4743E+00	1.5345E+00	1.4890E-01	2.4350E-03
1.4165E+00	1.4743E+00	1.5200E-01	2.4450E-03
1.3610E+00	1.4165E+00	1.5610E-01	2.4630E-03
1.3076E+00	1.3610E+00	1.5330E-01	2.4300E-03
1.2563E+00	1.3076E+00	1.5600E-01	2.4380E-03
1.2071E+00	1.2563E+00	1.6030E-01	2.4590E-03
1.1598E+00	1.2071E+00	1.6050E-01	2.4500E-03
1.1143E+00	1.1598E+00	1.6200E-01	2.4510E-03
1.0706E+00	1.1143E+00	1.5520E-01	2.3920E-03
1.0286E+00	1.0706E+00	1.5380E-01	2.3730E-03

9.8827E-01	1.0286E+00	1.4510E-01	2.3010E-03
9.4952E-01	9.8827E-01	1.5170E-01	2.3420E-03
9.1229E-01	9.4952E-01	1.5460E-01	2.3560E-03
8.7652E-01	9.1229E-01	1.5750E-01	2.3700E-03
8.4215E-01	8.7652E-01	1.5480E-01	2.3420E-03
8.0913E-01	8.4215E-01	1.5410E-01	2.3260E-03
7.7740E-01	8.0913E-01	1.5040E-01	2.2880E-03
7.4692E-01	7.7740E-01	1.5060E-01	2.2800E-03
7.1763E-01	7.4692E-01	1.4950E-01	2.2630E-03
6.8950E-01	7.1763E-01	1.4740E-01	2.2400E-03
6.6246E-01	6.8950E-01	1.4260E-01	2.1970E-03
6.3648E-01	6.6246E-01	1.4690E-01	2.2200E-03
6.1153E-01	6.3648E-01	1.3950E-01	2.1480E-03
5.8755E-01	6.1153E-01	1.3370E-01	2.0890E-03
5.6451E-01	5.8755E-01	1.2750E-01	2.0280E-03
5.4238E-01	5.6451E-01	1.2070E-01	1.9630E-03
5.2111E-01	5.4238E-01	1.1900E-01	1.9370E-03
5.0068E-01	5.2111E-01	1.1690E-01	1.9080E-03
4.8105E-01	5.0068E-01	1.1340E-01	1.8700E-03
4.6218E-01	4.8105E-01	1.0890E-01	1.8320E-03
4.4406E-01	4.6218E-01	1.0800E-01	1.8260E-03
4.2665E-01	4.4406E-01	9.7100E-02	1.7410E-03
4.0992E-01	4.2665E-01	8.7930E-02	1.6650E-03
3.9385E-01	4.0992E-01	8.8610E-02	1.6730E-03
3.7840E-01	3.9385E-01	9.0010E-02	1.6860E-03
3.6357E-01	3.7840E-01	9.5790E-02	1.7360E-03
3.4931E-01	3.6357E-01	9.2620E-02	1.7110E-03
3.3561E-01	3.4931E-01	9.5510E-02	1.7410E-03
3.2245E-01	3.3561E-01	9.4180E-02	1.7350E-03
3.0981E-01	3.2245E-01	8.9290E-02	1.7000E-03
2.9766E-01	3.0981E-01	9.2290E-02	1.7310E-03
2.8599E-01	2.9766E-01	9.3680E-02	1.7480E-03
2.7478E-01	2.8599E-01	8.8810E-02	1.7120E-03
2.6400E-01	2.7478E-01	8.2560E-02	1.6630E-03
2.5365E-01	2.6400E-01	8.0410E-02	1.6570E-03
2.4371E-01	2.5365E-01	8.4280E-02	1.7120E-03
2.3415E-01	2.4371E-01	8.0720E-02	1.7010E-03
2.2497E-01	2.3415E-01	8.3650E-02	1.7470E-03
2.1615E-01	2.2497E-01	7.9150E-02	1.7270E-03
2.0767E-01	2.1615E-01	7.6520E-02	1.7230E-03
1.9953E-01	2.0767E-01	7.5500E-02	1.7330E-03
1.9171E-01	1.9953E-01	6.9860E-02	1.7000E-03
1.8419E-01	1.9171E-01	6.6580E-02	1.7040E-03
1.7697E-01	1.8419E-01	6.2360E-02	1.6970E-03
1.7003E-01	1.7697E-01	6.5830E-02	1.7710E-03
1.6336E-01	1.7003E-01	6.4870E-02	1.8000E-03
1.5696E-01	1.6336E-01	6.4760E-02	1.8380E-03
1.5080E-01	1.5696E-01	5.7600E-02	1.8010E-03
1.4489E-01	1.5080E-01	6.0730E-02	1.8770E-03
1.3921E-01	1.4489E-01	5.4980E-02	1.8550E-03
1.3375E-01	1.3921E-01	4.6140E-02	1.7940E-03
1.2850E-01	1.3375E-01	5.1440E-02	1.9050E-03
1.2347E-01	1.2850E-01	5.2900E-02	1.9700E-03
1.1862E-01	1.2347E-01	5.4740E-02	2.0410E-03
1.1397E-01	1.1862E-01	4.3290E-02	1.9500E-03
1.0950E-01	1.1397E-01	3.8080E-02	1.9320E-03
1.0521E-01	1.0950E-01	3.7640E-02	1.9790E-03
1.0109E-01	1.0521E-01	3.7910E-02	2.0760E-03
9.7122E-02	1.0109E-01	4.0120E-02	2.2100E-03
9.3313E-02	9.7122E-02	3.3810E-02	2.2350E-03
8.9655E-02	9.3313E-02	3.0470E-02	2.3090E-03
8.6139E-02	8.9655E-02	2.8880E-02	2.4190E-03
8.2762E-02	8.6139E-02	3.1710E-02	2.6060E-03
7.9516E-02	8.2762E-02	3.6590E-02	2.8360E-03
7.6399E-02	7.9516E-02	2.6500E-02	2.8810E-03
7.3403E-02	7.6399E-02	2.4860E-02	3.0840E-03
7.0525E-02	7.3403E-02	2.3030E-02	3.3130E-03
6.7759E-02	7.0525E-02	2.9100E-02	3.7020E-03
6.5103E-02	6.7759E-02	3.0750E-02	4.0670E-03
6.2550E-02	6.5103E-02	1.6160E-02	4.2380E-03
6.0097E-02	6.2550E-02	1.5660E-02	4.6960E-03
5.7741E-02	6.0097E-02	3.0550E-02	5.4790E-03
5.5477E-02	5.7741E-02	3.1710E-02	6.1120E-03
5.3302E-02	5.5477E-02	1.8850E-02	6.6560E-03

5.1212E-02	5.3302E-02	1.9720E-02	7.5760E-03
4.9204E-02	5.1212E-02	1.9860E-02	8.7120E-03
4.7274E-02	4.9204E-02	1.9870E-02	1.0170E-02
4.5421E-02	4.7274E-02	1.3680E-02	1.2000E-02

Table 4.17 Numerical data of measured leakage current spectrum from Se pile of 40 cm.

Lower Energy (MeV)	Upper Energy (MeV)	Lethargy Flux (1/MeV/n)	Error
1.9850E+01	2.0660E+01	4.6100E-04	6.0130E-04
1.9072E+01	1.9850E+01	1.2680E-03	6.6490E-04
1.8324E+01	1.9072E+01	2.3130E-03	7.3770E-04
1.7605E+01	1.8324E+01	3.1450E-03	7.9200E-04
1.6915E+01	1.7605E+01	5.8250E-03	9.3760E-04
1.6252E+01	1.6915E+01	1.3830E-01	3.6040E-03
1.5615E+01	1.6252E+01	1.4160E+00	1.1390E-02
1.5002E+01	1.5615E+01	3.6640E+00	1.8310E-02
1.4414E+01	1.5002E+01	4.4030E+00	2.0040E-02
1.3849E+01	1.4414E+01	2.8700E+00	1.6150E-02
1.3306E+01	1.3849E+01	8.7410E-01	8.8460E-03
1.2784E+01	1.3306E+01	3.9260E-01	5.3950E-03
1.2283E+01	1.2784E+01	2.1180E-01	4.3110E-03
1.1801E+01	1.2283E+01	1.5200E-01	3.6440E-03
1.1339E+01	1.1801E+01	1.2310E-01	3.2830E-03
1.0894E+01	1.1339E+01	1.0010E-01	2.9690E-03
1.0467E+01	1.0894E+01	8.9130E-02	2.7910E-03
1.0056E+01	1.0467E+01	7.6670E-02	2.5780E-03
9.6620E+00	1.0056E+01	6.9000E-02	2.4360E-03
9.2832E+00	9.6620E+00	6.3550E-02	2.3290E-03
8.9192E+00	9.2832E+00	5.9300E-02	2.2420E-03
8.5694E+00	8.9192E+00	5.3960E-02	2.1270E-03
8.2334E+00	8.5694E+00	4.7960E-02	1.9970E-03
7.9106E+00	8.2334E+00	4.5100E-02	1.9240E-03
7.6004E+00	7.9106E+00	4.3890E-02	1.8850E-03
7.3024E+00	7.6004E+00	4.5710E-02	1.9060E-03
7.0161E+00	7.3024E+00	4.5240E-02	1.8870E-03
6.7410E+00	7.0161E+00	4.3370E-02	1.8420E-03
6.4766E+00	6.7410E+00	4.4260E-02	1.8510E-03
6.2227E+00	6.4766E+00	4.7350E-02	1.9000E-03
5.9787E+00	6.2227E+00	4.8760E-02	1.9180E-03
5.7443E+00	5.9787E+00	5.1380E-02	1.9570E-03
5.5190E+00	5.7443E+00	4.9380E-02	1.9140E-03
5.3026E+00	5.5190E+00	4.9220E-02	1.9050E-03
5.0947E+00	5.3026E+00	5.2680E-02	1.9470E-03
4.8949E+00	5.0947E+00	5.6650E-02	1.9850E-03
4.7030E+00	4.8949E+00	5.7290E-02	1.9690E-03
4.5186E+00	4.7030E+00	5.5760E-02	1.9220E-03
4.3414E+00	4.5186E+00	6.0370E-02	1.9710E-03
4.1712E+00	4.3414E+00	6.1910E-02	1.9730E-03
4.0076E+00	4.1712E+00	6.6170E-02	2.0150E-03
3.8505E+00	4.0076E+00	6.3380E-02	1.9570E-03
3.6995E+00	3.8505E+00	6.9630E-02	2.0190E-03
3.5545E+00	3.6995E+00	7.0580E-02	2.0090E-03
3.4151E+00	3.5545E+00	7.1360E-02	1.9970E-03
3.2812E+00	3.4151E+00	7.7760E-02	2.0580E-03
3.1525E+00	3.2812E+00	7.8790E-02	2.0520E-03
3.0289E+00	3.1525E+00	8.2860E-02	2.0820E-03
2.9101E+00	3.0289E+00	8.6860E-02	2.1110E-03
2.7960E+00	2.9101E+00	9.2290E-02	2.1590E-03
2.6864E+00	2.7960E+00	1.0280E-01	2.2610E-03
2.5811E+00	2.6864E+00	9.9880E-02	2.2200E-03
2.4799E+00	2.5811E+00	1.0090E-01	2.2210E-03
2.3826E+00	2.4799E+00	1.0340E-01	2.2380E-03
2.2892E+00	2.3826E+00	1.0420E-01	2.2380E-03
2.1994E+00	2.2892E+00	1.0870E-01	2.2750E-03
2.1132E+00	2.1994E+00	1.0830E-01	2.2630E-03
2.0303E+00	2.1132E+00	1.1410E-01	2.3110E-03

1.9507E+00	2.0303E+00	1.1390E-01	2.3000E-03
1.8742E+00	1.9507E+00	1.1660E-01	2.3170E-03
1.8008E+00	1.8742E+00	1.1800E-01	2.3220E-03
1.7301E+00	1.8008E+00	1.2140E-01	2.3460E-03
1.6623E+00	1.7301E+00	1.2320E-01	2.3550E-03
1.5971E+00	1.6623E+00	1.3060E-01	2.4140E-03
1.5345E+00	1.5971E+00	1.3150E-01	2.4110E-03
1.4743E+00	1.5345E+00	1.3400E-01	2.4180E-03
1.4165E+00	1.4743E+00	1.3010E-01	2.3710E-03
1.3610E+00	1.4165E+00	1.3410E-01	2.3920E-03
1.3076E+00	1.3610E+00	1.3090E-01	2.3530E-03
1.2563E+00	1.3076E+00	1.3450E-01	2.3720E-03
1.2071E+00	1.2563E+00	1.3630E-01	2.3770E-03
1.1598E+00	1.2071E+00	1.3840E-01	2.3840E-03
1.1143E+00	1.1598E+00	1.3590E-01	2.3540E-03
1.0706E+00	1.1143E+00	1.2920E-01	2.2890E-03
1.0286E+00	1.0706E+00	1.2610E-01	2.2550E-03
9.8827E-01	1.0286E+00	1.2150E-01	2.2080E-03
9.4952E-01	9.8827E-01	1.3170E-01	2.2870E-03
9.1229E-01	9.4952E-01	1.3750E-01	2.3270E-03
8.7652E-01	9.1229E-01	1.3310E-01	2.2850E-03
8.4215E-01	8.7652E-01	1.3250E-01	2.2710E-03
8.0913E-01	8.4215E-01	1.3300E-01	2.2650E-03
7.7740E-01	8.0913E-01	1.2740E-01	2.2090E-03
7.4692E-01	7.7740E-01	1.2940E-01	2.2160E-03
7.1763E-01	7.4692E-01	1.3130E-01	2.2220E-03
6.8950E-01	7.1763E-01	1.2900E-01	2.1950E-03
6.6246E-01	6.8950E-01	1.2580E-01	2.1610E-03
6.3648E-01	6.6246E-01	1.2600E-01	2.1550E-03
6.1153E-01	6.3648E-01	1.1930E-01	2.0830E-03
5.8755E-01	6.1153E-01	1.2070E-01	2.0780E-03
5.6451E-01	5.8755E-01	1.1570E-01	2.0210E-03
5.4238E-01	5.6451E-01	1.0870E-01	1.9490E-03
5.2111E-01	5.4238E-01	1.0260E-01	1.8840E-03
5.0068E-01	5.2111E-01	9.9280E-02	1.8840E-03
4.8105E-01	5.0068E-01	9.6170E-02	1.8070E-03
4.6218E-01	4.8105E-01	9.1650E-02	1.7630E-03
4.4406E-01	4.6218E-01	8.6930E-02	1.7220E-03
4.2665E-01	4.4406E-01	7.9890E-02	1.6580E-03
4.0992E-01	4.2665E-01	6.9090E-02	1.5550E-03
3.9385E-01	4.0992E-01	7.0750E-02	1.5730E-03
3.7840E-01	3.9385E-01	6.7850E-02	1.5460E-03
3.6357E-01	3.7840E-01	6.4720E-02	1.5160E-03
3.4931E-01	3.6357E-01	6.2480E-02	1.4940E-03
3.3561E-01	3.4931E-01	6.6250E-02	1.5390E-03
3.2245E-01	3.3561E-01	6.2320E-02	1.5030E-03
3.0981E-01	3.2245E-01	6.2520E-02	1.5110E-03
2.9766E-01	3.0981E-01	6.0810E-02	1.4980E-03
2.8599E-01	2.9766E-01	5.7240E-02	1.4650E-03
2.7478E-01	2.8599E-01	5.0650E-02	1.3970E-03
2.6400E-01	2.7478E-01	4.7040E-02	1.3600E-03
2.5365E-01	2.6400E-01	4.2610E-02	1.3190E-03
2.4371E-01	2.5365E-01	3.9130E-02	1.2930E-03
2.3415E-01	2.4371E-01	3.6110E-02	1.2720E-03
2.2497E-01	2.3415E-01	3.9900E-02	1.3390E-03
2.1615E-01	2.2497E-01	4.2000E-02	1.3830E-03
2.0767E-01	2.1615E-01	3.7060E-02	1.3380E-03
1.9953E-01	2.0767E-01	3.4660E-02	1.3240E-03
1.9171E-01	1.9953E-01	3.1420E-02	1.2980E-03
1.8419E-01	1.9171E-01	2.5950E-02	1.2500E-03
1.7697E-01	1.8419E-01	2.5080E-02	1.2690E-03
1.7003E-01	1.7697E-01	2.6610E-02	1.3260E-03
1.6336E-01	1.7003E-01	2.7000E-02	1.3670E-03
1.5696E-01	1.6336E-01	2.5970E-02	1.3870E-03
1.5080E-01	1.5696E-01	2.5240E-02	1.4130E-03
1.4489E-01	1.5080E-01	1.9090E-02	1.3510E-03
1.3921E-01	1.4489E-01	1.5710E-02	1.3320E-03
1.3375E-01	1.3921E-01	1.4520E-02	1.3530E-03
1.2850E-01	1.3375E-01	1.6660E-02	1.4340E-03
1.2347E-01	1.2850E-01	1.8160E-02	1.5050E-03
1.1862E-01	1.2347E-01	1.8220E-02	1.5530E-03
1.1397E-01	1.1862E-01	1.4280E-02	1.5320E-03
1.0950E-01	1.1397E-01	1.3600E-02	1.5690E-03
1.0521E-01	1.0950E-01	1.3680E-02	1.6220E-03

1.0109E-01	1.0521E-01	1.6910E-02	1.7690E-03
9.7122E-02	1.0109E-01	1.4640E-02	1.8290E-03
9.3313E-02	9.7122E-02	1.2040E-02	1.8900E-03
8.9655E-02	9.3313E-02	8.4670E-03	1.9420E-03
8.6139E-02	8.9655E-02	6.9390E-03	2.0430E-03
8.2762E-02	8.6139E-02	9.5680E-03	2.2350E-03
7.9516E-02	8.2762E-02	1.0580E-02	2.4100E-03
7.6399E-02	7.9516E-02	8.8770E-03	2.5670E-03
7.3403E-02	7.6399E-02	3.5920E-03	2.6890E-03
7.0525E-02	7.3403E-02	5.1290E-03	2.9720E-03
6.7759E-02	7.0525E-02	4.9130E-03	3.2580E-03
6.5103E-02	6.7759E-02	1.0590E-02	3.6970E-03
6.2550E-02	6.5103E-02	2.9940E-03	3.9450E-03
6.0097E-02	6.2550E-02	3.4820E-03	4.4110E-03
5.7741E-02	6.0097E-02	1.3020E-02	5.1260E-03
5.5477E-02	5.7741E-02	1.4680E-02	5.7580E-03

Table 4.18 Numerical data of measured leakage current spectrum from Zr pile of 61 cm.

Lower Energy (MeV)	Upper Energy (MeV)	Lethargy Flux (1/MeV/n)	Error
1.9850E+01	2.0660E+01	6.5220E-04	7.4950E-04
1.9072E+01	1.9850E+01	1.1540E-03	7.9530E-04
1.8324E+01	1.9072E+01	8.4550E-04	7.7810E-04
1.7605E+01	1.8324E+01	1.1860E-03	8.1070E-04
1.6915E+01	1.7605E+01	6.5310E-03	1.1470E-03
1.6252E+01	1.6915E+01	1.1850E-01	3.8600E-03
1.5615E+01	1.6252E+01	7.3120E-01	9.4410E-03
1.5002E+01	1.5615E+01	1.9780E+00	1.5500E-02
1.4414E+01	1.5002E+01	2.2510E+00	1.6510E-02
1.3849E+01	1.4414E+01	1.4490E+00	1.3230E-02
1.3306E+01	1.3849E+01	5.0900E-01	7.7910E-03
1.2784E+01	1.3306E+01	2.3410E-01	5.2560E-03
1.2283E+01	1.2784E+01	1.5440E-01	4.2610E-03
1.1801E+01	1.2283E+01	1.2180E-01	3.7780E-03
1.1339E+01	1.1801E+01	1.0740E-01	3.5500E-03
1.0894E+01	1.1339E+01	9.1820E-02	3.2910E-03
1.0467E+01	1.0894E+01	7.6430E-02	2.9990E-03
1.0056E+01	1.0467E+01	7.1460E-02	2.8840E-03
9.6620E+00	1.0056E+01	6.0880E-02	2.6580E-03
9.2832E+00	9.6620E+00	5.4330E-02	2.5070E-03
8.9192E+00	9.2832E+00	5.1130E-02	2.4250E-03
8.5694E+00	8.9192E+00	4.7540E-02	2.3260E-03
8.2334E+00	8.5694E+00	4.6560E-02	2.2820E-03
7.9106E+00	8.2334E+00	3.9590E-02	2.1040E-03
7.6004E+00	7.9106E+00	4.0930E-02	2.1180E-03
7.3024E+00	7.6004E+00	4.2200E-02	2.1310E-03
7.0161E+00	7.3024E+00	4.0980E-02	2.0930E-03
6.7410E+00	7.0161E+00	3.9130E-02	2.0410E-03
6.4766E+00	6.7410E+00	4.2980E-02	2.1180E-03
6.2227E+00	6.4766E+00	4.7360E-02	2.2020E-03
5.9787E+00	6.2227E+00	4.6430E-02	2.1740E-03
5.7443E+00	5.9787E+00	4.6230E-02	2.1620E-03
5.5190E+00	5.7443E+00	5.3800E-02	2.3060E-03
5.3026E+00	5.5190E+00	5.5220E-02	2.3250E-03
5.0947E+00	5.3026E+00	5.4440E-02	2.2890E-03
4.8949E+00	5.0947E+00	6.5250E-02	2.4520E-03
4.7030E+00	4.8949E+00	6.3210E-02	2.3850E-03
4.5186E+00	4.7030E+00	6.6480E-02	2.4120E-03
4.3414E+00	4.5186E+00	7.0120E-02	2.4440E-03
4.1712E+00	4.3414E+00	6.9420E-02	2.4080E-03
4.0076E+00	4.1712E+00	7.4570E-02	2.4640E-03
3.8505E+00	4.0076E+00	7.9980E-02	2.5220E-03
3.6995E+00	3.8505E+00	8.5910E-02	2.5760E-03
3.5545E+00	3.6995E+00	8.9470E-02	2.5960E-03
3.4151E+00	3.5545E+00	9.0680E-02	2.5840E-03
3.2812E+00	3.4151E+00	1.0090E-01	2.6910E-03
3.1525E+00	3.2812E+00	1.0410E-01	2.7040E-03

3.0289E+00	3.1525E+00	1.0900E-01	2.7400E-03
2.9101E+00	3.0289E+00	1.1290E-01	2.7630E-03
2.7960E+00	2.9101E+00	1.2250E-01	2.8530E-03
2.6864E+00	2.7960E+00	1.3010E-01	2.9230E-03
2.5811E+00	2.6864E+00	1.3830E-01	2.9960E-03
2.4799E+00	2.5811E+00	1.4420E-01	3.0440E-03
2.3826E+00	2.4799E+00	1.5250E-01	3.1140E-03
2.2892E+00	2.3826E+00	1.6390E-01	3.2110E-03
2.1994E+00	2.2892E+00	1.6760E-01	3.2330E-03
2.1132E+00	2.1994E+00	1.9190E-01	3.4400E-03
2.0303E+00	2.1132E+00	2.0640E-01	3.5480E-03
1.9507E+00	2.0303E+00	2.1220E-01	3.5830E-03
1.8742E+00	1.9507E+00	2.2400E-01	3.6640E-03
1.8008E+00	1.8742E+00	2.4170E-01	3.7880E-03
1.7301E+00	1.8008E+00	2.4890E-01	3.8290E-03
1.6623E+00	1.7301E+00	2.6970E-01	3.9690E-03
1.5971E+00	1.6623E+00	2.7310E-01	3.9810E-03
1.5345E+00	1.5971E+00	2.8380E-01	4.0370E-03
1.4743E+00	1.5345E+00	2.9980E-01	4.1210E-03
1.4165E+00	1.4743E+00	3.0690E-01	4.1450E-03
1.3610E+00	1.4165E+00	3.0630E-01	4.1190E-03
1.3076E+00	1.3610E+00	3.0630E-01	4.0970E-03
1.2563E+00	1.3076E+00	3.0950E-01	4.0980E-03
1.2071E+00	1.2563E+00	3.1200E-01	4.0950E-03
1.1598E+00	1.2071E+00	3.1410E-01	4.0910E-03
1.1143E+00	1.1598E+00	3.2510E-01	4.1430E-03
1.0706E+00	1.1143E+00	3.2690E-01	4.1370E-03
1.0286E+00	1.0706E+00	3.2640E-01	4.1190E-03
9.8827E-01	1.0286E+00	3.2650E-01	4.1050E-03
9.4952E-01	9.8827E-01	3.1520E-01	4.0220E-03
9.1229E-01	9.4952E-01	3.2790E-01	4.0870E-03
8.7652E-01	9.1229E-01	3.4080E-01	4.1520E-03
8.4215E-01	8.7652E-01	3.4280E-01	4.1470E-03
8.0913E-01	8.4215E-01	3.4450E-01	4.1360E-03
7.7740E-01	8.0913E-01	3.5280E-01	4.1660E-03
7.4692E-01	7.7740E-01	3.5370E-01	4.1530E-03
7.1763E-01	7.4692E-01	3.4260E-01	4.0710E-03
6.8950E-01	7.1763E-01	3.3430E-01	4.0070E-03
6.6246E-01	6.8950E-01	3.2770E-01	3.9530E-03
6.3648E-01	6.6246E-01	3.2960E-01	3.9490E-03
6.1153E-01	6.3648E-01	3.2230E-01	3.8730E-03
5.8755E-01	6.1153E-01	3.1680E-01	3.8100E-03
5.6451E-01	5.8755E-01	3.0940E-01	3.7380E-03
5.4238E-01	5.6451E-01	2.8580E-01	3.5710E-03
5.2111E-01	5.4238E-01	2.8500E-01	3.5410E-03
5.0068E-01	5.2111E-01	2.7060E-01	3.4310E-03
4.8105E-01	5.0068E-01	2.5430E-01	3.3090E-03
4.6218E-01	4.8105E-01	2.5150E-01	3.2840E-03
4.4406E-01	4.6218E-01	2.4100E-01	3.2180E-03
4.2665E-01	4.4406E-01	2.2570E-01	3.1190E-03
4.0992E-01	4.2665E-01	2.0400E-01	2.9730E-03
3.9385E-01	4.0992E-01	1.9230E-01	2.8910E-03
3.7840E-01	3.9385E-01	1.8240E-01	2.8210E-03
3.6357E-01	3.7840E-01	1.8390E-01	2.8320E-03
3.4931E-01	3.6357E-01	1.8310E-01	2.8280E-03
3.3561E-01	3.4931E-01	1.7810E-01	2.7990E-03
3.2245E-01	3.3561E-01	1.7570E-01	2.7890E-03
3.0981E-01	3.2245E-01	1.7770E-01	2.8110E-03
2.9766E-01	3.0981E-01	1.8010E-01	2.8360E-03
2.8599E-01	2.9766E-01	1.9190E-01	2.9290E-03
2.7478E-01	2.8599E-01	1.8640E-01	2.8970E-03
2.6400E-01	2.7478E-01	1.6060E-01	2.7080E-03
2.5365E-01	2.6400E-01	1.5450E-01	2.6780E-03
2.4371E-01	2.5365E-01	1.4690E-01	2.6450E-03
2.3415E-01	2.4371E-01	1.4080E-01	2.6230E-03
2.2497E-01	2.3415E-01	1.3490E-01	2.6010E-03
2.1615E-01	2.2497E-01	1.2940E-01	2.5800E-03
2.0767E-01	2.1615E-01	1.2150E-01	2.5350E-03
1.9953E-01	2.0767E-01	1.1310E-01	2.4830E-03
1.9171E-01	1.9953E-01	1.0290E-01	2.4100E-03
1.8419E-01	1.9171E-01	9.7840E-02	2.4060E-03
1.7697E-01	1.8419E-01	9.5590E-02	2.4310E-03
1.7003E-01	1.7697E-01	9.7440E-02	2.5000E-03
1.6336E-01	1.7003E-01	1.0080E-01	2.5870E-03

1.5696E-01	1.6336E-01	9.7020E-02	2.5980E-03
1.5080E-01	1.5696E-01	8.7300E-02	2.5410E-03
1.4489E-01	1.5080E-01	7.3580E-02	2.4290E-03
1.3921E-01	1.4489E-01	6.5840E-02	2.3830E-03
1.3375E-01	1.3921E-01	6.5850E-02	2.4390E-03
1.2850E-01	1.3375E-01	6.9630E-02	2.5460E-03
1.2347E-01	1.2850E-01	7.4050E-02	2.6630E-03
1.1862E-01	1.2347E-01	6.6490E-02	2.6240E-03
1.1397E-01	1.1862E-01	6.0040E-02	2.5970E-03
1.0950E-01	1.1397E-01	5.3660E-02	2.5680E-03
1.0521E-01	1.0950E-01	4.9840E-02	2.5760E-03
1.0109E-01	1.0521E-01	5.9660E-02	2.8350E-03
9.7122E-02	1.0109E-01	5.7410E-02	2.9310E-03
9.3313E-02	9.7122E-02	4.3020E-02	2.8450E-03
8.9655E-02	9.3313E-02	4.0150E-02	2.9470E-03
8.6139E-02	8.9655E-02	3.7120E-02	3.0560E-03
8.2762E-02	8.6139E-02	4.2720E-02	3.3270E-03
7.9516E-02	8.2762E-02	4.3780E-02	3.5380E-03
7.6399E-02	7.9516E-02	3.3390E-02	3.5930E-03
7.3403E-02	7.6399E-02	2.4240E-02	3.7010E-03
7.0525E-02	7.3403E-02	2.8010E-02	4.0810E-03
6.7759E-02	7.0525E-02	3.1150E-02	4.4930E-03
6.5103E-02	6.7759E-02	3.9380E-02	5.0500E-03
6.2550E-02	6.5103E-02	3.3260E-02	5.4180E-03
6.0097E-02	6.2550E-02	2.7130E-02	5.8670E-03
5.7741E-02	6.0097E-02	4.3390E-02	6.8260E-03
5.5477E-02	5.7741E-02	3.5000E-02	7.4160E-03
5.3302E-02	5.5477E-02	2.4800E-02	8.1200E-03
5.1212E-02	5.3302E-02	2.6280E-02	9.2380E-03
4.9204E-02	5.1212E-02	6.2820E-02	1.1250E-02
4.7274E-02	4.9204E-02	3.9910E-02	1.2600E-02

Table 4.19 Numerical data of measured leakage current spectrum from Nb pile of 28 cm.

Lower Energy (MeV)	Upper Energy (MeV)	Lethargy Flux (1/MeV/n)	Error
1.9652E+01	2.0250E+01	8.7740E-04	1.4920E-04
1.9071E+01	1.9652E+01	1.0900E-03	1.6170E-04
1.8507E+01	1.9071E+01	1.5550E-03	1.8570E-04
1.7960E+01	1.8507E+01	2.6640E-03	2.3300E-04
1.7429E+01	1.7960E+01	4.5010E-03	2.9490E-04
1.6914E+01	1.7429E+01	6.7860E-03	3.5720E-04
1.6414E+01	1.6914E+01	9.3810E-03	4.1680E-04
1.5929E+01	1.6414E+01	2.8380E-02	7.1480E-04
1.5458E+01	1.5929E+01	2.6190E-01	2.1570E-03
1.5002E+01	1.5458E+01	1.4400E+00	5.0550E-03
1.4558E+01	1.5002E+01	5.5360E+00	9.9300E-03
1.4128E+01	1.4558E+01	5.6430E+00	1.0070E-02
1.3710E+01	1.4128E+01	1.9260E+00	5.8880E-03
1.3305E+01	1.3710E+01	6.9170E-01	3.4960E-03
1.2912E+01	1.3305E+01	3.8090E-01	2.5720E-03
1.2530E+01	1.2912E+01	2.5170E-01	2.0890E-03
1.2160E+01	1.2530E+01	1.8220E-01	1.7810E-03
1.1801E+01	1.2160E+01	1.4430E-01	1.5880E-03
1.1452E+01	1.1801E+01	1.2040E-01	1.4510E-03
1.1113E+01	1.1452E+01	1.0630E-01	1.3640E-03
1.0785E+01	1.1113E+01	9.2210E-02	1.2680E-03
1.0466E+01	1.0785E+01	7.7080E-02	1.1410E-03
1.0157E+01	1.0466E+01	6.9710E-02	1.0700E-03
9.8567E+00	1.0157E+01	6.1820E-02	9.9390E-04
9.5654E+00	9.8567E+00	5.7730E-02	9.6190E-04
9.2827E+00	9.5654E+00	5.5860E-02	9.4770E-04
9.0084E+00	9.2827E+00	5.5890E-02	9.4930E-04
8.7422E+00	9.0084E+00	5.2050E-02	9.0260E-04
8.4838E+00	8.7422E+00	4.8420E-02	8.5830E-04
8.2331E+00	8.4838E+00	4.6480E-02	8.2970E-04
7.9897E+00	8.2331E+00	4.5310E-02	8.0870E-04



7.7536E+00	7.9897E+00	4.4410E-02	7.9110E-04
7.5244E+00	7.7536E+00	4.4680E-02	7.8430E-04
7.3021E+00	7.5244E+00	4.3630E-02	7.6770E-04
7.0863E+00	7.3021E+00	4.4110E-02	7.6670E-04
6.8768E+00	7.0863E+00	4.6380E-02	7.8100E-04
6.6736E+00	6.8768E+00	4.5970E-02	7.7290E-04
6.4764E+00	6.6736E+00	4.8080E-02	7.8570E-04
6.2849E+00	6.4764E+00	4.7600E-02	7.7740E-04
6.0992E+00	6.2849E+00	4.9760E-02	7.9050E-04
5.9189E+00	6.0992E+00	5.1610E-02	8.0040E-04
5.7440E+00	5.9189E+00	5.3980E-02	8.1390E-04
5.5742E+00	5.7440E+00	5.5720E-02	8.2240E-04
5.4095E+00	5.5742E+00	5.5580E-02	8.1720E-04
5.2496E+00	5.4095E+00	5.8600E-02	8.3480E-04
5.0945E+00	5.2496E+00	6.0290E-02	8.4260E-04
4.9439E+00	5.0945E+00	6.3990E-02	8.6390E-04
4.7978E+00	4.9439E+00	6.5800E-02	8.6250E-04
4.6560E+00	4.7978E+00	6.7940E-02	8.6370E-04
4.5184E+00	4.6560E+00	6.7890E-02	8.5170E-04
4.3849E+00	4.5184E+00	7.0060E-02	8.5390E-04
4.2553E+00	4.3849E+00	7.1270E-02	8.5080E-04
4.1295E+00	4.2553E+00	7.4200E-02	8.5790E-04
4.0075E+00	4.1295E+00	7.4730E-02	8.5220E-04
3.8890E+00	4.0075E+00	7.9810E-02	8.7320E-04
3.7741E+00	3.8890E+00	8.2400E-02	8.8010E-04
3.6625E+00	3.7741E+00	8.5160E-02	8.8790E-04
3.5543E+00	3.6625E+00	8.9530E-02	9.0370E-04
3.4493E+00	3.5543E+00	9.1550E-02	9.0740E-04
3.3473E+00	3.4493E+00	9.5170E-02	9.1900E-04
3.2484E+00	3.3473E+00	1.0020E-01	9.3520E-04
3.1524E+00	3.2484E+00	1.0220E-01	9.3660E-04
3.0592E+00	3.1524E+00	1.0420E-01	9.3810E-04
2.9688E+00	3.0592E+00	1.1030E-01	9.5730E-04
2.8811E+00	2.9688E+00	1.1060E-01	9.5140E-04
2.7959E+00	2.8811E+00	1.1420E-01	9.6000E-04
2.7133E+00	2.7959E+00	1.2040E-01	9.7910E-04
2.6331E+00	2.7133E+00	1.2290E-01	9.8380E-04
2.5553E+00	2.6331E+00	1.2890E-01	1.0020E-03
2.4798E+00	2.5553E+00	1.2830E-01	9.9510E-04
2.4065E+00	2.4798E+00	1.3280E-01	1.0070E-03
2.3353E+00	2.4065E+00	1.3590E-01	1.0150E-03
2.2663E+00	2.3353E+00	1.3970E-01	1.0240E-03
2.1993E+00	2.2663E+00	1.4060E-01	1.0230E-03
2.1343E+00	2.1993E+00	1.4510E-01	1.0340E-03
2.0713E+00	2.1343E+00	1.4920E-01	1.0430E-03
2.0101E+00	2.0713E+00	1.5080E-01	1.0430E-03
1.9506E+00	2.0101E+00	1.5370E-01	1.0480E-03
1.8930E+00	1.9506E+00	1.5600E-01	1.0510E-03
1.8371E+00	1.8930E+00	1.5620E-01	1.0470E-03
1.7828E+00	1.8371E+00	1.6190E-01	1.0640E-03
1.7301E+00	1.7828E+00	1.6160E-01	1.0620E-03
1.6789E+00	1.7301E+00	1.6620E-01	1.0750E-03
1.6293E+00	1.6789E+00	1.7060E-01	1.0880E-03
1.5812E+00	1.6293E+00	1.7280E-01	1.0940E-03
1.5344E+00	1.5812E+00	1.7360E-01	1.0960E-03
1.4891E+00	1.5344E+00	1.7530E-01	1.1000E-03
1.4451E+00	1.4891E+00	1.7570E-01	1.0990E-03
1.4024E+00	1.4451E+00	1.7720E-01	1.1020E-03
1.3609E+00	1.4024E+00	1.8110E-01	1.1110E-03
1.3207E+00	1.3609E+00	1.7700E-01	1.0970E-03
1.2817E+00	1.3207E+00	1.8070E-01	1.1060E-03
1.2438E+00	1.2817E+00	1.8650E-01	1.1220E-03
1.2070E+00	1.2438E+00	1.9020E-01	1.1310E-03
1.1714E+00	1.2070E+00	1.9170E-01	1.1320E-03
1.1367E+00	1.1714E+00	1.9470E-01	1.1380E-03
1.1031E+00	1.1367E+00	1.9450E-01	1.1340E-03
1.0705E+00	1.1031E+00	1.9170E-01	1.1230E-03
1.0389E+00	1.0705E+00	1.9110E-01	1.1190E-03
1.0082E+00	1.0389E+00	1.9110E-01	1.1160E-03
9.7840E-01	1.0082E+00	1.9320E-01	1.1220E-03
9.4948E-01	9.7840E-01	1.9850E-01	1.1370E-03
9.2142E-01	9.4948E-01	2.0850E-01	1.1660E-03
8.9419E-01	9.2142E-01	2.1730E-01	1.1900E-03
8.6776E-01	8.9419E-01	2.2040E-01	1.1990E-03

8.4211E-01	8.6776E-01	2.1890E-01	1.1950E-03
8.1723E-01	8.4211E-01	2.2020E-01	1.1990E-03
7.9307E-01	8.1723E-01	2.2390E-01	1.2160E-03
7.6963E-01	7.9307E-01	2.3010E-01	1.2400E-03
7.4689E-01	7.6963E-01	2.3240E-01	1.2530E-03
7.2481E-01	7.4689E-01	2.3410E-01	1.2650E-03
7.0339E-01	7.2481E-01	2.3580E-01	1.2760E-03
6.8260E-01	7.0339E-01	2.3670E-01	1.2860E-03
6.6243E-01	6.8260E-01	2.4030E-01	1.3050E-03
6.4285E-01	6.6243E-01	2.3950E-01	1.3170E-03
6.2385E-01	6.4285E-01	2.4250E-01	1.3390E-03
6.0542E-01	6.2385E-01	2.4130E-01	1.3500E-03
5.8752E-01	6.0542E-01	2.4400E-01	1.3720E-03
5.7016E-01	5.8752E-01	2.4320E-01	1.3840E-03
5.5331E-01	5.7016E-01	2.2990E-01	1.3600E-03
5.3696E-01	5.5331E-01	2.2350E-01	1.3670E-03
5.2109E-01	5.3696E-01	2.1780E-01	1.3790E-03
5.0569E-01	5.2109E-01	2.1170E-01	1.3890E-03
4.9074E-01	5.0569E-01	2.0640E-01	1.4010E-03
4.7624E-01	4.9074E-01	2.0070E-01	1.4120E-03
4.6216E-01	4.7624E-01	1.9660E-01	1.4290E-03
4.4850E-01	4.6216E-01	1.9220E-01	1.4480E-03
4.3525E-01	4.4850E-01	1.8920E-01	1.4770E-03
4.2238E-01	4.3525E-01	1.7670E-01	1.4700E-03
4.0990E-01	4.2238E-01	1.6910E-01	1.4810E-03
3.9779E-01	4.0990E-01	1.7000E-01	1.5310E-03
3.8603E-01	3.9779E-01	1.7380E-01	1.5960E-03
3.7462E-01	3.8603E-01	1.7290E-01	1.6450E-03
3.6355E-01	3.7462E-01	1.7450E-01	1.7080E-03
3.5281E-01	3.6355E-01	1.6850E-01	1.7290E-03
3.4238E-01	3.5281E-01	1.6150E-01	1.7470E-03
3.3226E-01	3.4238E-01	1.5220E-01	1.7510E-03
3.2244E-01	3.3226E-01	1.4470E-01	1.7660E-03
3.1291E-01	3.2244E-01	1.3340E-01	1.7570E-03
3.0366E-01	3.1291E-01	1.3030E-01	1.7990E-03
2.9469E-01	3.0366E-01	1.3420E-01	1.8910E-03
2.8598E-01	2.9469E-01	1.2890E-01	1.9240E-03
2.7753E-01	2.8598E-01	1.2680E-01	1.9840E-03
2.6932E-01	2.7753E-01	1.1790E-01	1.9950E-03
2.6137E-01	2.6932E-01	1.0930E-01	2.0100E-03
2.5364E-01	2.6137E-01	1.0550E-01	2.0690E-03
2.4614E-01	2.5364E-01	9.9910E-02	2.1170E-03
2.3887E-01	2.4614E-01	9.0810E-02	2.0770E-03
2.3181E-01	2.3887E-01	7.6160E-02	1.9680E-03
2.2496E-01	2.3181E-01	7.0630E-02	1.9550E-03
2.1831E-01	2.2496E-01	6.5770E-02	1.9480E-03
2.1186E-01	2.1831E-01	6.0750E-02	1.9380E-03
2.0560E-01	2.1186E-01	6.2440E-02	2.0320E-03
1.9952E-01	2.0560E-01	6.0420E-02	2.1390E-03
1.9362E-01	1.9952E-01	5.9040E-02	2.2780E-03
1.8790E-01	1.9362E-01	6.1060E-02	2.5030E-03
1.8235E-01	1.8790E-01	5.0940E-02	2.5680E-03
1.7696E-01	1.8235E-01	5.3720E-02	2.9190E-03
1.7173E-01	1.7696E-01	5.7160E-02	3.3920E-03
1.6665E-01	1.7173E-01	6.5800E-02	4.0740E-03
1.6173E-01	1.6665E-01	6.2860E-02	4.2420E-03
1.5695E-01	1.6173E-01	5.6320E-02	4.3590E-03
1.5231E-01	1.5695E-01	5.2540E-02	4.5630E-03
1.4781E-01	1.5231E-01	5.6920E-02	4.9880E-03
1.4344E-01	1.4781E-01	5.4570E-02	5.3160E-03
1.3920E-01	1.4344E-01	5.2040E-02	5.7040E-03
1.3509E-01	1.3920E-01	4.6150E-02	6.0910E-03
1.3109E-01	1.3509E-01	3.9730E-02	6.5680E-03
1.2722E-01	1.3109E-01	4.8370E-02	7.5760E-03
1.2346E-01	1.2722E-01	5.0740E-02	8.6390E-03
1.1981E-01	1.2346E-01	7.3590E-02	1.0520E-02
1.1627E-01	1.1981E-01	7.6580E-02	1.2400E-02
1.1283E-01	1.1627E-01	6.6490E-02	1.4730E-02
1.0950E-01	1.1283E-01	8.8620E-02	1.9370E-02
1.0626E-01	1.0950E-01	7.4300E-02	2.6270E-02
1.0312E-01	1.0626E-01	1.7440E-01	4.5740E-02
1.0008E-01	1.0312E-01	3.8410E-01	1.3230E-01

Table 4.20 Numerical data of measured leakage current spectrum from Mo pile of 61 cm.

Lower Energy (MeV)	Upper Energy (MeV)	Lethargy Flux (1/MeV/n)	Error
1.9850E+01	2.0660E+01	2.2180E-05	5.9610E-04
1.9072E+01	1.9850E+01	7.6190E-04	6.5340E-04
1.8324E+01	1.9072E+01	9.9200E-04	6.7410E-04
1.7605E+01	1.8324E+01	1.2630E-04	6.2200E-04
1.6915E+01	1.7605E+01	1.0000E-38	6.1490E-04
1.6252E+01	1.6915E+01	2.0320E-03	7.5370E-04
1.5615E+01	1.6252E+01	1.5380E-01	3.7080E-03
1.5002E+01	1.5615E+01	2.3760E+00	1.4370E-02
1.4414E+01	1.5002E+01	6.8010E+00	2.4350E-02
1.3849E+01	1.4414E+01	2.0820E+00	1.3530E-02
1.3306E+01	1.3849E+01	4.7540E-01	6.5070E-03
1.2784E+01	1.3306E+01	3.1570E-01	5.3240E-03
1.2283E+01	1.2784E+01	2.3590E-01	4.6160E-03
1.1801E+01	1.2283E+01	1.9030E-01	4.1580E-03
1.1339E+01	1.1801E+01	1.4780E-01	3.6740E-03
1.0894E+01	1.1339E+01	1.2520E-01	3.3860E-03
1.0467E+01	1.0894E+01	1.0210E-01	3.0280E-03
1.0056E+01	1.0467E+01	8.6620E-02	2.7540E-03
9.6620E+00	1.0056E+01	7.6780E-02	2.5700E-03
9.2832E+00	9.6620E+00	7.3290E-02	2.5000E-03
8.9192E+00	9.2832E+00	6.7010E-02	2.3850E-03
8.5694E+00	8.9192E+00	6.4370E-02	2.3160E-03
8.2334E+00	8.5694E+00	6.2670E-02	2.2600E-03
7.9106E+00	8.2334E+00	5.7410E-02	2.1470E-03
7.6004E+00	7.9106E+00	5.2360E-02	2.0400E-03
7.3024E+00	7.6004E+00	5.4200E-02	2.0550E-03
7.0161E+00	7.3024E+00	5.5650E-02	2.0640E-03
6.7410E+00	7.0161E+00	5.4750E-02	2.0340E-03
6.4766E+00	6.7410E+00	5.4660E-02	2.0180E-03
6.2227E+00	6.4766E+00	5.9060E-02	2.0770E-03
5.9787E+00	6.2227E+00	5.6210E-02	2.0190E-03
5.7443E+00	5.9787E+00	6.2620E-02	2.0890E-03
5.5190E+00	5.7443E+00	6.2080E-02	2.0710E-03
5.3026E+00	5.5190E+00	6.2310E-02	2.1290E-03
5.0947E+00	5.3026E+00	6.7680E-02	2.1520E-03
4.8949E+00	5.0947E+00	7.0650E-02	2.1830E-03
4.7030E+00	4.8949E+00	7.4270E-02	2.2120E-03
4.5186E+00	4.7030E+00	7.7820E-02	2.2380E-03
4.3414E+00	4.5186E+00	8.1110E-02	2.3120E-03
4.1712E+00	4.3414E+00	8.8300E-02	2.3000E-03
4.0076E+00	4.1712E+00	8.8670E-02	2.3430E-03
3.8505E+00	4.0076E+00	9.3530E-02	2.4020E-03
3.6995E+00	3.8505E+00	9.9870E-02	2.3660E-03
3.5545E+00	3.6995E+00	9.9220E-02	2.3810E-03
3.4151E+00	3.5545E+00	1.0310E-01	2.4770E-03
3.2812E+00	3.4151E+00	1.1160E-01	2.4810E-03
3.1525E+00	3.2812E+00	1.1740E-01	2.5390E-03
3.0289E+00	3.1525E+00	1.2570E-01	2.5300E-03
2.9101E+00	3.0289E+00	1.2710E-01	2.5660E-03
2.7960E+00	2.9101E+00	1.3320E-01	2.6130E-03
2.6864E+00	2.7960E+00	1.4070E-01	2.7290E-03
2.5811E+00	2.6864E+00	1.5640E-01	2.7090E-03
2.4799E+00	2.5811E+00	1.5630E-01	2.7440E-03
2.3826E+00	2.4799E+00	1.6210E-01	2.8120E-03
2.2892E+00	2.3826E+00	1.7220E-01	2.8550E-03
2.1994E+00	2.2892E+00	1.7930E-01	2.8870E-03
2.1132E+00	2.1994E+00	1.8490E-01	2.9470E-03
2.0303E+00	2.1132E+00	1.9460E-01	2.9560E-03
1.9507E+00	2.0303E+00	1.9720E-01	3.0030E-03
1.8742E+00	1.9507E+00	2.0530E-01	3.0390E-03
1.8008E+00	1.8742E+00	2.1190E-01	3.0110E-03
1.7301E+00	1.8008E+00	2.0910E-01	3.0720E-03
1.6623E+00	1.7301E+00	2.1930E-01	3.0990E-03
1.5971E+00	1.6623E+00	2.2440E-01	3.1550E-03
1.5345E+00	1.5971E+00	2.3880E-01	3.1880E-03
1.4743E+00	1.5345E+00	2.3990E-01	3.2260E-03
1.4165E+00	1.4743E+00	2.4670E-01	3.2790E-03
1.3610E+00	1.4165E+00	2.5610E-01	3.2560E-03

1.3076E+00	1.3610E+00	2.5320E-01	3.2730E-03
1.2563E+00	1.3076E+00	2.5680E-01	3.3640E-03
1.2071E+00	1.2563E+00	2.7260E-01	3.3850E-03
1.1598E+00	1.2071E+00	2.7690E-01	3.4290E-03
1.1143E+00	1.1598E+00	2.8530E-01	3.4460E-03
1.0706E+00	1.1143E+00	2.9000E-01	3.4250E-03
1.0286E+00	1.0706E+00	2.8820E-01	3.3970E-03
9.8827E-01	1.0286E+00	2.8510E-01	3.3780E-03
9.4952E-01	9.8827E-01	2.8340E-01	3.4400E-03
9.1229E-01	9.4952E-01	2.9580E-01	3.4770E-03
8.7652E-01	9.1229E-01	3.1380E-01	3.5290E-03
8.4215E-01	8.7652E-01	3.1490E-01	3.4880E-03
8.0913E-01	8.4215E-01	3.0880E-01	3.4940E-03
7.7740E-01	8.0913E-01	3.1110E-01	3.4960E-03
7.4692E-01	7.7740E-01	3.1290E-01	3.5140E-03
7.1763E-01	7.4692E-01	3.1470E-01	3.5870E-03
6.8950E-01	7.1763E-01	3.2680E-01	3.6620E-03
6.6246E-01	6.8950E-01	3.3950E-01	3.6850E-03
6.3648E-01	6.6246E-01	3.4240E-01	3.7210E-03
6.1153E-01	6.3648E-01	3.4790E-01	3.8200E-03
5.8755E-01	6.1153E-01	3.6580E-01	3.8340E-03
5.6451E-01	5.8755E-01	3.6710E-01	3.7990E-03
5.4238E-01	5.6451E-01	3.5880E-01	3.7560E-03
5.2111E-01	5.4238E-01	3.4910E-01	3.7140E-03
5.0068E-01	5.2111E-01	3.3990E-01	3.6160E-03
4.8105E-01	5.0068E-01	3.2110E-01	3.5520E-03
4.6218E-01	4.8105E-01	3.0880E-01	3.4590E-03
4.4406E-01	4.6218E-01	2.9180E-01	3.3760E-03
4.2665E-01	4.4406E-01	2.7680E-01	3.2110E-03
4.0992E-01	4.2665E-01	2.4880E-01	3.1200E-03
3.9385E-01	4.0992E-01	2.3770E-01	3.0660E-03
3.7840E-01	3.9385E-01	2.2470E-01	3.0980E-03
3.6357E-01	3.7840E-01	2.2850E-01	3.2070E-03
3.4931E-01	3.6357E-01	2.3900E-01	3.3040E-03
3.3561E-01	3.4931E-01	2.4760E-01	3.3570E-03
3.2245E-01	3.3561E-01	2.4930E-01	3.3290E-03
3.0981E-01	3.2245E-01	2.3820E-01	3.2540E-03
2.9766E-01	3.0981E-01	2.2080E-01	3.2430E-03
2.8599E-01	2.9766E-01	2.1360E-01	3.1900E-03
2.7478E-01	2.8599E-01	2.0080E-01	3.1430E-03
2.6400E-01	2.7478E-01	1.8940E-01	3.2170E-03
2.5365E-01	2.6400E-01	1.9430E-01	3.1830E-03
2.4371E-01	2.5365E-01	1.8380E-01	3.2880E-03
2.3415E-01	2.4371E-01	1.8400E-01	3.3700E-03
2.2497E-01	2.3415E-01	1.8080E-01	3.3360E-03
2.1615E-01	2.2497E-01	1.6340E-01	3.2840E-03
2.0767E-01	2.1615E-01	1.4490E-01	3.3410E-03
1.9953E-01	2.0767E-01	1.3880E-01	3.3960E-03
1.9171E-01	1.9953E-01	1.3520E-01	3.4550E-03
1.8419E-01	1.9171E-01	1.3170E-01	3.6320E-03
1.7697E-01	1.8419E-01	1.3920E-01	3.8020E-03
1.7003E-01	1.7697E-01	1.4570E-01	3.7370E-03
1.6336E-01	1.7003E-01	1.2880E-01	3.8490E-03
1.5696E-01	1.6336E-01	1.1980E-01	4.0400E-03
1.5080E-01	1.5696E-01	1.1560E-01	4.3630E-03
1.4489E-01	1.5080E-01	1.1970E-01	4.6900E-03
1.3921E-01	1.4489E-01	1.2050E-01	5.1180E-03
1.3375E-01	1.3921E-01	1.2550E-01	5.4040E-03
1.2850E-01	1.3375E-01	1.1960E-01	5.5790E-03
1.2347E-01	1.2850E-01	1.0190E-01	6.0140E-03
1.1862E-01	1.2347E-01	9.8380E-02	6.5140E-03
1.1397E-01	1.1862E-01	9.3040E-02	7.7140E-03
1.0950E-01	1.1397E-01	1.2640E-01	8.8850E-03
1.0521E-01	1.0950E-01	1.4100E-01	9.6790E-03
1.0109E-01	1.0521E-01	1.1080E-01	1.1240E-02
9.7122E-02	1.0109E-01	1.0320E-01	1.3540E-02
9.3313E-02	9.7122E-02	9.7440E-02	1.8100E-02
8.9655E-02	9.3313E-02	1.5580E-01	2.2750E-02
8.6139E-02	8.9655E-02	1.6020E-01	3.0480E-02
8.2762E-02	8.6139E-02	1.5950E-01	4.4390E-02
7.9516E-02	8.2762E-02	4.4240E-02	9.6620E-02

Table 4.21 Numerical data of measured leakage current spectrum from W pile of 40 cm.

Lower Energy (MeV)	Upper Energy (MeV)	Lethargy Flux (1/MeV/n)	Error
1.9850E+01	2.0660E+01	5.0710E-04	7.0110E-04
1.9072E+01	1.9850E+01	5.8820E-04	7.1370E-04
1.8324E+01	1.9072E+01	2.5710E-03	8.5630E-04
1.7605E+01	1.8324E+01	4.2740E-03	9.6280E-04
1.6915E+01	1.7605E+01	1.3010E-02	1.3720E-03
1.6252E+01	1.6915E+01	5.8100E-02	2.6030E-03
1.5615E+01	1.6252E+01	3.7580E-01	6.4170E-03
1.5002E+01	1.5615E+01	3.6460E+00	1.9880E-02
1.4414E+01	1.5002E+01	9.3720E+00	3.1920E-02
1.3849E+01	1.4414E+01	2.5010E+00	1.6570E-02
1.3306E+01	1.3849E+01	5.3750E-01	7.7220E-03
1.2784E+01	1.3306E+01	3.3890E-01	6.1570E-03
1.2283E+01	1.2784E+01	2.3580E-01	5.1540E-03
1.1801E+01	1.2283E+01	1.7610E-01	4.4710E-03
1.1339E+01	1.1801E+01	1.4290E-01	4.0360E-03
1.0894E+01	1.1339E+01	1.2000E-01	3.7050E-03
1.0467E+01	1.0894E+01	1.1390E-01	3.5630E-03
1.0056E+01	1.0467E+01	9.5300E-02	3.2170E-03
9.6620E+00	1.0056E+01	8.1580E-02	2.9520E-03
9.2832E+00	9.6620E+00	8.2680E-02	2.9530E-03
8.9192E+00	9.2832E+00	7.1920E-02	2.7510E-03
8.5694E+00	8.9192E+00	6.7860E-02	2.6490E-03
8.2334E+00	8.5694E+00	6.4300E-02	2.5530E-03
7.9106E+00	8.2334E+00	6.1210E-02	2.4680E-03
7.6004E+00	7.9106E+00	5.6720E-02	2.3610E-03
7.3024E+00	7.6004E+00	5.1900E-02	2.2500E-03
7.0161E+00	7.3024E+00	5.3400E-02	2.2610E-03
6.7410E+00	7.0161E+00	5.0680E-02	2.1920E-03
6.4766E+00	6.7410E+00	5.0700E-02	2.1780E-03
6.2227E+00	6.4766E+00	5.3730E-02	2.2220E-03
5.9787E+00	6.2227E+00	5.2150E-02	2.1790E-03
5.7443E+00	5.9787E+00	4.8740E-02	2.1010E-03
5.5190E+00	5.7443E+00	4.7700E-02	2.0700E-03
5.3026E+00	5.5190E+00	4.9570E-02	2.0840E-03
5.0947E+00	5.3026E+00	4.6530E-02	2.0060E-03
4.8949E+00	5.0947E+00	5.1340E-02	2.0770E-03
4.7030E+00	4.8949E+00	5.5020E-02	2.1240E-03
4.5186E+00	4.7030E+00	5.4560E-02	2.0980E-03
4.3414E+00	4.5186E+00	5.5600E-02	2.1000E-03
4.1712E+00	4.3414E+00	5.9810E-02	2.1550E-03
4.0076E+00	4.1712E+00	5.8610E-02	2.1210E-03
3.8505E+00	4.0076E+00	6.5870E-02	2.2230E-03
3.6995E+00	3.8505E+00	6.7310E-02	2.2310E-03
3.5545E+00	3.6995E+00	6.8790E-02	2.2270E-03
3.4151E+00	3.5545E+00	7.3980E-02	2.2770E-03
3.2812E+00	3.4151E+00	8.2920E-02	2.3750E-03
3.1525E+00	3.2812E+00	8.3820E-02	2.3630E-03
3.0289E+00	3.1525E+00	8.8080E-02	2.3960E-03
2.9101E+00	3.0289E+00	9.6020E-02	2.4730E-03
2.7960E+00	2.9101E+00	1.0190E-01	2.5230E-03
2.6864E+00	2.7960E+00	1.0900E-01	2.5830E-03
2.5811E+00	2.6864E+00	1.1490E-01	2.6300E-03
2.4799E+00	2.5811E+00	1.2120E-01	2.6780E-03
2.3826E+00	2.4799E+00	1.2680E-01	2.7230E-03
2.2892E+00	2.3826E+00	1.3220E-01	2.7660E-03
2.1994E+00	2.2892E+00	1.3990E-01	2.8300E-03
2.1132E+00	2.1994E+00	1.5320E-01	2.9440E-03
2.0303E+00	2.1132E+00	1.5130E-01	2.9150E-03
1.9507E+00	2.0303E+00	1.5920E-01	2.9760E-03
1.8742E+00	1.9507E+00	1.6920E-01	3.0540E-03
1.8008E+00	1.8742E+00	1.6890E-01	3.0410E-03
1.7301E+00	1.8008E+00	1.7840E-01	3.1130E-03
1.6623E+00	1.7301E+00	1.9680E-01	3.2550E-03
1.5971E+00	1.6623E+00	1.9880E-01	3.2710E-03
1.5345E+00	1.5971E+00	1.9370E-01	3.2170E-03
1.4743E+00	1.5345E+00	2.1260E-01	3.3580E-03
1.4165E+00	1.4743E+00	2.2170E-01	3.4210E-03
1.3610E+00	1.4165E+00	2.2370E-01	3.4290E-03

1.3076E+00	1.3610E+00	2.3520E-01	3.5080E-03
1.2563E+00	1.3076E+00	2.4370E-01	3.5630E-03
1.2071E+00	1.2563E+00	2.4940E-01	3.5980E-03
1.1598E+00	1.2071E+00	2.6150E-01	3.6770E-03
1.1143E+00	1.1598E+00	2.7850E-01	3.7850E-03
1.0706E+00	1.1143E+00	2.7090E-01	3.7230E-03
1.0286E+00	1.0706E+00	2.7290E-01	3.7250E-03
9.8827E-01	1.0286E+00	2.7620E-01	3.7360E-03
9.4952E-01	9.8827E-01	2.7760E-01	3.7340E-03
9.1229E-01	9.4952E-01	2.8900E-01	3.7990E-03
8.7652E-01	9.1229E-01	2.9420E-01	3.8220E-03
8.4215E-01	8.7652E-01	2.9990E-01	3.8490E-03
8.0913E-01	8.4215E-01	2.9310E-01	3.7980E-03
7.7740E-01	8.0913E-01	2.8640E-01	3.7480E-03
7.4692E-01	7.7740E-01	2.8000E-01	3.6990E-03
7.1763E-01	7.4692E-01	2.8690E-01	3.7520E-03
6.8950E-01	7.1763E-01	2.8230E-01	3.7310E-03
6.6246E-01	6.8950E-01	2.8580E-01	3.7620E-03
6.3648E-01	6.6246E-01	2.7860E-01	3.7240E-03
6.1153E-01	6.3648E-01	2.8080E-01	3.7460E-03
5.8755E-01	6.1153E-01	2.8150E-01	3.7580E-03
5.6451E-01	5.8755E-01	2.7960E-01	3.7540E-03
5.4238E-01	5.6451E-01	2.6290E-01	3.6510E-03
5.2111E-01	5.4238E-01	2.5370E-01	3.5970E-03
5.0068E-01	5.2111E-01	2.4210E-01	3.5230E-03
4.8105E-01	5.0068E-01	2.2620E-01	3.4150E-03
4.6218E-01	4.8105E-01	2.1100E-01	3.3070E-03
4.4406E-01	4.6218E-01	1.9990E-01	3.2270E-03
4.2665E-01	4.4406E-01	1.8040E-01	3.0780E-03
4.0992E-01	4.2665E-01	1.5690E-01	2.8890E-03
3.9385E-01	4.0992E-01	1.5660E-01	2.8890E-03
3.7840E-01	3.9385E-01	1.5450E-01	2.8750E-03
3.6357E-01	3.7840E-01	1.6080E-01	2.9370E-03
3.4931E-01	3.6357E-01	1.5920E-01	2.9640E-03
3.3561E-01	3.4931E-01	1.5850E-01	2.9990E-03
3.2245E-01	3.3561E-01	1.5450E-01	3.0040E-03
3.0981E-01	3.2245E-01	1.3340E-01	2.8510E-03
2.9766E-01	3.0981E-01	1.2810E-01	2.8380E-03
2.8599E-01	2.9766E-01	1.1960E-01	2.7910E-03
2.7478E-01	2.8599E-01	1.1670E-01	2.7970E-03
2.6400E-01	2.7478E-01	1.1200E-01	2.7840E-03
2.5365E-01	2.6400E-01	1.1090E-01	2.8080E-03
2.4371E-01	2.5365E-01	1.1470E-01	2.8920E-03
2.3415E-01	2.4371E-01	9.8350E-02	2.8080E-03
2.2497E-01	2.3415E-01	9.0260E-02	2.8120E-03
2.1615E-01	2.2497E-01	7.5140E-02	2.7230E-03
2.0767E-01	2.1615E-01	7.8380E-02	2.8780E-03
1.9953E-01	2.0767E-01	7.3710E-02	2.9270E-03
1.9171E-01	1.9953E-01	8.0320E-02	3.1100E-03
1.8419E-01	1.9171E-01	7.5860E-02	3.1440E-03
1.7697E-01	1.8419E-01	7.0510E-02	3.1660E-03
1.7003E-01	1.7697E-01	7.3950E-02	3.3210E-03
1.6336E-01	1.7003E-01	5.4480E-02	3.1350E-03
1.5696E-01	1.6336E-01	5.5580E-02	3.3670E-03
1.5080E-01	1.5696E-01	5.9460E-02	3.6760E-03
1.4489E-01	1.5080E-01	6.1250E-02	3.9900E-03
1.3921E-01	1.4489E-01	6.2670E-02	4.3440E-03
1.3375E-01	1.3921E-01	5.6420E-02	4.6180E-03
1.2850E-01	1.3375E-01	4.5830E-02	4.8090E-03
1.2347E-01	1.2850E-01	4.1700E-02	5.1760E-03
1.1862E-01	1.2347E-01	4.6740E-02	5.7970E-03
1.1397E-01	1.1862E-01	6.2740E-02	6.7250E-03
1.0950E-01	1.1397E-01	4.8610E-02	7.2350E-03
1.0521E-01	1.0950E-01	5.6370E-02	8.4230E-03
1.0109E-01	1.0521E-01	2.9650E-02	9.2570E-03
9.7122E-02	1.0109E-01	2.4550E-02	1.1020E-02
9.3313E-02	9.7122E-02	6.7260E-02	1.4500E-02
8.9655E-02	9.3313E-02	7.9630E-02	1.8730E-02
8.6139E-02	8.9655E-02	6.8110E-02	2.3570E-02

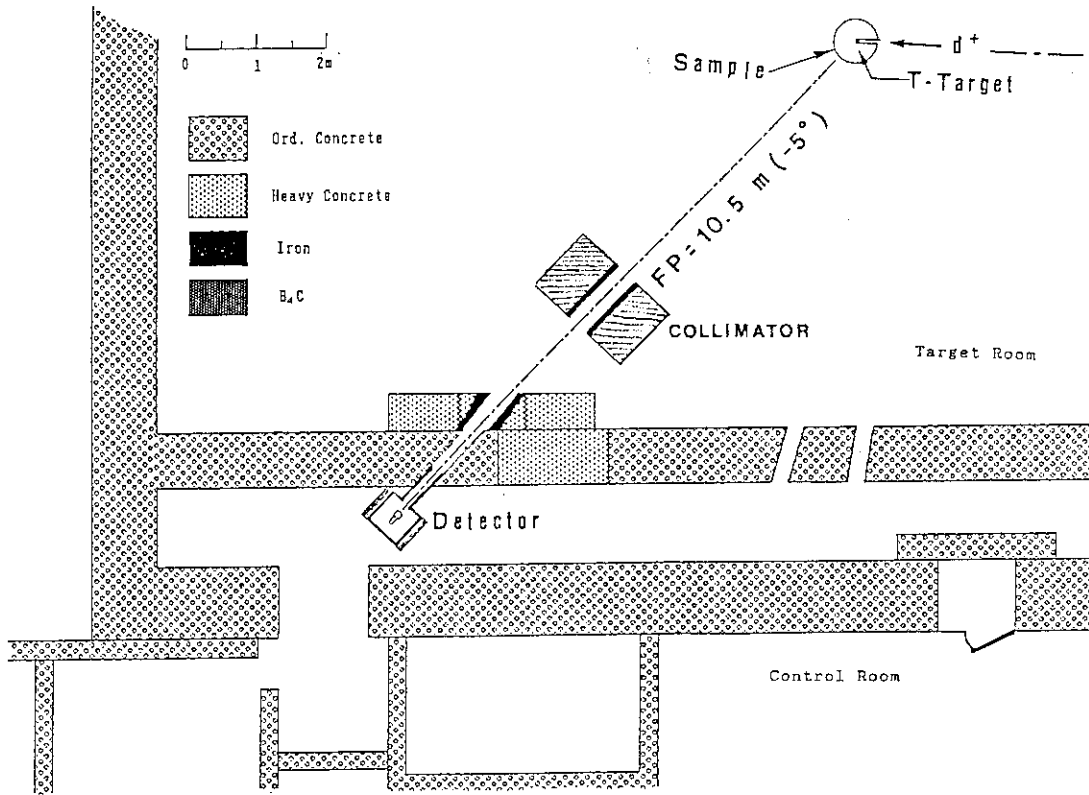


Fig. 4.1 Experimental arrangement in the OKTAVIAN Facility.

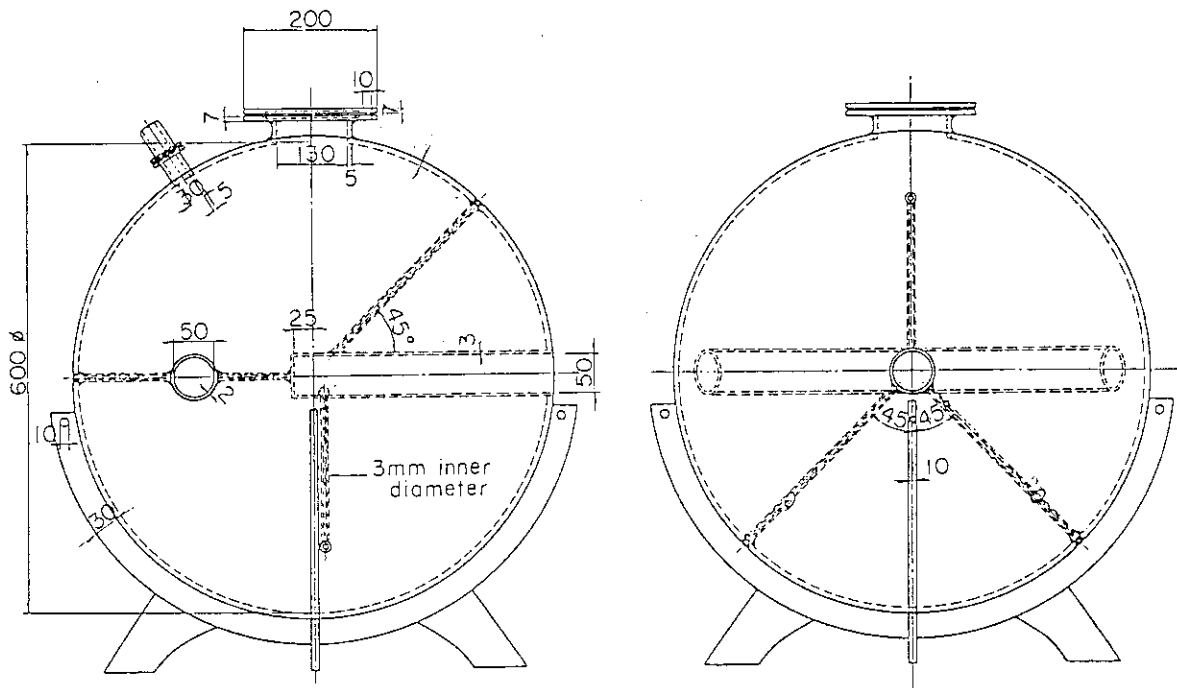


Fig. 4.2 61 cm diameter vessel (Type-I).

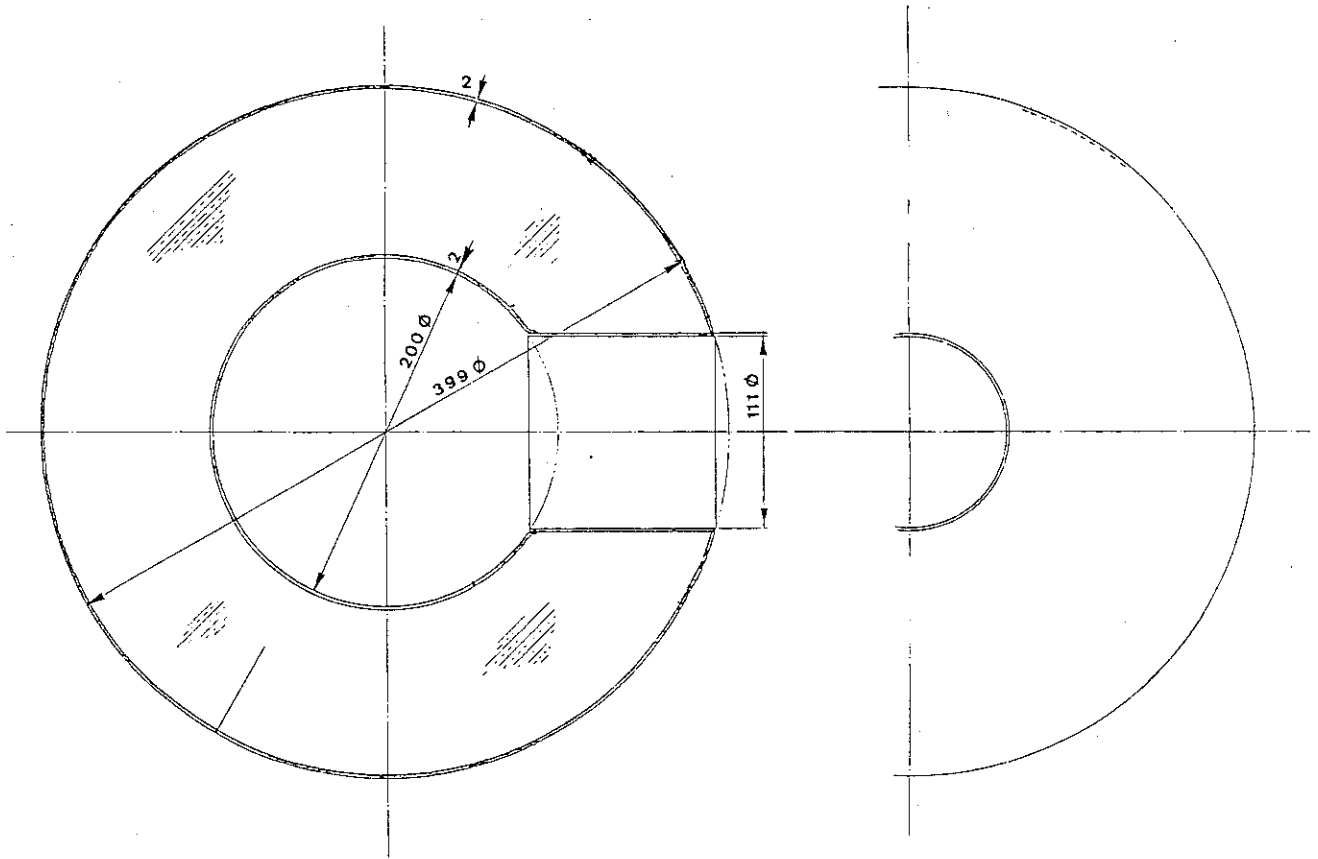


Fig. 4.3 40 cm diameter vessel (Type-II).

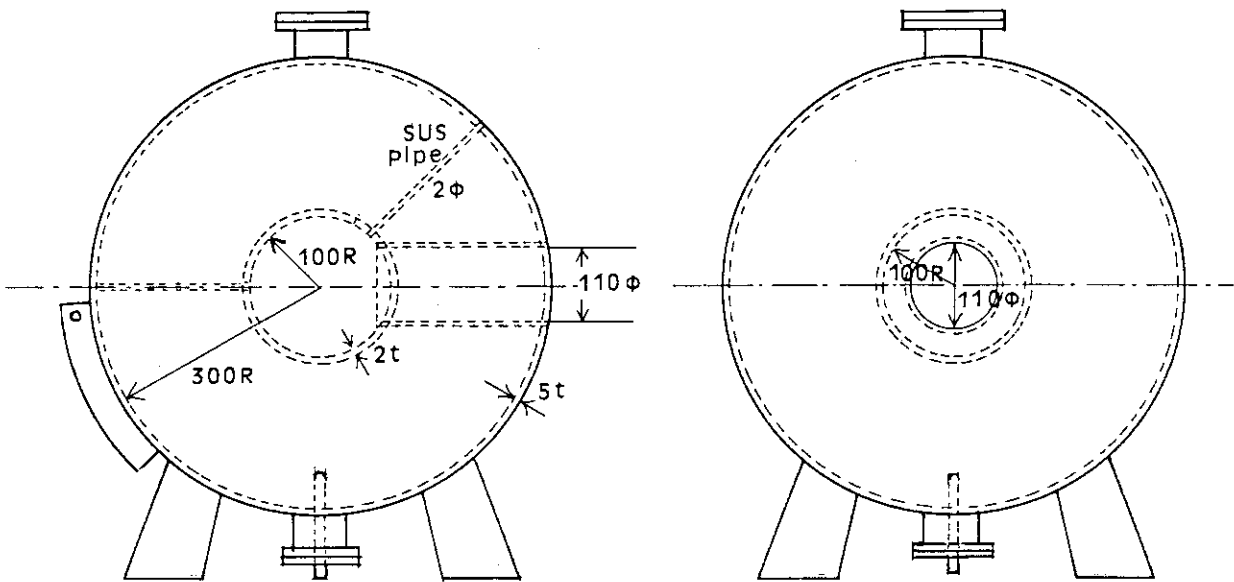


Fig. 4.4 60 cm diameter vessel (Type-III).



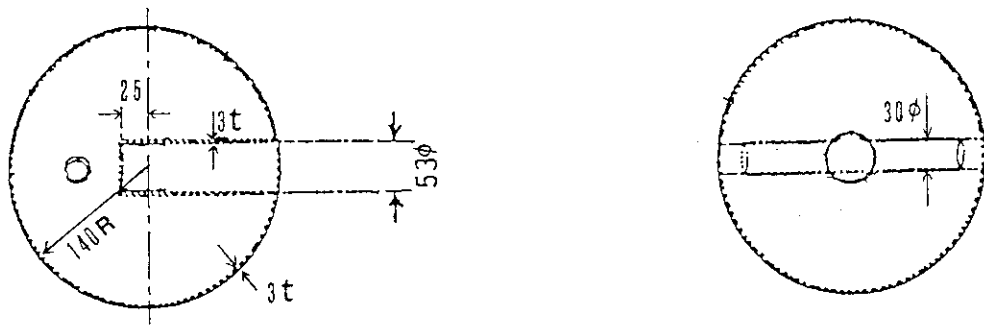


Fig. 4.5 28 cm diameter vessel (Type-IV).

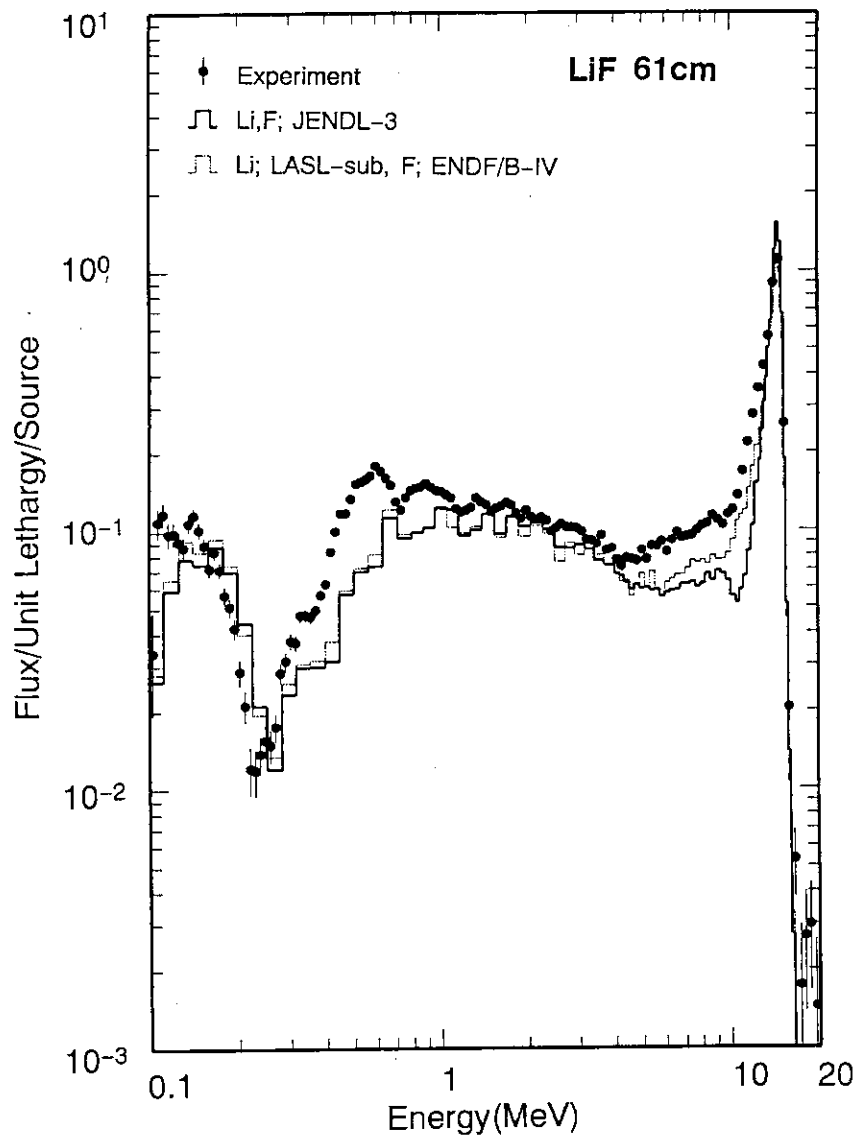


Fig. 4.6 Experimental and calculated spectra from LiF 61 cm pile.

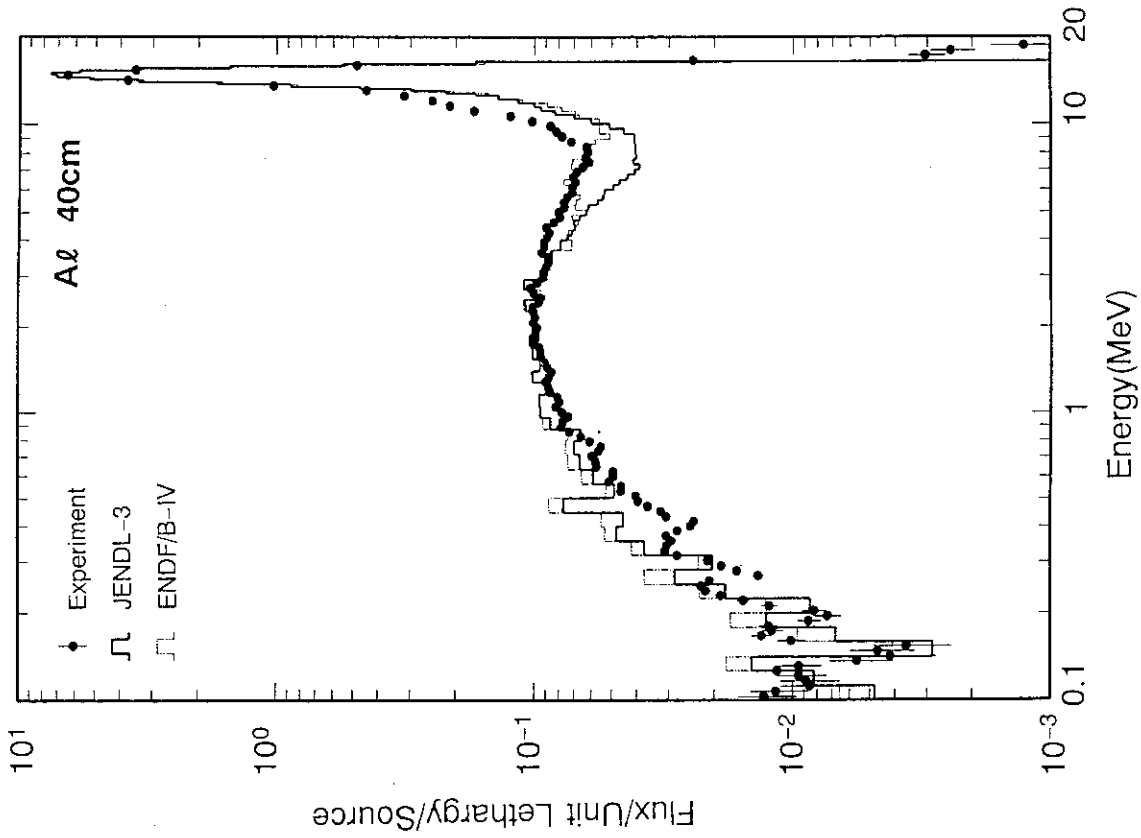


Fig. 4.8 Experimental and calculated spectra from Al 40 cm pile.

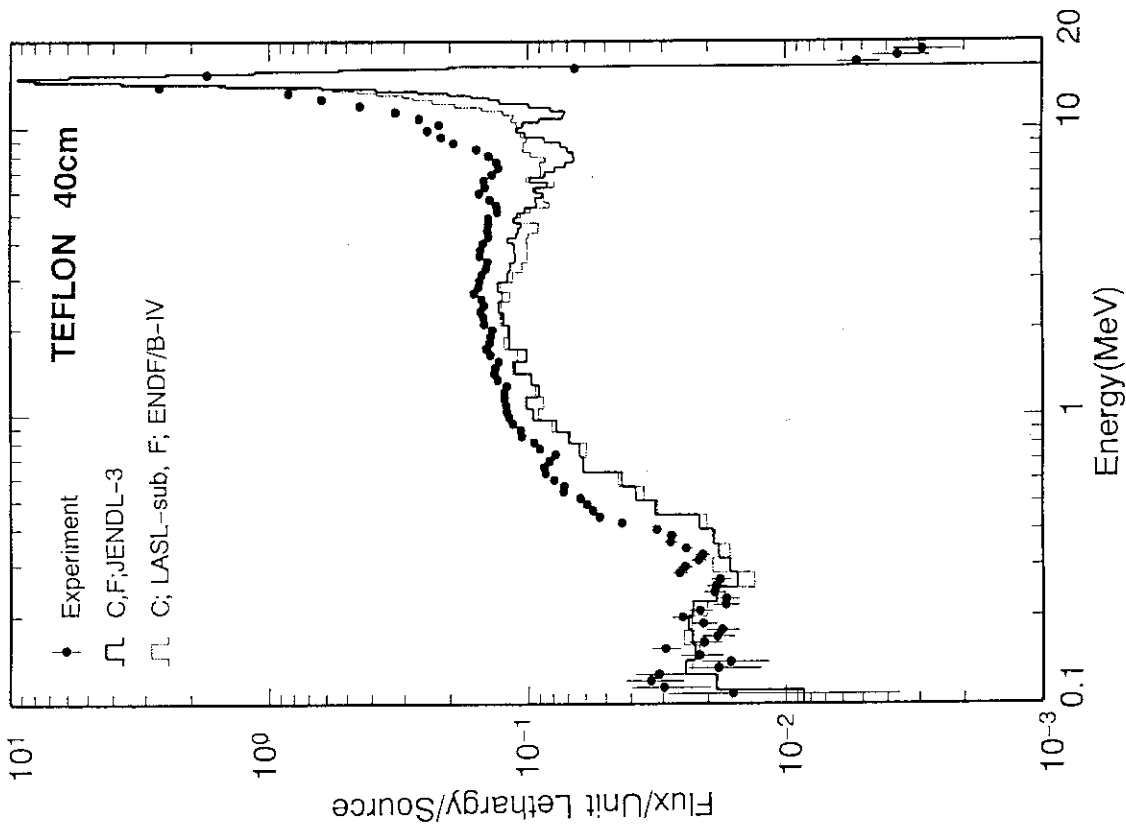


Fig. 4.7 Experimental and calculated spectra from TEFLON 40 cm pile.

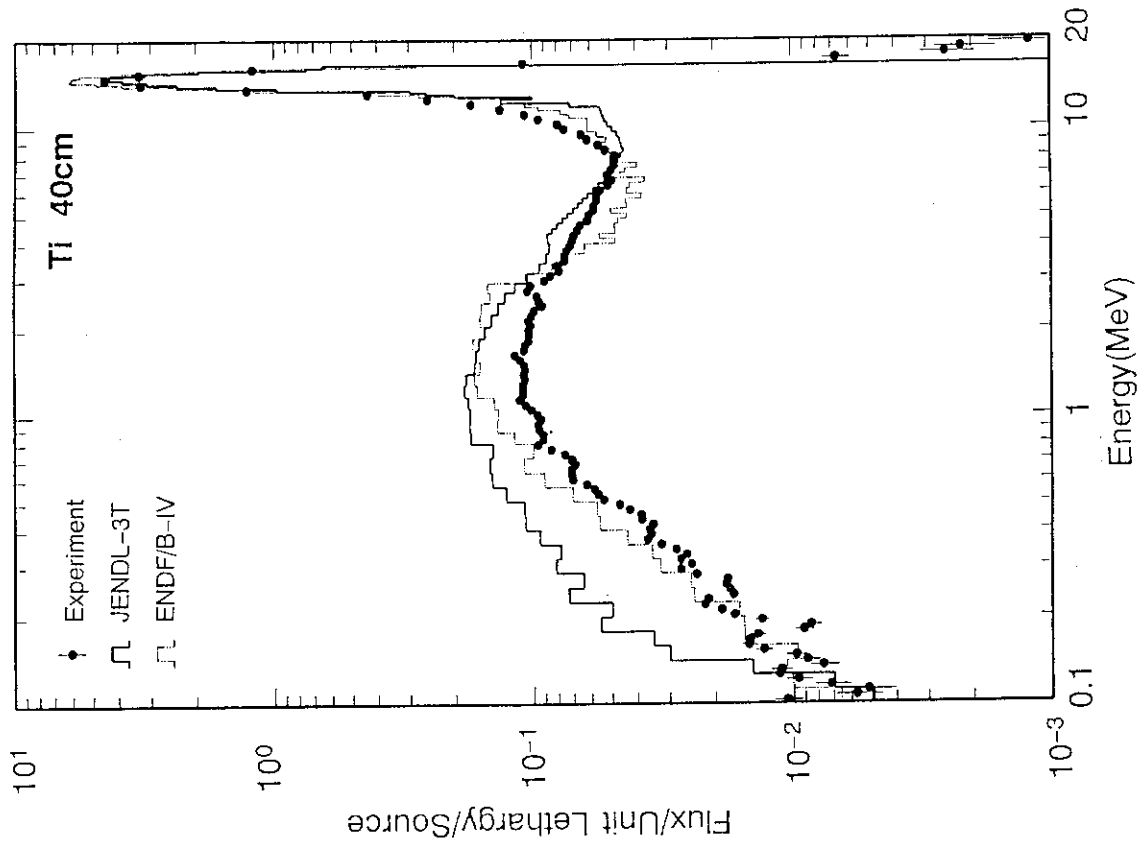


Fig. 4.10 Experimental and calculated spectra from Ti 40 cm pile.

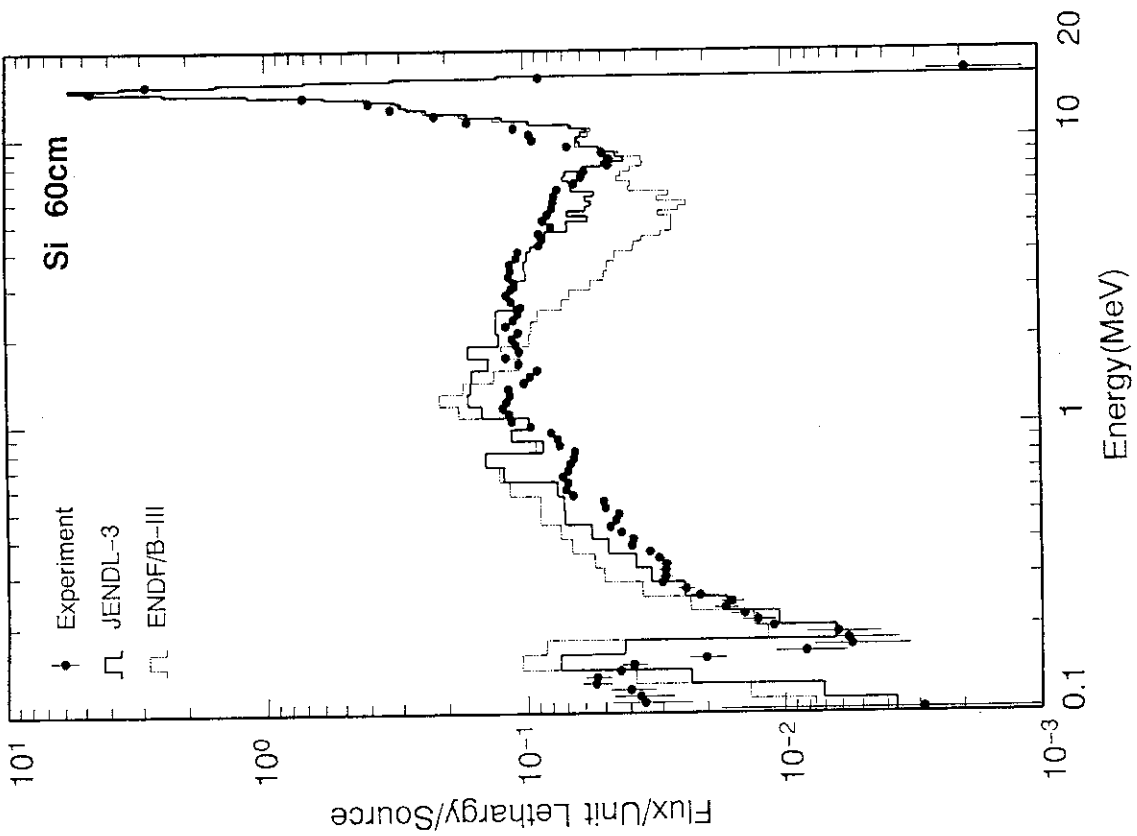


Fig. 4.9 Experimental and calculated spectra from Si 60 cm pile.

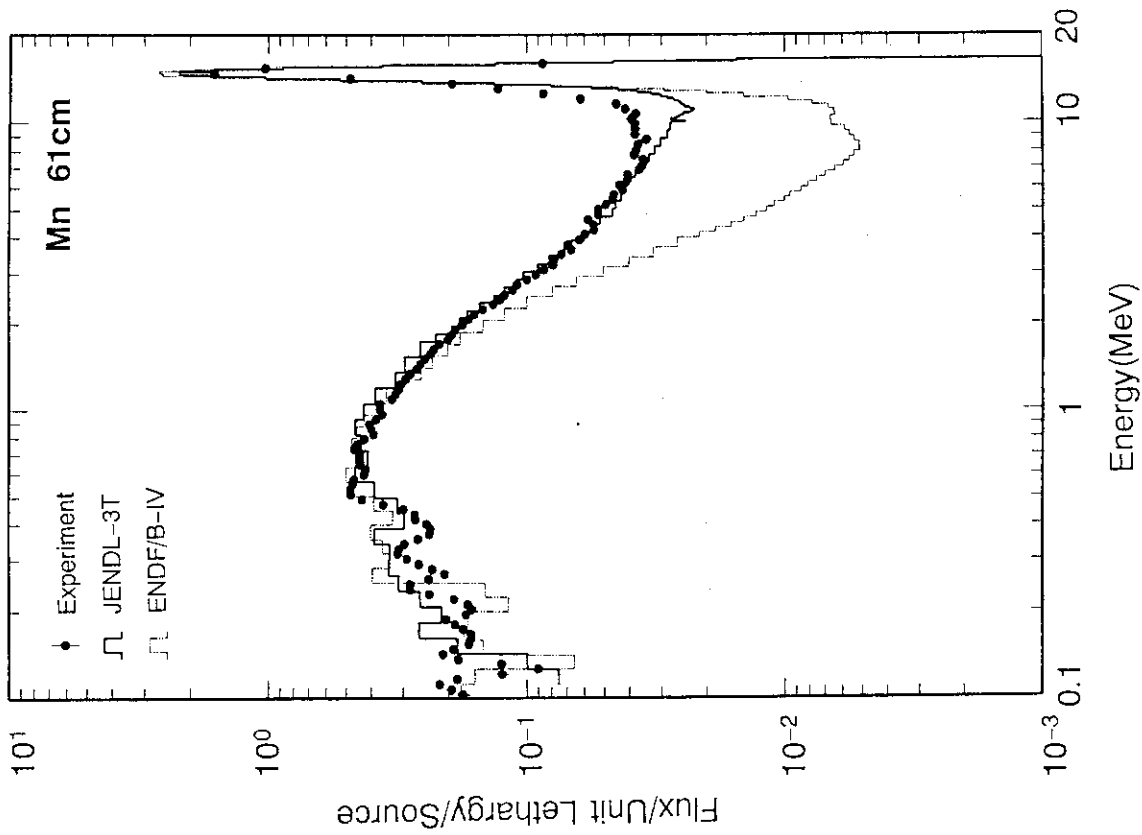


Fig. 4.12 Experimental and calculated spectra from Mn 61 cm pile.

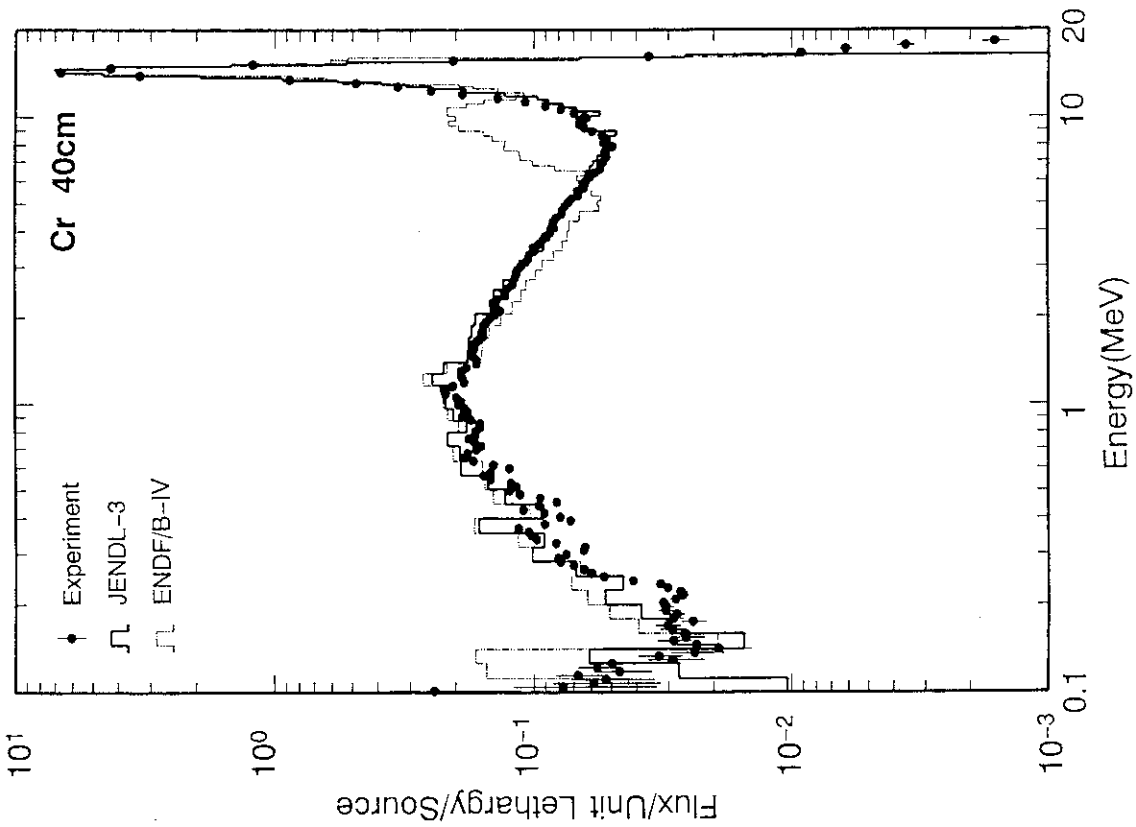


Fig. 4.11 Experimental and calculated spectra from Cr 40 cm pile.

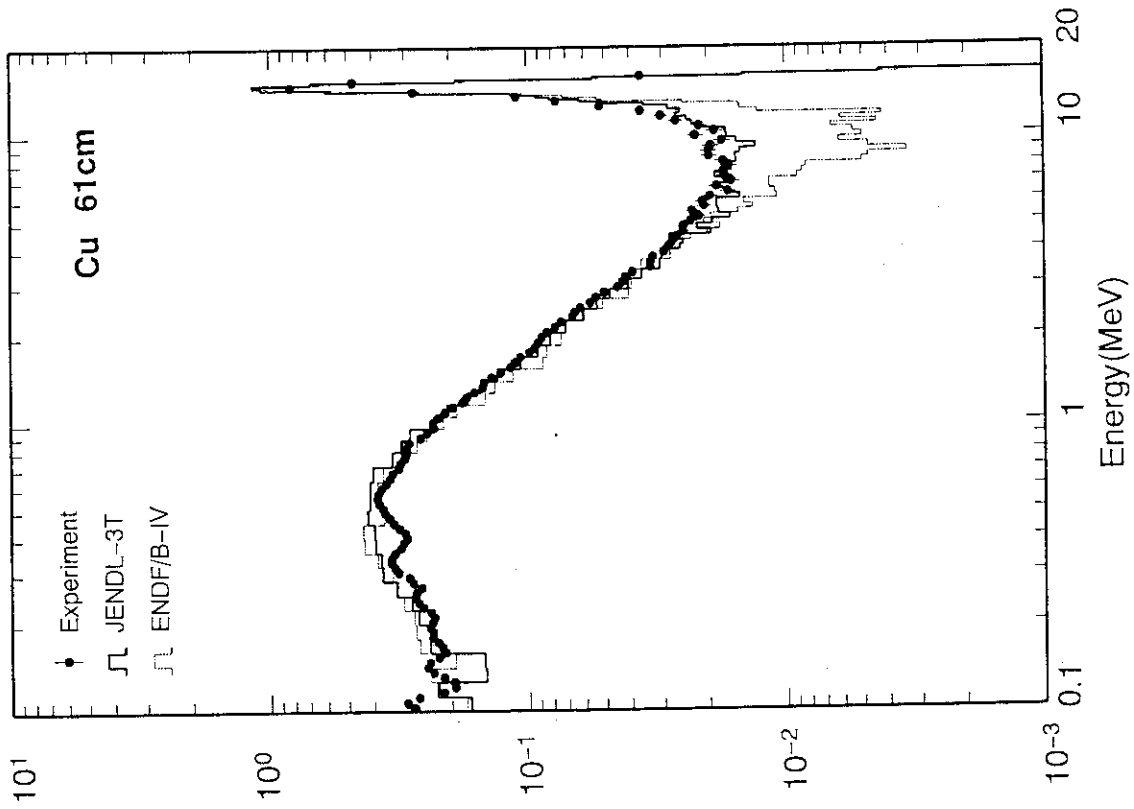


Fig. 4.14 Experimental and calculated spectra from Cu 61 cm pile.

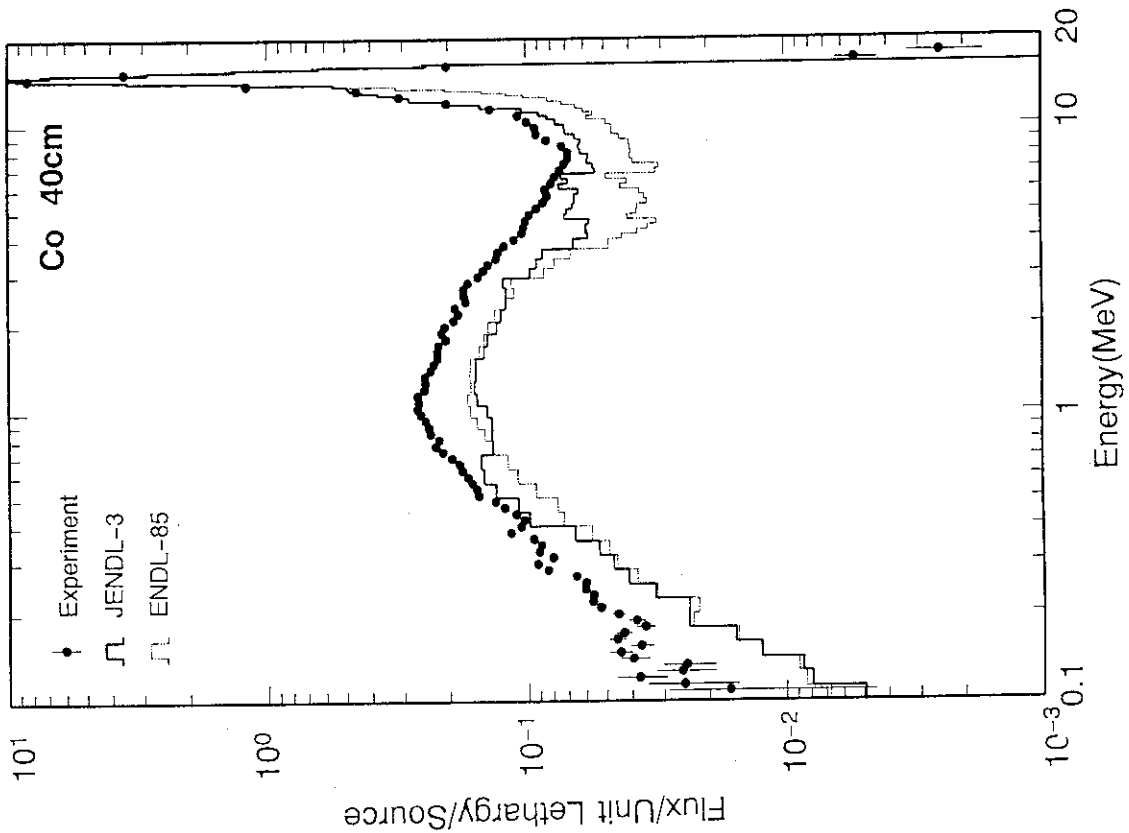


Fig. 4.13 Experimental and calculated spectra from Co 40 cm pile.

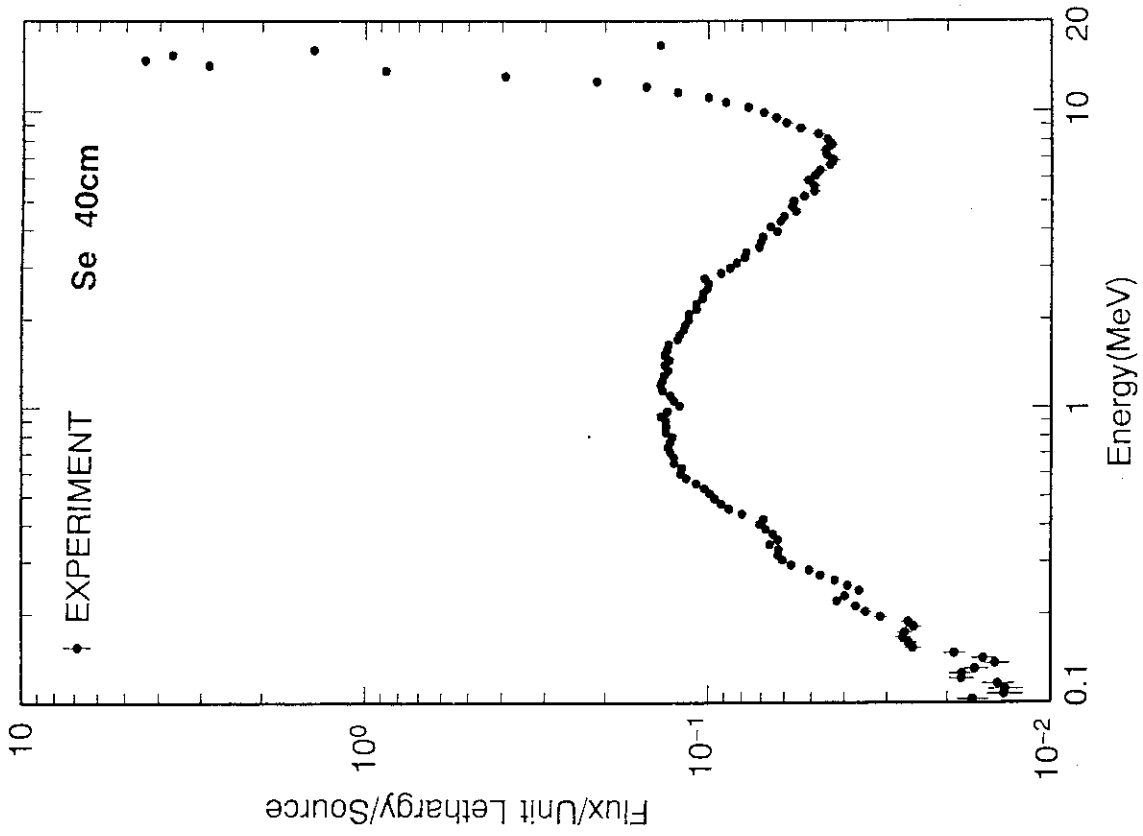


Fig. 4.16 Experimental and calculated spectra from Se 40 cm pile.

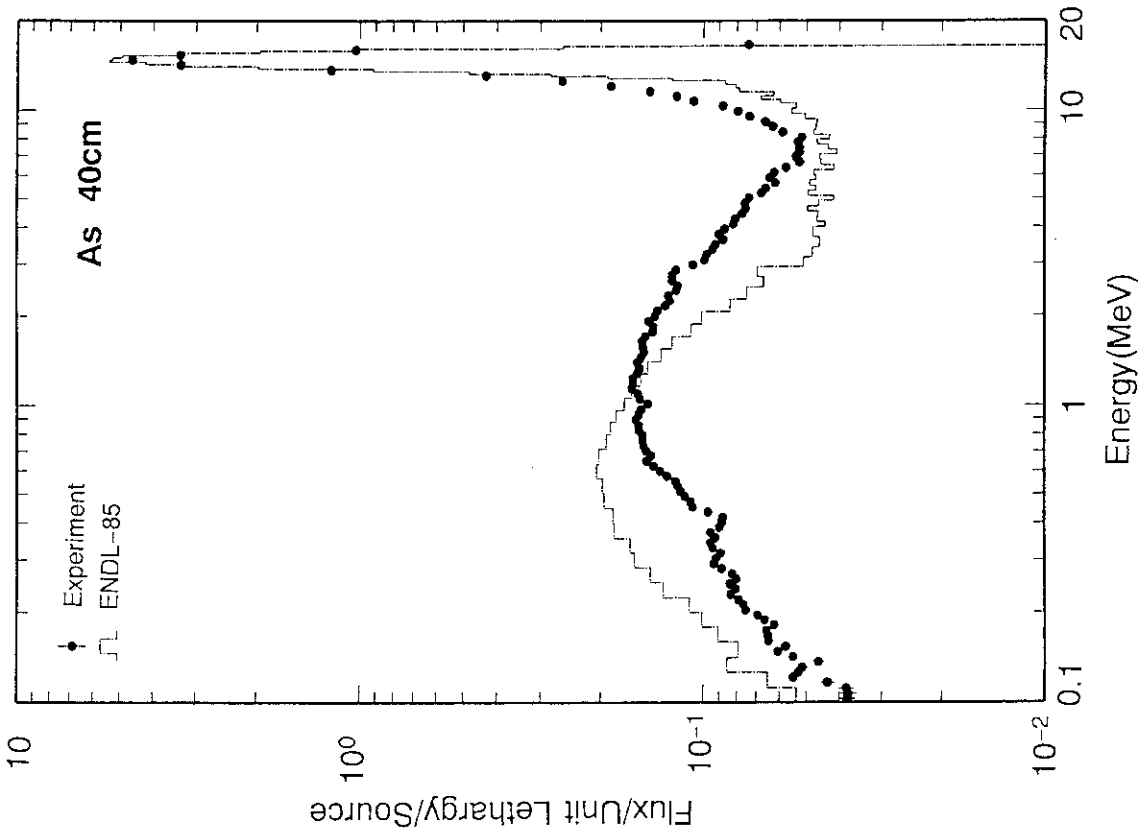


Fig. 4.15 Experimental and calculated spectra from As 40 cm pile.

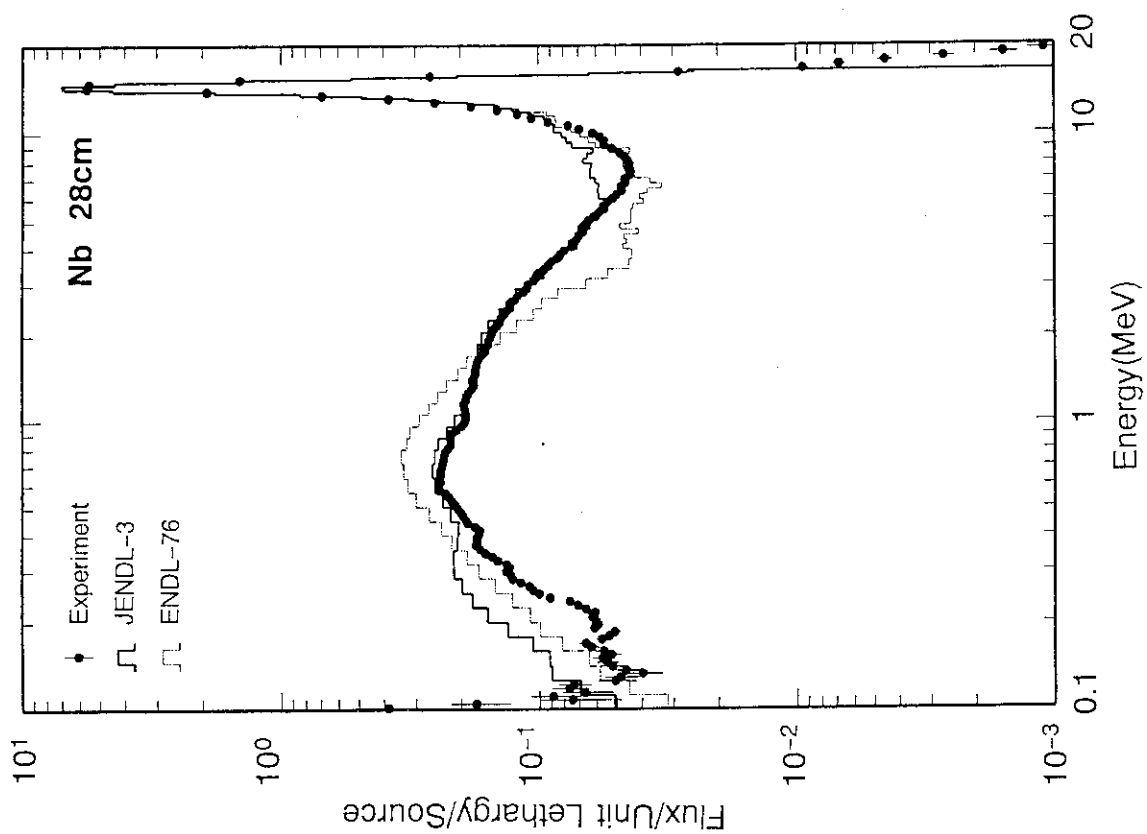


Fig. 4.18 Experimental and calculated spectra from Nb 28 cm pile.

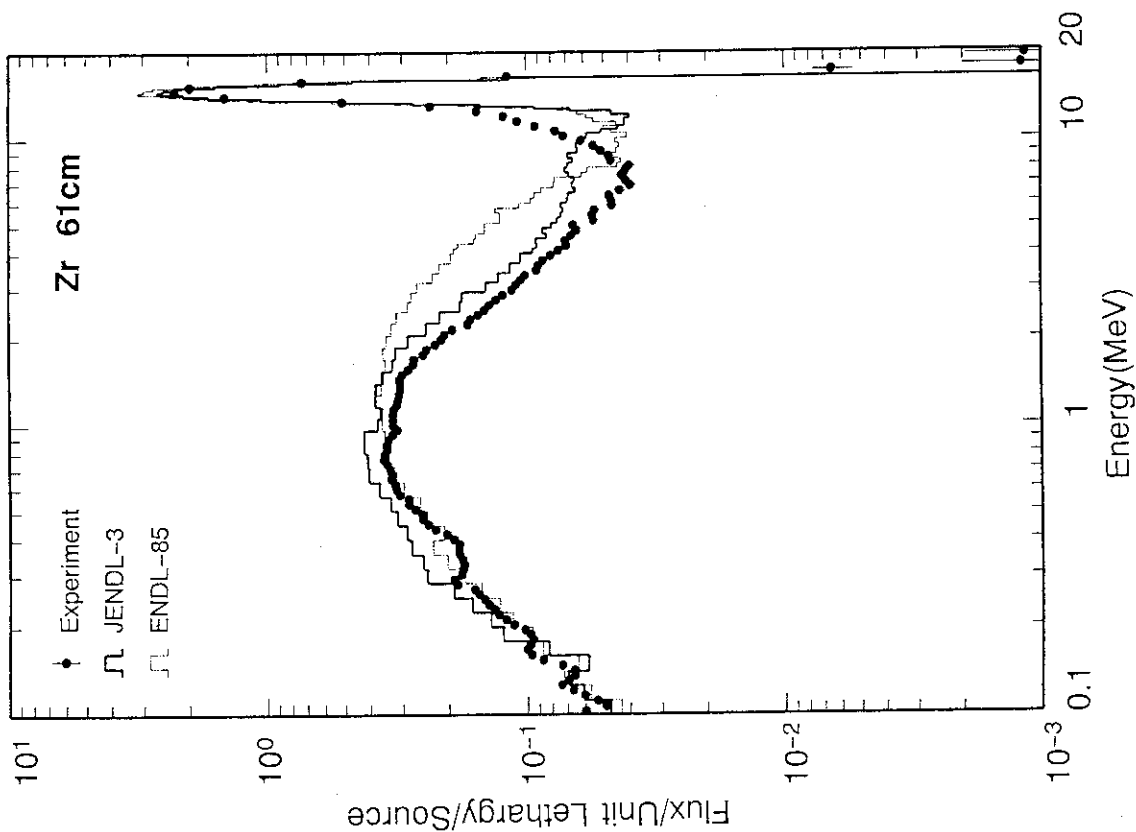


Fig. 4.17 Experimental and calculated spectra from Zr 61 cm pile.

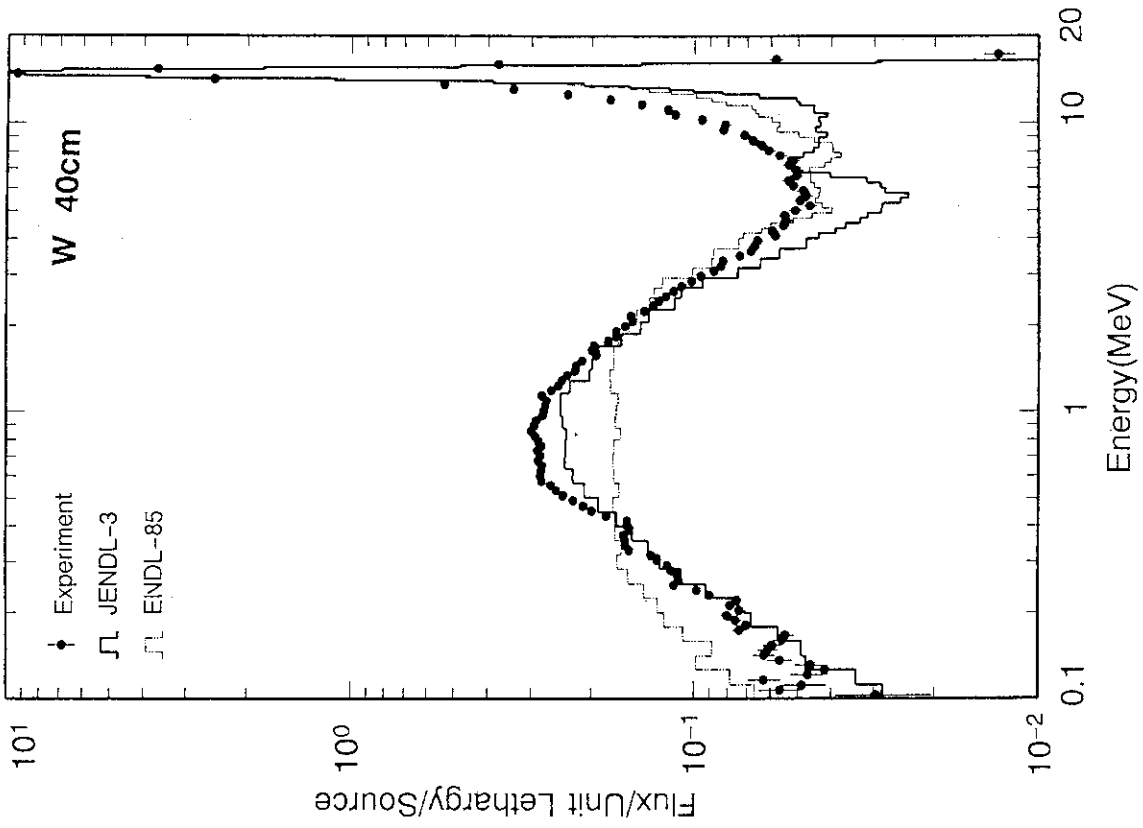


Fig. 4.20 Experimental and calculated spectra from W 40 cm pile.

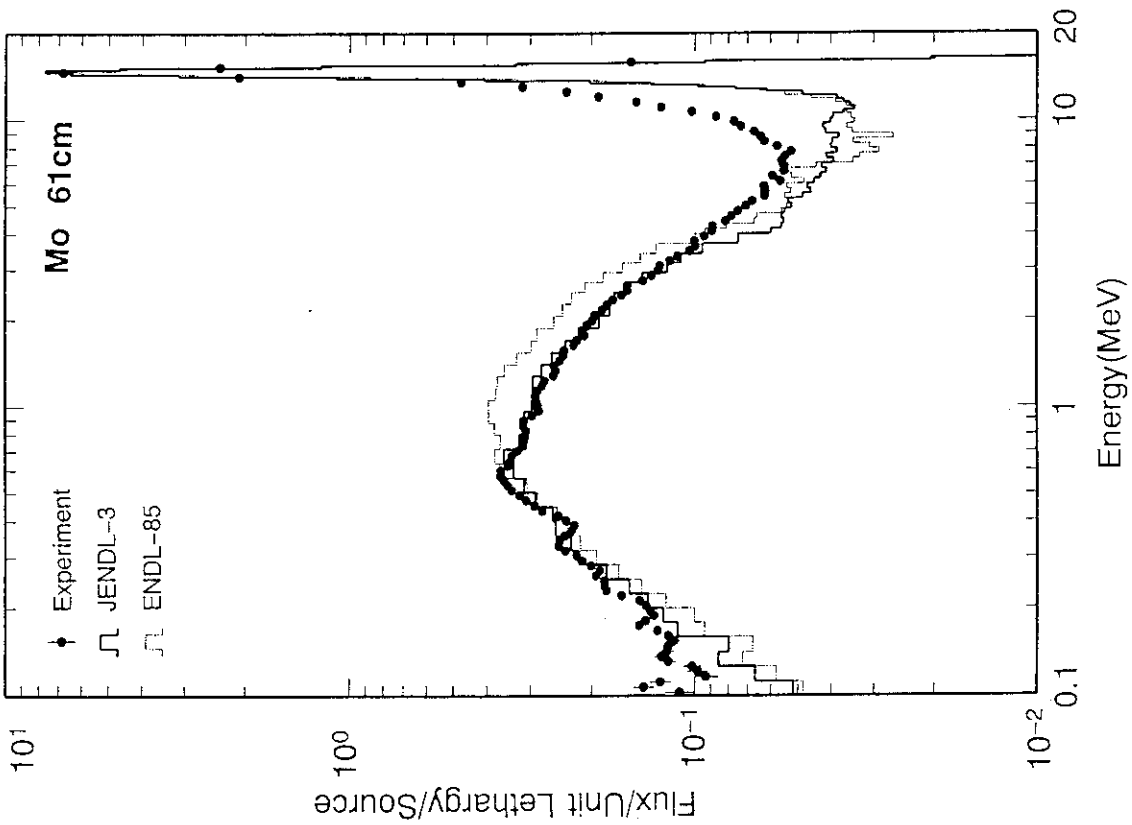


Fig. 4.19 Experimental and calculated spectra from Mo 61 cm pile.



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LEAKAGE FROM ALUMINUM(40CM DIA) SPHERE 3-D SURFACE TALLY (JENDL-3)
C ***** CELL CARDS *****
1 0 (-3 -8):(8 -1 -6)
2 2 -7.824 (-4 3 -8):(8 -2 1 -6)
3 1 -1.223 (-5 4 -8):(-5 2 8)
4 2 -7.824 (-6 5 -8):(-6 5 8 2)
5 0 -7 6

C ***** SURFACE CARDS *****
1 CX 5.55
2 CX 5.75
3 SO 10.0
4 SO 10.2
5 SO 19.75
6 SO 19.95
7 SO 100.0
8 PX 8.32

C ***** DATA CARDS *****
MODE 0
SRC1 0.0 0.0 0.0 1
IN 1 1 1 0
C *** ENERGY BIN FOR SOURCE NEUTRON ***
SI 1.000E-01 1.120E-01 1.260E-01 1.410E-01 1.590E-01
1.780E-01 2.000E-01 2.240E-01 2.520E-01 2.830E-01
3.170E-01 3.560E-01 4.000E-01 4.490E-01 5.040E-01
5.660E-01 6.350E-01 7.130E-01 8.000E-01 8.780E-01
9.640E-01 1.058E+00 1.162E+00 1.275E+00 1.400E+00
1.542E+00 1.698E+00 1.871E+00 2.061E+00 2.270E+00
2.500E+00 2.704E+00 2.924E+00 3.162E+00 3.419E+00
3.699E+00 4.000E+00 4.165E+00 4.337E+00 4.516E+00
4.703E+00 4.897E+00 5.099E+00 5.310E+00 5.529E+00
5.757E+00 5.995E+00 6.242E+00 6.500E+00 6.765E+00
7.041E+00 7.327E+00 7.627E+00 7.938E+00 8.261E+00
8.598E+00 8.949E+00 9.314E+00 9.693E+00 1.009E+01
1.050E+01 1.082E+01 1.114E+01 1.148E+01 1.183E+01
1.218E+01 1.255E+01 1.277E+01 1.300E+01 1.324E+01
1.348E+01 1.372E+01 1.397E+01 1.422E+01 1.447E+01
1.474E+01 1.500E+01 1.527E+01 1.554E+01 1.583E+01
1.611E+01 1.640E+01
C *** SOURCE DISTRIBUTION ***
SP 0.000E-04 0.000E-00 0.000E-00 1.270E-04 5.774E-05
2.536E-04 2.722E-04 2.076E-04 4.366E-04 3.873E-04
4.756E-04 6.161E-04 6.727E-04 6.648E-04 8.581E-03
1.098E-03 1.184E-03 1.412E-03 1.616E-03 1.546E-03
1.556E-03 1.631E-03 1.771E-03 1.804E-03 1.823E-03
1.891E-03 1.935E-03 2.002E-03 2.052E-03 2.004E-03
2.068E-03 2.091E-03 3.354E-03 1.492E-03 1.322E-03
1.451E-03 1.401E-03 7.112E-04 6.423E-04 6.514E-04
6.195E-04 6.428E-04 6.209E-04 5.788E-04 5.227E-04
5.250E-04 5.456E-04 5.106E-04 5.789E-04 5.391E-04
4.998E-04 4.813E-04 5.300E-04 5.756E-04 5.230E-04
5.394E-04 6.256E-04 7.047E-04 7.729E-04 7.951E-04
8.659E-04 8.106E-04 8.923E-04 1.022E-03 1.281E-03
1.687E-03 2.286E-03 1.825E-03 2.479E-03 3.794E-03
7.010E-03 1.565E-02 3.634E-02 7.492E-02 1.279E-01
1.768E-01 1.916E-01 1.500E-01 8.676E-02 3.950E-02
1.430E-02 4.269E-03
C ***** MATERIAL CARDS *****
M1 13027.33 1
M2 24000.33 -0.185 26000.33 -0.704 28000.33 -0.111
C ***** TALLY CARDS *****
F21 6
C ***** ENERGY BIN *****
E21 1.000E-03 1.290E-03 1.670E-03 2.150E-03
2.780E-03 3.590E-03 4.640E-03 5.990E-03 7.740E-03
1.000E-02 1.290E-02 1.670E-02 2.150E-02 2.780E-02
3.590E-02 4.640E-02 5.990E-02 7.740E-02
1.000E-01 1.120E-01

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Fig. 4.21 Example of the input data for the MCNP calculation.

```

1.260E-01 1.410E-01 1.590E-01 1.780E-01 2.000E-01
2.240E-01 2.520E-01 2.830E-01 3.170E-01 3.560E-01
4.000E-01 4.490E-01 5.040E-01 5.660E-01 6.350E-01
7.130E-01 8.000E-01 8.780E-01 9.640E-01 1.058E+00
1.162E+00 1.275E+00 1.400E+00 1.542E+00 1.698E+00
1.871E+00 2.061E+00 2.270E+00 2.500E+00 2.704E+00
2.924E+00 3.162E+00 3.419E+00 3.699E+00 4.000E+00
4.165E+00 4.337E+00 4.516E+00 4.703E+00 4.897E+00
5.099E+00 5.310E+00 5.529E+00 5.757E+00 5.995E+00
6.242E+00 6.500E+00 6.765E+00 7.041E+00 7.327E+00
7.627E+00 7.938E+00 8.261E+00 8.598E+00 8.949E+00
9.314E+00 9.693E+00 1.009E+01 1.050E+01 1.082E+01
1.114E+01 1.148E+01 1.183E+01 1.218E+01 1.255E+01
1.277E+01 1.300E+01 1.324E+01 1.348E+01 1.372E+01
1.397E+01 1.422E+01 1.447E+01 1.474E+01 1.500E+01
1.527E+01 1.554E+01 1.583E+01 1.611E+01 1.640E+01
C ***** CUT OFF CARD *****
CUIN 1.0E16 1.0E-3 0.01 ¥IN SHAKES E-L WEIGHT
C ***** NEUTRON HISTORY *****
NPS 1000000
PRINT

```

Fig. 4.21 Continued

## 1.5 Angular Neutron Flux Spectra Leaking from Slabs

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**Facility** FNS, Japan Atomic Energy Research Institute

**Date** 1985 - 1990

**Measured Quantity**

Angular Neutron Flux Spectra

The measured flux spectrum was reduced to the following quantity.

$$\phi(\Omega, E) = \frac{C(E)}{\varepsilon(E) \cdot \Delta\Omega \cdot A_s \cdot S_n \cdot T(E)} \quad [\text{n/sr/m}^2/\text{lethargy/source neutrons}],$$

where  $C(E)$  is detected neutron counts,  $\varepsilon(E)$  the efficiency,  $\Delta\Omega$  the solid angle subtended by the detector to the point on the center of slab surface,  $A_s$  the effective measured area defined by the detector-collimator system on the plane perpendicular to its axis,  $S_n$  total neutron number emitted from the DT target and  $T(E)$  the attenuation correction due to scattering by air.

**Experimental Method**

Pulsed neutron and neutron time-of-flight method

**Neutron Source Characteristics**

Source neutron spectrum is attached with angular flux data.

**Material / Geometry / Configuration**

Slab surface is set at 200 mm distance from the source. Fig. 5.1 illustrates the configuration of the D-T source, cylindrical slab, collimator and detector. Dimensions of the slabs are summarized in Table 5.1.

Relation of effective measured area  $A_s$  to flight path  $L$  is calculated with the equation

$$A_s(\text{cm}^2) = 0.2304 \times L (\text{cm}) - 84.16.$$

Flight paths as a function of slab thickness and angle are presented in Table 5.2.

Chemical compositions and atomic densities of all the slabs are summarized in Table 5.3.

### Experimental Data with Errors

Mid energy of the measured spectra for Li<sub>2</sub>O, Be, C, Fe and Pb are given in Tables 5.4, 5.20, 5.31, 5.48 and 5.68, respectively. Measured source neutron spectra for the five materials are summarized in Tables 5.5, 5.21, 5.32, 5.49 and 5.69, respectively, and shown Fig. 5.2.

Measured angular spectra leaking from the Li<sub>2</sub>O slab are shown in Tables 5.6 - 5.19 and Figs. 5.3 - 5.5. Those for the Be slab are shown in Tables 5.22 - 5.30 and Figs. 5.6 - 5.7. Those for the C slab are shown in Tables 5.33 - 5.47 and Figs. 5.8 - 5.10. Those for the Fe slab are shown in Tables 5.50 - 5.67 and Figs. 5.11 - 5.14. Those for the Pb slab are shown in Tables 5.70 - 5.83 and Figs. 5.15 - 5.17.

### Error assessment

#### i) Systematic Error

##### 1) Efficiency

En > 200 keV	< 2%
80 < En < 200 keV	5-10%
50 < En < 80 keV	10-20%

##### 2) Solid Angle << 1%

##### 3) Effective measured area < 2%

#### ii) Random Error

included in data list for counting statistics

### Example of Experimental Analysis

#### *Example for MCNP Calculation*

A point Monte Carlo method is adopted for a nuclear data test. Example of our calculation using the MCNP code is described here.

The point detector estimator is used and five detector locations are taken into account corresponding to the measured angles. The example of calculation model is shown in Fig. 5.18. In this model, The collimator is simulated by cylindrical hole with the radius of effective measured area  $A_s$ . This cylindrical hole is surrounded by no-importance regions in

which neutron histories are immediately terminated. The calculated flux are reduced to the measured quantity by multiplying  $L^2/A_s$  for each detector position.

Fig. 5.19 shows the input data of the MCNP calculation for 48 mm thick Li<sub>2</sub>O assembly.

#### Example for DOT3.5 Calculation

The R-Z model, shown in Fig.5.20, is applied to analyze this experiment. The experimental assembly is modeled by a cylinder of area equivalent radius, and the angular flux at the rear boundary is obtained. The GRTUNCL code is also applied to calculate the first collision source in order to avoid the ray-effect. The mesh size of about 1 cm is suitable. The order of quadrature set of S16 gives the same angles as the measurement. Input data for the GRTUNCL and DOT calculations are shown in Figs. 5.21 and 5.22, respectively.

Since the measured angular flux is averaged over the effective measured area defined by the collimator-detector system, it is necessary to average the calculated angular flux for radial direction on the rear surface. The averaged angular flux directed to the detector along the circle at the distance  $r$  from the center can be obtained by averaging the calculated angular flux at the distance  $r$  with respect to the azimuthal angles  $\cos^{-1} \mu$ , as shown in Fig. 5.23. This procedure is written as follows:

$$\langle \Phi(\eta, r) \rangle_{\mu} = \frac{\sum_{\mu} \omega_{\mu\eta} \Phi(\mu, \eta, r)}{\sum_{\mu} \omega_{\mu\eta}}, \quad (5.1)$$

and then

$$\langle \Phi(\eta) \rangle_r = \frac{\sum_r 2\pi r \cdot \langle \Phi(\eta, r) \rangle_{\mu} \cdot \Delta r}{\sum_r 2\pi r \cdot \Delta r}, \quad (5.2)$$

where  $\Phi$  : angular flux,  
 $\mu = \cos \Phi$  : azimuthal angle,  
 $\eta = \cos \theta$  : polar angle,  
 $\omega_{\mu\eta}$  : angular weight for  $S_n$  quadrature set,  
 $r$  : radial position of calculated angular flux.

The radial averaging is usually performed up to 5 cm in radius corresponding to the approximate radius of the effective measured area. The difference of the averaged flux to the flux at the center is about 5 % for the lithium-oxide assembly.

Figures 5.24 and 5.25 show a program for the radial averaging and an example of the input data.

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Table 5.1 Dimensions of the slabs.

Material	Geometry	Size	Thickness
Beryllium	Pseudo-Cylinder	Effective Radius: 314 mm	50.8, 152.4 mm
Carbon	"	" "	50.6, 202.4, 404.8 mm
Lithium Oxide	"	" "	48, 200, 400 mm
Lead	"	" "	50.8, 203, 406 mm
Iron	Cylinder	Radius: 500 mm	50, 200, 400, 600 mm

Measuring angles: 0, 12.2, 24.9, 41.8 and 66.8 degree

Table 5.2 Flight path as a function of slab thickness and angle.

Angle	Slab thickness				
	48(50.6,50.8)	152.4	200(202.4)	400(404.8)	600
0	738 cm	728	723	703	683
12.2	---	729	724	704	684
24.9	740	731	726	708	689
41.8	744	736	732	716	700
66.8	753	748	746	736	725

Table 5.3 Chemical composition and atomic densities.

Material	Atomic densities atoms/cm <sup>3</sup>	
Graphite		
C	8.280 x 10 <sup>22</sup>	
Beryllium		
Be	1.215 x 10 <sup>23</sup>	
Lithium Oxide		
<sup>7</sup> Li	5.338 x 10 <sup>22</sup>	(5.371 x 10 <sup>22</sup> )*
<sup>6</sup> Li	4.278 x 10 <sup>21</sup>	(4.304 x 10 <sup>21</sup> )*
O	2.883 x 10 <sup>22</sup>	(2.901 x 10 <sup>22</sup> )*
Fe	1.557 x 10 <sup>21</sup>	(1.098 x 10 <sup>21</sup> )*
Ni	1.837 x 10 <sup>20</sup>	(1.295 x 10 <sup>20</sup> )*
Cr	4.223 x 10 <sup>20</sup>	(2.977 x 10 <sup>20</sup> )*
Mn	3.309 x 10 <sup>19</sup>	(2.333 x 10 <sup>19</sup> )*
Lead		
Pb	3.2874 x 10 <sup>22</sup>	
Iron		
Fe	8.3699 x 10 <sup>22</sup>	
Mn	7.1857 x 10 <sup>20</sup>	
C	7.2906 x 10 <sup>20</sup>	
Si	2.8132 x 10 <sup>19</sup>	
Cr	1.7024 x 10 <sup>19</sup>	
Al	2.7944 x 10 <sup>19</sup>	
Ni	1.1200 x 10 <sup>19</sup>	

\* for 200 and 400 mm-thick slabs

Table 5.4 Mid energy of measured spectra for lithium oxide experiment.

0.11629E-01	0.12225E-01	0.12852E-01	0.13511E-01	0.14203E-01	0.14932E-01
0.15697E-01	0.16502E-01	0.17348E-01	0.18238E-01	0.19173E-01	0.20156E-01
0.21189E-01	0.22275E-01	0.23418E-01	0.24618E-01	0.25880E-01	0.27207E-01
0.28602E-01	0.30069E-01	0.31610E-01	0.33231E-01	0.34935E-01	0.36726E-01
0.38609E-01	0.40589E-01	0.42670E-01	0.44857E-01	0.47157E-01	0.49575E-01
0.52117E-01	0.54789E-01	0.57598E-01	0.60551E-01	0.63656E-01	0.66919E-01
0.70350E-01	0.73957E-01	0.77749E-01	0.81735E-01	0.85926E-01	0.90332E-01
0.94963E-01	0.99832E-01	0.10495E+00	0.11033E+00	0.11599E+00	0.12193E+00
0.12819E+00	0.13476E+00	0.14167E+00	0.14893E+00	0.15657E+00	0.16459E+00
0.17303E+00	0.18191E+00	0.19123E+00	0.20104E+00	0.21134E+00	0.22218E+00
0.23357E+00	0.24555E+00	0.25814E+00	0.27137E+00	0.28528E+00	0.29991E+00
0.31529E+00	0.33145E+00	0.34845E+00	0.36631E+00	0.38509E+00	0.40484E+00
0.42559E+00	0.44742E+00	0.47035E+00	0.49447E+00	0.51982E+00	0.54647E+00
0.57449E+00	0.60395E+00	0.63491E+00	0.66747E+00	0.70169E+00	0.73766E+00
0.77548E+00	0.81524E+00	0.85704E+00	0.90098E+00	0.94718E+00	0.99574E+00
0.10468E+01	0.11005E+01	0.11569E+01	0.12162E+01	0.12786E+01	0.13441E+01
0.14130E+01	0.14855E+01	0.15616E+01	0.16417E+01	0.17259E+01	0.18144E+01
0.19074E+01	0.20052E+01	0.21080E+01	0.22161E+01	0.23297E+01	0.24491E+01
0.25747E+01	0.27067E+01	0.28455E+01	0.29914E+01	0.31447E+01	0.33060E+01
0.34755E+01	0.36537E+01	0.38410E+01	0.40379E+01	0.42450E+01	0.44626E+01
0.46914E+01	0.49319E+01	0.51848E+01	0.54506E+01	0.57301E+01	0.60239E+01
0.63327E+01	0.66574E+01	0.69988E+01	0.73576E+01	0.77348E+01	0.81314E+01
0.85483E+01	0.89866E+01	0.94473E+01	0.99317E+01	0.10441E+02	0.10976E+02
0.11539E+02	0.12131E+02	0.12753E+02	0.13406E+02	0.14094E+02	0.14816E+02
0.15576E+02	0.16375E+02	0.17214E+02	0.18097E+02	0.19025E+02	0.20000E+02

Table 5.5 Source neutron spectrum for lithium oxide experiment.

<< Spectrum >>

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	-0.23326E-03	-0.40772E-03
-0.38707E-03	-0.22803E-03	-0.22690E-03	-0.43178E-03	-0.33428E-03	-0.10290E-03
-0.19368E-03	-0.15603E-03	-0.24334E-03	-0.12879E-03	-0.11297E-03	-0.84896E-04
0.14694E-04	0.13582E-06	-0.25100E-04	-0.23554E-04	0.13008E-04	0.28749E-04
0.36420E-04	0.24219E-04	0.46619E-04	0.68370E-04	0.52588E-04	0.45198E-04
0.79750E-04	0.13229E-03	0.11647E-03	0.83708E-04	0.10510E-03	0.11641E-03
0.10924E-03	0.15439E-03	0.17258E-03	0.14427E-03	0.19349E-03	0.22872E-03
0.22715E-03	0.27335E-03	0.32231E-03	0.29709E-03	0.31727E-03	0.39820E-03
0.35119E-03	0.47096E-03	0.47510E-03	0.46600E-03	0.48809E-03	0.52999E-03
0.55491E-03	0.55844E-03	0.65924E-03	0.67612E-03	0.72404E-03	0.84729E-03
0.84034E-03	0.90638E-03	0.99356E-03	0.10156E-02	0.10042E-02	0.10911E-02
0.12193E-02	0.11338E-02	0.12103E-02	0.12633E-02	0.13734E-02	0.13767E-02
0.14881E-02	0.15126E-02	0.14865E-02	0.14711E-02	0.15725E-02	0.15354E-02
0.15752E-02	0.15751E-02	0.15728E-02	0.16819E-02	0.14839E-02	0.16390E-02
0.15652E-02	0.16129E-02	0.15268E-02	0.14327E-02	0.14975E-02	0.15326E-02
0.14350E-02	0.16907E-02	0.19937E-02	0.22590E-02	0.28919E-02	0.24352E-02
0.13675E-02	0.12826E-02	0.11295E-02	0.11129E-02	0.11243E-02	0.94764E-03
0.96315E-03	0.10080E-02	0.94194E-03	0.85143E-03	0.85572E-03	0.73651E-03
0.67772E-03	0.64803E-03	0.66015E-03	0.55770E-03	0.49315E-03	0.50626E-03
0.55392E-03	0.58301E-03	0.71392E-03	0.86232E-03	0.10749E-02	0.13009E-02
0.14618E-02	0.26726E-02	0.38429E-02	0.49230E-02	0.42123E-01	0.72069E+00

<< Error >>

0.75202E+00	0.10665E+00	0.68642E-02	0.18478E-02	0.10033E-02	0.61280E-03
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.65202E+01	0.10844E+01	0.60055E+00
0.53903E+00	0.82295E+00	0.76646E+00	0.35929E+00	0.44942E+00	0.12900E+01
0.59629E+00	0.66016E+00	0.38481E+00	0.59723E+00	0.65474E+00	0.76332E+00
0.39013E+01	0.37272E+03	0.20169E+01	0.20545E+01	0.33264E+01	0.13957E+01
0.10988E+01	0.15605E+01	0.75778E+00	0.48421E+00	0.63129E+00	0.72026E+00
0.38153E+00	0.22786E+00	0.24160E+00	0.33078E+00	0.25070E+00	0.23318E+00
0.24786E+00	0.17150E+00	0.14846E+00	0.18106E+00	0.13468E+00	0.11681E+00
0.11486E+00	0.97837E-01	0.81690E-01	0.94555E-01	0.85082E-01	0.70162E-01

0.82034E-01	0.61984E-01	0.64437E-01	0.66743E-01	0.63442E-01	0.60998E-01
0.55252E-01	0.57562E-01	0.51108E-01	0.53084E-01	0.48448E-01	0.43905E-01
0.43602E-01	0.42838E-01	0.39602E-01	0.39550E-01	0.40594E-01	0.37796E-01
0.35826E-01	0.38226E-01	0.36022E-01	0.35927E-01	0.33652E-01	0.34889E-01
0.33082E-01	0.32901E-01	0.33405E-01	0.34452E-01	0.33238E-01	0.34429E-01
0.34045E-01	0.33807E-01	0.35077E-01	0.33878E-01	0.46305E-01	0.42802E-01
0.43196E-01	0.42898E-01	0.43523E-01	0.44599E-01	0.42218E-01	0.42892E-01
0.43614E-01	0.40761E-01	0.37122E-01	0.34261E-01	0.30679E-01	0.34654E-01
0.47442E-01	0.50467E-01	0.53019E-01	0.55736E-01	0.54407E-01	0.63213E-01
0.60511E-01	0.58378E-01	0.62169E-01	0.66982E-01	0.63525E-01	0.74079E-01
0.81814E-01	0.82956E-01	0.83605E-01	0.10300E+00	0.12976E+00	0.12784E+00
0.11555E+00	0.12340E+00	0.11206E+00	0.98143E-01	0.79123E-01	0.74267E-01
0.74899E-01	0.45161E-01	0.36277E-01	0.32091E-01	0.10230E-01	0.24449E-02
0.23509E-02	0.61310E-02	0.23820E-01	0.44966E-01	0.60504E-01	0.76503E-01

Table 5.6 Angular neutron spectrum for lithium oxide experiment (48.0 mm, 0.0 deg.).

<< Spectrum >>

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.16871E-06	0.89245E-06	0.17284E-06	-0.13247E-06	0.92727E-06
-0.98581E-06	-0.10609E-05	0.94340E-06	0.12646E-06	-0.60570E-06	0.19824E-06
0.94278E-06	-0.94283E-06	0.21550E-06	-0.14522E-06	0.80339E-06	0.26350E-06
0.66298E-06	0.73686E-06	0.35911E-06	0.27099E-06	0.72580E-06	0.38823E-06
0.70288E-06	0.71889E-06	0.72876E-06	0.94251E-06	0.10608E-05	0.10118E-05
0.79984E-06	0.69939E-06	0.10992E-05	0.11517E-05	0.11821E-05	0.12418E-05
0.12858E-05	0.14825E-05	0.95440E-06	0.10564E-05	0.70315E-06	0.74079E-06
0.31910E-06	0.78320E-07	0.52265E-06	0.10001E-05	0.12237E-05	0.19514E-05
0.19539E-05	0.23945E-05	0.24373E-05	0.20868E-05	0.16606E-05	0.10554E-05
0.15883E-05	0.28159E-05	0.35540E-05	0.41632E-05	0.44952E-05	0.50520E-05
0.54183E-05	0.58671E-05	0.62366E-05	0.66368E-05	0.69369E-05	0.71650E-05
0.71248E-05	0.70096E-05	0.64558E-05	0.53690E-05	0.42453E-05	0.55364E-05
0.70681E-05	0.75367E-05	0.76843E-05	0.69570E-05	0.71649E-05	0.87326E-05
0.87740E-05	0.85803E-05	0.91693E-05	0.96623E-05	0.99416E-05	0.10002E-04
0.93291E-05	0.93617E-05	0.98579E-05	0.11221E-04	0.96949E-05	0.92330E-05
0.99932E-05	0.12249E-04	0.14216E-04	0.14260E-04	0.10404E-04	0.67335E-05
0.60027E-05	0.61525E-05	0.58500E-05	0.57261E-05	0.54169E-05	0.55736E-05
0.56207E-05	0.55450E-05	0.58495E-05	0.52358E-05	0.50171E-05	0.50187E-05
0.55370E-05	0.53927E-05	0.52659E-05	0.50456E-05	0.58458E-05	0.69508E-05
0.78168E-05	0.75560E-05	0.86585E-05	0.10157E-04	0.95467E-05	0.11438E-04
0.15810E-04	0.22840E-04	0.40986E-04	0.48771E-03	0.45210E-02	0.47022E-02
0.42202E-03	0.18905E-04	0.13629E-05	0.11151E-06	-0.10941E-07	-0.26612E-07

<< Error >>

0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.33401E+01	0.21510E+01	0.95632E+01	0.10970E+02	0.14451E+01
0.12571E+01	0.10158E+01	0.10466E+01	0.72443E+01	0.14416E+01	0.39115E+01
0.69872E+00	0.65627E+00	0.22357E+01	0.30823E+01	0.49932E+00	0.14156E+01
0.49257E+00	0.40671E+00	0.74984E+00	0.98744E+00	0.33742E+00	0.61924E+00
0.32897E+00	0.28522E+00	0.27499E+00	0.19563E+00	0.17337E+00	0.17526E+00
0.20603E+00	0.22731E+00	0.14572E+00	0.13609E+00	0.13272E+00	0.12509E+00
0.11766E+00	0.10023E+00	0.15457E+00	0.13045E+00	0.19686E+00	0.27177E+00
0.35530E+00	0.15465E+01	0.24019E+00	0.13190E+00	0.11774E+00	0.79179E-01
0.74445E-01	0.65988E-01	0.67287E-01	0.78345E-01	0.89185E-01	0.13316E+00
0.95377E-01	0.61463E-01	0.52264E-01	0.46924E-01	0.43842E-01	0.40368E-01
0.38283E-01	0.36236E-01	0.36046E-01	0.33854E-01	0.33780E-01	0.33022E-01
0.33713E-01	0.34487E-01	0.36912E-01	0.41444E-01	0.49512E-01	0.41711E-01
0.35031E-01	0.35412E-01	0.34793E-01	0.37138E-01	0.36111E-01	0.31818E-01
0.33458E-01	0.35021E-01	0.32650E-01	0.32109E-01	0.40708E-01	0.39921E-01
0.40326E-01	0.38789E-01	0.37437E-01	0.34968E-01	0.38066E-01	0.38264E-01
0.36777E-01	0.33406E-01	0.30719E-01	0.30655E-01	0.36645E-01	0.49398E-01
0.54551E-01	0.53241E-01	0.56596E-01	0.55834E-01	0.58740E-01	0.59029E-01
0.58172E-01	0.57030E-01	0.55870E-01	0.59926E-01	0.65369E-01	0.65610E-01
0.60181E-01	0.62341E-01	0.69119E-01	0.75025E-01	0.71137E-01	0.64298E-01
0.62554E-01	0.66903E-01	0.62255E-01	0.60767E-01	0.61613E-01	0.52641E-01
0.42789E-01	0.33950E-01	0.24253E-01	0.67758E-02	0.21784E-02	0.21169E-02
0.69436E-02	0.32411E-01	0.12052E+00	0.66341E+00	0.49028E+01	0.14204E+01

Table 5.7 Angular neutron spectrum for lithium oxide experiment (48.0 mm, 24.9 deg.).

&lt;&lt; Spectrum &gt;&gt;

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	-0.22394E-05	-0.23080E-05	-0.45018E-05	-0.20581E-05
-0.10009E-05	-0.38274E-06	0.16651E-05	-0.81930E-06	-0.22231E-06	-0.80508E-06
0.92381E-06	-0.58690E-06	-0.23391E-06	0.25210E-06	-0.23334E-06	-0.31288E-06
0.83752E-06	0.58689E-06	0.22648E-06	-0.19108E-06	-0.73813E-07	0.47665E-06
-0.12736E-06	-0.25829E-07	-0.30926E-07	0.26483E-07	0.28026E-06	0.30988E-06
-0.18099E-07	0.44164E-06	0.43372E-06	0.41042E-06	0.48009E-06	0.38874E-06
0.10371E-06	0.25059E-06	0.49098E-06	0.27811E-06	0.44656E-06	0.19573E-06
0.25131E-06	0.10985E-06	0.23959E-06	0.18238E-06	0.20907E-06	0.43776E-06
0.30487E-06	0.35674E-06	0.55977E-06	0.54350E-06	0.37223E-06	0.14220E-06
0.34312E-06	0.62692E-06	0.47043E-06	0.67385E-06	0.71263E-06	0.72216E-06
0.85693E-06	0.10005E-05	0.92952E-06	0.89867E-06	0.98288E-06	0.74642E-06
0.11918E-05	0.98163E-06	0.99786E-06	0.10941E-05	0.10935E-05	0.85182E-06
0.11610E-05	0.12008E-05	0.13235E-05	0.14773E-05	0.12055E-05	0.10024E-05
0.13200E-05	0.15159E-05	0.14456E-05	0.14024E-05	0.13391E-05	0.12796E-05
0.11189E-05	0.10888E-05	0.13930E-05	0.14260E-05	0.15799E-05	0.15561E-05
0.17938E-05	0.20522E-05	0.18147E-05	0.21011E-05	0.16918E-05	0.13778E-05
0.19638E-05	0.15548E-05	0.13792E-05	0.13561E-05	0.15839E-05	0.17168E-05
0.17307E-05	0.14442E-05	0.16713E-05	0.19784E-05	0.18538E-05	0.17028E-05
0.17093E-05	0.20374E-05	0.21598E-05	0.29239E-05	0.33255E-05	0.36503E-05
0.37294E-05	0.34639E-05	0.49277E-05	0.43656E-05	0.30744E-05	0.14851E-05
0.28364E-05	0.36504E-05	0.87709E-05	0.35854E-04	0.12142E-03	0.15170E-03
0.36727E-04	0.16941E-05	0.19302E-06	0.21299E-06	0.12939E-06	0.69465E-07

&lt;&lt; Error &gt;&gt;

0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.76453E+00	0.73120E+00	0.33580E+00	0.64474E+00
0.11359E+01	0.28628E+01	0.55578E+00	0.11233E+01	0.35799E+01	0.94185E+00
0.65982E+00	0.10003E+01	0.20976E+01	0.17407E+01	0.16604E+01	0.12079E+01
0.35129E+00	0.48308E+00	0.11866E+01	0.12979E+01	0.31251E+01	0.44052E+00
0.16403E+01	0.78333E+01	0.58837E+01	0.66230E+01	0.56710E+00	0.51973E+00
0.87081E+01	0.34875E+00	0.33100E+00	0.33164E+00	0.27279E+00	0.33463E+00
0.12553E+01	0.50149E+00	0.24556E+00	0.45698E+00	0.28318E+00	0.54943E+00
0.47757E+00	0.10551E+01	0.44225E+00	0.57609E+00	0.51923E+00	0.25054E+00
0.38980E+00	0.32816E+00	0.20133E+00	0.21877E+00	0.31240E+00	0.82623E+00
0.37269E+00	0.20772E+00	0.29254E+00	0.18998E+00	0.17909E+00	0.19628E+00
0.15940E+00	0.12918E+00	0.15335E+00	0.14831E+00	0.14436E+00	0.19672E+00
0.12191E+00	0.15551E+00	0.15633E+00	0.14279E+00	0.14039E+00	0.18422E+00
0.13525E+00	0.14916E+00	0.13021E+00	0.12615E+00	0.15218E+00	0.19698E+00
0.14333E+00	0.13413E+00	0.13492E+00	0.15019E+00	0.15010E+00	0.16644E+00
0.17216E+00	0.16769E+00	0.13834E+00	0.13726E+00	0.13422E+00	0.12869E+00
0.10985E+00	0.98180E-01	0.11120E+00	0.97966E-01	0.12946E+00	0.14219E+00
0.11251E+00	0.12272E+00	0.15831E+00	0.16491E+00	0.13729E+00	0.12487E+00
0.12517E+00	0.14065E+00	0.12706E+00	0.11656E+00	0.13196E+00	0.14704E+00
0.14228E+00	0.12715E+00	0.13460E+00	0.11169E+00	0.10906E+00	0.10309E+00
0.97417E-01	0.12125E+00	0.90565E-01	0.10403E+00	0.12935E+00	0.24809E+00
0.14194E+00	0.10608E+00	0.59982E-01	0.27377E-01	0.14441E-01	0.12810E-01
0.25627E-01	0.12182E+00	0.56489E+00	0.45658E+00	0.47162E+00	0.86804E+00

Table 5.8 Angular neutron spectrum for lithium oxide experiment (48.0 mm, 41.8 deg.).

&lt;&lt; Spectrum &gt;&gt;

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	-0.31235E-06	-0.10033E-05	-0.32394E-06	0.48098E-06
0.92457E-06	-0.25718E-06	0.26156E-06	0.24189E-06	0.31652E-06	0.25639E-06
0.51974E-07	0.38364E-06	-0.43963E-06	0.14954E-07	0.17685E-06	0.31304E-06
0.81432E-07	0.28015E-07	0.21559E-06	0.72182E-07	0.27495E-06	0.50295E-06
0.42064E-06	0.96446E-07	0.26160E-06	0.20319E-06	0.10297E-06	0.29939E-06
0.14810E-06	0.41824E-06	0.32588E-06	0.39898E-06	0.45869E-06	0.30897E-06

0.34495E-06	0.45208E-06	0.37144E-06	0.56765E-06	0.32126E-06	0.36803E-06
0.20033E-06	0.83981E-07	0.11059E-06	0.19839E-06	0.33879E-06	0.45528E-06
0.48301E-06	0.48004E-06	0.45583E-06	0.53736E-06	0.57284E-06	0.56013E-06
0.58729E-06	0.61865E-06	0.83192E-06	0.75617E-06	0.74688E-06	0.79157E-06
0.73785E-06	0.78434E-06	0.10518E-05	0.10712E-05	0.10853E-05	0.13494E-05
0.12203E-05	0.11857E-05	0.11296E-05	0.11517E-05	0.10596E-05	0.90853E-06
0.95450E-06	0.11813E-05	0.13884E-05	0.14111E-05	0.12739E-05	0.13044E-05
0.14970E-05	0.12632E-05	0.14010E-05	0.14371E-05	0.15233E-05	0.15265E-05
0.17435E-05	0.16718E-05	0.18098E-05	0.15386E-05	0.20975E-05	0.19680E-05
0.20232E-05	0.18362E-05	0.18403E-05	0.19918E-05	0.21364E-05	0.19409E-05
0.16500E-05	0.16074E-05	0.13655E-05	0.15350E-05	0.17138E-05	0.15635E-05
0.17460E-05	0.16689E-05	0.18743E-05	0.18110E-05	0.20673E-05	0.17599E-05
0.20701E-05	0.20967E-05	0.27074E-05	0.32737E-05	0.36504E-05	0.43508E-05
0.46206E-05	0.46662E-05	0.43106E-05	0.30278E-05	0.20923E-05	0.17166E-05
0.23835E-05	0.48964E-05	0.12386E-04	0.32172E-04	0.55026E-04	0.39588E-04
0.69665E-05	0.13829E-06	0.37311E-07	0.45987E-07	0.37674E-07	0.70061E-07

<< Error >>

0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.32749E+01	0.10381E+01	0.27670E+01	0.17293E+01
0.77181E+00	0.25255E+01	0.23690E+01	0.22903E+01	0.15850E+01	0.17661E+01
0.75545E+01	0.90308E+00	0.70333E+00	0.18124E+02	0.13849E+01	0.68062E+00
0.24063E+01	0.66828E+01	0.79861E+00	0.21157E+01	0.54855E+00	0.26235E+00
0.29146E+00	0.12722E+01	0.44004E+00	0.52762E+00	0.10281E+01	0.33891E+00
0.64151E+00	0.22092E+00	0.28159E+00	0.22312E+00	0.18456E+00	0.27625E+00
0.24510E+00	0.18067E+00	0.21541E+00	0.13590E+00	0.23146E+00	0.20026E+00
0.35176E+00	0.85380E+00	0.64548E+00	0.36582E+00	0.21760E+00	0.16038E+00
0.15355E+00	0.15429E+00	0.15603E+00	0.13883E+00	0.13610E+00	0.14212E+00
0.13491E+00	0.12802E+00	0.97945E-01	0.11002E+00	0.11251E+00	0.10359E+00
0.11246E+00	0.11179E+00	0.85300E-01	0.83912E-01	0.80888E-01	0.64546E-01
0.78439E-01	0.83098E-01	0.85452E-01	0.83570E-01	0.94052E-01	0.11236E+00
0.11416E+00	0.92600E-01	0.79562E-01	0.83316E-01	0.91488E-01	0.92411E-01
0.83642E-01	0.10364E+00	0.95321E-01	0.93993E-01	0.93739E-01	0.92429E-01
0.77405E-01	0.84491E-01	0.77521E-01	0.91932E-01	0.69341E-01	0.70618E-01
0.68681E-01	0.75484E-01	0.75634E-01	0.70822E-01	0.61166E-01	0.63589E-01
0.78489E-01	0.76380E-01	0.79969E-01	0.76544E-01	0.69898E-01	0.78565E-01
0.71334E-01	0.75678E-01	0.76477E-01	0.85686E-01	0.72272E-01	0.85588E-01
0.79644E-01	0.83068E-01	0.67563E-01	0.60565E-01	0.59204E-01	0.54497E-01
0.52106E-01	0.55551E-01	0.59039E-01	0.77814E-01	0.10704E+00	0.12512E+00
0.96025E-01	0.56958E-01	0.30593E-01	0.17890E-01	0.13247E-01	0.15450E-01
0.36269E-01	0.40672E+00	0.88021E+00	0.71117E+00	0.94701E+00	0.30965E+00

Table 5.9 Angular neutron spectrum for lithium oxide experiment (48.0 mm, 66.8 deg.).

<< Spectrum >>

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.15416E-06	-0.14906E-05	-0.30645E-06	-0.43388E-06
-0.21466E-05	0.40584E-06	-0.34610E-07	0.38166E-06	-0.11193E-05	-0.25904E-06
0.51532E-06	-0.45219E-06	-0.68968E-06	0.36180E-06	0.26219E-06	0.21898E-06
0.10110E-06	-0.13742E-06	0.36194E-06	0.41779E-06	0.14453E-06	0.31886E-06
0.44575E-06	0.36476E-07	0.52862E-06	0.27357E-06	0.16375E-06	0.19371E-06
0.45535E-06	0.44636E-06	0.53213E-06	0.54645E-06	0.36925E-06	0.44116E-06
0.54914E-06	0.42502E-06	0.62233E-06	0.42743E-06	0.38845E-06	0.16559E-06
0.24819E-06	0.17026E-06	0.33198E-06	0.30931E-06	0.25975E-06	0.40688E-06
0.34787E-06	0.44845E-06	0.51890E-06	0.48565E-06	0.45297E-06	0.51866E-06
0.53630E-06	0.62403E-06	0.56484E-06	0.76459E-06	0.91494E-06	0.91961E-06
0.11222E-05	0.11005E-05	0.13081E-05	0.12109E-05	0.12731E-05	0.11772E-05
0.13540E-05	0.13540E-05	0.11433E-05	0.10676E-05	0.80661E-06	0.10176E-05
0.11309E-05	0.12228E-05	0.14273E-05	0.15238E-05	0.14329E-05	0.15960E-05
0.14724E-05	0.18446E-05	0.18094E-05	0.16603E-05	0.19640E-05	0.16786E-05
0.20410E-05	0.20380E-05	0.16000E-05	0.20131E-05	0.20031E-05	0.21724E-05
0.21344E-05	0.18779E-05	0.20510E-05	0.20857E-05	0.17613E-05	0.16745E-05
0.17773E-05	0.13047E-05	0.15441E-05	0.15431E-05	0.16178E-05	0.15399E-05
0.16725E-05	0.19064E-05	0.20642E-05	0.18241E-05	0.19666E-05	0.19182E-05
0.19629E-05	0.26096E-05	0.27304E-05	0.36924E-05	0.37124E-05	0.30586E-05

0.29059E-05 0.29548E-05 0.28030E-05 0.32716E-05 0.38922E-05 0.39107E-05  
 0.41728E-05 0.56403E-05 0.95983E-05 0.13429E-04 0.12855E-04 0.63177E-05  
 0.14153E-05 0.15295E-06 0.97804E-07 0.32160E-07 0.95612E-07 -0.62781E-07

<< Error >>

0.10000E+01 0.10000E+01 0.10000E+01 0.10000E+01 0.10000E+01 0.10000E+01  
 0.10000E+01 0.10000E+01 0.10000E+01 0.10000E+01 0.10000E+01 0.10000E+01  
 0.10000E+01 0.10000E+01 0.10000E+01 0.10000E+01 0.10000E+01 0.10000E+01  
 0.10000E+01 0.10000E+01 0.40553E+01 0.97534E+00 0.39941E+01 0.25117E+01  
 0.46138E+00 0.21664E+01 0.23076E+02 0.19578E+01 0.63843E+00 0.24623E+01  
 0.10331E+01 0.11004E+01 0.62635E+00 0.97777E+00 0.12318E+01 0.13536E+01  
 0.26818E+01 0.18088E+01 0.61509E+00 0.47973E+00 0.12973E+01 0.55872E+00  
 0.38499E+00 0.46990E+01 0.28285E+00 0.52553E+00 0.85134E+00 0.72674E+00  
 0.27524E+00 0.27676E+00 0.22479E+00 0.20232E+00 0.30809E+00 0.25018E+00  
 0.19080E+00 0.24142E+00 0.15265E+00 0.23701E+00 0.23697E+00 0.60423E+00  
 0.36327E+00 0.54843E+00 0.26042E+00 0.29105E+00 0.35224E+00 0.22991E+00  
 0.28439E+00 0.20911E+00 0.18153E+00 0.19510E+00 0.20617E+00 0.18192E+00  
 0.17816E+00 0.16145E+00 0.18532E+00 0.13256E+00 0.11064E+00 0.10981E+00  
 0.93041E-01 0.97410E-01 0.79742E-01 0.92353E-01 0.88185E-01 0.95749E-01  
 0.88988E-01 0.85454E-01 0.10397E+00 0.11073E+00 0.14267E+00 0.12079E+00  
 0.10904E+00 0.10768E+00 0.92098E-01 0.90964E-01 0.98368E-01 0.89306E-01  
 0.10641E+00 0.84252E-01 0.86535E-01 0.98403E-01 0.85252E-01 0.93629E-01  
 0.78886E-01 0.78168E-01 0.97479E-01 0.83782E-01 0.83432E-01 0.75086E-01  
 0.74034E-01 0.82619E-01 0.76924E-01 0.74982E-01 0.83205E-01 0.89790E-01  
 0.83210E-01 0.11719E+00 0.10970E+00 0.11104E+00 0.10338E+00 0.10742E+00  
 0.92087E-01 0.84225E-01 0.81454E-01 0.91013E-01 0.85711E-01 0.92405E-01  
 0.10199E+00 0.77999E-01 0.86518E-01 0.68479E-01 0.70028E-01 0.86861E-01  
 0.84938E-01 0.88202E-01 0.10172E+00 0.92081E-01 0.79941E-01 0.85465E-01  
 0.77573E-01 0.62422E-01 0.41268E-01 0.32228E-01 0.32131E-01 0.44857E-01  
 0.11395E+00 0.49198E+00 0.46139E+00 0.15894E+01 0.34046E+00 0.83376E+00

Table 5.10 Angular neutron spectrum for lithium oxide experiment (200.0 mm, 0.0 deg.).

<< Spectrum >>

0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00  
 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00  
 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00  
 0.00000E+00 0.42097E-06 0.19298E-05 0.14876E-05 0.10633E-05 0.13891E-05  
 0.13734E-05 0.88440E-06 0.90271E-06 0.15456E-05 0.35049E-06 0.10590E-05  
 0.13896E-05 0.14515E-05 0.76661E-06 0.93452E-06 0.67649E-06 0.71143E-06  
 0.90062E-06 0.11092E-05 0.97159E-06 0.67838E-06 0.70180E-06 0.70868E-06  
 0.11380E-05 0.95312E-06 0.11295E-05 0.94571E-06 0.11497E-05 0.10383E-05  
 0.10141E-05 0.11961E-05 0.11177E-05 0.13611E-05 0.13560E-05 0.11582E-05  
 0.11517E-05 0.10984E-05 0.91232E-06 0.68404E-06 0.71173E-06 0.42958E-06  
 0.20416E-06 0.20167E-06 0.31618E-06 0.47190E-06 0.63113E-06 0.82073E-06  
 0.96319E-06 0.92452E-06 0.85516E-06 0.85843E-06 0.84706E-06 0.67000E-06  
 0.84675E-06 0.13297E-05 0.14763E-05 0.18727E-05 0.20572E-05 0.23077E-05  
 0.24971E-05 0.24683E-05 0.23935E-05 0.24818E-05 0.26705E-05 0.27103E-05  
 0.24692E-05 0.22027E-05 0.16591E-05 0.12919E-05 0.13575E-05 0.14024E-05  
 0.17133E-05 0.20068E-05 0.22344E-05 0.21292E-05 0.18317E-05 0.21508E-05  
 0.27549E-05 0.25274E-05 0.26731E-05 0.25001E-05 0.27089E-05 0.28588E-05  
 0.25410E-05 0.29817E-05 0.32126E-05 0.38541E-05 0.37352E-05 0.27809E-05  
 0.27739E-05 0.28868E-05 0.29102E-05 0.27941E-05 0.24951E-05 0.16684E-05  
 0.14919E-05 0.13958E-05 0.16381E-05 0.15211E-05 0.14338E-05 0.15960E-05  
 0.18781E-05 0.19402E-05 0.19986E-05 0.22969E-05 0.18059E-05 0.21265E-05  
 0.22209E-05 0.25603E-05 0.31073E-05 0.27546E-05 0.32417E-05 0.31007E-05  
 0.35729E-05 0.35593E-05 0.35037E-05 0.47847E-05 0.51627E-05 0.33269E-05  
 0.37738E-05 0.57499E-05 0.95823E-05 0.16972E-04 0.65598E-04 0.61997E-03  
 0.69329E-03 0.84962E-04 0.18760E-05 -0.13978E-06 -0.17567E-06 -0.74050E-07

<< Error >>

0.10000E+01 0.10000E+01 0.10000E+01 0.10000E+01 0.10000E+01 0.10000E+01  
 0.10000E+01 0.10000E+01 0.10000E+01 0.10000E+01 0.10000E+01 0.10000E+01  
 0.10000E+01 0.10000E+01 0.10000E+01 0.10000E+01 0.10000E+01 0.10000E+01  
 0.10000E+01 0.70405E+00 0.44282E+00 0.49317E+00 0.65142E+00 0.43830E+00  
 0.38620E+00 0.57087E+00 0.50747E+00 0.26174E+00 0.11338E+01 0.32282E+00  
 0.21798E+00 0.19417E+00 0.32066E+00 0.23335E+00 0.29615E+00 0.25212E+00  
 0.17418E+00 0.13364E+00 0.14896E+00 0.20300E+00 0.18222E+00 0.17112E+00



0.10085E+00	0.12178E+00	0.96402E-01	0.11153E+00	0.87946E-01	0.95034E-01
0.10040E+00	0.80772E-01	0.84329E-01	0.70578E-01	0.67989E-01	0.75709E-01
0.75655E-01	0.74382E-01	0.86492E-01	0.10287E+00	0.98446E-01	0.15116E+00
0.29323E+00	0.31165E+00	0.18273E+00	0.13187E+00	0.10650E+00	0.90015E-01
0.77338E-01	0.80583E-01	0.88828E-01	0.88889E-01	0.88045E-01	0.10449E+00
0.91051E-01	0.64797E-01	0.58395E-01	0.51823E-01	0.48202E-01	0.45278E-01
0.42556E-01	0.43889E-01	0.46013E-01	0.45211E-01	0.42565E-01	0.43094E-01
0.45394E-01	0.49256E-01	0.62779E-01	0.74002E-01	0.71911E-01	0.72086E-01
0.63598E-01	0.58442E-01	0.53081E-01	0.52974E-01	0.63087E-01	0.57754E-01
0.46169E-01	0.50548E-01	0.49278E-01	0.53577E-01	0.61774E-01	0.59307E-01
0.63854E-01	0.56278E-01	0.52120E-01	0.47128E-01	0.47684E-01	0.56050E-01
0.56716E-01	0.57158E-01	0.54608E-01	0.57185E-01	0.62382E-01	0.76476E-01
0.80786E-01	0.91356E-01	0.82913E-01	0.88845E-01	0.89656E-01	0.85535E-01
0.75813E-01	0.74886E-01	0.73390E-01	0.67482E-01	0.85583E-01	0.75199E-01
0.77399E-01	0.69813E-01	0.61359E-01	0.70583E-01	0.66813E-01	0.72422E-01
0.66532E-01	0.67845E-01	0.69708E-01	0.56255E-01	0.55019E-01	0.76343E-01
0.69637E-01	0.54901E-01	0.40560E-01	0.29359E-01	0.14116E-01	0.45047E-02
0.41829E-02	0.11761E-01	0.89480E-01	0.54325E+00	0.34463E+00	0.53875E+00

Table 5.11 Angular neutron spectrum for lithium oxide experiment (200.0 mm, 12.2 deg.).

<< Spectrum >>

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	-0.27291E-07	0.70877E-06	0.71199E-06	0.55018E-06	-0.29473E-06
0.11846E-06	0.39906E-06	0.45150E-06	0.64738E-06	0.70892E-06	0.70062E-06
0.51365E-06	0.31602E-06	0.45979E-06	0.72826E-06	0.69929E-06	0.67855E-06
0.64046E-06	0.72429E-06	0.58532E-06	0.66633E-06	0.74126E-06	0.66848E-06
0.86651E-06	0.95299E-06	0.89714E-06	0.80320E-06	0.95392E-06	0.94432E-06
0.10412E-05	0.99918E-06	0.99482E-06	0.10592E-05	0.11296E-05	0.11023E-05
0.10750E-05	0.88404E-06	0.82372E-06	0.74282E-06	0.44588E-06	0.28334E-06
0.23261E-06	0.16392E-06	0.22123E-06	0.25497E-06	0.46148E-06	0.57968E-06
0.55717E-06	0.74603E-06	0.88283E-06	0.83704E-06	0.74335E-06	0.56020E-06
0.69033E-06	0.95923E-06	0.13185E-05	0.14925E-05	0.16621E-05	0.17128E-05
0.17266E-05	0.18794E-05	0.19545E-05	0.18738E-05	0.20229E-05	0.19670E-05
0.19712E-05	0.16962E-05	0.14084E-05	0.11838E-05	0.11288E-05	0.98522E-06
0.11406E-05	0.14627E-05	0.15154E-05	0.15547E-05	0.14900E-05	0.16246E-05
0.17691E-05	0.17380E-05	0.17563E-05	0.17139E-05	0.20927E-05	0.19888E-05
0.19898E-05	0.19870E-05	0.20783E-05	0.22663E-05	0.24587E-05	0.20593E-05
0.19363E-05	0.20936E-05	0.18200E-05	0.19096E-05	0.16909E-05	0.14461E-05
0.12794E-05	0.12470E-05	0.13257E-05	0.13581E-05	0.13643E-05	0.14416E-05
0.15443E-05	0.14447E-05	0.16438E-05	0.17266E-05	0.17743E-05	0.19291E-05
0.19175E-05	0.22130E-05	0.21777E-05	0.25518E-05	0.26930E-05	0.30264E-05
0.31909E-05	0.30798E-05	0.32216E-05	0.38938E-05	0.29859E-05	0.21929E-05
0.28129E-05	0.47304E-05	0.94029E-05	0.22011E-04	0.73504E-04	0.14470E-03
0.37274E-04	0.19865E-05	0.16148E-06	0.59269E-07	0.59925E-09	0.25140E-08

<< Error >>

0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.64421E+01	0.79149E+00	0.68912E+00	0.82441E+00	0.13432E+01
0.29786E+01	0.77773E+00	0.66558E+00	0.43622E+00	0.36413E+00	0.33346E+00
0.39549E+00	0.57286E+00	0.34605E+00	0.19456E+00	0.17841E+00	0.17730E+00
0.16625E+00	0.13412E+00	0.15783E+00	0.12986E+00	0.10979E+00	0.11786E+00
0.84852E-01	0.75234E-01	0.76895E-01	0.85200E-01	0.70186E-01	0.65473E-01
0.58203E-01	0.60422E-01	0.58624E-01	0.52638E-01	0.49872E-01	0.50958E-01
0.49991E-01	0.58759E-01	0.60912E-01	0.63380E-01	0.99772E-01	0.15163E+00
0.16880E+00	0.23101E+00	0.16948E+00	0.15773E+00	0.91611E-01	0.81034E-01
0.84420E-01	0.63430E-01	0.53810E-01	0.55633E-01	0.62566E-01	0.79558E-01
0.68444E-01	0.53248E-01	0.42290E-01	0.38328E-01	0.35783E-01	0.35804E-01
0.34709E-01	0.33018E-01	0.32751E-01	0.33943E-01	0.32071E-01	0.33103E-01
0.33393E-01	0.36752E-01	0.43200E-01	0.50255E-01	0.51968E-01	0.59916E-01
0.54855E-01	0.46680E-01	0.45949E-01	0.44926E-01	0.46186E-01	0.44322E-01
0.42128E-01	0.42506E-01	0.43302E-01	0.45541E-01	0.46288E-01	0.45754E-01
0.45130E-01	0.44999E-01	0.41998E-01	0.39298E-01	0.37498E-01	0.41491E-01
0.42515E-01	0.39725E-01	0.43243E-01	0.42450E-01	0.46158E-01	0.53477E-01
0.58361E-01	0.58939E-01	0.56805E-01	0.56245E-01	0.56944E-01	0.54455E-01

0.50887E-01	0.54617E-01	0.51994E-01	0.51136E-01	0.50942E-01	0.47965E-01
0.49051E-01	0.46710E-01	0.49062E-01	0.44985E-01	0.45215E-01	0.43029E-01
0.43112E-01	0.45510E-01	0.43982E-01	0.38850E-01	0.46249E-01	0.60430E-01
0.49196E-01	0.35227E-01	0.24171E-01	0.15349E-01	0.81646E-02	0.57543E-02
0.11141E-01	0.48098E-01	0.21774E+00	0.38240E+00	0.35867E+02	0.69393E+01

Table 5.12 Angular neutron spectrum for lithium oxide experiment (200.0 mm, 24.9 deg.).

## &lt;&lt; Spectrum &gt;&gt;

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	-0.29103E-07	-0.37330E-06	0.54145E-06	0.65467E-06	0.20563E-06
0.54330E-06	0.57421E-06	0.77586E-06	0.80230E-06	0.52111E-06	0.46310E-06
0.73501E-06	0.37326E-06	0.40677E-06	0.81195E-06	0.94509E-06	0.76882E-06
0.60926E-06	0.59903E-06	0.74481E-06	0.66044E-06	0.73262E-06	0.62256E-06
0.86318E-06	0.84273E-06	0.86146E-06	0.96014E-06	0.95038E-06	0.11592E-05
0.11073E-05	0.10537E-05	0.10530E-05	0.10794E-05	0.12083E-05	0.12279E-05
0.11302E-05	0.10645E-05	0.85498E-06	0.68085E-06	0.52175E-06	0.21382E-06
0.22688E-06	0.14265E-06	0.18540E-06	0.34265E-06	0.49616E-06	0.60782E-06
0.84107E-06	0.94034E-06	0.82375E-06	0.77315E-06	0.69234E-06	0.67134E-06
0.63024E-06	0.90444E-06	0.12618E-05	0.14663E-05	0.17000E-05	0.18278E-05
0.19006E-05	0.19593E-05	0.19613E-05	0.20290E-05	0.20176E-05	0.20855E-05
0.18836E-05	0.17872E-05	0.15055E-05	0.12464E-05	0.10254E-05	0.10090E-05
0.12514E-05	0.15387E-05	0.15549E-05	0.15628E-05	0.14554E-05	0.17483E-05
0.19201E-05	0.18351E-05	0.17339E-05	0.18662E-05	0.20734E-05	0.19804E-05
0.19457E-05	0.20170E-05	0.21233E-05	0.21224E-05	0.22342E-05	0.21325E-05
0.19211E-05	0.16953E-05	0.19423E-05	0.16986E-05	0.14998E-05	0.13713E-05
0.14210E-05	0.13209E-05	0.11479E-05	0.11619E-05	0.12864E-05	0.12629E-05
0.13666E-05	0.12310E-05	0.15035E-05	0.15099E-05	0.17712E-05	0.15578E-05
0.17181E-05	0.21611E-05	0.23008E-05	0.26839E-05	0.26663E-05	0.20867E-05
0.28248E-05	0.28252E-05	0.32715E-05	0.27460E-05	0.20570E-05	0.22949E-05
0.28392E-05	0.45801E-05	0.95915E-05	0.23495E-04	0.49125E-04	0.45581E-04
0.85565E-05	0.80925E-06	0.20308E-06	0.18015E-07	0.11791E-07	0.27838E-08

## &lt;&lt; Error &gt;&gt;

0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.17046E+01	0.17096E+01	0.98932E+00	0.75105E+00	0.21117E+01
0.73161E+00	0.61664E+00	0.42487E+00	0.40570E+00	0.56942E+00	0.55101E+00
0.32015E+00	0.52602E+00	0.43836E+00	0.19472E+00	0.15376E+00	0.16845E+00
0.19686E+00	0.18270E+00	0.13854E+00	0.14689E+00	0.12551E+00	0.13921E+00
0.99628E-01	0.95255E-01	0.89249E-01	0.76562E-01	0.76059E-01	0.61674E-01
0.62805E-01	0.65099E-01	0.62006E-01	0.58421E-01	0.52176E-01	0.50270E-01
0.52361E-01	0.53263E-01	0.65199E-01	0.76673E-01	0.93755E-01	0.13293E+00
0.19697E+00	0.31616E+00	0.23714E+00	0.13422E+00	0.95908E-01	0.80069E-01
0.61660E-01	0.56617E-01	0.64547E-01	0.67242E-01	0.72634E-01	0.74836E-01
0.81950E-01	0.61058E-01	0.48260E-01	0.42713E-01	0.39018E-01	0.36631E-01
0.35278E-01	0.34137E-01	0.35537E-01	0.34898E-01	0.36211E-01	0.35017E-01
0.37486E-01	0.38896E-01	0.45864E-01	0.50993E-01	0.63225E-01	0.65408E-01
0.56352E-01	0.48417E-01	0.48604E-01	0.48234E-01	0.52235E-01	0.44861E-01
0.43569E-01	0.46640E-01	0.47573E-01	0.45789E-01	0.52200E-01	0.50339E-01
0.49804E-01	0.47315E-01	0.46245E-01	0.46762E-01	0.44639E-01	0.44001E-01
0.46482E-01	0.49887E-01	0.44896E-01	0.48801E-01	0.56526E-01	0.57515E-01
0.54661E-01	0.61301E-01	0.72281E-01	0.66269E-01	0.63026E-01	0.64892E-01
0.60171E-01	0.67787E-01	0.58287E-01	0.60498E-01	0.55379E-01	0.62868E-01
0.60939E-01	0.49196E-01	0.51073E-01	0.47165E-01	0.49251E-01	0.47992E-01
0.48769E-01	0.51213E-01	0.46725E-01	0.52767E-01	0.63908E-01	0.58849E-01
0.52878E-01	0.38305E-01	0.25724E-01	0.15981E-01	0.10801E-01	0.11092E-01
0.25406E-01	0.86790E-01	0.18494E+00	0.14087E+01	0.18448E+01	0.44151E+01

Table 5.13 Angular neutron spectrum for lithium oxide experiment (200.0 mm, 41.8 deg.).

<< Spectrum >>

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	-0.12147E-06	0.87278E-07	-0.14580E-06	0.51798E-06
0.35144E-06	0.77574E-06	0.83132E-06	0.43196E-06	0.47004E-06	0.91889E-06
0.55705E-06	0.72402E-06	0.54580E-06	0.56523E-06	0.73233E-06	0.55130E-06
0.64435E-06	0.75715E-06	0.70090E-06	0.61215E-06	0.78811E-06	0.71276E-06
0.78597E-06	0.78086E-06	0.93415E-06	0.96694E-06	0.89174E-06	0.96131E-06
0.98736E-06	0.10878E-05	0.10218E-05	0.10549E-05	0.10758E-05	0.98520E-06
0.10443E-05	0.83124E-06	0.79963E-06	0.59092E-06	0.42756E-06	0.31303E-06
0.23909E-06	0.13993E-06	0.18051E-06	0.27456E-06	0.46966E-06	0.61236E-06
0.69672E-06	0.74472E-06	0.67621E-06	0.73952E-06	0.70513E-06	0.55464E-06
0.61538E-06	0.94283E-06	0.12681E-05	0.14303E-05	0.15366E-05	0.17223E-05
0.17695E-05	0.17949E-05	0.17782E-05	0.17430E-05	0.16973E-05	0.19181E-05
0.18356E-05	0.16141E-05	0.13408E-05	0.11031E-05	0.99994E-06	0.89953E-06
0.12023E-05	0.13951E-05	0.14708E-05	0.13626E-05	0.14320E-05	0.13917E-05
0.15899E-05	0.16096E-05	0.15511E-05	0.16076E-05	0.18546E-05	0.16465E-05
0.15879E-05	0.16527E-05	0.18313E-05	0.19252E-05	0.19809E-05	0.18191E-05
0.17829E-05	0.16468E-05	0.16001E-05	0.15491E-05	0.13380E-05	0.12741E-05
0.11432E-05	0.11689E-05	0.11062E-05	0.11768E-05	0.11010E-05	0.10600E-05
0.12366E-05	0.12225E-05	0.13438E-05	0.13190E-05	0.14964E-05	0.14506E-05
0.16349E-05	0.18186E-05	0.20796E-05	0.20687E-05	0.24313E-05	0.24958E-05
0.23129E-05	0.23511E-05	0.23335E-05	0.17352E-05	0.18465E-05	0.19192E-05
0.25780E-05	0.41912E-05	0.81640E-05	0.13590E-04	0.15695E-04	0.82617E-05
0.15355E-05	0.12385E-06	-0.90470E-08	-0.55006E-08	-0.65032E-08	0.46618E-08

<< Error >>

0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.36258E+01	0.57234E+01	0.30123E+01	0.75325E+00
0.98703E+00	0.41846E+00	0.34534E+00	0.65476E+00	0.52039E+00	0.24641E+00
0.36979E+00	0.24202E+00	0.29848E+00	0.24092E+00	0.17609E+00	0.20710E+00
0.16365E+00	0.12920E+00	0.13304E+00	0.14121E+00	0.10373E+00	0.11013E+00
0.95095E-01	0.91992E-01	0.75299E-01	0.69247E-01	0.72176E-01	0.66739E-01
0.63779E-01	0.55642E-01	0.55717E-01	0.54305E-01	0.53122E-01	0.55900E-01
0.51163E-01	0.60328E-01	0.60868E-01	0.79362E-01	0.10324E+00	0.13712E+00
0.16166E+00	0.27567E+00	0.21977E+00	0.15037E+00	0.92588E-01	0.74458E-01
0.65818E-01	0.64093E-01	0.70543E-01	0.62126E-01	0.65547E-01	0.82000E-01
0.73727E-01	0.52755E-01	0.42233E-01	0.40444E-01	0.38795E-01	0.34969E-01
0.34419E-01	0.34486E-01	0.35128E-01	0.36683E-01	0.38192E-01	0.33594E-01
0.35914E-01	0.39134E-01	0.45602E-01	0.53536E-01	0.58379E-01	0.66978E-01
0.53562E-01	0.48165E-01	0.47493E-01	0.51013E-01	0.48707E-01	0.53745E-01
0.48515E-01	0.47535E-01	0.50305E-01	0.49288E-01	0.49848E-01	0.54927E-01
0.55109E-01	0.54602E-01	0.49341E-01	0.46243E-01	0.45623E-01	0.48374E-01
0.48563E-01	0.51345E-01	0.49959E-01	0.51218E-01	0.52863E-01	0.55063E-01
0.60216E-01	0.60215E-01	0.61478E-01	0.58599E-01	0.61728E-01	0.66436E-01
0.62140E-01	0.60343E-01	0.59631E-01	0.62303E-01	0.55850E-01	0.59568E-01
0.54965E-01	0.53666E-01	0.50278E-01	0.50941E-01	0.47830E-01	0.48282E-01
0.52082E-01	0.52097E-01	0.51856E-01	0.67544E-01	0.66038E-01	0.64222E-01
0.52685E-01	0.37996E-01	0.26132E-01	0.19711E-01	0.17935E-01	0.24501E-01
0.56009E-01	0.24758E+00	0.21057E+01	0.22933E+01	0.16942E+01	0.23363E+01

Table 5.14 Angular neutron spectrum for lithium oxide experiment (200.0 mm, 66.8 deg.).

<< Spectrum >>

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.89857E-07	0.65336E-06	0.77344E-06
0.46216E-06	0.56066E-06	0.96561E-06	0.32871E-06	0.43119E-06	0.40249E-06
0.57982E-06	0.65083E-06	0.54319E-06	0.32912E-06	0.42900E-06	0.56357E-06
0.57282E-06	0.32620E-06	0.64105E-06	0.51768E-06	0.50464E-06	0.66961E-06
0.47857E-06	0.65756E-06	0.76076E-06	0.67038E-06	0.71509E-06	0.80841E-06
0.83649E-06	0.75237E-06	0.73932E-06	0.81802E-06	0.82464E-06	0.88388E-06

0.78549E-06	0.63681E-06	0.68023E-06	0.65329E-06	0.38345E-06	0.30593E-06
0.11579E-06	0.21694E-06	0.17121E-06	0.10544E-06	0.23072E-06	0.39118E-06
0.48952E-06	0.58501E-06	0.67669E-06	0.59399E-06	0.57777E-06	0.43800E-06
0.41327E-06	0.50666E-06	0.70077E-06	0.10573E-05	0.10975E-05	0.11208E-05
0.13482E-05	0.13095E-05	0.12591E-05	0.13278E-05	0.14475E-05	0.12843E-05
0.13175E-05	0.12941E-05	0.11506E-05	0.10443E-05	0.77288E-06	0.74780E-06
0.77935E-06	0.86904E-06	0.11331E-05	0.10678E-05	0.99384E-06	0.10398E-05
0.12007E-05	0.12971E-05	0.11641E-05	0.12985E-05	0.12376E-05	0.11789E-05
0.11210E-05	0.11738E-05	0.12754E-05	0.12676E-05	0.13595E-05	0.13358E-05
0.13421E-05	0.11927E-05	0.11496E-05	0.10955E-05	0.10227E-05	0.76778E-06
0.86712E-06	0.73579E-06	0.77671E-06	0.71490E-06	0.99877E-06	0.81275E-06
0.66123E-06	0.82024E-06	0.84386E-06	0.89519E-06	0.94033E-06	0.90799E-06
0.11119E-05	0.11822E-05	0.13235E-05	0.12908E-05	0.12232E-05	0.13222E-05
0.14005E-05	0.11139E-05	0.14248E-05	0.11181E-05	0.10861E-05	0.15190E-05
0.16563E-05	0.19358E-05	0.24487E-05	0.32568E-05	0.34217E-05	0.23392E-05
0.82736E-06	0.29469E-06	0.16654E-07	0.22188E-07	-0.25587E-07	-0.10843E-07

<< Error >>

0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+00	0.57326E+00
0.88058E+00	0.64361E+00	0.34784E+00	0.94605E+00	0.67670E+00	0.64976E+00
0.38601E+00	0.30480E+00	0.32515E+00	0.49124E+00	0.33688E+00	0.23122E+00
0.20352E+00	0.32784E+00	0.15784E+00	0.18105E+00	0.17359E+00	0.12371E+00
0.16521E+00	0.11433E+00	0.92428E-01	0.10335E+00	0.95109E-01	0.78175E-01
0.74198E-01	0.78699E-01	0.79891E-01	0.68336E-01	0.68080E-01	0.61342E-01
0.66607E-01	0.78640E-01	0.71774E-01	0.72359E-01	0.12559E+00	0.14465E+00
0.37735E+00	0.18554E+00	0.24393E+00	0.41099E+00	0.19437E+00	0.11922E+00
0.92721E-01	0.81766E-01	0.69856E-01	0.81317E-01	0.82868E-01	0.10468E+00
0.11223E+00	0.92844E-01	0.74726E-01	0.50321E-01	0.51793E-01	0.51400E-01
0.41547E-01	0.43270E-01	0.46479E-01	0.44512E-01	0.40537E-01	0.46730E-01
0.45662E-01	0.46672E-01	0.51710E-01	0.56496E-01	0.75566E-01	0.80683E-01
0.79558E-01	0.73045E-01	0.55962E-01	0.62807E-01	0.69364E-01	0.67534E-01
0.60495E-01	0.57791E-01	0.67702E-01	0.61463E-01	0.65672E-01	0.66832E-01
0.67375E-01	0.64617E-01	0.59889E-01	0.61952E-01	0.59668E-01	0.59561E-01
0.59149E-01	0.63579E-01	0.66137E-01	0.66841E-01	0.72936E-01	0.98732E-01
0.93555E-01	0.10532E+00	0.98576E-01	0.11741E+00	0.80123E-01	0.10130E+00
0.11926E+00	0.91272E-01	0.89744E-01	0.84712E-01	0.81376E-01	0.90497E-01
0.77046E-01	0.78450E-01	0.73090E-01	0.82714E-01	0.92340E-01	0.90865E-01
0.90569E-01	0.11004E+00	0.91513E-01	0.12072E+00	0.13484E+00	0.10166E+00
0.98132E-01	0.84317E-01	0.68794E-01	0.51483E-01	0.45853E-01	0.53327E-01
0.91613E-01	0.18310E+00	0.20435E+01	0.13179E+01	0.11233E+01	0.23209E+01

Table 5.15 Angular neutron spectrum for lithium oxide experiment (400.0 mm, 0.0 deg.).

<< Spectrum >>

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.19327E-06	0.13321E-05	0.16024E-06	0.98357E-06	0.22306E-06	-0.29830E-06
-0.47158E-06	0.76898E-06	-0.65686E-07	0.97237E-06	0.34236E-06	0.65438E-06
0.72514E-06	0.80273E-06	0.46787E-06	0.57683E-06	0.86270E-06	0.56070E-06
0.66352E-06	0.56907E-06	0.74210E-06	0.57694E-06	0.32390E-06	0.59366E-06
0.48817E-06	0.65794E-06	0.47694E-06	0.65984E-06	0.61322E-06	0.67148E-06
0.69289E-06	0.63421E-06	0.54677E-06	0.57069E-06	0.63974E-06	0.50708E-06
0.46106E-06	0.40559E-06	0.37538E-06	0.17698E-06	0.26323E-06	0.16620E-06
0.51820E-07	0.13689E-06	0.16943E-06	0.11711E-06	0.17033E-06	0.22956E-06
0.23779E-06	0.43411E-06	0.32234E-06	0.26736E-06	0.23680E-06	0.34144E-06
0.35646E-06	0.51443E-06	0.66675E-06	0.69944E-06	0.61366E-06	0.73362E-06
0.95201E-06	0.81441E-06	0.87842E-06	0.76569E-06	0.64757E-06	0.61924E-06
0.82057E-06	0.57747E-06	0.39408E-06	0.37000E-06	0.22988E-06	0.30510E-06
0.56846E-06	0.43411E-06	0.46891E-06	0.40154E-06	0.45585E-06	0.46203E-06
0.73075E-06	0.52760E-06	0.53254E-06	0.63496E-06	0.74405E-06	0.56916E-06
0.61954E-06	0.73740E-06	0.83904E-06	0.88797E-06	0.72265E-06	0.74757E-06
0.61901E-06	0.47184E-06	0.57884E-06	0.40399E-06	0.29220E-06	0.22435E-06
0.40691E-06	0.34994E-06	0.38900E-06	0.39054E-06	0.32996E-06	0.29393E-06
0.36124E-06	0.44145E-06	0.47692E-06	0.42729E-06	0.41881E-06	0.48133E-06
0.50049E-06	0.71976E-06	0.64938E-06	0.73966E-06	0.67411E-06	0.71808E-06

0.85267E-06	0.76202E-06	0.93313E-06	0.10165E-05	0.99629E-06	0.95568E-06
0.10498E-05	0.20927E-05	0.32356E-05	0.63815E-05	0.22778E-04	0.69935E-04
0.21247E-04	0.12097E-06	-0.24785E-07	-0.22224E-07	-0.74843E-09	-0.28587E-07

&lt;&lt; Error &gt;&gt;

0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.14163E+01	0.10025E+01	0.72307E+01	0.99833E+00	0.39692E+01	0.27066E+01
0.15502E+01	0.85043E+00	0.90590E+01	0.57386E+00	0.14802E+01	0.71280E+00
0.55067E+00	0.43315E+00	0.63376E+00	0.47410E+00	0.28000E+00	0.39673E+00
0.29903E+00	0.30521E+00	0.22225E+00	0.26813E+00	0.45253E+00	0.23419E+00
0.26575E+00	0.18809E+00	0.25535E+00	0.16995E+00	0.18017E+00	0.15001E+00
0.14280E+00	0.14554E+00	0.17216E+00	0.15502E+00	0.12994E+00	0.16258E+00
0.18008E+00	0.19459E+00	0.19523E+00	0.40784E+00	0.24949E+00	0.39683E+00
0.12259E+01	0.45907E+00	0.36754E+00	0.55704E+00	0.40181E+00	0.29854E+00
0.28282E+00	0.16354E+00	0.20215E+00	0.25518E+00	0.28684E+00	0.19427E+00
0.20699E+00	0.14707E+00	0.10829E+00	0.10625E+00	0.11822E+00	0.10323E+00
0.77368E-01	0.92065E-01	0.85482E-01	0.98124E-01	0.11314E+00	0.12690E+00
0.89644E-01	0.12751E+00	0.18847E+00	0.19183E+00	0.31998E+00	0.24883E+00
0.12546E+00	0.18352E+00	0.17662E+00	0.20907E+00	0.18061E+00	0.18835E+00
0.11602E+00	0.16958E+00	0.15995E+00	0.13538E+00	0.12836E+00	0.15204E+00
0.14508E+00	0.11567E+00	0.10483E+00	0.10156E+00	0.11658E+00	0.10997E+00
0.11944E+00	0.17005E+00	0.11311E+00	0.17173E+00	0.19632E+00	0.32687E+00
0.15864E+00	0.19455E+00	0.17824E+00	0.17450E+00	0.17033E+00	0.21211E+00
0.18486E+00	0.16129E+00	0.15418E+00	0.18863E+00	0.18023E+00	0.14632E+00
0.18017E+00	0.12766E+00	0.15255E+00	0.13108E+00	0.16365E+00	0.16079E+00
0.12834E+00	0.16223E+00	0.12805E+00	0.10704E+00	0.11587E+00	0.13158E+00
0.11383E+00	0.69714E-01	0.55511E-01	0.38785E-01	0.19396E-01	0.10917E-01
0.19532E-01	0.49913E+00	0.18876E+01	0.12808E+01	0.33094E+02	0.91407E+00

Table 5.16 Angular neutron spectrum for lithium oxide experiment (400.0 mm, 12.2 deg.).

&lt;&lt; Spectrum &gt;&gt;

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.54569E-09	-0.35151E-07	0.49181E-06	-0.11759E-05	0.15154E-06
0.95672E-07	0.45023E-06	0.83454E-06	0.50043E-06	0.63482E-06	0.64357E-07
0.50170E-06	0.59707E-06	0.42920E-06	0.46220E-06	0.49137E-07	0.39351E-06
0.73403E-06	0.21341E-06	0.46275E-06	0.30866E-06	0.42359E-06	0.36493E-06
0.46008E-06	0.60166E-06	0.54560E-06	0.58445E-06	0.56258E-06	0.59705E-06
0.57357E-06	0.51462E-06	0.49556E-06	0.45803E-06	0.45462E-06	0.54596E-06
0.48230E-06	0.34461E-06	0.28929E-06	0.32063E-06	0.24667E-06	0.13361E-06
0.21304E-07	0.63203E-07	0.90304E-07	0.66555E-07	0.17087E-06	0.20880E-06
0.24560E-06	0.29754E-06	0.19193E-06	0.23581E-06	0.29143E-06	0.26779E-06
0.30312E-06	0.28322E-06	0.40793E-06	0.58423E-06	0.59939E-06	0.63680E-06
0.66918E-06	0.71630E-06	0.69201E-06	0.59537E-06	0.63329E-06	0.76156E-06
0.62313E-06	0.54405E-06	0.58936E-06	0.39582E-06	0.31947E-06	0.30638E-06
0.29260E-06	0.43130E-06	0.43601E-06	0.53493E-06	0.32830E-06	0.47227E-06
0.55030E-06	0.59312E-06	0.50621E-06	0.54803E-06	0.65681E-06	0.58529E-06
0.57648E-06	0.51070E-06	0.62093E-06	0.56973E-06	0.64732E-06	0.56877E-06
0.56813E-06	0.44755E-06	0.48087E-06	0.55015E-06	0.34266E-06	0.29932E-06
0.35185E-06	0.32849E-06	0.28164E-06	0.29530E-06	0.29837E-06	0.29495E-06
0.34984E-06	0.28683E-06	0.32746E-06	0.40673E-06	0.46608E-06	0.51423E-06
0.52306E-06	0.61123E-06	0.70065E-06	0.65685E-06	0.73450E-06	0.65291E-06
0.77050E-06	0.77163E-06	0.74168E-06	0.80947E-06	0.75948E-06	0.74981E-06
0.90577E-06	0.15290E-05	0.26055E-05	0.43067E-05	0.86348E-05	0.13765E-04
0.64381E-05	0.76344E-06	0.34857E-07	0.13390E-07	0.32869E-09	0.99508E-08

&lt;&lt; Error &gt;&gt;

0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.41084E+03	0.19927E+02	0.12386E+01	0.49250E+00	0.32985E+01
0.46901E+01	0.90873E+00	0.44392E+00	0.68276E+00	0.50668E+00	0.46958E+01
0.49543E+00	0.37035E+00	0.45824E+00	0.37338E+00	0.31954E+01	0.35459E+00
0.16524E+00	0.53473E+00	0.23044E+00	0.34153E+00	0.21943E+00	0.24831E+00

0.17580E+00	0.13011E+00	0.13942E+00	0.12020E+00	0.12348E+00	0.11289E+00
0.11111E+00	0.12670E+00	0.12022E+00	0.12665E+00	0.11869E+00	0.95228E-01
0.10373E+00	0.14685E+00	0.16488E+00	0.14349E+00	0.18469E+00	0.31946E+00
0.20490E+01	0.64549E+00	0.44215E+00	0.64316E+00	0.25667E+00	0.20788E+00
0.18558E+00	0.14914E+00	0.23823E+00	0.18177E+00	0.15323E+00	0.16778E+00
0.14455E+00	0.16457E+00	0.11176E+00	0.87788E-01	0.80805E-01	0.79376E-01
0.74449E-01	0.70618E-01	0.75024E-01	0.87978E-01	0.81420E-01	0.65985E-01
0.83036E-01	0.94800E-01	0.88086E-01	0.13008E+00	0.15974E+00	0.16479E+00
0.18360E+00	0.12228E+00	0.13092E+00	0.10589E+00	0.18837E+00	0.12571E+00
0.11106E+00	0.10269E+00	0.12713E+00	0.11123E+00	0.90677E-01	0.10888E+00
0.98110E-01	0.11340E+00	0.92832E-01	0.10903E+00	0.98343E-01	0.10371E+00
0.98574E-01	0.11858E+00	0.10653E+00	0.89416E-01	0.13354E+00	0.15830E+00
0.11842E+00	0.12313E+00	0.15050E+00	0.14407E+00	0.14035E+00	0.14327E+00
0.12336E+00	0.16779E+00	0.14759E+00	0.12771E+00	0.11965E+00	0.10988E+00
0.10884E+00	0.88153E-01	0.81647E-01	0.93479E-01	0.89120E-01	0.10628E+00
0.90355E-01	0.92073E-01	0.10797E+00	0.10097E+00	0.10636E+00	0.99307E-01
0.88289E-01	0.59406E-01	0.44987E-01	0.33552E-01	0.22671E-01	0.17740E-01
0.25546E-01	0.76557E-01	0.54363E+00	0.61309E+00	0.50215E+02	0.82026E+00

Table 5.17 Angular neutron spectrum for lithium oxide experiment (400.0 mm, 24.9 deg.).

<< Spectrum >>

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.12409E-06	-0.88045E-06	0.14916E-05	0.13094E-05	0.78319E-07
0.81127E-06	0.85505E-06	0.70077E-06	0.10473E-05	0.56276E-06	0.55225E-06
0.10386E-05	0.74859E-06	0.62009E-06	0.71719E-06	0.74988E-06	0.49826E-06
0.51473E-06	0.43777E-06	0.57492E-06	0.48747E-06	0.62881E-06	0.45250E-06
0.66240E-06	0.56186E-06	0.60898E-06	0.59089E-06	0.61638E-06	0.60599E-06
0.55764E-06	0.57591E-06	0.51387E-06	0.48565E-06	0.60481E-06	0.44206E-06
0.49878E-06	0.45464E-06	0.39649E-06	0.30428E-06	0.27225E-06	0.13787E-06
0.79464E-07	0.20707E-07	0.67748E-07	0.69528E-07	0.10912E-06	0.19759E-06
0.22651E-06	0.26898E-06	0.38864E-06	0.25612E-06	0.28777E-06	0.23252E-06
0.33603E-06	0.40905E-06	0.55733E-06	0.58756E-06	0.62231E-06	0.73563E-06
0.70887E-06	0.73918E-06	0.67024E-06	0.64219E-06	0.66837E-06	0.60613E-06
0.60326E-06	0.66424E-06	0.53822E-06	0.38458E-06	0.34084E-06	0.29592E-06
0.34349E-06	0.45421E-06	0.47539E-06	0.42588E-06	0.46335E-06	0.40555E-06
0.44479E-06	0.48904E-06	0.48339E-06	0.46279E-06	0.57758E-06	0.44206E-06
0.45800E-06	0.48536E-06	0.59609E-06	0.63554E-06	0.67386E-06	0.57107E-06
0.59850E-06	0.48540E-06	0.47769E-06	0.41051E-06	0.47816E-06	0.36047E-06
0.25774E-06	0.30739E-06	0.22398E-06	0.25902E-06	0.23654E-06	0.31692E-06
0.31576E-06	0.31263E-06	0.35594E-06	0.30757E-06	0.43101E-06	0.45192E-06
0.52193E-06	0.48950E-06	0.55438E-06	0.42968E-06	0.58513E-06	0.70366E-06
0.63733E-06	0.53428E-06	0.65867E-06	0.61976E-06	0.62238E-06	0.62801E-06
0.62637E-06	0.92314E-06	0.15534E-05	0.21606E-05	0.32813E-05	0.50920E-05
0.47648E-05	0.13441E-05	0.68746E-07	-0.22313E-07	0.12385E-07	-0.34674E-08

<< Error >>

0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.25880E+01	0.68458E+00	0.34653E+00	0.35199E+00	0.55406E+01
0.46692E+00	0.39484E+00	0.45173E+00	0.27858E+00	0.47731E+00	0.46179E+00
0.19268E+00	0.24683E+00	0.26495E+00	0.20198E+00	0.16725E+00	0.24182E+00
0.21059E+00	0.22429E+00	0.16014E+00	0.17733E+00	0.12413E+00	0.16600E+00
0.10705E+00	0.11956E+00	0.10542E+00	0.10513E+00	0.95238E-01	0.90317E-01
0.10295E+00	0.94036E-01	0.99493E-01	0.10529E+00	0.78168E-01	0.10691E+00
0.93178E-01	0.92123E-01	0.10579E+00	0.13254E+00	0.14129E+00	0.26819E+00
0.46573E+00	0.18071E+01	0.53547E+00	0.52829E+00	0.35051E+00	0.19379E+00
0.17416E+00	0.14983E+00	0.97619E-01	0.14948E+00	0.13820E+00	0.17091E+00
0.11685E+00	0.99768E-01	0.73699E-01	0.75416E-01	0.69382E-01	0.59849E-01
0.62273E-01	0.60128E-01	0.66522E-01	0.71782E-01	0.68871E-01	0.7623E-01
0.75841E-01	0.68597E-01	0.82452E-01	0.11511E+00	0.12779E+00	0.15017E+00
0.13572E+00	0.10528E+00	0.10400E+00	0.12101E+00	0.11280E+00	0.13624E+00
0.12478E+00	0.11553E+00	0.12071E+00	0.12673E+00	0.11250E+00	0.13042E+00
0.12943E+00	0.11910E+00	0.95762E-01	0.91800E-01	0.86560E-01	0.93810E-01
0.83517E-01	0.98059E-01	0.86744E-01	0.96898E-01	0.93802E-01	0.10333E+00
0.16273E+00	0.12415E+00	0.18285E+00	0.15532E+00	0.16829E+00	0.12557E+00

0.12955E+00	0.13448E+00	0.12177E+00	0.16285E+00	0.11145E+00	0.10899E+00
0.10111E+00	0.10804E+00	0.10176E+00	0.12749E+00	0.10707E+00	0.81247E-01
0.10099E+00	0.13290E+00	0.10106E+00	0.10981E+00	0.10693E+00	0.10408E+00
0.11431E+00	0.75530E-01	0.56262E-01	0.45946E-01	0.36028E-01	0.28056E-01
0.28422E-01	0.53500E-01	0.29463E+00	0.77056E+00	0.14544E+01	0.37463E+01

Table 5.18 Angular neutron spectrum for lithium oxide experiment (400.0 mm, 41.8 deg.).

## &lt;&lt; Spectrum &gt;&gt;

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	-0.29950E-08	-0.12243E-06	0.71665E-06	0.52686E-06	0.58140E-06
0.64019E-06	0.27780E-06	0.62972E-06	0.15894E-07	0.46178E-06	0.56624E-06
0.69066E-06	0.60596E-06	0.56054E-06	0.33013E-06	0.64162E-06	0.38082E-06
0.52084E-06	0.39075E-06	0.46730E-06	0.27628E-06	0.39773E-06	0.33351E-06
0.40609E-06	0.57502E-06	0.44575E-06	0.46971E-06	0.43028E-06	0.52185E-06
0.48379E-06	0.35980E-06	0.47532E-06	0.48960E-06	0.57330E-06	0.41610E-06
0.38079E-06	0.36608E-06	0.23817E-06	0.24440E-06	0.12798E-06	0.11283E-06
0.89547E-07	0.49589E-07	0.44119E-07	0.90155E-07	0.14484E-06	0.23805E-06
0.24399E-06	0.30286E-06	0.24949E-06	0.20398E-06	0.22293E-06	0.23978E-06
0.26893E-06	0.25333E-06	0.42880E-06	0.50465E-06	0.54746E-06	0.66841E-06
0.57492E-06	0.59398E-06	0.61179E-06	0.54757E-06	0.61607E-06	0.53374E-06
0.49388E-06	0.42258E-06	0.40823E-06	0.24916E-06	0.25523E-06	0.21113E-06
0.24161E-06	0.36171E-06	0.41144E-06	0.36609E-06	0.35811E-06	0.41200E-06
0.45796E-06	0.48203E-06	0.37749E-06	0.36582E-06	0.45200E-06	0.42297E-06
0.49345E-06	0.51057E-06	0.43649E-06	0.52078E-06	0.47321E-06	0.43225E-06
0.40376E-06	0.38327E-06	0.32660E-06	0.31935E-06	0.31953E-06	0.23101E-06
0.19328E-06	0.23397E-06	0.25583E-06	0.28655E-06	0.24204E-06	0.27060E-06
0.34510E-06	0.30750E-06	0.29015E-06	0.27212E-06	0.32980E-06	0.35726E-06
0.40374E-06	0.42344E-06	0.45586E-06	0.38551E-06	0.44017E-06	0.46886E-06
0.43561E-06	0.43831E-06	0.36131E-06	0.38801E-06	0.48296E-06	0.55746E-06
0.68120E-06	0.10618E-05	0.15541E-05	0.16381E-05	0.17894E-05	0.90465E-06
0.15160E-06	0.13175E-07	0.83201E-08	-0.42223E-08	0.10192E-07	0.12947E-07

## &lt;&lt; Error &gt;&gt;

0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.18447E+01	0.35577E+01	0.55310E+00	0.66362E+00	0.53929E+00
0.42584E+00	0.94061E+00	0.36315E+00	0.14364E+02	0.43156E+00	0.31954E+00
0.22682E+00	0.22911E+00	0.21587E+00	0.33681E+00	0.15414E+00	0.23490E+00
0.15695E+00	0.19024E+00	0.15122E+00	0.24455E+00	0.15782E+00	0.17753E+00
0.13893E+00	0.91898E-01	0.11127E+00	0.10164E+00	0.10322E+00	0.84511E-01
0.89083E-01	0.11828E+00	0.82604E-01	0.81174E-01	0.63302E-01	0.86756E-01
0.93685E-01	0.91414E-01	0.13990E+00	0.13140E+00	0.24368E+00	0.26560E+00
0.32103E+00	0.58413E+00	0.67842E+00	0.32839E+00	0.20862E+00	0.13108E+00
0.12577E+00	0.10337E+00	0.12732E+00	0.15479E+00	0.13630E+00	0.12770E+00
0.11706E+00	0.13221E+00	0.78021E-01	0.68270E-01	0.64959E-01	0.52383E-01
0.62321E-01	0.60315E-01	0.59331E-01	0.68748E-01	0.60883E-01	0.70080E-01
0.77936E-01	0.89201E-01	0.89751E-01	0.15299E+00	0.15174E+00	0.19195E+00
0.17732E+00	0.11423E+00	0.10357E+00	0.11854E+00	0.12381E+00	0.11844E+00
0.10325E+00	0.10183E+00	0.13303E+00	0.14148E+00	0.10876E+00	0.11316E+00
0.92352E-01	0.87358E-01	0.11037E+00	0.97328E-01	0.98487E-01	0.10997E+00
0.10820E+00	0.11037E+00	0.12319E+00	0.11408E+00	0.10308E+00	0.14357E+00
0.16950E+00	0.13433E+00	0.13185E+00	0.11490E+00	0.13979E+00	0.12197E+00
0.10526E+00	0.11707E+00	0.13353E+00	0.14743E+00	0.12737E+00	0.11609E+00
0.10829E+00	0.11422E+00	0.10686E+00	0.12961E+00	0.11757E+00	0.11114E+00
0.12755E+00	0.12854E+00	0.16158E+00	0.15314E+00	0.13184E+00	0.11734E+00
0.10229E+00	0.68219E-01	0.47788E-01	0.48252E-01	0.41758E-01	0.60811E-01
0.16231E+00	0.10788E+01	0.15492E+01	0.33380E+01	0.14162E+01	0.74552E+00

Table 5.19 Angular neutron spectrum for lithium oxide experiment (400.0 mm, 66.8 deg.).

&lt;&lt; Spectrum &gt;&gt;

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.22065E-06	0.34699E-06	0.37411E-06
0.27103E-06	0.25711E-06	0.27231E-06	0.19804E-06	0.83112E-07	0.24402E-06
0.27987E-06	0.33820E-06	0.52336E-06	0.33077E-06	0.25239E-06	0.41501E-06
0.24316E-06	0.20535E-06	0.28263E-06	0.25808E-06	0.29479E-06	0.29994E-06
0.33164E-06	0.38252E-06	0.31643E-06	0.30912E-06	0.34429E-06	0.35107E-06
0.39504E-06	0.28451E-06	0.34393E-06	0.27092E-06	0.25910E-06	0.31332E-06
0.28768E-06	0.22356E-06	0.22105E-06	0.13067E-06	0.11773E-06	0.69257E-07
0.60364E-07	0.26954E-07	0.98517E-07	0.50701E-07	0.10892E-06	0.14441E-06
0.19357E-06	0.17741E-06	0.21535E-06	0.15251E-06	0.19102E-06	0.18674E-06
0.16540E-06	0.22560E-06	0.27308E-06	0.32197E-06	0.38383E-06	0.37941E-06
0.43571E-06	0.38494E-06	0.39353E-06	0.35174E-06	0.35028E-06	0.33933E-06
0.35308E-06	0.33119E-06	0.21282E-06	0.26243E-06	0.21568E-06	0.14662E-06
0.22777E-06	0.15517E-06	0.24602E-06	0.29822E-06	0.25571E-06	0.27338E-06
0.31391E-06	0.25163E-06	0.31119E-06	0.24781E-06	0.26924E-06	0.29086E-06
0.30572E-06	0.29974E-06	0.24304E-06	0.28671E-06	0.35650E-06	0.24800E-06
0.27267E-06	0.22521E-06	0.19772E-06	0.22867E-06	0.15688E-06	0.11174E-06
0.94964E-07	0.14849E-06	0.18949E-06	0.16731E-06	0.13024E-06	0.15903E-06
0.20500E-06	0.11904E-06	0.10386E-06	0.20123E-06	0.23806E-06	0.21499E-06
0.18198E-06	0.24073E-06	0.20781E-06	0.24441E-06	0.24115E-06	0.25996E-06
0.22456E-06	0.13002E-06	0.21181E-06	0.92393E-07	0.20329E-06	0.32029E-06
0.37319E-06	0.30074E-06	0.31443E-06	0.54370E-06	0.31246E-06	0.15987E-06
0.80379E-07	0.14890E-06	0.60796E-07	-0.35289E-07	-0.20219E-07	-0.28284E-07

&lt;&lt; Error &gt;&gt;

0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.14453E+01	0.87793E+00	0.72258E+00
0.89075E+00	0.85736E+00	0.73750E+00	0.95417E+00	0.20716E+01	0.65126E+00
0.48424E+00	0.35482E+00	0.20321E+00	0.28410E+00	0.34323E+00	0.18069E+00
0.28282E+00	0.31361E+00	0.20784E+00	0.21693E+00	0.17468E+00	0.16277E+00
0.14094E+00	0.11658E+00	0.13273E+00	0.12826E+00	0.11114E+00	0.10713E+00
0.88261E-01	0.11907E+00	0.95042E-01	0.11533E+00	0.12127E+00	0.95301E-01
0.10134E+00	0.12557E+00	0.12503E+00	0.20873E+00	0.22005E+00	0.37509E+00
0.41587E+00	0.93704E+00	0.25237E+00	0.50040E+00	0.23387E+00	0.17772E+00
0.13221E+00	0.14802E+00	0.12094E+00	0.17278E+00	0.13773E+00	0.13469E+00
0.16079E+00	0.11941E+00	0.10226E+00	0.88590E-01	0.76042E-01	0.77072E-01
0.65798E-01	0.76790E-01	0.76007E-01	0.87569E-01	0.86362E-01	0.92380E-01
0.85815E-01	0.93935E-01	0.14866E+00	0.11800E+00	0.14768E+00	0.22899E+00
0.15462E+00	0.23102E+00	0.14395E+00	0.12337E+00	0.14838E+00	0.14383E+00
0.12853E+00	0.16352E+00	0.13867E+00	0.18103E+00	0.14199E+00	0.12230E+00
0.11791E+00	0.12235E+00	0.15526E+00	0.13010E+00	0.10313E+00	0.15120E+00
0.13706E+00	0.16712E+00	0.18560E+00	0.15402E+00	0.23513E+00	0.35411E+00
0.43465E+00	0.28106E+00	0.22056E+00	0.24829E+00	0.33290E+00	0.25522E+00
0.18004E+00	0.30778E+00	0.35119E+00	0.17487E+00	0.14748E+00	0.18243E+00
0.22399E+00	0.18169E+00	0.23658E+00	0.22259E+00	0.23923E+00	0.24112E+00
0.30312E+00	0.55447E+00	0.35811E+00	0.84542E+00	0.40822E+00	0.28598E+00
0.24860E+00	0.31693E+00	0.29239E+00	0.15643E+00	0.22677E+00	0.35661E+00
0.50594E+00	0.21553E+00	0.41228E+00	0.51212E+00	0.81529E+00	0.51693E+00



Table 5.20 Mid energy of measured spectra for beryllium experiment.

0.11629E-01	0.12225E-01	0.12852E-01	0.13511E-01	0.14203E-01	0.14932E-01
0.15697E-01	0.16502E-01	0.17348E-01	0.18238E-01	0.19173E-01	0.20156E-01
0.21189E-01	0.22275E-01	0.23418E-01	0.24618E-01	0.25880E-01	0.27207E-01
0.28602E-01	0.30069E-01	0.31610E-01	0.33231E-01	0.34935E-01	0.36726E-01
0.38609E-01	0.40589E-01	0.42670E-01	0.44857E-01	0.47157E-01	0.49575E-01
0.52117E-01	0.54789E-01	0.57598E-01	0.60551E-01	0.63656E-01	0.66919E-01
0.70350E-01	0.73957E-01	0.77749E-01	0.81735E-01	0.85926E-01	0.90332E-01
0.94963E-01	0.99832E-01	0.10495E+00	0.11033E+00	0.11599E+00	0.12193E+00
0.12819E+00	0.13476E+00	0.14167E+00	0.14893E+00	0.15657E+00	0.16459E+00
0.17303E+00	0.18191E+00	0.19123E+00	0.20104E+00	0.21134E+00	0.22218E+00
0.23357E+00	0.24555E+00	0.25814E+00	0.27137E+00	0.28528E+00	0.29991E+00
0.31529E+00	0.33145E+00	0.34845E+00	0.36631E+00	0.38509E+00	0.40484E+00
0.42559E+00	0.44742E+00	0.47035E+00	0.49447E+00	0.51982E+00	0.54647E+00
0.57449E+00	0.60395E+00	0.63491E+00	0.66747E+00	0.70169E+00	0.73766E+00
0.77548E+00	0.81524E+00	0.85704E+00	0.90098E+00	0.94718E+00	0.99574E+00
0.10468E+01	0.11005E+01	0.11569E+01	0.12162E+01	0.12786E+01	0.13441E+01
0.14130E+01	0.14855E+01	0.15616E+01	0.16417E+01	0.17259E+01	0.18144E+01
0.19074E+01	0.20052E+01	0.21080E+01	0.22161E+01	0.23297E+01	0.24491E+01
0.25747E+01	0.27067E+01	0.28455E+01	0.29914E+01	0.31447E+01	0.33060E+01
0.34755E+01	0.36537E+01	0.38410E+01	0.40379E+01	0.42450E+01	0.44626E+01
0.46914E+01	0.49319E+01	0.51848E+01	0.54506E+01	0.57301E+01	0.60239E+01
0.63327E+01	0.66574E+01	0.69988E+01	0.73576E+01	0.77348E+01	0.81314E+01
0.85483E+01	0.89866E+01	0.94473E+01	0.99317E+01	0.10441E+02	0.10976E+02
0.11539E+02	0.12131E+02	0.12753E+02	0.13406E+02	0.14094E+02	0.14816E+02
0.15576E+02	0.16375E+02	0.17214E+02	0.18097E+02	0.19025E+02	0.20000E+02

Table 5.21 Source neutron spectrum for beryllium experiment.

<< Spectrum >>

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	-0.15867E-03	-0.18447E-02	-0.73716E-03	-0.61534E-03
-0.10239E-02	-0.67687E-03	-0.34646E-03	-0.54775E-03	-0.44102E-03	-0.31421E-03
-0.33433E-03	-0.25290E-03	-0.31934E-03	-0.15738E-03	-0.53232E-04	-0.22293E-03
-0.16873E-03	-0.92750E-04	-0.88047E-04	-0.92791E-04	-0.46925E-04	-0.78456E-05
0.52154E-04	0.52357E-05	0.39352E-04	0.54903E-04	0.15199E-04	0.39688E-04
0.38540E-04	0.94081E-04	0.99901E-04	0.10935E-03	0.11658E-03	0.11156E-03
0.19026E-03	0.15899E-03	0.13773E-03	0.17581E-03	0.20471E-03	0.23478E-03
0.24806E-03	0.25418E-03	0.26489E-03	0.26762E-03	0.32889E-03	0.37668E-03
0.39420E-03	0.44681E-03	0.39581E-03	0.51900E-03	0.50433E-03	0.52919E-03
0.56557E-03	0.55913E-03	0.70901E-03	0.73448E-03	0.73970E-03	0.79812E-03
0.85289E-03	0.94600E-03	0.99734E-03	0.10431E-02	0.11349E-02	0.11216E-02
0.12104E-02	0.12105E-02	0.12886E-02	0.13777E-02	0.14410E-02	0.13836E-02
0.14494E-02	0.14606E-02	0.15247E-02	0.14986E-02	0.15323E-02	0.15205E-02
0.16500E-02	0.16110E-02	0.16064E-02	0.15690E-02	0.19017E-02	0.17006E-02
0.17429E-02	0.17037E-02	0.16975E-02	0.15582E-02	0.16208E-02	0.16158E-02
0.15890E-02	0.19309E-02	0.25373E-02	0.38790E-02	0.57483E-02	0.48469E-02
0.14078E-02	0.13933E-02	0.13468E-02	0.12967E-02	0.11403E-02	0.11425E-02
0.10671E-02	0.10817E-02	0.96040E-03	0.84727E-03	0.92662E-03	0.78331E-03
0.87026E-03	0.79555E-03	0.66488E-03	0.63386E-03	0.60391E-03	0.65809E-03
0.66315E-03	0.73741E-03	0.89861E-03	0.10198E-02	0.13088E-02	0.19132E-02
0.35175E-02	0.60178E-02	0.12581E-01	0.34346E-01	0.12106E+00	0.59702E+00
0.79449E+00	0.97662E-01	0.66023E-02	0.99430E-03	0.18250E-03	0.34195E-04

<< Error >>

0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.30722E+00	0.10454E+00	0.27164E+00	0.30616E+00
0.16868E+00	0.22439E+00	0.40753E+00	0.24540E+00	0.28055E+00	0.36025E+00
0.29657E+00	0.34335E+00	0.23408E+00	0.44303E+00	0.11777E+01	0.25716E+00
0.30898E+00	0.50211E+00	0.49837E+00	0.45244E+00	0.85417E+00	0.48063E+01
0.67463E+00	0.64460E+01	0.83037E+00	0.58154E+00	0.19817E+01	0.72576E+00
0.75858E+00	0.29513E+00	0.27978E+00	0.24699E+00	0.23322E+00	0.23709E+00
0.13533E+00	0.15441E+00	0.18958E+00	0.14954E+00	0.13044E+00	0.11184E+00
0.11131E+00	0.10904E+00	0.10243E+00	0.10317E+00	0.83260E-01	0.73947E-01

0.69708E-01	0.64449E-01	0.75097E-01	0.59444E-01	0.60208E-01	0.59777E-01
0.56428E-01	0.57516E-01	0.48025E-01	0.46953E-01	0.47008E-01	0.43896E-01
0.42255E-01	0.38774E-01	0.38043E-01	0.37425E-01	0.35112E-01	0.35764E-01
0.33901E-01	0.33887E-01	0.33067E-01	0.31228E-01	0.30697E-01	0.32753E-01
0.32012E-01	0.31771E-01	0.30932E-01	0.31261E-01	0.31516E-01	0.32681E-01
0.29747E-01	0.31161E-01	0.31103E-01	0.31642E-01	0.36569E-01	0.38018E-01
0.36901E-01	0.36914E-01	0.36977E-01	0.37991E-01	0.37072E-01	0.37326E-01
0.38579E-01	0.33253E-01	0.28713E-01	0.23271E-01	0.19149E-01	0.21351E-01
0.41535E-01	0.42692E-01	0.43121E-01	0.44702E-01	0.49671E-01	0.48716E-01
0.51248E-01	0.51289E-01	0.55827E-01	0.59944E-01	0.57067E-01	0.64402E-01
0.60927E-01	0.65863E-01	0.75909E-01	0.87268E-01	0.95724E-01	0.92894E-01
0.93166E-01	0.85787E-01	0.75282E-01	0.74632E-01	0.64229E-01	0.48860E-01
0.34542E-01	0.25646E-01	0.17302E-01	0.10262E-01	0.53274E-02	0.23765E-02
0.20233E-02	0.56684E-02	0.21556E-01	0.55848E-01	0.13056E+00	0.40418E+00

Table 5.22 Angular neutron spectrum for beryllium experiment (50.8 mm, 0.0 deg.).

<< Spectrum >>

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.86987E-05	-0.11218E-04	-0.88215E-05	-0.34541E-05	-0.50336E-05	-0.33593E-05
0.48407E-05	-0.37820E-05	-0.38680E-05	-0.23671E-05	-0.22259E-05	-0.25258E-05
0.14073E-05	-0.16378E-05	-0.87559E-06	-0.59197E-06	0.50382E-06	-0.52532E-06
0.39521E-06	-0.27901E-06	0.48851E-06	0.48269E-06	-0.15386E-06	0.38219E-06
0.98686E-06	0.70931E-06	0.42107E-06	0.10384E-05	0.10742E-05	0.12082E-05
0.11523E-05	0.16638E-05	0.12307E-05	0.15421E-05	0.14048E-05	0.20603E-05
0.15766E-05	0.17421E-05	0.14958E-05	0.18941E-05	0.19668E-05	0.21107E-05
0.23214E-05	0.20437E-05	0.25149E-05	0.28815E-05	0.31118E-05	0.26870E-05
0.33080E-05	0.34825E-05	0.35615E-05	0.35216E-05	0.33368E-05	0.37599E-05
0.37117E-05	0.37830E-05	0.40129E-05	0.46028E-05	0.41894E-05	0.42916E-05
0.33694E-05	0.26147E-05	0.39567E-05	0.48653E-05	0.48827E-05	0.49749E-05
0.48409E-05	0.50312E-05	0.51703E-05	0.56677E-05	0.58878E-05	0.59731E-05
0.61855E-05	0.66851E-05	0.70271E-05	0.68292E-05	0.74997E-05	0.84819E-05
0.90306E-05	0.89613E-05	0.90795E-05	0.93645E-05	0.10998E-04	0.10626E-04
0.10125E-04	0.10102E-04	0.99055E-05	0.94482E-05	0.80305E-05	0.81141E-05
0.64479E-05	0.51790E-05	0.78234E-05	0.13952E-04	0.19423E-04	0.79010E-05
0.67744E-05	0.70281E-05	0.75843E-05	0.74727E-05	0.69333E-05	0.67096E-05
0.68099E-05	0.64709E-05	0.64003E-05	0.64214E-05	0.56214E-05	0.64677E-05
0.59642E-05	0.60792E-05	0.63559E-05	0.69042E-05	0.76680E-05	0.84785E-05
0.81469E-05	0.77640E-05	0.79872E-05	0.79576E-05	0.88919E-05	0.99074E-05
0.13834E-04	0.23487E-04	0.37709E-04	0.37106E-04	0.14317E-03	0.30790E-02
0.40581E-02	0.42463E-03	0.65816E-05	0.55313E-06	0.19312E-06	0.13517E-06

<< Error >>

0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.14148E+00	0.19247E+00	0.23636E+00	0.52289E+00	0.31948E+00	0.43427E+00
0.27579E+00	0.31707E+00	0.28729E+00	0.45090E+00	0.42526E+00	0.32848E+00
0.53684E+00	0.40404E+00	0.65384E+00	0.87633E+00	0.93090E+00	0.84907E+00
0.98820E+00	0.13198E+01	0.72201E+00	0.63459E+00	0.20051E+01	0.70793E+00
0.26867E+00	0.36243E+00	0.58997E+00	0.22494E+00	0.21611E+00	0.17953E+00
0.18068E+00	0.12795E+00	0.16462E+00	0.12473E+00	0.14149E+00	0.94788E-01
0.11723E+00	0.10361E+00	0.12323E+00	0.98646E-01	0.95810E-01	0.84276E-01
0.80203E-01	0.90197E-01	0.74031E-01	0.66485E-01	0.61456E-01	0.75425E-01
0.59515E-01	0.56868E-01	0.56259E-01	0.59279E-01	0.63316E-01	0.54701E-01
0.56238E-01	0.56970E-01	0.54869E-01	0.48398E-01	0.52186E-01	0.49684E-01
0.62490E-01	0.73525E-01	0.54802E-01	0.47817E-01	0.49807E-01	0.47864E-01
0.47711E-01	0.47742E-01	0.46860E-01	0.43288E-01	0.43709E-01	0.45240E-01
0.44278E-01	0.41386E-01	0.39797E-01	0.42160E-01	0.38777E-01	0.36503E-01
0.35254E-01	0.36308E-01	0.35650E-01	0.35787E-01	0.40937E-01	0.40474E-01
0.40665E-01	0.40330E-01	0.41062E-01	0.41715E-01	0.45279E-01	0.43945E-01
0.51175E-01	0.59828E-01	0.44675E-01	0.33207E-01	0.28221E-01	0.47377E-01
0.51199E-01	0.52206E-01	0.49279E-01	0.49550E-01	0.52866E-01	0.54881E-01
0.53826E-01	0.54695E-01	0.54421E-01	0.57828E-01	0.63673E-01	0.58814E-01
0.63816E-01	0.64279E-01	0.61632E-01	0.59661E-01	0.58965E-01	0.59487E-01
0.60823E-01	0.67364E-01	0.67354E-01	0.67680E-01	0.66009E-01	0.64833E-01
0.51221E-01	0.35834E-01	0.27269E-01	0.27232E-01	0.13266E-01	0.28164E-02
0.24090E-02	0.73117E-02	0.58105E-01	0.20126E+00	0.32477E+00	0.38124E+00

Table 5.23 Angular neutron spectrum for beryllium experiment (50.8 mm, 24.9 deg.).

&lt;&lt; Spectrum &gt;&gt;

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.48447E-06	-0.44730E-06	0.78165E-07	-0.14906E-05	0.74504E-06	0.34441E-06
0.63399E-06	0.95841E-06	0.35030E-06	0.13456E-05	0.59881E-06	0.10002E-05
0.56630E-06	0.92327E-06	0.93648E-06	0.11521E-05	0.10629E-05	0.99813E-06
0.13090E-05	0.11899E-05	0.10910E-05	0.14598E-05	0.15208E-05	0.13916E-05
0.13481E-05	0.11338E-05	0.12057E-05	0.15047E-05	0.13835E-05	0.14032E-05
0.14007E-05	0.15056E-05	0.14142E-05	0.15970E-05	0.18738E-05	0.18903E-05
0.18418E-05	0.19369E-05	0.19996E-05	0.18553E-05	0.22962E-05	0.21284E-05
0.23465E-05	0.23800E-05	0.22923E-05	0.27390E-05	0.29148E-05	0.27517E-05
0.29130E-05	0.27428E-05	0.32924E-05	0.31444E-05	0.31613E-05	0.33318E-05
0.31730E-05	0.30754E-05	0.34697E-05	0.32014E-05	0.31380E-05	0.31992E-05
0.29480E-05	0.21989E-05	0.28835E-05	0.33640E-05	0.38539E-05	0.35292E-05
0.37674E-05	0.34218E-05	0.38077E-05	0.40547E-05	0.39495E-05	0.42934E-05
0.38798E-05	0.40086E-05	0.41084E-05	0.41760E-05	0.44490E-05	0.45159E-05
0.42606E-05	0.43094E-05	0.37541E-05	0.40277E-05	0.39008E-05	0.41547E-05
0.39144E-05	0.39625E-05	0.38323E-05	0.39863E-05	0.41246E-05	0.39614E-05
0.38259E-05	0.34942E-05	0.34866E-05	0.36498E-05	0.34948E-05	0.33220E-05
0.29614E-05	0.34862E-05	0.32945E-05	0.32974E-05	0.36179E-05	0.32700E-05
0.29778E-05	0.30145E-05	0.32970E-05	0.32971E-05	0.33836E-05	0.35363E-05
0.31914E-05	0.35176E-05	0.40453E-05	0.48382E-05	0.51379E-05	0.53590E-05
0.49667E-05	0.44526E-05	0.39686E-05	0.35402E-05	0.43700E-05	0.48237E-05
0.63798E-05	0.12981E-04	0.14974E-04	0.11377E-04	0.37079E-04	0.18645E-03
0.21030E-03	0.24210E-04	0.26872E-06	0.40045E-07	0.85950E-08	0.63548E-08

&lt;&lt; Error &gt;&gt;

0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.40545E+00	0.19060E+01	0.14308E+02	0.69121E+00	0.11749E+01	0.22774E+01
0.11628E+01	0.69968E+00	0.17242E+01	0.42672E+00	0.85859E+00	0.45800E+00
0.74530E+00	0.40574E+00	0.34275E+00	0.24822E+00	0.25465E+00	0.24664E+00
0.16721E+00	0.17200E+00	0.17994E+00	0.12663E+00	0.11160E+00	0.11580E+00
0.11698E+00	0.13363E+00	0.12190E+00	0.93815E-01	0.99144E-01	0.96404E-01
0.90848E-01	0.85606E-01	0.87998E-01	0.79178E-01	0.68064E-01	0.65050E-01
0.66060E-01	0.59883E-01	0.60529E-01	0.64770E-01	0.53229E-01	0.57767E-01
0.53005E-01	0.52375E-01	0.54187E-01	0.47862E-01	0.44615E-01	0.47499E-01
0.45643E-01	0.46328E-01	0.41342E-01	0.42944E-01	0.42663E-01	0.41471E-01
0.44331E-01	0.45086E-01	0.41247E-01	0.43975E-01	0.44446E-01	0.45022E-01
0.46613E-01	0.59041E-01	0.47835E-01	0.43543E-01	0.40031E-01	0.43017E-01
0.39638E-01	0.44352E-01	0.41408E-01	0.39323E-01	0.41586E-01	0.39945E-01
0.43776E-01	0.42622E-01	0.41772E-01	0.42381E-01	0.39516E-01	0.41223E-01
0.43572E-01	0.43721E-01	0.49619E-01	0.47845E-01	0.58463E-01	0.54727E-01
0.56717E-01	0.54627E-01	0.54488E-01	0.53971E-01	0.51861E-01	0.53055E-01
0.52428E-01	0.56723E-01	0.55247E-01	0.53723E-01	0.56592E-01	0.59986E-01
0.66185E-01	0.56529E-01	0.61021E-01	0.61392E-01	0.58668E-01	0.59791E-01
0.65456E-01	0.62890E-01	0.62080E-01	0.61587E-01	0.63196E-01	0.61272E-01
0.74006E-01	0.67697E-01	0.62049E-01	0.56747E-01	0.58161E-01	0.56960E-01
0.62436E-01	0.72310E-01	0.77022E-01	0.89934E-01	0.76489E-01	0.74827E-01
0.62950E-01	0.39334E-01	0.35118E-01	0.39954E-01	0.20446E-01	0.89160E-02
0.82347E-02	0.23823E-01	0.24979E+00	0.73455E+00	0.36438E+01	0.38348E+01

Table 5.24 Angular neutron spectrum for beryllium experiment (50.8 mm, 41.8 deg.).

&lt;&lt; Spectrum &gt;&gt;

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.51304E-06	-0.29074E-05	-0.16158E-05	-0.48075E-05	-0.85508E-06	0.27952E-06
0.11562E-05	0.38777E-06	-0.59842E-06	0.93747E-06	0.19259E-06	0.63997E-06
0.14559E-06	0.35945E-06	0.17324E-06	0.85897E-06	0.11408E-05	0.83287E-06
0.45671E-06	0.69081E-06	0.54930E-06	0.77284E-06	0.80954E-06	0.11405E-05
0.80965E-06	0.11765E-05	0.10680E-05	0.14255E-05	0.12101E-05	0.14023E-05
0.14204E-05	0.14485E-05	0.13055E-05	0.12631E-05	0.15036E-05	0.14166E-05

0.16476E-05	0.18544E-05	0.17066E-05	0.19183E-05	0.18172E-05	0.21026E-05
0.19476E-05	0.21609E-05	0.21803E-05	0.26069E-05	0.24880E-05	0.26663E-05
0.29667E-05	0.27402E-05	0.29075E-05	0.28398E-05	0.28945E-05	0.31129E-05
0.31436E-05	0.29597E-05	0.31572E-05	0.32109E-05	0.29844E-05	0.30205E-05
0.28457E-05	0.24954E-05	0.27882E-05	0.34520E-05	0.34235E-05	0.32303E-05
0.33044E-05	0.34854E-05	0.37839E-05	0.37892E-05	0.37331E-05	0.38473E-05
0.38940E-05	0.38990E-05	0.38164E-05	0.42057E-05	0.43271E-05	0.41652E-05
0.38943E-05	0.43126E-05	0.38883E-05	0.44939E-05	0.44079E-05	0.42030E-05
0.47449E-05	0.42885E-05	0.37599E-05	0.41515E-05	0.35089E-05	0.42020E-05
0.39269E-05	0.30434E-05	0.31128E-05	0.25920E-05	0.25318E-05	0.33098E-05
0.28636E-05	0.25801E-05	0.28499E-05	0.26662E-05	0.27569E-05	0.30076E-05
0.26188E-05	0.29835E-05	0.26500E-05	0.29946E-05	0.35064E-05	0.31924E-05
0.35524E-05	0.38261E-05	0.44448E-05	0.45794E-05	0.45162E-05	0.44947E-05
0.41993E-05	0.38670E-05	0.39990E-05	0.43363E-05	0.48296E-05	0.77940E-05
0.99816E-05	0.10652E-04	0.71408E-05	0.13007E-04	0.43453E-04	0.73851E-04
0.30752E-04	0.17118E-05	0.64450E-07	-0.45281E-07	0.30402E-07	0.54569E-09

<< Error >>

0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.46237E+00	0.29385E+00	0.80397E+00	0.24689E+00	0.11936E+01	0.32054E+01
0.73081E+00	0.18864E+01	0.11567E+01	0.67364E+00	0.32368E+01	0.83437E+00
0.31849E+01	0.11569E+01	0.20983E+01	0.38319E+00	0.25595E+00	0.32508E+00
0.54648E+00	0.33926E+00	0.38896E+00	0.27309E+00	0.24178E+00	0.15983E+00
0.22555E+00	0.14801E+00	0.15652E+00	0.11240E+00	0.12175E+00	0.10425E+00
0.97592E-01	0.10072E+00	0.10641E+00	0.10243E+00	0.87483E-01	0.88801E-01
0.76879E-01	0.70295E-01	0.73228E-01	0.65938E-01	0.70755E-01	0.61587E-01
0.67369E-01	0.60831E-01	0.60910E-01	0.50557E-01	0.53707E-01	0.50920E-01
0.47174E-01	0.50665E-01	0.47626E-01	0.49868E-01	0.48402E-01	0.45802E-01
0.45774E-01	0.47593E-01	0.46513E-01	0.46798E-01	0.50871E-01	0.48788E-01
0.51176E-01	0.57244E-01	0.51385E-01	0.44690E-01	0.46701E-01	0.49374E-01
0.48471E-01	0.46258E-01	0.44954E-01	0.43755E-01	0.44088E-01	0.44950E-01
0.46276E-01	0.45862E-01	0.47284E-01	0.43502E-01	0.44609E-01	0.46199E-01
0.49843E-01	0.46473E-01	0.52726E-01	0.45575E-01	0.56308E-01	0.54898E-01
0.50441E-01	0.53833E-01	0.60122E-01	0.54765E-01	0.62856E-01	0.53268E-01
0.53666E-01	0.67574E-01	0.61410E-01	0.72801E-01	0.74997E-01	0.61270E-01
0.66662E-01	0.76750E-01	0.64293E-01	0.71621E-01	0.75199E-01	0.63087E-01
0.74179E-01	0.62776E-01	0.76967E-01	0.68030E-01	0.61577E-01	0.71457E-01
0.65147E-01	0.64036E-01	0.60492E-01	0.62848E-01	0.63810E-01	0.65132E-01
0.72538E-01	0.78008E-01	0.80418E-01	0.75729E-01	0.75900E-01	0.53658E-01
0.46905E-01	0.43173E-01	0.59534E-01	0.39513E-01	0.19092E-01	0.14481E-01
0.21947E-01	0.93314E-01	0.78692E+00	0.11574E+01	0.12619E+01	0.66907E+02

Table 5.25 Angular neutron spectrum for beryllium experiment (50.8 mm, 66.8 deg.).

<< Spectrum >>

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	-0.14717E-06	-0.12125E-05	0.14371E-05	0.19349E-05	0.27239E-06
0.91210E-06	0.19247E-06	0.87581E-06	-0.13256E-06	0.12265E-05	0.10774E-05
0.84494E-06	0.12814E-05	0.78765E-06	0.93178E-06	0.59979E-06	0.96086E-06
0.85273E-06	0.90906E-06	0.76210E-06	0.92305E-06	0.86588E-06	0.11357E-05
0.10491E-05	0.10994E-05	0.10479E-05	0.10563E-05	0.12032E-05	0.13211E-05
0.13836E-05	0.13121E-05	0.11411E-05	0.13386E-05	0.14266E-05	0.15408E-05
0.14362E-05	0.16935E-05	0.13951E-05	0.16228E-05	0.18364E-05	0.17814E-05
0.17930E-05	0.20400E-05	0.19031E-05	0.21911E-05	0.21013E-05	0.23072E-05
0.25018E-05	0.24310E-05	0.25773E-05	0.26575E-05	0.27207E-05	0.27972E-05
0.28233E-05	0.26348E-05	0.27557E-05	0.29221E-05	0.29244E-05	0.26901E-05
0.24438E-05	0.21726E-05	0.22081E-05	0.29637E-05	0.31487E-05	0.28700E-05
0.30195E-05	0.31616E-05	0.33229E-05	0.31369E-05	0.30973E-05	0.31202E-05
0.36214E-05	0.34409E-05	0.36064E-05	0.38080E-05	0.39076E-05	0.39344E-05
0.42381E-05	0.41960E-05	0.44422E-05	0.46594E-05	0.51156E-05	0.44712E-05
0.44027E-05	0.41321E-05	0.42951E-05	0.39601E-05	0.34227E-05	0.32552E-05
0.31705E-05	0.23271E-05	0.20858E-05	0.18898E-05	0.20947E-05	0.22620E-05
0.24455E-05	0.25253E-05	0.27304E-05	0.25789E-05	0.28227E-05	0.25291E-05
0.27981E-05	0.28131E-05	0.28835E-05	0.28869E-05	0.32347E-05	0.33116E-05
0.36170E-05	0.38412E-05	0.40902E-05	0.39695E-05	0.39174E-05	0.37990E-05

0.41154E-05	0.42932E-05	0.50264E-05	0.53373E-05	0.69028E-05	0.80159E-05
0.87314E-05	0.77378E-05	0.76575E-05	0.94217E-05	0.16806E-04	0.18170E-04
0.63773E-05	0.11318E-05	0.22184E-06	0.10894E-06	0.31460E-07	0.19870E-07

<< Error >>

0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.59876E+00	0.69052E+00	0.56382E+00	0.35611E+00	0.23377E+01
0.60690E+00	0.27817E+01	0.56656E+00	0.35032E+01	0.35050E+00	0.35146E+00
0.39262E+00	0.22641E+00	0.33306E+00	0.25693E+00	0.35222E+00	0.20828E+00
0.21244E+00	0.17779E+00	0.19741E+00	0.15736E+00	0.15822E+00	0.11022E+00
0.11670E+00	0.10456E+00	0.11197E+00	0.10224E+00	0.89167E-01	0.75681E-01
0.71539E-01	0.73455E-01	0.82888E-01	0.69411E-01	0.64436E-01	0.58047E-01
0.61948E-01	0.52794E-01	0.61546E-01	0.53316E-01	0.48339E-01	0.50211E-01
0.49459E-01	0.43832E-01	0.47104E-01	0.41920E-01	0.43560E-01	0.40087E-01
0.38016E-01	0.38601E-01	0.36471E-01	0.35652E-01	0.36284E-01	0.35961E-01
0.35578E-01	0.37759E-01	0.37532E-01	0.34341E-01	0.35339E-01	0.37770E-01
0.40630E-01	0.41877E-01	0.44132E-01	0.36367E-01	0.34400E-01	0.38422E-01
0.36096E-01	0.34588E-01	0.34870E-01	0.36423E-01	0.37706E-01	0.38475E-01
0.33849E-01	0.36246E-01	0.35409E-01	0.33638E-01	0.33766E-01	0.35174E-01
0.33633E-01	0.34303E-01	0.33619E-01	0.32983E-01	0.36322E-01	0.38949E-01
0.37610E-01	0.38337E-01	0.36960E-01	0.39453E-01	0.44204E-01	0.44818E-01
0.45308E-01	0.54629E-01	0.60320E-01	0.63885E-01	0.60915E-01	0.61006E-01
0.60325E-01	0.57124E-01	0.53104E-01	0.57082E-01	0.53330E-01	0.60223E-01
0.53305E-01	0.53542E-01	0.52750E-01	0.50118E-01	0.48523E-01	0.49638E-01
0.47521E-01	0.47202E-01	0.46063E-01	0.51244E-01	0.53320E-01	0.57970E-01
0.56370E-01	0.56705E-01	0.51897E-01	0.51998E-01	0.44901E-01	0.43223E-01
0.40122E-01	0.43469E-01	0.41194E-01	0.35641E-01	0.22844E-01	0.21722E-01
0.37150E-01	0.90164E-01	0.24840E+00	0.28723E+00	0.10879E+01	0.13922E+01

Table 5.26 Angular neutron spectrum for beryllium experiment (152.4 mm, 0.0 deg.).

<< Spectrum >>

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.12358E-04	0.84613E-05	0.81084E-05	0.59893E-05	0.60588E-05	0.60993E-05
0.45344E-05	0.57262E-05	0.35602E-05	0.45562E-05	0.41509E-05	0.38487E-05
0.31431E-05	0.34471E-05	0.30136E-05	0.23872E-05	0.25432E-05	0.18182E-05
0.27145E-05	0.23681E-05	0.22665E-05	0.23697E-05	0.19670E-05	0.20308E-05
0.22092E-05	0.22056E-05	0.19717E-05	0.20263E-05	0.20410E-05	0.20183E-05
0.21502E-05	0.21607E-05	0.21608E-05	0.21256E-05	0.21712E-05	0.22179E-05
0.21527E-05	0.20683E-05	0.23305E-05	0.23132E-05	0.24595E-05	0.22924E-05
0.24282E-05	0.25618E-05	0.24694E-05	0.28232E-05	0.27469E-05	0.29391E-05
0.29003E-05	0.29056E-05	0.31231E-05	0.31391E-05	0.31013E-05	0.30981E-05
0.29624E-05	0.31927E-05	0.30874E-05	0.30817E-05	0.29701E-05	0.27116E-05
0.25948E-05	0.18855E-05	0.24973E-05	0.33142E-05	0.34416E-05	0.32399E-05
0.32802E-05	0.31822E-05	0.33631E-05	0.35696E-05	0.35398E-05	0.35796E-05
0.38010E-05	0.37262E-05	0.41417E-05	0.40649E-05	0.42936E-05	0.43313E-05
0.46703E-05	0.47460E-05	0.47366E-05	0.50187E-05	0.52414E-05	0.50660E-05
0.48134E-05	0.46512E-05	0.42732E-05	0.38509E-05	0.33955E-05	0.30791E-05
0.27570E-05	0.19350E-05	0.19527E-05	0.19922E-05	0.27853E-05	0.24692E-05
0.28394E-05	0.29675E-05	0.29413E-05	0.31308E-05	0.35513E-05	0.30841E-05
0.30188E-05	0.30090E-05	0.30942E-05	0.30298E-05	0.33650E-05	0.34196E-05
0.38212E-05	0.39020E-05	0.42447E-05	0.45150E-05	0.47477E-05	0.46433E-05
0.46992E-05	0.42550E-05	0.47368E-05	0.50163E-05	0.56336E-05	0.71539E-05
0.84126E-05	0.12599E-04	0.17143E-04	0.24096E-04	0.83982E-04	0.62107E-03
0.69440E-03	0.68393E-04	0.21377E-05	0.29200E-06	0.49028E-07	0.23147E-07

<< Error >>

0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.61757E-01	0.15540E+00	0.14320E+00	0.17571E+00	0.15059E+00	0.13422E+00
0.16265E+00	0.11378E+00	0.17548E+00	0.12683E+00	0.12810E+00	0.12579E+00
0.13204E+00	0.10949E+00	0.10868E+00	0.12230E+00	0.10324E+00	0.13421E+00
0.77934E-01	0.82610E-01	0.80976E-01	0.74375E-01	0.80457E-01	0.75918E-01

0.67238E-01	0.63988E-01	0.68945E-01	0.64559E-01	0.60433E-01	0.59783E-01
0.55199E-01	0.53798E-01	0.51272E-01	0.50090E-01	0.47484E-01	0.46673E-01
0.47001E-01	0.48684E-01	0.41839E-01	0.41877E-01	0.39133E-01	0.42675E-01
0.39507E-01	0.37883E-01	0.40069E-01	0.35274E-01	0.35585E-01	0.34592E-01
0.34377E-01	0.34813E-01	0.33437E-01	0.32431E-01	0.32677E-01	0.32473E-01
0.33748E-01	0.31231E-01	0.33343E-01	0.34081E-01	0.33978E-01	0.36962E-01
0.38283E-01	0.49397E-01	0.38781E-01	0.32755E-01	0.31257E-01	0.33209E-01
0.32466E-01	0.33911E-01	0.32169E-01	0.31425E-01	0.31586E-01	0.32078E-01
0.31152E-01	0.32464E-01	0.29487E-01	0.30013E-01	0.29119E-01	0.30247E-01
0.28233E-01	0.27934E-01	0.28023E-01	0.27559E-01	0.32572E-01	0.32237E-01
0.32936E-01	0.32846E-01	0.34460E-01	0.35990E-01	0.38346E-01	0.39711E-01
0.42912E-01	0.52581E-01	0.50833E-01	0.50958E-01	0.44040E-01	0.47862E-01
0.43561E-01	0.42835E-01	0.42773E-01	0.42005E-01	0.38778E-01	0.43040E-01
0.43246E-01	0.42170E-01	0.43507E-01	0.43815E-01	0.41635E-01	0.42693E-01
0.39626E-01	0.40303E-01	0.39219E-01	0.38635E-01	0.38378E-01	0.41049E-01
0.41888E-01	0.47091E-01	0.44387E-01	0.42267E-01	0.40082E-01	0.34939E-01
0.32227E-01	0.25451E-01	0.21566E-01	0.17915E-01	0.92803E-02	0.33707E-02
0.31296E-02	0.97917E-02	0.55795E-01	0.15777E+00	0.57637E+00	0.90531E+00

Table 5.27 Angular neutron spectrum for beryllium experiment (152.4 mm, 12.2 deg.).

&lt;&lt; Spectrum &gt;&gt;

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.67519E-05	-0.17878E-05	-0.13482E-05	-0.12323E-05	-0.74497E-06	0.63292E-07
0.38395E-06	0.68096E-07	0.19441E-06	0.12381E-06	0.42953E-06	0.82457E-06
0.12059E-05	0.83277E-06	0.95807E-06	0.11576E-05	0.96263E-06	0.10467E-05
0.13825E-05	0.12553E-05	0.14492E-05	0.12769E-05	0.14402E-05	0.13772E-05
0.14094E-05	0.14747E-05	0.17328E-05	0.16632E-05	0.15522E-05	0.17650E-05
0.16521E-05	0.17620E-05	0.17413E-05	0.16459E-05	0.17665E-05	0.19396E-05
0.18231E-05	0.18371E-05	0.19274E-05	0.19528E-05	0.20435E-05	0.22293E-05
0.21118E-05	0.21479E-05	0.22285E-05	0.23770E-05	0.25663E-05	0.26828E-05
0.27584E-05	0.27633E-05	0.28811E-05	0.28150E-05	0.28809E-05	0.28999E-05
0.27168E-05	0.27588E-05	0.28614E-05	0.28754E-05	0.27028E-05	0.26718E-05
0.24182E-05	0.18504E-05	0.21492E-05	0.29910E-05	0.30006E-05	0.32550E-05
0.28738E-05	0.30137E-05	0.32968E-05	0.31359E-05	0.32778E-05	0.34008E-05
0.33734E-05	0.36691E-05	0.37811E-05	0.37948E-05	0.38717E-05	0.40617E-05
0.41294E-05	0.41467E-05	0.43159E-05	0.43000E-05	0.41058E-05	0.41058E-05
0.40894E-05	0.38092E-05	0.36647E-05	0.34553E-05	0.31578E-05	0.26623E-05
0.24154E-05	0.18455E-05	0.16604E-05	0.18421E-05	0.20109E-05	0.20672E-05
0.22064E-05	0.24169E-05	0.26312E-05	0.29192E-05	0.26495E-05	0.27513E-05
0.25643E-05	0.27877E-05	0.27932E-05	0.28445E-05	0.27288E-05	0.28876E-05
0.32459E-05	0.33040E-05	0.36201E-05	0.39093E-05	0.40101E-05	0.39921E-05
0.41282E-05	0.39703E-05	0.37320E-05	0.41314E-05	0.46891E-05	0.58004E-05
0.68029E-05	0.99736E-05	0.12769E-04	0.17844E-04	0.46830E-04	0.16310E-03
0.17456E-03	0.22915E-04	0.73972E-06	0.72091E-07	-0.32155E-09	0.48084E-08

&lt;&lt; Error &gt;&gt;

0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.64232E-01	0.49293E+00	0.59290E+00	0.58432E+00	0.84602E+00	0.90724E+01
0.13289E-01	0.67281E+01	0.22092E+01	0.32673E+01	0.87963E+00	0.40968E+00
0.24046E+00	0.31834E+00	0.24275E+00	0.17740E+00	0.19518E+00	0.16246E+00
0.10957E+00	0.11515E+00	0.93761E-01	0.10092E+00	0.83560E-01	0.82692E-01
0.77255E-01	0.69863E-01	0.59109E-01	0.56803E-01	0.60129E-01	0.51174E-01
0.53856E-01	0.48765E-01	0.47488E-01	0.48209E-01	0.44071E-01	0.40168E-01
0.41523E-01	0.40691E-01	0.38578E-01	0.37811E-01	0.37045E-01	0.33127E-01
0.35321E-01	0.35165E-01	0.33458E-01	0.32111E-01	0.29671E-01	0.29074E-01
0.28481E-01	0.28130E-01	0.28029E-01	0.27809E-01	0.27343E-01	0.27251E-01
0.29073E-01	0.28618E-01	0.27760E-01	0.27546E-01	0.29069E-01	0.29293E-01
0.31553E-01	0.37382E-01	0.34912E-01	0.27615E-01	0.28242E-01	0.26345E-01
0.28980E-01	0.28119E-01	0.26251E-01	0.27344E-01	0.27205E-01	0.26667E-01
0.27535E-01	0.25812E-01	0.25346E-01	0.25449E-01	0.25454E-01	0.24943E-01
0.25058E-01	0.25137E-01	0.24218E-01	0.24716E-01	0.31744E-01	0.31175E-01
0.29957E-01	0.30078E-01	0.30468E-01	0.31833E-01	0.33232E-01	0.37610E-01
0.38454E-01	0.45781E-01	0.47211E-01	0.44721E-01	0.43082E-01	0.44356E-01
0.41313E-01	0.39817E-01	0.37591E-01	0.35315E-01	0.37968E-01	0.36847E-01

0.40216E-01	0.37217E-01	0.38016E-01	0.36825E-01	0.38636E-01	0.38460E-01
0.36860E-01	0.37444E-01	0.36249E-01	0.35524E-01	0.35736E-01	0.36621E-01
0.37099E-01	0.37927E-01	0.40932E-01	0.39198E-01	0.36579E-01	0.32781E-01
0.29810E-01	0.23963E-01	0.20784E-01	0.17258E-01	0.10359E-01	0.54760E-02
0.51938E-02	0.14087E-01	0.80590E-01	0.34863E+00	0.46750E+02	0.37458E+01

Table 5.28 Angular neutron spectrum for beryllium experiment (152.4 mm, 24.9 deg.).

<< Spectrum >>

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.16161E-05	-0.71358E-06	0.41277E-06	0.29042E-06	0.15681E-05	0.15069E-05
0.17356E-05	0.88336E-06	0.13805E-05	0.13552E-05	0.18301E-05	0.16978E-05
0.18390E-05	0.15761E-05	0.95738E-06	0.13674E-05	0.15613E-05	0.12957E-05
0.14478E-05	0.11499E-05	0.13747E-05	0.13058E-05	0.14255E-05	0.13905E-05
0.13073E-05	0.15202E-05	0.15840E-05	0.15358E-05	0.17239E-05	0.16285E-05
0.16771E-05	0.18011E-05	0.17132E-05	0.16235E-05	0.16720E-05	0.16652E-05
0.17433E-05	0.19404E-05	0.18873E-05	0.19528E-05	0.20135E-05	0.21829E-05
0.21426E-05	0.21511E-05	0.23437E-05	0.24719E-05	0.24027E-05	0.25185E-05
0.24769E-05	0.26374E-05	0.26686E-05	0.26157E-05	0.25887E-05	0.27475E-05
0.26510E-05	0.26630E-05	0.28071E-05	0.27301E-05	0.27456E-05	0.25138E-05
0.22980E-05	0.16727E-05	0.21801E-05	0.28829E-05	0.30039E-05	0.29612E-05
0.28270E-05	0.28563E-05	0.31021E-05	0.30573E-05	0.34021E-05	0.31651E-05
0.33552E-05	0.34337E-05	0.36203E-05	0.34728E-05	0.37534E-05	0.37014E-05
0.39878E-05	0.38834E-05	0.38742E-05	0.38129E-05	0.40189E-05	0.39726E-05
0.36846E-05	0.39523E-05	0.33341E-05	0.31276E-05	0.29956E-05	0.28287E-05
0.25296E-05	0.18791E-05	0.16082E-05	0.18216E-05	0.21752E-05	0.20826E-05
0.20555E-05	0.23303E-05	0.23098E-05	0.24124E-05	0.25067E-05	0.23237E-05
0.23248E-05	0.26518E-05	0.23758E-05	0.25574E-05	0.25727E-05	0.27087E-05
0.28755E-05	0.31754E-05	0.31465E-05	0.34376E-05	0.35964E-05	0.37572E-05
0.34864E-05	0.34809E-05	0.34552E-05	0.37443E-05	0.43950E-05	0.53852E-05
0.67798E-05	0.92223E-05	0.89854E-05	0.14857E-04	0.43022E-04	0.76982E-04
0.36190E-04	0.24134E-05	0.48092E-07	0.37576E-08	-0.18578E-07	0.20553E-07

<< Error >>

0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.11981E+00	0.94433E+00	0.17120E+01	0.20893E+01	0.35811E+00	0.33017E+00
0.25504E+00	0.45503E+00	0.27865E+00	0.26456E+00	0.17926E+00	0.17756E+00
0.14152E+00	0.14319E+00	0.21539E+00	0.13526E+00	0.10703E+00	0.12028E+00
0.96201E-01	0.11222E+00	0.87105E-01	0.88775E-01	0.77572E-01	0.73253E-01
0.73651E-01	0.63358E-01	0.57442E-01	0.57387E-01	0.49571E-01	0.50049E-01
0.48179E-01	0.44307E-01	0.44136E-01	0.45448E-01	0.43812E-01	0.43228E-01
0.40863E-01	0.36967E-01	0.36828E-01	0.36214E-01	0.35607E-01	0.32733E-01
0.32955E-01	0.33022E-01	0.30251E-01	0.30392E-01	0.29549E-01	0.30141E-01
0.30263E-01	0.28420E-01	0.28382E-01	0.29229E-01	0.29255E-01	0.27898E-01
0.28664E-01	0.28607E-01	0.27586E-01	0.28370E-01	0.28188E-01	0.29836E-01
0.32183E-01	0.40355E-01	0.32929E-01	0.27617E-01	0.26979E-01	0.27794E-01
0.28499E-01	0.28824E-01	0.27371E-01	0.27610E-01	0.25812E-01	0.28366E-01
0.27231E-01	0.26711E-01	0.25912E-01	0.26746E-01	0.25758E-01	0.26391E-01
0.25144E-01	0.26031E-01	0.26733E-01	0.27087E-01	0.32832E-01	0.32079E-01
0.32772E-01	0.30552E-01	0.34221E-01	0.34759E-01	0.35397E-01	0.36637E-01
0.38314E-01	0.44450E-01	0.47407E-01	0.45401E-01	0.40575E-01	0.42809E-01
0.45445E-01	0.40753E-01	0.42096E-01	0.39896E-01	0.39801E-01	0.41495E-01
0.41331E-01	0.37372E-01	0.42486E-01	0.41147E-01	0.41477E-01	0.40394E-01
0.39869E-01	0.38133E-01	0.38920E-01	0.37779E-01	0.38160E-01	0.38114E-01
0.41033E-01	0.42753E-01	0.41866E-01	0.40771E-01	0.37833E-01	0.33557E-01
0.29981E-01	0.25138E-01	0.25804E-01	0.19514E-01	0.11068E-01	0.81798E-02
0.11716E-01	0.45339E-01	0.35846E+00	0.37868E+01	0.89612E+00	0.73041E+00

Table 5.29 Angular neutron spectrum for beryllium experiment (152.4 mm, 41.8 deg.).

&lt;&lt; Spectrum &gt;&gt;

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.42113E-06	-0.26459E-05	-0.37408E-06	0.10419E-06	-0.23258E-06	0.96903E-06
0.34825E-06	0.44236E-06	0.11444E-05	0.25545E-06	0.82397E-06	0.17377E-05
0.85606E-06	0.98922E-06	0.11273E-05	0.11502E-05	0.99544E-06	0.11357E-05
0.12994E-05	0.11550E-05	0.12059E-05	0.12790E-05	0.10988E-05	0.12828E-05
0.14416E-05	0.12726E-05	0.12892E-05	0.14048E-05	0.12678E-05	0.12118E-05
0.13644E-05	0.14418E-05	0.14173E-05	0.15810E-05	0.14929E-05	0.16587E-05
0.16744E-05	0.16233E-05	0.17107E-05	0.18812E-05	0.17866E-05	0.18270E-05
0.18213E-05	0.18987E-05	0.21360E-05	0.21145E-05	0.22217E-05	0.24249E-05
0.23947E-05	0.23807E-05	0.25462E-05	0.24616E-05	0.23622E-05	0.24648E-05
0.24532E-05	0.24712E-05	0.24832E-05	0.25223E-05	0.22940E-05	0.26734E-05
0.22602E-05	0.16230E-05	0.17656E-05	0.24899E-05	0.27669E-05	0.26964E-05
0.26136E-05	0.26058E-05	0.28736E-05	0.29305E-05	0.28275E-05	0.29010E-05
0.30345E-05	0.31323E-05	0.32775E-05	0.31581E-05	0.34346E-05	0.35433E-05
0.35986E-05	0.37146E-05	0.36350E-05	0.36213E-05	0.36712E-05	0.36386E-05
0.35528E-05	0.34914E-05	0.32191E-05	0.30500E-05	0.27915E-05	0.23783E-05
0.19710E-05	0.14550E-05	0.12712E-05	0.14139E-05	0.15688E-05	0.17245E-05
0.19446E-05	0.20365E-05	0.18605E-05	0.20604E-05	0.20293E-05	0.19371E-05
0.22231E-05	0.22237E-05	0.22607E-05	0.22893E-05	0.22455E-05	0.25234E-05
0.25171E-05	0.28181E-05	0.29471E-05	0.30557E-05	0.29934E-05	0.28665E-05
0.27977E-05	0.29138E-05	0.30283E-05	0.33135E-05	0.40820E-05	0.49598E-05
0.57710E-05	0.61390E-05	0.60593E-05	0.10048E-04	0.20105E-04	0.25868E-04
0.10906E-04	0.98159E-06	0.33813E-07	-0.17052E-07	0.12688E-07	0.92827E-09

&lt;&lt; Error &gt;&gt;

0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.24987E+00	0.17542E+00	0.18692E+01	0.58957E+01	0.23007E+01	0.50446E+00
0.12563E+01	0.88957E+00	0.33034E+00	0.13710E+01	0.39071E+00	0.16685E+00
0.29572E+00	0.23222E+00	0.17828E+00	0.15510E+00	0.16600E+00	0.12987E+00
0.99118E-01	0.10877E+00	0.97175E-01	0.86726E-01	0.93534E-01	0.77910E-01
0.64355E-01	0.72910E-01	0.67910E-01	0.60383E-01	0.63905E-01	0.65010E-01
0.55577E-01	0.51359E-01	0.50413E-01	0.44014E-01	0.44869E-01	0.41548E-01
0.40825E-01	0.41577E-01	0.39120E-01	0.36270E-01	0.37325E-01	0.36213E-01
0.36103E-01	0.34828E-01	0.31240E-01	0.31867E-01	0.31145E-01	0.28773E-01
0.28992E-01	0.29356E-01	0.28010E-01	0.28552E-01	0.30036E-01	0.28583E-01
0.28037E-01	0.29003E-01	0.28728E-01	0.28574E-01	0.30882E-01	0.29815E-01
0.30556E-01	0.40938E-01	0.38338E-01	0.29516E-01	0.27731E-01	0.28637E-01
0.29243E-01	0.29611E-01	0.27218E-01	0.27056E-01	0.28735E-01	0.29356E-01
0.28033E-01	0.27765E-01	0.26874E-01	0.27583E-01	0.26377E-01	0.26114E-01
0.26622E-01	0.25792E-01	0.27512E-01	0.27588E-01	0.32360E-01	0.32286E-01
0.32206E-01	0.31791E-01	0.33880E-01	0.33946E-01	0.36590E-01	0.40227E-01
0.45509E-01	0.54341E-01	0.61866E-01	0.55628E-01	0.50113E-01	0.48103E-01
0.43357E-01	0.41009E-01	0.44529E-01	0.41567E-01	0.42786E-01	0.45121E-01
0.39208E-01	0.40257E-01	0.41229E-01	0.42206E-01	0.42758E-01	0.39794E-01
0.41207E-01	0.38459E-01	0.39557E-01	0.40135E-01	0.41527E-01	0.44528E-01
0.45446E-01	0.45123E-01	0.43392E-01	0.43059E-01	0.37353E-01	0.34022E-01
0.30700E-01	0.29693E-01	0.30049E-01	0.22338E-01	0.15187E-01	0.13248E-01
0.20032E-01	0.67712E-01	0.61671E+00	0.11174E+01	0.14008E+01	0.17414E+02

Table 5.30 Angular neutron spectrum for beryllium experiment (152.4 mm, 66.8 deg.).

&lt;&lt; Spectrum &gt;&gt;

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.71909E-07	-0.93088E-06	-0.40883E-06	-0.23200E-06	0.44855E-06	-0.65637E-06
0.79949E-06	0.26571E-06	0.82451E-06	0.73746E-06	0.74817E-06	0.75337E-06
0.96344E-06	0.85058E-06	0.10797E-05	0.12264E-05	0.11910E-05	0.88011E-06
0.10630E-05	0.90701E-06	0.93252E-06	0.96928E-06	0.10136E-05	0.10749E-05
0.99020E-06	0.99480E-06	0.88715E-06	0.10455E-05	0.10850E-05	0.12176E-05
0.12175E-05	0.11789E-05	0.10273E-05	0.10717E-05	0.11414E-05	0.13154E-05



0.12981E-05	0.12589E-05	0.14241E-05	0.14068E-05	0.14077E-05	0.14700E-05
0.15242E-05	0.15393E-05	0.15366E-05	0.16002E-05	0.16650E-05	0.18558E-05
0.15635E-05	0.17588E-05	0.18594E-05	0.17416E-05	0.19292E-05	0.18725E-05
0.17078E-05	0.17074E-05	0.17929E-05	0.18772E-05	0.17840E-05	0.17595E-05
0.14395E-05	0.12811E-05	0.16193E-05	0.17853E-05	0.21106E-05	0.20319E-05
0.18396E-05	0.17966E-05	0.19739E-05	0.21294E-05	0.21411E-05	0.22052E-05
0.21856E-05	0.23072E-05	0.23767E-05	0.24655E-05	0.24644E-05	0.25924E-05
0.26178E-05	0.26294E-05	0.26411E-05	0.27743E-05	0.29030E-05	0.25335E-05
0.24036E-05	0.23752E-05	0.20129E-05	0.18900E-05	0.15299E-05	0.15136E-05
0.11801E-05	0.11728E-05	0.89676E-06	0.11343E-05	0.10329E-05	0.11800E-05
0.13357E-05	0.12937E-05	0.14379E-05	0.14972E-05	0.13377E-05	0.13458E-05
0.14852E-05	0.15212E-05	0.14176E-05	0.16794E-05	0.14494E-05	0.15556E-05
0.16854E-05	0.18590E-05	0.19587E-05	0.19440E-05	0.14860E-05	0.17328E-05
0.18928E-05	0.21882E-05	0.23647E-05	0.27625E-05	0.35425E-05	0.32874E-05
0.25510E-05	0.29717E-05	0.34065E-05	0.47117E-05	0.42205E-05	0.16915E-05
0.28471E-06	0.66925E-07	-0.18309E-07	-0.15858E-07	0.27935E-07	-0.33300E-08

<< Error >>

0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.61860E+00	0.41153E+00	0.18336E+01	0.28113E+01	0.12917E+01	0.81500E+00
0.59057E+00	0.15994E+01	0.48042E+00	0.50038E+00	0.45402E+00	0.41778E+00
0.29037E+00	0.28474E+00	0.19240E+00	0.15332E+00	0.14282E+00	0.17555E+00
0.13135E+00	0.14528E+00	0.12719E+00	0.11971E+00	0.10560E+00	0.96813E-01
0.98769E-01	0.94587E-01	0.10229E+00	0.83129E-01	0.77113E-01	0.65949E-01
0.64150E-01	0.65217E-01	0.71763E-01	0.66422E-01	0.62616E-01	0.51568E-01
0.51175E-01	0.52453E-01	0.45435E-01	0.46352E-01	0.47817E-01	0.44330E-01
0.43458E-01	0.42982E-01	0.42530E-01	0.42353E-01	0.40581E-01	0.36406E-01
0.42569E-01	0.38657E-01	0.37508E-01	0.39623E-01	0.36500E-01	0.35964E-01
0.40909E-01	0.40528E-01	0.39220E-01	0.37825E-01	0.39279E-01	0.39786E-01
0.47445E-01	0.51925E-01	0.44506E-01	0.40912E-01	0.36071E-01	0.37640E-01
0.40557E-01	0.42760E-01	0.39790E-01	0.36636E-01	0.37878E-01	0.37595E-01
0.38742E-01	0.37624E-01	0.36695E-01	0.35371E-01	0.36857E-01	0.36522E-01
0.37077E-01	0.37690E-01	0.38384E-01	0.37369E-01	0.39094E-01	0.42614E-01
0.43149E-01	0.41606E-01	0.48011E-01	0.50378E-01	0.58033E-01	0.57618E-01
0.67950E-01	0.66281E-01	0.87387E-01	0.69372E-01	0.83863E-01	0.76315E-01
0.69444E-01	0.75128E-01	0.69276E-01	0.66026E-01	0.74704E-01	0.71816E-01
0.62539E-01	0.61235E-01	0.62638E-01	0.53126E-01	0.64703E-01	0.65309E-01
0.62731E-01	0.58025E-01	0.60589E-01	0.62652E-01	0.86620E-01	0.82119E-01
0.77596E-01	0.73704E-01	0.74102E-01	0.67889E-01	0.56953E-01	0.62318E-01
0.82134E-01	0.67849E-01	0.60827E-01	0.42950E-01	0.42109E-01	0.74824E-01
0.25034E+00	0.55096E+00	0.16490E+01	0.15951E+01	0.83071E+00	0.77837E+01

Table 5.31 Mid energy of measured spectra for graphite experiment.

0.48230E+00	0.49451E+00	0.50703E+00	0.51986E+00	0.53302E+00	0.54652E+00
0.56035E+00	0.57454E+00	0.58908E+00	0.60399E+00	0.61929E+00	0.63496E+00
0.65104E+00	0.66752E+00	0.68442E+00	0.70174E+00	0.71951E+00	0.73772E+00
0.75640E+00	0.77554E+00	0.79518E+00	0.81531E+00	0.83595E+00	0.85711E+00
0.87881E+00	0.90105E+00	0.92386E+00	0.94725E+00	0.97123E+00	0.99582E+00
0.10210E+01	0.10469E+01	0.10734E+01	0.11006E+01	0.11284E+01	0.11570E+01
0.11863E+01	0.12163E+01	0.12471E+01	0.12787E+01	0.13110E+01	0.13442E+01
0.13782E+01	0.14131E+01	0.14489E+01	0.14856E+01	0.15232E+01	0.15618E+01
0.16013E+01	0.16418E+01	0.16834E+01	0.17260E+01	0.17697E+01	0.18145E+01
0.18604E+01	0.19075E+01	0.19558E+01	0.20053E+01	0.20561E+01	0.21081E+01
0.21615E+01	0.22162E+01	0.22723E+01	0.23299E+01	0.23888E+01	0.24493E+01
0.25113E+01	0.25749E+01	0.26401E+01	0.27069E+01	0.27754E+01	0.28457E+01
0.29177E+01	0.29916E+01	0.30673E+01	0.31450E+01	0.32246E+01	0.33062E+01
0.33899E+01	0.34758E+01	0.35637E+01	0.36540E+01	0.37465E+01	0.38413E+01
0.39385E+01	0.40382E+01	0.41405E+01	0.42453E+01	0.43528E+01	0.44630E+01
0.45759E+01	0.46918E+01	0.48105E+01	0.49323E+01	0.50572E+01	0.51852E+01
0.53165E+01	0.54511E+01	0.55891E+01	0.57305E+01	0.58756E+01	0.60244E+01
0.61769E+01	0.63332E+01	0.64936E+01	0.66579E+01	0.68265E+01	0.69993E+01
0.71765E+01	0.73582E+01	0.75444E+01	0.77354E+01	0.79312E+01	0.81320E+01
0.83379E+01	0.85490E+01	0.87654E+01	0.89873E+01	0.92148E+01	0.94481E+01
0.96872E+01	0.99325E+01	0.10184E+02	0.10442E+02	0.10706E+02	0.10977E+02
0.11255E+02	0.11540E+02	0.11832E+02	0.12132E+02	0.12439E+02	0.12754E+02
0.13076E+02	0.13407E+02	0.13747E+02	0.14095E+02	0.14452E+02	0.14818E+02
0.15193E+02	0.15577E+02	0.15972E+02	0.16376E+02	0.16790E+02	0.17216E+02
0.17651E+02	0.18098E+02	0.18556E+02	0.19026E+02	0.19508E+02	0.20002E+02

Table 5.32 Source neutron spectrum for graphite experiment.

<< Spectrum >>

0.31078E-03	0.48504E-03	0.46495E-03	0.56693E-03	0.58587E-03	0.64349E-03
0.71645E-03	0.87052E-03	0.80679E-03	0.91443E-03	0.12220E-02	0.12153E-02
0.11177E-02	0.13551E-02	0.14307E-02	0.15143E-02	0.15728E-02	0.14745E-02
0.17072E-02	0.16580E-02	0.17048E-02	0.17617E-02	0.18158E-02	0.17938E-02
0.19782E-02	0.19500E-02	0.20040E-02	0.21058E-02	0.21297E-02	0.20000E-02
0.22135E-02	0.22299E-02	0.21980E-02	0.23904E-02	0.24030E-02	0.24018E-02
0.26129E-02	0.24246E-02	0.26149E-02	0.25448E-02	0.25862E-02	0.25704E-02
0.26032E-02	0.25965E-02	0.27693E-02	0.27265E-02	0.26941E-02	0.26986E-02
0.27899E-02	0.26917E-02	0.28619E-02	0.27189E-02	0.29822E-02	0.29636E-02
0.26166E-02	0.27104E-02	0.27827E-02	0.26645E-02	0.27295E-02	0.25446E-02
0.26584E-02	0.26428E-02	0.26836E-02	0.26991E-02	0.27980E-02	0.25356E-02
0.25206E-02	0.25983E-02	0.27132E-02	0.25531E-02	0.27470E-02	0.27613E-02
0.26560E-02	0.27241E-02	0.28975E-02	0.31014E-02	0.32013E-02	0.29395E-02
0.23870E-02	0.23187E-02	0.22299E-02	0.25042E-02	0.22934E-02	0.22580E-02
0.23130E-02	0.22846E-02	0.22506E-02	0.20744E-02	0.21549E-02	0.21449E-02
0.19617E-02	0.20815E-02	0.20587E-02	0.20084E-02	0.20868E-02	0.22078E-02
0.21244E-02	0.21899E-02	0.20926E-02	0.20854E-02	0.19539E-02	0.18879E-02
0.17215E-02	0.15454E-02	0.15607E-02	0.18138E-02	0.13895E-02	0.13305E-02
0.13234E-02	0.11859E-02	0.11811E-02	0.11942E-02	0.10088E-02	0.12647E-02
0.11399E-02	0.11166E-02	0.11453E-02	0.11961E-02	0.10300E-02	0.11508E-02
0.12560E-02	0.12218E-02	0.11429E-02	0.15245E-02	0.21711E-02	0.23253E-02
0.29457E-02	0.36214E-02	0.52846E-02	0.68925E-02	0.80334E-02	0.86922E-02
0.94132E-02	0.13815E-01	0.29448E-01	0.68488E-01	0.25554E+00	0.10098E+01
0.11132E+01	0.50389E+00	0.59669E-01	0.64854E-02	0.10045E-02	0.88914E-04
-0.42091E-05	-0.53171E-05	0.00000E+00	-0.84411E-05	0.16683E-04	-0.86137E-05

<< Error >>

0.17828E+00	0.12541E+00	0.12919E+00	0.11046E+00	0.11001E+00	0.10307E+00
0.93599E-01	0.81159E-01	0.87162E-01	0.75915E-01	0.64088E-01	0.64287E-01
0.67400E-01	0.59613E-01	0.57763E-01	0.54796E-01	0.52948E-01	0.53404E-01
0.48796E-01	0.49233E-01	0.47979E-01	0.46605E-01	0.45768E-01	0.45874E-01
0.43317E-01	0.43835E-01	0.43105E-01	0.42166E-01	0.41853E-01	0.44345E-01
0.41580E-01	0.41809E-01	0.41520E-01	0.39448E-01	0.39427E-01	0.38527E-01
0.36561E-01	0.38116E-01	0.36741E-01	0.37712E-01	0.37653E-01	0.37653E-01
0.37616E-01	0.37555E-01	0.36237E-01	0.36264E-01	0.36437E-01	0.36629E-01
0.35768E-01	0.36858E-01	0.35504E-01	0.36638E-01	0.34948E-01	0.35116E-01
0.37613E-01	0.36499E-01	0.36124E-01	0.37317E-01	0.36475E-01	0.37998E-01
0.36946E-01	0.36900E-01	0.36938E-01	0.37005E-01	0.36543E-01	0.38497E-01

0.38360E-01	0.38213E-01	0.37666E-01	0.39248E-01	0.37785E-01	0.37828E-01
0.39634E-01	0.38980E-01	0.38331E-01	0.36995E-01	0.36612E-01	0.38405E-01
0.43355E-01	0.44143E-01	0.45396E-01	0.43750E-01	0.47095E-01	0.47670E-01
0.47284E-01	0.46924E-01	0.47403E-01	0.50072E-01	0.49335E-01	0.49628E-01
0.52282E-01	0.50484E-01	0.51739E-01	0.51933E-01	0.51742E-01	0.56439E-01
0.58062E-01	0.57066E-01	0.58528E-01	0.58151E-01	0.60878E-01	0.61775E-01
0.65217E-01	0.70217E-01	0.69146E-01	0.63879E-01	0.76357E-01	0.76613E-01
0.78314E-01	0.82596E-01	0.85384E-01	0.86557E-01	0.97955E-01	0.85084E-01
0.91236E-01	0.91380E-01	0.95678E-01	0.90734E-01	0.10327E+00	0.95956E-01
0.91748E-01	0.93555E-01	0.10202E+00	0.86799E-01	0.71226E-01	0.69456E-01
0.59784E-01	0.54722E-01	0.45156E-01	0.39136E-01	0.36576E-01	0.34967E-01
0.33913E-01	0.27746E-01	0.18978E-01	0.12456E-01	0.64270E-02	0.32247E-02
0.30447E-02	0.44645E-02	0.12801E-01	0.38224E-01	0.95667E-01	0.31687E+00
0.31543E+01	0.12728E+01	0.10000E+01	0.17690E+01	0.71337E+00	0.10000E+01

Table 5.33 Angular neutron spectrum for graphite experiment (50.6 mm, 0.0 deg.).

<< Spectrum >>

0.14842E-05	0.16901E-05	0.20541E-05	0.30233E-05	0.26238E-05	0.32817E-05
0.37360E-05	0.44573E-05	0.42601E-05	0.40727E-05	0.52029E-05	0.52788E-05
0.57304E-05	0.56909E-05	0.59726E-05	0.58914E-05	0.67357E-05	0.63978E-05
0.72075E-05	0.69571E-05	0.70268E-05	0.73289E-05	0.78063E-05	0.76795E-05
0.83763E-05	0.87538E-05	0.85098E-05	0.88504E-05	0.98239E-05	0.95502E-05
0.10675E-04	0.10899E-04	0.11303E-04	0.11980E-04	0.11453E-04	0.11906E-04
0.12124E-04	0.12218E-04	0.11540E-04	0.12707E-04	0.12920E-04	0.13307E-04
0.13233E-04	0.14296E-04	0.13510E-04	0.14673E-04	0.14406E-04	0.14192E-04
0.15224E-04	0.15086E-04	0.14965E-04	0.15206E-04	0.15025E-04	0.15871E-04
0.15590E-04	0.15757E-04	0.15116E-04	0.13309E-04	0.16344E-04	0.16254E-04
0.16410E-04	0.16158E-04	0.17077E-04	0.15813E-04	0.15245E-04	0.15924E-04
0.15855E-04	0.15554E-04	0.14249E-04	0.13944E-04	0.11662E-04	0.13051E-04
0.18637E-04	0.18929E-04	0.18513E-04	0.15691E-04	0.12060E-04	0.10596E-04
0.10235E-04	0.94166E-05	0.10203E-04	0.10275E-04	0.11008E-04	0.11898E-04
0.12746E-04	0.12420E-04	0.11114E-04	0.11773E-04	0.13232E-04	0.13359E-04
0.14494E-04	0.16852E-04	0.16402E-04	0.17865E-04	0.17541E-04	0.16933E-04
0.16252E-04	0.16032E-04	0.15657E-04	0.14256E-04	0.14042E-04	0.13183E-04
0.10481E-04	0.12659E-04	0.12430E-04	0.13386E-04	0.12811E-04	0.12473E-04
0.99753E-05	0.80338E-05	0.69827E-05	0.68076E-05	0.64222E-05	0.76672E-05
0.72118E-05	0.82837E-05	0.90854E-05	0.88397E-05	0.10235E-04	0.11203E-04
0.12362E-04	0.21600E-04	0.34933E-04	0.35267E-04	0.26864E-04	0.22560E-04
0.23080E-04	0.32835E-04	0.41517E-04	0.54241E-04	0.64037E-04	0.69392E-04
0.78674E-04	0.12076E-03	0.23649E-03	0.59555E-03	0.30418E-02	0.72962E-02
0.55751E-02	0.19468E-02	0.33601E-03	0.11391E-03	0.56192E-04	0.33055E-04
0.20208E-04	0.13726E-04	0.91690E-05	0.61390E-05	0.51461E-05	0.29668E-05

<< Error >>

0.18005E+00	0.14140E+00	0.11688E+00	0.88792E-01	0.98182E-01	0.82224E-01
0.74097E-01	0.65991E-01	0.65570E-01	0.64163E-01	0.55841E-01	0.55341E-01
0.51861E-01	0.51962E-01	0.49803E-01	0.48662E-01	0.45775E-01	0.46276E-01
0.41594E-01	0.41735E-01	0.41294E-01	0.41128E-01	0.40343E-01	0.38853E-01
0.37210E-01	0.36554E-01	0.36879E-01	0.35908E-01	0.34074E-01	0.35543E-01
0.33154E-01	0.32496E-01	0.31343E-01	0.30166E-01	0.31074E-01	0.30597E-01
0.29894E-01	0.29580E-01	0.30494E-01	0.29125E-01	0.29268E-01	0.28992E-01
0.28545E-01	0.27644E-01	0.28962E-01	0.27168E-01	0.27260E-01	0.27518E-01
0.26715E-01	0.26714E-01	0.26835E-01	0.26784E-01	0.27043E-01	0.26459E-01
0.26499E-01	0.26499E-01	0.27046E-01	0.28681E-01	0.25809E-01	0.26123E-01
0.26081E-01	0.26036E-01	0.25259E-01	0.26519E-01	0.27150E-01	0.26656E-01
0.26831E-01	0.27551E-01	0.29149E-01	0.29423E-01	0.33212E-01	0.30920E-01
0.25783E-01	0.25763E-01	0.25866E-01	0.29171E-01	0.33654E-01	0.37234E-01
0.38245E-01	0.41190E-01	0.39647E-01	0.39678E-01	0.38661E-01	0.36912E-01
0.35504E-01	0.35649E-01	0.38411E-01	0.38145E-01	0.35562E-01	0.35595E-01
0.33889E-01	0.30720E-01	0.31464E-01	0.30123E-01	0.31290E-01	0.35624E-01
0.35691E-01	0.36231E-01	0.36847E-01	0.38587E-01	0.38924E-01	0.40444E-01
0.46436E-01	0.41846E-01	0.42253E-01	0.40993E-01	0.42563E-01	0.43278E-01
0.49871E-01	0.57082E-01	0.63457E-01	0.64052E-01	0.68581E-01	0.61665E-01
0.66493E-01	0.61611E-01	0.57704E-01	0.60166E-01	0.55458E-01	0.52978E-01
0.50870E-01	0.36804E-01	0.28598E-01	0.28796E-01	0.34023E-01	0.37780E-01
0.37427E-01	0.30746E-01	0.27269E-01	0.24013E-01	0.22100E-01	0.21181E-01
0.19837E-01	0.15993E-01	0.11466E-01	0.72246E-02	0.31831E-02	0.20499E-02
0.23247E-02	0.38813E-02	0.92158E-02	0.15605E-01	0.21856E-01	0.28081E-01
0.35578E-01	0.42724E-01	0.52118E-01	0.63542E-01	0.69883E-01	0.91774E-01

Table 5.34 Angular neutron spectrum for graphite experiment (50.6 mm, 12.2 deg.).

<< Spectrum >>

0.15054E-05	0.11862E-05	0.14441E-05	0.17185E-05	0.22025E-05	0.19946E-05
0.27665E-05	0.24416E-05	0.28125E-05	0.29378E-05	0.30009E-05	0.29460E-05
0.33947E-05	0.39813E-05	0.37285E-05	0.35767E-05	0.41278E-05	0.44440E-05
0.43769E-05	0.41736E-05	0.50983E-05	0.49439E-05	0.48174E-05	0.52977E-05
0.52714E-05	0.52726E-05	0.55658E-05	0.54578E-05	0.58428E-05	0.60860E-05
0.61846E-05	0.62807E-05	0.63683E-05	0.72134E-05	0.73118E-05	0.77682E-05
0.75473E-05	0.70855E-05	0.74933E-05	0.73925E-05	0.82978E-05	0.80741E-05
0.85296E-05	0.88162E-05	0.83606E-05	0.91689E-05	0.86700E-05	0.88753E-05
0.86502E-05	0.10059E-04	0.93869E-05	0.95352E-05	0.96540E-05	0.91910E-05
0.99960E-05	0.10138E-04	0.94830E-05	0.82229E-05	0.97649E-05	0.99969E-05
0.10197E-04	0.10442E-04	0.99401E-05	0.99062E-05	0.94546E-05	0.99917E-05
0.95679E-05	0.95261E-05	0.89741E-05	0.85066E-05	0.79494E-05	0.78107E-05
0.12113E-04	0.12424E-04	0.11977E-04	0.99808E-05	0.74918E-05	0.66820E-05
0.65706E-05	0.58597E-05	0.65179E-05	0.64769E-05	0.72565E-05	0.70196E-05
0.73895E-05	0.73089E-05	0.71103E-05	0.72688E-05	0.82365E-05	0.91347E-05
0.97438E-05	0.10281E-04	0.11671E-04	0.11603E-04	0.11413E-04	0.11188E-04
0.10556E-04	0.10317E-04	0.10049E-04	0.90086E-05	0.81004E-05	0.74498E-05
0.56476E-05	0.71514E-05	0.70833E-05	0.76174E-05	0.82583E-05	0.80587E-05
0.66095E-05	0.48567E-05	0.41720E-05	0.36729E-05	0.39453E-05	0.48183E-05
0.47175E-05	0.48023E-05	0.53506E-05	0.52965E-05	0.64366E-05	0.70703E-05
0.10435E-04	0.19519E-04	0.31460E-04	0.30463E-04	0.20428E-04	0.14551E-04
0.14338E-04	0.17297E-04	0.23363E-04	0.28043E-04	0.33267E-04	0.33725E-04
0.41172E-04	0.64213E-04	0.12631E-03	0.34255E-03	0.18096E-02	0.45106E-02
0.35055E-02	0.11524E-02	0.15946E-03	0.36711E-04	0.14892E-04	0.73175E-05
0.40259E-05	0.22661E-05	0.14254E-05	0.78978E-06	0.53721E-06	0.31658E-06

<< Error >>

0.11876E+00	0.14790E+00	0.11951E+00	0.10796E+00	0.84401E-01	0.86591E-01
0.73894E-01	0.74780E-01	0.64435E-01	0.61576E-01	0.61553E-01	0.60122E-01
0.53526E-01	0.47622E-01	0.50625E-01	0.51132E-01	0.45829E-01	0.43032E-01
0.42814E-01	0.43730E-01	0.37365E-01	0.37579E-01	0.38617E-01	0.36776E-01
0.37179E-01	0.37473E-01	0.35989E-01	0.35658E-01	0.34861E-01	0.34094E-01
0.34157E-01	0.33782E-01	0.33534E-01	0.30385E-01	0.30503E-01	0.28871E-01
0.29462E-01	0.30205E-01	0.29583E-01	0.30452E-01	0.28344E-01	0.28771E-01
0.28173E-01	0.27471E-01	0.28746E-01	0.26804E-01	0.27585E-01	0.27442E-01
0.27862E-01	0.25561E-01	0.26831E-01	0.26818E-01	0.26186E-01	0.27422E-01
0.25973E-01	0.25667E-01	0.26645E-01	0.29307E-01	0.26351E-01	0.26330E-01
0.25236E-01	0.25503E-01	0.26117E-01	0.26165E-01	0.27130E-01	0.25907E-01
0.27133E-01	0.27166E-01	0.28591E-01	0.29629E-01	0.31053E-01	0.31825E-01
0.24814E-01	0.24335E-01	0.25451E-01	0.28381E-01	0.34160E-01	0.37345E-01
0.38356E-01	0.41633E-01	0.38853E-01	0.39417E-01	0.37611E-01	0.38009E-01
0.37608E-01	0.36934E-01	0.38778E-01	0.38701E-01	0.35879E-01	0.33421E-01
0.32315E-01	0.32100E-01	0.28993E-01	0.29673E-01	0.30127E-01	0.32976E-01
0.34325E-01	0.34266E-01	0.35311E-01	0.37315E-01	0.40277E-01	0.42656E-01
0.48521E-01	0.43048E-01	0.43853E-01	0.42976E-01	0.41545E-01	0.41522E-01
0.48917E-01	0.59488E-01	0.66496E-01	0.72855E-01	0.72238E-01	0.61613E-01
0.64162E-01	0.63654E-01	0.61677E-01	0.63266E-01	0.53661E-01	0.53860E-01
0.42924E-01	0.29652E-01	0.23239E-01	0.23619E-01	0.29965E-01	0.37724E-01
0.37406E-01	0.33740E-01	0.28526E-01	0.26321E-01	0.23680E-01	0.23780E-01
0.21143E-01	0.16796E-01	0.11967E-01	0.72468E-02	0.31401E-02	0.19832E-02
0.22301E-02	0.38380E-02	0.10183E-01	0.20951E-01	0.32470E-01	0.46179E-01
0.61587E-01	0.84003E-01	0.10142E+00	0.14079E+00	0.18150E+00	0.24530E+00

Table 5.35 Angular neutron spectrum for graphite experiment (50.6 mm, 24.9 deg.).

<< Spectrum >>

0.13670E-06	0.43770E-06	0.59171E-06	0.39158E-06	0.66833E-06	0.58976E-06
0.61725E-06	0.56067E-06	0.72182E-06	0.62162E-06	0.79632E-06	0.76898E-06
0.84965E-06	0.85237E-06	0.82497E-06	0.85843E-06	0.10103E-05	0.91417E-06
0.90966E-06	0.86799E-06	0.99503E-06	0.11118E-05	0.11301E-05	0.11989E-05
0.10672E-05	0.12358E-05	0.11700E-05	0.11581E-05	0.11337E-05	0.11789E-05
0.13871E-05	0.12654E-05	0.12734E-05	0.12921E-05	0.13960E-05	0.14371E-05
0.13256E-05	0.13789E-05	0.13690E-05	0.12430E-05	0.13872E-05	0.13516E-05
0.14651E-05	0.12088E-05	0.10781E-05	0.13431E-05	0.14201E-05	0.14737E-05
0.12974E-05	0.15011E-05	0.14176E-05	0.14886E-05	0.13603E-05	0.14869E-05

0.14151E-05	0.15724E-05	0.16157E-05	0.15804E-05	0.17115E-05	0.14885E-05
0.14528E-05	0.13222E-05	0.16511E-05	0.13658E-05	0.16652E-05	0.13911E-05
0.14961E-05	0.14178E-05	0.15757E-05	0.13015E-05	0.14167E-05	0.12313E-05
0.14267E-05	0.14453E-05	0.14691E-05	0.13162E-05	0.12995E-05	0.15981E-05
0.13804E-05	0.13689E-05	0.10714E-05	0.13377E-05	0.13213E-05	0.13363E-05
0.16176E-05	0.16929E-05	0.19456E-05	0.20826E-05	0.25562E-05	0.29153E-05
0.31828E-05	0.37407E-05	0.36012E-05	0.26975E-05	0.22912E-05	0.22173E-05
0.17957E-05	0.13583E-05	0.94302E-06	0.99262E-06	0.84958E-06	0.97751E-06
0.61675E-06	0.69727E-06	0.92363E-06	0.87723E-06	0.12455E-05	0.14652E-05
0.11981E-05	0.85908E-06	0.68900E-06	0.72631E-06	0.44396E-06	0.76015E-06
0.72199E-06	0.52569E-06	0.15678E-05	0.20603E-05	0.31127E-05	0.60682E-05
0.11356E-04	0.17920E-04	0.16696E-04	0.11969E-04	0.56038E-05	0.22221E-05
0.14678E-05	0.15069E-05	0.19448E-05	0.25208E-05	0.30095E-05	0.33598E-05
0.54997E-05	0.10470E-04	0.27469E-04	0.73875E-04	0.14557E-03	0.14158E-03
0.72067E-04	0.17512E-04	0.39694E-05	0.15649E-05	0.89627E-06	0.44665E-06
0.24780E-06	0.22580E-06	0.15156E-06	0.98995E-07	0.32653E-07	-0.11097E-07

&lt;&lt; Error &gt;&gt;

0.91937E+00	0.25716E+00	0.19399E+00	0.29816E+00	0.16671E+00	0.18735E+00
0.16435E+00	0.17920E+00	0.13914E+00	0.16385E+00	0.13031E+00	0.11760E+00
0.11247E+00	0.10597E+00	0.11441E+00	0.10563E+00	0.90291E-01	0.99323E-01
0.10173E+00	0.10234E+00	0.87241E-01	0.78420E-01	0.78450E-01	0.75170E-01
0.79993E-01	0.72193E-01	0.79210E-01	0.76034E-01	0.78210E-01	0.76685E-01
0.67770E-01	0.74601E-01	0.73079E-01	0.73261E-01	0.69188E-01	0.65073E-01
0.72678E-01	0.67273E-01	0.69838E-01	0.76027E-01	0.68936E-01	0.71336E-01
0.67570E-01	0.81539E-01	0.94577E-01	0.74791E-01	0.71740E-01	0.70703E-01
0.79780E-01	0.71335E-01	0.77532E-01	0.73440E-01	0.76834E-01	0.73196E-01
0.76312E-01	0.71564E-01	0.67409E-01	0.71251E-01	0.66266E-01	0.74280E-01
0.75096E-01	0.83453E-01	0.69318E-01	0.79567E-01	0.65143E-01	0.78709E-01
0.74515E-01	0.77003E-01	0.69677E-01	0.85412E-01	0.80153E-01	0.90478E-01
0.78383E-01	0.80648E-01	0.79858E-01	0.88867E-01	0.90389E-01	0.74919E-01
0.84268E-01	0.88923E-01	0.11379E+00	0.96756E-01	0.91827E-01	0.95268E-01
0.78938E-01	0.82068E-01	0.67582E-01	0.69250E-01	0.61335E-01	0.55074E-01
0.51413E-01	0.46239E-01	0.46801E-01	0.58534E-01	0.67841E-01	0.66719E-01
0.72449E-01	0.87588E-01	0.11771E+00	0.11397E+00	0.12711E+00	0.11373E+00
0.16356E+00	0.14545E+00	0.12579E+00	0.13610E+00	0.10793E+00	0.93779E-01
0.11463E+00	0.15202E+00	0.17455E+00	0.17854E+00	0.28348E+00	0.17399E+00
0.18316E+00	0.25235E+00	0.10216E+00	0.85265E-01	0.68967E-01	0.44506E-01
0.31305E-01	0.24723E-01	0.26480E-01	0.32049E-01	0.49922E-01	0.10148E+00
0.13626E+00	0.14026E+00	0.11585E+00	0.92959E-01	0.83677E-01	0.75030E-01
0.53033E-01	0.35919E-01	0.21250E-01	0.12863E-01	0.91045E-02	0.92059E-02
0.12794E-01	0.25753E-01	0.53547E-01	0.85417E-01	0.11364E+00	0.17123E+00
0.25670E+00	0.24315E+00	0.34654E+00	0.46055E+00	0.10221E+01	0.42543E+01

Table 5.36 Angular neutron spectrum for graphite experiment (50.6 mm, 41.8 deg.).

&lt;&lt; Spectrum &gt;&gt;

0.47498E-06	0.48968E-06	0.34071E-06	0.61561E-06	0.64337E-06	0.45012E-06
0.67158E-06	0.75645E-06	0.73461E-06	0.64976E-06	0.77020E-06	0.76494E-06
0.87992E-06	0.10498E-05	0.10141E-05	0.88218E-06	0.87003E-06	0.90827E-06
0.88131E-06	0.10552E-05	0.10117E-05	0.10637E-05	0.95455E-06	0.12143E-05
0.11030E-05	0.10592E-05	0.11842E-05	0.12586E-05	0.10837E-05	0.12002E-05
0.12057E-05	0.11766E-05	0.11311E-05	0.11242E-05	0.11569E-05	0.12221E-05
0.13681E-05	0.14380E-05	0.12436E-05	0.13641E-05	0.12864E-05	0.12513E-05
0.13613E-05	0.11850E-05	0.13495E-05	0.14517E-05	0.13557E-05	0.13137E-05
0.12240E-05	0.13759E-05	0.14724E-05	0.15516E-05	0.13820E-05	0.15425E-05
0.13293E-05	0.14723E-05	0.14472E-05	0.14465E-05	0.13871E-05	0.14144E-05
0.13760E-05	0.15197E-05	0.15575E-05	0.13008E-05	0.16351E-05	0.14501E-05
0.14046E-05	0.12313E-05	0.15697E-05	0.14311E-05	0.12346E-05	0.12001E-05
0.12430E-05	0.13451E-05	0.14586E-05	0.13370E-05	0.11319E-05	0.11292E-05
0.10322E-05	0.11468E-05	0.12997E-05	0.12633E-05	0.14369E-05	0.15792E-05
0.21423E-05	0.21060E-05	0.24087E-05	0.24557E-05	0.27984E-05	0.31076E-05
0.26164E-05	0.25585E-05	0.19096E-05	0.18142E-05	0.13186E-05	0.13186E-05
0.94411E-06	0.90060E-06	0.89055E-06	0.73916E-06	0.58353E-06	0.61520E-06
0.67460E-06	0.75688E-06	0.76069E-06	0.61286E-06	0.83129E-06	0.82208E-06
0.69529E-06	0.61181E-06	0.69249E-06	0.59561E-06	0.89648E-06	0.87094E-06
0.10309E-05	0.19671E-05	0.28277E-05	0.44233E-05	0.66295E-05	0.85730E-05
0.10152E-04	0.85217E-05	0.61598E-05	0.34652E-05	0.14597E-05	0.12232E-05
0.14671E-05	0.13735E-05	0.18084E-05	0.20026E-05	0.31587E-05	0.44779E-05

0.79295E-05	0.12428E-04	0.20501E-04	0.30134E-04	0.32959E-04	0.21728E-04
0.80574E-05	0.19606E-05	0.72608E-06	0.35085E-06	0.12190E-06	0.14842E-06
0.54643E-07	-0.33257E-07	-0.85089E-08	0.18715E-07	-0.82352E-08	0.21591E-08

<< Error >>

0.21110E+00	0.20223E+00	0.28872E+00	0.17264E+00	0.15256E+00	0.21697E+00
0.13752E+00	0.12112E+00	0.12058E+00	0.13051E+00	0.11089E+00	0.11478E+00
0.95210E-01	0.82928E-01	0.86079E-01	0.88147E-01	0.91175E-01	0.88862E-01
0.85459E-01	0.72589E-01	0.77514E-01	0.74710E-01	0.79579E-01	0.61172E-01
0.71662E-01	0.73909E-01	0.67404E-01	0.65539E-01	0.71388E-01	0.66042E-01
0.67371E-01	0.69371E-01	0.72239E-01	0.73266E-01	0.70155E-01	0.64964E-01
0.60616E-01	0.55808E-01	0.66183E-01	0.63985E-01	0.64486E-01	0.66199E-01
0.62754E-01	0.75558E-01	0.64825E-01	0.62546E-01	0.63966E-01	0.68978E-01
0.73826E-01	0.68983E-01	0.62168E-01	0.59296E-01	0.68220E-01	0.62355E-01
0.75532E-01	0.67823E-01	0.68104E-01	0.69517E-01	0.71501E-01	0.73403E-01
0.72609E-01	0.66150E-01	0.64437E-01	0.78175E-01	0.62283E-01	0.68543E-01
0.71759E-01	0.81844E-01	0.64240E-01	0.70771E-01	0.81349E-01	0.78656E-01
0.76068E-01	0.74990E-01	0.69204E-01	0.72263E-01	0.86102E-01	0.82947E-01
0.89214E-01	0.77608E-01	0.71198E-01	0.75614E-01	0.68597E-01	0.63628E-01
0.49607E-01	0.53756E-01	0.47834E-01	0.48358E-01	0.44659E-01	0.41498E-01
0.48719E-01	0.48353E-01	0.62395E-01	0.64862E-01	0.84917E-01	0.86565E-01
0.94269E-01	0.10054E+00	0.10047E+00	0.12170E+00	0.14068E+00	0.14398E+00
0.12676E+00	0.11760E+00	0.11841E+00	0.15687E+00	0.11931E+00	0.11684E+00
0.13603E+00	0.15600E+00	0.14324E+00	0.16253E+00	0.11721E+00	0.12197E+00
0.11325E+00	0.70788E-01	0.58074E-01	0.44082E-01	0.34710E-01	0.29933E-01
0.27429E-01	0.31046E-01	0.38394E-01	0.54343E-01	0.11468E+00	0.12544E+00
0.10758E+00	0.11486E+00	0.94804E-01	0.88995E-01	0.65828E-01	0.50705E-01
0.34264E-01	0.26873E-01	0.20523E-01	0.16701E-01	0.15899E-01	0.19563E-01
0.32088E-01	0.65232E-01	0.11433E+00	0.17281E+00	0.35686E+00	0.26031E+00
0.59521E+00	0.10385E+01	0.34857E+01	0.15328E+01	0.37656E+01	0.10606E+02

Table 5.37 Angular neutron spectrum for graphite experiment (50.6 mm, 66.8 deg.).

<< Spectrum >>

0.44387E-06	0.54665E-06	0.46438E-06	0.49431E-06	0.80609E-06	0.80960E-06
0.64338E-06	0.92941E-06	0.85502E-06	0.91549E-06	0.10401E-05	0.77761E-06
0.82381E-06	0.97958E-06	0.95036E-06	0.95505E-06	0.99862E-06	0.99559E-06
0.95983E-06	0.94232E-06	0.10355E-05	0.93465E-06	0.11210E-05	0.12070E-05
0.13246E-05	0.10246E-05	0.11031E-05	0.10522E-05	0.11686E-05	0.11620E-05
0.12939E-05	0.13957E-05	0.11932E-05	0.12911E-05	0.13923E-05	0.13176E-05
0.12024E-05	0.12858E-05	0.13131E-05	0.13398E-05	0.11689E-05	0.14616E-05
0.13925E-05	0.14430E-05	0.14045E-05	0.14943E-05	0.15145E-05	0.15253E-05
0.15757E-05	0.16157E-05	0.15613E-05	0.16002E-05	0.15479E-05	0.16239E-05
0.18320E-05	0.17089E-05	0.15714E-05	0.16833E-05	0.15022E-05	0.15670E-05
0.15809E-05	0.16395E-05	0.15617E-05	0.16175E-05	0.17005E-05	0.17724E-05
0.17908E-05	0.16766E-05	0.15713E-05	0.15514E-05	0.15110E-05	0.15871E-05
0.13903E-05	0.17395E-05	0.15716E-05	0.16500E-05	0.16379E-05	0.14700E-05
0.15486E-05	0.13275E-05	0.15085E-05	0.16144E-05	0.18399E-05	0.18339E-05
0.21886E-05	0.20542E-05	0.19219E-05	0.19254E-05	0.19321E-05	0.17671E-05
0.15453E-05	0.14099E-05	0.12147E-05	0.10640E-05	0.10905E-05	0.11559E-05
0.10451E-05	0.10862E-05	0.10603E-05	0.87867E-06	0.10227E-05	0.72528E-06
0.93525E-06	0.10966E-05	0.11893E-05	0.12150E-05	0.14705E-05	0.15100E-05
0.15298E-05	0.15715E-05	0.17278E-05	0.15896E-05	0.19522E-05	0.23185E-05
0.23659E-05	0.30534E-05	0.32253E-05	0.34822E-05	0.39628E-05	0.40037E-05
0.45230E-05	0.40289E-05	0.35887E-05	0.29792E-05	0.33393E-05	0.35586E-05
0.46268E-05	0.55751E-05	0.65252E-05	0.73419E-05	0.78827E-05	0.81607E-05
0.75996E-05	0.74439E-05	0.64093E-05	0.65166E-05	0.64456E-05	0.52211E-05
0.31880E-05	0.11651E-05	0.32005E-06	0.56995E-07	0.75975E-07	0.31110E-07
0.19029E-07	-0.44108E-07	0.20525E-07	0.20940E-07	0.17643E-07	-0.18924E-07

<< Error >>

0.22897E+00	0.18205E+00	0.20844E+00	0.20583E+00	0.11922E+00	0.11650E+00
0.14292E+00	0.95103E-01	0.99794E-01	0.98378E-01	0.83810E-01	0.10949E+00
0.10556E+00	0.85818E-01	0.85580E-01	0.88553E-01	0.82209E-01	0.82186E-01
0.80745E-01	0.82091E-01	0.74841E-01	0.81071E-01	0.65855E-01	0.64991E-01
0.59774E-01	0.74558E-01	0.67946E-01	0.74569E-01	0.66166E-01	0.68748E-01
0.63863E-01	0.58482E-01	0.69965E-01	0.64056E-01	0.58845E-01	0.63650E-01
0.66095E-01	0.61059E-01	0.63412E-01	0.61278E-01	0.70010E-01	0.58891E-01

0.60910E-01	0.61525E-01	0.61015E-01	0.57920E-01	0.58825E-01	0.58001E-01
0.57070E-01	0.57703E-01	0.60026E-01	0.59936E-01	0.61696E-01	0.59254E-01
0.52954E-01	0.57301E-01	0.61812E-01	0.57610E-01	0.65464E-01	0.63682E-01
0.63594E-01	0.60825E-01	0.63579E-01	0.61842E-01	0.58313E-01	0.57377E-01
0.57015E-01	0.62166E-01	0.64759E-01	0.64378E-01	0.65164E-01	0.62546E-01
0.74878E-01	0.61909E-01	0.68277E-01	0.63724E-01	0.66118E-01	0.72618E-01
0.70719E-01	0.82907E-01	0.78388E-01	0.74326E-01	0.68049E-01	0.67375E-01
0.58473E-01	0.62775E-01	0.64639E-01	0.66372E-01	0.63978E-01	0.68560E-01
0.78531E-01	0.82382E-01	0.92267E-01	0.10289E+00	0.10450E+00	0.80623E-01
0.90618E-01	0.89078E-01	0.90882E-01	0.10745E+00	0.94254E-01	0.11947E+00
0.98465E-01	0.88352E-01	0.91566E-01	0.90502E-01	0.78841E-01	0.79046E-01
0.82316E-01	0.81303E-01	0.80319E-01	0.84756E-01	0.74275E-01	0.65449E-01
0.68460E-01	0.54528E-01	0.55784E-01	0.54197E-01	0.50850E-01	0.51577E-01
0.48440E-01	0.53012E-01	0.54930E-01	0.69081E-01	0.62192E-01	0.63000E-01
0.53079E-01	0.45839E-01	0.43813E-01	0.39327E-01	0.37090E-01	0.36937E-01
0.37858E-01	0.37553E-01	0.40861E-01	0.40889E-01	0.39616E-01	0.44322E-01
0.54656E-01	0.94936E-01	0.21260E+00	0.85854E+00	0.49501E+00	0.10942E+01
0.15805E+01	0.68119E+00	0.14833E+01	0.17349E+01	0.11652E+01	0.12994E+01

Table 5.38 Angular neutron spectrum for graphite experiment (202.4 mm, 0.0 deg.).

&lt;&lt; Spectrum &gt;&gt;

0.43973E-06	0.67218E-06	0.67425E-06	0.57695E-06	0.90229E-06	0.70878E-06
0.85933E-06	0.75509E-06	0.96118E-06	0.96032E-06	0.10670E-05	0.10871E-05
0.10668E-05	0.11491E-05	0.11279E-05	0.12369E-05	0.12594E-05	0.12303E-05
0.12617E-05	0.12526E-05	0.14714E-05	0.13153E-05	0.14500E-05	0.14208E-05
0.13109E-05	0.14938E-05	0.15997E-05	0.15000E-05	0.17645E-05	0.18103E-05
0.21366E-05	0.20237E-05	0.21294E-05	0.20483E-05	0.22590E-05	0.21353E-05
0.22946E-05	0.22141E-05	0.23174E-05	0.22634E-05	0.25022E-05	0.26588E-05
0.26366E-05	0.29057E-05	0.28699E-05	0.29022E-05	0.30545E-05	0.30204E-05
0.29791E-05	0.31873E-05	0.32468E-05	0.34275E-05	0.35355E-05	0.35916E-05
0.38921E-05	0.33107E-05	0.33261E-05	0.36012E-05	0.39279E-05	0.37741E-05
0.35324E-05	0.35708E-05	0.38520E-05	0.36148E-05	0.36724E-05	0.33349E-05
0.31446E-05	0.28224E-05	0.22882E-05	0.16484E-05	0.37731E-05	0.65932E-05
0.50160E-05	0.35675E-05	0.19927E-05	0.14478E-05	0.13337E-05	0.12780E-05
0.12249E-05	0.15022E-05	0.18579E-05	0.21471E-05	0.24215E-05	0.27525E-05
0.26710E-05	0.26331E-05	0.30721E-05	0.34803E-05	0.44526E-05	0.49808E-05
0.60647E-05	0.64897E-05	0.67016E-05	0.74881E-05	0.65535E-05	0.61973E-05
0.59276E-05	0.55089E-05	0.50666E-05	0.43650E-05	0.32029E-05	0.28489E-05
0.45923E-05	0.57768E-05	0.62553E-05	0.70140E-05	0.62052E-05	0.35570E-05
0.21869E-05	0.13548E-05	0.13348E-05	0.17605E-05	0.24677E-05	0.30955E-05
0.33624E-05	0.36967E-05	0.36128E-05	0.48937E-05	0.67882E-05	0.93955E-05
0.15270E-04	0.22070E-04	0.19833E-04	0.10910E-04	0.56430E-05	0.50233E-05
0.63308E-05	0.80409E-05	0.10028E-04	0.11777E-04	0.11942E-04	0.14875E-04
0.28391E-04	0.69575E-04	0.18835E-03	0.64577E-03	0.14523E-02	0.11122E-02
0.32449E-03	0.48007E-04	0.13666E-04	0.44288E-05	0.14250E-05	0.41411E-06
0.16257E-06	0.10238E-06	-0.29683E-08	-0.14155E-07	-0.32646E-08	0.17436E-07

&lt;&lt; Error &gt;&gt;

0.21898E+00	0.13987E+00	0.14089E+00	0.15212E+00	0.10566E+00	0.11979E+00
0.98340E-01	0.10835E+00	0.86702E-01	0.84415E-01	0.75787E-01	0.75108E-01
0.75066E-01	0.68043E-01	0.72570E-01	0.64435E-01	0.62169E-01	0.63170E-01
0.61945E-01	0.60663E-01	0.52983E-01	0.57448E-01	0.53980E-01	0.54632E-01
0.57487E-01	0.51288E-01	0.49119E-01	0.53103E-01	0.47262E-01	0.45917E-01
0.42966E-01	0.43673E-01	0.41303E-01	0.42471E-01	0.39906E-01	0.40573E-01
0.39317E-01	0.40020E-01	0.38407E-01	0.39631E-01	0.38127E-01	0.36965E-01
0.35629E-01	0.34124E-01	0.34602E-01	0.33985E-01	0.32619E-01	0.32839E-01
0.33710E-01	0.32095E-01	0.31784E-01	0.31279E-01	0.30012E-01	0.30266E-01
0.28640E-01	0.31236E-01	0.31457E-01	0.30408E-01	0.28605E-01	0.29622E-01
0.30957E-01	0.30276E-01	0.29241E-01	0.30990E-01	0.30261E-01	0.32190E-01
0.33097E-01	0.35981E-01	0.40367E-01	0.52083E-01	0.30995E-01	0.22602E-01
0.26162E-01	0.32192E-01	0.47567E-01	0.61437E-01	0.64892E-01	0.69667E-01
0.72578E-01	0.61205E-01	0.53167E-01	0.49199E-01	0.45838E-01	0.41885E-01
0.43644E-01	0.44011E-01	0.39827E-01	0.36829E-01	0.31821E-01	0.29973E-01
0.26384E-01	0.25799E-01	0.25627E-01	0.23969E-01	0.26089E-01	0.30008E-01
0.30857E-01	0.32278E-01	0.33469E-01	0.36190E-01	0.43374E-01	0.46323E-01
0.35444E-01	0.31815E-01	0.31008E-01	0.29116E-01	0.31360E-01	0.42891E-01
0.57166E-01	0.82208E-01	0.81872E-01	0.68683E-01	0.55970E-01	0.50162E-01
0.47322E-01	0.44820E-01	0.45246E-01	0.39355E-01	0.33309E-01	0.27982E-01

0.21808E-01	0.17976E-01	0.19225E-01	0.26719E-01	0.38882E-01	0.42842E-01
0.37642E-01	0.32425E-01	0.29033E-01	0.26725E-01	0.26500E-01	0.23506E-01
0.16941E-01	0.10810E-01	0.65910E-02	0.35668E-02	0.23708E-02	0.27023E-02
0.49602E-02	0.12744E-01	0.23640E-01	0.41232E-01	0.72847E-01	0.14090E+00
0.25691E+00	0.31987E+00	0.91114E+01	0.14311E+01	0.45449E+01	0.88685E+00

Table 5.39 Angular neutron spectrum for graphite experiment (202.4 mm, 12.2 deg.).

## &lt;&lt; Spectrum &gt;&gt;

0.26228E-06	0.43294E-06	0.48987E-06	0.53840E-06	0.61594E-06	0.73134E-06
0.56396E-06	0.56413E-06	0.69653E-06	0.83294E-06	0.87203E-06	0.86209E-06
0.91153E-06	0.76383E-06	0.86106E-06	0.11237E-05	0.96326E-06	0.96713E-06
0.95886E-06	0.96370E-06	0.10202E-05	0.11062E-05	0.11269E-05	0.11893E-05
0.11470E-05	0.12533E-05	0.11734E-05	0.13007E-05	0.13309E-05	0.12581E-05
0.13722E-05	0.13927E-05	0.14379E-05	0.13958E-05	0.13907E-05	0.13856E-05
0.15762E-05	0.14948E-05	0.16317E-05	0.14400E-05	0.14433E-05	0.15165E-05
0.16858E-05	0.15439E-05	0.15953E-05	0.16250E-05	0.17707E-05	0.17082E-05
0.17624E-05	0.16843E-05	0.18850E-05	0.17905E-05	0.17008E-05	0.17693E-05
0.19096E-05	0.19600E-05	0.19745E-05	0.18762E-05	0.17449E-05	0.16561E-05
0.18114E-05	0.17755E-05	0.17254E-05	0.17998E-05	0.18021E-05	0.16300E-05
0.15435E-05	0.14715E-05	0.14007E-05	0.12119E-05	0.11123E-05	0.10661E-05
0.12289E-05	0.14401E-05	0.14961E-05	0.13350E-05	0.12351E-05	0.10834E-05
0.99848E-06	0.10374E-05	0.10849E-05	0.10583E-05	0.12966E-05	0.14778E-05
0.15296E-05	0.18603E-05	0.19719E-05	0.18842E-05	0.21092E-05	0.24057E-05
0.28326E-05	0.32185E-05	0.36203E-05	0.37097E-05	0.39594E-05	0.35063E-05
0.27179E-05	0.24641E-05	0.19650E-05	0.17052E-05	0.13733E-05	0.12424E-05
0.10217E-05	0.11862E-05	0.14459E-05	0.19520E-05	0.20164E-05	0.23909E-05
0.19650E-05	0.13814E-05	0.98834E-06	0.86717E-06	0.89978E-06	0.10059E-05
0.13001E-05	0.15147E-05	0.19155E-05	0.25232E-05	0.32882E-05	0.50885E-05
0.79860E-05	0.11589E-04	0.16293E-04	0.15866E-04	0.97900E-05	0.39072E-05
0.17892E-05	0.13609E-05	0.17370E-05	0.21873E-05	0.27022E-05	0.38469E-05
0.53214E-05	0.10394E-04	0.21361E-04	0.44248E-04	0.91391E-04	0.14356E-03
0.12474E-03	0.52682E-04	0.11585E-04	0.26987E-05	0.73840E-06	0.12219E-06
0.32942E-07	-0.25459E-07	-0.31495E-07	0.25824E-07	-0.38684E-08	-0.11020E-07

## &lt;&lt; Error &gt;&gt;

0.33481E+00	0.19956E+00	0.16322E+00	0.14938E+00	0.14049E+00	0.10482E+00
0.13702E+00	0.14077E+00	0.10175E+00	0.94032E-01	0.87686E-01	0.83519E-01
0.77994E-01	0.94721E-01	0.82188E-01	0.65178E-01	0.69848E-01	0.69869E-01
0.69839E-01	0.67507E-01	0.68229E-01	0.62539E-01	0.59673E-01	0.57794E-01
0.61611E-01	0.56706E-01	0.57910E-01	0.54063E-01	0.54032E-01	0.54820E-01
0.52459E-01	0.52576E-01	0.51389E-01	0.52260E-01	0.52445E-01	0.50971E-01
0.47224E-01	0.48708E-01	0.44846E-01	0.51406E-01	0.51941E-01	0.49507E-01
0.45427E-01	0.49822E-01	0.48726E-01	0.46922E-01	0.44721E-01	0.46578E-01
0.45925E-01	0.47229E-01	0.43614E-01	0.45230E-01	0.47294E-01	0.44489E-01
0.43234E-01	0.40723E-01	0.42239E-01	0.42050E-01	0.45439E-01	0.47110E-01
0.44420E-01	0.45814E-01	0.46594E-01	0.44608E-01	0.43809E-01	0.48253E-01
0.50533E-01	0.51799E-01	0.54493E-01	0.61342E-01	0.64428E-01	0.67239E-01
0.59324E-01	0.54480E-01	0.54040E-01	0.58382E-01	0.62124E-01	0.67957E-01
0.71720E-01	0.70684E-01	0.70291E-01	0.74427E-01	0.64076E-01	0.58024E-01
0.57705E-01	0.50634E-01	0.48505E-01	0.51564E-01	0.48244E-01	0.43990E-01
0.39408E-01	0.36488E-01	0.34199E-01	0.33688E-01	0.32828E-01	0.39096E-01
0.44256E-01	0.46516E-01	0.52412E-01	0.58698E-01	0.66599E-01	0.71993E-01
0.82603E-01	0.74640E-01	0.64108E-01	0.55897E-01	0.56576E-01	0.50955E-01
0.56257E-01	0.72369E-01	0.88575E-01	0.97403E-01	0.99205E-01	0.96591E-01
0.77025E-01	0.73007E-01	0.64189E-01	0.52447E-01	0.47202E-01	0.37037E-01
0.28647E-01	0.23953E-01	0.20238E-01	0.20588E-01	0.26828E-01	0.43884E-01
0.73630E-01	0.92611E-01	0.76394E-01	0.64999E-01	0.56790E-01	0.45466E-01
0.39011E-01	0.27340E-01	0.18854E-01	0.13041E-01	0.90306E-02	0.71851E-02
0.76369E-02	0.11603E-01	0.24420E-01	0.50518E-01	0.99259E-01	0.31494E+00
0.92467E+00	0.86180E+00	0.74082E+00	0.78295E+00	0.40470E+01	0.17509E+01



Table 5.40 Angular neutron spectrum for graphite experiment (202.4 mm, 24.9 deg.).

&lt;&lt; Spectrum &gt;&gt;

0.53180E-06	0.42673E-06	0.59593E-06	0.74858E-06	0.48533E-06	0.56401E-06
0.69698E-06	0.82317E-06	0.76300E-06	0.79093E-06	0.73146E-06	0.10106E-05
0.78413E-06	0.82597E-06	0.99124E-06	0.92084E-06	0.95206E-06	0.10391E-05
0.99505E-06	0.93140E-06	0.12210E-05	0.10848E-05	0.11515E-05	0.10822E-05
0.11699E-05	0.12477E-05	0.11340E-05	0.13469E-05	0.12625E-05	0.12754E-05
0.13193E-05	0.13273E-05	0.14113E-05	0.13611E-05	0.13563E-05	0.13565E-05
0.13652E-05	0.13764E-05	0.14921E-05	0.13982E-05	0.13382E-05	0.15104E-05
0.15597E-05	0.15788E-05	0.16469E-05	0.16364E-05	0.17169E-05	0.16888E-05
0.14757E-05	0.14727E-05	0.16229E-05	0.15902E-05	0.16804E-05	0.17534E-05
0.18267E-05	0.19547E-05	0.17474E-05	0.18251E-05	0.18464E-05	0.17351E-05
0.16382E-05	0.16557E-05	0.14989E-05	0.15511E-05	0.15638E-05	0.13467E-05
0.15608E-05	0.13333E-05	0.12460E-05	0.11549E-05	0.99558E-06	0.10274E-05
0.12727E-05	0.13384E-05	0.11934E-05	0.10850E-05	0.98201E-06	0.10421E-05
0.91074E-06	0.87362E-06	0.11737E-05	0.12628E-05	0.12885E-05	0.15658E-05
0.17324E-05	0.17696E-05	0.19068E-05	0.18855E-05	0.23280E-05	0.27208E-05
0.25794E-05	0.27637E-05	0.26670E-05	0.25214E-05	0.22055E-05	0.19362E-05
0.16390E-05	0.15636E-05	0.12057E-05	0.12021E-05	0.99051E-06	0.94485E-06
0.82153E-06	0.11708E-05	0.14058E-05	0.15215E-05	0.15615E-05	0.13523E-05
0.10571E-05	0.82887E-06	0.79757E-06	0.79990E-06	0.92464E-06	0.13200E-05
0.14765E-05	0.20949E-05	0.29503E-05	0.35873E-05	0.53004E-05	0.79809E-05
0.10805E-04	0.10742E-04	0.74275E-05	0.37633E-05	0.18302E-05	0.13709E-05
0.13201E-05	0.13483E-05	0.17562E-05	0.22221E-05	0.26772E-05	0.36221E-05
0.65838E-05	0.13865E-04	0.28338E-04	0.47646E-04	0.56226E-04	0.35410E-04
0.11588E-04	0.23537E-05	0.88001E-06	0.30169E-06	0.10534E-06	0.52312E-07
0.57390E-08	0.27139E-07	0.24248E-07	0.23838E-07	-0.20717E-08	0.20160E-07

&lt;&lt; Error &gt;&gt;

0.17322E+00	0.21057E+00	0.14717E+00	0.11135E+00	0.16905E+00	0.14271E+00
0.10955E+00	0.95527E-01	0.99869E-01	0.92656E-01	0.10080E+00	0.73052E-01
0.89829E-01	0.83866E-01	0.69517E-01	0.72862E-01	0.73272E-01	0.65266E-01
0.65345E-01	0.71265E-01	0.54002E-01	0.59573E-01	0.58192E-01	0.62108E-01
0.54969E-01	0.53212E-01	0.56871E-01	0.50318E-01	0.54204E-01	0.54866E-01
0.52551E-01	0.53089E-01	0.48332E-01	0.50812E-01	0.51487E-01	0.49901E-01
0.49685E-01	0.51563E-01	0.46889E-01	0.50357E-01	0.55635E-01	0.48526E-01
0.47294E-01	0.46370E-01	0.44559E-01	0.44362E-01	0.43623E-01	0.43839E-01
0.49332E-01	0.50178E-01	0.47473E-01	0.47887E-01	0.44812E-01	0.45377E-01
0.43736E-01	0.40666E-01	0.45298E-01	0.43080E-01	0.42903E-01	0.45186E-01
0.45394E-01	0.45039E-01	0.50051E-01	0.48247E-01	0.48129E-01	0.55338E-01
0.45971E-01	0.53840E-01	0.52888E-01	0.55856E-01	0.63722E-01	0.65052E-01
0.54082E-01	0.52502E-01	0.60246E-01	0.62807E-01	0.68350E-01	0.65496E-01
0.74388E-01	0.77662E-01	0.62050E-01	0.60290E-01	0.60192E-01	0.52849E-01
0.49403E-01	0.47754E-01	0.45774E-01	0.47743E-01	0.40151E-01	0.37068E-01
0.38789E-01	0.38059E-01	0.38241E-01	0.40277E-01	0.44555E-01	0.50034E-01
0.56473E-01	0.56484E-01	0.70427E-01	0.65833E-01	0.79773E-01	0.80569E-01
0.93377E-01	0.71494E-01	0.62309E-01	0.60525E-01	0.60371E-01	0.67869E-01
0.81114E-01	0.10163E+00	0.96537E-01	0.10541E+00	0.94987E-01	0.72697E-01
0.69754E-01	0.53703E-01	0.44282E-01	0.41010E-01	0.32896E-01	0.26862E-01
0.22942E-01	0.22977E-01	0.28647E-01	0.42306E-01	0.66488E-01	0.77110E-01
0.83951E-01	0.83626E-01	0.68012E-01	0.58180E-01	0.53737E-01	0.44095E-01
0.31775E-01	0.21657E-01	0.15039E-01	0.11619E-01	0.10655E-01	0.13376E-01
0.23317E-01	0.53304E-01	0.83374E-01	0.16780E+00	0.32451E+00	0.48677E+00
0.40673E+01	0.76353E+00	0.84141E+00	0.78555E+00	0.10527E+02	0.10744E+01

Table 5.41 Angular neutron spectrum for graphite experiment (202.4 mm, 41.8 deg.).

&lt;&lt; Spectrum &gt;&gt;

0.59595E-06	0.46727E-06	0.55626E-06	0.50858E-06	0.65642E-06	0.60344E-06
0.79398E-06	0.78753E-06	0.65238E-06	0.73310E-06	0.78470E-06	0.71496E-06
0.88592E-06	0.86664E-06	0.89644E-06	0.96231E-06	0.92484E-06	0.87761E-06
0.89789E-06	0.98187E-06	0.98145E-06	0.10197E-05	0.10158E-05	0.10149E-05
0.12333E-05	0.10155E-05	0.11976E-05	0.10704E-05	0.10670E-05	0.10967E-05
0.11446E-05	0.11347E-05	0.12104E-05	0.11252E-05	0.13247E-05	0.12948E-05
0.11475E-05	0.12370E-05	0.12902E-05	0.13228E-05	0.13717E-05	0.12873E-05
0.12984E-05	0.13816E-05	0.12718E-05	0.14531E-05	0.14352E-05	0.14134E-05
0.14299E-05	0.15454E-05	0.13904E-05	0.14028E-05	0.15271E-05	0.16516E-05

0.15440E-05	0.15021E-05	0.15665E-05	0.15228E-05	0.14698E-05	0.14018E-05
0.13276E-05	0.14319E-05	0.12824E-05	0.14427E-05	0.13739E-05	0.11855E-05
0.12316E-05	0.12352E-05	0.10876E-05	0.97751E-06	0.95049E-06	0.98115E-06
0.10514E-05	0.10528E-05	0.10870E-05	0.94911E-06	0.93233E-06	0.69794E-06
0.76620E-06	0.87548E-06	0.98009E-06	0.11732E-05	0.13162E-05	0.14191E-05
0.14362E-05	0.15347E-05	0.16534E-05	0.17550E-05	0.16879E-05	0.17888E-05
0.16292E-05	0.15944E-05	0.16845E-05	0.15323E-05	0.13179E-05	0.12666E-05
0.13146E-05	0.10939E-05	0.99264E-06	0.93542E-06	0.72928E-06	0.78915E-06
0.78026E-06	0.10552E-05	0.12472E-05	0.10541E-05	0.12139E-05	0.10377E-05
0.84073E-06	0.92450E-06	0.83424E-06	0.97184E-06	0.14383E-05	0.18861E-05
0.23277E-05	0.24802E-05	0.27675E-05	0.35820E-05	0.41577E-05	0.43305E-05
0.45735E-05	0.32447E-05	0.22397E-05	0.13496E-05	0.10586E-05	0.11477E-05
0.14039E-05	0.18350E-05	0.21415E-05	0.30985E-05	0.36368E-05	0.43191E-05
0.52131E-05	0.71663E-05	0.95704E-05	0.11110E-04	0.90432E-05	0.43898E-05
0.13090E-05	0.34206E-06	0.64253E-07	0.55349E-08	0.71555E-07	0.10402E-07
0.10921E-07	0.24222E-07	0.11412E-07	0.14737E-07	0.27695E-07	-0.36124E-07

<< Error >>

0.15810E+00	0.18997E+00	0.16265E+00	0.17160E+00	0.13342E+00	0.13936E+00
0.96301E-01	0.95272E-01	0.11324E+00	0.10179E+00	0.98032E-01	0.10114E+00
0.81081E-01	0.87004E-01	0.80549E-01	0.74314E-01	0.75150E-01	0.79608E-01
0.74805E-01	0.70558E-01	0.67128E-01	0.63484E-01	0.65394E-01	0.63832E-01
0.54908E-01	0.65885E-01	0.58218E-01	0.62563E-01	0.64765E-01	0.68153E-01
0.63616E-01	0.61891E-01	0.59540E-01	0.61839E-01	0.54541E-01	0.52297E-01
0.62145E-01	0.57541E-01	0.55312E-01	0.56170E-01	0.54103E-01	0.58316E-01
0.59744E-01	0.55021E-01	0.59198E-01	0.51525E-01	0.54116E-01	0.53559E-01
0.53338E-01	0.50250E-01	0.57305E-01	0.59138E-01	0.53918E-01	0.49518E-01
0.54284E-01	0.55013E-01	0.54713E-01	0.53279E-01	0.55431E-01	0.59810E-01
0.62447E-01	0.57976E-01	0.64796E-01	0.56090E-01	0.60238E-01	0.67677E-01
0.65609E-01	0.62791E-01	0.69259E-01	0.77546E-01	0.75542E-01	0.73700E-01
0.70280E-01	0.69028E-01	0.66101E-01	0.71834E-01	0.71132E-01	0.97896E-01
0.79783E-01	0.74305E-01	0.75657E-01	0.61681E-01	0.58624E-01	0.55716E-01
0.56997E-01	0.52214E-01	0.51855E-01	0.47870E-01	0.53299E-01	0.51962E-01
0.55800E-01	0.54203E-01	0.55181E-01	0.59466E-01	0.67750E-01	0.68202E-01
0.67640E-01	0.75346E-01	0.77630E-01	0.86103E-01	0.97155E-01	0.93313E-01
0.98557E-01	0.80432E-01	0.71324E-01	0.84702E-01	0.71789E-01	0.84298E-01
0.99805E-01	0.94128E-01	0.93919E-01	0.91333E-01	0.70774E-01	0.58397E-01
0.50872E-01	0.50484E-01	0.49628E-01	0.41682E-01	0.38857E-01	0.38585E-01
0.38044E-01	0.48653E-01	0.57396E-01	0.83853E-01	0.97248E-01	0.91416E-01
0.82123E-01	0.68467E-01	0.62912E-01	0.48968E-01	0.44515E-01	0.41215E-01
0.37287E-01	0.31412E-01	0.26833E-01	0.24839E-01	0.27716E-01	0.40838E-01
0.76562E-01	0.15753E+00	0.49699E+00	0.56397E+01	0.37166E+00	0.27691E+01
0.22982E+01	0.89519E+00	0.23096E+01	0.18902E+01	0.79315E+00	0.73624E+00

Table 5.42 Angular neutron spectrum for graphite experiment (202.4 mm, 66.8 deg.).

<< Spectrum >>

0.25757E-06	0.36836E-06	0.35766E-06	0.47160E-06	0.41853E-06	0.34985E-06
0.41449E-06	0.40047E-06	0.43439E-06	0.48000E-06	0.54202E-06	0.52526E-06
0.62806E-06	0.67719E-06	0.53222E-06	0.63615E-06	0.67408E-06	0.63298E-06
0.58033E-06	0.71845E-06	0.72062E-06	0.71496E-06	0.80000E-06	0.74184E-06
0.79907E-06	0.73725E-06	0.70742E-06	0.85670E-06	0.82264E-06	0.75017E-06
0.84824E-06	0.88136E-06	0.82778E-06	0.87476E-06	0.88393E-06	0.91126E-06
0.82169E-06	0.95062E-06	0.85664E-06	0.86881E-06	0.95656E-06	0.10429E-05
0.10298E-05	0.93960E-06	0.10241E-05	0.10088E-05	0.98645E-06	0.10378E-05
0.10989E-05	0.10018E-05	0.10989E-05	0.10617E-05	0.11271E-05	0.10823E-05
0.11368E-05	0.10049E-05	0.98923E-06	0.10119E-05	0.98040E-06	0.10127E-05
0.98435E-06	0.98512E-06	0.96168E-06	0.10520E-05	0.10159E-05	0.86074E-06
0.97059E-06	0.85607E-06	0.70050E-06	0.74217E-06	0.71531E-06	0.81904E-06
0.81076E-06	0.79613E-06	0.71014E-06	0.59609E-06	0.71722E-06	0.72146E-06
0.69440E-06	0.76207E-06	0.73810E-06	0.91371E-06	0.87319E-06	0.10158E-05
0.90126E-06	0.10191E-05	0.99622E-06	0.92559E-06	0.95521E-06	0.88704E-06
0.90205E-06	0.74049E-06	0.78518E-06	0.82270E-06	0.74098E-06	0.77489E-06
0.68160E-06	0.67773E-06	0.64321E-06	0.57521E-06	0.63234E-06	0.74821E-06
0.79794E-06	0.79225E-06	0.10006E-05	0.10736E-05	0.10462E-05	0.86239E-06
0.72442E-06	0.75331E-06	0.76165E-06	0.81387E-06	0.10461E-05	0.11378E-05
0.14250E-05	0.14542E-05	0.14630E-05	0.14543E-05	0.13374E-05	0.12720E-05
0.12422E-05	0.10211E-05	0.10199E-05	0.97221E-06	0.12704E-05	0.13051E-05
0.17521E-05	0.20707E-05	0.20803E-05	0.22550E-05	0.23590E-05	0.23048E-05

0.21753E-05	0.21422E-05	0.16142E-05	0.13419E-05	0.89947E-06	0.61222E-06
0.39718E-06	0.21777E-06	0.13874E-06	0.33194E-07	0.59943E-09	0.64156E-08
0.32548E-07	-0.10318E-07	-0.18276E-08	0.73881E-08	-0.22340E-08	-0.13568E-07

<< Error >>

0.26020E+00	0.16832E+00	0.16317E+00	0.12878E+00	0.14092E+00	0.17500E+00
0.13655E+00	0.13606E+00	0.12315E+00	0.10487E+00	0.96287E-01	0.99072E-01
0.80102E-01	0.73724E-01	0.91308E-01	0.75308E-01	0.71668E-01	0.75585E-01
0.78271E-01	0.66851E-01	0.61774E-01	0.63712E-01	0.56828E-01	0.61916E-01
0.56769E-01	0.61516E-01	0.64407E-01	0.54261E-01	0.56042E-01	0.62574E-01
0.57830E-01	0.55587E-01	0.59259E-01	0.55592E-01	0.53748E-01	0.51762E-01
0.58910E-01	0.50795E-01	0.56101E-01	0.57292E-01	0.52326E-01	0.49050E-01
0.50234E-01	0.54722E-01	0.51457E-01	0.52351E-01	0.53419E-01	0.51386E-01
0.49274E-01	0.54208E-01	0.50414E-01	0.52367E-01	0.50113E-01	0.52461E-01
0.51506E-01	0.56505E-01	0.56446E-01	0.56679E-01	0.59247E-01	0.58380E-01
0.59193E-01	0.58483E-01	0.60385E-01	0.55363E-01	0.57574E-01	0.66421E-01
0.58724E-01	0.68217E-01	0.79352E-01	0.76723E-01	0.79988E-01	0.70998E-01
0.70063E-01	0.74384E-01	0.84161E-01	0.99156E-01	0.83321E-01	0.83906E-01
0.88624E-01	0.84389E-01	0.90327E-01	0.74472E-01	0.78798E-01	0.67465E-01
0.76116E-01	0.68739E-01	0.70355E-01	0.74624E-01	0.70404E-01	0.75485E-01
0.71711E-01	0.85498E-01	0.79257E-01	0.75700E-01	0.84712E-01	0.72500E-01
0.80330E-01	0.79542E-01	0.85494E-01	0.90019E-01	0.84697E-01	0.76499E-01
0.73189E-01	0.77697E-01	0.66164E-01	0.64866E-01	0.63990E-01	0.78476E-01
0.88506E-01	0.84729E-01	0.93188E-01	0.87935E-01	0.75336E-01	0.72147E-01
0.59614E-01	0.57973E-01	0.60032E-01	0.62192E-01	0.68922E-01	0.71773E-01
0.75758E-01	0.86710E-01	0.91223E-01	0.95667E-01	0.80674E-01	0.79762E-01
0.62937E-01	0.56131E-01	0.56877E-01	0.54129E-01	0.52618E-01	0.53634E-01
0.53228E-01	0.52622E-01	0.63454E-01	0.68173E-01	0.91739E-01	0.11171E+00
0.13600E+00	0.20508E+00	0.23909E+00	0.63356E+00	0.33984E+02	0.28278E+01
0.59034E+00	0.17778E+01	0.85953E+01	0.19425E+01	0.78108E+01	0.11208E+01

Table 5.43 Angular neutron spectrum for graphite experiment (404.8 mm, 0.0 deg.).

<< Spectrum >>

0.25830E-06	0.31194E-06	0.17163E-06	0.20759E-06	0.16955E-06	0.26667E-06
0.22122E-06	0.20850E-06	0.32398E-06	0.31635E-06	0.26364E-06	0.30802E-06
0.24323E-06	0.34311E-06	0.43842E-06	0.40614E-06	0.30844E-06	0.31763E-06
0.42034E-06	0.35249E-06	0.34721E-06	0.36793E-06	0.39329E-06	0.37021E-06
0.47825E-06	0.45700E-06	0.43739E-06	0.46237E-06	0.49351E-06	0.49611E-06
0.45847E-06	0.50298E-06	0.56203E-06	0.64247E-06	0.57558E-06	0.58702E-06
0.53724E-06	0.56567E-06	0.52177E-06	0.58786E-06	0.59310E-06	0.56340E-06
0.64944E-06	0.60544E-06	0.65716E-06	0.58179E-06	0.51071E-06	0.65217E-06
0.60254E-06	0.73689E-06	0.82544E-06	0.77601E-06	0.69593E-06	0.76091E-06
0.69058E-06	0.72667E-06	0.68984E-06	0.74688E-06	0.73736E-06	0.75331E-06
0.71515E-06	0.66452E-06	0.65478E-06	0.56578E-06	0.57747E-06	0.52792E-06
0.44303E-06	0.41379E-06	0.57478E-06	0.11120E-05	0.72572E-06	0.55828E-06
0.36982E-06	0.32252E-06	0.29250E-06	0.31045E-06	0.23583E-06	0.27733E-06
0.40548E-06	0.42255E-06	0.42254E-06	0.56594E-06	0.57617E-06	0.52950E-06
0.72638E-06	0.72048E-06	0.90558E-06	0.10552E-05	0.11543E-05	0.15429E-05
0.17551E-05	0.18034E-05	0.16019E-05	0.15404E-05	0.14670E-05	0.14251E-05
0.13890E-05	0.11069E-05	0.92870E-06	0.75008E-06	0.10521E-05	0.17315E-05
0.20159E-05	0.22451E-05	0.24570E-05	0.16503E-05	0.82438E-06	0.34622E-06
0.30639E-06	0.31920E-06	0.49151E-06	0.84730E-06	0.10726E-05	0.11432E-05
0.13419E-05	0.16016E-05	0.18419E-05	0.29089E-05	0.32830E-05	0.46963E-05
0.54065E-05	0.36875E-05	0.14800E-05	0.10495E-05	0.10363E-05	0.12466E-05
0.13365E-05	0.18517E-05	0.27574E-05	0.35280E-05	0.56829E-05	0.10628E-04
0.19682E-04	0.38276E-04	0.91738E-04	0.14421E-03	0.81482E-04	0.17394E-04
0.37909E-05	0.12969E-05	0.38288E-06	0.18807E-06	0.63882E-07	0.87358E-07
0.11446E-07	0.83923E-08	-0.11885E-07	0.18938E-07	-0.11568E-07	-0.35436E-07

<< Error >>

0.26005E+00	0.21612E+00	0.37065E+00	0.31787E+00	0.35727E+00	0.22462E+00
0.27028E+00	0.28366E+00	0.16353E+00	0.17127E+00	0.20830E+00	0.17568E+00
0.20696E+00	0.15700E+00	0.11307E+00	0.12039E+00	0.15482E+00	0.15013E+00
0.11082E+00	0.12898E+00	0.13308E+00	0.12161E+00	0.11075E+00	0.12115E+00
0.98154E-01	0.95391E-01	0.10744E+00	0.10284E+00	0.97079E-01	0.99273E-01
0.10945E+00	0.98173E-01	0.85248E-01	0.73075E-01	0.83243E-01	0.81974E-01
0.86352E-01	0.79982E-01	0.92546E-01	0.80677E-01	0.79202E-01	0.87002E-01

0.77801E-01	0.81305E-01	0.74098E-01	0.84323E-01	0.92776E-01	0.75886E-01
0.83006E-01	0.68224E-01	0.61633E-01	0.66321E-01	0.74488E-01	0.67876E-01
0.73920E-01	0.67764E-01	0.74183E-01	0.69158E-01	0.68436E-01	0.69633E-01
0.70298E-01	0.75695E-01	0.79409E-01	0.86655E-01	0.84454E-01	0.86963E-01
0.98172E-01	0.10450E+00	0.79510E-01	0.51408E-01	0.72619E-01	0.91760E-01
0.13259E+00	0.14199E+00	0.15158E+00	0.14253E+00	0.19029E+00	0.15951E+00
0.11295E+00	0.11291E+00	0.12020E+00	0.91154E-01	0.92197E-01	0.10049E+00
0.73037E-01	0.77152E-01	0.64559E-01	0.57216E-01	0.57797E-01	0.44821E-01
0.42461E-01	0.42195E-01	0.44630E-01	0.46193E-01	0.49305E-01	0.52592E-01
0.55549E-01	0.64267E-01	0.69444E-01	0.81830E-01	0.63945E-01	0.50150E-01
0.45599E-01	0.43311E-01	0.41189E-01	0.51328E-01	0.81188E-01	0.14823E+00
0.17811E+00	0.17332E+00	0.12077E+00	0.80024E-01	0.70941E-01	0.69950E-01
0.62164E-01	0.58920E-01	0.54878E-01	0.42061E-01	0.39082E-01	0.32516E-01
0.30381E-01	0.37290E-01	0.62421E-01	0.79056E-01	0.79286E-01	0.76646E-01
0.66686E-01	0.56770E-01	0.45773E-01	0.40599E-01	0.31320E-01	0.22877E-01
0.16801E-01	0.12078E-01	0.78320E-02	0.62607E-02	0.83080E-02	0.17983E-01
0.39108E-01	0.66561E-01	0.13608E+00	0.17554E+00	0.39694E+00	0.30573E+00
0.20200E+01	0.19187E+01	0.14581E+01	0.80018E+00	0.12485E+01	0.57316E+00

Table 5.44 Angular neutron spectrum for graphite experiment (404.8 mm, 12.2 deg.).

## &lt;&lt; Spectrum &gt;&gt;

0.11615E-06	0.14405E-06	0.32402E-06	0.33395E-06	0.30187E-06	0.34901E-06
0.33861E-06	0.19272E-06	0.18668E-06	0.31057E-06	0.30384E-06	0.27611E-06
0.27513E-06	0.40075E-06	0.43081E-06	0.40115E-06	0.33783E-06	0.36816E-06
0.34927E-06	0.38371E-06	0.31999E-06	0.33210E-06	0.43566E-06	0.39900E-06
0.50114E-06	0.38956E-06	0.51015E-06	0.40803E-06	0.42849E-06	0.45652E-06
0.39373E-06	0.42427E-06	0.44817E-06	0.46485E-06	0.54415E-06	0.47367E-06
0.45813E-06	0.50718E-06	0.54176E-06	0.52266E-06	0.48454E-06	0.59202E-06
0.49807E-06	0.54390E-06	0.56328E-06	0.54830E-06	0.63255E-06	0.56899E-06
0.53992E-06	0.58105E-06	0.55286E-06	0.58211E-06	0.59968E-06	0.63474E-06
0.60648E-06	0.59425E-06	0.58257E-06	0.65808E-06	0.57937E-06	0.60250E-06
0.54376E-06	0.56766E-06	0.52630E-06	0.57932E-06	0.58226E-06	0.57690E-06
0.40822E-06	0.36247E-06	0.37556E-06	0.35462E-06	0.22118E-06	0.38899E-06
0.41849E-06	0.36097E-06	0.45331E-06	0.23313E-06	0.27934E-06	0.32320E-06
0.31241E-06	0.33852E-06	0.30749E-06	0.47449E-06	0.48033E-06	0.52297E-06
0.61909E-06	0.57786E-06	0.61258E-06	0.67037E-06	0.67234E-06	0.84057E-06
0.96637E-06	0.11084E-05	0.11641E-05	0.10336E-05	0.11947E-05	0.11649E-05
0.93598E-06	0.81976E-06	0.66239E-06	0.57276E-06	0.57240E-06	0.44908E-06
0.47507E-06	0.48620E-06	0.74158E-06	0.10087E-05	0.94962E-06	0.86924E-06
0.58201E-06	0.36237E-06	0.34968E-06	0.28225E-06	0.33128E-06	0.48815E-06
0.68672E-06	0.65948E-06	0.92906E-06	0.12338E-05	0.14811E-05	0.22241E-05
0.28589E-05	0.40794E-05	0.40660E-05	0.28083E-05	0.13717E-05	0.63949E-06
0.50497E-06	0.61249E-06	0.60616E-06	0.69087E-06	0.80587E-06	0.12255E-05
0.20739E-05	0.35462E-05	0.67212E-05	0.12434E-04	0.20895E-04	0.22331E-04
0.11232E-04	0.27409E-05	0.55158E-06	0.29838E-06	0.11042E-06	-0.23437E-07
-0.85812E-08	-0.26803E-07	-0.20614E-07	0.16438E-08	0.20482E-07	-0.27207E-08

## &lt;&lt; Error &gt;&gt;

0.64212E+00	0.51332E+00	0.20924E+00	0.19962E+00	0.21423E+00	0.17958E+00
0.17918E+00	0.30933E+00	0.31092E+00	0.17516E+00	0.18890E+00	0.19654E+00
0.19762E+00	0.13272E+00	0.11900E+00	0.12674E+00	0.14411E+00	0.13380E+00
0.13708E+00	0.11535E+00	0.14121E+00	0.13698E+00	0.10743E+00	0.11667E+00
0.93369E-01	0.11754E+00	0.90764E-01	0.11063E+00	0.11086E+00	0.10485E+00
0.12261E+00	0.10848E+00	0.10962E+00	0.10096E+00	0.86218E-01	0.99691E-01
0.10028E+00	0.94164E-01	0.90960E-01	0.87526E-01	0.10239E+00	0.89364E-01
0.99254E-01	0.94197E-01	0.85768E-01	0.94014E-01	0.79439E-01	0.86787E-01
0.93607E-01	0.89740E-01	0.95181E-01	0.88468E-01	0.86795E-01	0.78864E-01
0.83777E-01	0.85816E-01	0.86897E-01	0.77047E-01	0.89154E-01	0.87254E-01
0.91762E-01	0.87292E-01	0.94049E-01	0.85454E-01	0.84614E-01	0.82180E-01
0.11221E+00	0.12665E+00	0.11967E+00	0.12108E+00	0.19455E+00	0.10499E+00
0.10901E+00	0.12801E+00	0.10100E+00	0.19261E+00	0.14503E+00	0.12768E+00
0.13709E+00	0.12364E+00	0.14603E+00	0.95632E-01	0.10059E+00	0.93865E-01
0.81450E-01	0.88473E-01	0.89506E-01	0.77991E-01	0.82025E-01	0.68948E-01
0.64281E-01	0.58988E-01	0.55697E-01	0.62370E-01	0.54641E-01	0.62057E-01
0.68248E-01	0.72799E-01	0.85954E-01	0.96461E-01	0.97153E-01	0.11372E+00
0.10981E+00	0.10998E+00	0.83931E-01	0.66870E-01	0.73081E-01	0.78312E-01
0.98905E-01	0.13987E+00	0.14585E+00	0.19022E+00	0.16730E+00	0.11987E+00
0.94582E-01	0.97759E-01	0.80226E-01	0.69481E-01	0.62814E-01	0.47909E-01

0.43854E-01	0.35075E-01	0.35466E-01	0.44103E-01	0.67277E-01	0.10800E+00
0.13124E+00	0.12246E+00	0.11273E+00	0.10436E+00	0.10102E+00	0.76035E-01
0.55180E-01	0.41184E-01	0.29602E-01	0.21484E-01	0.16477E-01	0.15880E-01
0.22258E-01	0.45203E-01	0.11094E+00	0.14203E+00	0.23545E+00	0.10854E+01
0.31103E+01	0.91810E+00	0.80446E+00	0.11784E+02	0.76544E+00	0.62803E+01

Table 5.45 Angular neutron spectrum for graphite experiment (404.8 mm, 24.9 deg.).

&lt;&lt; Spectrum &gt;&gt;

0.14245E-06	0.89419E-07	0.19675E-06	0.14662E-06	0.53296E-07	0.23468E-06
0.23855E-06	0.15511E-06	0.36602E-06	0.26882E-06	0.25087E-06	0.20011E-06
0.35578E-06	0.34724E-06	0.35515E-06	0.26444E-06	0.33527E-06	0.28400E-06
0.28227E-06	0.29151E-06	0.33119E-06	0.39284E-06	0.35423E-06	0.32931E-06
0.34717E-06	0.37967E-06	0.39393E-06	0.41290E-06	0.36303E-06	0.39952E-06
0.40950E-06	0.45741E-06	0.46188E-06	0.40332E-06	0.41884E-06	0.47616E-06
0.45207E-06	0.45077E-06	0.40076E-06	0.46737E-06	0.58124E-06	0.41732E-06
0.45087E-06	0.57186E-06	0.52879E-06	0.51056E-06	0.57251E-06	0.52857E-06
0.48072E-06	0.54810E-06	0.62230E-06	0.48731E-06	0.60802E-06	0.56053E-06
0.53366E-06	0.52085E-06	0.64521E-06	0.54251E-06	0.60909E-06	0.56859E-06
0.56472E-06	0.49131E-06	0.53972E-06	0.56760E-06	0.41479E-06	0.45582E-06
0.48672E-06	0.45639E-06	0.39407E-06	0.37323E-06	0.41471E-06	0.33872E-06
0.27715E-06	0.34210E-06	0.38776E-06	0.42064E-06	0.33447E-06	0.29516E-06
0.27738E-06	0.24337E-06	0.28613E-06	0.31586E-06	0.36571E-06	0.36737E-06
0.43947E-06	0.50471E-06	0.53917E-06	0.62869E-06	0.60796E-06	0.56551E-06
0.68400E-06	0.62995E-06	0.77244E-06	0.80829E-06	0.91872E-06	0.70373E-06
0.72008E-06	0.59566E-06	0.66261E-06	0.46003E-06	0.40731E-06	0.46439E-06
0.32312E-06	0.53552E-06	0.54966E-06	0.67802E-06	0.64392E-06	0.64749E-06
0.37354E-06	0.31632E-06	0.35897E-06	0.27328E-06	0.32567E-06	0.53096E-06
0.68711E-06	0.90399E-06	0.99538E-06	0.11608E-05	0.15870E-05	0.19524E-05
0.20156E-05	0.22056E-05	0.18258E-05	0.10943E-05	0.53462E-06	0.41292E-06
0.40070E-06	0.46433E-06	0.53678E-06	0.61776E-06	0.72709E-06	0.10370E-05
0.16803E-05	0.29005E-05	0.51499E-05	0.75944E-05	0.82469E-05	0.56795E-05
0.19815E-05	0.59898E-06	0.22184E-06	0.11626E-06	-0.12337E-07	0.40359E-07
0.13618E-07	0.41577E-09	-0.18686E-07	0.12550E-07	0.23279E-09	0.21888E-08

&lt;&lt; Error &gt;&gt;

0.41421E+00	0.65200E+00	0.28727E+00	0.40282E+00	0.10412E+01	0.23178E+00
0.20439E+00	0.32644E+00	0.12901E+00	0.17286E+00	0.17964E+00	0.22281E+00
0.12360E+00	0.12779E+00	0.12169E+00	0.15675E+00	0.11695E+00	0.14220E+00
0.14005E+00	0.12961E+00	0.11483E+00	0.95945E-01	0.10651E+00	0.12214E+00
0.10771E+00	0.10416E+00	0.97008E-01	0.92807E-01	0.11042E+00	0.10212E+00
0.99758E-01	0.89142E-01	0.88449E-01	0.10062E+00	0.95432E-01	0.84260E-01
0.88215E-01	0.90764E-01	0.98505E-01	0.88172E-01	0.70366E-01	0.10245E+00
0.94491E-01	0.76356E-01	0.82554E-01	0.85302E-01	0.74108E-01	0.83947E-01
0.91188E-01	0.81929E-01	0.72219E-01	0.89612E-01	0.74197E-01	0.79934E-01
0.82779E-01	0.85907E-01	0.71023E-01	0.83361E-01	0.75591E-01	0.77733E-01
0.78897E-01	0.88169E-01	0.83261E-01	0.73599E-01	0.10072E+00	0.90040E-01
0.81682E-01	0.85442E-01	0.97969E-01	0.99135E-01	0.85382E-01	0.10002E+00
0.12897E+00	0.10534E+00	0.94124E-01	0.90076E-01	0.10576E+00	0.12545E+00
0.12586E+00	0.14313E+00	0.12409E+00	0.11758E+00	0.10734E+00	0.10999E+00
0.90713E-01	0.83090E-01	0.83282E-01	0.73837E-01	0.75791E-01	0.79909E-01
0.69886E-01	0.79756E-01	0.64995E-01	0.61645E-01	0.56644E-01	0.70293E-01
0.70940E-01	0.80571E-01	0.73275E-01	0.97186E-01	0.11056E+00	0.97595E-01
0.13586E+00	0.86486E-01	0.87771E-01	0.75789E-01	0.82278E-01	0.82297E-01
0.12555E+00	0.13589E+00	0.12505E+00	0.16024E+00	0.13700E+00	0.98243E-01
0.81842E-01	0.68221E-01	0.67598E-01	0.62409E-01	0.50469E-01	0.44941E-01
0.45685E-01	0.43561E-01	0.48875E-01	0.67314E-01	0.10818E+00	0.13062E+00
0.13457E+00	0.12934E+00	0.11567E+00	0.10228E+00	0.90134E-01	0.72244E-01
0.54676E-01	0.39460E-01	0.29421E-01	0.24124E-01	0.23130E-01	0.28013E-01
0.47401E-01	0.88076E-01	0.16133E+00	0.24513E+00	0.19794E+01	0.52053E+00
0.14503E+01	0.34414E+02	0.96575E+00	0.13191E+01	0.79011E+02	0.63253E+01

Table 5.46 Angular neutron spectrum for graphite experiment (404.8 mm, 41.8 deg.).

&lt;&lt; Spectrum &gt;&gt;

0.30488E-06	0.22249E-06	0.27022E-06	0.24227E-06	0.24211E-06	0.32066E-06
0.30132E-06	0.25110E-06	0.30005E-06	0.37857E-06	0.30627E-06	0.30561E-06
0.29656E-06	0.29919E-06	0.34535E-06	0.39472E-06	0.40171E-06	0.39811E-06
0.27518E-06	0.34761E-06	0.35080E-06	0.35902E-06	0.39178E-06	0.31735E-06
0.31580E-06	0.36676E-06	0.33556E-06	0.41894E-06	0.39849E-06	0.39516E-06
0.44813E-06	0.36369E-06	0.43181E-06	0.39657E-06	0.42940E-06	0.40725E-06
0.46518E-06	0.43493E-06	0.35017E-06	0.45650E-06	0.42100E-06	0.48071E-06
0.44470E-06	0.45047E-06	0.41014E-06	0.52507E-06	0.52129E-06	0.46926E-06
0.45185E-06	0.47869E-06	0.57981E-06	0.47146E-06	0.42855E-06	0.49782E-06
0.44373E-06	0.45906E-06	0.43103E-06	0.54819E-06	0.42689E-06	0.38858E-06
0.37831E-06	0.40992E-06	0.43474E-06	0.35723E-06	0.35436E-06	0.39154E-06
0.34721E-06	0.25556E-06	0.26680E-06	0.29144E-06	0.28008E-06	0.25501E-06
0.29509E-06	0.31803E-06	0.19614E-06	0.18062E-06	0.28444E-06	0.21999E-06
0.27364E-06	0.35385E-06	0.37169E-06	0.42185E-06	0.30923E-06	0.44290E-06
0.46603E-06	0.35911E-06	0.44300E-06	0.52870E-06	0.50319E-06	0.55296E-06
0.51807E-06	0.47042E-06	0.52621E-06	0.49973E-06	0.38574E-06	0.37830E-06
0.34761E-06	0.30285E-06	0.26415E-06	0.25847E-06	0.29707E-06	0.27482E-06
0.42593E-06	0.38878E-06	0.51097E-06	0.42388E-06	0.30807E-06	0.22984E-06
0.20931E-06	0.26781E-06	0.24212E-06	0.43964E-06	0.48722E-06	0.57528E-06
0.63042E-06	0.81103E-06	0.76174E-06	0.71999E-06	0.10037E-05	0.90245E-06
0.69040E-06	0.51149E-06	0.28453E-06	0.20300E-06	0.19462E-06	0.31087E-06
0.32518E-06	0.51388E-06	0.47368E-06	0.61177E-06	0.74270E-06	0.10387E-05
0.13466E-05	0.17982E-05	0.21741E-05	0.18518E-05	0.10614E-05	0.37670E-06
0.90727E-07	0.18084E-08	-0.24879E-07	0.31213E-09	0.12292E-07	0.25813E-07
0.20645E-07	0.77731E-08	-0.98151E-08	-0.14523E-07	0.10913E-07	0.22807E-08

&lt;&lt; Error &gt;&gt;

0.21069E+00	0.28551E+00	0.22336E+00	0.24355E+00	0.22395E+00	0.16534E+00
0.16723E+00	0.20004E+00	0.16354E+00	0.12299E+00	0.14936E+00	0.14631E+00
0.14785E+00	0.14476E+00	0.12348E+00	0.10529E+00	0.10352E+00	0.99396E-01
0.13960E+00	0.10840E+00	0.10473E+00	0.10226E+00	0.99123E-01	0.11133E+00
0.11732E+00	0.11017E+00	0.11157E+00	0.89011E-01	0.97387E-01	0.98681E-01
0.88536E-01	0.10635E+00	0.90317E-01	0.98565E-01	0.92161E-01	0.94911E-01
0.85288E-01	0.87458E-01	0.11264E+00	0.86699E-01	0.95600E-01	0.87541E-01
0.92132E-01	0.93563E-01	0.98334E-01	0.79779E-01	0.82453E-01	0.92437E-01
0.93862E-01	0.93027E-01	0.75664E-01	0.94978E-01	0.10809E+00	0.90115E-01
0.10339E+00	0.10269E+00	0.10508E+00	0.83189E-01	0.10749E+00	0.11812E+00
0.11831E+00	0.11160E+00	0.10302E+00	0.12226E+00	0.11753E+00	0.10897E+00
0.11677E+00	0.15648E+00	0.13914E+00	0.12728E+00	0.13028E+00	0.14184E+00
0.11642E+00	0.11012E+00	0.17005E+00	0.18493E+00	0.11301E+00	0.14447E+00
0.11730E+00	0.98097E-01	0.98679E-01	0.94190E-01	0.12490E+00	0.91572E-01
0.87654E-01	0.11509E+00	0.96614E-01	0.84892E-01	0.89438E-01	0.82490E-01
0.94434E-01	0.98240E-01	0.89738E-01	0.96082E-01	0.12582E+00	0.10695E+00
0.11563E+00	0.13748E+00	0.15217E+00	0.14837E+00	0.13168E+00	0.14939E+00
0.10318E+00	0.11882E+00	0.95597E-01	0.10703E+00	0.14092E+00	0.18728E+00
0.19963E+00	0.16300E+00	0.18530E+00	0.11041E+00	0.10271E+00	0.92780E-01
0.94074E-01	0.75358E-01	0.77671E-01	0.85434E-01	0.68595E-01	0.74429E-01
0.95215E-01	0.11241E+00	0.19148E+00	0.25578E+00	0.26511E+00	0.17072E+00
0.17865E+00	0.11253E+00	0.12620E+00	0.10537E+00	0.91017E-01	0.69095E-01
0.58983E-01	0.49292E-01	0.44195E-01	0.48124E-01	0.66116E-01	0.11498E+00
0.32974E+00	0.13350E+02	0.80340E+00	0.59964E+02	0.12645E+01	0.68627E+00
0.73741E+00	0.20873E+01	0.15996E+01	0.12118E+01	0.14900E+01	0.64561E+01

Table 5.47 Angular neutron spectrum for graphite experiment (404.8 mm, 66.8 deg.).

&lt;&lt; Spectrum &gt;&gt;

0.38151E-07	0.37458E-07	0.50648E-07	0.63534E-07	0.12502E-06	0.14757E-06
0.48098E-07	0.16363E-06	0.11265E-06	0.15516E-06	0.13126E-06	0.11565E-06
0.18405E-06	0.16156E-06	0.12414E-06	0.12036E-06	0.10402E-06	0.15157E-06
0.19409E-06	0.16281E-06	0.19927E-06	0.21083E-06	0.16345E-06	0.17791E-06
0.24600E-06	0.19768E-06	0.21461E-06	0.21512E-06	0.20030E-06	0.19696E-06
0.20636E-06	0.26962E-06	0.25690E-06	0.25036E-06	0.26768E-06	0.22367E-06
0.23513E-06	0.20134E-06	0.19381E-06	0.26218E-06	0.31653E-06	0.29014E-06
0.23616E-06	0.25341E-06	0.20471E-06	0.28695E-06	0.31435E-06	0.19808E-06
0.29202E-06	0.26376E-06	0.28045E-06	0.22044E-06	0.25510E-06	0.27546E-06

0.23737E-06	0.30734E-06	0.31133E-06	0.27473E-06	0.16753E-06	0.27358E-06
0.26036E-06	0.26085E-06	0.20582E-06	0.29782E-06	0.25536E-06	0.25455E-06
0.22712E-06	0.24470E-06	0.21078E-06	0.22464E-06	0.23686E-06	0.17622E-06
0.16353E-06	0.17876E-06	0.20500E-06	0.15144E-06	0.23351E-06	0.15384E-06
0.79399E-07	0.16172E-06	0.16151E-06	0.24631E-06	0.28770E-06	0.24136E-06
0.27790E-06	0.30102E-06	0.30659E-06	0.21793E-06	0.28459E-06	0.21334E-06
0.12164E-06	0.21599E-06	0.18353E-06	0.22674E-06	0.17754E-06	0.15473E-06
0.17108E-06	0.22824E-06	0.15861E-06	0.18359E-06	0.12773E-06	0.11709E-06
0.12639E-06	0.10915E-06	0.16958E-06	0.18162E-06	0.16332E-06	0.22835E-06
0.13280E-06	0.19548E-06	0.18296E-06	0.16313E-06	0.12466E-06	0.23710E-06
0.26057E-06	0.24950E-06	0.28243E-06	0.18735E-06	0.22999E-06	0.28782E-06
0.22496E-06	0.20298E-06	0.18340E-06	0.20774E-06	0.18841E-06	0.17388E-06
0.48415E-07	0.20350E-06	0.15557E-06	0.29544E-06	0.39594E-06	0.39617E-06
0.34973E-06	0.29199E-06	0.28770E-06	0.29559E-06	0.23305E-06	0.23737E-06
0.15453E-06	0.13386E-06	0.72098E-07	0.63582E-07	0.15948E-06	0.50924E-07
0.13006E-07	0.20023E-08	-0.30089E-07	-0.41652E-07	0.66526E-08	0.99205E-08

&lt;&lt; Error &gt;&gt;

0.13283E+01	0.13345E+01	0.96149E+00	0.72468E+00	0.37026E+00	0.29194E+00
0.88101E+00	0.24639E+00	0.35304E+00	0.24453E+00	0.29011E+00	0.31619E+00
0.19574E+00	0.22317E+00	0.27585E+00	0.28134E+00	0.31853E+00	0.21435E+00
0.16202E+00	0.19197E+00	0.15305E+00	0.14242E+00	0.18550E+00	0.17770E+00
0.12400E+00	0.15616E+00	0.14127E+00	0.14401E+00	0.15504E+00	0.16122E+00
0.15903E+00	0.12106E+00	0.12298E+00	0.13116E+00	0.11463E+00	0.14087E+00
0.13639E+00	0.15474E+00	0.16152E+00	0.12206E+00	0.10754E+00	0.11775E+00
0.14259E+00	0.13727E+00	0.16479E+00	0.11738E+00	0.11037E+00	0.17627E+00
0.12254E+00	0.13732E+00	0.13189E+00	0.16882E+00	0.15250E+00	0.13574E+00
0.16275E+00	0.12570E+00	0.12573E+00	0.14029E+00	0.23467E+00	0.14568E+00
0.15246E+00	0.15267E+00	0.19529E+00	0.14012E+00	0.16432E+00	0.16313E+00
0.18583E+00	0.16687E+00	0.20051E+00	0.18857E+00	0.17854E+00	0.23984E+00
0.25818E+00	0.24297E+00	0.21514E+00	0.30029E+00	0.19653E+00	0.30420E+00
0.57481E+00	0.30260E+00	0.29303E+00	0.20330E+00	0.17259E+00	0.20764E+00
0.18252E+00	0.16618E+00	0.16585E+00	0.23305E+00	0.17543E+00	0.23949E+00
0.41161E+00	0.22409E+00	0.26283E+00	0.21003E+00	0.25856E+00	0.22726E+00
0.19582E+00	0.15044E+00	0.20982E+00	0.18107E+00	0.24494E+00	0.27854E+00
0.26560E+00	0.31026E+00	0.21198E+00	0.20376E+00	0.23212E+00	0.18578E+00
0.30880E+00	0.21047E+00	0.22702E+00	0.26247E+00	0.36945E+00	0.20924E+00
0.19791E+00	0.20677E+00	0.19798E+00	0.27814E+00	0.22309E+00	0.19356E+00
0.25781E+00	0.28124E+00	0.32890E+00	0.29800E+00	0.32737E+00	0.36189E+00
0.13464E+01	0.33206E+00	0.45720E+00	0.23922E+00	0.18331E+00	0.18259E+00
0.21340E+00	0.23686E+00	0.23295E+00	0.21515E+00	0.26302E+00	0.22658E+00
0.30820E+00	0.31755E+00	0.52444E+00	0.57384E+00	0.19669E+00	0.47927E+00
0.16196E+01	0.74191E+01	0.52457E+00	0.39384E+00	0.22086E+01	0.14678E+01

Table 5.48 Mid energy of measured spectra for iron experiment.

0.11629E-01	0.12225E-01	0.12852E-01	0.13511E-01	0.14203E-01	0.14932E-01
0.15697E-01	0.16502E-01	0.17348E-01	0.18238E-01	0.19173E-01	0.20156E-01
0.21189E-01	0.22275E-01	0.23418E-01	0.24618E-01	0.25880E-01	0.27207E-01
0.28602E-01	0.30069E-01	0.31610E-01	0.33231E-01	0.34935E-01	0.36726E-01
0.38609E-01	0.40589E-01	0.42670E-01	0.44857E-01	0.47157E-01	0.49575E-01
0.52117E-01	0.54789E-01	0.57598E-01	0.60551E-01	0.63656E-01	0.66919E-01
0.70350E-01	0.73957E-01	0.77749E-01	0.81735E-01	0.85926E-01	0.90332E-01
0.94963E-01	0.99832E-01	0.10495E+00	0.11033E+00	0.11599E+00	0.12193E+00
0.12819E+00	0.13476E+00	0.14167E+00	0.14893E+00	0.15657E+00	0.16459E+00
0.17303E+00	0.18191E+00	0.19123E+00	0.20104E+00	0.21134E+00	0.22218E+00
0.23357E+00	0.24555E+00	0.25814E+00	0.27137E+00	0.28528E+00	0.29991E+00
0.31529E+00	0.33145E+00	0.34845E+00	0.36631E+00	0.38509E+00	0.40484E+00
0.42559E+00	0.44742E+00	0.47035E+00	0.49447E+00	0.51982E+00	0.54647E+00
0.57449E+00	0.60395E+00	0.63491E+00	0.66747E+00	0.70169E+00	0.73766E+00
0.77548E+00	0.81524E+00	0.85704E+00	0.90098E+00	0.94718E+00	0.99574E+00
0.10468E+01	0.11005E+01	0.11569E+01	0.12162E+01	0.12786E+01	0.13441E+01
0.14130E+01	0.14855E+01	0.15616E+01	0.16417E+01	0.17259E+01	0.18144E+01
0.19074E+01	0.20052E+01	0.21080E+01	0.22161E+01	0.23297E+01	0.24491E+01
0.25747E+01	0.27067E+01	0.28455E+01	0.29914E+01	0.31447E+01	0.33060E+01
0.34755E+01	0.36537E+01	0.38410E+01	0.40379E+01	0.42450E+01	0.44626E+01
0.46914E+01	0.49319E+01	0.51848E+01	0.54506E+01	0.57301E+01	0.60239E+01
0.63327E+01	0.66574E+01	0.69988E+01	0.73576E+01	0.77348E+01	0.81314E+01
0.85483E+01	0.89866E+01	0.94473E+01	0.99317E+01	0.10441E+02	0.10976E+02
0.11539E+02	0.12131E+02	0.12753E+02	0.13406E+02	0.14094E+02	0.14816E+02
0.15576E+02	0.16375E+02	0.17214E+02	0.18097E+02	0.19025E+02	0.20000E+02

Table 5.49 Source neutron spectrum for iron experiment.

<< Spectrum >>

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	-0.66723E-03	-0.61006E-03	-0.38554E-03	-0.25814E-03
-0.28385E-03	-0.30334E-03	-0.20765E-03	-0.15341E-03	-0.14242E-03	-0.12898E-03
-0.12016E-03	-0.10986E-03	-0.63888E-04	-0.25389E-04	-0.24384E-04	0.12223E-04
0.18977E-04	0.15868E-04	0.23775E-04	0.20038E-04	0.30623E-04	0.60031E-04
0.67284E-04	0.95651E-04	0.11162E-03	0.11509E-03	0.10873E-03	0.14454E-03
0.15999E-03	0.15599E-03	0.16830E-03	0.16774E-03	0.19632E-03	0.20764E-03
0.23233E-03	0.27754E-03	0.23897E-03	0.28418E-03	0.31707E-03	0.37517E-03
0.31846E-03	0.36346E-03	0.40202E-03	0.47013E-03	0.47298E-03	0.56472E-03
0.52861E-03	0.60084E-03	0.69729E-03	0.74239E-03	0.78256E-03	0.85647E-03
0.84929E-03	0.89463E-03	0.10146E-02	0.10352E-02	0.11277E-02	0.12299E-02
0.12623E-02	0.13648E-02	0.13696E-02	0.14285E-02	0.15491E-02	0.15889E-02
0.17030E-02	0.17761E-02	0.18966E-02	0.19352E-02	0.20598E-02	0.19924E-02
0.20917E-02	0.21383E-02	0.22979E-02	0.23383E-02	0.23364E-02	0.22892E-02
0.23331E-02	0.23814E-02	0.23453E-02	0.23825E-02	0.26109E-02	0.25860E-02
0.25295E-02	0.25131E-02	0.25371E-02	0.25681E-02	0.25870E-02	0.24881E-02
0.25082E-02	0.24099E-02	0.24344E-02	0.24399E-02	0.26186E-02	0.24971E-02
0.21521E-02	0.21869E-02	0.19054E-02	0.19328E-02	0.18901E-02	0.18008E-02
0.17832E-02	0.16844E-02	0.16028E-02	0.15413E-02	0.14588E-02	0.12969E-02
0.12536E-02	0.12702E-02	0.12773E-02	0.11387E-02	0.11250E-02	0.11815E-02
0.12072E-02	0.12995E-02	0.14972E-02	0.15536E-02	0.21053E-02	0.33848E-02
0.69036E-02	0.13028E-01	0.20854E-01	0.36516E-01	0.13291E+00	0.94527E+00

<< Error >>

0.47038E+00	0.41487E-02	0.21445E-06	0.23112E-05	-0.92817E-05	-0.30902E-05
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.00000E+00	0.49490E-01	0.14640E+00	0.20206E+00
0.17166E+00	0.14819E+00	0.19554E+00	0.27385E+00	0.27860E+00	0.25394E+00
0.25274E+00	0.24056E+00	0.38302E+00	0.99605E+00	0.81665E+00	0.17190E+01
0.93305E+00	0.10831E+01	0.66796E+00	0.80646E+00	0.48547E+00	0.24773E+00
0.20757E+00	0.15313E+00	0.12607E+00	0.12247E+00	0.12441E+00	0.10147E+00
0.94325E-01	0.90905E-01	0.81977E-01	0.81366E-01	0.74583E-01	0.67971E-01
0.63719E-01	0.56525E-01	0.63727E-01	0.56167E-01	0.51977E-01	0.46287E-01
0.52272E-01	0.48241E-01	0.44945E-01	0.41696E-01	0.41667E-01	0.37215E-01



0.38418E-01	0.36192E-01	0.33729E-01	0.32547E-01	0.32258E-01	0.30896E-01
0.31372E-01	0.30378E-01	0.28271E-01	0.27982E-01	0.26266E-01	0.25238E-01
0.24953E-01	0.24126E-01	0.24218E-01	0.23578E-01	0.22664E-01	0.22401E-01
0.21768E-01	0.21233E-01	0.20703E-01	0.20785E-01	0.20433E-01	0.20889E-01
0.20264E-01	0.20236E-01	0.19696E-01	0.19493E-01	0.19703E-01	0.19961E-01
0.19947E-01	0.19833E-01	0.20310E-01	0.20095E-01	0.27414E-01	0.26762E-01
0.26486E-01	0.26124E-01	0.25922E-01	0.25605E-01	0.25234E-01	0.25596E-01
0.25343E-01	0.26062E-01	0.25655E-01	0.25954E-01	0.25328E-01	0.26401E-01
0.29077E-01	0.28533E-01	0.30796E-01	0.31002E-01	0.32215E-01	0.32924E-01
0.33027E-01	0.34479E-01	0.35531E-01	0.36347E-01	0.37676E-01	0.41446E-01
0.42610E-01	0.42993E-01	0.43820E-01	0.49236E-01	0.50252E-01	0.50307E-01
0.50819E-01	0.50615E-01	0.47414E-01	0.48043E-01	0.40231E-01	0.31043E-01
0.20840E-01	0.14867E-01	0.11785E-01	0.88061E-02	0.45185E-02	0.16787E-02
0.23376E-02	0.24459E-01	0.35201E+02	0.19483E+01	0.34522E+00	0.15151E+01

Table 5.50 Angular neutron spectrum for iron experiment (50.0 mm, 0.0 deg.).

<< Spectrum >>

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	-0.37317E-07	-0.25557E-05	-0.14901E-05	-0.22310E-06	-0.54704E-06
-0.59790E-06	0.23005E-06	0.91611E-07	0.50027E-06	-0.17143E-06	-0.10764E-06
0.14496E-06	-0.25854E-06	0.34882E-06	0.28156E-06	0.28636E-06	0.43548E-06
0.61631E-06	0.25192E-06	0.39642E-06	0.10223E-05	0.37358E-06	0.23321E-06
0.48651E-06	0.48551E-06	0.90695E-06	0.91010E-06	0.12050E-05	0.13788E-05
0.16967E-05	0.19671E-05	0.12504E-05	0.83785E-06	0.12900E-05	0.19481E-05
0.16245E-05	0.27286E-05	0.15502E-05	0.11774E-05	0.19137E-05	0.23640E-05
0.24486E-05	0.26061E-05	0.32783E-05	0.43814E-05	0.28865E-05	0.48089E-05
0.53632E-05	0.37168E-05	0.59290E-05	0.54397E-05	0.53438E-05	0.39152E-05
0.40204E-05	0.48369E-05	0.64051E-05	0.69529E-05	0.67186E-05	0.75684E-05
0.78965E-05	0.10819E-04	0.12794E-04	0.11811E-04	0.11795E-04	0.99085E-05
0.87079E-05	0.99870E-05	0.11394E-04	0.12852E-04	0.15787E-04	0.13194E-04
0.12738E-04	0.13549E-04	0.15130E-04	0.15844E-04	0.13871E-04	0.13137E-04
0.14500E-04	0.13116E-04	0.12973E-04	0.12966E-04	0.13958E-04	0.13802E-04
0.12846E-04	0.11975E-04	0.12485E-04	0.12492E-04	0.11702E-04	0.10568E-04
0.10243E-04	0.10939E-04	0.10257E-04	0.10305E-04	0.10128E-04	0.96133E-05
0.95677E-05	0.88266E-05	0.84038E-05	0.75563E-05	0.71115E-05	0.73338E-05
0.74124E-05	0.66692E-05	0.61210E-05	0.61705E-05	0.60173E-05	0.56675E-05
0.56831E-05	0.53594E-05	0.55305E-05	0.54856E-05	0.60269E-05	0.52782E-05
0.55461E-05	0.56405E-05	0.64187E-05	0.67125E-05	0.84312E-05	0.87189E-05
0.11389E-04	0.18663E-04	0.28119E-04	0.48284E-04	0.37468E-03	0.42092E-02
0.21446E-02	0.32540E-03	0.13669E-03	0.45435E-04	0.99665E-05	0.16932E-05

<< Error >>

0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.00000E+00	0.00000E+00	0.16709E+00	0.19023E+01	0.70528E+00
0.55584E+00	0.13951E+01	0.28895E+01	0.54764E+00	0.14471E+01	0.21362E+01
0.14078E+01	0.68252E+00	0.45994E+00	0.50287E+00	0.45692E+00	0.27226E+00
0.18248E+00	0.38373E+00	0.22068E+00	0.95757E-01	0.22671E+00	0.31843E+00
0.16717E+00	0.16014E+00	0.92384E-01	0.85771E-01	0.69897E-01	0.62566E-01
0.53350E-01	0.47835E-01	0.65984E-01	0.80047E-01	0.58659E-01	0.44867E-01
0.49245E-01	0.36039E-01	0.49988E-01	0.58546E-01	0.43068E-01	0.37967E-01
0.38553E-01	0.35703E-01	0.31180E-01	0.26816E-01	0.33992E-01	0.25112E-01
0.24152E-01	0.29924E-01	0.22588E-01	0.24243E-01	0.24626E-01	0.29360E-01
0.28821E-01	0.26376E-01	0.22579E-01	0.21411E-01	0.21526E-01	0.20146E-01
0.19696E-01	0.16693E-01	0.15462E-01	0.16274E-01	0.16264E-01	0.17953E-01
0.19235E-01	0.17906E-01	0.16783E-01	0.15858E-01	0.14395E-01	0.16011E-01
0.16321E-01	0.15934E-01	0.15046E-01	0.14727E-01	0.15987E-01	0.16510E-01
0.15764E-01	0.16728E-01	0.16900E-01	0.17003E-01	0.23217E-01	0.22850E-01
0.23115E-01	0.23692E-01	0.22951E-01	0.22786E-01	0.23451E-01	0.24376E-01
0.24926E-01	0.24065E-01	0.24993E-01	0.25009E-01	0.25734E-01	0.26480E-01
0.26919E-01	0.28310E-01	0.29030E-01	0.31242E-01	0.32896E-01	0.32203E-01
0.32164E-01	0.34493E-01	0.36966E-01	0.36518E-01	0.37385E-01	0.39111E-01
0.39987E-01	0.41839E-01	0.42361E-01	0.43513E-01	0.42185E-01	0.47828E-01
0.48136E-01	0.49386E-01	0.46906E-01	0.46293E-01	0.40707E-01	0.41534E-01
0.34641E-01	0.25895E-01	0.20579E-01	0.15305E-01	0.53124E-02	0.15694E-02
0.21599E-02	0.54450E-02	0.82591E-02	0.14076E-01	0.29589E-01	0.70641E-01

Table 5.51 Angular neutron spectrum for iron experiment (50.0 mm, 24.9 deg.).

<< Spectrum >>

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	-0.38709E-08	-0.54636E-07	-0.42403E-06	-0.80141E-07	0.85900E-07
-0.10264E-06	0.37088E-06	-0.28309E-06	0.46775E-06	0.17239E-06	0.24737E-06
0.48668E-06	0.23309E-06	0.33842E-06	0.42813E-07	0.22052E-06	0.24285E-06
0.30558E-06	0.32321E-06	0.23576E-06	0.48139E-06	0.42224E-06	0.15947E-06
0.25612E-06	0.33286E-06	0.29120E-06	0.40872E-06	0.42172E-06	0.59206E-06
0.67512E-06	0.64882E-06	0.84099E-06	0.44885E-06	0.53790E-06	0.70284E-06
0.96076E-06	0.90585E-06	0.12594E-05	0.61470E-06	0.92181E-06	0.11329E-05
0.11120E-05	0.11959E-05	0.12701E-05	0.13892E-05	0.16454E-05	0.14384E-05
0.19854E-05	0.20707E-05	0.18500E-05	0.27376E-05	0.26072E-05	0.23751E-05
0.21720E-05	0.24005E-05	0.26369E-05	0.31054E-05	0.30496E-05	0.31153E-05
0.32915E-05	0.36902E-05	0.46256E-05	0.49394E-05	0.46637E-05	0.50148E-05
0.44381E-05	0.44176E-05	0.46938E-05	0.48393E-05	0.49840E-05	0.53882E-05
0.48104E-05	0.48846E-05	0.52973E-05	0.57012E-05	0.56350E-05	0.53889E-05
0.51958E-05	0.51899E-05	0.52268E-05	0.49945E-05	0.52867E-05	0.54033E-05
0.49489E-05	0.48036E-05	0.50585E-05	0.47023E-05	0.47599E-05	0.46791E-05
0.43540E-05	0.42046E-05	0.40550E-05	0.39796E-05	0.40493E-05	0.35853E-05
0.34483E-05	0.32755E-05	0.29191E-05	0.28184E-05	0.27917E-05	0.26374E-05
0.24913E-05	0.24936E-05	0.23304E-05	0.22182E-05	0.22021E-05	0.19562E-05
0.19361E-05	0.18108E-05	0.17736E-05	0.19208E-05	0.15918E-05	0.14997E-05
0.14165E-05	0.14551E-05	0.16688E-05	0.16043E-05	0.21899E-05	0.18036E-05
0.17219E-05	0.21744E-05	0.22294E-05	0.28486E-05	0.10571E-04	0.80926E-04
0.10906E-03	0.14110E-04	0.28648E-05	0.52954E-06	0.67125E-07	0.17558E-07

<< Error >>

0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.00000E+00	0.00000E+00	0.49254E+00	0.38283E+01	0.31005E+01
0.22192E+01	0.59914E+00	0.73654E+00	0.37394E+00	0.10198E+01	0.61284E+00
0.28821E+00	0.51278E+00	0.31638E+00	0.21886E+01	0.38618E+00	0.31574E+00
0.23292E+00	0.20608E+00	0.26972E+00	0.12559E+00	0.14031E+00	0.32019E+00
0.19136E+00	0.14619E+00	0.15479E+00	0.10925E+00	0.10221E+00	0.71666E-01
0.66089E-01	0.68661E-01	0.54258E-01	0.87953E-01	0.68431E-01	0.56673E-01
0.44917E-01	0.46290E-01	0.36127E-01	0.60562E-01	0.44147E-01	0.38418E-01
0.38263E-01	0.36983E-01	0.35589E-01	0.32680E-01	0.30045E-01	0.32515E-01
0.26899E-01	0.26437E-01	0.28214E-01	0.22114E-01	0.23177E-01	0.24486E-01
0.26023E-01	0.24729E-01	0.23050E-01	0.20747E-01	0.20834E-01	0.20496E-01
0.19839E-01	0.18624E-01	0.16703E-01	0.16309E-01	0.16885E-01	0.16029E-01
0.17334E-01	0.17364E-01	0.16868E-01	0.16692E-01	0.16766E-01	0.16281E-01
0.17441E-01	0.17354E-01	0.16566E-01	0.16022E-01	0.16320E-01	0.17039E-01
0.17633E-01	0.17837E-01	0.17821E-01	0.18624E-01	0.23965E-01	0.23285E-01
0.23900E-01	0.23987E-01	0.22772E-01	0.23755E-01	0.23484E-01	0.23530E-01
0.24371E-01	0.25034E-01	0.25158E-01	0.25839E-01	0.25691E-01	0.28210E-01
0.29584E-01	0.30077E-01	0.32334E-01	0.33444E-01	0.35049E-01	0.35215E-01
0.36527E-01	0.36465E-01	0.38710E-01	0.39919E-01	0.41298E-01	0.45876E-01
0.46057E-01	0.51207E-01	0.53264E-01	0.50734E-01	0.63149E-01	0.70628E-01
0.77370E-01	0.75775E-01	0.69749E-01	0.75989E-01	0.61245E-01	0.72173E-01
0.76472E-01	0.61235E-01	0.56054E-01	0.44083E-01	0.19851E-01	0.69337E-02
0.58573E-02	0.16037E-01	0.35487E-01	0.82399E-01	0.30645E+00	0.75093E+00

Table 5.52 Angular neutron spectrum for iron experiment (50.0 mm, 41.8 deg.).

<< Spectrum >>

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.13369E-06	0.24292E-07	0.32901E-06	0.16741E-06
-0.54673E-07	0.56286E-08	0.48866E-07	0.28099E-06	0.11918E-06	0.25469E-06
0.39048E-06	0.21855E-06	0.23590E-06	0.24329E-06	0.24033E-06	0.20481E-06
0.34751E-06	0.28538E-06	0.28720E-06	0.41411E-06	0.50540E-06	0.26768E-06
0.31874E-06	0.27751E-06	0.41540E-06	0.46049E-06	0.47915E-06	0.68475E-06
0.62870E-06	0.76614E-06	0.97553E-06	0.55657E-06	0.58948E-06	0.80037E-06

0.97966E-06	0.10236E-05	0.12911E-05	0.74694E-06	0.97781E-06	0.12566E-05
0.11718E-05	0.12275E-05	0.12891E-05	0.15175E-05	0.18123E-05	0.14849E-05
0.23673E-05	0.21560E-05	0.20210E-05	0.30132E-05	0.27751E-05	0.25512E-05
0.22555E-05	0.23840E-05	0.27861E-05	0.32602E-05	0.31135E-05	0.32873E-05
0.36524E-05	0.39932E-05	0.51365E-05	0.55656E-05	0.49331E-05	0.53539E-05
0.46074E-05	0.43880E-05	0.48070E-05	0.48740E-05	0.54817E-05	0.56627E-05
0.51459E-05	0.51724E-05	0.56518E-05	0.59639E-05	0.60668E-05	0.55528E-05
0.54727E-05	0.56112E-05	0.54382E-05	0.53614E-05	0.58021E-05	0.55240E-05
0.54964E-05	0.49766E-05	0.52439E-05	0.49480E-05	0.48402E-05	0.43915E-05
0.43990E-05	0.43230E-05	0.40833E-05	0.38867E-05	0.36401E-05	0.35683E-05
0.33632E-05	0.32276E-05	0.30056E-05	0.27911E-05	0.27816E-05	0.26243E-05
0.23509E-05	0.22578E-05	0.21654E-05	0.19920E-05	0.20662E-05	0.20163E-05
0.18410E-05	0.17018E-05	0.16348E-05	0.17152E-05	0.16306E-05	0.15793E-05
0.13875E-05	0.13227E-05	0.11663E-05	0.19203E-05	0.21114E-05	0.13268E-05
0.13243E-05	0.15999E-05	0.16050E-05	0.28350E-05	0.82731E-05	0.27794E-04
0.20280E-04	0.12720E-05	0.63300E-07	0.77868E-08	-0.31438E-07	-0.27307E-07

<< Error >>

0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.00000E+00	0.60702E+01	0.94645E+00	0.16417E+01
0.44329E+01	0.39355E+02	0.42222E+01	0.72097E+00	0.15345E+01	0.64547E+00
0.36950E+00	0.56284E+00	0.46400E+00	0.39933E+00	0.35635E+00	0.39516E+00
0.21594E+00	0.25015E+00	0.22387E+00	0.15235E+00	0.11889E+00	0.19717E+00
0.15734E+00	0.17298E+00	0.11565E+00	0.10269E+00	0.94752E-01	0.66385E-01
0.71813E-01	0.59912E-01	0.49480E-01	0.74176E-01	0.68488E-01	0.52778E-01
0.45476E-01	0.42928E-01	0.36443E-01	0.51391E-01	0.42940E-01	0.35617E-01
0.38235E-01	0.36308E-01	0.35256E-01	0.31763E-01	0.27966E-01	0.33261E-01
0.24201E-01	0.26038E-01	0.26804E-01	0.21246E-01	0.22480E-01	0.23887E-01
0.26168E-01	0.25111E-01	0.22566E-01	0.20500E-01	0.20803E-01	0.20218E-01
0.18984E-01	0.17843E-01	0.15819E-01	0.15232E-01	0.16362E-01	0.15601E-01
0.16985E-01	0.17781E-01	0.16786E-01	0.17074E-01	0.15923E-01	0.15852E-01
0.16900E-01	0.17068E-01	0.16213E-01	0.15890E-01	0.15823E-01	0.16974E-01
0.17385E-01	0.17172E-01	0.17782E-01	0.18282E-01	0.23177E-01	0.23543E-01
0.22828E-01	0.23851E-01	0.22939E-01	0.23636E-01	0.23800E-01	0.24862E-01
0.25164E-01	0.25187E-01	0.26076E-01	0.26738E-01	0.27867E-01	0.28646E-01
0.29626E-01	0.30110E-01	0.31063E-01	0.32117E-01	0.32895E-01	0.34367E-01
0.37254E-01	0.38452E-01	0.39334E-01	0.42676E-01	0.42928E-01	0.43734E-01
0.49819E-01	0.52474E-01	0.55644E-01	0.54805E-01	0.59356E-01	0.62774E-01
0.73233E-01	0.77827E-01	0.93927E-01	0.64632E-01	0.60926E-01	0.93568E-01
0.88377E-01	0.74561E-01	0.69710E-01	0.43610E-01	0.22539E-01	0.11962E-01
0.13728E-01	0.54238E-01	0.36416E+00	0.21523E+01	0.59535E+00	0.56295E+00

Table 5.53 Angular neutron spectrum for iron experiment (50.0 mm, 66.8 deg.).

<< Spectrum >>

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	-0.95025E-06	-0.11747E-05	-0.11587E-05
-0.39783E-06	-0.65318E-06	-0.26240E-06	0.37717E-07	-0.26883E-06	-0.25710E-07
-0.39970E-06	0.20679E-08	0.17911E-06	-0.31057E-07	0.15261E-06	-0.59414E-07
0.11646E-06	0.44941E-06	0.35768E-06	0.32267E-06	0.53534E-06	0.31645E-06
0.51644E-06	0.60694E-06	0.18581E-06	0.28011E-06	0.30200E-06	0.36039E-06
0.37469E-06	0.47744E-06	0.69477E-06	0.78717E-06	0.10330E-05	0.12081E-05
0.10776E-05	0.49243E-06	0.70832E-06	0.99973E-06	0.12204E-05	0.14121E-05
0.13740E-05	0.72557E-06	0.93334E-06	0.13139E-05	0.12545E-05	0.13343E-05
0.14240E-05	0.18793E-05	0.21378E-05	0.19359E-05	0.30129E-05	0.25964E-05
0.24019E-05	0.34912E-05	0.32843E-05	0.25929E-05	0.19822E-05	0.24421E-05
0.28567E-05	0.33280E-05	0.34786E-05	0.34430E-05	0.37693E-05	0.41629E-05
0.57565E-05	0.66167E-05	0.58925E-05	0.56999E-05	0.51075E-05	0.45228E-05
0.47913E-05	0.53222E-05	0.57946E-05	0.62143E-05	0.59866E-05	0.55268E-05
0.57790E-05	0.65477E-05	0.67035E-05	0.60744E-05	0.57360E-05	0.56253E-05
0.54702E-05	0.56388E-05	0.54018E-05	0.56931E-05	0.63268E-05	0.54751E-05
0.51592E-05	0.47833E-05	0.47880E-05	0.47074E-05	0.42691E-05	0.40824E-05
0.42382E-05	0.38779E-05	0.35645E-05	0.33948E-05	0.32119E-05	0.30086E-05
0.28420E-05	0.27538E-05	0.26669E-05	0.24670E-05	0.24986E-05	0.24279E-05
0.22042E-05	0.18779E-05	0.20677E-05	0.19265E-05	0.19252E-05	0.18480E-05
0.16317E-05	0.13600E-05	0.15140E-05	0.13073E-05	0.14764E-05	0.12737E-05

0.12077E-05	0.13340E-05	0.14219E-05	0.15986E-05	0.15276E-05	0.10945E-05
0.11797E-05	0.12331E-05	0.14407E-05	0.38900E-05	0.95196E-05	0.14651E-04
0.67970E-05	0.50016E-06	0.17643E-06	0.60653E-07	0.10006E-07	0.26303E-07

<< Error >>

0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.00000E+00	0.00000E+00	0.37721E+00
0.11364E+01	0.62709E+00	0.12779E+01	0.81297E+01	0.10156E+01	0.97000E+01
0.58756E+00	0.10045E+03	0.10750E+01	0.58885E+01	0.10717E+01	0.26256E+01
0.11248E+01	0.26415E+00	0.28440E+00	0.30141E+00	0.16589E+00	0.24890E+00
0.14614E+00	0.11545E+00	0.31797E+00	0.20829E+00	0.17863E+00	0.14554E+00
0.13541E+00	0.10493E+00	0.71274E-01	0.63491E-01	0.50522E-01	0.43712E-01
0.46621E-01	0.83028E-01	0.58590E-01	0.45739E-01	0.39173E-01	0.34663E-01
0.34908E-01	0.52986E-01	0.44159E-01	0.34602E-01	0.35955E-01	0.34272E-01
0.32911E-01	0.27230E-01	0.25155E-01	0.26982E-01	0.20382E-01	0.22347E-01
0.23903E-01	0.18868E-01	0.19511E-01	0.22868E-01	0.27097E-01	0.23933E-01
0.22197E-01	0.20216E-01	0.19506E-01	0.19577E-01	0.18271E-01	0.17545E-01
0.14445E-01	0.13469E-01	0.14538E-01	0.14849E-01	0.15975E-01	0.17142E-01
0.16510E-01	0.15669E-01	0.15001E-01	0.14557E-01	0.15126E-01	0.15999E-01
0.15677E-01	0.14706E-01	0.14663E-01	0.15715E-01	0.16300E-01	0.16747E-01
0.17267E-01	0.17306E-01	0.18039E-01	0.17530E-01	0.21895E-01	0.23251E-01
0.23834E-01	0.24563E-01	0.24244E-01	0.24420E-01	0.25590E-01	0.25984E-01
0.25183E-01	0.27068E-01	0.28067E-01	0.28911E-01	0.30731E-01	0.32734E-01
0.33971E-01	0.35055E-01	0.36526E-01	0.38533E-01	0.38252E-01	0.38889E-01
0.40932E-01	0.44291E-01	0.40981E-01	0.43186E-01	0.43713E-01	0.45360E-01
0.51247E-01	0.62092E-01	0.58833E-01	0.69304E-01	0.67133E-01	0.76444E-01
0.84049E-01	0.76734E-01	0.79247E-01	0.71368E-01	0.75889E-01	0.97616E-01
0.89017E-01	0.81886E-01	0.67515E-01	0.35039E-01	0.20647E-01	0.16453E-01
0.23723E-01	0.92978E-01	0.15767E+00	0.37019E+00	0.18452E+01	0.62847E+00

Table 5.54 Angular neutron spectrum for iron experiment (200.0 mm, 0.0 deg.).

<< Spectrum >>

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
-0.10746E-06	-0.50183E-06	-0.24690E-06	-0.62068E-07	0.56283E-07	-0.10727E-06
0.34088E-06	0.20020E-06	0.40640E-06	0.10468E-06	0.49023E-06	0.72454E-06
0.49479E-06	0.38814E-06	0.61535E-06	0.62951E-06	0.74438E-06	0.10033E-05
0.11615E-05	0.87087E-06	0.11228E-05	0.10803E-05	0.56544E-06	0.54311E-06
0.79056E-06	0.89032E-06	0.11045E-05	0.14226E-05	0.17857E-05	0.23281E-05
0.26147E-05	0.23890E-05	0.17160E-05	0.14075E-05	0.21977E-05	0.26205E-05
0.25767E-05	0.25951E-05	0.15873E-05	0.16527E-05	0.24549E-05	0.26315E-05
0.25736E-05	0.31076E-05	0.41358E-05	0.44393E-05	0.46647E-05	0.66532E-05
0.53182E-05	0.50450E-05	0.60230E-05	0.51624E-05	0.34891E-05	0.26286E-05
0.34694E-05	0.44008E-05	0.47170E-05	0.44257E-05	0.48130E-05	0.58885E-05
0.74940E-05	0.10045E-04	0.10275E-04	0.77301E-05	0.64167E-05	0.43702E-05
0.38140E-05	0.47394E-05	0.53986E-05	0.62413E-05	0.67560E-05	0.53774E-05
0.46716E-05	0.53150E-05	0.60818E-05	0.53493E-05	0.40539E-05	0.37850E-05
0.35339E-05	0.34176E-05	0.31103E-05	0.31604E-05	0.34827E-05	0.29617E-05
0.23956E-05	0.21373E-05	0.21995E-05	0.22483E-05	0.19350E-05	0.15182E-05
0.15881E-05	0.15278E-05	0.14704E-05	0.13255E-05	0.12937E-05	0.11664E-05
0.10507E-05	0.94665E-06	0.83436E-06	0.82786E-06	0.77766E-06	0.73937E-06
0.68146E-06	0.64428E-06	0.63826E-06	0.56981E-06	0.52724E-06	0.54308E-06
0.49901E-06	0.50553E-06	0.57619E-06	0.63193E-06	0.56479E-06	0.55626E-06
0.56046E-06	0.65366E-06	0.61855E-06	0.87515E-06	0.87638E-06	0.89813E-06
0.12653E-05	0.24384E-05	0.43414E-05	0.92530E-05	0.33837E-04	0.25335E-03
0.14118E-03	0.11384E-04	0.25844E-05	0.77599E-06	0.11567E-06	0.26593E-07

<< Error >>

0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.00000E+00	0.00000E+00	0.11892E+01	0.61658E+01	0.55573E+01	0.27800E+01
0.77352E+00	0.11821E+01	0.53687E+00	0.20035E+01	0.41331E+00	0.24067E+00
0.30587E+00	0.34034E+00	0.20222E+00	0.17497E+00	0.13901E+00	0.91555E-01
0.74054E-01	0.91719E-01	0.71879E-01	0.67046E-01	0.10872E+00	0.10929E+00

0.73318E-01	0.66044E-01	0.53878E-01	0.42660E-01	0.35379E-01	0.30159E-01
0.27703E-01	0.29862E-01	0.34408E-01	0.36947E-01	0.27339E-01	0.24174E-01
0.23431E-01	0.22451E-01	0.31018E-01	0.29829E-01	0.23011E-01	0.21949E-01
0.21814E-01	0.19633E-01	0.16865E-01	0.16275E-01	0.15978E-01	0.12911E-01
0.15022E-01	0.15233E-01	0.13875E-01	0.14992E-01	0.18706E-01	0.22007E-01
0.18803E-01	0.16577E-01	0.15940E-01	0.16004E-01	0.15108E-01	0.13391E-01
0.11785E-01	0.10190E-01	0.10285E-01	0.11940E-01	0.13278E-01	0.16295E-01
0.17507E-01	0.15652E-01	0.14387E-01	0.13504E-01	0.13131E-01	0.14998E-01
0.16089E-01	0.15086E-01	0.13981E-01	0.15371E-01	0.17764E-01	0.18958E-01
0.19688E-01	0.20155E-01	0.21782E-01	0.21114E-01	0.27568E-01	0.29522E-01
0.32016E-01	0.33537E-01	0.33620E-01	0.32867E-01	0.34114E-01	0.39029E-01
0.37387E-01	0.38933E-01	0.39220E-01	0.42377E-01	0.44671E-01	0.46210E-01
0.50524E-01	0.51808E-01	0.57052E-01	0.59740E-01	0.62152E-01	0.63287E-01
0.68899E-01	0.71424E-01	0.74171E-01	0.80531E-01	0.85799E-01	0.81328E-01
0.91682E-01	0.94830E-01	0.93159E-01	0.80380E-01	0.10243E+00	0.96600E-01
0.10512E+00	0.96921E-01	0.10511E+00	0.80454E-01	0.89450E-01	0.84702E-01
0.69660E-01	0.41709E-01	0.30620E-01	0.19964E-01	0.10105E-01	0.36457E-02
0.47970E-02	0.16631E-01	0.35444E-01	0.62359E-01	0.19494E+00	0.50459E+00

Table 5.55 Angular neutron spectrum for iron experiment (200.0 mm, 12.2 deg.).

<< Spectrum >>

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	-0.25160E-06	-0.45764E-06	-0.91072E-06	-0.18584E-06	0.47168E-07
0.15257E-06	0.29462E-06	0.31504E-06	0.83975E-07	0.17416E-06	0.41080E-06
0.17113E-06	0.28536E-06	0.39620E-06	0.48869E-06	0.69116E-06	0.77161E-06
0.86501E-06	0.90025E-06	0.72158E-06	0.10153E-05	0.73237E-06	0.48746E-06
0.59941E-06	0.82081E-06	0.88764E-06	0.11190E-05	0.13535E-05	0.17551E-05
0.20667E-05	0.20548E-05	0.19762E-05	0.13036E-05	0.15855E-05	0.19972E-05
0.22650E-05	0.21614E-05	0.20847E-05	0.12064E-05	0.17861E-05	0.22365E-05
0.21793E-05	0.25170E-05	0.28821E-05	0.35760E-05	0.41704E-05	0.43043E-05
0.53105E-05	0.43845E-05	0.44595E-05	0.50512E-05	0.38117E-05	0.25555E-05
0.26089E-05	0.33390E-05	0.39042E-05	0.41677E-05	0.41212E-05	0.47407E-05
0.57144E-05	0.70355E-05	0.84296E-05	0.76579E-05	0.55725E-05	0.51701E-05
0.35748E-05	0.34432E-05	0.41710E-05	0.44870E-05	0.50047E-05	0.49732E-05
0.38722E-05	0.38093E-05	0.45839E-05	0.44811E-05	0.38733E-05	0.32635E-05
0.30494E-05	0.29065E-05	0.26795E-05	0.25561E-05	0.28507E-05	0.26865E-05
0.20733E-05	0.19154E-05	0.18994E-05	0.18793E-05	0.16359E-05	0.15077E-05
0.13263E-05	0.12811E-05	0.12301E-05	0.11945E-05	0.11255E-05	0.10350E-05
0.93781E-06	0.87944E-06	0.79208E-06	0.77037E-06	0.63664E-06	0.66868E-06
0.67550E-06	0.64024E-06	0.59968E-06	0.55144E-06	0.53627E-06	0.47106E-06
0.50683E-06	0.42011E-06	0.46258E-06	0.48937E-06	0.46182E-06	0.43119E-06
0.32349E-06	0.38657E-06	0.42145E-06	0.56658E-06	0.63329E-06	0.53691E-06
0.58048E-06	0.97810E-06	0.14159E-05	0.36148E-05	0.16977E-04	0.69861E-04
0.20386E-04	0.19063E-05	0.36837E-06	0.69690E-07	0.15776E-07	0.25999E-08

<< Error >>

0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.00000E+00	0.00000E+00	0.31431E+00	0.14393E+01	0.53549E+01
0.14354E+01	0.69621E+00	0.60785E+00	0.20366E+01	0.93437E+00	0.36078E+00
0.75202E+00	0.39167E+00	0.25924E+00	0.18066E+00	0.12536E+00	0.99418E-01
0.83848E-01	0.74866E-01	0.88148E-01	0.60831E-01	0.77702E-01	0.10249E+00
0.80373E-01	0.58743E-01	0.54515E-01	0.45022E-01	0.37250E-01	0.30270E-01
0.26850E-01	0.27063E-01	0.27623E-01	0.34547E-01	0.28697E-01	0.24485E-01
0.22485E-01	0.22000E-01	0.22653E-01	0.32139E-01	0.24116E-01	0.21631E-01
0.21601E-01	0.19707E-01	0.18245E-01	0.16196E-01	0.14886E-01	0.14586E-01
0.13077E-01	0.14622E-01	0.14426E-01	0.13475E-01	0.15699E-01	0.19776E-01
0.19684E-01	0.17095E-01	0.15740E-01	0.14808E-01	0.14603E-01	0.13343E-01
0.12145E-01	0.10966E-01	0.10049E-01	0.10730E-01	0.12682E-01	0.13147E-01
0.16021E-01	0.16549E-01	0.14862E-01	0.14433E-01	0.13695E-01	0.14096E-01
0.16085E-01	0.16199E-01	0.14597E-01	0.15137E-01	0.16312E-01	0.18000E-01
0.19342E-01	0.19795E-01	0.21281E-01	0.21750E-01	0.28105E-01	0.28146E-01
0.31279E-01	0.32199E-01	0.31517E-01	0.31844E-01	0.34397E-01	0.35465E-01
0.38588E-01	0.38222E-01	0.38578E-01	0.38774E-01	0.41254E-01	0.44271E-01
0.46256E-01	0.48326E-01	0.50617E-01	0.52300E-01	0.61152E-01	0.58727E-01

0.58779E-01	0.62575E-01	0.64357E-01	0.67696E-01	0.71013E-01	0.79003E-01
0.73743E-01	0.94500E-01	0.81896E-01	0.83118E-01	0.89154E-01	0.10651E+00
0.13496E+00	0.11627E+00	0.11364E+00	0.94492E-01	0.85448E-01	0.95058E-01
0.95140E-01	0.61453E-01	0.49043E-01	0.29204E-01	0.12899E-01	0.62792E-02
0.11433E-01	0.37493E-01	0.87942E-01	0.23782E+00	0.66957E+00	0.28765E+01

Table 5.56 Angular neutron spectrum for iron experiment (200.0 mm, 24.9 deg.).

<< Spectrum >>

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	-0.16689E-06	-0.73119E-06	-0.81735E-06	-0.29159E-06	-0.44108E-06
-0.40201E-06	-0.46344E-07	0.28887E-06	-0.27707E-06	0.26213E-06	0.55188E-07
0.35765E-06	0.42914E-06	0.44827E-06	0.38994E-06	0.61755E-06	0.71761E-06
0.77181E-06	0.71306E-06	0.71082E-06	0.95519E-06	0.75063E-06	0.40177E-06
0.53083E-06	0.69355E-06	0.89284E-06	0.10122E-05	0.13209E-05	0.14956E-05
0.18939E-05	0.20000E-05	0.20043E-05	0.12391E-05	0.14360E-05	0.19799E-05
0.22003E-05	0.20675E-05	0.20454E-05	0.13107E-05	0.15925E-05	0.21652E-05
0.20860E-05	0.23959E-05	0.27393E-05	0.34107E-05	0.39455E-05	0.42333E-05
0.49641E-05	0.42866E-05	0.43323E-05	0.49234E-05	0.37732E-05	0.25702E-05
0.24419E-05	0.31842E-05	0.37844E-05	0.40407E-05	0.39461E-05	0.44038E-05
0.54303E-05	0.69336E-05	0.81923E-05	0.74679E-05	0.55220E-05	0.49620E-05
0.34107E-05	0.32443E-05	0.39436E-05	0.42265E-05	0.46365E-05	0.47853E-05
0.36963E-05	0.35665E-05	0.40541E-05	0.41852E-05	0.36095E-05	0.29147E-05
0.27572E-05	0.26794E-05	0.24770E-05	0.24020E-05	0.26445E-05	0.24013E-05
0.20558E-05	0.18229E-05	0.17531E-05	0.16743E-05	0.16024E-05	0.13825E-05
0.11828E-05	0.12858E-05	0.11590E-05	0.11349E-05	0.99550E-06	0.88711E-06
0.86896E-06	0.74058E-06	0.68154E-06	0.69507E-06	0.58635E-06	0.61034E-06
0.54759E-06	0.60660E-06	0.52628E-06	0.47239E-06	0.43322E-06	0.43261E-06
0.43306E-06	0.37858E-06	0.41611E-06	0.33642E-06	0.35846E-06	0.38454E-06
0.36691E-06	0.39934E-06	0.45714E-06	0.42857E-06	0.60194E-06	0.47222E-06
0.42552E-06	0.53236E-06	0.54554E-06	0.13146E-05	0.39544E-05	0.15011E-04
0.74865E-05	0.78914E-06	0.20995E-06	0.49954E-07	0.66022E-08	0.28669E-08

<< Error >>

0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.00000E+00	0.00000E+00	0.27666E+00	0.88888E+00	0.54129E+00
0.52192E+00	0.40488E+01	0.63124E+00	0.60905E+00	0.60044E+00	0.24645E+01
0.34002E+00	0.24239E+00	0.21120E+00	0.22261E+00	0.12570E+00	0.10192E+00
0.88074E-01	0.88711E-01	0.80484E-01	0.59772E-01	0.68317E-01	0.11522E+00
0.83971E-01	0.62802E-01	0.49675E-01	0.43310E-01	0.34492E-01	0.31358E-01
0.25876E-01	0.24874E-01	0.24091E-01	0.32154E-01	0.28092E-01	0.22068E-01
0.20454E-01	0.20552E-01	0.20391E-01	0.26912E-01	0.24190E-01	0.19839E-01
0.20320E-01	0.18283E-01	0.16742E-01	0.14864E-01	0.13796E-01	0.13095E-01
0.12121E-01	0.13234E-01	0.12987E-01	0.12075E-01	0.14185E-01	0.17882E-01
0.18687E-01	0.15686E-01	0.14159E-01	0.13305E-01	0.13423E-01	0.12531E-01
0.11218E-01	0.98695E-02	0.91671E-02	0.96754E-02	0.11419E-01	0.12071E-01
0.14888E-01	0.15244E-01	0.13710E-01	0.13431E-01	0.12890E-01	0.12894E-01
0.14671E-01	0.15252E-01	0.14282E-01	0.14085E-01	0.15419E-01	0.17493E-01
0.18601E-01	0.19003E-01	0.20182E-01	0.20638E-01	0.26104E-01	0.26808E-01
0.28518E-01	0.29591E-01	0.30844E-01	0.30887E-01	0.31252E-01	0.33960E-01
0.36772E-01	0.34055E-01	0.35616E-01	0.36092E-01	0.38986E-01	0.43728E-01
0.43267E-01	0.49753E-01	0.51212E-01	0.50377E-01	0.58009E-01	0.55861E-01
0.58164E-01	0.54502E-01	0.61922E-01	0.68474E-01	0.70459E-01	0.74113E-01
0.73126E-01	0.85526E-01	0.82693E-01	0.10246E+00	0.95832E-01	0.91849E-01
0.97686E-01	0.92833E-01	0.87409E-01	0.97548E-01	0.73920E-01	0.92046E-01
0.94844E-01	0.79071E-01	0.80678E-01	0.43792E-01	0.23881E-01	0.12076E-01
0.16778E-01	0.53299E-01	0.10456E+00	0.24563E+00	0.10669E+01	0.27956E+01

Table 5.57 Angular neutron spectrum for iron experiment (200.0 mm, 41.8 deg.).

&lt;&lt; Spectrum &gt;&gt;

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	-0.84368E-06	-0.81927E-06	0.49287E-07	-0.45446E-06
-0.18229E-06	0.89746E-07	0.52897E-07	0.17698E-06	0.35957E-06	0.20129E-06
0.54666E-06	0.39525E-06	0.34155E-06	0.45980E-06	0.61665E-06	0.77944E-06
0.85982E-06	0.95891E-06	0.89761E-06	0.10007E-05	0.73061E-06	0.55247E-06
0.64293E-06	0.69922E-06	0.85912E-06	0.10286E-05	0.13521E-05	0.17038E-05
0.19337E-05	0.21762E-05	0.20476E-05	0.12732E-05	0.15528E-05	0.20815E-05
0.21715E-05	0.20828E-05	0.19026E-05	0.12374E-05	0.16870E-05	0.21616E-05
0.20548E-05	0.24732E-05	0.27686E-05	0.35350E-05	0.39317E-05	0.42434E-05
0.50323E-05	0.40754E-05	0.44399E-05	0.45265E-05	0.34728E-05	0.23321E-05
0.23872E-05	0.30025E-05	0.35601E-05	0.35826E-05	0.36585E-05	0.41607E-05
0.52236E-05	0.64677E-05	0.75436E-05	0.66014E-05	0.48914E-05	0.42255E-05
0.30351E-05	0.29761E-05	0.35064E-05	0.37143E-05	0.41229E-05	0.39736E-05
0.31851E-05	0.31293E-05	0.35664E-05	0.35727E-05	0.29670E-05	0.25507E-05
0.23384E-05	0.21216E-05	0.20650E-05	0.19348E-05	0.21938E-05	0.19894E-05
0.16861E-05	0.14103E-05	0.14106E-05	0.13098E-05	0.12147E-05	0.11530E-05
0.10005E-05	0.93273E-06	0.97537E-06	0.77302E-06	0.73643E-06	0.71748E-06
0.64096E-06	0.54283E-06	0.52046E-06	0.51418E-06	0.49315E-06	0.46449E-06
0.39418E-06	0.37030E-06	0.38221E-06	0.36372E-06	0.36514E-06	0.29851E-06
0.32508E-06	0.31140E-06	0.26375E-06	0.32066E-06	0.24799E-06	0.27308E-06
0.19204E-06	0.25911E-06	0.22131E-06	0.21174E-06	0.34664E-06	0.24761E-06
0.24606E-06	0.31045E-06	0.21759E-06	0.66872E-06	0.14980E-05	0.29647E-05
0.18356E-05	0.21134E-06	0.40407E-07	0.31868E-08	-0.22210E-08	0.13112E-08

&lt;&lt; Error &gt;&gt;

0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.00000E+00	0.16570E+00	0.54810E+01	0.54237E+00
0.12265E+01	0.21894E+01	0.35479E+01	0.96397E+00	0.46191E+00	0.72160E+00
0.22532E+00	0.27727E+00	0.28912E+00	0.19755E+00	0.13774E+00	0.97434E-01
0.84480E-01	0.69792E-01	0.70968E-01	0.60536E-01	0.75300E-01	0.86142E-01
0.73005E-01	0.66445E-01	0.55547E-01	0.45978E-01	0.36445E-01	0.30285E-01
0.27850E-01	0.24513E-01	0.25168E-01	0.34762E-01	0.28184E-01	0.22845E-01
0.21911E-01	0.22238E-01	0.23214E-01	0.30668E-01	0.24632E-01	0.20953E-01
0.21528E-01	0.19119E-01	0.18054E-01	0.15628E-01	0.14676E-01	0.14257E-01
0.12845E-01	0.14632E-01	0.13783E-01	0.13751E-01	0.16183E-01	0.20769E-01
0.20339E-01	0.17642E-01	0.15789E-01	0.15742E-01	0.15215E-01	0.14064E-01
0.12401E-01	0.11079E-01	0.10296E-01	0.11259E-01	0.13328E-01	0.14473E-01
0.17398E-01	0.17815E-01	0.16181E-01	0.15750E-01	0.14937E-01	0.15510E-01
0.17820E-01	0.17976E-01	0.16706E-01	0.16882E-01	0.19258E-01	0.21210E-01
0.22947E-01	0.24390E-01	0.25293E-01	0.26696E-01	0.31921E-01	0.33707E-01
0.36093E-01	0.39945E-01	0.39123E-01	0.40234E-01	0.43869E-01	0.45014E-01
0.48398E-01	0.51078E-01	0.48339E-01	0.56395E-01	0.55938E-01	0.57722E-01
0.62014E-01	0.66193E-01	0.68515E-01	0.71651E-01	0.70511E-01	0.73457E-01
0.85157E-01	0.88601E-01	0.86285E-01	0.95068E-01	0.95847E-01	0.11408E+00
0.10773E+00	0.12720E+00	0.14154E+00	0.11297E+00	0.14306E+00	0.13711E+00
0.20116E+00	0.15451E+00	0.18146E+00	0.20411E+00	0.12020E+00	0.15916E+00
0.16332E+00	0.13273E+00	0.18864E+00	0.73624E-01	0.44918E-01	0.30334E-01
0.37970E-01	0.12723E+00	0.41366E+00	0.37852E+01	0.49678E+01	0.85381E+01

Table 5.58 Angular neutron spectrum for iron experiment (200.0 mm, 66.8 deg.).

&lt;&lt; Spectrum &gt;&gt;

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	-0.50690E-07	-0.20478E-06	0.10120E-06	0.28628E-06
-0.44229E-06	0.24070E-06	0.32208E-06	0.12656E-06	0.23970E-07	0.13810E-06
0.25011E-06	0.55372E-06	0.23149E-06	0.42344E-06	0.30378E-06	0.72199E-06
0.68979E-06	0.56609E-06	0.74059E-06	0.60932E-06	0.50075E-06	0.27322E-06
0.46433E-06	0.52515E-06	0.71263E-06	0.92059E-06	0.10771E-05	0.13016E-05
0.15943E-05	0.14728E-05	0.12775E-05	0.10565E-05	0.12516E-05	0.15622E-05

0.14924E-05	0.14616E-05	0.12241E-05	0.94250E-06	0.12270E-05	0.15343E-05
0.16277E-05	0.17791E-05	0.22393E-05	0.25546E-05	0.30102E-05	0.32941E-05
0.33901E-05	0.31636E-05	0.32355E-05	0.29281E-05	0.22650E-05	0.16956E-05
0.17989E-05	0.22107E-05	0.25519E-05	0.25881E-05	0.26374E-05	0.30922E-05
0.39074E-05	0.47994E-05	0.51873E-05	0.43170E-05	0.32956E-05	0.26813E-05
0.20781E-05	0.20925E-05	0.23830E-05	0.25802E-05	0.25758E-05	0.23824E-05
0.20629E-05	0.20161E-05	0.22072E-05	0.20861E-05	0.18398E-05	0.15605E-05
0.14515E-05	0.13207E-05	0.12728E-05	0.12929E-05	0.13625E-05	0.12345E-05
0.94988E-06	0.84320E-06	0.86871E-06	0.86770E-06	0.82013E-06	0.67135E-06
0.62571E-06	0.47152E-06	0.51447E-06	0.44406E-06	0.43161E-06	0.42630E-06
0.40400E-06	0.43763E-06	0.32616E-06	0.34369E-06	0.31265E-06	0.26484E-06
0.23664E-06	0.23544E-06	0.24454E-06	0.21639E-06	0.19637E-06	0.16486E-06
0.13352E-06	0.67707E-07	0.11189E-06	0.10883E-06	0.10849E-06	0.15117E-06
0.14902E-06	0.69097E-07	0.86275E-07	0.12533E-06	0.14966E-06	0.79104E-07
0.11351E-06	0.95136E-07	0.17293E-06	0.32329E-06	0.46491E-06	0.65193E-06
0.47942E-06	0.12265E-06	0.31649E-07	-0.20574E-08	0.84831E-08	-0.79608E-08

<< Error >>

0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.00000E+00	0.00000E+00	0.18010E+01	0.80162E+00
0.47641E+00	0.77389E+00	0.52942E+00	0.13365E+01	0.64257E+01	0.10234E+01
0.49430E+00	0.18794E+00	0.41380E+00	0.19645E+00	0.26070E+00	0.99228E-01
0.94728E-01	0.10686E+00	0.78085E-01	0.88274E-01	0.96715E-01	0.16633E+00
0.93479E-01	0.81115E-01	0.59177E-01	0.46760E-01	0.40955E-01	0.35336E-01
0.29256E-01	0.30636E-01	0.34172E-01	0.37571E-01	0.32076E-01	0.26497E-01
0.27477E-01	0.27260E-01	0.29490E-01	0.35772E-01	0.30196E-01	0.25312E-01
0.23794E-01	0.22854E-01	0.19729E-01	0.18243E-01	0.16556E-01	0.15851E-01
0.15625E-01	0.16260E-01	0.16167E-01	0.17089E-01	0.20228E-01	0.25117E-01
0.23587E-01	0.20445E-01	0.18734E-01	0.18570E-01	0.18079E-01	0.16341E-01
0.14189E-01	0.12671E-01	0.12281E-01	0.13785E-01	0.16332E-01	0.18577E-01
0.21662E-01	0.21339E-01	0.19804E-01	0.18966E-01	0.19698E-01	0.20654E-01
0.22650E-01	0.23490E-01	0.22268E-01	0.23368E-01	0.25794E-01	0.29183E-01
0.31929E-01	0.34820E-01	0.35678E-01	0.35889E-01	0.42601E-01	0.43681E-01
0.52224E-01	0.56207E-01	0.53387E-01	0.54745E-01	0.55837E-01	0.64504E-01
0.67270E-01	0.89717E-01	0.80440E-01	0.93601E-01	0.91506E-01	0.95697E-01
0.10656E+00	0.91749E-01	0.12694E+00	0.11630E+00	0.12738E+00	0.15555E+00
0.14592E+00	0.14666E+00	0.13619E+00	0.14860E+00	0.16731E+00	0.20184E+00
0.26481E+00	0.52582E+00	0.34716E+00	0.39467E+00	0.39995E+00	0.30838E+00
0.33003E+00	0.71966E+00	0.59442E+00	0.44020E+00	0.38629E+00	0.75550E+00
0.50836E+00	0.60252E+00	0.32020E+00	0.15249E+00	0.11193E+00	0.75051E-01
0.79826E-01	0.19014E+00	0.49349E+00	0.81140E+01	0.11654E+01	0.13580E+01

Table 5.59 Angular neutron spectrum for iron experiment (400.0 mm, 0.0 deg.).

<< Spectrum >>

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	-0.76374E-07	-0.11852E-05	-0.89447E-06	-0.10685E-05	-0.24588E-06
-0.75674E-06	-0.54208E-06	-0.11456E-06	0.13786E-06	-0.48776E-06	0.94185E-07
0.31112E-06	0.12881E-06	0.44640E-06	0.53244E-06	0.70879E-06	0.73812E-06
0.63596E-06	0.61684E-06	0.70253E-06	0.60722E-06	0.56038E-06	0.54611E-06
0.69806E-06	0.87694E-06	0.10861E-05	0.11911E-05	0.13816E-05	0.16540E-05
0.18577E-05	0.15815E-05	0.13129E-05	0.12283E-05	0.14930E-05	0.13573E-05
0.13362E-05	0.12056E-05	0.10012E-05	0.12673E-05	0.15260E-05	0.15290E-05
0.18101E-05	0.21899E-05	0.27648E-05	0.28352E-05	0.30497E-05	0.33020E-05
0.26952E-05	0.25455E-05	0.24263E-05	0.16464E-05	0.10974E-05	0.11701E-05
0.13717E-05	0.16474E-05	0.16000E-05	0.15515E-05	0.18834E-05	0.23379E-05
0.31653E-05	0.36380E-05	0.29709E-05	0.20445E-05	0.13791E-05	0.74170E-06
0.76885E-06	0.98064E-06	0.11272E-05	0.15183E-05	0.12847E-05	0.83612E-06
0.82441E-06	0.98128E-06	0.98582E-06	0.70733E-06	0.49632E-06	0.46627E-06
0.34489E-06	0.32814E-06	0.28370E-06	0.31921E-06	0.35002E-06	0.22702E-06
0.20312E-06	0.18236E-06	0.16374E-06	0.18367E-06	0.14800E-06	0.85409E-07
0.66200E-07	0.98724E-07	0.71965E-07	0.10146E-06	0.36666E-07	0.68971E-07
0.32656E-07	0.43908E-07	0.19820E-07	0.26580E-07	0.29293E-07	0.30684E-07
0.34842E-07	0.44461E-07	0.13411E-07	0.20126E-07	0.12451E-07	0.54564E-07
0.56628E-07	0.23408E-07	0.51888E-07	0.22443E-07	0.27518E-07	0.30115E-07



0.54592E-07	0.41421E-07	0.25713E-07	0.70010E-08	0.28940E-07	0.20884E-07
0.45908E-07	0.13843E-07	0.29980E-07	0.33626E-07	0.15706E-06	0.10358E-05
0.60736E-05	0.28222E-05	0.16632E-06	0.34908E-08	-0.10514E-07	0.12831E-09

&lt;&lt; Error &gt;&gt;

0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.00000E+00	0.00000E+00	0.24368E+00	0.26782E+00	0.99059E+00
0.30096E+00	0.38203E+00	0.16744E+01	0.12426E+01	0.35263E+00	0.15596E+01
0.43265E+00	0.90227E+00	0.24421E+00	0.18231E+00	0.12517E+00	0.11302E+00
0.11650E+00	0.11176E+00	0.95693E-01	0.99917E-01	0.95324E-01	0.93606E-01
0.72536E-01	0.62720E-01	0.50637E-01	0.48531E-01	0.41947E-01	0.36487E-01
0.33198E-01	0.37437E-01	0.37973E-01	0.38386E-01	0.32560E-01	0.34775E-01
0.33309E-01	0.35060E-01	0.38662E-01	0.32431E-01	0.29268E-01	0.29848E-01
0.26172E-01	0.23988E-01	0.20566E-01	0.20577E-01	0.19832E-01	0.18920E-01
0.20637E-01	0.21737E-01	0.21862E-01	0.27580E-01	0.35155E-01	0.33923E-01
0.31350E-01	0.28130E-01	0.28342E-01	0.28289E-01	0.24791E-01	0.22060E-01
0.18438E-01	0.17322E-01	0.19485E-01	0.24332E-01	0.30377E-01	0.47390E-01
0.44531E-01	0.38417E-01	0.34788E-01	0.29038E-01	0.33446E-01	0.45943E-01
0.45003E-01	0.40565E-01	0.40924E-01	0.52253E-01	0.66531E-01	0.70063E-01
0.93597E-01	0.94053E-01	0.10651E+00	0.96266E-01	0.10398E+00	0.13940E+00
0.15463E+00	0.16046E+00	0.16990E+00	0.14447E+00	0.16964E+00	0.26088E+00
0.34306E+00	0.23283E+00	0.26777E+00	0.20869E+00	0.56675E+00	0.31320E+00
0.67371E+00	0.45812E+00	0.10558E+01	0.64671E+00	0.62174E+00	0.62456E+00
0.50058E+00	0.38856E+00	0.12300E+01	0.92098E+00	0.15262E+01	0.34045E+00
0.32115E+00	0.78781E+00	0.33171E+00	0.83303E+00	0.78862E+00	0.67112E+00
0.48082E+00	0.52165E+00	0.10165E+01	0.34779E+01	0.83563E+00	0.13659E+01
0.55949E+00	0.17507E+01	0.72587E+00	0.74796E+00	0.18032E+00	0.60768E-01
0.22683E-01	0.32820E-01	0.15828E+00	0.41489E+01	0.10473E+01	0.81992E+02

Table 5.60 Angular neutron spectrum for iron experiment (400.0 mm, 12.2 deg.).

&lt;&lt; Spectrum &gt;&gt;

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	-0.86949E-07	-0.47837E-06	-0.39204E-06	-0.28089E-06
-0.25565E-06	0.48250E-07	-0.80453E-07	0.60785E-07	0.19636E-06	-0.15007E-06
-0.28577E-07	0.11231E-06	0.41707E-06	0.41322E-06	0.34833E-06	0.60766E-06
0.65402E-06	0.62554E-06	0.56186E-06	0.67552E-06	0.54307E-06	0.41020E-06
0.43993E-06	0.50894E-06	0.73945E-06	0.92465E-06	0.10378E-05	0.12376E-05
0.13891E-05	0.15416E-05	0.14965E-05	0.12860E-05	0.10824E-05	0.12755E-05
0.13165E-05	0.11518E-05	0.11363E-05	0.10280E-05	0.10011E-05	0.12432E-05
0.15132E-05	0.16831E-05	0.19386E-05	0.23818E-05	0.26651E-05	0.27006E-05
0.28073E-05	0.23918E-05	0.22473E-05	0.21345E-05	0.14993E-05	0.10899E-05
0.10420E-05	0.13927E-05	0.15822E-05	0.15198E-05	0.16497E-05	0.19684E-05
0.24427E-05	0.30106E-05	0.29896E-05	0.22190E-05	0.15749E-05	0.93914E-06
0.64640E-06	0.80304E-06	0.99844E-06	0.10967E-05	0.12941E-05	0.90210E-06
0.79640E-06	0.85027E-06	0.83848E-06	0.70350E-06	0.48386E-06	0.35221E-06
0.31207E-06	0.31793E-06	0.28881E-06	0.23339E-06	0.18015E-06	0.20590E-06
0.12589E-06	0.14214E-06	0.11231E-06	0.12685E-06	0.11449E-06	0.10440E-06
0.87718E-07	0.83072E-07	0.83564E-07	0.24256E-07	0.37576E-07	0.28691E-07
0.65490E-07	0.36246E-07	0.40621E-07	0.51104E-07	0.50672E-07	0.61895E-07
0.79823E-08	0.36692E-07	0.12709E-07	0.39486E-07	0.49828E-08	0.33274E-07
0.10617E-07	0.20351E-07	0.19228E-07	0.44008E-07	0.14442E-07	0.35081E-08
0.20919E-07	0.38528E-07	0.32329E-07	0.11890E-07	0.53003E-07	0.72998E-07
0.26426E-07	0.12121E-07	0.48643E-07	0.13265E-06	0.56606E-06	0.24708E-05
0.86610E-06	0.97725E-09	-0.15249E-07	-0.34816E-08	-0.90764E-09	-0.47465E-09

&lt;&lt; Error &gt;&gt;

0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.00000E+00	0.00000E+00	0.49979E+00	0.87737E+00
0.85058E+00	0.41306E+01	0.22479E+01	0.27205E+01	0.75373E+00	0.93684E+00
0.42534E+01	0.10084E+01	0.23894E+00	0.20876E+00	0.23360E+00	0.12278E+00
0.10635E+00	0.10121E+00	0.11035E+00	0.82196E-01	0.97715E-01	0.11983E+00

0.10737E+00	0.88230E-01	0.60617E-01	0.52530E-01	0.46554E-01	0.40712E-01
0.37429E-01	0.34065E-01	0.33690E-01	0.36952E-01	0.38663E-01	0.33423E-01
0.32722E-01	0.35351E-01	0.33871E-01	0.35898E-01	0.37506E-01	0.31702E-01
0.27838E-01	0.25732E-01	0.23725E-01	0.21158E-01	0.19849E-01	0.19884E-01
0.19737E-01	0.21213E-01	0.22162E-01	0.22746E-01	0.27806E-01	0.34074E-01
0.36371E-01	0.29297E-01	0.26672E-01	0.27325E-01	0.25133E-01	0.23105E-01
0.20480E-01	0.18129E-01	0.18266E-01	0.21770E-01	0.26949E-01	0.37592E-01
0.50061E-01	0.42354E-01	0.36671E-01	0.34367E-01	0.31029E-01	0.40543E-01
0.43843E-01	0.43728E-01	0.43570E-01	0.51035E-01	0.64585E-01	0.89962E-01
0.98967E-01	0.94261E-01	0.10661E+00	0.13283E+00	0.20856E+00	0.16108E+00
0.24858E+00	0.19655E+00	0.23580E+00	0.21574E+00	0.20588E+00	0.21793E+00
0.23802E+00	0.25843E+00	0.22778E+00	0.74903E+00	0.45369E+00	0.66843E+00
0.28033E+00	0.52355E+00	0.40979E+00	0.31766E+00	0.33719E+00	0.30928E+00
0.20667E+01	0.44309E+00	0.13739E+01	0.43296E+00	0.39813E+01	0.58406E+00
0.15871E+01	0.87009E+00	0.82869E+00	0.45710E+00	0.15163E+01	0.61074E+01
0.11177E+01	0.60709E+00	0.62723E+00	0.19441E+01	0.43957E+00	0.34095E+00
0.80497E+00	0.21468E+01	0.44177E+00	0.21104E+00	0.79151E-01	0.34590E-01
0.60841E-01	0.11416E+02	0.81689E+00	0.26384E+01	0.12102E+02	0.20056E+02

Table 5.61 Angular neutron spectrum for iron experiment (400.0 mm, 24.9 deg.).

<< Spectrum >>

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.19834E-06	0.67753E-07	-0.46945E-06
-0.16270E-06	-0.19115E-06	-0.21198E-06	-0.12125E-06	0.10268E-06	0.22631E-06
0.19305E-06	0.18841E-06	0.31870E-06	0.35742E-06	0.46636E-06	0.55371E-06
0.51107E-06	0.64138E-06	0.59706E-06	0.63308E-06	0.56539E-06	0.43927E-06
0.45346E-06	0.56667E-06	0.76964E-06	0.93641E-06	0.10974E-05	0.12630E-05
0.15238E-05	0.15247E-05	0.14222E-05	0.13510E-05	0.10962E-05	0.12333E-05
0.12768E-05	0.12232E-05	0.11662E-05	0.96724E-06	0.10817E-05	0.12817E-05
0.14574E-05	0.16301E-05	0.20211E-05	0.23484E-05	0.26921E-05	0.26335E-05
0.27715E-05	0.23331E-05	0.21415E-05	0.19738E-05	0.14361E-05	0.98325E-06
0.11283E-05	0.13916E-05	0.14976E-05	0.14616E-05	0.14820E-05	0.18843E-05
0.23500E-05	0.28723E-05	0.26978E-05	0.19801E-05	0.13704E-05	0.82022E-06
0.62819E-06	0.77441E-06	0.93860E-06	0.98314E-06	0.10367E-05	0.74367E-06
0.63120E-06	0.70247E-06	0.65023E-06	0.53873E-06	0.32783E-06	0.30530E-06
0.30820E-06	0.26120E-06	0.26973E-06	0.27397E-06	0.23016E-06	0.15615E-06
0.96610E-07	0.10042E-06	0.96052E-07	0.10023E-06	0.87939E-07	0.77267E-07
0.88708E-07	0.62251E-07	0.23684E-07	0.59521E-07	0.49865E-07	0.49366E-07
0.62570E-07	0.31782E-07	0.47585E-07	0.31574E-07	0.10710E-08	0.34886E-07
0.21900E-07	0.18842E-07	0.55780E-07	-0.30747E-07	0.18140E-07	0.13160E-07
-0.28148E-07	0.60580E-07	-0.44906E-08	0.25997E-07	0.21067E-07	0.16514E-07
0.29170E-07	0.34527E-07	0.69147E-07	0.51213E-08	0.52823E-07	0.26222E-07
0.98752E-08	0.49225E-07	0.31651E-08	0.82644E-07	0.25438E-06	0.74386E-06
0.20383E-06	0.10537E-07	-0.24636E-07	-0.75211E-08	-0.76461E-08	-0.11492E-07

<< Error >>

0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.00000E+00	0.24348E+01	0.60493E+00
0.14893E+01	0.11624E+01	0.96436E+00	0.16018E+01	0.17073E+01	0.70332E+00
0.72807E+02	0.66278E+00	0.32987E+00	0.27204E+00	0.18547E+00	0.14412E+00
0.14599E+00	0.10957E+00	0.10600E+00	0.92578E-01	0.99736E-01	0.11833E+00
0.10635E+00	0.81846E-01	0.61782E-01	0.51289E-01	0.43619E-01	0.38588E-01
0.32153E-01	0.32766E-01	0.33739E-01	0.32342E-01	0.35960E-01	0.33136E-01
0.31468E-01	0.31753E-01	0.30936E-01	0.35949E-01	0.32458E-01	0.29599E-01
0.26281E-01	0.24413E-01	0.21445E-01	0.19446E-01	0.17801E-01	0.18200E-01
0.17614E-01	0.19493E-01	0.20469E-01	0.21316E-01	0.25812E-01	0.34797E-01
0.30981E-01	0.26874E-01	0.25112E-01	0.25143E-01	0.24812E-01	0.21147E-01
0.18349E-01	0.16646E-01	0.17318E-01	0.21191E-01	0.27266E-01	0.38889E-01
0.47570E-01	0.40409E-01	0.34279E-01	0.34307E-01	0.33918E-01	0.44228E-01
0.49246E-01	0.45810E-01	0.51094E-01	0.61555E-01	0.94710E-01	0.95462E-01
0.10078E+00	0.11566E+00	0.11335E+00	0.11067E+00	0.14339E+00	0.20350E+00
0.29552E+00	0.29824E+00	0.30100E+00	0.25084E+00	0.26770E+00	0.30510E+00
0.21850E+00	0.30193E+00	0.78157E+00	0.29979E+00	0.36032E+00	0.34199E+00
0.26133E+00	0.47583E+00	0.34864E+00	0.53419E+00	0.16676E+02	0.50240E+00

0.80020E+00	0.90245E+00	0.30215E+00	0.63535E+00	0.11611E+01	0.16065E+01
0.68020E+00	0.27657E+00	0.38715E+01	0.71016E+00	0.91714E+00	0.11719E+01
0.69548E+00	0.63285E+00	0.30058E+00	0.43089E+01	0.37659E+00	0.78239E+00
0.23762E+01	0.45851E+00	0.78066E+01	0.27084E+00	0.11270E+00	0.56791E-01
0.12860E+00	0.12003E+01	0.54727E+00	0.15356E+01	0.15091E+01	0.88304E+00

Table 5.62 Angular neutron spectrum for iron experiment (400.0 mm, 41.8 deg.).

<< Spectrum >>

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	-0.38901E-06	-0.63651E-06	-0.27278E-06
-0.82622E-07	0.11060E-06	-0.16324E-06	-0.78767E-07	0.16232E-06	-0.43306E-07
0.19538E-06	0.22961E-06	0.24646E-06	0.40707E-06	0.44150E-06	0.56890E-06
0.57565E-06	0.62196E-06	0.61569E-06	0.61487E-06	0.40522E-06	0.36194E-06
0.42351E-06	0.50221E-06	0.72521E-06	0.96051E-06	0.11133E-05	0.11901E-05
0.13369E-05	0.14420E-05	0.12795E-05	0.10372E-05	0.10625E-05	0.11466E-05
0.11948E-05	0.10573E-05	0.96156E-06	0.94096E-06	0.10104E-05	0.11723E-05
0.12871E-05	0.15564E-05	0.18800E-05	0.21548E-05	0.22804E-05	0.23893E-05
0.22924E-05	0.19131E-05	0.18564E-05	0.14318E-05	0.10186E-05	0.94245E-06
0.10366E-05	0.11321E-05	0.12163E-05	0.12056E-05	0.14124E-05	0.16902E-05
0.21324E-05	0.23939E-05	0.20346E-05	0.13164E-05	0.92773E-06	0.61284E-06
0.53862E-06	0.57551E-06	0.73544E-06	0.75213E-06	0.68423E-06	0.51383E-06
0.44803E-06	0.50434E-06	0.45287E-06	0.38715E-06	0.25161E-06	0.21394E-06
0.19700E-06	0.19421E-06	0.17918E-06	0.19731E-06	0.16581E-06	0.12759E-06
0.12798E-06	0.54732E-07	0.90319E-07	0.11809E-06	0.57048E-07	0.69795E-07
0.91375E-07	0.44648E-07	0.29971E-07	0.73662E-07	0.30292E-07	0.40264E-07
0.38067E-07	0.92721E-08	0.28107E-07	0.11678E-07	0.29863E-07	0.39881E-07
0.21547E-07	0.45879E-07	0.20943E-07	0.19855E-07	0.32568E-07	0.17047E-08
0.20952E-07	0.42848E-07	0.23964E-07	0.17235E-07	0.27466E-07	0.28898E-07
0.36766E-07	0.18363E-07	0.13879E-07	0.96260E-08	0.76812E-09	0.35988E-07
0.46681E-09	0.25817E-08	0.47267E-07	0.85097E-07	0.90701E-07	0.14384E-06
0.11370E-07	-0.71204E-08	0.22511E-08	0.19071E-07	-0.27879E-09	0.13243E-08

<< Error >>

0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.00000E+00	0.67490E-02	0.54405E+00
0.17593E+01	0.11618E+01	0.72608E+00	0.14508E+01	0.63859E+00	0.22273E+01
0.43099E+00	0.31629E+00	0.27271E+00	0.15023E+00	0.12165E+00	0.90529E-01
0.82269E-01	0.72662E-01	0.69247E-01	0.64132E-01	0.89114E-01	0.92196E-01
0.75700E-01	0.62208E-01	0.45514E-01	0.36023E-01	0.32004E-01	0.29924E-01
0.27075E-01	0.25157E-01	0.26745E-01	0.30363E-01	0.28223E-01	0.26185E-01
0.25420E-01	0.26972E-01	0.27748E-01	0.28122E-01	0.26802E-01	0.24266E-01
0.22899E-01	0.20079E-01	0.17805E-01	0.16590E-01	0.16065E-01	0.15721E-01
0.16048E-01	0.17992E-01	0.18074E-01	0.21509E-01	0.26988E-01	0.27723E-01
0.26290E-01	0.25240E-01	0.23908E-01	0.23448E-01	0.20711E-01	0.18754E-01
0.16278E-01	0.15409E-01	0.17226E-01	0.22842E-01	0.28807E-01	0.37519E-01
0.40718E-01	0.39728E-01	0.33244E-01	0.32922E-01	0.36195E-01	0.45863E-01
0.51776E-01	0.47457E-01	0.53311E-01	0.59682E-01	0.88818E-01	0.10281E+00
0.11156E+00	0.11557E+00	0.12590E+00	0.11339E+00	0.15250E+00	0.18912E+00
0.16895E+00	0.38792E+00	0.23329E+00	0.16763E+00	0.34433E+00	0.27724E+00
0.21858E+00	0.40857E+00	0.53844E+00	0.21047E+00	0.45487E+00	0.34721E+00
0.35075E+00	0.14452E+01	0.45809E+00	0.11448E+01	0.42592E+00	0.34595E+00
0.61012E+00	0.31405E+00	0.61986E+00	0.68369E+00	0.46902E+00	0.85034E+01
0.70476E+00	0.37652E+00	0.65377E+00	0.10299E+01	0.53635E+00	0.53430E+00
0.45109E+00	0.87072E+00	0.12189E+01	0.15678E+01	0.20321E+02	0.46982E+00
0.35277E+02	0.60042E+01	0.34185E+00	0.20084E+00	0.20049E+00	0.12609E+00
0.85585E+00	0.98635E+00	0.27815E+01	0.38758E+00	0.18746E+02	0.44015E+01

Table 5.63 Angular neutron spectrum for iron experiment (400.0 mm, 66.8 deg.).

<< Spectrum >>

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	-0.84875E-07	-0.14194E-06
0.12877E-06	0.24183E-06	0.28557E-06	-0.69386E-07	0.47112E-07	0.28449E-06
0.22549E-06	0.21505E-06	0.28167E-06	0.39739E-06	0.38271E-06	0.40607E-06
0.43202E-06	0.42988E-06	0.43908E-06	0.33402E-06	0.28170E-06	0.28421E-06
0.29009E-06	0.38821E-06	0.54005E-06	0.65724E-06	0.79925E-06	0.88627E-06
0.91002E-06	0.80640E-06	0.75854E-06	0.73901E-06	0.74411E-06	0.76939E-06
0.73528E-06	0.62649E-06	0.61369E-06	0.62999E-06	0.70981E-06	0.80987E-06
0.90118E-06	0.11173E-05	0.12196E-05	0.14141E-05	0.15053E-05	0.14706E-05
0.13499E-05	0.12126E-05	0.10582E-05	0.76743E-06	0.64146E-06	0.59311E-06
0.67847E-06	0.77877E-06	0.80401E-06	0.85486E-06	0.94540E-06	0.11475E-05
0.13375E-05	0.12842E-05	0.97947E-06	0.68836E-06	0.54005E-06	0.38950E-06
0.36652E-06	0.36761E-06	0.42611E-06	0.38346E-06	0.33190E-06	0.29916E-06
0.25069E-06	0.25329E-06	0.23696E-06	0.16171E-06	0.12226E-06	0.14884E-06
0.13924E-06	0.11274E-06	0.11783E-06	0.10465E-06	0.10093E-06	0.69018E-07
0.35928E-07	0.50548E-07	0.57720E-07	0.37681E-08	0.39013E-07	0.41703E-07
0.44969E-07	0.72803E-07	0.32866E-07	0.36762E-07	0.52706E-08	0.33429E-07
0.27797E-07	0.36286E-07	0.18812E-07	0.22233E-07	0.16285E-07	0.22941E-07
0.29337E-07	0.11723E-07	0.14234E-07	0.88365E-08	0.21087E-08	-0.34867E-07
-0.31148E-07	0.29510E-08	0.12242E-07	0.10173E-07	0.30634E-08	-0.38950E-08
0.15457E-07	-0.36126E-07	0.40588E-07	-0.25002E-07	-0.19801E-08	-0.61026E-09
0.23755E-07	-0.19903E-07	-0.85218E-08	0.26245E-07	0.20404E-07	0.47575E-07
0.59657E-07	0.18794E-07	0.11684E-07	0.81017E-08	-0.51935E-08	-0.96832E-09

<< Error >>

0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.00000E+00	0.28971E-01
0.10051E+01	0.49120E+00	0.39409E+00	0.14512E+01	0.20269E+01	0.29852E+00
0.32858E+00	0.31016E+00	0.21458E+00	0.13696E+00	0.13052E+00	0.10810E+00
0.98955E-01	0.88223E-01	0.83498E-01	0.10021E+00	0.10592E+00	0.10353E+00
0.96418E-01	0.69864E-01	0.50590E-01	0.44236E-01	0.36567E-01	0.32675E-01
0.31823E-01	0.35129E-01	0.35282E-01	0.35793E-01	0.34238E-01	0.32244E-01
0.32461E-01	0.36061E-01	0.35910E-01	0.33613E-01	0.30807E-01	0.28089E-01
0.26132E-01	0.22314E-01	0.21155E-01	0.19354E-01	0.18721E-01	0.19083E-01
0.20387E-01	0.22053E-01	0.23823E-01	0.30232E-01	0.33759E-01	0.36235E-01
0.33017E-01	0.29156E-01	0.28581E-01	0.27221E-01	0.25263E-01	0.21881E-01
0.19854E-01	0.20568E-01	0.25514E-01	0.32998E-01	0.38672E-01	0.50318E-01
0.52084E-01	0.52944E-01	0.47012E-01	0.52463E-01	0.61204E-01	0.66299E-01
0.79902E-01	0.82688E-01	0.83941E-01	0.12629E+00	0.17177E+00	0.14499E+00
0.15326E+00	0.20078E+00	0.19728E+00	0.22994E+00	0.22685E+00	0.32234E+00
0.59793E+00	0.41794E+00	0.37165E+00	0.56034E+01	0.53160E+00	0.50032E+00
0.44632E+00	0.26522E+00	0.54839E+00	0.49724E+00	0.35079E+01	0.57226E+00
0.69539E+00	0.53286E+00	0.10706E+01	0.88773E+00	0.11713E+01	0.79015E+00
0.57981E+00	0.12842E+01	0.10574E+01	0.16280E+01	0.69434E+01	0.45107E+00
0.52440E+00	0.60146E+01	0.15143E+01	0.17687E+01	0.69693E+01	0.12337E+02
0.14699E+01	0.74501E+00	0.63208E+00	0.11046E+01	0.14561E+02	0.46161E+02
0.11897E+01	0.13982E+01	0.30839E+01	0.87033E+00	0.88667E+00	0.30827E+00
0.20172E+00	0.35874E+00	0.59817E+00	0.68003E+00	0.11243E+01	0.69281E+01

Table 5.64 Angular neutron spectrum for iron experiment (600.0 mm, 0.0 deg).

<< Spectrum >>

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	-0.20958E-06	-0.53678E-06	-0.33971E-06
0.13961E-07	-0.15951E-06	-0.13436E-06	-0.15823E-06	-0.51818E-07	-0.29527E-07
0.49972E-07	0.13662E-06	0.12129E-06	0.15863E-06	0.33585E-06	0.36184E-06
0.39290E-06	0.37809E-06	0.31089E-06	0.35844E-06	0.31330E-06	0.30738E-06
0.28091E-06	0.34708E-06	0.43895E-06	0.55498E-06	0.71198E-06	0.79634E-06
0.94640E-06	0.88508E-06	0.10561E-05	0.89644E-06	0.80534E-06	0.74073E-06
0.72685E-06	0.70028E-06	0.59928E-06	0.56697E-06	0.56837E-06	0.67829E-06
0.80675E-06	0.85830E-06	0.10323E-05	0.12461E-05	0.14300E-05	0.13642E-05
0.14862E-05	0.12356E-05	0.10592E-05	0.97100E-06	0.69764E-06	0.39902E-06
0.42680E-06	0.50142E-06	0.56861E-06	0.50057E-06	0.48959E-06	0.63210E-06
0.81508E-06	0.97787E-06	0.10430E-05	0.74012E-06	0.43647E-06	0.20127E-06
0.15744E-06	0.18976E-06	0.21485E-06	0.28232E-06	0.30027E-06	0.16348E-06

0.15433E-06	0.16003E-06	0.16320E-06	0.85558E-07	0.33261E-07	0.33062E-07
0.20786E-07	0.33133E-07	0.47625E-07	0.60937E-08	0.15930E-07	0.45888E-07
0.21220E-07	0.15865E-07	0.12959E-07	0.26469E-07	0.13132E-07	0.24801E-07
0.23303E-07	0.15338E-07	0.20372E-07	0.60693E-08	0.10761E-07	0.10204E-07
0.10731E-07	0.49608E-08	-0.15167E-08	0.81403E-08	0.58392E-08	0.16362E-07
0.20047E-07	-0.29411E-08	0.31836E-08	0.62632E-08	-0.20519E-09	-0.57102E-08
-0.20663E-08	-0.43202E-09	0.17405E-07	0.18732E-07	-0.36980E-08	-0.10697E-09
-0.11815E-07	0.14807E-07	-0.12463E-07	0.50327E-08	-0.16833E-09	0.51769E-08
0.11079E-07	0.17689E-07	0.22294E-07	0.20313E-07	0.14058E-06	0.12325E-06
-0.10884E-07	0.16106E-08	-0.29771E-08	0.27422E-08	0.37277E-08	0.13528E-08

&lt;&lt; Error &gt;&gt;

0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.00000E+00	0.00000E+00	0.32719E+00
0.85974E+01	0.67968E+00	0.76095E+00	0.59411E+00	0.16820E+01	0.26197E+01
0.13433E+01	0.44210E+00	0.43802E+00	0.30920E+00	0.13148E+00	0.11475E+00
0.96187E-01	0.95390E-01	0.10575E+00	0.85841E-01	0.91323E-01	0.88012E-01
0.88850E-01	0.70562E-01	0.57328E-01	0.46366E-01	0.37665E-01	0.34441E-01
0.29402E-01	0.32107E-01	0.26806E-01	0.29727E-01	0.29024E-01	0.29948E-01
0.29861E-01	0.29691E-01	0.31374E-01	0.32618E-01	0.32012E-01	0.28295E-01
0.25263E-01	0.24469E-01	0.21432E-01	0.19058E-01	0.17440E-01	0.18253E-01
0.17245E-01	0.19528E-01	0.21164E-01	0.22445E-01	0.27316E-01	0.42602E-01
0.39900E-01	0.36208E-01	0.31906E-01	0.33662E-01	0.34275E-01	0.28532E-01
0.24170E-01	0.21288E-01	0.20758E-01	0.26526E-01	0.38461E-01	0.71044E-01
0.88279E-01	0.77913E-01	0.68721E-01	0.57446E-01	0.55267E-01	0.94446E-01
0.98200E-01	0.97358E-01	0.96732E-01	0.18306E+00	0.43476E+00	0.45002E+00
0.72028E+00	0.44746E+00	0.30245E+00	0.24206E+01	0.91498E+00	0.30355E+00
0.60885E+00	0.80971E+00	0.95924E+00	0.43061E+00	0.83674E+00	0.43856E+00
0.38803E+00	0.59245E+00	0.43855E+00	0.16453E+01	0.89748E+00	0.91494E+00
0.82486E+00	0.16634E+01	0.53255E+01	0.96303E+00	0.12680E+01	0.47995E+00
0.36958E+00	0.27870E+01	0.27175E+01	0.12882E+01	0.37923E+02	0.16004E+01
0.43478E+01	0.20935E+02	0.44354E+00	0.49221E+00	0.24991E+01	0.91039E+02
0.91104E+00	0.72709E+00	0.90525E+00	0.17367E+01	0.47383E+02	0.15565E+01
0.82118E+00	0.45374E+00	0.38952E+00	0.52017E+00	0.10197E+00	0.10773E+00
0.81547E+00	0.38731E+01	0.21390E+01	0.18798E+01	0.15115E+01	0.35323E+01

Table 5.65 Angular neutron spectrum for iron experiment (600.0 mm, 12.2 deg.).

&lt;&lt; Spectrum &gt;&gt;

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	-0.16945E-06	-0.60065E-06	-0.47817E-06
-0.30768E-06	-0.30651E-06	-0.26958E-06	-0.59139E-07	-0.80080E-07	-0.53603E-07
-0.37036E-07	0.49672E-07	0.12954E-06	0.15141E-06	0.22520E-06	0.30109E-06
0.27281E-06	0.36007E-06	0.33325E-06	0.27933E-06	0.26613E-06	0.23968E-06
0.20966E-06	0.29310E-06	0.40774E-06	0.54396E-06	0.60981E-06	0.74649E-06
0.79096E-06	0.85879E-06	0.85916E-06	0.83311E-06	0.64864E-06	0.65058E-06
0.65609E-06	0.60065E-06	0.47811E-06	0.49793E-06	0.49466E-06	0.59560E-06
0.72800E-06	0.79487E-06	0.94552E-06	0.11243E-05	0.12409E-05	0.12008E-05
0.12453E-05	0.11131E-05	0.90159E-06	0.79864E-06	0.53186E-06	0.37938E-06
0.38396E-06	0.42633E-06	0.45419E-06	0.44725E-06	0.48022E-06	0.56997E-06
0.76948E-06	0.88402E-06	0.81523E-06	0.56915E-06	0.34412E-06	0.15525E-06
0.98312E-07	0.15881E-06	0.19478E-06	0.21925E-06	0.19839E-06	0.10426E-06
0.16046E-06	0.11857E-06	0.10775E-06	0.63160E-07	0.58192E-07	0.42721E-07
0.22822E-07	0.29920E-07	0.77418E-08	0.22903E-07	0.15759E-07	0.15382E-07
0.87576E-08	0.95319E-08	0.53388E-08	0.21692E-07	0.13257E-07	0.50077E-08
0.16166E-08	0.15548E-07	0.18155E-07	-0.14862E-08	0.11480E-07	-0.38397E-08
0.80250E-08	0.26723E-10	0.11559E-07	0.76261E-08	0.27842E-08	0.76200E-08
0.48067E-08	-0.43291E-08	-0.33976E-08	-0.30043E-08	0.17946E-07	-0.71784E-08
0.65375E-08	0.34821E-08	-0.26313E-08	0.41446E-10	0.87853E-08	-0.82544E-08
-0.58832E-08	0.49983E-09	-0.25087E-08	-0.74347E-08	0.32304E-08	0.51403E-08
0.64294E-08	-0.77145E-08	0.17739E-07	0.32796E-07	0.72142E-07	0.57589E-07
0.46571E-08	0.10369E-08	0.88190E-08	0.90071E-08	0.35288E-08	0.40166E-08

## &lt;&lt; Error &gt;&gt;

0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.00000E+00	0.00000E+00	0.18272E+00
0.34651E+00	0.30992E+00	0.32368E+00	0.13775E+01	0.94842E+00	0.12855E+01
0.16294E+01	0.10413E+01	0.36967E+00	0.28414E+00	0.17459E+00	0.12122E+00
0.11992E+00	0.85897E-01	0.87350E-01	0.97552E-01	0.95601E-01	0.99976E-01
0.10698E+00	0.74874E-01	0.55123E-01	0.41748E-01	0.39344E-01	0.32689E-01
0.30591E-01	0.28579E-01	0.27941E-01	0.27148E-01	0.31298E-01	0.29948E-01
0.29438E-01	0.30211E-01	0.35726E-01	0.33546E-01	0.32763E-01	0.28953E-01
0.25399E-01	0.23814E-01	0.21107E-01	0.19155E-01	0.17946E-01	0.18322E-01
0.18041E-01	0.19020E-01	0.21810E-01	0.23637E-01	0.31495E-01	0.40535E-01
0.40345E-01	0.37002E-01	0.35735E-01	0.34117E-01	0.32569E-01	0.29009E-01
0.23530E-01	0.21617E-01	0.23089E-01	0.30005E-01	0.43572E-01	0.85115E-01
0.12860E+00	0.83983E-01	0.70137E-01	0.65462E-01	0.73303E-01	0.13062E+00
0.87352E-01	0.11917E+00	0.13511E+00	0.22198E+00	0.22903E+00	0.31749E+00
0.59744E+00	0.45913E+00	0.17800E+01	0.59666E+00	0.92142E+00	0.81797E+00
0.13391E+01	0.11523E+01	0.20683E+01	0.48916E+00	0.75920E+00	0.18121E+01
0.51756E+01	0.46581E+00	0.39083E+00	0.49496E+01	0.62703E+00	0.17431E+01
0.83149E+00	0.26296E+03	0.56310E+00	0.90244E+00	0.24714E+01	0.83604E+00
0.13590E+01	0.16472E+01	0.19316E+01	0.24648E+01	0.41355E+00	0.95161E+00
0.11085E+01	0.21019E+01	0.28702E+01	0.20152E+03	0.87212E+00	0.97768E+00
0.14760E+01	0.16457E+02	0.34947E+01	0.95918E+00	0.23674E+01	0.13647E+01
0.11539E+01	0.83332E+00	0.38675E+00	0.24710E+00	0.14566E+00	0.14789E+00
0.90221E+00	0.51042E+01	0.56775E+00	0.48189E+00	0.10974E+01	0.10151E+01

Table 5.66 Angular neutron spectrum for iron experiment (600.0 mm, 24.9 deg.).

## &lt;&lt; Spectrum &gt;&gt;

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	-0.64398E-08	-0.56954E-06	-0.50060E-06
-0.39075E-06	-0.22082E-06	-0.14797E-06	-0.44346E-07	-0.12785E-07	-0.13697E-06
-0.75951E-07	0.81204E-07	0.89710E-07	0.17341E-06	0.20971E-06	0.28515E-06
0.27414E-06	0.28357E-06	0.30390E-06	0.28157E-06	0.30430E-06	0.23548E-06
0.22499E-06	0.31512E-06	0.39380E-06	0.55603E-06	0.64361E-06	0.71911E-06
0.75686E-06	0.80744E-06	0.81127E-06	0.75347E-06	0.58129E-06	0.58934E-06
0.58647E-06	0.55125E-06	0.48938E-06	0.45265E-06	0.48071E-06	0.55037E-06
0.66750E-06	0.76119E-06	0.92702E-06	0.10751E-05	0.11514E-05	0.11455E-05
0.10815E-05	0.94085E-06	0.76842E-06	0.65518E-06	0.47078E-06	0.32955E-06
0.34062E-06	0.39780E-06	0.42327E-06	0.38650E-06	0.43679E-06	0.56862E-06
0.70413E-06	0.76766E-06	0.66033E-06	0.43128E-06	0.26270E-06	0.14687E-06
0.80831E-07	0.10835E-06	0.16382E-06	0.16051E-06	0.15569E-06	0.89615E-07
0.91710E-07	0.88614E-07	0.75764E-07	0.57364E-07	0.30401E-07	0.22727E-07
0.23457E-07	0.88908E-08	-0.28135E-08	0.55357E-08	-0.23002E-07	0.12044E-07
0.25885E-07	0.16691E-07	0.10026E-07	0.27663E-07	0.98202E-08	0.11628E-07
0.78602E-08	0.74683E-08	0.91725E-08	-0.10479E-07	0.70889E-08	0.77675E-08
0.15468E-07	0.51748E-08	-0.41149E-08	-0.29892E-08	-0.13114E-08	0.10328E-07
-0.15827E-07	-0.74585E-08	0.11716E-07	0.79789E-09	0.48710E-08	-0.57486E-08
0.12204E-07	0.18004E-07	0.10392E-07	-0.94732E-08	-0.53458E-08	0.67181E-08
-0.38361E-08	-0.42089E-08	-0.39404E-08	0.36192E-08	0.17501E-07	0.37513E-08
0.13498E-08	0.71128E-08	0.21001E-08	0.27138E-07	0.32233E-07	0.13361E-07
-0.99193E-08	0.17053E-08	0.53198E-08	0.63256E-08	-0.28919E-08	-0.35196E-08

## &lt;&lt; Error &gt;&gt;

0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.00000E+00	0.00000E+00	0.12812E+00
0.26376E+00	0.42456E+00	0.58703E+00	0.17736E+01	0.58304E+01	0.48655E+00
0.77493E+00	0.65245E+00	0.51600E+00	0.24363E+00	0.18156E+00	0.12157E+00
0.12074E+00	0.10607E+00	0.94327E-01	0.93941E-01	0.82005E-01	0.98666E-01
0.94674E-01	0.67575E-01	0.54012E-01	0.39414E-01	0.35045E-01	0.32269E-01
0.30290E-01	0.27749E-01	0.26933E-01	0.27509E-01	0.32240E-01	0.30229E-01
0.30521E-01	0.30462E-01	0.32404E-01	0.34500E-01	0.32485E-01	0.29687E-01
0.25045E-01	0.23299E-01	0.20302E-01	0.18345E-01	0.17780E-01	0.17809E-01

0.18480E-01	0.20047E-01	0.23103E-01	0.25616E-01	0.32575E-01	0.43544E-01
0.43077E-01	0.38005E-01	0.35607E-01	0.37823E-01	0.33458E-01	0.27808E-01
0.23987E-01	0.22443E-01	0.25537E-01	0.35161E-01	0.52092E-01	0.87897E-01
0.15536E+00	0.11958E+00	0.80063E-01	0.84795E-01	0.89278E-01	0.15212E+00
0.14685E+00	0.15436E+00	0.18134E+00	0.23545E+00	0.44439E+00	0.62453E+00
0.60480E+00	0.15712E+01	0.52211E+01	0.25249E+01	0.65079E+00	0.11451E+01
0.50880E+00	0.80537E+00	0.13247E+01	0.43348E+00	0.11140E+01	0.82646E+00
0.11459E+01	0.10974E+01	0.81701E+00	0.74477E+00	0.11431E+01	0.93895E+00
0.49566E+00	0.14428E+01	0.17206E+01	0.23117E+01	0.54405E+01	0.72645E+00
0.50677E+00	0.98679E+00	0.63166E+00	0.10688E+02	0.16552E+01	0.14830E+01
0.68962E+00	0.43596E+00	0.79351E+00	0.88162E+00	0.16304E+01	0.12826E+01
0.22241E+01	0.23024E+01	0.23411E+01	0.26165E+01	0.45870E+00	0.22594E+01
0.76449E+01	0.12471E+01	0.41275E+01	0.29686E+00	0.23254E+00	0.50471E+00
0.61173E+00	0.32801E+01	0.87142E+00	0.68601E+00	0.18580E+01	0.11431E+01

Table 5.67 Angular neutron spectrum for iron experiment (600.0 mm, 41.8 deg.).

<< Spectrum >>

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.47632E-08	-0.65345E-07
0.85795E-07	0.23676E-06	0.16123E-06	0.22017E-06	0.32534E-06	0.24703E-07
0.34178E-06	0.22982E-06	0.32381E-06	0.20268E-06	0.32597E-06	0.28471E-06
0.27110E-06	0.32495E-06	0.32337E-06	0.28416E-06	0.27660E-06	0.25973E-06
0.25405E-06	0.26507E-06	0.32889E-06	0.42523E-06	0.50905E-06	0.60874E-06
0.57191E-06	0.55836E-06	0.52444E-06	0.46196E-06	0.47691E-06	0.47337E-06
0.46745E-06	0.38785E-06	0.36838E-06	0.37696E-06	0.40615E-06	0.47370E-06
0.54647E-06	0.58815E-06	0.75319E-06	0.80259E-06	0.82635E-06	0.76228E-06
0.67293E-06	0.51449E-06	0.44787E-06	0.31587E-06	0.27475E-06	0.28565E-06
0.28361E-06	0.31679E-06	0.28734E-06	0.33715E-06	0.41161E-06	0.46268E-06
0.52945E-06	0.41599E-06	0.27501E-06	0.14485E-06	0.12106E-06	0.98449E-07
0.12629E-06	0.10907E-06	0.13263E-06	0.95450E-07	0.53952E-07	0.37724E-07
0.76530E-07	0.55298E-07	0.35687E-07	0.48279E-07	0.23675E-07	0.73070E-08
0.40252E-08	0.11524E-07	0.15712E-07	-0.12267E-08	0.58458E-08	0.42358E-09
0.56907E-08	-0.15517E-07	0.38236E-08	-0.86205E-08	0.22837E-08	0.38762E-08
0.78580E-08	0.13472E-07	0.10888E-07	-0.44506E-08	0.56419E-08	0.44033E-08
0.79236E-08	0.66921E-08	0.20008E-07	0.14955E-08	-0.11470E-07	-0.79306E-08
0.11084E-07	0.18703E-08	0.32353E-08	0.15156E-07	0.14296E-07	0.93103E-08
-0.95074E-08	-0.17319E-07	0.30502E-07	0.64005E-08	0.26155E-09	0.13541E-09
-0.93807E-08	-0.15078E-07	0.42559E-08	0.10705E-07	-0.72915E-09	-0.13663E-07
0.38732E-08	0.12121E-07	-0.28988E-09	0.19337E-07	0.32899E-08	-0.60705E-08
-0.52131E-08	0.90476E-09	-0.47518E-08	-0.17972E-09	-0.17314E-08	0.48191E-08

<< Error >>

0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.83712E+00	0.97615E+00
0.12187E+01	0.42240E+00	0.54751E+00	0.38165E+00	0.23650E+00	0.29277E+01
0.17970E+00	0.23559E+00	0.14800E+00	0.21235E+00	0.11951E+00	0.12789E+00
0.12517E+00	0.95932E-01	0.89145E-01	0.94630E-01	0.88628E-01	0.89933E-01
0.87997E-01	0.80842E-01	0.65310E-01	0.51501E-01	0.44305E-01	0.37187E-01
0.39178E-01	0.39037E-01	0.40123E-01	0.43611E-01	0.39414E-01	0.38671E-01
0.37766E-01	0.43197E-01	0.43146E-01	0.42372E-01	0.39471E-01	0.34719E-01
0.31092E-01	0.30298E-01	0.24949E-01	0.23860E-01	0.23356E-01	0.25157E-01
0.27663E-01	0.34293E-01	0.36986E-01	0.49060E-01	0.51856E-01	0.51868E-01
0.53232E-01	0.48625E-01	0.52966E-01	0.44646E-01	0.37610E-01	0.35814E-01
0.32236E-01	0.39026E-01	0.53733E-01	0.95553E-01	0.11084E+00	0.13455E+00
0.10800E+00	0.12480E+00	0.10747E+00	0.14674E+00	0.26273E+00	0.38982E+00
0.19721E+00	0.27902E+00	0.43275E+00	0.32063E+00	0.67688E+00	0.22722E+01
0.41401E+01	0.14438E+01	0.10770E+01	0.14036E+02	0.30355E+01	0.38719E+02
0.27648E+01	0.10167E+01	0.42681E+01	0.17417E+01	0.67612E+01	0.37474E+01
0.18554E+01	0.88887E+00	0.98090E+00	0.23780E+01	0.17775E+01	0.21526E+01
0.12429E+01	0.15239E+01	0.47407E+00	0.64493E+01	0.79146E+00	0.12364E+01
0.86381E+00	0.53987E+01	0.34798E+01	0.71816E+00	0.74977E+00	0.13079E+01
0.12392E+01	0.58853E+00	0.34466E+00	0.17200E+01	0.47805E+02	0.88060E+02
0.12958E+01	0.84447E+00	0.28505E+01	0.99542E+00	0.15579E+02	0.84164E+00
0.28535E+01	0.65828E+00	0.32856E+02	0.40211E+00	0.18896E+01	0.95805E+00
0.11333E+01	0.46638E+01	0.10417E+01	0.24490E+02	0.24645E+01	0.80542E+00

Table 5.68 Mid energy of measured spectra for lead experiment.

0.11629E-01	0.12225E-01	0.12852E-01	0.13511E-01	0.14203E-01	0.14932E-01
0.15697E-01	0.16502E-01	0.17348E-01	0.18238E-01	0.19173E-01	0.20156E-01
0.21189E-01	0.22275E-01	0.23418E-01	0.24618E-01	0.25880E-01	0.27207E-01
0.28602E-01	0.30069E-01	0.31610E-01	0.33231E-01	0.34935E-01	0.36726E-01
0.38609E-01	0.40589E-01	0.42670E-01	0.44857E-01	0.47157E-01	0.49575E-01
0.52117E-01	0.54789E-01	0.57598E-01	0.60551E-01	0.63656E-01	0.66919E-01
0.70350E-01	0.73957E-01	0.77749E-01	0.81735E-01	0.85926E-01	0.90332E-01
0.94963E-01	0.99832E-01	0.10495E+00	0.11033E+00	0.11599E+00	0.12193E+00
0.12819E+00	0.13476E+00	0.14167E+00	0.14893E+00	0.15657E+00	0.16459E+00
0.17303E+00	0.18191E+00	0.19123E+00	0.20104E+00	0.21134E+00	0.22218E+00
0.23357E+00	0.24555E+00	0.25814E+00	0.27137E+00	0.28528E+00	0.29991E+00
0.31529E+00	0.33145E+00	0.34845E+00	0.36631E+00	0.38509E+00	0.40484E+00
0.42559E+00	0.44742E+00	0.47035E+00	0.49447E+00	0.51982E+00	0.54647E+00
0.57449E+00	0.60395E+00	0.63491E+00	0.66747E+00	0.70169E+00	0.73766E+00
0.77548E+00	0.81524E+00	0.85704E+00	0.90098E+00	0.94718E+00	0.99574E+00
0.10468E+01	0.11005E+01	0.11569E+01	0.12162E+01	0.12786E+01	0.13441E+01
0.14130E+01	0.14855E+01	0.15616E+01	0.16417E+01	0.17259E+01	0.18144E+01
0.19074E+01	0.20052E+01	0.21080E+01	0.22161E+01	0.23297E+01	0.24491E+01
0.25747E+01	0.27067E+01	0.28455E+01	0.29914E+01	0.31447E+01	0.33060E+01
0.34755E+01	0.36537E+01	0.38410E+01	0.40379E+01	0.42450E+01	0.44626E+01
0.46914E+01	0.49319E+01	0.51848E+01	0.54506E+01	0.57301E+01	0.60239E+01
0.63327E+01	0.66574E+01	0.69988E+01	0.73576E+01	0.77348E+01	0.81314E+01
0.85483E+01	0.89866E+01	0.94473E+01	0.99317E+01	0.10441E+02	0.10976E+02
0.11539E+02	0.12131E+02	0.12753E+02	0.13406E+02	0.14094E+02	0.14816E+02
0.15576E+02	0.16375E+02	0.17214E+02	0.18097E+02	0.19025E+02	0.20000E+02

Table 5.69 Source neutron spectrum for lead experiment.

<< Spectrum >>

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	-0.46967E-03	-0.35872E-03	0.22543E-03	0.20620E-03	0.33399E-03
0.21309E-03	0.61665E-04	0.16261E-03	0.16428E-03	0.78194E-04	0.12867E-03
0.51535E-05	0.10652E-03	0.75531E-04	0.15068E-03	0.76519E-04	0.11269E-03
0.83106E-04	0.10496E-03	0.13135E-03	0.72372E-04	0.12487E-03	0.13205E-03
0.15507E-03	0.13810E-03	0.10594E-03	0.13284E-03	0.16942E-03	0.16242E-03
0.18529E-03	0.24377E-03	0.18855E-03	0.20774E-03	0.24143E-03	0.25357E-03
0.28202E-03	0.30803E-03	0.32689E-03	0.34812E-03	0.38781E-03	0.39089E-03
0.43714E-03	0.48368E-03	0.52122E-03	0.55336E-03	0.54942E-03	0.66232E-03
0.67913E-03	0.72453E-03	0.79905E-03	0.80916E-03	0.88873E-03	0.92771E-03
0.96061E-03	0.98334E-03	0.11399E-02	0.11719E-02	0.12642E-02	0.13078E-02
0.13228E-02	0.14359E-02	0.15520E-02	0.15952E-02	0.17272E-02	0.17826E-02
0.18599E-02	0.19301E-02	0.20342E-02	0.20755E-02	0.21523E-02	0.21557E-02
0.21998E-02	0.22730E-02	0.24159E-02	0.24462E-02	0.24611E-02	0.24100E-02
0.24129E-02	0.24972E-02	0.24733E-02	0.25103E-02	0.26309E-02	0.27822E-02
0.26088E-02	0.26356E-02	0.25677E-02	0.26517E-02	0.25848E-02	0.25889E-02
0.26849E-02	0.28012E-02	0.32533E-02	0.41808E-02	0.50694E-02	0.27258E-02
0.23086E-02	0.23485E-02	0.21243E-02	0.19445E-02	0.19866E-02	0.18765E-02
0.17486E-02	0.17224E-02	0.16244E-02	0.15990E-02	0.15001E-02	0.14703E-02
0.13849E-02	0.13360E-02	0.13405E-02	0.12424E-02	0.11907E-02	0.11500E-02
0.11438E-02	0.13104E-02	0.14201E-02	0.15064E-02	0.16972E-02	0.21352E-02
0.28786E-02	0.46835E-02	0.69125E-02	0.15131E-01	0.15103E+00	0.10360E+01
0.43004E+00	0.32936E-01	0.77709E-02	0.15541E-02	0.27091E-03	0.51087E-04

<< Error >>

0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.53591E-01	0.56281E+00	0.79150E+00	0.77399E+00	0.43092E+00
0.61072E+00	0.18570E+01	0.64474E+00	0.61350E+00	0.11722E+01	0.64076E+00
0.13655E+02	0.57324E+00	0.72614E+00	0.32343E+00	0.56575E+00	0.33723E+00
0.42089E+00	0.30247E+00	0.22525E+00	0.38521E+00	0.20869E+00	0.18239E+00
0.14832E+00	0.15959E+00	0.19745E+00	0.15029E+00	0.11037E+00	0.11160E+00
0.96284E-01	0.71114E-01	0.87199E-01	0.78010E-01	0.65509E-01	0.62308E-01
0.55076E-01	0.49670E-01	0.46809E-01	0.44151E-01	0.39426E-01	0.39449E-01
0.36382E-01	0.32910E-01	0.30896E-01	0.29811E-01	0.29951E-01	0.25760E-01



0.25465E-01	0.24019E-01	0.22486E-01	0.22379E-01	0.21694E-01	0.21184E-01
0.20994E-01	0.20472E-01	0.18672E-01	0.18128E-01	0.16979E-01	0.16603E-01
0.16571E-01	0.15628E-01	0.15088E-01	0.15054E-01	0.14447E-01	0.14262E-01
0.13823E-01	0.13575E-01	0.13161E-01	0.13091E-01	0.13020E-01	0.13156E-01
0.13017E-01	0.12843E-01	0.12357E-01	0.12386E-01	0.12475E-01	0.12703E-01
0.12827E-01	0.12620E-01	0.12795E-01	0.12748E-01	0.17308E-01	0.16412E-01
0.16581E-01	0.16227E-01	0.16368E-01	0.15927E-01	0.16115E-01	0.16058E-01
0.15625E-01	0.15321E-01	0.14154E-01	0.12530E-01	0.11434E-01	0.16036E-01
0.17798E-01	0.17656E-01	0.18686E-01	0.19710E-01	0.19535E-01	0.20403E-01
0.21439E-01	0.21813E-01	0.22600E-01	0.23266E-01	0.23855E-01	0.24399E-01
0.25651E-01	0.26747E-01	0.28084E-01	0.29963E-01	0.32271E-01	0.34514E-01
0.35258E-01	0.32407E-01	0.32261E-01	0.31076E-01	0.29812E-01	0.25831E-01
0.21576E-01	0.16265E-01	0.13354E-01	0.87621E-02	0.26924E-02	0.10184E-02
0.15527E-02	0.55128E-02	0.11194E-01	0.24792E-01	0.62287E-01	0.16418E+00

Table 5.70 Angular neutron spectrum for lead experiment (50.8 mm, 0.0 deg.).

<< Spectrum >>

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
-0.52395E-05	0.83845E-06	0.11623E-05	0.70695E-06	0.35060E-06	0.52480E-06
-0.35945E-06	0.13201E-05	0.11225E-05	-0.57589E-06	0.70778E-06	0.16892E-05
0.34467E-06	-0.32380E-08	0.20785E-06	-0.14173E-07	0.10015E-05	0.58187E-06
0.72119E-06	0.92168E-06	0.76199E-06	0.32253E-06	0.82882E-06	0.79517E-06
0.63436E-06	0.56254E-06	0.95362E-06	0.43000E-06	0.70562E-06	0.84189E-06
0.98669E-06	0.79555E-06	0.97536E-06	0.90223E-06	0.11538E-05	0.12123E-05
0.15893E-05	0.15813E-05	0.18445E-05	0.17341E-05	0.19629E-05	0.21896E-05
0.22493E-05	0.24081E-05	0.28225E-05	0.30641E-05	0.35336E-05	0.38869E-05
0.41134E-05	0.40349E-05	0.44657E-05	0.53552E-05	0.58304E-05	0.62841E-05
0.68473E-05	0.76766E-05	0.92685E-05	0.89127E-05	0.86950E-05	0.92378E-05
0.99982E-05	0.10526E-04	0.11159E-04	0.11676E-04	0.11728E-04	0.12838E-04
0.12756E-04	0.13659E-04	0.15283E-04	0.15665E-04	0.15500E-04	0.16362E-04
0.17292E-04	0.17205E-04	0.18175E-04	0.17523E-04	0.18267E-04	0.17798E-04
0.18563E-04	0.19200E-04	0.19329E-04	0.17315E-04	0.19939E-04	0.20247E-04
0.18974E-04	0.18464E-04	0.17679E-04	0.16621E-04	0.16552E-04	0.15941E-04
0.14925E-04	0.14729E-04	0.14361E-04	0.14963E-04	0.13540E-04	0.11712E-04
0.11760E-04	0.11021E-04	0.97916E-05	0.91773E-05	0.91942E-05	0.88760E-05
0.84438E-05	0.79380E-05	0.76805E-05	0.74557E-05	0.77451E-05	0.72529E-05
0.69738E-05	0.71416E-05	0.73023E-05	0.71351E-05	0.68202E-05	0.71040E-05
0.78957E-05	0.88555E-05	0.96990E-05	0.96872E-05	0.12486E-04	0.13426E-04
0.16766E-04	0.31849E-04	0.42471E-04	0.10029E-03	0.12572E-02	0.63210E-02
0.14530E-02	0.73660E-05	0.28392E-06	-0.28998E-07	0.88989E-07	0.40856E-07

<< Error >>

0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.18242E+00	0.24178E+01	0.15211E+01	0.21965E+01	0.38857E+01	0.23752E+01
0.30781E+01	0.73097E+00	0.81657E+00	0.14644E+01	0.11004E+01	0.40615E+00
0.17434E+01	0.16328E+03	0.21766E+01	0.28817E+02	0.35971E+00	0.56608E+00
0.40481E+00	0.28220E+00	0.32583E+00	0.71829E+00	0.25725E+00	0.24794E+00
0.30125E+00	0.31986E+00	0.17615E+00	0.37796E+00	0.21218E+00	0.17072E+00
0.13933E+00	0.16479E+00	0.13132E+00	0.13706E+00	0.10424E+00	0.98128E-01
0.71175E-01	0.71433E-01	0.59345E-01	0.64612E-01	0.56162E-01	0.50067E-01
0.48401E-01	0.45642E-01	0.39268E-01	0.35631E-01	0.31965E-01	0.28837E-01
0.28245E-01	0.28277E-01	0.25780E-01	0.22925E-01	0.21953E-01	0.20751E-01
0.19694E-01	0.18170E-01	0.15894E-01	0.15984E-01	0.16109E-01	0.15008E-01
0.14528E-01	0.13846E-01	0.13731E-01	0.13334E-01	0.13323E-01	0.12561E-01
0.12625E-01	0.12135E-01	0.11201E-01	0.11222E-01	0.11511E-01	0.11208E-01
0.10885E-01	0.10849E-01	0.10543E-01	0.10844E-01	0.10722E-01	0.10982E-01
0.10754E-01	0.10622E-01	0.10599E-01	0.11407E-01	0.14046E-01	0.13542E-01
0.13786E-01	0.13742E-01	0.14062E-01	0.14245E-01	0.14165E-01	0.14428E-01
0.15000E-01	0.15042E-01	0.15298E-01	0.14972E-01	0.16172E-01	0.17697E-01
0.17753E-01	0.18657E-01	0.20048E-01	0.21098E-01	0.21057E-01	0.21565E-01
0.22590E-01	0.23163E-01	0.24101E-01	0.24428E-01	0.24002E-01	0.25498E-01
0.26937E-01	0.27539E-01	0.27627E-01	0.28623E-01	0.32071E-01	0.32431E-01
0.30099E-01	0.29246E-01	0.28115E-01	0.28550E-01	0.24747E-01	0.24232E-01
0.20897E-01	0.14024E-01	0.12082E-01	0.75652E-02	0.20779E-02	0.91795E-03
0.18809E-02	0.26519E-01	0.16050E+00	0.13142E+01	0.34556E+00	0.60445E+00

Table 5.71 Angular neutron spectrum for lead experiment (50.8 mm, 24.9 deg.).

&lt;&lt; Spectrum &gt;&gt;

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
-0.37254E-05	-0.18949E-05	0.15955E-05	-0.25086E-05	-0.24203E-05	0.27806E-07
0.17232E-05	-0.19206E-05	0.78362E-06	0.34478E-06	-0.22106E-06	0.18369E-05
-0.85003E-06	0.13018E-05	0.67158E-07	0.52927E-06	0.21510E-07	-0.84438E-07
-0.49239E-06	-0.14708E-07	0.12788E-07	0.45842E-06	0.74978E-07	0.34880E-07
0.28913E-06	0.37178E-06	0.14564E-06	0.23940E-06	0.10015E-06	0.70666E-07
0.59326E-06	0.38228E-06	0.56252E-06	0.42370E-06	0.54968E-06	0.79219E-06
0.76607E-06	0.10039E-05	0.52744E-06	0.62153E-06	0.71224E-06	0.78442E-06
0.86909E-06	0.82675E-06	0.11018E-05	0.11679E-05	0.13194E-05	0.13864E-05
0.15263E-05	0.19517E-05	0.17175E-05	0.17609E-05	0.19367E-05	0.21190E-05
0.23297E-05	0.24237E-05	0.25399E-05	0.29258E-05	0.31992E-05	0.33320E-05
0.36356E-05	0.37901E-05	0.40841E-05	0.43611E-05	0.43843E-05	0.48089E-05
0.49836E-05	0.50096E-05	0.52021E-05	0.55914E-05	0.58551E-05	0.58594E-05
0.60634E-05	0.62446E-05	0.65891E-05	0.68917E-05	0.68188E-05	0.68291E-05
0.70821E-05	0.73882E-05	0.77153E-05	0.76672E-05	0.80756E-05	0.82990E-05
0.82899E-05	0.81054E-05	0.79865E-05	0.77237E-05	0.74926E-05	0.71112E-05
0.67450E-05	0.59772E-05	0.56495E-05	0.51357E-05	0.47726E-05	0.40719E-05
0.37274E-05	0.31800E-05	0.31294E-05	0.27027E-05	0.22979E-05	0.22375E-05
0.18957E-05	0.19978E-05	0.15677E-05	0.15424E-05	0.13753E-05	0.13425E-05
0.11696E-05	0.11587E-05	0.12912E-05	0.10919E-05	0.11790E-05	0.14648E-05
0.14986E-05	0.14548E-05	0.18015E-05	0.18896E-05	0.24371E-05	0.16552E-05
0.14514E-05	0.29861E-05	0.18375E-05	0.20944E-05	0.28478E-04	0.11350E-03
0.28372E-04	0.68394E-06	0.70361E-07	-0.12276E-07	-0.21430E-07	-0.46142E-07

&lt;&lt; Error &gt;&gt;

0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.29805E+00	0.12762E+01	0.13179E+01	0.74589E+00	0.67543E+00	0.53806E+02
0.75599E+00	0.61033E+00	0.14065E+01	0.28851E+01	0.42782E+01	0.44445E+00
0.85300E+00	0.47884E+00	0.81540E+01	0.92216E+00	0.20179E+02	0.46265E+01
0.70148E+00	0.21641E+02	0.22851E+02	0.59539E+00	0.34343E+01	0.68616E+01
0.77386E+00	0.56408E+00	0.13463E+01	0.78035E+00	0.17803E+01	0.23549E+01
0.26786E+00	0.39549E+00	0.26004E+00	0.33035E+00	0.24408E+00	0.16335E+00
0.16532E+00	0.12131E+00	0.22964E+00	0.19150E+00	0.16332E+00	0.14703E+00
0.13005E+00	0.13676E+00	0.10179E+00	0.93566E-01	0.82784E-01	0.77860E-01
0.70414E-01	0.55070E-01	0.62898E-01	0.61054E-01	0.56903E-01	0.52899E-01
0.47584E-01	0.46054E-01	0.43918E-01	0.37619E-01	0.33945E-01	0.32521E-01
0.30042E-01	0.28317E-01	0.27055E-01	0.25609E-01	0.25596E-01	0.23640E-01
0.22955E-01	0.22758E-01	0.21984E-01	0.20886E-01	0.20583E-01	0.20876E-01
0.20071E-01	0.19809E-01	0.18858E-01	0.18266E-01	0.18570E-01	0.18739E-01
0.18201E-01	0.17790E-01	0.17313E-01	0.17367E-01	0.18673E-01	0.17779E-01
0.17273E-01	0.17314E-01	0.17408E-01	0.17689E-01	0.17800E-01	0.17970E-01
0.18328E-01	0.19759E-01	0.20470E-01	0.21977E-01	0.22737E-01	0.25829E-01
0.27514E-01	0.30851E-01	0.30980E-01	0.34348E-01	0.37270E-01	0.38196E-01
0.43619E-01	0.39506E-01	0.49206E-01	0.50698E-01	0.56435E-01	0.59836E-01
0.69625E-01	0.74824E-01	0.70587E-01	0.83946E-01	0.84190E-01	0.72284E-01
0.74418E-01	0.84598E-01	0.69249E-01	0.69494E-01	0.58601E-01	0.84264E-01
0.90756E-01	0.47117E-01	0.62570E-01	0.51730E-01	0.11273E-01	0.55459E-02
0.10917E-01	0.74807E-01	0.34121E+00	0.17795E+01	0.99537E+00	0.44158E+00

Table 5.72 Angular neutron spectrum for lead experiment (50.8 mm, 41.8 deg.).

&lt;&lt; Spectrum &gt;&gt;

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
-0.78089E-05	0.74989E-06	-0.63980E-05	-0.11485E-05	0.99277E-06	0.32759E-05
-0.34042E-05	0.11786E-05	-0.29117E-06	-0.14496E-05	-0.20052E-05	-0.40130E-06
0.73617E-06	-0.16169E-05	-0.32449E-06	-0.96592E-06	-0.10161E-05	-0.13413E-06
0.36843E-06	-0.46634E-06	-0.36953E-06	0.34215E-06	-0.29233E-06	-0.47687E-07
-0.90746E-07	0.19932E-06	-0.99868E-07	0.15662E-06	0.11833E-06	0.27446E-06
0.34183E-06	0.27706E-07	0.12354E-06	0.56781E-06	0.76238E-06	0.56504E-06

0.60360E-06	0.65871E-06	0.67420E-06	0.64109E-06	0.81431E-06	0.10133E-05
0.89419E-06	0.93774E-06	0.10818E-05	0.13762E-05	0.13871E-05	0.16180E-05
0.18957E-05	0.19183E-05	0.19049E-05	0.21029E-05	0.20832E-05	0.22069E-05
0.27351E-05	0.26259E-05	0.30566E-05	0.29419E-05	0.34661E-05	0.38340E-05
0.39898E-05	0.42752E-05	0.45298E-05	0.46482E-05	0.48880E-05	0.49732E-05
0.56648E-05	0.53752E-05	0.58701E-05	0.62152E-05	0.66547E-05	0.65533E-05
0.64875E-05	0.70920E-05	0.75810E-05	0.75250E-05	0.75174E-05	0.77894E-05
0.79300E-05	0.84150E-05	0.86437E-05	0.85923E-05	0.89406E-05	0.91215E-05
0.88334E-05	0.87110E-05	0.85647E-05	0.83340E-05	0.75973E-05	0.72291E-05
0.70964E-05	0.64233E-05	0.57923E-05	0.50617E-05	0.46338E-05	0.43269E-05
0.38555E-05	0.32575E-05	0.29042E-05	0.27891E-05	0.23069E-05	0.20003E-05
0.19253E-05	0.16001E-05	0.15065E-05	0.13161E-05	0.12978E-05	0.13310E-05
0.10002E-05	0.10482E-05	0.12069E-05	0.12310E-05	0.10787E-05	0.12049E-05
0.14542E-05	0.15229E-05	0.18841E-05	0.16227E-05	0.20916E-05	0.18131E-05
0.12859E-05	0.27824E-05	0.13143E-05	0.12208E-05	0.11500E-04	0.61126E-04
0.20104E-04	0.19903E-06	0.23785E-07	-0.11504E-07	0.34863E-07	0.30790E-07

<< Error >>

0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.36128E-01	0.43163E+01	0.45495E+00	0.22428E+01	0.22946E+01	0.60532E+00
0.53167E+00	0.13903E+01	0.51118E+01	0.96552E+00	0.63400E+00	0.28449E+01
0.13625E+01	0.53423E+00	0.23359E+01	0.69344E+00	0.59077E+00	0.39858E+01
0.13121E+01	0.93930E+00	0.10933E+01	0.10977E+01	0.11899E+01	0.69303E+01
0.33591E+01	0.14442E+01	0.27038E+01	0.16285E+01	0.20471E+01	0.84612E+00
0.63803E+00	0.74757E+01	0.16380E+01	0.33925E+00	0.24388E+00	0.31601E+00
0.28811E+00	0.25471E+00	0.24352E+00	0.25334E+00	0.19555E+00	0.15521E+00
0.17246E+00	0.16393E+00	0.13960E+00	0.10909E+00	0.10520E+00	0.90518E-01
0.76877E-01	0.75555E-01	0.76339E-01	0.68329E-01	0.70680E-01	0.67498E-01
0.54926E-01	0.56951E-01	0.48687E-01	0.50378E-01	0.41071E-01	0.37518E-01
0.35801E-01	0.33291E-01	0.31591E-01	0.31368E-01	0.29904E-01	0.29592E-01
0.25991E-01	0.27368E-01	0.25152E-01	0.24217E-01	0.23056E-01	0.23747E-01
0.23882E-01	0.22139E-01	0.20989E-01	0.21383E-01	0.21452E-01	0.21036E-01
0.20618E-01	0.19751E-01	0.19635E-01	0.19694E-01	0.19613E-01	0.19214E-01
0.19031E-01	0.19061E-01	0.19085E-01	0.19002E-01	0.19902E-01	0.20527E-01
0.20577E-01	0.21991E-01	0.23433E-01	0.24647E-01	0.26682E-01	0.27748E-01
0.29736E-01	0.32795E-01	0.35033E-01	0.34814E-01	0.41311E-01	0.46710E-01
0.47185E-01	0.55686E-01	0.58198E-01	0.69626E-01	0.69975E-01	0.72560E-01
0.94817E-01	0.93418E-01	0.82099E-01	0.83679E-01	0.96240E-01	0.97134E-01
0.83229E-01	0.84127E-01	0.72630E-01	0.86783E-01	0.74219E-01	0.81374E-01
0.11276E+00	0.56718E-01	0.96975E-01	0.90426E-01	0.19979E-01	0.83779E-02
0.14404E-01	0.22713E+00	0.13988E+01	0.23190E+01	0.64518E+00	0.70634E+00

Table 5.73 Angular neutron spectrum for lead experiment (50.8 mm, 66.8 deg.).

<< Spectrum >>

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
-0.17901E-05	-0.20022E-04	-0.27601E-05	-0.20687E-05	-0.43358E-06	0.72753E-06
-0.18123E-05	-0.15127E-05	0.22531E-06	0.14951E-06	-0.11519E-05	-0.93103E-06
-0.13887E-05	-0.10091E-06	-0.58653E-06	0.62226E-06	-0.41730E-06	0.28829E-07
-0.31459E-06	-0.54761E-06	0.33070E-06	0.25381E-07	-0.25918E-06	0.50350E-07
-0.92889E-08	0.22180E-06	0.27979E-07	0.38908E-06	-0.45485E-08	-0.21598E-07
0.19423E-06	0.43825E-06	0.51120E-06	0.46275E-06	0.49572E-06	0.54502E-06
0.30411E-06	0.71766E-06	0.54075E-06	0.78972E-06	0.81423E-06	0.89564E-06
0.95252E-06	0.11235E-05	0.12728E-05	0.15218E-05	0.16058E-05	0.14615E-05
0.17923E-05	0.19713E-05	0.18594E-05	0.21876E-05	0.24204E-05	0.27020E-05
0.28061E-05	0.33294E-05	0.36491E-05	0.43749E-05	0.41801E-05	0.40861E-05
0.46965E-05	0.48414E-05	0.50054E-05	0.54466E-05	0.56233E-05	0.60098E-05
0.64388E-05	0.64228E-05	0.66940E-05	0.74916E-05	0.75897E-05	0.77306E-05
0.78711E-05	0.82387E-05	0.85419E-05	0.88158E-05	0.88652E-05	0.88043E-05
0.94471E-05	0.96177E-05	0.97569E-05	0.97312E-05	0.10180E-04	0.10595E-04
0.10372E-04	0.97607E-05	0.95867E-05	0.88737E-05	0.84260E-05	0.81642E-05
0.71148E-05	0.66356E-05	0.58176E-05	0.51975E-05	0.45040E-05	0.41847E-05
0.36803E-05	0.32322E-05	0.29682E-05	0.26524E-05	0.22710E-05	0.19578E-05
0.17180E-05	0.15589E-05	0.12886E-05	0.13181E-05	0.13199E-05	0.10452E-05
0.10549E-05	0.10667E-05	0.10169E-05	0.98975E-06	0.11693E-05	0.10542E-05

0.11185E-05	0.15403E-05	0.14798E-05	0.14483E-05	0.18209E-05	0.12796E-05
0.11702E-05	0.16627E-05	0.92802E-06	0.15522E-05	0.74362E-05	0.21401E-04
0.65475E-05	0.15450E-06	0.10316E-07	-0.95756E-08	-0.12903E-07	-0.63364E-08

<< Error >>

0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.00000E+00	0.83060E-01	0.72515E+00	0.85221E+00	0.36408E+01	0.19352E+01
0.68215E+00	0.74315E+00	0.45471E+01	0.64461E+01	0.77245E+00	0.85104E+00
0.50100E+00	0.59313E+01	0.89405E+00	0.73580E+00	0.99774E+00	0.12723E+02
0.10610E+01	0.55284E+00	0.85031E+00	0.10198E+02	0.93318E+00	0.44791E+01
0.22665E+02	0.89879E+00	0.67106E+01	0.45525E+00	0.37031E+02	0.74299E+01
0.78115E+00	0.33190E+00	0.27251E+00	0.28743E+00	0.25753E+00	0.22960E+00
0.40114E+00	0.16463E+00	0.21421E+00	0.14422E+00	0.13860E+00	0.12332E+00
0.11392E+00	0.95623E-01	0.83438E-01	0.69237E-01	0.65123E-01	0.71495E-01
0.58398E-01	0.52455E-01	0.56330E-01	0.47706E-01	0.44238E-01	0.40673E-01
0.39175E-01	0.33395E-01	0.30413E-01	0.25444E-01	0.26116E-01	0.26387E-01
0.23126E-01	0.22329E-01	0.21885E-01	0.20682E-01	0.20171E-01	0.18860E-01
0.17997E-01	0.18193E-01	0.17371E-01	0.15972E-01	0.16110E-01	0.15992E-01
0.15961E-01	0.15494E-01	0.15081E-01	0.14631E-01	0.14819E-01	0.15042E-01
0.14367E-01	0.14275E-01	0.14222E-01	0.14355E-01	0.16083E-01	0.15258E-01
0.15130E-01	0.15439E-01	0.15345E-01	0.16197E-01	0.16392E-01	0.16489E-01
0.18102E-01	0.18451E-01	0.19900E-01	0.21218E-01	0.24305E-01	0.25226E-01
0.28254E-01	0.31168E-01	0.32426E-01	0.35019E-01	0.41139E-01	0.44796E-01
0.49327E-01	0.48964E-01	0.60161E-01	0.56923E-01	0.58745E-01	0.74469E-01
0.78275E-01	0.82891E-01	0.87845E-01	0.97690E-01	0.88041E-01	0.10439E+00
0.10464E+00	0.79267E-01	0.91899E-01	0.96490E-01	0.81034E-01	0.11592E+00
0.12680E+00	0.85575E-01	0.12882E+00	0.71934E-01	0.22312E-01	0.12598E-01
0.22601E-01	0.22849E+00	0.27399E+01	0.26142E+01	0.21203E+01	0.36113E+01

Table 5.74 Angular neutron spectrum for lead experiment (203.2 mm, 0.0 deg.).

<< Spectrum >>

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
-0.35673E-05	-0.12175E-05	-0.46366E-05	0.18396E-06	-0.64065E-06	0.13631E-06
-0.17439E-05	-0.19063E-06	-0.77315E-06	-0.86125E-07	0.14173E-05	0.50118E-06
0.72034E-06	-0.29821E-06	0.73116E-06	-0.16068E-06	0.57088E-06	-0.91780E-07
-0.21104E-06	0.10684E-06	0.31584E-06	0.63219E-06	0.37609E-06	0.64313E-06
0.44917E-06	0.45855E-06	0.42938E-06	0.47923E-06	0.67903E-06	0.69547E-06
0.76904E-06	0.85953E-06	0.86001E-06	0.96258E-06	0.97426E-06	0.11810E-05
0.12771E-05	0.12995E-05	0.13688E-05	0.17690E-05	0.18661E-05	0.16530E-05
0.21372E-05	0.20752E-05	0.23392E-05	0.25548E-05	0.26529E-05	0.30711E-05
0.33738E-05	0.34410E-05	0.33094E-05	0.36163E-05	0.39388E-05	0.46431E-05
0.53512E-05	0.58528E-05	0.71191E-05	0.77663E-05	0.68493E-05	0.66218E-05
0.67843E-05	0.70897E-05	0.77193E-05	0.77988E-05	0.77390E-05	0.79368E-05
0.80984E-05	0.75449E-05	0.83384E-05	0.93403E-05	0.92778E-05	0.92223E-05
0.95186E-05	0.99533E-05	0.97459E-05	0.98214E-05	0.96216E-05	0.98574E-05
0.94120E-05	0.95900E-05	0.10059E-04	0.92964E-05	0.94602E-05	0.97554E-05
0.87220E-05	0.81376E-05	0.73334E-05	0.63489E-05	0.61057E-05	0.55249E-05
0.48275E-05	0.44604E-05	0.37548E-05	0.35831E-05	0.27186E-05	0.27484E-05
0.22899E-05	0.20602E-05	0.18693E-05	0.15470E-05	0.15637E-05	0.13711E-05
0.12186E-05	0.11272E-05	0.10298E-05	0.95861E-06	0.11496E-05	0.10263E-05
0.91229E-06	0.11244E-05	0.10460E-05	0.12289E-05	0.12998E-05	0.12670E-05
0.11567E-05	0.18519E-05	0.21757E-05	0.21512E-05	0.27410E-05	0.24060E-05
0.25839E-05	0.48673E-05	0.52698E-05	0.96853E-05	0.84150E-04	0.67051E-03
0.22117E-03	0.55643E-05	0.12826E-05	0.36217E-06	0.12169E-06	0.58606E-08

<< Error >>

0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.21716E+00	0.16992E+01	0.37953E+00	0.85571E+01	0.22041E+01	0.90938E+01
0.64648E+00	0.53175E+01	0.12092E+01	0.10063E+02	0.55901E+00	0.14104E+01
0.83489E+00	0.18128E+01	0.63215E+00	0.25908E+01	0.64565E+00	0.36861E+01
0.14299E+01	0.25501E+01	0.80013E+00	0.36557E+00	0.58700E+00	0.31891E+00

0.42735E+00	0.40492E+00	0.40439E+00	0.34377E+00	0.22862E+00	0.21272E+00
0.18390E+00	0.16165E+00	0.15234E+00	0.13090E+00	0.12604E+00	0.10264E+00
0.91213E-01	0.89383E-01	0.82781E-01	0.63015E-01	0.60677E-01	0.67867E-01
0.51749E-01	0.53386E-01	0.47074E-01	0.42923E-01	0.42386E-01	0.37167E-01
0.33813E-01	0.32638E-01	0.34615E-01	0.31893E-01	0.30662E-01	0.26920E-01
0.24222E-01	0.22704E-01	0.19737E-01	0.18211E-01	0.19502E-01	0.20072E-01
0.19474E-01	0.18844E-01	0.17901E-01	0.17860E-01	0.18001E-01	0.17952E-01
0.17603E-01	0.18323E-01	0.17138E-01	0.16005E-01	0.16420E-01	0.16690E-01
0.16251E-01	0.15741E-01	0.15909E-01	0.15928E-01	0.16379E-01	0.16167E-01
0.16699E-01	0.16862E-01	0.16227E-01	0.17166E-01	0.21794E-01	0.20872E-01
0.21654E-01	0.22238E-01	0.23316E-01	0.24986E-01	0.25258E-01	0.26586E-01
0.28733E-01	0.29449E-01	0.32024E-01	0.33422E-01	0.40483E-01	0.39365E-01
0.45663E-01	0.49088E-01	0.54156E-01	0.58365E-01	0.57460E-01	0.62051E-01
0.67312E-01	0.69559E-01	0.83242E-01	0.82598E-01	0.71168E-01	0.78415E-01
0.88412E-01	0.81148E-01	0.90365E-01	0.79764E-01	0.84317E-01	0.84184E-01
0.99522E-01	0.67844E-01	0.62413E-01	0.65020E-01	0.54372E-01	0.64184E-01
0.58446E-01	0.39111E-01	0.37114E-01	0.26293E-01	0.85073E-02	0.29827E-02
0.51024E-02	0.32335E-01	0.67124E-01	0.14399E+00	0.28897E+00	0.52937E+01

Table 5.75 Angular neutron spectrum for lead experiment (203.2 mm, 12.2 deg.).

<< Spectrum >>

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.16582E-04	0.80432E-05	0.16647E-05	0.20444E-05	0.10569E-05	0.21493E-05
0.18005E-05	0.20187E-05	0.34353E-05	-0.64148E-06	0.19418E-07	0.11942E-05
0.29982E-06	0.12090E-05	-0.42398E-06	0.61576E-06	0.38541E-06	0.12058E-06
0.46053E-06	0.72031E-06	0.12448E-05	0.52798E-06	0.89305E-06	0.45176E-06
0.53590E-06	0.63553E-06	0.41439E-06	0.58895E-06	0.77409E-06	0.72011E-06
0.86473E-06	0.93204E-06	0.11353E-05	0.93370E-06	0.10746E-05	0.12372E-05
0.12635E-05	0.16764E-05	0.14454E-05	0.17272E-05	0.17104E-05	0.16048E-05
0.17017E-05	0.20681E-05	0.22468E-05	0.24203E-05	0.25969E-05	0.27069E-05
0.29683E-05	0.28833E-05	0.31013E-05	0.33121E-05	0.36403E-05	0.40339E-05
0.46332E-05	0.53331E-05	0.59096E-05	0.63658E-05	0.59774E-05	0.60028E-05
0.63128E-05	0.63580E-05	0.65393E-05	0.69720E-05	0.70171E-05	0.70480E-05
0.74097E-05	0.68593E-05	0.69747E-05	0.76776E-05	0.75714E-05	0.79764E-05
0.79088E-05	0.83118E-05	0.82023E-05	0.85127E-05	0.84633E-05	0.81445E-05
0.83237E-05	0.83250E-05	0.85513E-05	0.83601E-05	0.83626E-05	0.89344E-05
0.79743E-05	0.73059E-05	0.64273E-05	0.58405E-05	0.55613E-05	0.49106E-05
0.43545E-05	0.38015E-05	0.33297E-05	0.30254E-05	0.25952E-05	0.22593E-05
0.20075E-05	0.18987E-05	0.14649E-05	0.13780E-05	0.12737E-05	0.10803E-05
0.10058E-05	0.83504E-06	0.77787E-06	0.64814E-06	0.79296E-06	0.70496E-06
0.66547E-06	0.73448E-06	0.63851E-06	0.73981E-06	0.62514E-06	0.79236E-06
0.91579E-06	0.10242E-05	0.99931E-06	0.12665E-05	0.18801E-05	0.13744E-05
0.15785E-05	0.25667E-05	0.28247E-05	0.47070E-05	0.25142E-04	0.15620E-03
0.52442E-04	0.37575E-06	-0.35405E-07	-0.24002E-07	0.91142E-08	0.39372E-07

<< Error >>

0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.37897E-01	0.28925E+00	0.12167E+01	0.84492E+00	0.14851E+01	0.64250E+00
0.69107E+00	0.55741E+00	0.29692E+00	0.15363E+01	0.45075E+02	0.65693E+00
0.23206E+01	0.49145E+00	0.12477E+01	0.76448E+00	0.10842E+01	0.31106E+01
0.72201E+00	0.42450E+00	0.22359E+00	0.49448E+00	0.26967E+00	0.51235E+00
0.40304E+00	0.31319E+00	0.46345E+00	0.30928E+00	0.21914E+00	0.23052E+00
0.17735E+00	0.16066E+00	0.12615E+00	0.14711E+00	0.12376E+00	0.10369E+00
0.10088E+00	0.72819E-01	0.84473E-01	0.70210E-01	0.68349E-01	0.74088E-01
0.68200E-01	0.56392E-01	0.51850E-01	0.47170E-01	0.44695E-01	0.42604E-01
0.38662E-01	0.41044E-01	0.36703E-01	0.35168E-01	0.33292E-01	0.31057E-01
0.27298E-01	0.24290E-01	0.22543E-01	0.20907E-01	0.21951E-01	0.21058E-01
0.20340E-01	0.19992E-01	0.19946E-01	0.19053E-01	0.19080E-01	0.18910E-01
0.18081E-01	0.19191E-01	0.19091E-01	0.18035E-01	0.18464E-01	0.17967E-01
0.17852E-01	0.17552E-01	0.17774E-01	0.17231E-01	0.17127E-01	0.18018E-01
0.17884E-01	0.18183E-01	0.17770E-01	0.17812E-01	0.21942E-01	0.20376E-01
0.21330E-01	0.22030E-01	0.23485E-01	0.24225E-01	0.25354E-01	0.25898E-01
0.27389E-01	0.29789E-01	0.32073E-01	0.34052E-01	0.37128E-01	0.40991E-01
0.43852E-01	0.46917E-01	0.56708E-01	0.54629E-01	0.62217E-01	0.67331E-01

0.69799E-01	0.86036E-01	0.91650E-01	0.11004E+00	0.83444E-01	0.10147E+00
0.10143E+00	0.10366E+00	0.12968E+00	0.10861E+00	0.14388E+00	0.11345E+00
0.98989E-01	0.10068E+00	0.10859E+00	0.88107E-01	0.62883E-01	0.86006E-01
0.80460E-01	0.54750E-01	0.49208E-01	0.35878E-01	0.14640E-01	0.57618E-02
0.97835E-02	0.13366E+00	0.94034E+00	0.11646E+01	0.23946E+01	0.49847E+00

Table 5.76 Angular neutron spectrum for lead experiment (203.2 mm, 24.9 deg.).

## &lt;&lt; Spectrum &gt;&gt;

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.63964E-06	-0.15546E-05	-0.73592E-06	-0.95190E-06	-0.19327E-05	0.13521E-05
0.20027E-05	-0.50168E-06	-0.16543E-05	0.16915E-05	0.79887E-06	0.32386E-06
-0.13205E-05	-0.40636E-06	0.67435E-06	0.83977E-06	0.53451E-06	0.21521E-06
0.71707E-06	-0.13404E-06	0.47978E-06	0.39112E-06	0.11449E-06	0.73748E-06
0.40043E-06	0.42879E-06	0.51455E-06	0.41187E-06	0.49389E-06	0.77589E-06
0.68562E-06	0.62447E-06	0.72561E-06	0.91138E-06	0.93929E-06	0.10958E-05
0.13796E-05	0.12329E-05	0.12898E-05	0.15214E-05	0.16881E-05	0.16261E-05
0.17034E-05	0.19083E-05	0.22207E-05	0.24155E-05	0.24004E-05	0.25613E-05
0.30177E-05	0.30744E-05	0.29788E-05	0.31326E-05	0.36375E-05	0.39539E-05
0.45323E-05	0.51103E-05	0.56921E-05	0.64401E-05	0.60844E-05	0.58986E-05
0.58587E-05	0.61886E-05	0.64657E-05	0.69158E-05	0.66781E-05	0.73060E-05
0.71587E-05	0.68406E-05	0.70218E-05	0.76731E-05	0.78122E-05	0.79397E-05
0.78788E-05	0.81540E-05	0.80813E-05	0.84684E-05	0.80330E-05	0.82201E-05
0.81817E-05	0.82805E-05	0.81368E-05	0.79015E-05	0.81210E-05	0.82508E-05
0.76118E-05	0.70944E-05	0.64553E-05	0.57150E-05	0.51299E-05	0.48419E-05
0.41771E-05	0.36379E-05	0.32163E-05	0.27235E-05	0.24933E-05	0.20986E-05
0.19718E-05	0.15968E-05	0.14582E-05	0.13410E-05	0.10164E-05	0.84217E-06
0.77468E-06	0.73803E-06	0.65134E-06	0.64585E-06	0.68081E-06	0.56682E-06
0.63288E-06	0.45683E-06	0.45193E-06	0.47681E-06	0.57026E-06	0.70080E-06
0.79235E-06	0.82542E-06	0.79258E-06	0.85285E-06	0.11415E-05	0.91104E-06
0.81450E-06	0.12801E-05	0.98789E-06	0.12205E-05	0.95335E-05	0.32593E-04
0.95090E-05	0.63390E-06	0.16646E-06	0.30561E-07	0.23593E-08	0.54144E-08

## &lt;&lt; Error &gt;&gt;

0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.26811E+00	0.13486E+01	0.25496E+01	0.17412E+01	0.74638E+00	0.97404E+00
0.58092E+00	0.20615E+01	0.59244E+00	0.52276E+00	0.10430E+01	0.22972E+01
0.49181E+00	0.13771E+01	0.72427E+00	0.51529E+00	0.72286E+00	0.16277E+01
0.43135E+00	0.21019E+01	0.55473E+00	0.62364E+00	0.20019E+01	0.28746E+00
0.50327E+00	0.43182E+00	0.35062E+00	0.40642E+00	0.32273E+00	0.19422E+00
0.21178E+00	0.22040E+00	0.18557E+00	0.13913E+00	0.13238E+00	0.11068E+00
0.84733E-01	0.92727E-01	0.86884E-01	0.72359E-01	0.64222E-01	0.65907E-01
0.62409E-01	0.55080E-01	0.46802E-01	0.43150E-01	0.44093E-01	0.41496E-01
0.35128E-01	0.34391E-01	0.35039E-01	0.33668E-01	0.30141E-01	0.28210E-01
0.25311E-01	0.22961E-01	0.20678E-01	0.18287E-01	0.18870E-01	0.19157E-01
0.19320E-01	0.18314E-01	0.17964E-01	0.16812E-01	0.17632E-01	0.16153E-01
0.16489E-01	0.17130E-01	0.16621E-01	0.15816E-01	0.15735E-01	0.15715E-01
0.15911E-01	0.15522E-01	0.15570E-01	0.15047E-01	0.15827E-01	0.15661E-01
0.15581E-01	0.15694E-01	0.16298E-01	0.16456E-01	0.19071E-01	0.18380E-01
0.18699E-01	0.19047E-01	0.20068E-01	0.21392E-01	0.22347E-01	0.22816E-01
0.24504E-01	0.25903E-01	0.27611E-01	0.31071E-01	0.32167E-01	0.36223E-01
0.37992E-01	0.43920E-01	0.46078E-01	0.49270E-01	0.59505E-01	0.70951E-01
0.74036E-01	0.73813E-01	0.83329E-01	0.83555E-01	0.78845E-01	0.93551E-01
0.92544E-01	0.12174E+00	0.12795E+00	0.12614E+00	0.11386E+00	0.10020E+00
0.91048E-01	0.92399E-01	0.10480E+00	0.94888E-01	0.77175E-01	0.93525E-01
0.10349E+00	0.72965E-01	0.78981E-01	0.68612E-01	0.20198E-01	0.10704E-01
0.19558E-01	0.81964E-01	0.19690E+00	0.72740E+00	0.85450E+01	0.27293E+01

Table 5.77 Angular neutron spectrum for lead experiment (203.2 mm, 41.8 deg.).

&lt;&lt; Spectrum &gt;&gt;

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.96182E-07	-0.38826E-07	-0.15398E-05	-0.14725E-05	-0.18573E-06	-0.31356E-06
0.64079E-06	0.11182E-05	0.93458E-06	0.11728E-05	0.13270E-05	-0.13825E-07
-0.19791E-07	0.38374E-06	0.54566E-06	0.36533E-06	0.61912E-06	0.63957E-07
0.46994E-06	0.11763E-06	0.37668E-06	0.75406E-06	0.27990E-06	0.32016E-06
0.74098E-06	0.63633E-06	0.55860E-06	0.66098E-06	0.47961E-06	0.89899E-06
0.77352E-06	0.70368E-06	0.82653E-06	0.10034E-05	0.74537E-06	0.10379E-05
0.11736E-05	0.13324E-05	0.12777E-05	0.13467E-05	0.15024E-05	0.15687E-05
0.16484E-05	0.19261E-05	0.19426E-05	0.22328E-05	0.25474E-05	0.24334E-05
0.28159E-05	0.27451E-05	0.26832E-05	0.29204E-05	0.34653E-05	0.36993E-05
0.45360E-05	0.51453E-05	0.56068E-05	0.62368E-05	0.57562E-05	0.56178E-05
0.57435E-05	0.60855E-05	0.62131E-05	0.62951E-05	0.64212E-05	0.64342E-05
0.66150E-05	0.64200E-05	0.66561E-05	0.72400E-05	0.73135E-05	0.75380E-05
0.74955E-05	0.76157E-05	0.75935E-05	0.78309E-05	0.73858E-05	0.77612E-05
0.74713E-05	0.76661E-05	0.76252E-05	0.71765E-05	0.76345E-05	0.75818E-05
0.68388E-05	0.60774E-05	0.57759E-05	0.50272E-05	0.46093E-05	0.43058E-05
0.37375E-05	0.32718E-05	0.28142E-05	0.24141E-05	0.20203E-05	0.19446E-05
0.15594E-05	0.14706E-05	0.11754E-05	0.10896E-05	0.98137E-06	0.75892E-06
0.64913E-06	0.59350E-06	0.60138E-06	0.53179E-06	0.46235E-06	0.48160E-06
0.53145E-06	0.45821E-06	0.39991E-06	0.35759E-06	0.41581E-06	0.51316E-06
0.56736E-06	0.57689E-06	0.55385E-06	0.54153E-06	0.77084E-06	0.45671E-06
0.46483E-06	0.86579E-06	0.38079E-06	0.60596E-06	0.42289E-05	0.13789E-04
0.39315E-05	0.88015E-07	0.26732E-07	0.30614E-07	-0.18333E-07	-0.13235E-07

&lt;&lt; Error &gt;&gt;

0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.00000E+00	0.43651E+02	0.12279E+01	0.11342E+01	0.79945E+01	0.42287E+01
0.18390E+01	0.95528E+00	0.10290E+01	0.77418E+00	0.63614E+00	0.53762E+02
0.32518E+02	0.14670E+01	0.91620E+00	0.11932E+01	0.62721E+00	0.54563E+01
0.66786E+00	0.24544E+01	0.69609E+00	0.32283E+00	0.82260E+00	0.67334E+00
0.26898E+00	0.29338E+00	0.32090E+00	0.25312E+00	0.33237E+00	0.16710E+00
0.18480E+00	0.19553E+00	0.15970E+00	0.12585E+00	0.16639E+00	0.11429E+00
0.99218E-01	0.84420E-01	0.86776E-01	0.81217E-01	0.71740E-01	0.67655E-01
0.63438E-01	0.53886E-01	0.53420E-01	0.45319E-01	0.39729E-01	0.41831E-01
0.35834E-01	0.36746E-01	0.37491E-01	0.34615E-01	0.30144E-01	0.28940E-01
0.23913E-01	0.21175E-01	0.19783E-01	0.17769E-01	0.18528E-01	0.18710E-01
0.18262E-01	0.17225E-01	0.17097E-01	0.17225E-01	0.16864E-01	0.16933E-01
0.16280E-01	0.16552E-01	0.16091E-01	0.15302E-01	0.15357E-01	0.14935E-01
0.15168E-01	0.15015E-01	0.14898E-01	0.14840E-01	0.15663E-01	0.14922E-01
0.15538E-01	0.15290E-01	0.15504E-01	0.16487E-01	0.17253E-01	0.16605E-01
0.17217E-01	0.18183E-01	0.18865E-01	0.20399E-01	0.21340E-01	0.21676E-01
0.23575E-01	0.25787E-01	0.27493E-01	0.29497E-01	0.33233E-01	0.34250E-01
0.38549E-01	0.39880E-01	0.47948E-01	0.50189E-01	0.52363E-01	0.69447E-01
0.80497E-01	0.83704E-01	0.81138E-01	0.93552E-01	0.11501E+00	0.11804E+00
0.10519E+00	0.11992E+00	0.14321E+00	0.16375E+00	0.14479E+00	0.12075E+00
0.11301E+00	0.11695E+00	0.13024E+00	0.13511E+00	0.98732E-01	0.16179E+00
0.15431E+00	0.89039E-01	0.17841E+00	0.10362E+00	0.27149E-01	0.14331E-01
0.26780E-01	0.32752E+00	0.80032E+00	0.67716E+00	0.11320E+01	0.13960E+01

Table 5.78 Angular neutron spectrum for lead experiment (203.2 mm, 66.7 deg.).

&lt;&lt; Spectrum &gt;&gt;

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.28298E-05	0.45974E-06	0.21540E-05	0.33171E-07	0.70977E-06
0.16773E-05	0.55738E-06	0.44644E-06	0.21617E-05	-0.14692E-06	0.13258E-05
0.13494E-05	0.91788E-06	-0.31668E-06	0.14669E-06	0.43477E-06	0.38599E-06
0.55195E-06	0.75598E-06	0.87078E-06	0.26231E-06	0.96793E-07	0.25710E-06
0.20478E-06	0.35095E-06	0.27727E-06	0.36012E-06	0.31130E-06	0.53396E-06
0.67167E-06	0.75907E-06	0.57658E-06	0.42643E-06	0.67771E-06	0.76766E-06

0.97093E-06	0.67694E-06	0.95334E-06	0.11067E-05	0.10913E-05	0.12319E-05
0.11081E-05	0.14288E-05	0.14218E-05	0.16977E-05	0.17096E-05	0.18259E-05
0.21143E-05	0.17534E-05	0.18084E-05	0.23115E-05	0.25921E-05	0.28915E-05
0.31630E-05	0.36924E-05	0.42550E-05	0.41777E-05	0.40419E-05	0.41403E-05
0.42293E-05	0.41157E-05	0.43395E-05	0.47307E-05	0.46748E-05	0.49101E-05
0.48234E-05	0.45955E-05	0.47898E-05	0.52591E-05	0.52196E-05	0.50688E-05
0.51905E-05	0.53059E-05	0.54333E-05	0.54978E-05	0.54901E-05	0.53782E-05
0.53601E-05	0.52962E-05	0.52997E-05	0.48620E-05	0.51685E-05	0.49692E-05
0.44769E-05	0.39802E-05	0.38130E-05	0.34131E-05	0.29956E-05	0.29146E-05
0.24596E-05	0.21760E-05	0.17039E-05	0.14436E-05	0.13059E-05	0.11243E-05
0.10418E-05	0.95255E-06	0.64999E-06	0.70708E-06	0.56808E-06	0.31794E-06
0.44365E-06	0.40354E-06	0.25800E-06	0.29688E-06	0.21557E-06	0.27838E-06
0.24268E-06	0.30885E-06	0.24241E-06	0.30226E-06	0.28593E-06	0.26064E-06
0.24582E-06	0.13314E-06	0.44537E-06	0.34965E-06	0.26161E-06	0.39310E-06
0.14053E-06	0.35503E-06	0.29565E-06	0.47328E-06	0.12438E-05	0.25236E-05
0.11088E-05	0.10328E-06	-0.72873E-08	0.41446E-07	0.18690E-07	0.16022E-07

<< Error >>

0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.47973E-01	0.35822E+01	0.71499E+00	0.40574E+02	0.16995E+01
0.62598E+00	0.17261E+01	0.20067E+01	0.37975E+00	0.52275E+01	0.51479E+00
0.43578E+00	0.56004E+00	0.14371E+01	0.27244E+01	0.81943E+00	0.80682E+00
0.52019E+00	0.34147E+00	0.27430E+00	0.85228E+00	0.21797E+01	0.75644E+00
0.88924E+00	0.48791E+00	0.58346E+00	0.42726E+00	0.46630E+00	0.25884E+00
0.19809E+00	0.16554E+00	0.20781E+00	0.27322E+00	0.16602E+00	0.14119E+00
0.10813E+00	0.15164E+00	0.10576E+00	0.89197E-01	0.89377E-01	0.77488E-01
0.84831E-01	0.65972E-01	0.65047E-01	0.53829E-01	0.54010E-01	0.50001E-01
0.42569E-01	0.51897E-01	0.50738E-01	0.38863E-01	0.35941E-01	0.33361E-01
0.30788E-01	0.26521E-01	0.23311E-01	0.23602E-01	0.23470E-01	0.22612E-01
0.21991E-01	0.22628E-01	0.21949E-01	0.20151E-01	0.20442E-01	0.19644E-01
0.19983E-01	0.20635E-01	0.20024E-01	0.18505E-01	0.18756E-01	0.19765E-01
0.19139E-01	0.18990E-01	0.18602E-01	0.18807E-01	0.18458E-01	0.19213E-01
0.19129E-01	0.19733E-01	0.20029E-01	0.21677E-01	0.20791E-01	0.21083E-01
0.22102E-01	0.23362E-01	0.23770E-01	0.25116E-01	0.27742E-01	0.27458E-01
0.30839E-01	0.32537E-01	0.38987E-01	0.46818E-01	0.49860E-01	0.57222E-01
0.61502E-01	0.67491E-01	0.10102E+00	0.92010E-01	0.10871E+00	0.19216E+00
0.12498E+00	0.12915E+00	0.19575E+00	0.16960E+00	0.24108E+00	0.18702E+00
0.23058E+00	0.20628E+00	0.28381E+00	0.24310E+00	0.28747E+00	0.32671E+00
0.37648E+00	0.75293E+00	0.22859E+00	0.30776E+00	0.45222E+00	0.30249E+00
0.88837E+00	0.32702E+00	0.36017E+00	0.19505E+00	0.72830E-01	0.37334E-01
0.55053E-01	0.26070E+00	0.36179E+01	0.46616E+00	0.99412E+00	0.12603E+01

Table 5.79 Angular neutron spectrum for lead experiment (406.4 mm, 0.0 deg.).

<< Spectrum >>

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
-0.33038E-05	-0.15648E-06	-0.16241E-05	-0.28953E-05	-0.11894E-05	-0.76386E-07
0.67526E-06	-0.55932E-06	-0.77484E-06	-0.62910E-06	0.95922E-06	0.47165E-06
0.21243E-06	-0.42692E-06	-0.37671E-06	0.15324E-06	0.75598E-06	0.16094E-06
0.39827E-06	0.55348E-06	0.50037E-06	0.45447E-06	0.31326E-06	0.52276E-06
0.39071E-06	0.52455E-06	0.14723E-06	0.34588E-06	0.47359E-06	0.47783E-06
0.78246E-06	0.56918E-06	0.48597E-06	0.83758E-06	0.78121E-06	0.82372E-06
0.96539E-06	0.95183E-06	0.79904E-06	0.10121E-05	0.93675E-06	0.94176E-06
0.11350E-05	0.12050E-05	0.13172E-05	0.16101E-05	0.16094E-05	0.15919E-05
0.17945E-05	0.18465E-05	0.20636E-05	0.21345E-05	0.24686E-05	0.28871E-05
0.31761E-05	0.34126E-05	0.34302E-05	0.38183E-05	0.34543E-05	0.28284E-05
0.30206E-05	0.29476E-05	0.30075E-05	0.28347E-05	0.29980E-05	0.29229E-05
0.29478E-05	0.30503E-05	0.28302E-05	0.30143E-05	0.30405E-05	0.32213E-05
0.31848E-05	0.32231E-05	0.29653E-05	0.30186E-05	0.28465E-05	0.27614E-05
0.27117E-05	0.28220E-05	0.26624E-05	0.24402E-05	0.24648E-05	0.23484E-05
0.18840E-05	0.15792E-05	0.14175E-05	0.12049E-05	0.11468E-05	0.10352E-05
0.78806E-06	0.75153E-06	0.62058E-06	0.49207E-06	0.45926E-06	0.41284E-06
0.22078E-06	0.27959E-06	0.25049E-06	0.22145E-06	0.25429E-06	0.20435E-06
0.18613E-06	0.90909E-07	0.19300E-06	0.13711E-06	0.66291E-07	0.88800E-07
0.57566E-07	0.11584E-06	0.17252E-06	0.16284E-06	0.77373E-07	0.28321E-06



0.22990E-06	0.82043E-07	0.25879E-06	0.24511E-06	0.25741E-06	0.22816E-06
0.30163E-06	0.53368E-06	0.85022E-06	0.17714E-05	0.63162E-05	0.28262E-04
0.10880E-04	0.35281E-06	0.69116E-07	0.15614E-07	-0.11000E-07	0.23962E-07

<< Error >>

0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.14182E+00	0.10593E+02	0.89795E+00	0.44339E+00	0.94861E+00	0.13194E+02
0.13339E+01	0.14585E+01	0.97024E+00	0.11108E+01	0.66003E+00	0.12053E+01
0.23424E+01	0.10234E+01	0.10134E+01	0.22092E+01	0.39580E+00	0.16869E+01
0.60109E+00	0.39611E+00	0.41193E+00	0.41653E+00	0.56189E+00	0.31740E+00
0.40137E+00	0.27995E+00	0.94363E+00	0.38834E+00	0.26350E+00	0.25376E+00
0.14764E+00	0.19465E+00	0.21800E+00	0.11975E+00	0.12592E+00	0.11568E+00
0.96253E-01	0.95725E-01	0.11152E+00	0.87709E-01	0.94235E-01	0.92740E-01
0.75329E-01	0.70805E-01	0.64027E-01	0.53022E-01	0.52500E-01	0.52791E-01
0.46949E-01	0.46249E-01	0.41890E-01	0.40450E-01	0.36884E-01	0.32635E-01
0.30912E-01	0.28613E-01	0.28634E-01	0.25841E-01	0.27082E-01	0.31983E-01
0.29575E-01	0.30432E-01	0.29806E-01	0.31728E-01	0.30205E-01	0.30392E-01
0.30372E-01	0.29122E-01	0.31130E-01	0.30195E-01	0.31057E-01	0.29238E-01
0.29528E-01	0.28635E-01	0.31653E-01	0.31044E-01	0.32304E-01	0.33064E-01
0.34208E-01	0.32486E-01	0.35089E-01	0.37004E-01	0.39393E-01	0.40702E-01
0.45065E-01	0.50193E-01	0.52792E-01	0.57461E-01	0.59098E-01	0.61962E-01
0.76523E-01	0.74193E-01	0.81571E-01	0.10279E+00	0.10497E+00	0.11984E+00
0.20929E+00	0.17059E+00	0.16536E+00	0.21062E+00	0.16319E+00	0.19141E+00
0.20529E+00	0.42704E+00	0.21713E+00	0.31924E+00	0.61627E+00	0.50447E+00
0.78958E+00	0.40622E+00	0.27664E+00	0.30852E+00	0.67101E+00	0.18029E+00
0.26506E+00	0.77081E+00	0.23846E+00	0.24896E+00	0.22984E+00	0.26506E+00
0.20789E+00	0.12408E+00	0.96681E-01	0.57056E-01	0.28132E-01	0.12868E-01
0.20580E-01	0.14646E+00	0.41062E+00	0.17953E+01	0.22468E+01	0.10503E+01

Table 5.80 Angular neutron spectrum for lead experiment (406.4 mm, 12.2 deg.).

<< Spectrum >>

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.22565E-05	-0.44306E-06	0.11106E-06	0.15962E-05	-0.20516E-05	-0.13116E-05
-0.67406E-06	0.41407E-06	0.58263E-06	0.48012E-06	0.28574E-06	0.20659E-06
0.94763E-06	-0.18233E-06	0.89402E-06	0.38879E-06	0.34632E-06	0.72928E-06
0.50819E-06	0.27275E-06	0.18828E-06	0.35858E-06	0.55635E-07	0.49789E-06
0.31189E-06	0.25808E-06	0.41888E-06	0.43148E-06	0.60683E-06	0.55452E-06
0.60637E-06	0.46110E-06	0.51184E-06	0.59024E-06	0.68343E-06	0.76635E-06
0.80807E-06	0.89958E-06	0.10383E-05	0.95219E-06	0.99070E-06	0.96980E-06
0.11157E-05	0.10427E-05	0.13059E-05	0.13447E-05	0.13699E-05	0.15747E-05
0.17070E-05	0.17041E-05	0.19168E-05	0.19356E-05	0.23497E-05	0.27997E-05
0.30495E-05	0.32686E-05	0.32658E-05	0.34108E-05	0.31808E-05	0.26789E-05
0.27700E-05	0.27297E-05	0.27411E-05	0.28498E-05	0.30090E-05	0.27111E-05
0.27428E-05	0.26258E-05	0.25559E-05	0.28295E-05	0.29514E-05	0.27483E-05
0.28717E-05	0.28413E-05	0.28097E-05	0.28775E-05	0.25912E-05	0.25229E-05
0.24216E-05	0.22912E-05	0.24217E-05	0.22614E-05	0.19658E-05	0.20238E-05
0.17680E-05	0.13789E-05	0.13182E-05	0.10818E-05	0.94134E-06	0.85901E-06
0.71707E-06	0.57886E-06	0.55326E-06	0.45727E-06	0.35012E-06	0.28701E-06
0.30905E-06	0.24448E-06	0.21863E-06	0.15001E-06	0.17062E-06	0.12786E-06
0.12860E-06	0.11175E-06	0.84223E-07	0.89916E-07	0.31224E-07	0.10855E-06
0.59972E-07	0.39711E-07	0.10905E-06	0.15992E-07	0.21928E-07	0.78434E-07
0.64858E-07	0.12437E-06	0.25958E-06	0.21509E-06	0.22719E-06	0.22824E-06
0.24302E-06	0.31299E-06	0.35624E-06	0.34335E-06	0.16514E-05	0.10250E-04
0.37225E-05	0.63695E-07	0.11189E-07	-0.47084E-08	-0.12566E-07	0.15081E-07

<< Error >>

0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10619E+00	0.35690E+01	0.12366E+02	0.75328E+00	0.51608E+00	0.74274E+00
0.12809E+01	0.18147E+01	0.12256E+01	0.13625E+01	0.21400E+01	0.26003E+01
0.49415E+00	0.22814E+01	0.39446E+00	0.81609E+00	0.81379E+00	0.34773E+00
0.44908E+00	0.76384E+00	0.10315E+01	0.50387E+00	0.29929E+01	0.31451E+00

0.47149E+00	0.53484E+00	0.30694E+00	0.28726E+00	0.19280E+00	0.20079E+00
0.17831E+00	0.22363E+00	0.19130E+00	0.15940E+00	0.13300E+00	0.11610E+00
0.10706E+00	0.92357E-01	0.79605E-01	0.85915E-01	0.80977E-01	0.82531E-01
0.70055E-01	0.74524E-01	0.59614E-01	0.57630E-01	0.55655E-01	0.48900E-01
0.45209E-01	0.45160E-01	0.40476E-01	0.40527E-01	0.34808E-01	0.30085E-01
0.28683E-01	0.26486E-01	0.26596E-01	0.24945E-01	0.25898E-01	0.29694E-01
0.28463E-01	0.28783E-01	0.28856E-01	0.28225E-01	0.26624E-01	0.29044E-01
0.28870E-01	0.29600E-01	0.30764E-01	0.28202E-01	0.27614E-01	0.29991E-01
0.27949E-01	0.28799E-01	0.28943E-01	0.28197E-01	0.31145E-01	0.31979E-01
0.33406E-01	0.35060E-01	0.33486E-01	0.35630E-01	0.42546E-01	0.39336E-01
0.41224E-01	0.46689E-01	0.47579E-01	0.54167E-01	0.59134E-01	0.62446E-01
0.71624E-01	0.77871E-01	0.79303E-01	0.85667E-01	0.11605E+00	0.13066E+00
0.12338E+00	0.15399E+00	0.16548E+00	0.22465E+00	0.19307E+00	0.25594E+00
0.25473E+00	0.29287E+00	0.41315E+00	0.39339E+00	0.12129E+01	0.33906E+00
0.64115E+00	0.97466E+00	0.33476E+00	0.25336E+01	0.19967E+01	0.61138E+00
0.72195E+00	0.40267E+00	0.19981E+00	0.23454E+00	0.23575E+00	0.21711E+00
0.20105E+00	0.17435E+00	0.14217E+00	0.15178E+00	0.50994E-01	0.18572E-01
0.30680E-01	0.42901E+00	0.19731E+01	0.43954E+01	0.16503E+01	0.11772E+01

Table 5.81 Angular neutron spectrum for lead experiment (406.4 mm, 24.9 deg.).

&lt;&lt; Spectrum &gt;&gt;

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
-0.54766E-05	-0.12846E-05	0.36610E-05	0.92492E-06	0.18530E-05	0.20742E-05
0.11625E-05	0.27164E-05	0.11962E-05	0.23254E-05	0.12114E-05	0.10244E-05
0.17750E-05	0.92377E-06	0.84992E-06	0.96754E-06	0.68087E-06	0.34720E-06
0.99059E-06	0.93945E-06	0.84758E-06	0.66856E-06	0.59610E-06	0.32063E-06
0.10483E-05	0.71631E-06	0.54543E-06	0.98215E-06	0.98694E-06	0.69262E-06
0.60651E-06	0.76166E-06	0.10734E-05	0.71926E-06	0.60881E-06	0.80189E-06
0.91443E-06	0.92230E-06	0.75022E-06	0.95689E-06	0.10989E-05	0.11260E-05
0.11712E-05	0.13081E-05	0.14867E-05	0.13956E-05	0.14140E-05	0.14086E-05
0.14696E-05	0.19143E-05	0.18967E-05	0.21138E-05	0.24206E-05	0.27108E-05
0.31612E-05	0.32024E-05	0.32921E-05	0.33640E-05	0.30143E-05	0.27820E-05
0.28325E-05	0.28099E-05	0.27972E-05	0.28688E-05	0.28414E-05	0.27300E-05
0.26348E-05	0.24521E-05	0.27084E-05	0.27170E-05	0.28796E-05	0.27776E-05
0.27077E-05	0.27274E-05	0.26387E-05	0.28204E-05	0.26004E-05	0.25463E-05
0.23270E-05	0.23732E-05	0.22338E-05	0.20123E-05	0.19466E-05	0.21026E-05
0.15669E-05	0.12532E-05	0.11437E-05	0.96663E-06	0.82643E-06	0.85151E-06
0.71537E-06	0.61242E-06	0.44804E-06	0.33825E-06	0.34739E-06	0.32470E-06
0.24932E-06	0.21573E-06	0.18191E-06	0.13458E-06	0.11123E-06	0.17371E-06
0.13396E-06	0.11918E-06	0.29953E-07	0.55323E-07	0.92098E-07	0.41447E-08
0.49619E-07	0.46363E-07	0.12448E-06	0.85825E-07	0.13430E-06	0.11296E-06
0.14795E-06	0.11027E-06	0.12943E-06	0.15536E-06	0.97983E-07	0.20135E-06
0.11625E-06	0.12648E-06	0.34202E-07	0.27976E-06	0.14722E-05	0.32545E-05
0.54201E-06	0.29236E-07	0.29607E-07	0.16787E-08	-0.16904E-07	0.97963E-08

&lt;&lt; Error &gt;&gt;

0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.14428E-01	0.16344E+01	0.53710E+00	0.18880E+01	0.82202E+00	0.65365E+00
0.10609E+01	0.41050E+00	0.86147E+00	0.40658E+00	0.71920E+00	0.76352E+00
0.38267E+00	0.63803E+00	0.59992E+00	0.47941E+00	0.60017E+00	0.10472E+01
0.32998E+00	0.31944E+00	0.32389E+00	0.38232E+00	0.40057E+00	0.69951E+00
0.20048E+00	0.27488E+00	0.33938E+00	0.18061E+00	0.16809E+00	0.22862E+00
0.24754E+00	0.18885E+00	0.12913E+00	0.18568E+00	0.21175E+00	0.15510E+00
0.13027E+00	0.12671E+00	0.15366E+00	0.11806E+00	0.99915E-01	0.97891E-01
0.91268E-01	0.81480E-01	0.70938E-01	0.74927E-01	0.73854E-01	0.73336E-01
0.69746E-01	0.53003E-01	0.53725E-01	0.48937E-01	0.43250E-01	0.39877E-01
0.34560E-01	0.34216E-01	0.33138E-01	0.31458E-01	0.33663E-01	0.35952E-01
0.34922E-01	0.35494E-01	0.35619E-01	0.34820E-01	0.34663E-01	0.35627E-01
0.37227E-01	0.39912E-01	0.35852E-01	0.36061E-01	0.34240E-01	0.36341E-01
0.37067E-01	0.36556E-01	0.37326E-01	0.35128E-01	0.37636E-01	0.38692E-01
0.42097E-01	0.41921E-01	0.44279E-01	0.48986E-01	0.44316E-01	0.38024E-01
0.47418E-01	0.55266E-01	0.57306E-01	0.62306E-01	0.68365E-01	0.63383E-01
0.72119E-01	0.79000E-01	0.10030E+00	0.11696E+00	0.10985E+00	0.11729E+00
0.16025E+00	0.17495E+00	0.19979E+00	0.28096E+00	0.32092E+00	0.20884E+00

0.28111E+00	0.30559E+00	0.14042E+01	0.71790E+00	0.45604E+00	0.11420E+02
0.93290E+00	0.94358E+00	0.34568E+00	0.54681E+00	0.33168E+00	0.43919E+00
0.33537E+00	0.50075E+00	0.40296E+00	0.34952E+00	0.53527E+00	0.25312E+00
0.44692E+00	0.41979E+00	0.15186E+01	0.17276E+00	0.54322E-01	0.34649E-01
0.98660E-01	0.92956E+00	0.84452E+00	0.14449E+02	0.14445E+01	0.22384E+01

Table 5.82 Angular neutron spectrum for lead experiment (406.4 mm, 41.8 deg.).

<< Spectrum >>

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	-0.56446E-05	-0.12628E-05	0.43137E-06	0.13458E-05	0.47848E-06
0.72326E-06	0.10976E-05	0.55354E-07	0.47308E-06	0.45911E-06	-0.31449E-06
0.61675E-06	0.62762E-07	-0.45411E-07	0.55332E-06	0.46521E-06	0.18672E-06
-0.13207E-06	0.21696E-06	0.30701E-06	0.37740E-06	0.15410E-06	0.27349E-06
0.29763E-06	0.18144E-06	0.76656E-06	0.26920E-06	0.57321E-06	0.55194E-06
0.59824E-06	0.56699E-06	0.73377E-06	0.62207E-06	0.81374E-06	0.72238E-06
0.78095E-06	0.66405E-06	0.70447E-06	0.87533E-06	0.89030E-06	0.95629E-06
0.97402E-06	0.96113E-06	0.13702E-05	0.13515E-05	0.12660E-05	0.14187E-05
0.12974E-05	0.14357E-05	0.16188E-05	0.17211E-05	0.19310E-05	0.22243E-05
0.26655E-05	0.26518E-05	0.28698E-05	0.27226E-05	0.23680E-05	0.23946E-05
0.24265E-05	0.24137E-05	0.23852E-05	0.22479E-05	0.23357E-05	0.24382E-05
0.22294E-05	0.20832E-05	0.21764E-05	0.23240E-05	0.22280E-05	0.23216E-05
0.21547E-05	0.22550E-05	0.21597E-05	0.21891E-05	0.20685E-05	0.18064E-05
0.17633E-05	0.17508E-05	0.18277E-05	0.16646E-05	0.15784E-05	0.13714E-05
0.11158E-05	0.10073E-05	0.86871E-06	0.82138E-06	0.69328E-06	0.63481E-06
0.48554E-06	0.39623E-06	0.26465E-06	0.30509E-06	0.17985E-06	0.26009E-06
0.20241E-06	0.13039E-06	0.12810E-06	0.91987E-07	0.13430E-06	0.86724E-07
0.76700E-07	0.58922E-07	0.61836E-07	0.77885E-07	0.11618E-07	0.13623E-07
0.55968E-07	0.35674E-07	0.71347E-07	0.80912E-07	0.21432E-07	0.72808E-07
-0.34652E-07	0.70233E-07	0.14585E-06	0.11081E-06	0.52185E-07	0.37617E-07
0.13126E-06	0.61138E-07	0.71699E-07	0.47679E-07	0.43872E-06	0.96559E-06
0.32386E-06	0.37286E-07	-0.18098E-07	0.24949E-07	0.27617E-07	0.44483E-07

<< Error >>

0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.20136E+00	0.12743E+01	0.33872E+01	0.92396E+00	0.23961E+01
0.13893E+01	0.83326E+00	0.15326E+02	0.16452E+01	0.15344E+01	0.20616E+01
0.89510E+00	0.78118E+01	0.94527E+01	0.67155E+00	0.72452E+00	0.15871E+01
0.20381E+01	0.11348E+01	0.73232E+00	0.56236E+00	0.12825E+01	0.66981E+00
0.58068E+00	0.89021E+00	0.19867E+00	0.53745E+00	0.23592E+00	0.23829E+00
0.20405E+00	0.20915E+00	0.15422E+00	0.17559E+00	0.13037E+00	0.13954E+00
0.12632E+00	0.14554E+00	0.13265E+00	0.10572E+00	0.10337E+00	0.93115E-01
0.90722E-01	0.91348E-01	0.63347E-01	0.63320E-01	0.66705E-01	0.59444E-01
0.64583E-01	0.58606E-01	0.51902E-01	0.48978E-01	0.44842E-01	0.39729E-01
0.33788E-01	0.33806E-01	0.31297E-01	0.32175E-01	0.35177E-01	0.34604E-01
0.33413E-01	0.33521E-01	0.33862E-01	0.36241E-01	0.34583E-01	0.32847E-01
0.36001E-01	0.37859E-01	0.36098E-01	0.34632E-01	0.36499E-01	0.35184E-01
0.37477E-01	0.36204E-01	0.37419E-01	0.37013E-01	0.39125E-01	0.44806E-01
0.46655E-01	0.46553E-01	0.44481E-01	0.49169E-01	0.43580E-01	0.46658E-01
0.51804E-01	0.56507E-01	0.63026E-01	0.63624E-01	0.72305E-01	0.75933E-01
0.94579E-01	0.11106E+00	0.15553E+00	0.12140E+00	0.18596E+00	0.13018E+00
0.16066E+00	0.24661E+00	0.24325E+00	0.33917E+00	0.23774E+00	0.40208E+00
0.44474E+00	0.59196E+00	0.54455E+00	0.48123E+00	0.32716E+01	0.28400E+01
0.70864E+00	0.11905E+01	0.59260E+00	0.52902E+00	0.20621E+01	0.63375E+00
0.14603E+01	0.70574E+00	0.35583E+00	0.45834E+00	0.99834E+00	0.14386E+01
0.38297E+00	0.85615E+00	0.71367E+00	0.98488E+00	0.11403E+00	0.60551E-01
0.11674E+00	0.63833E+00	0.11194E+01	0.80310E+00	0.67720E+00	0.37962E+00

Table 5.83 Angular neutron spectrum for lead experiment (406.4 mm, 66.8 deg.).

## &lt;&lt; Spectrum &gt;&gt;

0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
0.00000E+00	0.00000E+00	-0.21624E-04	-0.60202E-05	-0.21700E-05	-0.17146E-05
-0.31557E-05	-0.22688E-05	-0.27430E-05	-0.25589E-05	-0.75812E-06	-0.16093E-05
-0.10618E-05	-0.12198E-05	-0.44037E-06	-0.71544E-06	-0.28655E-06	-0.75199E-06
-0.27844E-06	-0.33863E-06	-0.29447E-06	-0.19746E-06	-0.29652E-06	-0.51755E-06
-0.14874E-06	-0.17079E-06	-0.13634E-06	0.17331E-06	0.17175E-08	0.17588E-06
0.27879E-07	0.70281E-07	0.16315E-06	0.18759E-06	0.30897E-06	0.47978E-06
0.54624E-06	0.34079E-06	0.34854E-06	0.35377E-06	0.48948E-06	0.63044E-06
0.58376E-06	0.56445E-06	0.69279E-06	0.76293E-06	0.86734E-06	0.83322E-06
0.92110E-06	0.86422E-06	0.10501E-05	0.11095E-05	0.12401E-05	0.16385E-05
0.16583E-05	0.17845E-05	0.17610E-05	0.17426E-05	0.16102E-05	0.15662E-05
0.15102E-05	0.15628E-05	0.13176E-05	0.15650E-05	0.14434E-05	0.13584E-05
0.14271E-05	0.14196E-05	0.13709E-05	0.15747E-05	0.14133E-05	0.14399E-05
0.13656E-05	0.13040E-05	0.13620E-05	0.14271E-05	0.12598E-05	0.11162E-05
0.10160E-05	0.11247E-05	0.10454E-05	0.93804E-06	0.10088E-05	0.84629E-06
0.78602E-06	0.58725E-06	0.50307E-06	0.51412E-06	0.43703E-06	0.37371E-06
0.31603E-06	0.32071E-06	0.18570E-06	0.15730E-06	0.15690E-06	0.96871E-07
0.11173E-06	0.11968E-06	0.17606E-06	0.14182E-06	0.12146E-06	0.45003E-07
0.70999E-07	0.11540E-06	0.35811E-07	0.12393E-06	0.96145E-07	0.13232E-06
0.11845E-06	0.10312E-06	0.15866E-06	0.29705E-06	0.35292E-06	0.37458E-06
0.65616E-07	0.87498E-07	0.12303E-06	0.14509E-06	0.17717E-06	0.23095E-06
0.49918E-07	0.27663E-06	0.21690E-06	0.13381E-06	0.37985E-06	0.27075E-06
0.23322E-06	0.13257E-06	0.92278E-07	0.60771E-07	0.40342E-07	0.61567E-07

## &lt;&lt; Error &gt;&gt;

0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01	0.10000E+01
0.10000E+01	0.10000E+01	0.39841E-01	0.20060E+00	0.50996E+00	0.56363E+00
0.27489E+00	0.33975E+00	0.26282E+00	0.25679E+00	0.81975E+00	0.34022E+00
0.44564E+00	0.34128E+00	0.82409E+00	0.45741E+00	0.10043E+01	0.34201E+00
0.82912E+00	0.62756E+00	0.65417E+00	0.92152E+00	0.55994E+00	0.30281E+00
0.99186E+00	0.81112E+00	0.95561E+00	0.71997E+00	0.68217E+02	0.63093E+00
0.37841E+01	0.14420E+01	0.59427E+00	0.49523E+00	0.29259E+00	0.18249E+00
0.15664E+00	0.24167E+00	0.23296E+00	0.22424E+00	0.16079E+00	0.12258E+00
0.12979E+00	0.13397E+00	0.10734E+00	0.96268E-01	0.83933E-01	0.86984E-01
0.78353E-01	0.82769E-01	0.68067E-01	0.64597E-01	0.59306E-01	0.46345E-01
0.46116E-01	0.42877E-01	0.42574E-01	0.42363E-01	0.44413E-01	0.44603E-01
0.45548E-01	0.43569E-01	0.52067E-01	0.44463E-01	0.47884E-01	0.50393E-01
0.47726E-01	0.47878E-01	0.49391E-01	0.43525E-01	0.48783E-01	0.48484E-01
0.50662E-01	0.53077E-01	0.50668E-01	0.48797E-01	0.55191E-01	0.62365E-01
0.68908E-01	0.62549E-01	0.67875E-01	0.75012E-01	0.55560E-01	0.63039E-01
0.65289E-01	0.78386E-01	0.90158E-01	0.86380E-01	0.99086E-01	0.11448E+00
0.12990E+00	0.12528E+00	0.21815E+00	0.25663E+00	0.25944E+00	0.43533E+00
0.38758E+00	0.37122E+00	0.25753E+00	0.33077E+00	0.38011E+00	0.10244E+01
0.59288E+00	0.34597E+00	0.10856E+01	0.30925E+00	0.41213E+00	0.33018E+00
0.38789E+00	0.47875E+00	0.34935E+00	0.21361E+00	0.20144E+00	0.19485E+00
0.10575E+01	0.84051E+00	0.65323E+00	0.57740E+00	0.50730E+00	0.42180E+00
0.20252E+01	0.35954E+00	0.45787E+00	0.65409E+00	0.19628E+00	0.22715E+00
0.18316E+00	0.23827E+00	0.29758E+00	0.41674E+00	0.57667E+00	0.38483E+00

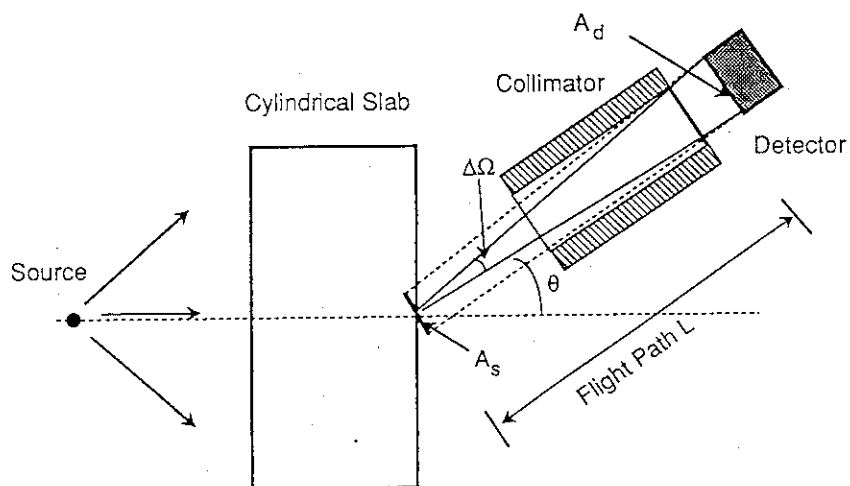


Fig. 5.1 Configuration of the D-T source, cylindrical slab, cylindrical slab, collimator and detector.

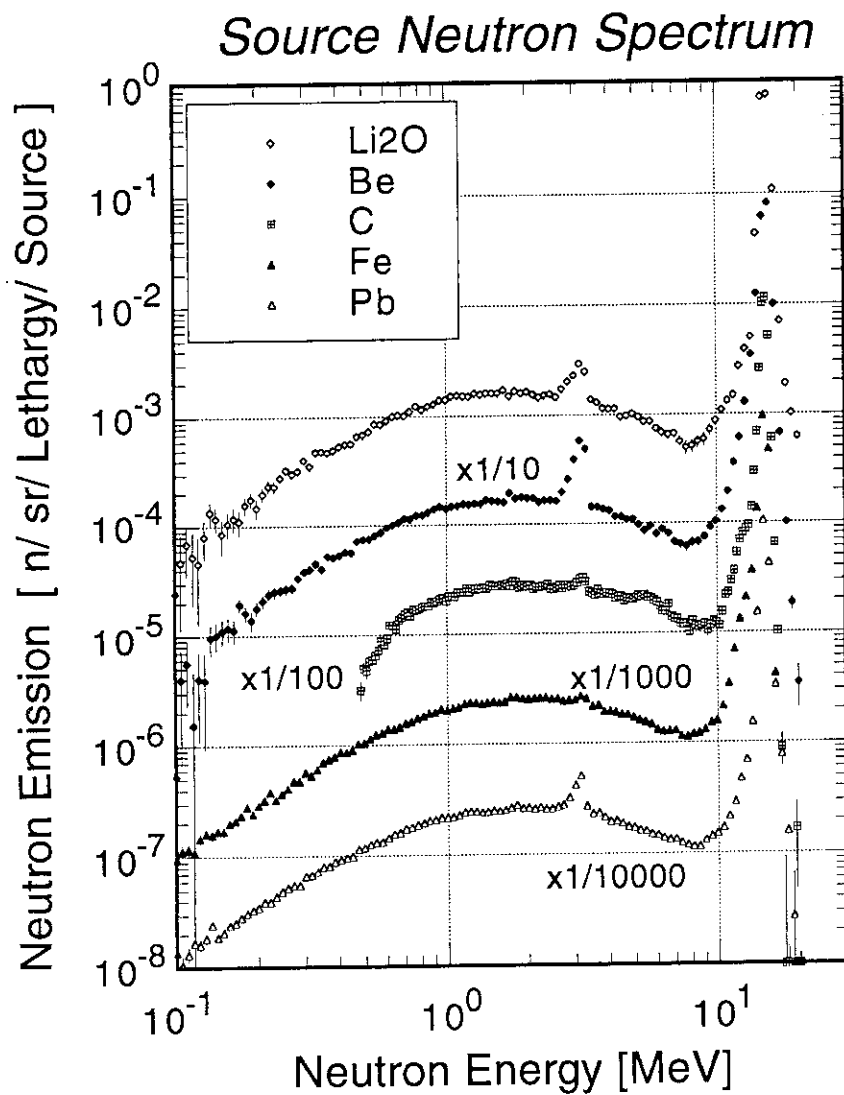


Fig. 5.2 Source neutron spectra for lithium oxide, beryllium, graphite, iron and lead experiments.

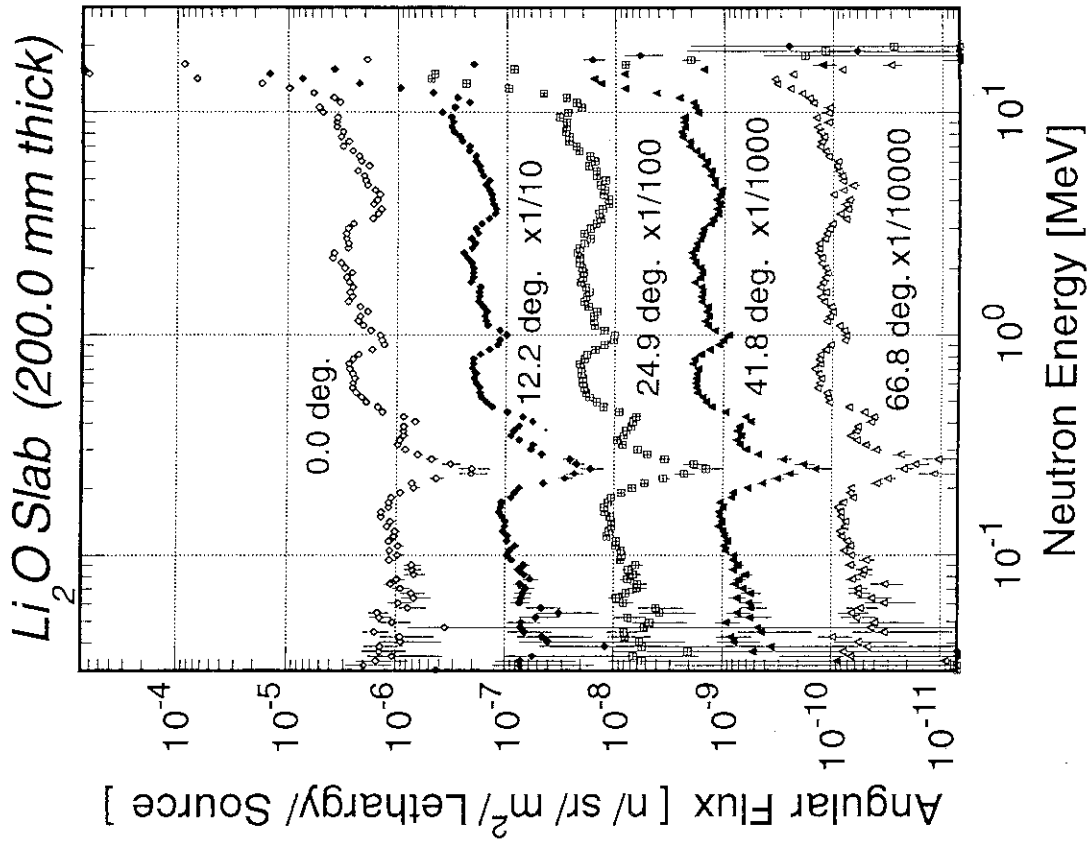


Fig. 5.4 Measured angular neutron spectra leaking from Li<sub>2</sub>O slab of 200.0 mm thickness.

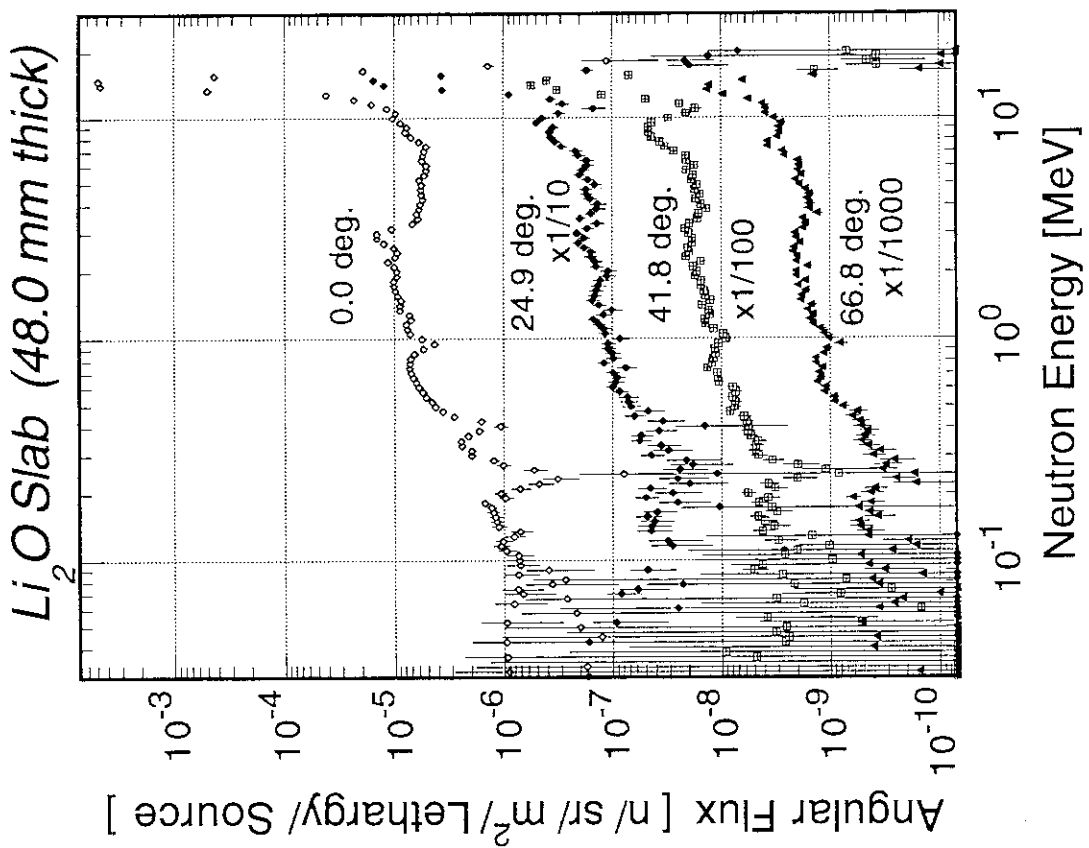


Fig. 5.3 Measured angular neutron spectra leaking from Li<sub>2</sub>O slab of 48.0 mm thickness.

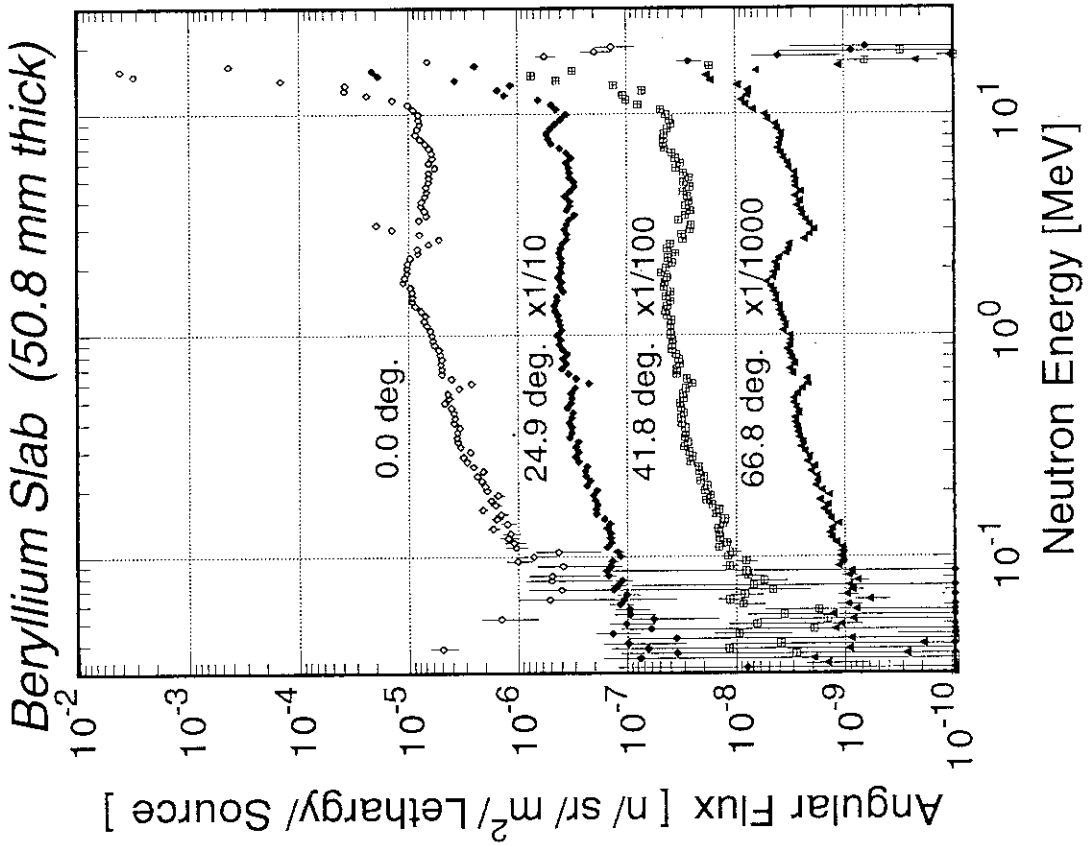


Fig. 5.6 Measured angular neutron spectra leaking from beryllium slab of 50.8 mm thickness.

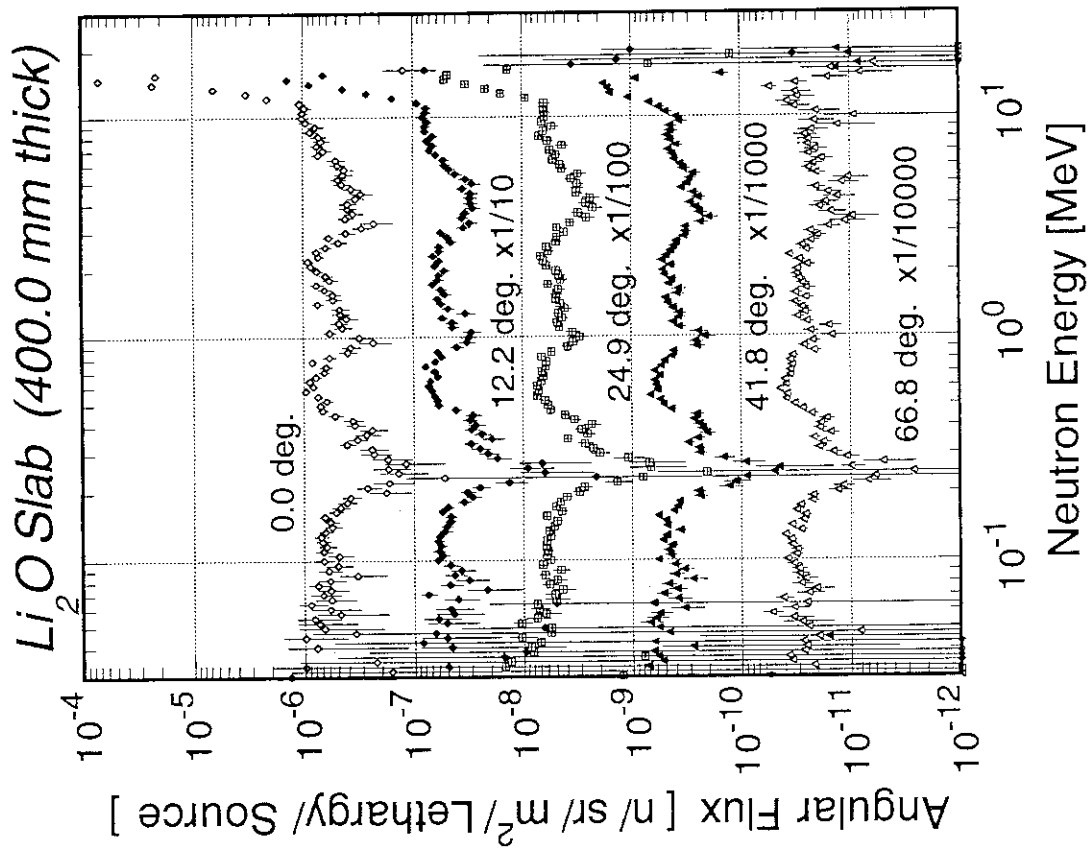


Fig. 5.5 Measured angular neutron spectra leaking from  $Li_2O$  slab of 400.0 mm thickness.

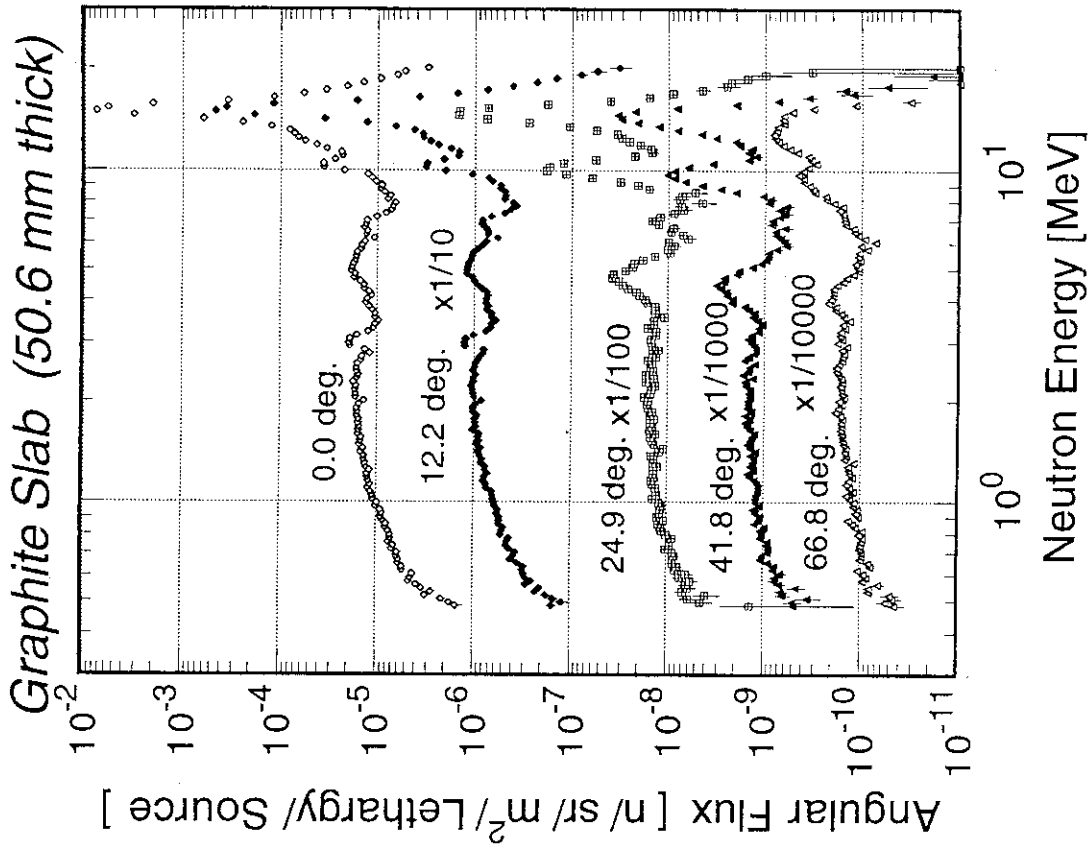


Fig. 5.8 Measured angular neutron spectra leaking from graphite slab of 50.6 mm thickness.

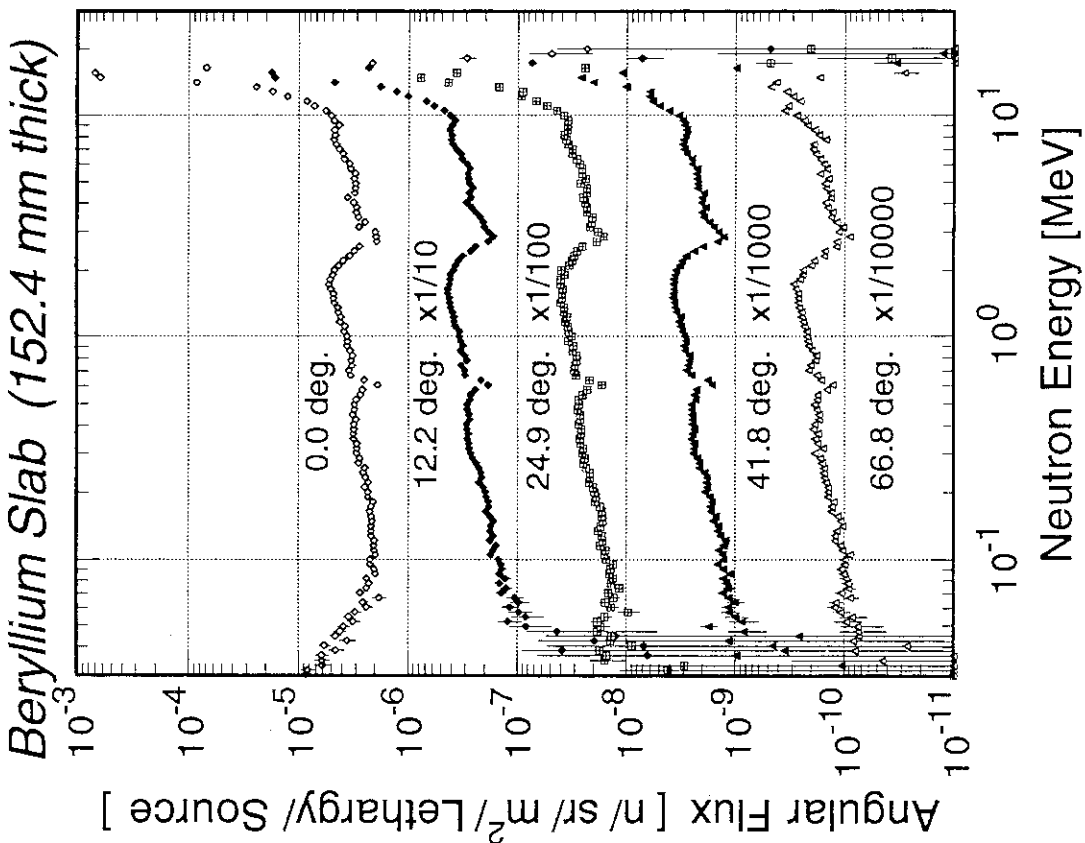


Fig. 5.7 Measured angular neutron spectra leaking from beryllium slab of 152.4 mm thickness.



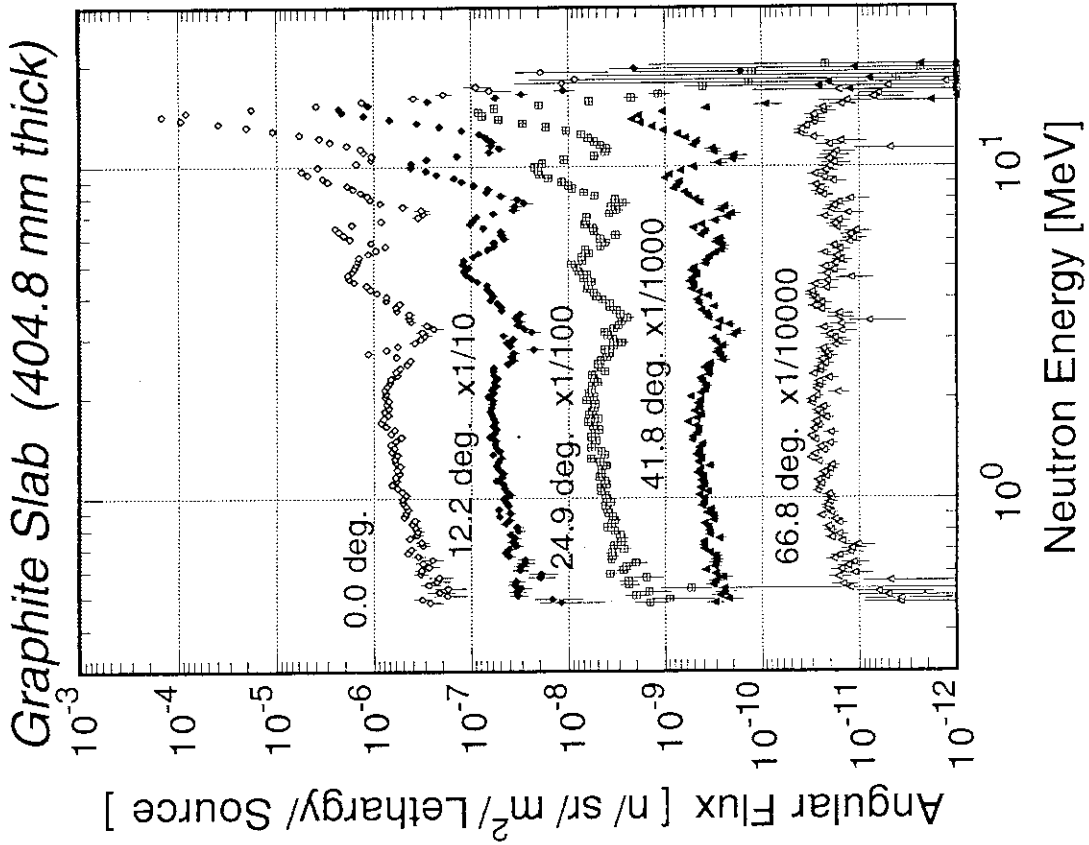


Fig. 5.10 Measured angular neutron spectra leaking from graphite slab of 404.8 mm thickness.

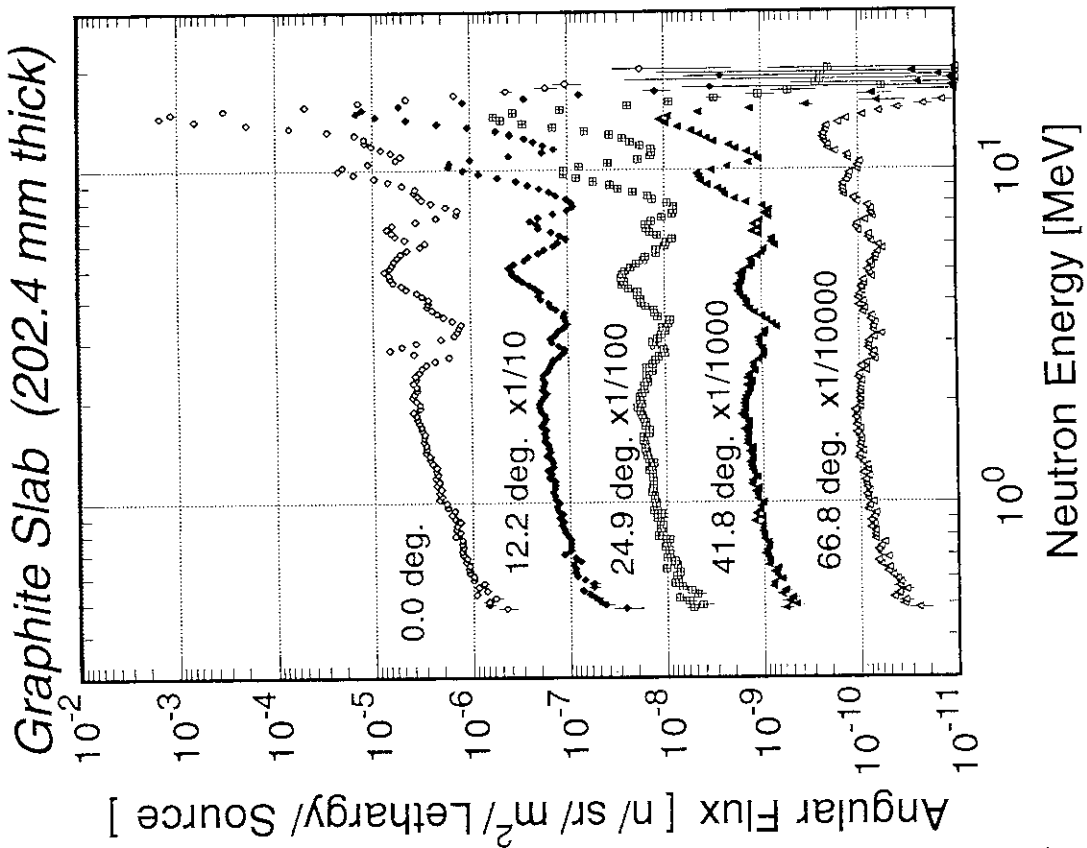


Fig. 5.9 Measured angular neutron spectra leaking from graphite slab of 202.4 mm thickness.

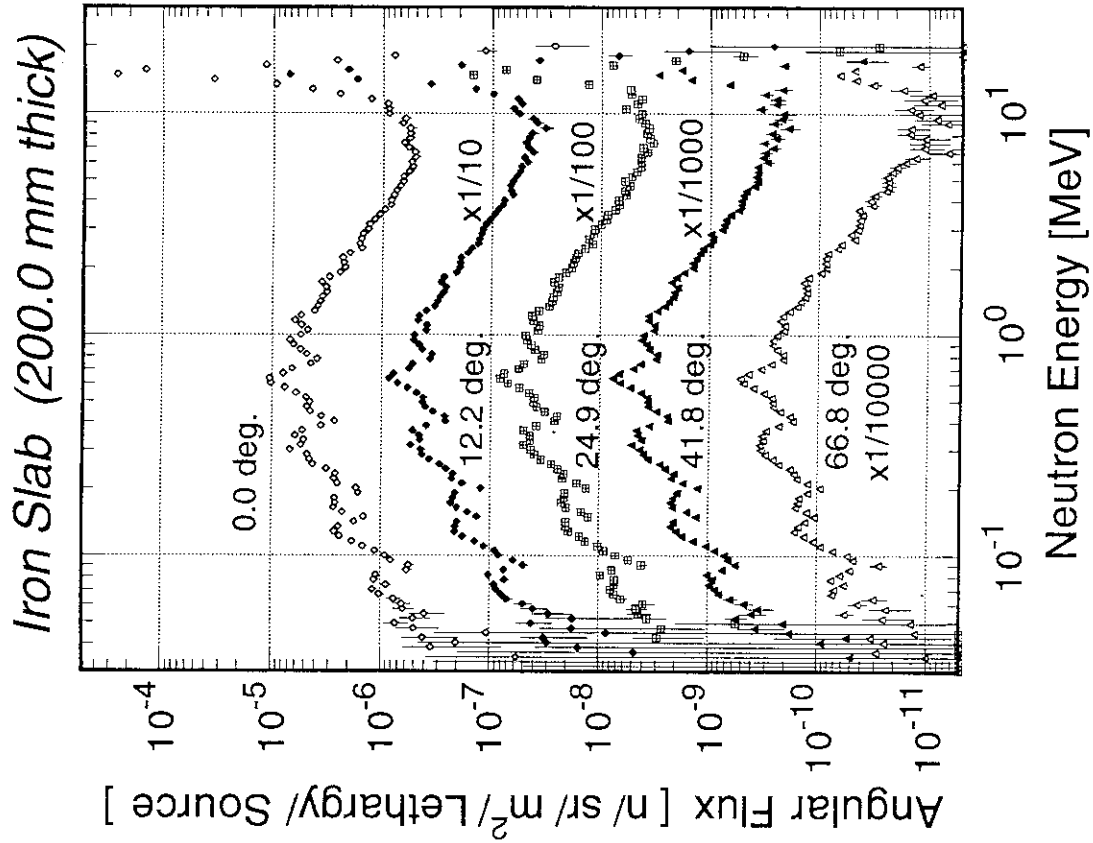


Fig. 5.11 Measured angular neutron spectra leaking from iron slab of 50.0 mm thickness.

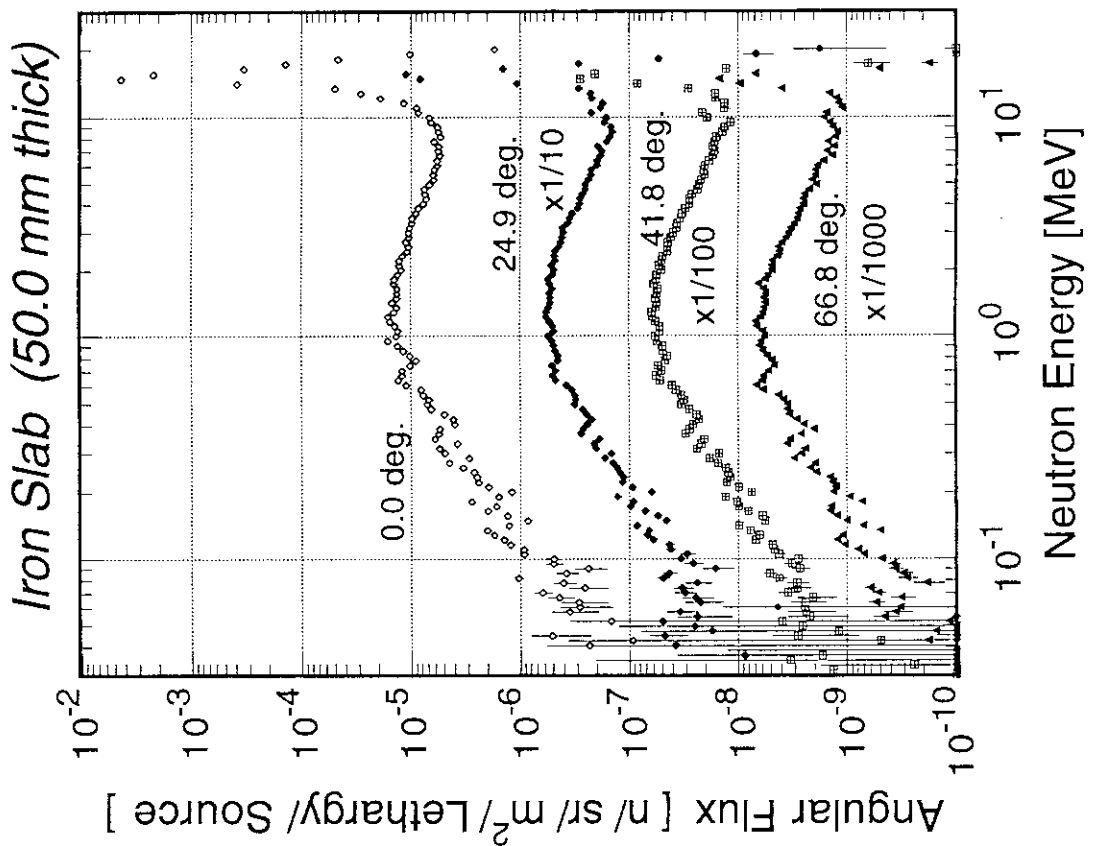


Fig. 5.12 Measured angular neutron spectra leaking from iron slab of 200.0 mm thickness.

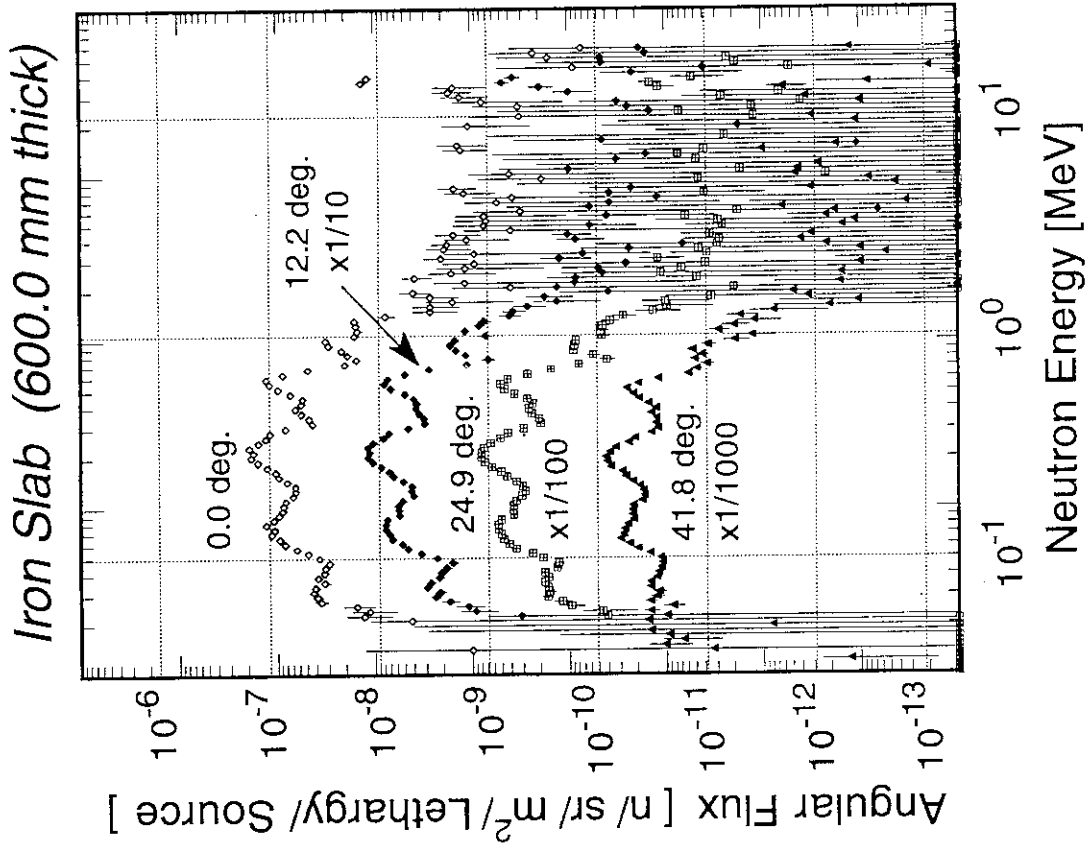


Fig. 5.14 Measured angular neutron spectra leaking from iron slab of 600.0 mm thickness.

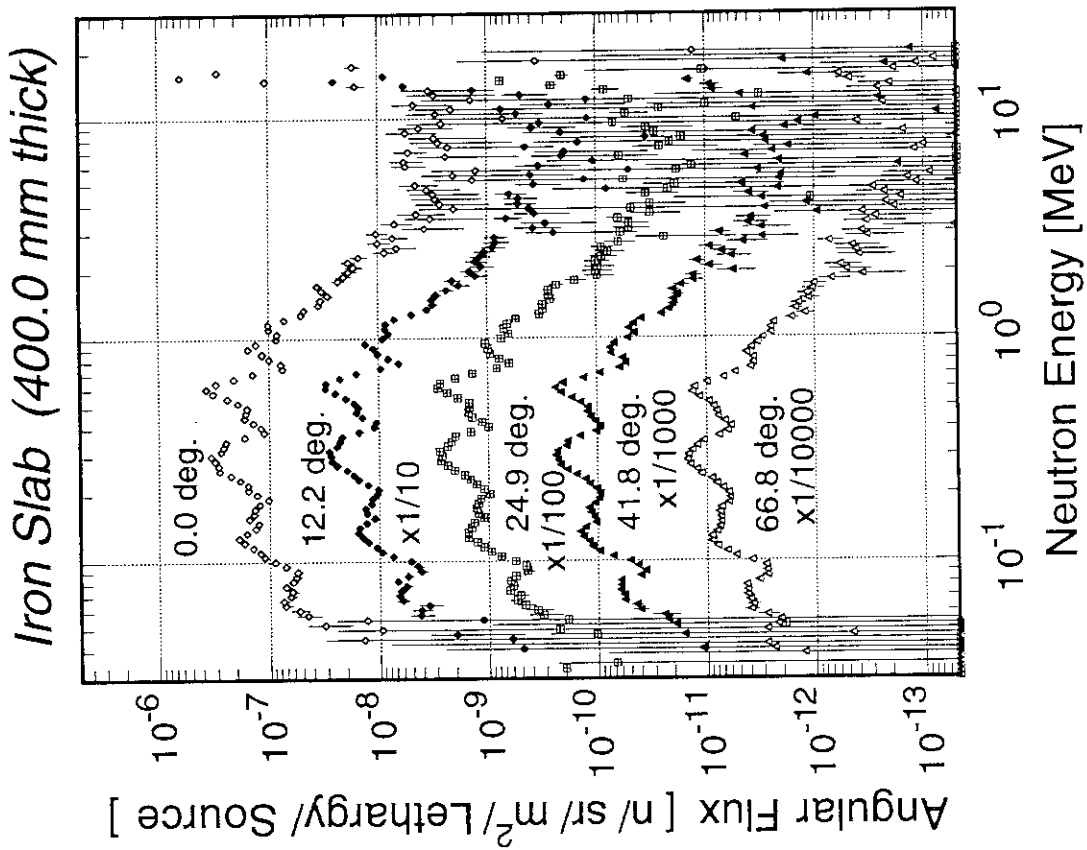


Fig. 5.13 Measured angular neutron spectra leaking from iron slab of 400.0 mm thickness.

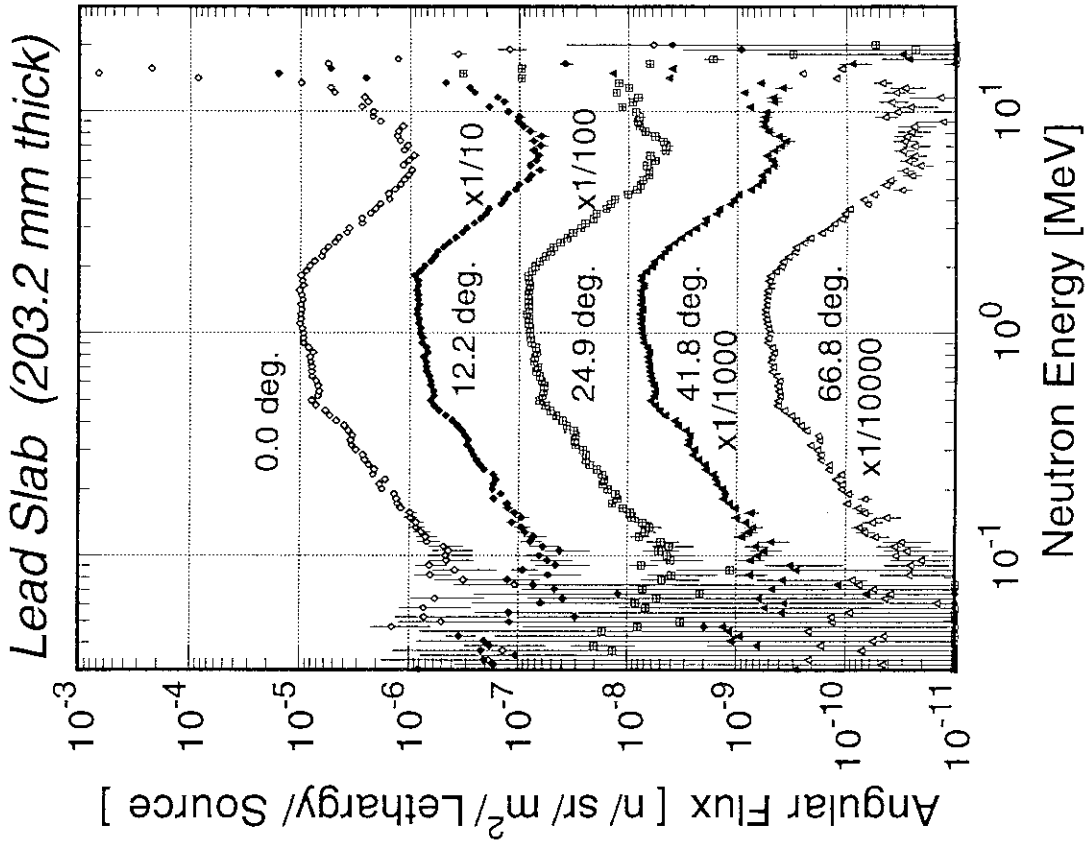


Fig. 5.16 Measured angular neutron spectra leaking from lead slab of 203.2 mm thickness.

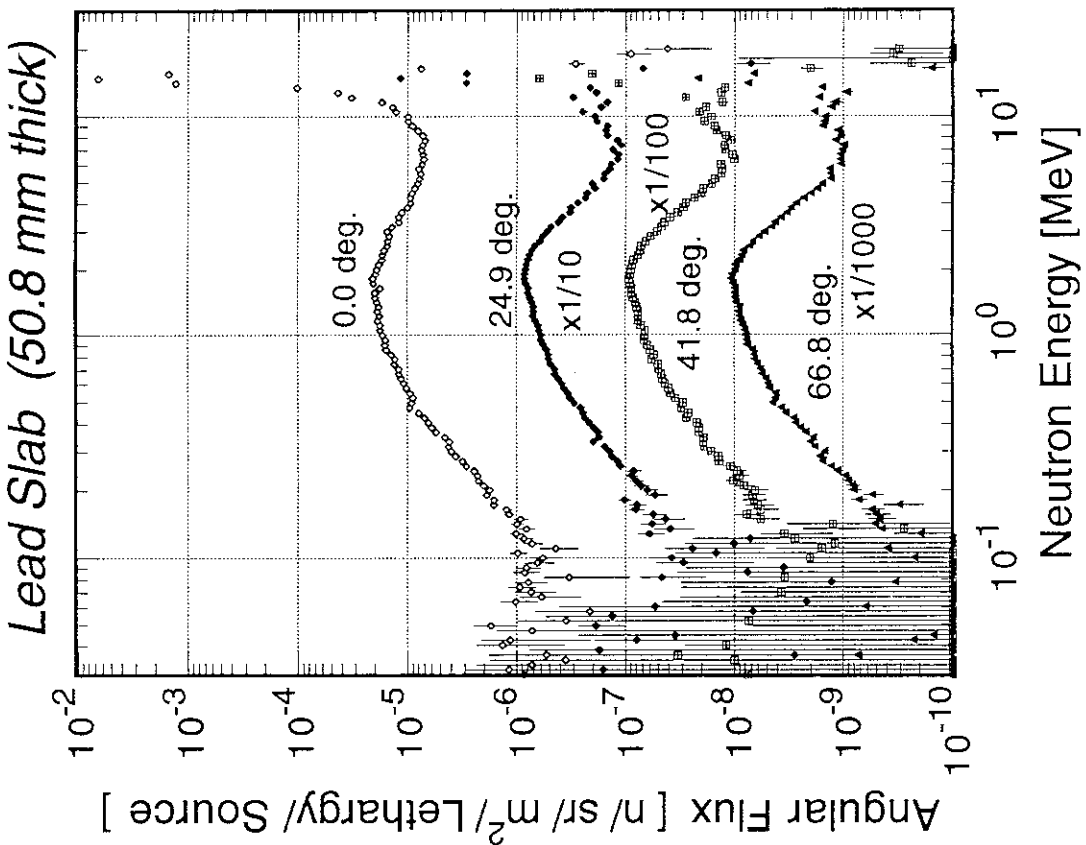


Fig. 5.15 Measured angular neutron spectra leaking from lead slab of 50.8 mm thickness.

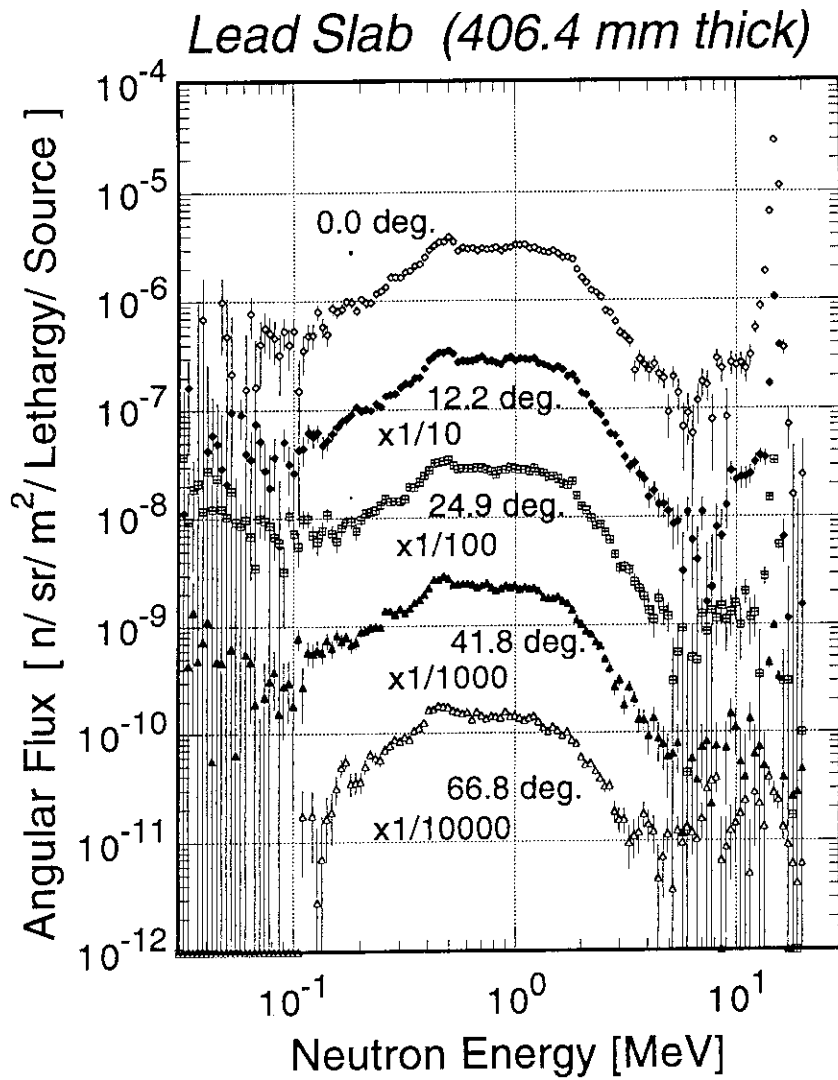


Fig. 5.17 Measured angular neutron spectra leaking from lead slab of 406.4 mm thickness.

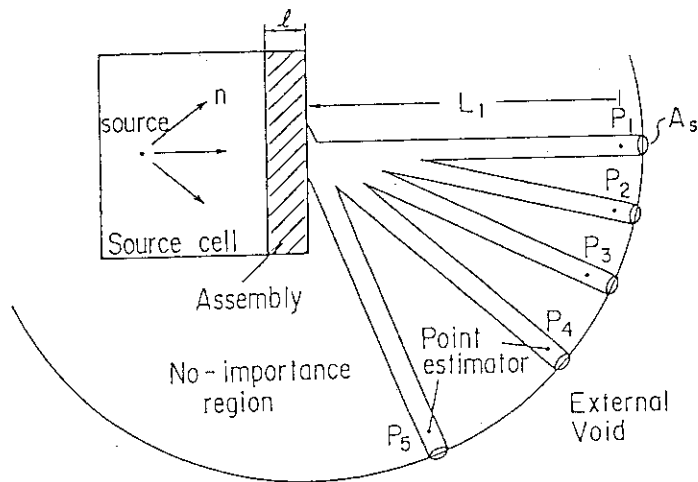


Fig. 5.18 Model for the MCNP calculations. The five point estimators are located at the same time, and the no-importance region is applied to the collimator simulation.

```

FNS-TOF/31.4 CM(R)*4.80 CM(Z)-LI2O CYL./FIXED CONE JENDL-3 PT DETECTORS
C *****
C * CELL CARAD *
C *****
C ***** EXTERNAL VOID *****
1 0 -4 : +4 -2 +3 : +10 : +2 -10 +5 +6 +7 +8 +9
C ***** SOURCE VACUUM REGION *****
2 0 -3 +4 -1
C ***** MATERIAL REGION *****
3 1 8.86823-2 -3 +1 -2
C ***** DETECTOR VACUUM REGION *****
4 0 +2 -10 -5 : +2 -10 -6 : +2 -10 -7 : +2 -10 -8 : +2 -10 -9
C ----- THE FOLLOWING IS A BLANK DELIMETER

C *****
C * SURFACE CARD *
C *****
1 PZ -4.80
2 PZ 0
3 CZ 31.4
4 PZ -50
5 CZ 5.2283
6 1 CZ 5.2332
7 2 CZ 5.2451
8 3 CZ 5.2716
9 4 CZ 5.3304
10 SO 1000
C ----- THE FOLLOWING IS A BLANK DELIMETER

C *****
C * MODE CARD - NEUTRON ONLY *
C *****
MODE 0
C *****
C * TRANSFORMATION CARDS *
C * ROTATION ABOUT THE Y AXIS BY THETA*
C *****
*TR1 0 0 0 12.2 90 102.2 90 0 90
77.8 90 12.2 +1
*TR2 0 0 0 24.9 90 114.9 90 0 90
65.1 90 24.9 +1
*TR3 0 0 0 41.8 90 131.8 90 0 90
48.2 90 41.8 +1
*TR4 0 0 0 66.8 90 156.8 90 0 90
23.2 90 66.8 +1
C *****
C * CELL PARAMETER CARDS *
C *****
IN 0 1 1 1
C *****
C * SOURCE SPECIFICATION CARDS *
C * SRC1=POINT ISOTROPIC OPTION *
C * SDIR DIRC. BIASING - HEIGHT REDUCTION CONSIDERED*
C * SI(ENG.) AND SP(PROB.) TAKEN FROM BETOF SOURCE *
C * EXPT. DATA *
C *****
SRC1 0 0 -24.80 2 1.0
SDIR 0 0 1 1 0.5372231
SI 4.6308-02
5.2474-02 5.9461-02 6.7378-02 7.6349-02 8.6515-02
9.8035-02 1.1109-01 1.2588-01 1.4264-01 1.6163-01
1.8315-01 2.0754-01 2.3517-01 2.6649-01 3.0197-01
3.4217-01 3.8774-01 4.3936-01 4.9786-01 5.6415-01
6.3927-01 7.2438-01 8.2084-01 9.3013-01 1.0540+00
1.1943+00 1.3533+00 1.5335+00 1.7377+00 1.8498+00
1.9691+00 2.0961+00 2.2313+00 2.3752+00 2.5284+00
2.6914+00 2.8650+00 3.0498+00 3.2465+00 3.4559+00
3.6787+00 3.9160+00 4.1686+00 4.4374+00 4.7236+00
5.0282+00 5.3525+00 5.6978+00 6.0652+00 6.4564+00
6.8728+00 7.3161+00 7.7879+00 8.2902+00 8.8249+00
9.3940+00 9.9999+00 1.0157+01 1.0317+01 1.0480+01
1.0645+01 1.0812+01 1.0983+01 1.1156+01 1.1331+01
1.1510+01 1.1691+01 1.1875+01 1.2062+01 1.2252+01
1.2445+01 1.2641+01 1.2840+01 1.3042+01 1.3248+01
1.3456+01 1.3668+01 1.3883+01 1.4102+01 1.4324+01
1.4550+01 1.4779+01 1.5012+01 1.5248+01 1.5488+01
1.5732+01 1.5980+01 1.6231+01 1.6487+01

```

Fig. 5.19 The input data for MCNP calculation.

```

SP    0
      0           0           0           0           0
      4.600-05   6.959-05   8.399-05   1.727-04   1.554-04
      1.932-04   2.512-04   3.390-04   4.520-04   5.189-04
      6.487-04   7.450-04   8.417-04   9.862-04   1.215-03
      1.421-03   1.591-03   1.810-03   1.933-03   2.203-03
      2.353-03   2.397-03   2.468-03   2.501-03   1.255-03
      1.238-03   1.243-03   1.162-03   1.164-03   1.193-03
      1.185-03   1.448-03   1.718-03   2.186-03   1.653-03
      1.040-03   9.251-04   8.761-04   8.385-04   7.505-04
      7.832-04   7.368-04   6.683-04   6.248-04   5.473-04
      5.120-04   4.928-04   4.124-04   3.956-04   4.339-04
      4.881-04   6.196-04   1.714-04   2.017-04   2.109-04
      2.134-04   2.369-04   2.547-04   2.576-04   2.685-04
      2.849-04   2.881-04   3.445-04   5.177-04   5.260-04
      5.417-04   7.421-04   7.535-04   7.649-04   9.229-04
      9.597-04   9.782-04   5.512-03   8.224-03   8.337-03
      6.554-02   1.400-01   1.424-01   1.440-01   1.456-01
      1.480-01   1.454-01   2.054-02   2.095-02
      *****
C     * MATERIAL SPECIFICATION CARDS
C     *
C     *****
C     ---- LI2O/SS COVER-----
M1    3006.33C 4.27817-3    3007.33C 5.33792-2    8016.33C 2.88287-2
      26000.33C 1.55712-3    28000.33C 1.83687-4    24000.33C 4.22314-4
      25055.33C 3.30907-5
C     DRXS
C     *****
C     * TALLY SPECIFICATION CARDS
C     *
C     *****
FC5   --- FLUXES AT 5 PT DTS(TH=0.0, 12.2, 24.9, 41.8, 66.8 DEG)
F5    0.0           0           738.2000         1
      156.1056       0           722.017          1
      311.7349       0           671.5754          1
      496.03346      0           554.7832          1
      691.8332       0           296.5201          1

DD    0.5  100
EO    4.6308-02
      5.2474-02   5.9461-02   6.7378-02   7.6349-02   8.6515-02
      9.8035-02   1.1109-01   1.2588-01   1.4264-01   1.6163-01
      1.8315-01   2.0754-01   2.3517-01   2.6649-01   3.0197-01
      3.4217-01   3.8774-01   4.3936-01   4.9786-01   5.6415-01
      6.3927-01   7.2438-01   8.2084-01   9.3013-01   1.0540+00
      1.1943+00   1.3533+00   1.5335+00   1.7377+00   1.8498+00
      1.9691+00   2.0961+00   2.2313+00   2.3752+00   2.5284+00
      2.6914+00   2.8650+00   3.0498+00   3.2465+00   3.4559+00
      3.6787+00   3.9160+00   4.1686+00   4.4374+00   4.7236+00
      5.0282+00   5.3525+00   5.6978+00   6.0652+00   6.4564+00
      6.8728+00   7.3161+00   7.7879+00   8.2902+00   8.8249+00
      9.3940+00   9.9999+00   1.0157+01   1.0317+01   1.0480+01
      1.0645+01   1.0812+01   1.0983+01   1.1156+01   1.1331+01
      1.1510+01   1.1691+01   1.1875+01   1.2062+01   1.2252+01
      1.2445+01   1.2641+01   1.2840+01   1.3042+01   1.3248+01
      1.3456+01   1.3668+01   1.3883+01   1.4102+01   1.4324+01
      1.4550+01   1.4779+01   1.5012+01   1.5248+01   1.5488+01
      1.5732+01   1.5980+01   1.6231+01   1.6487+01

FQO   E   F
C     *****
C     * ENERGY AND THERMAL CARDS
C     *
C     *****
ERGN  0  16.5  0
C     *****
C     * PROBLEM CUTOFF CARDS
C     *
C     *****
CUTN  0  4.6308-02  -10  -0.01
NPS   200000
CTIME 8
C     *****
C     * PERIPHERAL CRADS
C     *
C     *****
PRDMP 50000 50000
LOST  10 10
PRINT
  
```

Fig. 5.19 Continued

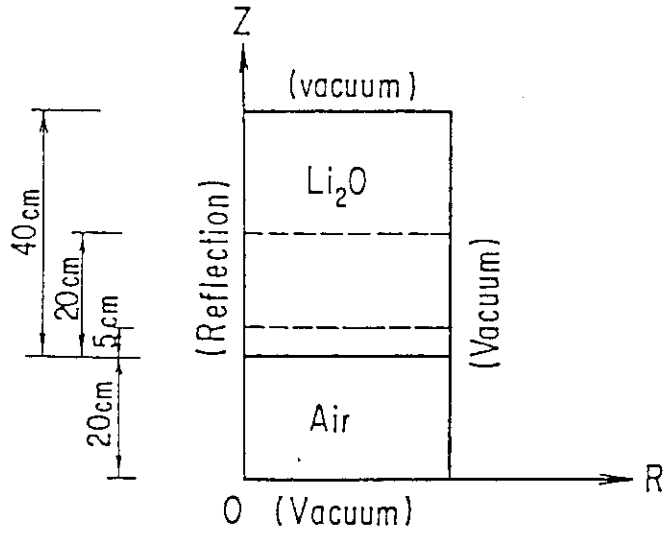
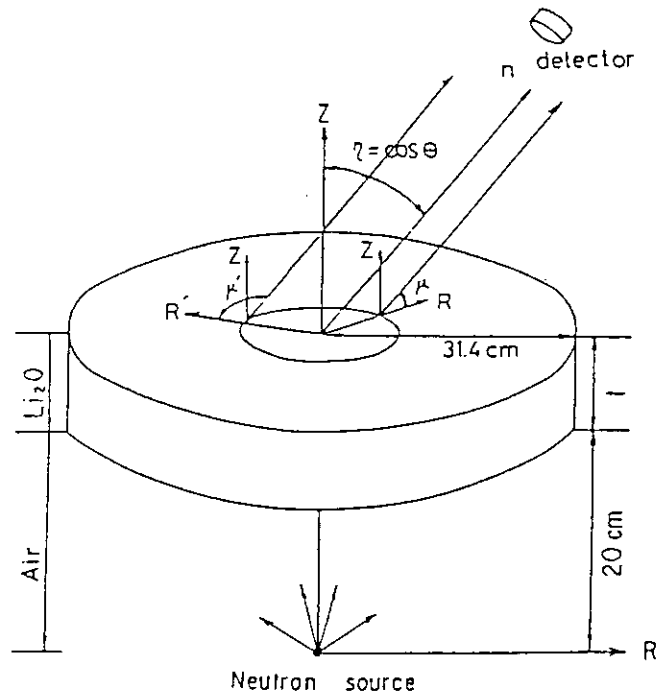


Fig. 5.20 R-Z model for the DOT 3.5 calculation.



$$\langle \phi \rangle_{\mu} = \frac{\sum_{\mu} \phi(n, \mu) \omega_{\mu}}{\sum_{\mu} \omega_{\mu}}$$

$$\langle \phi \rangle_{\mu \cdot R} = \frac{\int_0^R \langle \phi \rangle_r 2\pi r \Delta r}{\int_0^R 2\pi r \Delta r}$$

Fig. 5.23 The procedure of averaging the angular flux at the boundary.



```

GRTUNCL *R-Z;AIR(O)20CM+FE(40.0 CM);P5S16;I04=-6;SIGO-J3; 1990/7/04 *
O
1$$
  0   5   2  35  85  125  4   5  129  18
  0  24  24   2   1 30000 10   0   1   0
 18   0   0  16
2**
-1.000  0.  0.
T
1**
  F0.0
2**
  4I0.0      79I20.0  60.0
3**
0.81500E-03 0.79910E-03 0.90460E-01 0.92590E-01 0.91070E-01 0.16530E+00
0.18680E+00 0.18360E+00 0.94720E-01 0.26310E-01 0.25950E-01 0.18920E-01
0.72560E-02 0.71190E-02 0.65930E-02 0.41510E-02 0.40890E-02 0.40278E-02
0.26560E-02 0.25640E-02 0.25230E-02 0.16460E-02 0.13610E-02 0.13460E-02
0.95820E-03 0.67030E-03 0.66260E-03 0.56630E-03 0.41800E-03 0.41300E-03
0.39050E-03 0.30880E-03 0.11980E-02 0.10650E-02 0.95380E-03 0.91730E-03
0.88890E-03 0.96770E-03 0.99670E-03 0.99730E-03 0.10810E-02 0.11880E-02
0.12590E-02 0.13490E-02 0.14080E-02 0.14590E-02 0.15120E-02 0.15660E-02
0.17040E-02 0.18740E-02 0.20330E-02 0.19200E-02 0.19030E-02 0.19410E-02
0.19630E-02 0.20330E-02 0.20050E-02 0.19750E-02 0.19890E-02 0.120430-02
0.38090E-02 0.36900E-02 0.36480E-02 0.34680E-02 0.32030E-02 0.29930E-02
0.26390E-02 0.23220E-02 0.20880E-02 0.18280E-02 0.15350E-02 0.13280E-02
0.11560E-02 0.89910E-03 0.77690E-03 0.59450E-03 0.53450E-03 0.41980E-03
0.36900E-03 0.28520E-03 0.25180E-03 0.19930E-03 0.16780E-03 0.95140E-04
0.37670E-04 0.26720E-04
  F0.0
4**
 19I0.0  14I20.0  50.0
5**
  F1.0
6**
  1.0
7**
  1.0
8$$
  35R1  4Q35
  35R2  79Q35
10$$
  4I3   18
  4I19  24  1Q6
11$$
  6Z
  6Z  4I1  6
12**
  6Z
  6Z 6R8.3910-2
9$$
-13  -19
13**
-0.97753 -0.90676 -0.82999 -0.74536 -0.64979 -0.53748
-0.39441 -0.14907  1M8
14**
  F1.0
  T T

```

Fig. 5.21 The input data of GRTUNCL for DOT 3.5 calculation.

```

**RZ; AIR(20 CM)+FE(40.0 CM);DZ=0.5 CM;P5S16;I04=6;SIG0-J3;1990/7/04*
O
61$$
0 5 2 35 85 125 4 5 129 18
2Z 24 0 160 2R1 3Z
1 10 15 4 6 2 4Z
2Z 0 0 0 3Z 0 0
3 3Z 0 5Z
2 2R1 5Z 0 8
0
62$$
2 3 4 14 15 9 10 11 12 13 8 60000 0 0
63**
0.0 1.0-2 9Z 0.0 0.0 0.0 F0.0
T
7**
-0.21082 -0.14907 1M1 -0.42164 -0.39441 -0.14907
1M2 -0.55777 -0.53748 -0.39441 -0.14907 1M3
-0.66667 -0.64979 -0.53748 -0.39441 -0.14907 1M4
-0.76012 -0.74536 -0.64978 -0.53748 -0.39441 -0.14907
1M5 -0.84327 -0.82999 -0.74536 -0.64979 -0.53748
-0.39441 -0.14907 1M6 -0.91894 -0.90676 -0.82999
-0.74536 -0.64979 -0.53748 -0.39441 -0.14907 1M7
-0.98883 -0.97753 -0.90676 -0.82999 -0.74536 -0.64979
-0.53748 -0.39441 -0.14907 1M8 1Q80
3R-0.97753 5R-0.90676 7R-0.82999 9R-0.74536 11R-0.64979 13R-0.53748
15R-0.39441 17R-0.14907 3R0.97753 5R0.90676 7R0.82999 9R0.74536
11R0.64979 13R0.53748 15R0.39441 17R0.14907
T
6**
0.0 0.13586-1 1N2 4R0.97681-2
0.0 0.64738-2 0.50390-2 0.64738-2
1N4 0.64634-2 0.71124-2 1N2
1N5 0.64634-2 0.14381-2 0.36342-2
0.14381-2 0.64634-2 1N6 0.64738-2
0.71124-2 0.36342-2 1N3 1N7
0.97681-2 0.50390-2 0.71124-2 0.14381-2
0.71124-2 0.50390-2 0.97681-2 1N8
0.13586-1 0.97681-2 0.64738-2 0.64634-2
1N4 1N8 1Q80
T
3**
F0.0
T
1**
F0.0
2**
4I0.0 79I20.0 60.00
4**
19I0.0 14I20.0 50.0
5**
F1.0
8$$
35R1 4Q35
35R2 79Q35
10$$
4I13 18
4I19 24 1Q6
11$$
6Z
6Z 4I1 6
12**
6Z
6Z 6R8.3910-2
9$$
-13 -19
T T

```

Fig. 5.22 The input data for DOT 3.5 calculation.

```

C
C          FLUX.RJE   ( GRP69.DAT/GRP72.DAT , WEIGHT.DAT )
C
C
C S=0 -----> R=1       24 TABLES
C S=1 -----> R=AVE.    8 TABLES
C S=2 -----> R=BOTH   32 TABLES
C
C          $RJE FLUX -----> @MTOVAX -----> "PLOTTER"
C
C OUTPUT FILE OF DOT CALCULATION IS ASSIGNED ON DEVICE #9.
C
C          PARAMETER (IGMAX=176, IANGMX=160, IMMAX=50)
C -----(( IGMAX IS MAXIMUM OF GROUP NUMBER ))
C -----(( IANGMX IS MAXIMUM OF ANGULAR QUADRATURE ))
C -----(( IMMAX IS MAXIMUM OF IM MESH ))
C          DIMENSION ENERGY(IGMAX), ELETH(IGMAX), WEIGHT(80),
*          W(IANGMX), OUTAFL(IMMAX, IANGMX), FL(IANGMX),
*          FLX(6, IANGMX, IGMAX), FLUX(6, 10, IGMAX),
*          FLMAX(6, 10, IGMAX), FLMIN(6, 10, IGMAX),
*          R(IMMAX), RFLUX(10, IGMAX), ANGLE(10)
C          REWIND 9
C          READ(5, 500) IGRP, IM, JM, IO3, MM, NFLSV, IOPT, IS
C          READ(5, 501) RSIZE
C          READ(5, 502) (ANGLE(M), M=1, 8)
C          IGRP1=IGRP+1
C          READ(5, 503) (ENERGY(L), L=1, IGRP1)
C          READ(5, 504) (WEIGHT(K), K=1, 80)
500 FORMAT(8I5)
501 FORMAT(1H , F8.2)
502 FORMAT(1H , 8F8.2)
503 FORMAT(6E12.5)
504 FORMAT(5E14.7)
C          DO 5 KK=1, 80
C          K=KK+80
C          W(K)=WEIGHT(KK)
C          5 CONTINUE
C          DO 6 J=1, IM
CCC ***** FOR NON UNIFORM MESH (FE) *****
C          RSIZE0=20.0
C          IMO=20
C          DO 6 J=1, IMO
C
C          R(J)=RSIZE*(FLOAT(J)-0.5)/FLOAT(IM)
C          R(J)=RSIZE0*(FLOAT(J)-0.5)/FLOAT(IMO)
C          6 CONTINUE
C
C          IDUM=IM*JM+IM*JM*(IO3*(IO3+3))/2+MM*JM
C          DO 10 L=1, IGRP
C          ELETH(L)=LOG(ENERGY(L)/ENERGY(L+1))
C          READ(9) (DUM, I=1, IDUM), ((OUTAFL(J, K), K=1, MM), J=1, IM)
C          DO 20 J=1, 5
C          DO 20 K=81, 160
CCC *** WHEN SOURCE NOMALIZATION IS IN /4PAI *****
C          FLX(J, K, L)=OUTAFL(J, K)/(4.0*3.14159*ELETH(L))
CCC *** WHEN SOURCE NORMALIZATION IS IN /SR *****
C          FLX(J, K, L)=OUTAFL(J, K)/ELETH(L)
CCC *****
C          20 CONTINUE
C          DO 30 J=1, 5
C          K1=81
C          K2=83
C          DO 40 M=1, 8
C          U=0.
C          V=0.
C          FLMAX(J, M, L)=-1.
C          FLMIN(J, M, L)=1.
C          K0=K1+1

```

Fig. 5.24 The program for the radial averaging of the angular flux.

```

DO 50 K=K0,K2
FL(K)=FLX(J,K,L)
IF (FL(K) .LT. FLMIN(J,M,L)) FLMIN(J,M,L)=FL(K)
IF (FL(K) .GT. FLMAX(J,M,L)) FLMAX(J,M,L)=FL(K)
U=U+FL(K)*W(K)
V=V+W(K)
50 CONTINUE
FLUX(J,M,L)=U/V
K1=K1+2*M+1
K2=K2+2*M+3
40 CONTINUE
30 CONTINUE
10 CONTINUE
C
C
IF (IS.EQ.1) GO TO 1
J=1
DO 60 M=1,8
WRITE(6,610) ANGLE(M)
610 FORMAT(1H , ' ***** ANGULAR FLUX (R=1,WEIGHTED) ****',10X,
* ' ANGLE=',F8.1)
WRITE(6,600) (FLUX(J,M,L),L=1,IGRP)
600 FORMAT(1H ,1P6E12.5)
60 CONTINUE
DO 70 M=1,8
WRITE(6,620) ANGLE(M)
620 FORMAT(1H , ' ***** ANGULAR FLUX (R=1,MAXIMUM) ****',10X,
* ' ANGLE=',F8.1)
WRITE(6,600) (FLMAX(J,M,L),L=1,IGRP)
70 CONTINUE
DO 80 M=1,8
WRITE(6,630) ANGLE(M)
630 FORMAT(1H , ' ***** ANGULAR FLUX (R=1,MINIMUM) ****',10X,
* ' ANGLE=',F8.1)
WRITE(6,600) (FLMIN(J,M,L),L=1,IGRP)
80 CONTINUE
1 IF (IS.EQ.0) GO TO 2
DO 90 L=1,IGRP
DO 91 M=1,8
X=0.
Y=0.
DO 92 J=1,5
X=X+R(J)*FLUX(J,M,L)
Y=Y+R(J)
92 CONTINUE
RFLUX(M,L)=X/Y
91 CONTINUE
90 CONTINUE
DO 93 M=1,8
WRITE(6,640) ANGLE(M)
640 FORMAT(1H , ' ***** ANGULAR FLUX (R-AVERAGED) ****',10X,
* ' ANGLE=',F8.1)
WRITE(6,600) (RFLUX(M,L),L=1,IGRP)
93 CONTINUE
2 STOP
END

```

Fig. 5.24 Continued

```

127 35 125 5 160 9 1 2
50.0
12.2 24.9 33.9 41.8 49.5 57.5 66.8 81.4
0.16487+08 0.16231+08 0.15980+08 0.15732+08 0.15488+08 0.15248+08
0.15012+08 0.14779+08 0.14550+08 0.14324+08 0.14102+08 0.13883+08
0.13668+08 0.13456+08 0.13248+08 0.13042+08 0.12840+08 0.12641+08
0.12445+08 0.12252+08 0.12062+08 0.11875+08 0.11691+08 0.11510+08
0.11331+08 0.11156+08 0.10983+08 0.10812+08 0.10645+08 0.10480+08
0.10317+08 0.10157+08 1.00000+7 9.51229+6 9.04837+6 8.60708+6
8.18731+6 7.78801+6 7.40818+6 7.04688+6 6.70320+6 6.59238+6
6.37628+6 6.06531+6 5.76950+6 5.48812+6 5.22046+6 4.96585+6
4.72367+6 4.49329+6 4.06570+6 3.67879+6 3.32871+6 3.16637+6
3.01194+6 2.86505+6 2.72532+6 2.59240+6 2.46597+6 2.38521+6
2.36525+6 2.34570+6 2.30686+6 2.23130+6 2.12248+6 2.01897+6
1.92050+6 1.82684+6 1.73774+6 1.65299+6 1.57237+6 1.49569+6
1.42274+6 1.35335+6 1.28735+6 1.22456+6 1.16484+6 1.10803+6
1.00259+6 9.61640+5 9.07180+5 8.62936+5 8.20850+5 7.80817+5
7.42736+5 7.06512+5 6.72055+5 6.39279+5 6.08101+5 5.78444+5
5.50232+5 5.23397+5 4.97871+5 4.50492+5 4.07622+5 3.87742+5
3.68832+5 3.33733+5 3.01974+5 2.98491+5 2.97211+5 2.94518+5
2.87247+5 2.73237+5 2.47235+5 2.35177+5 2.22773+5 2.12797+5
2.02419+5 1.92547+5 1.83156+5 1.74224+5 1.65727+5 1.57644+5
1.49956+5 1.42642+5 1.35686+5 1.29068+5 1.22773+5 1.16786+5
1.11090+5 9.80366+4 8.65169+4 8.25034+4 7.94987+4 7.19981+4
6.73794+4 5.65622+4 5.24752+4 4.63092+4 4.08677+4 3.43067+4
0.0E+00 0.1358595E-01 0.1358595E-01 0.0E+00 0.9768061E-02
0.9768061E-02 0.9768061E-02 0.9768061E-02 0.0E+00 0.6473772E-02
0.5038980E-02 0.6473772E-02 0.6473772E-02 0.5038980E-02 0.6473772E-02
0.0E+00 0.6463375E-02 0.7112373E-02 0.7112373E-02 0.6463375E-02
0.6463375E-02 0.7112373E-02 0.7112373E-02 0.6463375E-02 0.0E+00
0.6463375E-02 0.1438095E-02 0.3634186E-02 0.1438095E-02 0.6463375E-02
0.6463375E-02 0.1438095E-02 0.3634186E-02 0.1438095E-02 0.6463375E-02
0.0E+00 0.6473772E-02 0.7112373E-02 0.7112373E-02 0.3634186E-02
0.7112373E-02 0.6473772E-02 0.6473772E-02 0.7112373E-02 0.3634186E-02
0.3634186E-02 0.7112373E-02 0.6473772E-02 0.0E+00 0.9768061E-02
0.5038980E-02 0.7112373E-02 0.1438095E-02 0.7112373E-02 0.5038980E-02
0.9768061E-02 0.9768061E-02 0.5038980E-02 0.7112373E-02 0.1438095E-02
0.7112373E-02 0.5038980E-02 0.9768061E-02 0.0E+00 0.1358595E-01
0.9768061E-02 0.6473772E-02 0.6463375E-02 0.6463375E-02 0.6473772E-02
0.9768061E-02 0.1358595E-01 0.1358595E-01 0.9768061E-02 0.6473772E-02
0.6463375E-02 0.6463375E-02 0.6473772E-02 0.9768061E-02 0.1358595E-01

```

<< Explanation of the Input Data >>

```

IGRP, IM, JM, I03, MM, NFLSV, IOPT, IS
RSIZE
(ANGLE(M), M=1, 8)
(ENERGY(L), L=1, IGRP1)
(WEIGHT(K), K=1, 80)

```

```

IGRP : Number of Energy Groups
IM : Number of R-meshes
JM : Number of Z-meshes
I03 : Order of Legendre Polynomial Expansion
MM : Number of Sn Quadrature Sets
NFLSV : Device Number for Assignment of the Flux File from DOT
IOPT : no meanings
IS : Output Option
RSIZE : Radius
ANGLE : Angles
ENERGY : Energy Boundaries
WEIGHT : Quadrature Weight

```

Fig. 5.25 The input data for the program presented in Fig. 5.24 and its explanation.

## 1.6 Integral Experiment on Graphite Cylindrical Assembly

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**Facility** FNS, Japan Atomic Energy Research Institute

**Date** 1984

**Measured Quantities**

(i) Fission Rate

Micro-Fission Chambers of U-235, U-238, Th-232 and Np-237, and  
Fission Track Detectors

(ii) Reaction Rate

Foil Activation

(iii) In-system Neutron Spectrum

14 mm Diam. Sphere NE213

(iv) Dose Rate

TLD

**Experimental Method and Material / Geometry / Configuration**

Reactor-grade graphite blocks were stacked in thin wall (2 mm) aluminum tubes to form a cylindrical slab in the same manner as the lithium-oxide assembly.<sup>1)</sup> The size of graphite assembly was 31.4 cm in equivalent radius and 61.0 cm in thickness. The blocks used in this assembly were four types except near the central region where there was an experimental channel. A sectional view of the assembly is shown in Fig. 6.1. The graphite blocks used were selected from the inventory so as to have the density with the deviation within  $\pm 2\%$ . The data of blocks are summarized in Table 6.1. The average density was  $(1.641 \pm 0.015) \text{ g/cm}^3$ .

The experimental channel, a set of sheath and drawer, was made of the same grade graphite [ $100 \times 100 \times 1000 \text{ mm}^3$ ,  $(1.654 \pm 0.002) \text{ g/cm}^3$ ] in order to save the changing time of detector position and for minimizing the personnel exposure for experimentalists. A sectional

view of the sheath, drawer and spacers are also shown in Fig. 6.2. The experimental channel was placed at the central axis of the assembly. Therefore, this experimental assembly consisted of a single element, i.e., carbon, except the aluminum framework. Graphite blocks with experimental hole of 21 mm diam. were made to allow insertion of a detector. Homogenized nuclide densities in each region are tabulated in Table 6.2.

Detailed descriptions about each measurement are given in Ref. 2.

### **Neutron Source Characteristics**

The 80-degree beam line in the first target room of the FNS facility was used for the present experiment. A high speed water-cooled target<sup>3)</sup> was set at the end of the beam line. A  $7.4 \times 10^{11}$  Bq (20 Ci) Ti-T target was mounted on the target assembly. Neutrons were generated at the distance of 20 cm from the assembly surface on its central axis. The setting accuracy is estimated to be within  $\pm 1$  mm. A view of the experimental arrangement is shown in Fig. 6.3. The layout in the first target room of 15 m x 15 m is illustrated in Fig. 6.4. The distances from the target to the west and south walls are 5.5 m, and those to the ceiling, the grating floor and the basement floor are 7.9, 1.8 and 3.8 m, respectively.

Neutron yields were determined by means of the associated alpha-particle detection method.<sup>4)</sup> A small silicon surface-barrier detector with a aperture of about 1 mm diam. was mounted inside the beam line to detect the alpha-particle of  ${}^3\text{T}(d,n){}^4\text{He}$  reaction. Source characteristics, that is, neutron yield, angular distribution and spectra of the target assembly were measured by the time-of-flight technique,<sup>5)</sup> foil activation and an NE213 spectrometer<sup>6)</sup>.

A good agreement was obtained between neutron yields measured by different methods within the experimental error. An analysis by Monte Carlo computation<sup>7)</sup> also showed fairly good agreement with measured neutron energy spectra as well as angular distributions, the latter obtained by foil activation. Thus, the calculated source spectrum and other characteristics were essentially confirmed and can be used as input information in the benchmark calculations. Source neutron spectrum is given in Table 6.19. The spectrum can be used for the experimental analysis. It should be noticed that the number of neutrons emitted toward 0 degree with respect to the  $d^+$  beam must be normalized as 1.1767 per unit D-T reaction at the target.

### **Experimental Data with Errors**

Fission rates measured by the micro fission chambers are shown in Table 6.3 and Fig. 6.5. Reaction rate distribution obtained by the foil activation technique is shown in Table 6.5 and Figs 6.6 and 6.7. Decay data needed for reaction rate calculation and error analysis for the reaction rate measurement are summarized in Tables 6.4 and 6.6, respectively. Neutron spectra measured by the NE213 spectrometer at eight positions are given in Tables 6.11 - 6.18 and Figs. 6.8 - 6.15. Detector location and alpha count of the spectrum measurements

are shown in Table 6.7. Systematic errors in the unfolded spectra are listed in Table 6.8. Response rates of TLDs are shown in Table 6.9 and Fig. 6.16 - 6.18. Fission rates measured by the fission track detector method are shown in Table 6.11 and Fig. 6.19.

### Error Assessment and Example of Experimental Analysis

Some descriptions about error assessment are given in the Tables. Examples of calculation model and input data for GRTUNCL and DOT are given in Figs. 6.20 - 6.22. Detailed descriptions about error assessment and experimental analysis are given in Ref. 2.

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Table 6.1 Data of graphite blocks used in the experiments.

Size [mm]	Quantity	Total weight [ kg ]	Density [ g / cm <sup>3</sup> ]
25.3 x 50.6 x 50.6	43	4.56	1.638 ± 0.011
50.6 x 50.6 x 50.6	50	10.66	1.637 ± 0.010
50.3 x 50.6 x 101.6	64	27.32	1.648 ± 0.016
25.3 x 50.6 x 203.2	332	141.57	1.639 ± 0.017
50.6 x 50.6 x 203.2	222	189.34	1.639 ± 0.017
100 x 100 x 1000*	4	65.99	1.654 ± 0.002
Weighted average			1.642 ± 0.015

\* The sheath, drawer and spacer, i.e., A, B, C and D show in Fig. 6.4, were made from these blocks.

Table 6.2 Homogenized nuclide density for each region of graphite assembly.

Nuclei	Air	Graphite	Al-frame
O	1.040-5*	----	----
N	3.881-5	----	----
C	----	8.2322-2	----
Al	----	----	1.067-2
Mg	----	----	6.000-5
Si	----	----	4.354-5
Fe	----	----	1.145-5

\* Read as  $1.040 \times 10^{-5}$  [  $10^{24}$  atom / cm<sup>3</sup> ].

Table 6.3 Fission-rates in the graphite assembly measured by micro-fission chambers.

Position <sup>*1</sup> [cm]	Fission rate [fission/atom/source neutron]							
	U-235		U-238		Np-237		Th-232	
24.1	3.88-27 <sup>*2</sup>	(4.1%) <sup>*3</sup>	1.82-28	(3.9%)	4.65-28	(5.1%)	5.79-29	(4.7%)
26.6	5.04-27	(4.1%)	1.38-28	(3.9%)	3.67-28	(5.1%)	4.42-29	(4.7%)
31.7	6.93-27	(4.1%)	8.40-29	(3.9%)	2.34-28	(5.1%)	2.71-29	(4.7%)
36.8	8.23-27	(4.1%)	5.13-29	(3.9%)	1.51-28	(5.1%)	1.78-29	(4.7%)
41.8	8.82-27	(4.1%)	3.34-29	(3.9%)	9.58-29	(5.1%)	1.18-29	(4.8%)
46.9	8.84-27	(4.1%)	2.16-29	(3.9%)	6.14-29	(5.1%)	8.47-30	(4.8%)
51.9	8.30-27	(4.1%)	1.44-29	(3.9%)	3.88-29	(5.1%)	6.04-30	(4.8%)
57.0	7.39-27	(4.1%)	9.40-30	(3.9%)	2.47-29	(5.1%)	4.44-30	(4.8%)
62.1	6.18-27	(4.1%)	6.07-30	(3.9%)	1.52-29	(5.2%)	3.13-30	(4.8%)
67.1	4.79-27	(4.1%)	4.12-30	(3.9%)	9.65-30	(5.2%)	2.28-30	(4.8%)
72.2	3.30-27	(4.1%)	2.65-30	(3.9%)	5.80-30	(5.3%)	1.53-30	(5.0%)
77.2	1.74-27	(4.1%)	1.67-30	(4.0%)	3.89-30	(5.2%)	8.88-31	(5.0%)

\*1 Distance from the target and along the central axis.

\*2 Read as  $3.88 \times 10^{-28}$ .

\*3 Estimated experimental error.

Table 6.4 Decay data needed for reaction-rate calculation.

Reaction	Half life	Detected g-ray energy [keV]	g-ray branching ratio [%]
$^{27}\text{Al}(n,\alpha)^{24}\text{Na}$	15.02 h	1368.6	100
$^{58}\text{Ni}(n,2n)^{57}\text{Ni}$	36.0 h	1377.6	77.6
$^{58}\text{Ni}(n,p)^{58}\text{Co}$	70.78 d	810.76	99.44
$^{90}\text{Zr}(n,2n)^{89}\text{Zr}$	78.43 h	909.2	99.01
$^{93}\text{Nb}(n,2n)^{92m}\text{Nb}$	10.14 d	934.5	99.2
$^{115}\text{In}(n,n')^{115m}\text{In}$	4.49 h	336.2	45.9
$^{197}\text{Au}(n,\gamma)^{198}\text{Au}$	2.696 d	411.8	95.40

Table 6.5 Reaction-rate distribution in the graphite assembly.

(a)  $^{27}\text{Al}(n,\alpha)^{24}\text{Na}$ ,  $^{58}\text{Ni}(n,2n)^{57}\text{Ni}$ ,  $^{58}\text{Ni}(n,p)^{58}\text{Co}$  and  $^{90}\text{Zr}(n,2n)^{89}\text{Zr}$ .

Position*1 [cm]	Reaction rate [reaction/atom/source neutron]			
	$^{27}\text{Al}(n,\alpha)^{24}\text{Na}$	$^{58}\text{Ni}(n,2n)^{57}\text{Ni}$	$^{58}\text{Ni}(n,p)^{58}\text{Co}$	$^{90}\text{Zr}(n,2n)^{89}\text{Zr}$
19.9	2.33-29 (3.1%)	8.12-30 (5.0%)	7.98-29 (3.1%)	1.49-28 (3.1%)
29.9	7.42-30 (3.2%)	1.96-30 (3.2%)	3.71-29 (5.0%)	3.59-29 (3.2%)
40.2	2.60-30 (3.2%)	5.50-31 (5.0%)	1.53-29 (5.2%)	1.07-29 (3.4%)
50.3	9.61-31 (3.8%)	1.64-31 (5.8%)	6.72-30 (5.2%)	3.44-30 (3.7%)
60.5	3.69-31 (3.7%)	5.40-32 (11.1%)	2.94-30 (5.5%)	1.23-30 (4.5%)
70.7	1.41-31 (6.0%)	1.98-32 (5.1%)	1.29-30 (5.0%)	4.27-31 (3.7%)
80.9	5.00-32 (8.8%)	-----	-----	-----

\*1 Distance from the target and along the central axis.

\*2 Read as  $2.33 \times 10^{-29}$ .

\*3 The error of neutron yield (2.2%) is excluded.

(b)  $^{93}\text{Nb}(n,2n)^{92m}\text{Nb}$ ,  $^{115}\text{In}(n,n')^{115m}\text{In}$  and  $^{197}\text{Au}(n,g)^{198}\text{Au}$ .

Position [cm]	Reaction rate [ reaction/atom source/neutron ]		
	$^{93}\text{Nb}(n,2n)^{92m}\text{Nb}$	$^{115}\text{In}(n,n')^{115m}\text{In}$	$^{197}\text{Au}(n,g)^{198}\text{Au}$ *4
19.9	8.78-29 (3.2%)	3.13-29 (3.3%)	2.77-28 (3.0%)
29.9	2.44-29 (3.2%)	1.99-29 (3.2%)	1.71-27 (3.1%)
40.2	8.13-30 (3.1%)	9.80-30 (3.6%)	-----
50.3	2.78-30 (3.1%)	4.57-30 (4.1%)	2.13-27 (3.1%)
60.5	1.05-30 (3.7%)	2.17-30 (5.2%)	1.55-27 (3.1%)
70.7	3.87-31 (3.6%)	9.26-31 (7.4%)	8.54-28 (3.0%)
80.9	1.47-31 (3.2%)	-----	1.39-28 (3.1%)

\*4 Not corrected for self-shielding effect because the foil was very thin (0.001 mm).

Table 6.6 Error analysis for the reaction-rate measurement.

Item	Error [ $\pm$ %]
Counting statistics	0.5 ~ 9
Detector efficiency	2.5
Natural abundance	< 0.2
Foil weight	< 0.1
Sum Peak	0.5 (only for $^{24}\text{Na}$ )
Saturation factor	0.5
Source neutron yield	3.0
Times for irradiation, cooling and measuring	~ negligible
Decay data	< 0.5

Table 6.7 Detector location and alpha count of in-system neutron spectral measurement.

Data No.	Position <sup>*1</sup> [ cm ]	Alpha count [ counts ]	
1	24.1 $\pm$ 0.1	1,050	(3.9%) <sup>*2</sup>
2	26.7 $\pm$ 0.1	1,604	(3.4%)
3	31.7 $\pm$ 0.1	2,379	(3.1%)
4	41.8 $\pm$ 0.1	4,887	(2.7%)
5	52.0 $\pm$ 0.1	9,848	(2.5%)
6	62.1 $\pm$ 0.1	17,383	(2.5%)
7	72.1 $\pm$ 0.1	35,977	(2.3%)
8	77.2 $\pm$ 0.1	65,925	(2.4%)

\*1 Distance from the target.

\*2 Experimental error for source intensity. (See Table 6.8)

Table 6.8 Systematic errors in the unfolded spectra<sup>\*1</sup>.

Item	Error [%]	Comment
Source intensity	$\pm \sqrt{(2.34)^2 + (10^4 / C\alpha)}$	Alpha monitor
Efficiency	$\pm 2.0\%$	Calibration error <sup>*2</sup>

\*1 Except the error related to the unfolding process.

\*2 The calibration was performed by using the same D-T neutron source and alpha-monitor. Therefore, the systematic error (2.34%) is excluded in the value.

Table 6.9 Response rates of TLDs in the graphite assembly.

(a) TLD-100, TLD-600, TLD-700						
Distance [cm]	TLD-100		TLD response [ R( <sup>60</sup> Co equivalence) / source ]			
			TLD-600		TLD-700	
20.0	1.46-14 <sup>*2</sup>	(12.2%) <sup>*3</sup>	4.24-14	(13.3%)	2.01-14	( 9.7%)
25.1	1.50-14	( 9.3%)	7.34-14	(10.4%)	1.46-14	(13.0%)
30.1	1.73-14	( 4.4%)	1.11-13	(15.1%)	9.39-15	(12.6%)
35.2	1.87-14	( 7.6%)	1.36-13	( 8.4%)	7.62-15	( 8.4%)
40.2	2.11-14	( 6.7%)	1.40-13	(14.2%)	6.89-15	(14.9%)
45.3	1.99-14	( 8.1%)	1.50-13	(14.0%)	6.49-15	(24.9%)
50.4	1.86-14	(10.7%)	1.37-13	(12.6%)	4.44-15	(13.5%)
55.4	1.71-14	( 6.0%)	1.14-13	( 9.9%)	4.13-15	(38.2%)
60.5	1.40-14	( 8.8%)	9.31-14	(17.5%)	3.24-15	(14.6%)
65.5	1.09-14	(11.5%)	7.94-14	(13.1%)	2.50-15	( 8.8%)
70.6	8.08-15	( 9.4%)	5.03-14	( 9.5%)	2.06-15	(27.8%)
75.7	4.58-15	(10.6%)	2.83-14	( 7.4%)	1.24-15	(18.1%)
80.7	1.26-15	( 8.4%)	9.04-15	(31.0%)	4.03-16	(12.0%)

\*1 Distance from the target and along the central axis.  
\*2 Read as 1.461 x 10<sup>-14</sup>.  
\*3 Experimental error.

(b) UD-110S, UD-136N, UD-137N						
Distance [cm]	UD-110S		TLD response [ R( <sup>60</sup> Co equivalence) / source ]			
			UD-136N		UD-137N	
20.0	6.52-13	(7.1%)	3.47-13	( 4.8%)	2.36-13	(17.9%)
25.1	3.99-13	(5.4%)	3.49-13	(11.8%)	1.45-13	(14.7%)
30.1	2.59-13	(5.2%)	3.98-13	(16.5%)	9.87-14	( 6.9%)
35.2	1.61-14	(5.3%)	4.44-13	( 8.2%)	6.06-14	( 7.4%)
40.2	1.15-13	(6.8%)	4.66-13	(10.9%)	4.40-14	(16.6%)
45.3	7.74-14	(5.2%)	4.64-13	(15.8%)	2.92-14	(15.8%)
50.4	5.40-14	(5.4%)	3.99-13	(11.0%)	1.96-14	(13.5%)
55.4	3.68-14	(6.1%)	3.66-13	(11.5%)	1.35-14	( 4.5%)
60.5	2.67-14	(7.8%)	2.82-13	(11.5%)	1.00-14	( 6.9%)
65.5	1.89-14	(4.4%)	2.30-13	(13.0%)	7.82-15	( 9.7%)
70.6	1.27-14	(6.6%)	1.63-13	(19.1%)	5.03-15	(10.5%)
75.7	8.78-15	(7.0%)	8.78-14	( 8.4%)	3.16-15	( 9.6%)
80.7	4.77-15	(6.4%)	2.54-14	(23.7%)	1.80-15	(15.6%)

(c) MSO-S, SSO-S, BSO-S						
Distance [cm]	MSO-S		TLD response [ R( <sup>60</sup> Co equivalence) / source ]			
			SSO-S		BSO-S	
25.1	1.60-13	(7.3%)	2.24-13	( 9.8%)	3.41-13	(14.9%)
30.1	1.04-13	(20.9%)	1.79-13	( 6.7%)	2.97-13	(25.3%)
35.2	5.91-14	(8.3%)	1.32-13	( 7.0%)	2.33-13	(31.1%)
40.2	4.40-14	(21.1%)	9.52-13	(11.0%)	1.49-13	(19.9%)
45.3	2.76-14	(7.1%)	6.86-13	( 6.6%)	1.26-13	(28.9%)
50.4	1.90-14	(18.6%)	5.11-13	( 9.0%)	7.95-14	(26.5%)
55.4	1.33-14	(17.3%)	3.52-13	( 6.4%)	6.23-14	(37.8%)
60.5	9.12-15	(16.8%)	2.62-13	( 6.8%)	3.55-14	(46.7%)
65.5	6.29-15	(18.7%)	1.74-13	(17.2%)	2.37-14	(65.7%)
70.6	4.41-15	(31.2%)	1.24-13	(12.2%)	1.78-14	(74.1%)
75.7	2.64-15	(58.5%)	8.30-14	(12.7%)	1.25-14	(128%)

Table 6.10 Absolute fission rate in graphite assembly measured by fission track detector method.

Position*1 [cm]	Absolute fission rate [fissions/atom/source neutron]					
	U-235		U-238		Th-232	
19.90	1.507-27*2	(5.9%)*3	2.65-28	(4.0%)	6.38-29	(4.5%)
24.85	-----		-----		4.51-29	(3.9%)
27.35	5.08-27	(5.7%)	-----		-----	
27.40	-----		1.245-28	(4.1%)	-----	
29.93	-----		-----		2.94-29	(4.3%)
35.00	7.49-27	(5.8%)	5.46-29	(4.1%)	1.453-29	(3.9%)
40.10	8.39-27	(5.7%)	3.35-29	(4.8%)	9.88-30	(4.3%)
45.15	9.23-27	(5.6%)	2.28-29	(4.0%)	5.91-30	(3.9%)
50.20	8.75-27	(5.6%)	1.311-29	(4.8%)	3.96-30	(4.4%)
55.30	-----		8.68-30	(5.7%)	2.36-30	(3.9%)
57.80	6.85-27	(5.8%)	-----		-----	
60.40	-----		6.22-30	(6.7%)	1.467-30	(4.5%)
65.40	4.69-27	(5.7%)	-----		-----	
65.45	-----		3.93-30	(5.4%)	9.54-31	(5.1%)
70.55	-----		2.76-30	(8.2%)	-----	
73.00	2.92-27	(5.7%)	-----		-----	

\*1 Distance from the target and along the central axis.

\*2 Read as  $1.507 \times 10^{27}$ .

\*3 Experimental error. The error includes statistical error and errors of neutron yield (2.4%) and prime sensitivity (1.7, 1.8 and 4.2 % for Th-232, U-238 and U-235, respectively). There is some unknown error such as the error in a chemical processing.

Table 6.11 Neutron spectrum in the graphite assembly (z=24.1 cm).

Energy [MeV]	Flux/Leth.	Error	Window	Energy [MeV]	Flux/Leth.	Error	Window
2.102E+05	-3.995E-07	1.0000	81.68	1.995E+06	3.591E-05	.0474	36.00
2.210E+05	-4.751E-07	1.0000	80.51	2.097E+06	3.544E-05	.0478	35.14
2.323E+05	-5.602E-07	1.0000	79.34	2.204E+06	3.506E-05	.0481	34.31
2.442E+05	-6.534E-07	1.0000	78.16	2.317E+06	3.486E-05	.0486	33.55
2.568E+05	-7.511E-07	1.0000	77.00	2.436E+06	3.468E-05	.0493	32.80
2.699E+05	-8.464E-07	1.0000	75.82	2.561E+06	3.403E-05	.0501	32.04
2.838E+05	-9.304E-07	1.0000	74.66	2.692E+06	3.253E-05	.0518	31.25
2.983E+05	-9.875E-07	1.0000	73.48	2.830E+06	3.034E-05	.0564	30.49
3.136E+05	-9.982E-07	1.0000	72.32	2.975E+06	2.822E-05	.0668	29.74
3.297E+05	-9.369E-07	1.0000	71.14	3.128E+06	2.693E-05	.0784	29.02
3.466E+05	-7.724E-07	1.0000	69.98	3.288E+06	2.628E-05	.0838	28.30
3.644E+05	-4.713E-07	1.0000	68.80	3.457E+06	2.509E-05	.0848	27.58
3.830E+05	-4.086E-10	1.0000	67.68	3.634E+06	2.235E-05	.0908	26.82
4.027E+05	6.648E-07	.6248	66.60	3.821E+06	1.862E-05	.1073	26.06
4.233E+05	1.537E-06	.2455	65.63	4.016E+06	1.586E-05	.1281	25.27
4.450E+05	2.609E-06	.1452	64.69	4.222E+06	1.565E-05	.1375	24.55
4.678E+05	3.854E-06	.1081	63.83	4.439E+06	1.777E-05	.1304	23.94
4.918E+05	5.226E-06	.0896	62.96	4.666E+06	2.049E-05	.1222	23.33
5.170E+05	6.675E-06	.0766	62.10	4.906E+06	2.203E-05	.1224	22.72
5.436E+05	8.168E-06	.0672	61.20	5.157E+06	2.196E-05	.1283	22.18
5.714E+05	9.693E-06	.0611	60.30	5.422E+06	2.169E-05	.1383	21.67
6.007E+05	1.127E-05	.0577	59.36	5.700E+06	2.281E-05	.1415	21.10
6.315E+05	1.294E-05	.0554	58.43	5.992E+06	2.495E-05	.1354	20.56
6.639E+05	1.473E-05	.0522	57.49	6.299E+06	2.650E-05	.1389	20.02
6.979E+05	1.662E-05	.0493	56.56	6.622E+06	2.732E-05	.1481	19.48
7.337E+05	1.855E-05	.0473	55.62	6.961E+06	2.837E-05	.1468	18.97
7.713E+05	2.039E-05	.0464	54.72	7.318E+06	2.920E-05	.1608	18.49
8.109E+05	2.206E-05	.0468	53.86	7.694E+06	2.830E-05	.1902	18.04
8.525E+05	2.349E-05	.0476	52.99	8.088E+06	2.555E-05	.2256	17.62
8.962E+05	2.469E-05	.0473	52.16	8.503E+06	2.487E-05	.2605	17.22
9.421E+05	2.570E-05	.0455	51.34	8.939E+06	2.997E-05	.2703	16.78
9.904E+05	2.656E-05	.0446	50.47	9.397E+06	3.634E-05	.2432	16.36
1.041E+06	2.733E-05	.0450	49.57	9.879E+06	4.055E-05	.2254	15.93
1.095E+06	2.812E-05	.0457	48.64	1.039E+07	4.471E-05	.2322	15.47
1.151E+06	2.902E-05	.0459	47.59	1.092E+07	4.335E-05	.2344	15.07
1.210E+06	3.011E-05	.0456	46.51	1.148E+07	4.341E-05	.2301	14.76
1.272E+06	3.142E-05	.0447	45.40	1.207E+07	6.361E-05	.1852	14.54
1.337E+06	3.286E-05	.0437	44.21	1.268E+07	1.068E-04	.1115	14.24
1.406E+06	3.428E-05	.0441	42.95	1.334E+07	2.508E-04	.0645	14.17
1.478E+06	3.541E-05	.0452	41.72	1.402E+07	5.171E-04	.0331	13.37
1.553E+06	3.614E-05	.0458	40.57	1.474E+07	5.994E-04	.0304	13.37
1.633E+06	3.650E-05	.0453	39.53	1.549E+07	4.042E-04	.0239	13.37
1.717E+06	3.657E-05	.0447	38.56	1.629E+07	1.559E-04	.0540	13.55
1.805E+06	3.647E-05	.0449	37.69	1.712E+07	2.947E-05	.1723	14.00
1.897E+06	3.623E-05	.0463	36.86	1.800E+07	4.285E-06	.2510	14.45

Table 6.12 Neutron spectrum in the graphite assembly (z=26.7 cm).

Energy [MeV]	Flux/Leth.	Error	Window	Energy [MeV]	Flux/Leth.	Error	Window
2.102E+05	-3.342E-07	1.0000	81.68	1.995E+06	3.649E-05	.0428	36.00
2.210E+05	-3.972E-07	1.0000	80.51	2.097E+06	3.639E-05	.0428	35.14
2.323E+05	-4.679E-07	1.0000	79.34	2.204E+06	3.617E-05	.0432	34.31
2.442E+05	-5.452E-07	1.0000	78.16	2.317E+06	3.582E-05	.0436	33.55
2.568E+05	-6.257E-07	1.0000	77.00	2.436E+06	3.513E-05	.0446	32.80
2.699E+05	-7.035E-07	1.0000	75.82	2.561E+06	3.377E-05	.0465	32.04
2.838E+05	-7.710E-07	1.0000	74.66	2.692E+06	3.156E-05	.0494	31.25
2.983E+05	-8.147E-07	1.0000	73.48	2.830E+06	2.889E-05	.0545	30.49
3.136E+05	-8.179E-07	1.0000	72.32	2.975E+06	2.666E-05	.0632	29.74
3.297E+05	-7.582E-07	1.0000	71.14	3.128E+06	2.575E-05	.0719	29.02
3.466E+05	-6.092E-07	1.0000	69.98	3.288E+06	2.598E-05	.0742	28.30
3.644E+05	-3.418E-07	1.0000	68.80	3.457E+06	2.610E-05	.0725	27.58
3.830E+05	7.276E-08	5.8277	67.68	3.634E+06	2.486E-05	.0741	26.82



4.027E+05	6.558E-07	.5775	66.60	3.821E+06	2.234E-05	.0822	26.06
4.233E+05	1.420E-06	.2435	65.63	4.016E+06	1.992E-05	.0937	25.27
4.450E+05	2.359E-06	.1482	64.69	4.222E+06	1.898E-05	.1028	24.55
4.678E+05	3.452E-06	.1119	63.83	4.439E+06	1.983E-05	.1051	23.94
4.918E+05	4.662E-06	.0926	62.96	4.666E+06	2.159E-05	.1037	23.33
5.170E+05	5.950E-06	.0793	62.10	4.906E+06	2.285E-05	.1049	22.72
5.436E+05	7.287E-06	.0689	61.20	5.157E+06	2.282E-05	.1092	22.18
5.714E+05	8.665E-06	.0625	60.30	5.422E+06	2.224E-05	.1187	21.67
6.007E+05	1.011E-05	.0587	59.36	5.700E+06	2.228E-05	.1275	21.10
6.315E+05	1.165E-05	.0560	58.43	5.992E+06	2.313E-05	.1281	20.56
6.639E+05	1.331E-05	.0528	57.49	6.299E+06	2.444E-05	.1306	20.02
6.979E+05	1.507E-05	.0494	56.56	6.622E+06	2.638E-05	.1328	19.48
7.337E+05	1.686E-05	.0471	55.62	6.961E+06	2.865E-05	.1264	18.97
7.713E+05	1.860E-05	.0461	54.72	7.318E+06	3.034E-05	.1331	18.49
8.109E+05	2.017E-05	.0465	53.86	7.694E+06	3.072E-05	.1492	18.04
8.525E+05	2.153E-05	.0472	52.99	8.088E+06	2.914E-05	.1672	17.62
8.962E+05	2.268E-05	.0467	52.16	8.503E+06	2.756E-05	.1981	17.22
9.421E+05	2.364E-05	.0453	51.34	8.939E+06	3.013E-05	.2236	16.78
9.904E+05	2.448E-05	.0440	50.47	9.397E+06	3.606E-05	.2032	16.36
1.041E+06	2.525E-05	.0442	49.57	9.879E+06	4.079E-05	.1864	15.93
1.095E+06	2.608E-05	.0452	48.64	1.039E+07	4.420E-05	.1925	15.47
1.151E+06	2.700E-05	.0457	47.59	1.092E+07	4.284E-05	.1938	15.07
1.210E+06	2.812E-05	.0451	46.51	1.148E+07	3.873E-05	.2103	14.76
1.272E+06	2.941E-05	.0438	45.40	1.207E+07	5.380E-05	.1796	14.54
1.337E+06	3.081E-05	.0431	44.21	1.268E+07	1.007E-04	.0965	14.12
1.406E+06	3.220E-05	.0429	42.95	1.334E+07	2.367E-04	.0559	13.94
1.478E+06	3.345E-05	.0437	41.72	1.402E+07	4.366E-04	.0317	13.16
1.553E+06	3.448E-05	.0438	40.57	1.474E+07	4.488E-04	.0295	13.16
1.633E+06	3.532E-05	.0434	39.53	1.549E+07	2.894E-04	.0243	13.16
1.717E+06	3.592E-05	.0424	38.56	1.629E+07	1.180E-04	.0530	13.46
1.805E+06	3.631E-05	.0417	37.69	1.712E+07	2.407E-05	.1505	14.01
1.897E+06	3.648E-05	.0423	36.86	1.800E+07	3.784E-06	.1922	14.56

Table 6.13 Neutron spectrum in the graphite assembly (z=31.7 cm).

Energy [MeV]	Flux/Leth.	Error	Window	Energy [MeV]	Flux/Leth.	Error	Window
2.102E+05	-1.034E-07	1.0000	81.68	1.995E+06	2.559E-05	.0386	36.00
2.210E+05	-1.206E-07	1.0000	80.51	2.097E+06	2.532E-05	.0390	35.14
2.323E+05	-1.386E-07	1.0000	79.34	2.204E+06	2.504E-05	.0391	34.31
2.442E+05	-1.561E-07	1.0000	78.16	2.317E+06	2.473E-05	.0394	33.55
2.568E+05	-1.711E-07	1.0000	77.00	2.436E+06	2.424E-05	.0399	32.80
2.699E+05	-1.801E-07	1.0000	75.82	2.561E+06	2.339E-05	.0416	32.04
2.838E+05	-1.787E-07	1.0000	74.66	2.692E+06	2.200E-05	.0444	31.25
2.983E+05	-1.600E-07	1.0000	73.48	2.830E+06	2.029E-05	.0483	30.49
3.136E+05	-1.152E-07	1.0000	72.32	2.975E+06	1.868E-05	.0546	29.74
3.297E+05	-3.316E-08	1.0000	71.14	3.128E+06	1.765E-05	.0613	29.02
3.466E+05	9.908E-08	3.2923	69.98	3.288E+06	1.719E-05	.0654	28.30
3.644E+05	2.957E-07	1.0590	68.80	3.457E+06	1.692E-05	.0668	27.58
3.830E+05	5.707E-07	.5043	67.68	3.634E+06	1.653E-05	.0685	26.82
4.027E+05	9.353E-07	.2753	66.60	3.821E+06	1.613E-05	.0711	26.06
4.233E+05	1.396E-06	.1697	65.63	4.016E+06	1.596E-05	.0735	25.27
4.450E+05	1.953E-06	.1239	64.69	4.222E+06	1.610E-05	.0759	24.55
4.678E+05	2.599E-06	.1033	63.83	4.439E+06	1.643E-05	.0788	23.94
4.918E+05	3.320E-06	.0902	62.96	4.666E+06	1.681E-05	.0816	23.33
5.170E+05	4.100E-06	.0789	62.10	4.906E+06	1.705E-05	.0850	22.72
5.436E+05	4.933E-06	.0689	61.20	5.157E+06	1.685E-05	.0894	22.18
5.714E+05	5.820E-06	.0621	60.30	5.422E+06	1.626E-05	.0980	21.67
6.007E+05	6.767E-06	.0582	59.36	5.700E+06	1.583E-05	.1072	21.10
6.315E+05	7.791E-06	.0556	58.43	5.992E+06	1.608E-05	.1090	20.56
6.639E+05	8.901E-06	.0522	57.49	6.299E+06	1.707E-05	.1094	20.02
6.979E+05	1.008E-05	.0489	56.56	6.622E+06	1.843E-05	.1106	19.48
7.337E+05	1.128E-05	.0466	55.62	6.961E+06	1.952E-05	.1077	18.97
7.713E+05	1.246E-05	.0454	54.72	7.318E+06	1.975E-05	.1178	18.49
8.109E+05	1.356E-05	.0455	53.86	7.694E+06	1.942E-05	.1341	18.04
8.525E+05	1.455E-05	.0461	52.99	8.088E+06	1.911E-05	.1439	17.62
8.962E+05	1.543E-05	.0453	52.16	8.503E+06	1.925E-05	.1582	17.22
9.421E+05	1.621E-05	.0434	51.34	8.939E+06	2.085E-05	.1774	16.78

9.904E+05	1.692E-05	.0419	50.47	9.397E+06	2.490E-05	.1583	16.36
1.041E+06	1.762E-05	.0419	49.57	9.879E+06	2.984E-05	.1382	15.93
1.095E+06	1.836E-05	.0425	48.64	1.039E+07	3.240E-05	.1428	15.47
1.151E+06	1.920E-05	.0427	47.59	1.092E+07	3.277E-05	.1337	15.07
1.210E+06	2.017E-05	.0418	46.51	1.148E+07	3.209E-05	.1340	14.76
1.272E+06	2.128E-05	.0402	45.40	1.207E+07	3.126E-05	.1618	14.54
1.337E+06	2.244E-05	.0387	44.21	1.268E+07	4.983E-05	.1011	13.69
1.406E+06	2.359E-05	.0383	42.95	1.334E+07	1.401E-04	.0516	13.20
1.478E+06	2.459E-05	.0386	41.72	1.402E+07	2.551E-04	.0257	12.53
1.553E+06	2.534E-05	.0387	40.57	1.474E+07	2.346E-04	.0287	12.53
1.633E+06	2.583E-05	.0385	39.53	1.549E+07	1.260E-04	.0265	12.53
1.717E+06	2.603E-05	.0377	38.56	1.629E+07	3.650E-05	.0821	13.27
1.805E+06	2.600E-05	.0376	37.69	1.712E+07	2.249E-06	.6448	14.07
1.897E+06	2.581E-05	.0381	36.86	1.800E+07	-3.188E-07	1.0000	14.87

Table 6.14 Neutron spectrum in the graphite assembly (z=41.8 cm).

Energy [MeV]	Flux/Leth.	Error	Window	Energy [MeV]	Flux/Leth.	Error	Window
2.102E+05	-4.121E-08	1.0000	81.68	1.995E+06	1.380E-05	.0341	36.00
2.210E+05	-4.736E-08	1.0000	80.51	2.097E+06	1.365E-05	.0340	35.14
2.323E+05	-5.330E-08	1.0000	79.34	2.204E+06	1.346E-05	.0341	34.31
2.442E+05	-5.834E-08	1.0000	78.16	2.317E+06	1.320E-05	.0348	33.55
2.568E+05	-6.132E-08	1.0000	77.00	2.436E+06	1.281E-05	.0355	32.80
2.699E+05	-6.039E-08	1.0000	75.82	2.561E+06	1.219E-05	.0375	32.04
2.838E+05	-5.314E-08	1.0000	74.66	2.692E+06	1.131E-05	.0401	31.25
2.983E+05	-3.605E-08	1.0000	73.48	2.830E+06	1.029E-05	.0441	30.49
3.136E+05	-4.724E-09	1.0000	72.32	2.975E+06	9.347E-06	.0496	29.74
3.297E+05	4.648E-08	3.6620	71.14	3.128E+06	8.694E-06	.0554	29.02
3.466E+05	1.239E-07	1.3767	69.98	3.288E+06	8.357E-06	.0594	28.30
3.644E+05	2.346E-07	.6978	68.80	3.457E+06	8.222E-06	.0614	27.58
3.830E+05	3.852E-07	.3905	67.68	3.634E+06	8.189E-06	.0626	26.82
4.027E+05	5.812E-07	.2317	66.60	3.821E+06	8.289E-06	.0632	26.06
4.233E+05	8.255E-07	.1503	65.63	4.016E+06	8.576E-06	.0625	25.27
4.450E+05	1.118E-06	.1135	64.69	4.222E+06	9.034E-06	.0614	24.55
4.678E+05	1.455E-06	.0968	63.83	4.439E+06	9.591E-06	.0605	23.94
4.918E+05	1.831E-06	.0853	62.96	4.666E+06	1.011E-05	.0602	23.33
5.170E+05	2.240E-06	.0748	62.10	4.906E+06	1.028E-05	.0621	22.72
5.436E+05	2.679E-06	.0658	61.20	5.157E+06	9.844E-06	.0666	22.18
5.714E+05	3.151E-06	.0594	60.30	5.422E+06	9.024E-06	.0753	21.67
6.007E+05	3.662E-06	.0556	59.36	5.700E+06	8.425E-06	.0847	21.10
6.315E+05	4.222E-06	.0527	58.43	5.992E+06	8.434E-06	.0868	20.56
6.639E+05	4.832E-06	.0493	57.49	6.299E+06	9.021E-06	.0848	20.02
6.979E+05	5.483E-06	.0463	56.56	6.622E+06	9.993E-06	.0821	19.48
7.337E+05	6.155E-06	.0435	55.62	6.961E+06	1.089E-05	.0772	18.97
7.713E+05	6.818E-06	.0424	54.72	7.318E+06	1.095E-05	.0840	18.49
8.109E+05	7.450E-06	.0422	53.86	7.694E+06	1.013E-05	.0996	18.04
8.525E+05	8.029E-06	.0424	52.99	8.088E+06	9.582E-06	.1092	17.62
8.962E+05	8.551E-06	.0417	52.16	8.503E+06	1.060E-05	.1072	17.22
9.421E+05	9.015E-06	.0397	51.34	8.939E+06	1.319E-05	.1021	16.78
9.904E+05	9.435E-06	.0382	50.47	9.397E+06	1.587E-05	.0892	16.36
1.041E+06	9.825E-06	.0378	49.57	9.879E+06	1.689E-05	.0863	15.93
1.095E+06	1.023E-05	.0382	48.64	1.039E+07	1.589E-05	.0998	15.47
1.151E+06	1.067E-05	.0381	47.59	1.092E+07	1.359E-05	.1079	15.07
1.210E+06	1.118E-05	.0374	46.51	1.148E+07	1.204E-05	.1153	14.76
1.272E+06	1.176E-05	.0359	45.40	1.207E+07	1.546E-05	.1025	14.54
1.337E+06	1.235E-05	.0347	44.21	1.268E+07	2.606E-05	.0607	14.10
1.406E+06	1.291E-05	.0342	42.95	1.334E+07	4.908E-05	.0414	13.89
1.478E+06	1.336E-05	.0344	41.72	1.402E+07	7.621E-05	.0295	13.81
1.553E+06	1.366E-05	.0346	40.57	1.474E+07	6.702E-05	.0277	13.81
1.633E+06	1.386E-05	.0341	39.53	1.549E+07	3.233E-05	.0297	13.81
1.717E+06	1.396E-05	.0336	38.56	1.629E+07	9.316E-06	.0959	14.14
1.805E+06	1.397E-05	.0334	37.69	1.712E+07	1.076E-06	.5414	14.36
1.897E+06	1.391E-05	.0337	36.86	1.800E+07	4.503E-08	3.0079	14.58

Table 6.15 Neutron spectrum in the graphite assembly (z=52.0 cm).

Energy [MeV]	Flux/Leth.	Error	Window	Energy [MeV]	Flux/Leth.	Error	Window
2.102E+05	-2.970E-09	1.0000	81.68	1.995E+06	6.865E-06	.0314	36.00
2.210E+05	-2.577E-09	1.0000	80.51	2.097E+06	6.785E-06	.0316	35.14
2.323E+05	-1.584E-09	1.0000	79.34	2.204E+06	6.656E-06	.0320	34.31
2.442E+05	3.572E-10	28.7800	78.16	2.317E+06	6.471E-06	.0323	33.55
2.568E+05	3.777E-09	14.1490	77.00	2.436E+06	6.215E-06	.0331	32.80
2.699E+05	9.430E-09	6.4884	75.82	2.561E+06	5.883E-06	.0350	32.04
2.838E+05	1.826E-08	3.7727	74.66	2.692E+06	5.462E-06	.0372	31.25
2.983E+05	3.164E-08	2.3995	73.48	2.830E+06	4.983E-06	.0411	30.49
3.136E+05	5.130E-08	1.5890	72.32	2.975E+06	4.509E-06	.0459	29.74
3.297E+05	7.940E-08	1.0682	71.14	3.128E+06	4.126E-06	.0511	29.02
3.466E+05	1.185E-07	.7174	69.98	3.288E+06	3.880E-06	.0556	28.30
3.644E+05	1.714E-07	.4762	68.80	3.457E+06	3.776E-06	.0586	27.58
3.830E+05	2.411E-07	.3110	67.68	3.634E+06	3.799E-06	.0602	26.82
4.027E+05	3.303E-07	.2033	66.60	3.821E+06	3.945E-06	.0597	26.06
4.233E+05	4.414E-07	.1400	65.63	4.016E+06	4.180E-06	.0575	25.27
4.450E+05	5.757E-07	.1097	64.69	4.222E+06	4.445E-06	.0560	24.55
4.678E+05	7.335E-07	.0954	63.83	4.439E+06	4.707E-06	.0551	23.94
4.918E+05	9.139E-07	.0853	62.96	4.666E+06	4.962E-06	.0544	23.33
5.170E+05	1.116E-06	.0749	62.10	4.906E+06	5.142E-06	.0547	22.72
5.436E+05	1.339E-06	.0653	61.20	5.157E+06	5.132E-06	.0557	22.18
5.714E+05	1.582E-06	.0584	60.30	5.422E+06	4.935E-06	.0591	21.67
6.007E+05	1.846E-06	.0545	59.36	5.700E+06	4.663E-06	.0653	21.10
6.315E+05	2.131E-06	.0515	58.43	5.992E+06	4.428E-06	.0697	20.56
6.639E+05	2.439E-06	.0482	57.49	6.299E+06	4.385E-06	.0717	20.02
6.979E+05	2.764E-06	.0449	56.56	6.622E+06	4.658E-06	.0713	19.48
7.337E+05	3.101E-06	.0423	55.62	6.961E+06	5.009E-06	.0682	18.97
7.713E+05	3.437E-06	.0412	54.72	7.318E+06	5.028E-06	.0730	18.49
8.109E+05	3.761E-06	.0410	53.86	7.694E+06	4.711E-06	.0847	18.04
8.525E+05	4.060E-06	.0411	52.99	8.088E+06	4.510E-06	.0914	17.62
8.962E+05	4.328E-06	.0402	52.16	8.503E+06	4.973E-06	.0878	17.22
9.421E+05	4.564E-06	.0382	51.34	8.939E+06	6.262E-06	.0807	16.78
9.904E+05	4.779E-06	.0364	50.47	9.397E+06	7.455E-06	.0707	16.36
1.041E+06	4.986E-06	.0361	49.57	9.879E+06	7.476E-06	.0721	15.93
1.095E+06	5.210E-06	.0362	48.64	1.039E+07	6.614E-06	.0872	15.47
1.151E+06	5.461E-06	.0361	47.59	1.092E+07	5.247E-06	.1004	15.07
1.210E+06	5.743E-06	.0351	46.51	1.148E+07	4.449E-06	.1094	14.76
1.272E+06	6.043E-06	.0337	45.40	1.207E+07	6.432E-06	.0875	14.54
1.337E+06	6.332E-06	.0324	44.21	1.268E+07	1.160E-05	.0465	14.13
1.406E+06	6.586E-06	.0321	42.95	1.334E+07	2.072E-05	.0343	13.58
1.478E+06	6.773E-06	.0323	41.72	1.402E+07	2.732E-05	.0275	13.58
1.553E+06	6.887E-06	.0322	40.57	1.474E+07	1.927E-05	.0254	13.58
1.633E+06	6.945E-06	.0321	39.53	1.549E+07	7.993E-06	.0367	13.58
1.717E+06	6.959E-06	.0313	38.56	1.629E+07	2.816E-06	.0915	13.87
1.805E+06	6.944E-06	.0310	37.69	1.712E+07	5.150E-07	.2923	14.40
1.897E+06	6.911E-06	.0312	36.86	1.800E+07	2.862E-08	1.0444	14.93

Table 6.16 Neutron spectrum in the graphite assembly (z=62.1 cm).

Energy [MeV]	Flux/Leth.	Error	Window	Energy [MeV]	Flux/Leth.	Error	Window
2.102E+05	5.738E-10	23.6240	81.68	1.995E+06	3.224E-06	.0310	35.97
2.210E+05	1.206E-09	13.4190	80.51	2.097E+06	3.168E-06	.0311	35.14
2.323E+05	2.215E-09	8.6562	79.34	2.204E+06	3.098E-06	.0314	34.31
2.442E+05	3.786E-09	5.9477	78.16	2.317E+06	3.003E-06	.0320	33.55
2.568E+05	6.179E-09	4.2344	77.00	2.436E+06	2.868E-06	.0328	32.80
2.699E+05	9.750E-09	3.0729	75.82	2.561E+06	2.694E-06	.0346	32.04
2.838E+05	1.499E-08	2.2503	74.66	2.692E+06	2.481E-06	.0380	31.25
2.983E+05	2.251E-08	1.6506	73.48	2.830E+06	2.254E-06	.0418	30.49
3.136E+05	3.315E-08	1.2037	72.32	2.975E+06	2.052E-06	.0458	29.74
3.297E+05	4.788E-08	.8669	71.14	3.128E+06	1.914E-06	.0499	29.02
3.466E+05	6.786E-08	.6128	69.98	3.288E+06	1.847E-06	.0532	28.30
3.644E+05	9.440E-08	.4229	68.80	3.457E+06	1.834E-06	.0555	27.58
3.830E+05	1.288E-07	.2849	67.68	3.634E+06	1.861E-06	.0566	26.82

4.027E+05	1.723E-07	.1907	66.60	3.821E+06	1.934E-06	.0559	26.06
4.233E+05	2.258E-07	.1340	65.63	4.016E+06	2.038E-06	.0542	25.27
4.450E+05	2.900E-07	.1067	64.69	4.222E+06	2.139E-06	.0534	24.55
4.678E+05	3.650E-07	.0939	63.83	4.439E+06	2.219E-06	.0536	23.94
4.918E+05	4.504E-07	.0846	62.96	4.666E+06	2.306E-06	.0534	23.33
5.170E+05	5.459E-07	.0750	62.10	4.906E+06	2.414E-06	.0529	22.72
5.436E+05	6.513E-07	.0657	61.20	5.157E+06	2.493E-06	.0520	22.18
5.714E+05	7.665E-07	.0590	60.30	5.422E+06	2.488E-06	.0532	21.67
6.007E+05	8.918E-07	.0549	59.36	5.700E+06	2.405E-06	.0568	21.10
6.315E+05	1.028E-06	.0520	58.43	5.992E+06	2.312E-06	.0593	20.56
6.639E+05	1.176E-06	.0486	57.49	6.299E+06	2.305E-06	.0595	20.02
6.979E+05	1.333E-06	.0455	56.56	6.622E+06	2.431E-06	.0587	19.48
7.337E+05	1.497E-06	.0429	55.62	6.961E+06	2.560E-06	.0568	18.97
7.713E+05	1.663E-06	.0414	54.72	7.318E+06	2.503E-06	.0615	18.49
8.109E+05	1.824E-06	.0411	53.86	7.694E+06	2.305E-06	.0708	18.04
8.525E+05	1.976E-06	.0411	52.99	8.088E+06	2.214E-06	.0752	17.62
8.962E+05	2.115E-06	.0402	52.16	8.503E+06	2.389E-06	.0731	17.22
9.421E+05	2.243E-06	.0377	51.34	8.939E+06	2.850E-06	.0689	16.78
9.904E+05	2.365E-06	.0359	50.47	9.397E+06	3.315E-06	.0615	16.36
1.041E+06	2.490E-06	.0350	49.57	9.879E+06	3.241E-06	.0641	15.93
1.095E+06	2.630E-06	.0349	48.64	1.039E+07	2.633E-06	.0828	15.47
1.151E+06	2.790E-06	.0344	47.59	1.092E+07	2.114E-06	.0930	15.07
1.210E+06	2.969E-06	.0330	46.49	1.148E+07	2.024E-06	.0903	14.76
1.272E+06	3.153E-06	.0314	45.25	1.207E+07	2.530E-06	.0802	14.51
1.337E+06	3.320E-06	.0300	43.99	1.268E+07	4.478E-06	.0461	13.96
1.406E+06	3.446E-06	.0297	42.73	1.334E+07	8.342E-06	.0292	13.94
1.478E+06	3.515E-06	.0298	41.51	1.402E+07	1.043E-05	.0269	13.94
1.553E+06	3.523E-06	.0300	40.34	1.474E+07	7.023E-06	.0357	13.94
1.633E+06	3.487E-06	.0300	39.39	1.549E+07	2.436E-06	.0533	13.97
1.717E+06	3.424E-06	.0300	38.49	1.629E+07	3.908E-07	.3076	14.40
1.805E+06	3.350E-06	.0303	37.63	1.712E+07	-7.170E-08	1.0000	14.40
1.897E+06	3.282E-06	.0303	36.80	1.800E+07	-3.665E-08	1.0000	14.40

Table 6.17 Neutron spectrum in the graphite assembly (z=72.1 cm).

Energy [MeV]	Flux/Leth.	Error	Window	Energy [MeV]	Flux/Leth.	Error	Window
2.102E+05	-4.254E-11	1.0000	81.68	1.995E+06	1.433E-06	.0310	35.93
2.210E+05	1.681E-10	42.8890	80.51	2.097E+06	1.408E-06	.0311	35.14
2.323E+05	5.306E-10	16.1000	79.34	2.204E+06	1.381E-06	.0316	34.31
2.442E+05	1.123E-09	8.9371	78.16	2.317E+06	1.349E-06	.0317	33.55
2.568E+05	2.061E-09	5.6556	77.00	2.436E+06	1.302E-06	.0324	32.80
2.699E+05	3.503E-09	3.8123	75.82	2.561E+06	1.237E-06	.0336	32.04
2.838E+05	5.656E-09	2.6585	74.66	2.692E+06	1.147E-06	.0366	31.25
2.983E+05	8.797E-09	1.8824	73.48	2.830E+06	1.042E-06	.0404	30.49
3.136E+05	1.331E-08	1.3364	72.32	2.975E+06	9.368E-07	.0448	29.74
3.297E+05	1.962E-08	.9429	71.14	3.128E+06	8.538E-07	.0497	29.02
3.466E+05	2.827E-08	.6557	69.98	3.288E+06	8.045E-07	.0541	28.30
3.644E+05	3.986E-08	.4465	68.80	3.457E+06	7.922E-07	.0568	27.58
3.830E+05	5.499E-08	.2973	67.68	3.634E+06	8.152E-07	.0573	26.82
4.027E+05	7.428E-08	.1972	66.60	3.821E+06	8.698E-07	.0556	26.06
4.233E+05	9.819E-08	.1374	65.63	4.016E+06	9.418E-07	.0524	25.27
4.450E+05	1.270E-07	.1088	64.69	4.222E+06	1.010E-06	.0502	24.55
4.678E+05	1.610E-07	.0951	63.83	4.439E+06	1.058E-06	.0498	23.94
4.918E+05	1.999E-07	.0851	62.96	4.666E+06	1.089E-06	.0501	23.33
5.170E+05	2.435E-07	.0746	62.10	4.906E+06	1.107E-06	.0508	22.72
5.436E+05	2.920E-07	.0650	61.20	5.157E+06	1.104E-06	.0514	22.18
5.714E+05	3.448E-07	.0586	60.30	5.422E+06	1.081E-06	.0537	21.67
6.007E+05	4.024E-07	.0544	59.36	5.700E+06	1.052E-06	.0569	21.10
6.315E+05	4.646E-07	.0514	58.43	5.992E+06	1.043E-06	.0575	20.56
6.639E+05	5.317E-07	.0480	57.49	6.299E+06	1.084E-06	.0553	20.02
6.979E+05	6.026E-07	.0448	56.56	6.622E+06	1.185E-06	.0521	19.48
7.337E+05	6.764E-07	.0422	55.62	6.961E+06	1.283E-06	.0488	18.97
7.713E+05	7.505E-07	.0409	54.72	7.318E+06	1.257E-06	.0522	18.49
8.109E+05	8.228E-07	.0408	53.86	7.694E+06	1.100E-06	.0622	18.04
8.525E+05	8.915E-07	.0408	52.99	8.088E+06	9.752E-07	.0703	17.62
8.962E+05	9.548E-07	.0397	52.16	8.503E+06	1.015E-06	.0704	17.22
9.421E+05	1.013E-06	.0374	51.34	8.939E+06	1.206E-06	.0671	16.78

9.904E+05	1.068E-06	.0353	50.47	9.397E+06	1.414E-06	.0585	16.36
1.041E+06	1.124E-06	.0346	49.57	9.879E+06	1.461E-06	.0576	15.93
1.095E+06	1.186E-06	.0345	48.64	1.039E+07	1.305E-06	.0682	15.47
1.151E+06	1.257E-06	.0340	47.59	1.092E+07	1.052E-06	.0748	15.07
1.210E+06	1.337E-06	.0326	46.42	1.148E+07	8.816E-07	.0802	14.76
1.272E+06	1.420E-06	.0311	45.10	1.207E+07	1.085E-06	.0713	14.44
1.337E+06	1.496E-06	.0298	43.78	1.268E+07	1.933E-06	.0404	13.81
1.406E+06	1.553E-06	.0294	42.49	1.334E+07	3.357E-06	.0291	13.79
1.478E+06	1.582E-06	.0297	41.25	1.402E+07	3.926E-06	.0261	13.79
1.553E+06	1.583E-06	.0299	40.11	1.474E+07	2.346E-06	.0351	13.79
1.633E+06	1.563E-06	.0297	39.19	1.549E+07	6.157E-07	.0778	13.90
1.717E+06	1.531E-06	.0299	38.36	1.629E+07	6.775E-08	.5434	14.40
1.805E+06	1.495E-06	.0301	37.52	1.712E+07	-2.169E-08	1.0000	14.40
1.897E+06	1.462E-06	.0306	36.71	1.800E+07	-1.033E-08	1.0000	14.40

Table 6.18 Neutron spectrum in the graphite assembly (z=77.2 cm).

Energy [MeV]	Flux/Leth.	Error	Window	Energy [MeV]	Flux/Leth.	Error	Window
2.102E+05	-5.720E-10	1.0000	81.68	1.995E+06	8.456E-07	.0309	36.00
2.210E+05	-5.746E-10	1.0000	80.51	2.097E+06	8.346E-07	.0314	35.14
2.323E+05	-5.157E-10	1.0000	79.34	2.204E+06	8.189E-07	.0317	34.31
2.442E+05	-3.548E-10	1.0000	78.16	2.317E+06	7.945E-07	.0322	33.55
2.568E+05	-3.117E-11	1.0000	77.00	2.436E+06	7.605E-07	.0334	32.80
2.699E+05	5.405E-10	14.0550	75.82	2.561E+06	7.146E-07	.0352	32.04
2.838E+05	1.481E-09	5.7721	74.66	2.692E+06	6.587E-07	.0387	31.25
2.983E+05	2.949E-09	3.1945	73.48	2.830E+06	5.975E-07	.0429	30.49
3.136E+05	5.154E-09	1.9614	72.32	2.975E+06	5.408E-07	.0473	29.74
3.297E+05	8.361E-09	1.2572	71.14	3.128E+06	4.981E-07	.0521	29.02
3.466E+05	1.289E-08	.8172	69.98	3.288E+06	4.750E-07	.0562	28.30
3.644E+05	1.909E-08	.5296	68.80	3.457E+06	4.740E-07	.0586	27.58
3.830E+05	2.733E-08	.3397	67.68	3.634E+06	4.958E-07	.0588	26.82
4.027E+05	3.799E-08	.2190	66.60	3.821E+06	5.358E-07	.0567	26.06
4.233E+05	5.136E-08	.1495	65.63	4.016E+06	5.794E-07	.0538	25.27
4.450E+05	6.764E-08	.1163	64.69	4.222E+06	6.133E-07	.0525	24.55
4.678E+05	8.694E-08	.1003	63.83	4.439E+06	6.381E-07	.0523	23.94
4.918E+05	1.092E-07	.0887	62.96	4.666E+06	6.639E-07	.0521	23.33
5.170E+05	1.343E-07	.0774	62.10	4.906E+06	6.901E-07	.0520	22.72
5.436E+05	1.621E-07	.0672	61.20	5.157E+06	7.039E-07	.0518	22.18
5.714E+05	1.925E-07	.0598	60.30	5.422E+06	7.052E-07	.0525	21.67
6.007E+05	2.257E-07	.0553	59.36	5.700E+06	7.075E-07	.0539	21.10
6.315E+05	2.614E-07	.0522	58.43	5.992E+06	7.178E-07	.0534	20.56
6.639E+05	2.996E-07	.0490	57.49	6.299E+06	7.377E-07	.0517	20.02
6.979E+05	3.397E-07	.0454	56.56	6.622E+06	7.740E-07	.0505	19.48
7.337E+05	3.808E-07	.0430	55.62	6.961E+06	8.061E-07	.0487	18.97
7.713E+05	4.220E-07	.0417	54.72	7.318E+06	7.866E-07	.0524	18.49
8.109E+05	4.621E-07	.0415	53.86	7.694E+06	7.144E-07	.0599	18.04
8.525E+05	5.001E-07	.0416	52.99	8.088E+06	6.606E-07	.0649	17.62
8.962E+05	5.356E-07	.0406	52.16	8.503E+06	6.931E-07	.0637	17.22
9.421E+05	5.690E-07	.0382	51.34	8.939E+06	8.041E-07	.0611	16.78
9.904E+05	6.014E-07	.0362	50.47	9.397E+06	8.949E-07	.0561	16.36
1.041E+06	6.346E-07	.0354	49.57	9.879E+06	8.735E-07	.0586	15.93
1.095E+06	6.716E-07	.0354	48.64	1.039E+07	7.444E-07	.0734	15.47
1.151E+06	7.132E-07	.0347	47.59	1.092E+07	5.913E-07	.0805	15.07
1.210E+06	7.595E-07	.0335	46.51	1.148E+07	5.261E-07	.0879	14.76
1.272E+06	8.068E-07	.0318	45.37	1.207E+07	6.682E-07	.0739	13.44
1.337E+06	8.502E-07	.0303	44.18	1.268E+07	1.250E-06	.0404	12.09
1.406E+06	8.831E-07	.0300	42.92	1.334E+07	2.334E-06	.0200	11.82
1.478E+06	9.016E-07	.0302	41.70	1.402E+07	2.646E-06	.0184	11.82
1.553E+06	9.044E-07	.0304	40.55	1.474E+07	1.044E-06	.0343	11.82
1.633E+06	8.963E-07	.0305	39.53	1.549E+07	1.526E-07	.1603	12.92
1.717E+06	8.824E-07	.0302	38.56	1.629E+07	1.078E-07	.1568	14.15
1.805E+06	8.678E-07	.0305	37.69	1.712E+07	1.643E-08	.4865	14.40
1.897E+06	8.551E-07	.0307	36.86	1.800E+07	-1.138E-09	1.0000	14.65

Table 6.19 Neutron source spectrum of FNS water cooled D-T target for 0 degree to the d<sup>+</sup>-beam. The units of energy and spectrum are [eV] and [neutrons/energy-bin/D-T reaction], respectively.

Group	Upper Energy	Spectrum	Group	Upper energy	Spectrum
1	1.6487e+07	0.0	64	1.1943e+06	9.6236e-03
2	1.6231e+07	0.0	65	1.0540e+06	9.7275e-03
3	1.5980e+07	2.7828e-03	66	9.3013e+05	9.9713e-03
4	1.5732e+07	1.7363e-02	67	8.2084e+05	9.7540e-03
5	1.5488e+07	7.1310e-02	68	7.2438e+05	9.3421e-03
6	1.5248e+07	2.3566e-01	69	6.3927e+05	8.6681e-03
7	1.5012e+07	2.8044e-01	70	5.6415e+05	7.7929e-03
8	1.4779e+07	1.9088e-01	71	4.9786e+05	6.8688e-03
9	1.4550e+07	8.8741e-02	72	4.3936e+05	5.9791e-03
10	1.4324e+07	1.9619e-02	73	3.8774e+05	4.9397e-03
11	1.4102e+07	4.7824e-03	74	3.4217e+05	3.8479e-03
12	1.3883e+07	3.6889e-03	75	3.0197e+05	3.2890e-03
13	1.3668e+07	4.0824e-03	76	2.6649e+05	2.8136e-03
14	1.3456e+07	3.0739e-03	77	2.3517e+05	2.4317e-03
15	1.3248e+07	2.0627e-03	78	2.0754e+05	2.1040e-03
16	1.3042e+07	1.5353e-03	79	1.8315e+05	1.8527e-03
17	1.2840e+07	1.3058e-03	80	1.6163e+05	1.6141e-03
18	1.2641e+07	1.0510e-03	81	1.4264e+05	1.4051e-03
19	1.2445e+07	9.1815e-04	82	1.2588e+05	1.2219e-03
20	1.2252e+07	6.6341e-04	83	1.1109e+05	9.1106e-04
21	1.2062e+07	4.9328e-04	84	9.8035e+04	7.9663e-04
22	1.1875e+07	4.3340e-04	85	8.6515e+04	6.9762e-04
23	1.1691e+07	3.5410e-04	86	7.6349e+04	6.1088e-04
24	1.1510e+07	3.3956e-04	87	6.7378e+04	5.3606e-04
25	1.1331e+07	3.3951e-04	88	5.9461e+04	4.7077e-04
26	1.1156e+07	4.7551e-04	89	5.2474e+04	4.1340e-04
27	1.0983e+07	5.2166e-04	90	4.6308e+04	3.6436e-04
28	1.0812e+07	5.4544e-04	91	4.0867e+04	3.2144e-04
29	1.0645e+07	6.0839e-04	92	3.6065e+04	2.8444e-04
30	1.0480e+07	5.8562e-04	93	3.1827e+04	2.5200e-04
31	1.0317e+07	5.9851e-04	94	2.8087e+04	2.2407e-04
32	1.0157e+07	5.9892e-04	95	2.4787e+04	2.0045e-04
33	9.9999e+06	2.3220e-03	96	2.1874e+04	1.7891e-04
34	9.3940e+06	2.1711e-03	97	1.9304e+04	3.0516e-04
35	8.8249e+06	1.9259e-03	98	1.5034e+04	2.4812e-04
36	8.2902e+06	2.0821e-03	99	1.1709e+04	2.1369e-04
37	7.7879e+06	2.4699e-03	100	9.1186e+03	1.9164e-04
38	7.3161e+06	2.3331e-03	101	7.1016e+03	1.6038e-04
39	6.8728e+06	2.1203e-03	102	5.5307e+03	1.3521e-04
40	6.4564e+06	2.3830e-03	103	4.3073e+03	1.1447e-04
41	6.0652e+06	2.7193e-03	104	3.3546e+03	9.7598e-05
42	5.6978e+06	2.5754e-03	105	2.6125e+03	8.3682e-05
43	5.3525e+06	2.5194e-03	106	2.0346e+03	7.2417e-05
44	5.0282e+06	2.9628e-03	107	1.5846e+03	6.3421e-05
45	4.7236e+06	3.5164e-03	108	1.2341e+03	5.5907e-05
46	4.4374e+06	3.9704e-03	109	9.6110e+02	4.3479e-05
47	4.1686e+06	4.3379e-03	110	5.8293e+02	0.0
48	3.9160e+06	4.2412e-03	111	3.5357e+02	0.0
49	3.6787e+06	3.6099e-03	112	2.1445e+02	0.0
50	3.4559e+06	3.3610e-03	113	1.3007e+02	0.0
51	3.2465e+06	3.4485e-03	114	7.8891e+01	0.0
52	3.0498e+06	3.7938e-03	115	4.7850e+01	0.0
53	2.8650e+06	4.3795e-03	116	2.9023e+01	0.0
54	2.6914e+06	4.7354e-03	117	1.7603e+01	0.0
55	2.5284e+06	5.0664e-03	118	1.0677e+01	0.0
56	2.3752e+06	5.2928e-03	119	6.4758e+00	0.0
57	2.2313e+06	5.3299e-03	120	3.9278e+00	0.0
58	2.0961e+06	5.3383e-03	121	2.3823e+00	0.0
59	1.9691e+06	5.3194e-03	122	1.4449e+00	0.0
60	1.8498e+06	5.3179e-03	123	8.7640e-01	0.0
61	1.7377e+06	1.0130e-02	124	5.3156e-01	0.0
62	1.5335e+06	9.9677e-03	125	3.2241e-01	0.0
63	1.3533e+06	9.7640e-03	126	1.0010e-05	0.0

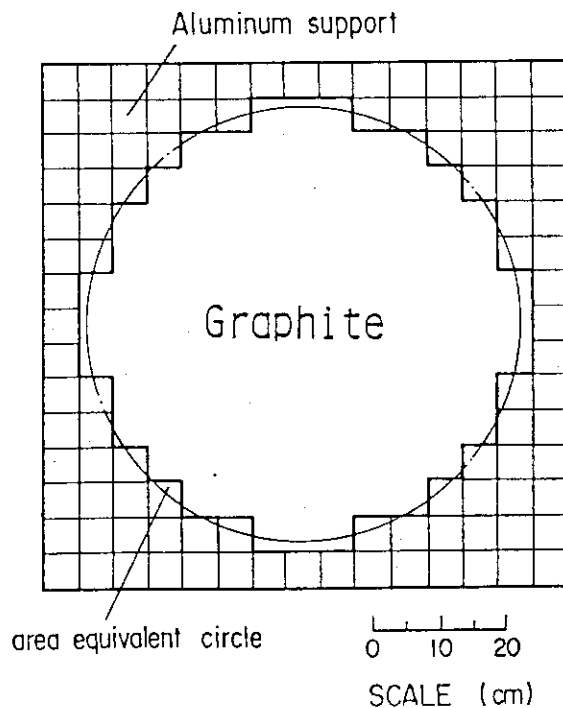
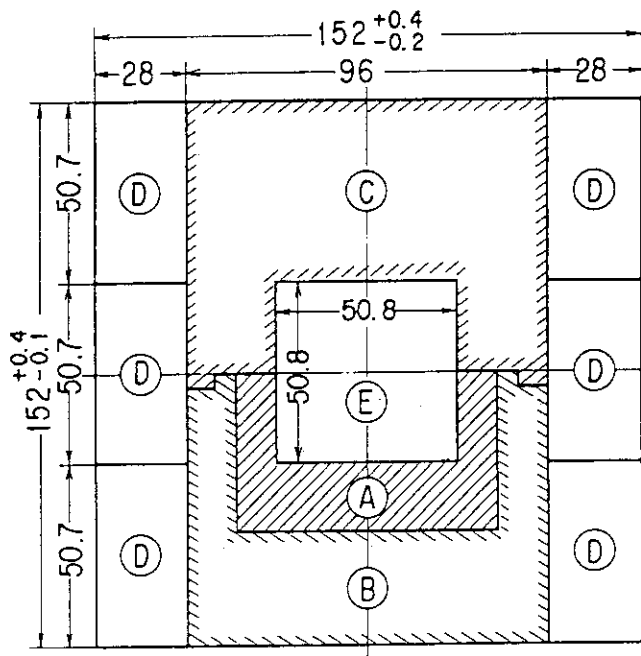


Fig. 6.1 Sectional view of the cylindrical assembly.



- A : Boat ( Drawer )
- B & C : Guide Rail ( Sheath )
- D : Spacer
- E : Void for Special-Sized  
Blocks

Fig. 6.2 A sectional view of the graphite sheath and drawer.

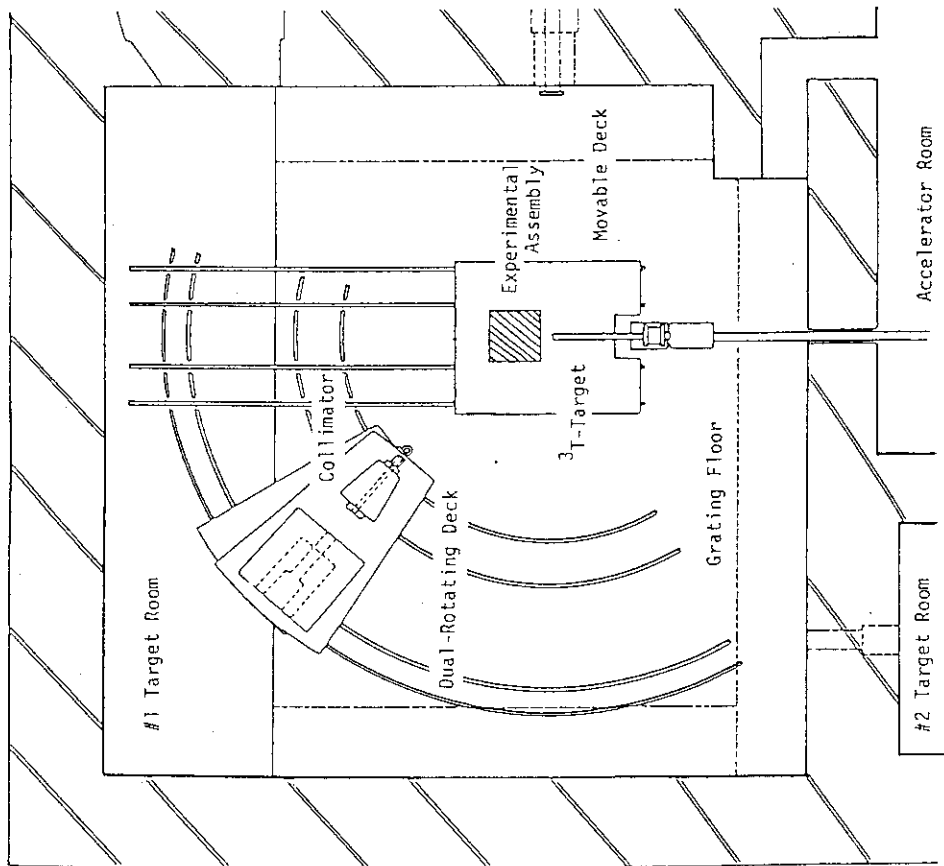


Fig. 6.4 Layout of the FNS first target room.

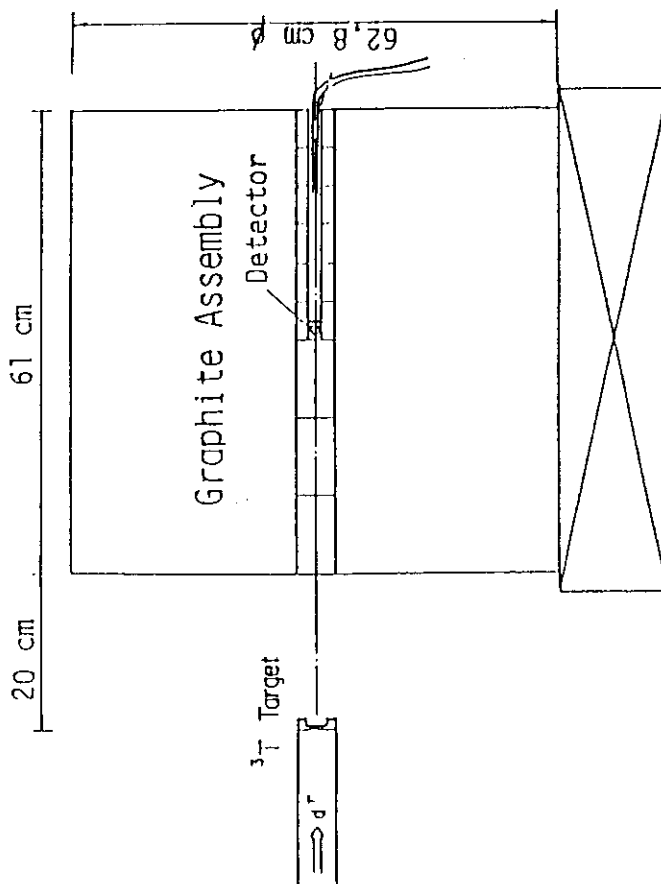


Fig. 6.3 Experimental layout.



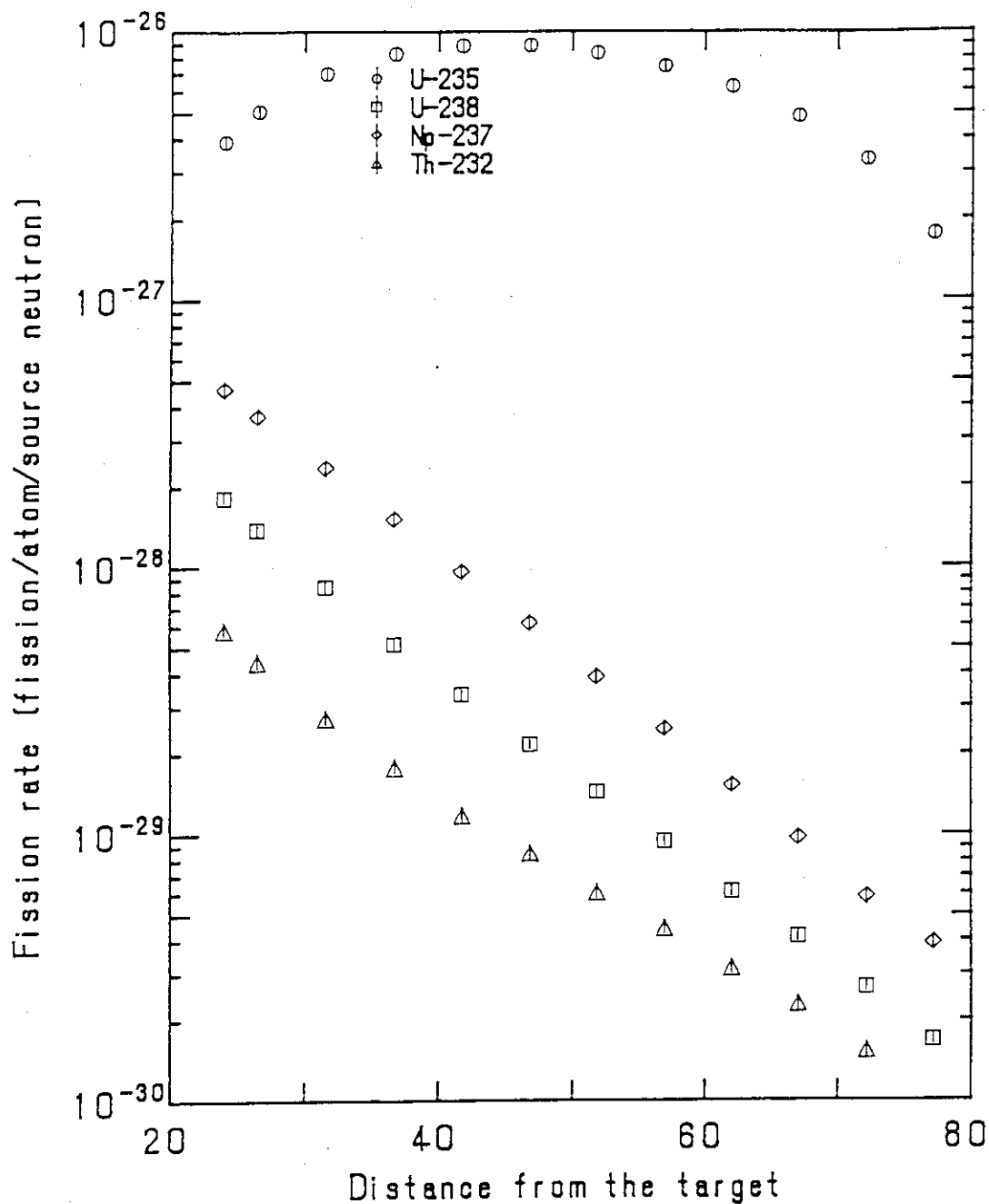


Fig. 6.5 Fission-rate distributions in the graphite assembly measured by micro-fission chambers.

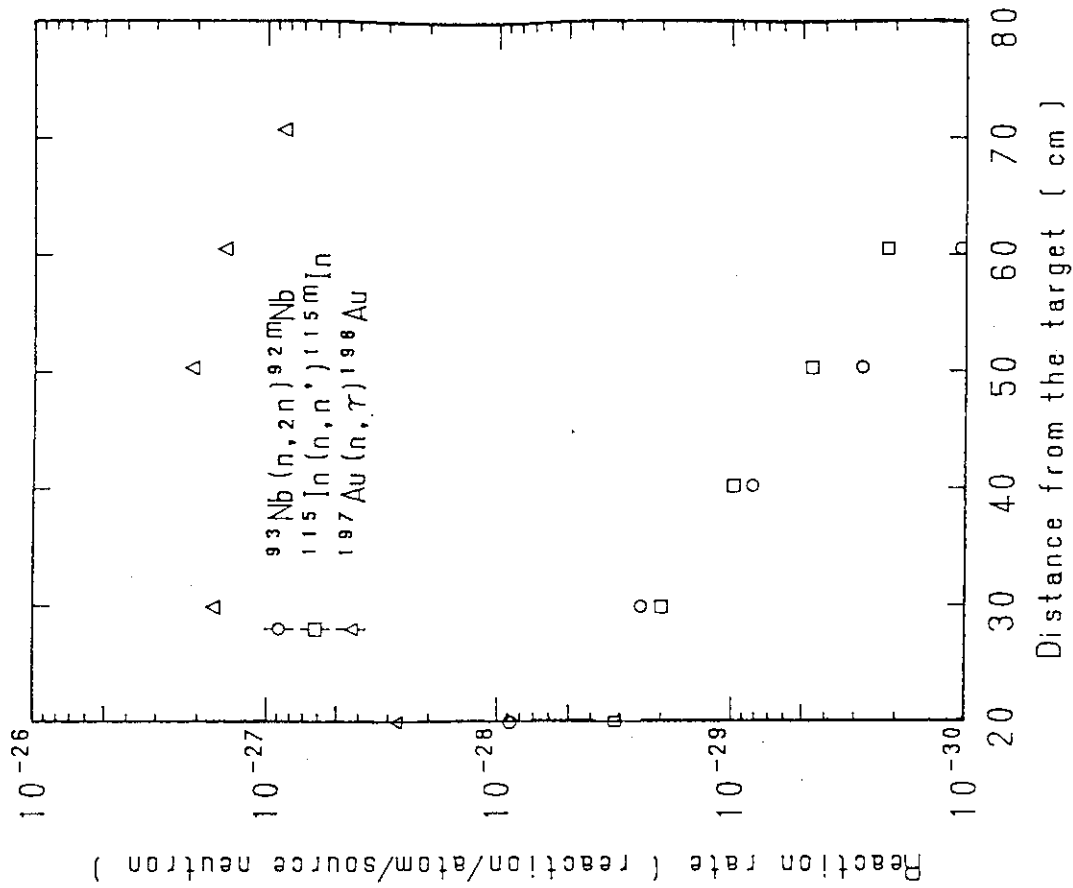


Fig. 6.7 Reaction-rate distributions of  $^{93}\text{Nb}(n, 2n)$ ,  $^{92m}\text{Nb}$ ,  $^{115}\text{In}(n, n')^{115m}\text{In}$  and  $^{197}\text{Au}(n, \gamma)^{198}\text{Au}$ .

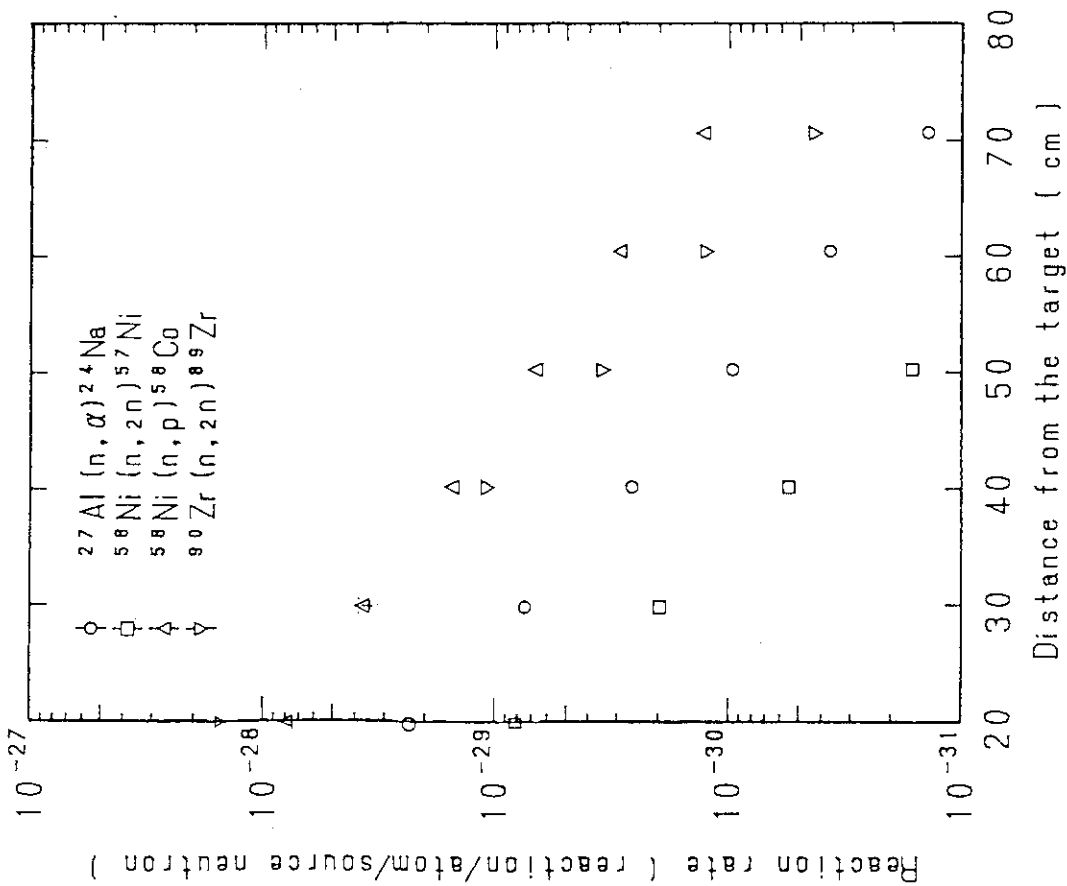


Fig. 6.6 Reaction-rate distributions of  $^{27}\text{Al}(n, \alpha)^{24}\text{Na}$ ,  $^{58}\text{Ni}(n, 2n)^{57}\text{Ni}$ ,  $^{58}\text{Ni}(n, p)^{58}\text{Co}$  and  $^{90}\text{Zr}(n, 2n)^{89}\text{Zr}$  in the graphite assembly.

GRAPHITE 60 CM ASSEMBLY ( CENTER )

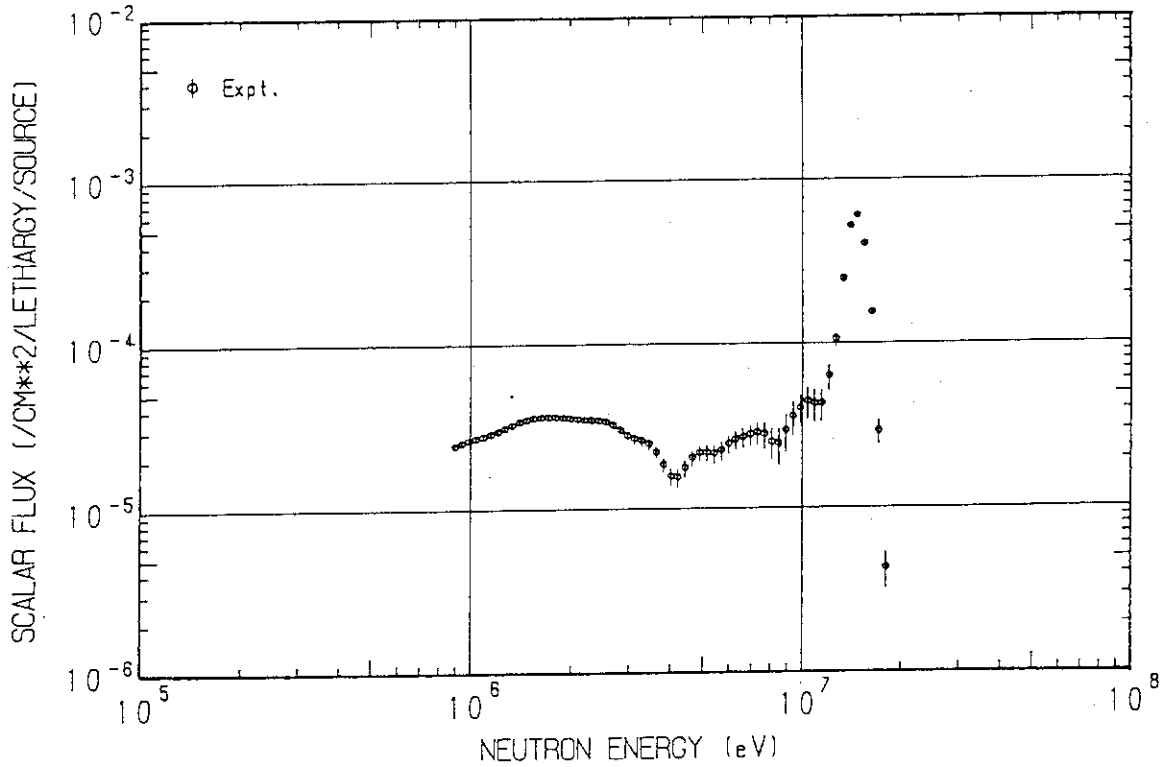


Fig. 6.8 Measured neutron scalar spectrum in the graphite assembly (z=24.1cm).

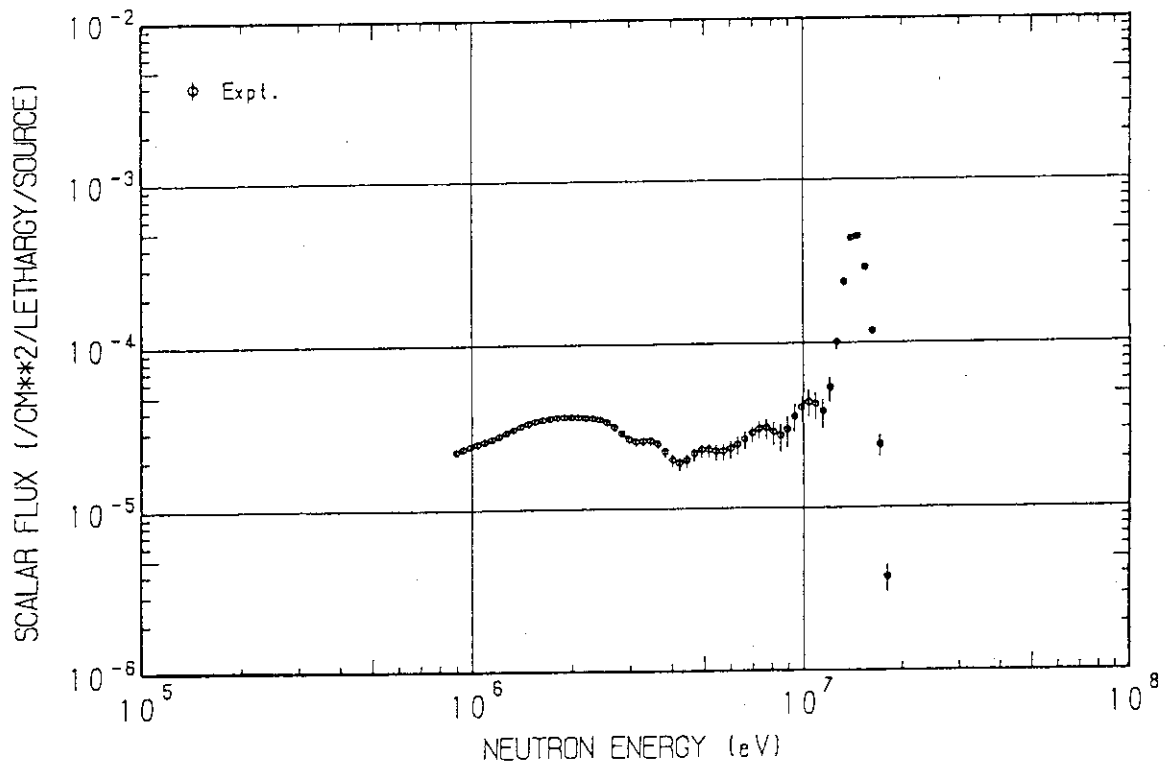


Fig. 6.9 Measured neutron scalar spectrum in the graphite assembly (z=26.7cm).

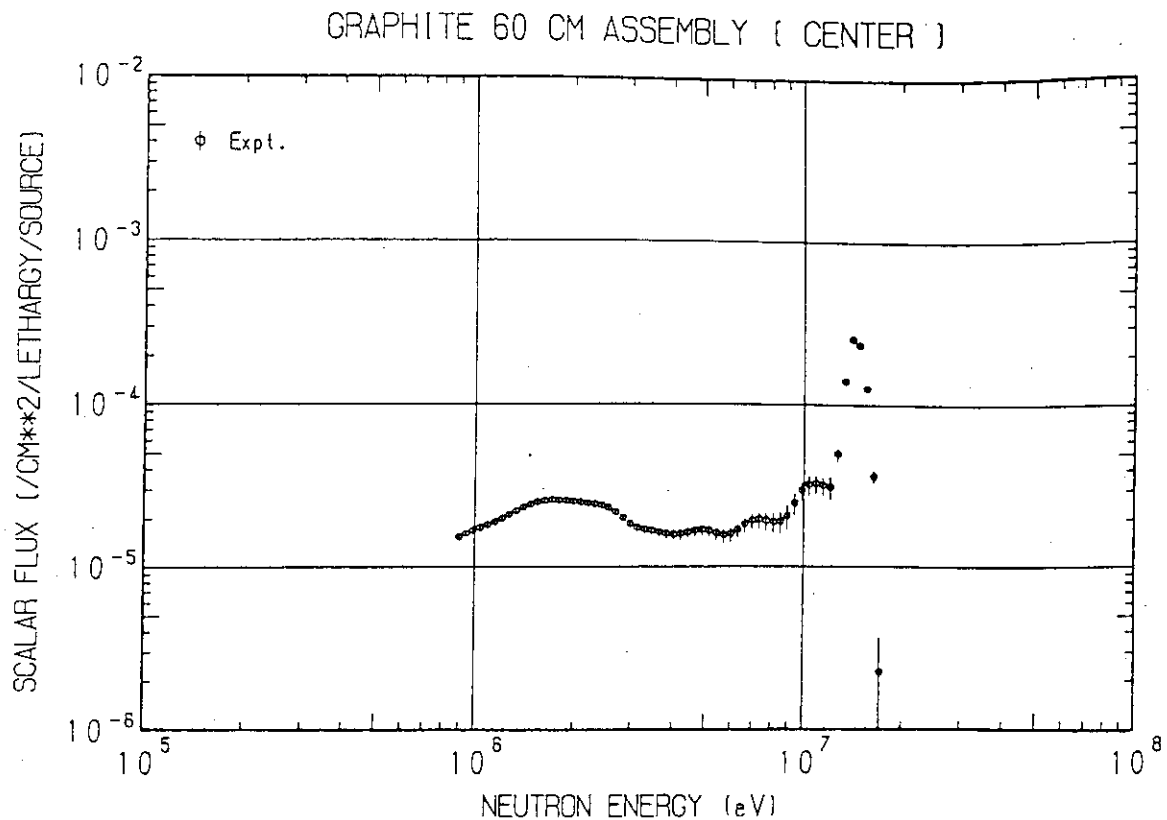


Fig. 6.10 Measured neutron scalar spectrum in the graphite assembly ( $z=31.7\text{cm}$ ).

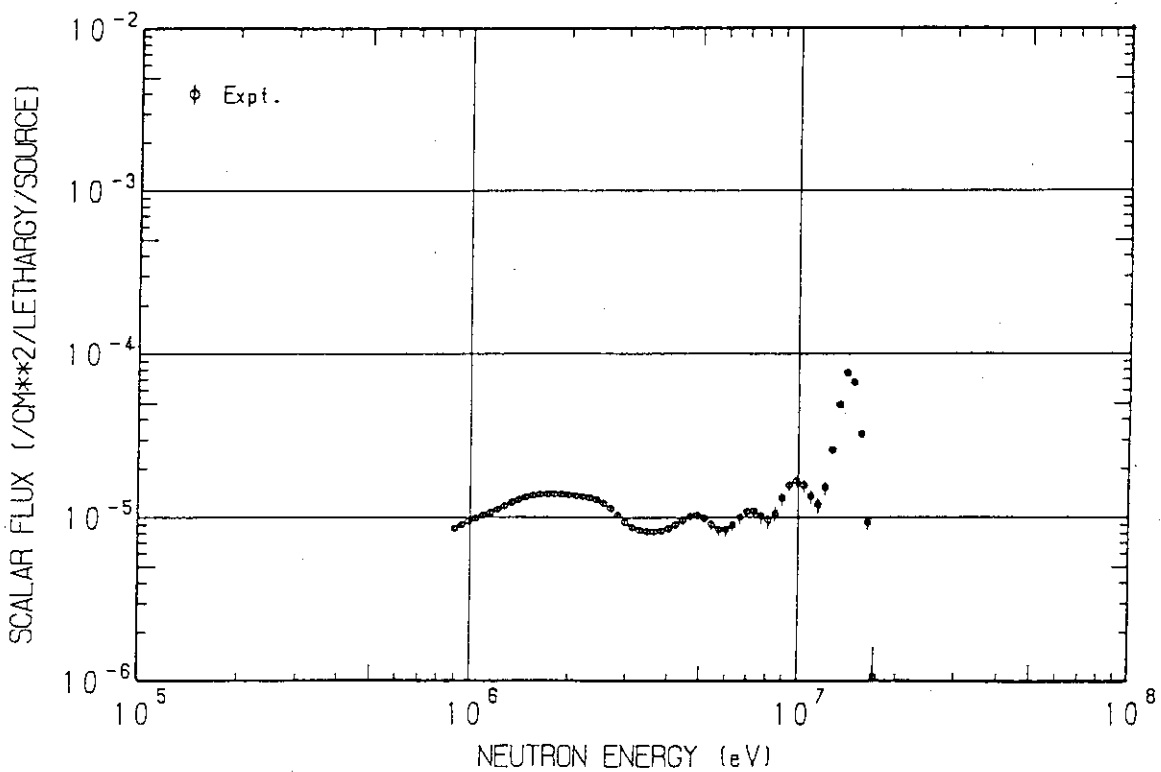


Fig. 6.11 Measured neutron scalar spectrum in the graphite assembly ( $z=41.8\text{cm}$ ).

GRAPHITE 60 CM ASSEMBLY ( CENTER )

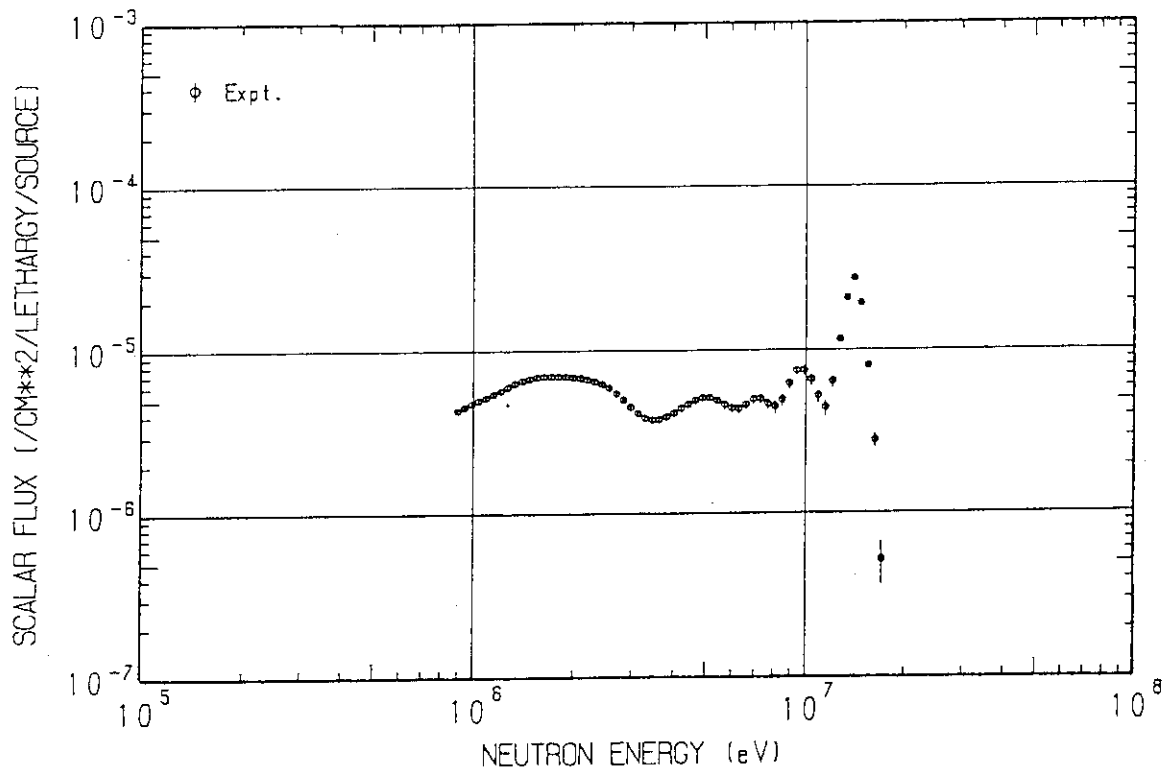


Fig. 6.12 Measured neutron scalar spectrum in the graphite assembly (z=52.0cm).

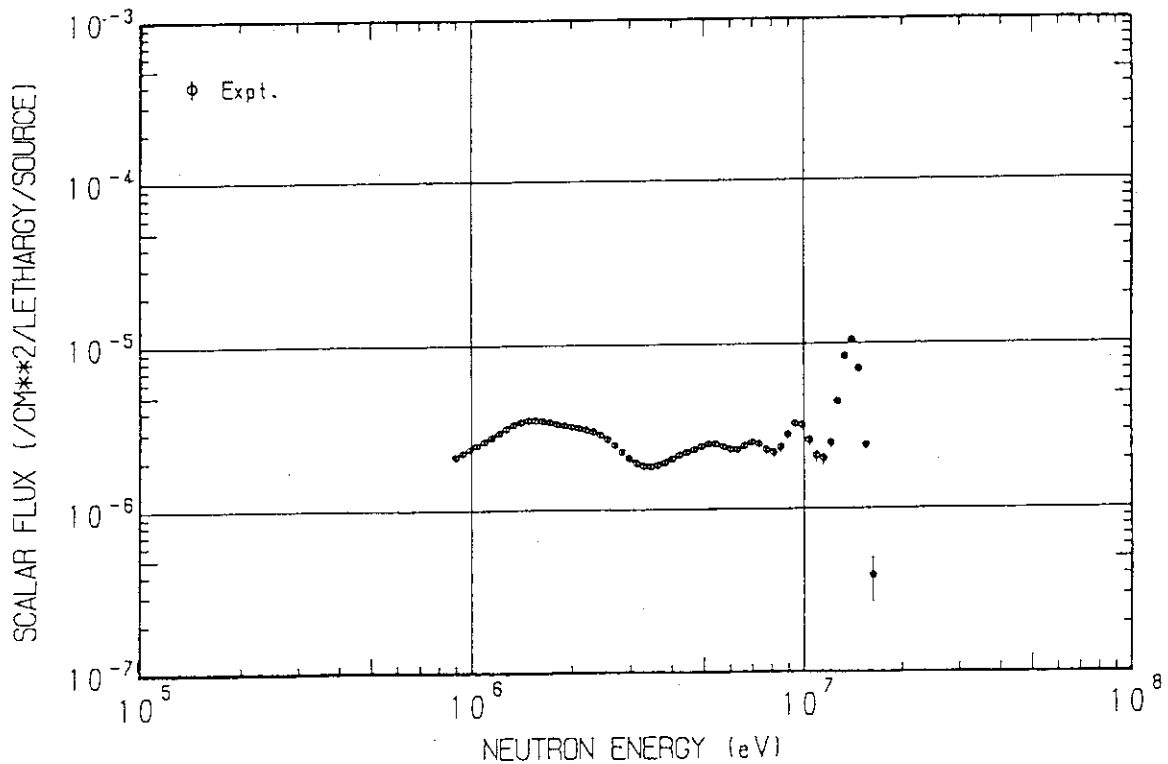


Fig. 6.13 Measured neutron scalar spectrum in the graphite assembly (z=62.1cm).

GRAPHITE 60 CM ASSEMBLY ( CENTER )

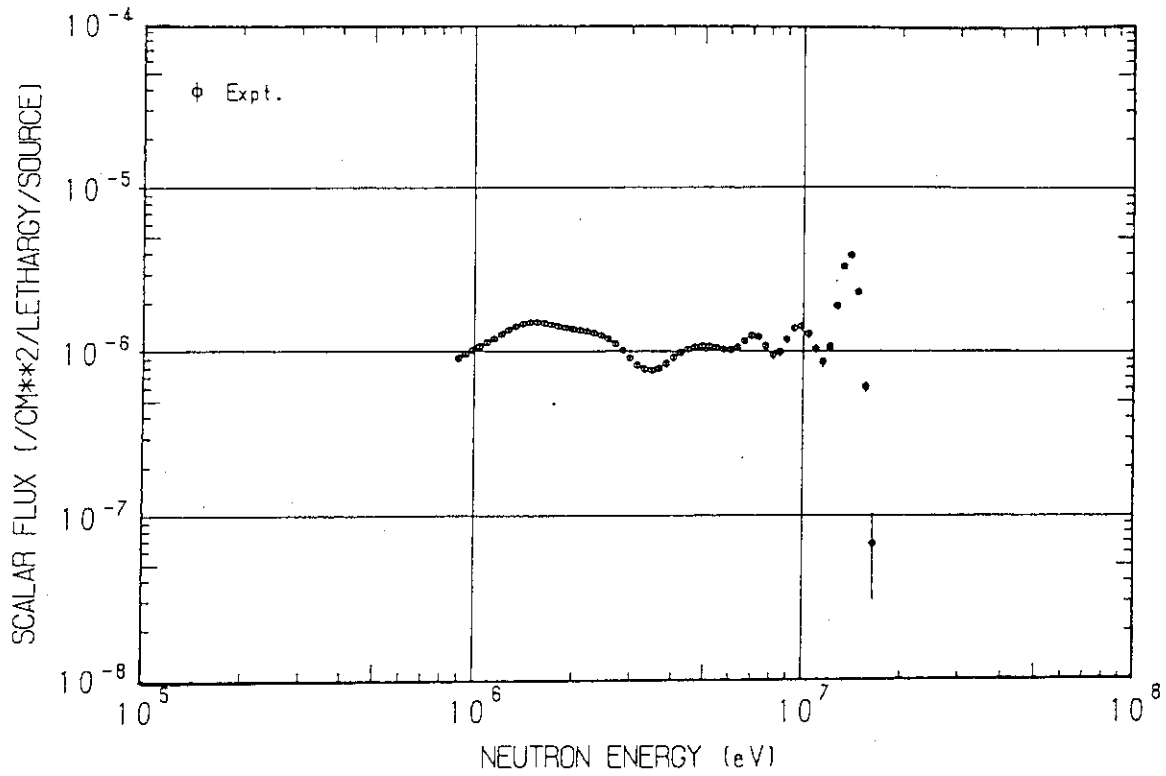


Fig. 6.14 Measured neutron scalar spectrum in the graphite assembly (z=72.1cm).

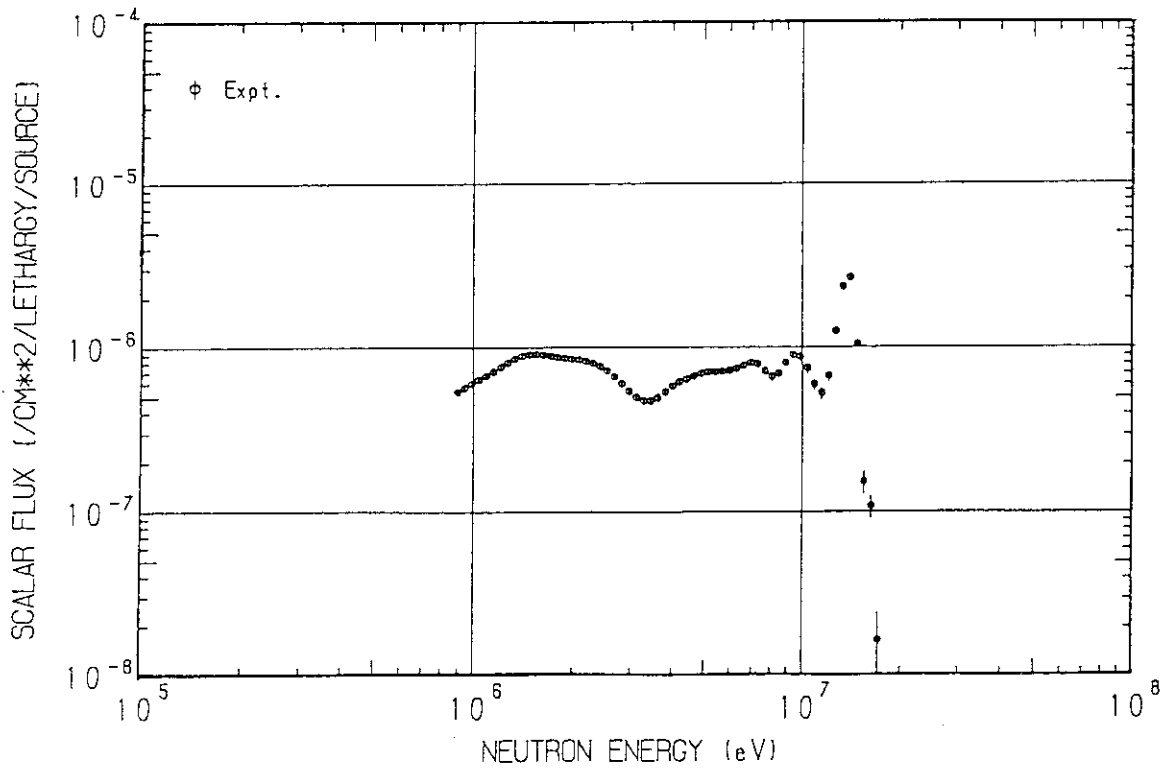


Fig. 6.15 Measured neutron scalar spectrum in the graphite assembly (z=77.2cm).

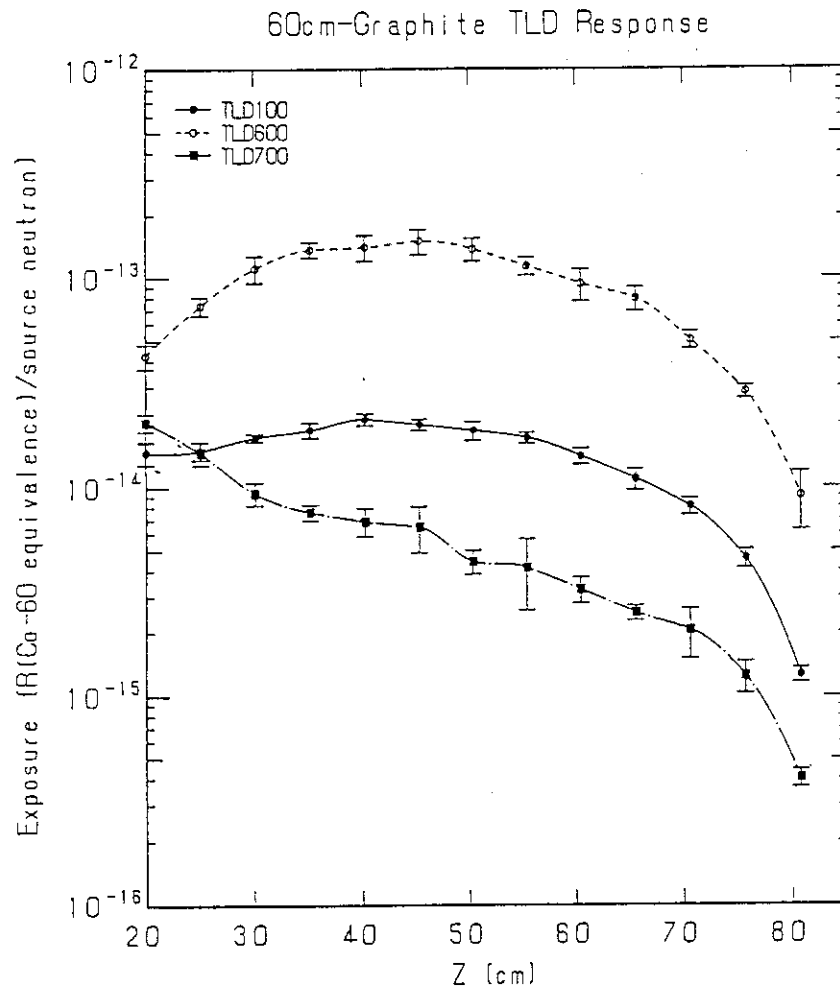


Fig. 6.16 Response distributions of TLD-600, TLD-700 and TLD-100 in the graphite assembly.

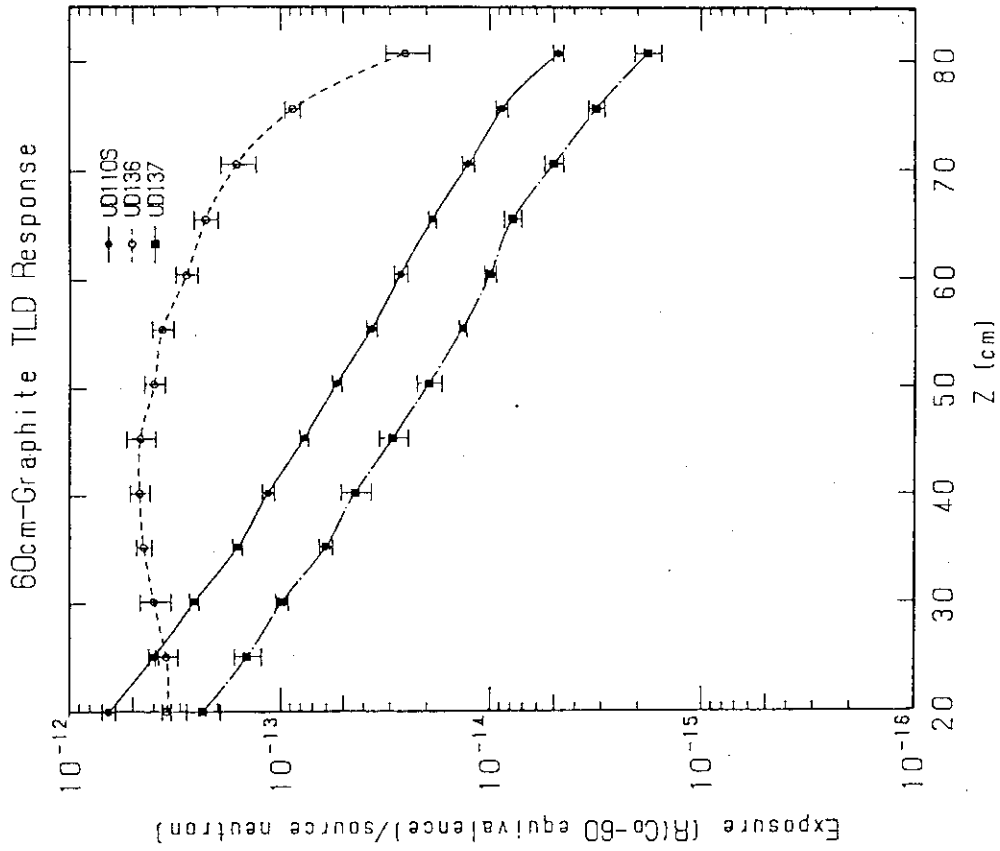


Fig. 6.18 Response distributions of MSO-S, SSO-S and BSO-S TLDs in the graphite assembly.

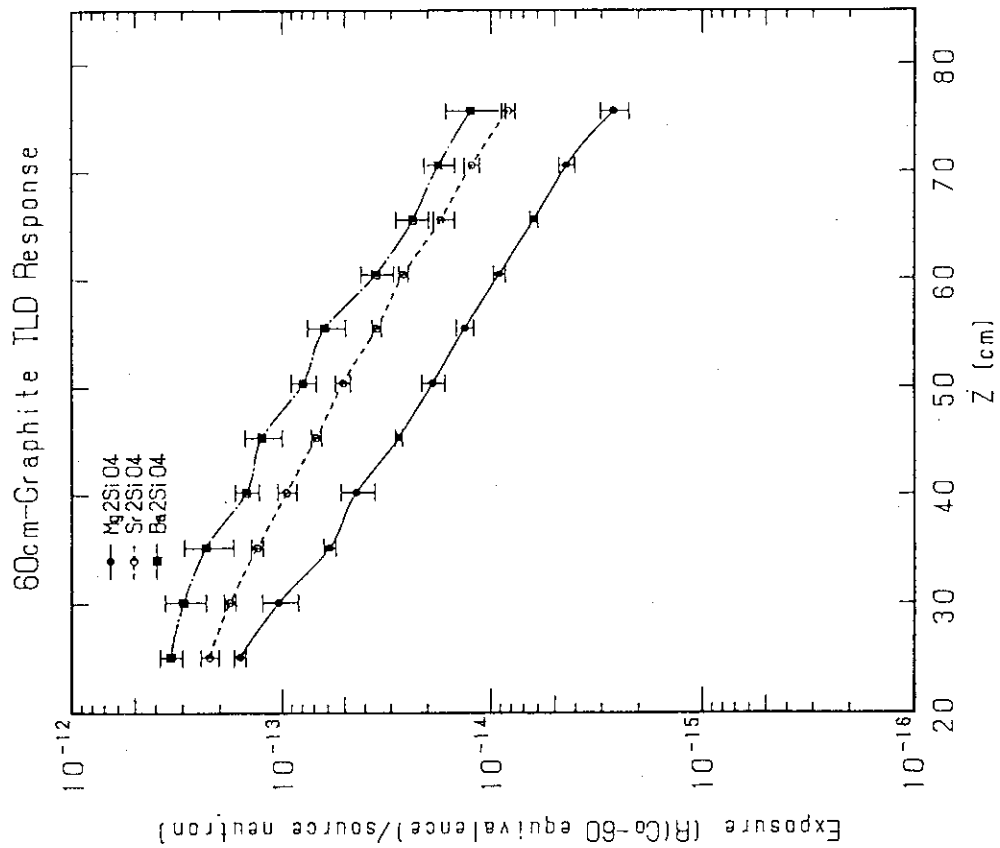


Fig. 6.17 Response distributions of UD-110S, UD-136N and UD-137N TLDs in the graphite assembly.



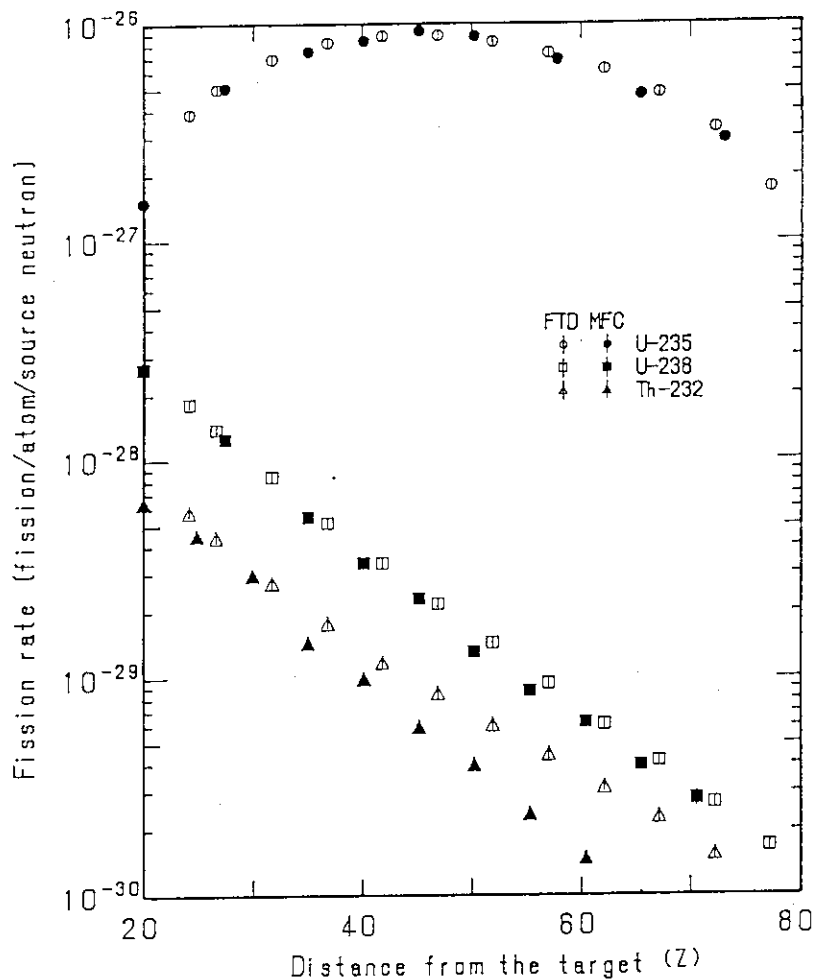
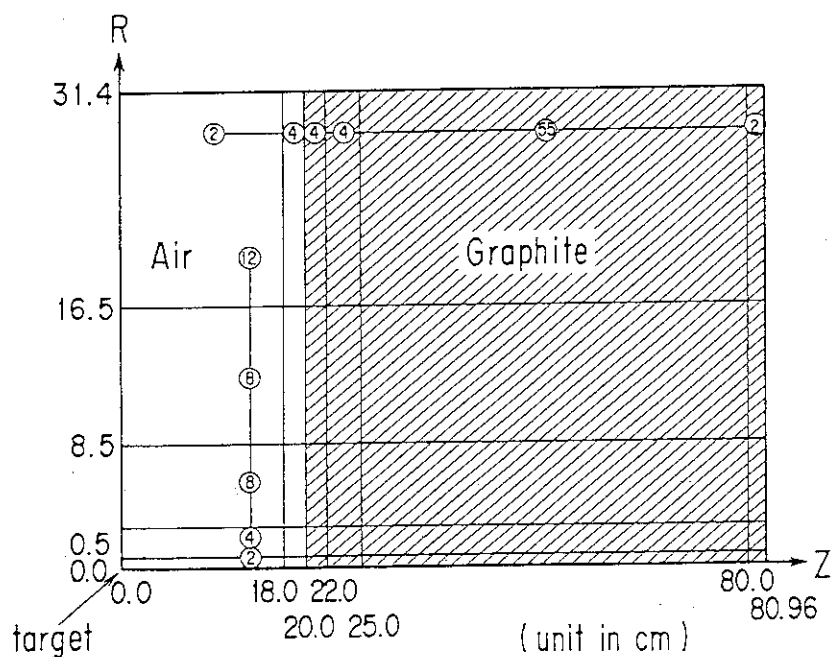


Fig. 6.19 Fission-rate distributions in the graphite assembly measured by FTD and those by micro-fission chambers.



\* Digit in a circle means mesh number for each region.

Fig. 6.20 Calculation model for the graphite assembly.

```

FNS-GRTUNCL GRAPHITE ASSEMBLY #4 AIR(20)-C(60.96) JACKAS(J3PR2 E-FLAT) 00000100
0 00000200
1¥¥ 00000300
      0 5 2 34 71 12500000400
      4 5 129 72 0 15600000500
      156 2 1 30000 10 000000600
      1 0 18 0 0 1600000700
2** 00000800
      1.1767+00 0.0 0.0 00000900
T 00001000
1** 00001100
FO.0 00001200
2** 00001300
110.0 3118.0 3120.0 3122.0 54125.0 1180.0 00001400
80.96 00001500
3** 00001600
      0.0 0.0 2.7828-03 1.7363-02 7.1310-02 2.3566-0100001700
      2.8044-01 1.9088-01 8.8741-02 1.9619-02 4.7824-03 3.6889-0300001800
      4.0824-03 3.0739-03 2.0627-03 1.5353-03 1.3058-03 1.0510-0300001900
      9.1815-04 6.6341-04 4.9328-04 4.3340-04 3.5410-04 3.3956-0400002000
      3.3951-04 4.7551-04 5.2166-04 5.4544-04 6.0839-04 5.8562-0400002100
      5.9851-04 5.9892-04 2.3220-03 2.1711-03 1.9259-03 2.0821-0300002200
      2.4699-03 2.3331-03 2.1203-03 2.3830-03 2.7193-03 2.5754-0300002300
      2.5194-03 2.9628-03 3.5164-03 3.9704-03 4.3379-03 4.2412-0300002400
      3.6099-03 3.3610-03 3.4485-03 3.7938-03 4.3795-03 4.7354-0300002500
      5.0664-03 5.2928-03 5.3299-03 5.3383-03 5.3194-03 5.3179-0300002600
      1.0130-02 9.9677-03 9.7640-03 9.6236-03 9.7275-03 9.9713-0300002700
      9.7540-03 9.3421-03 8.6681-03 7.7929-03 6.8688-03 5.9791-0300002800
      4.9397-03 3.8479-03 3.2890-03 2.8136-03 2.4317-03 2.1040-0300002900
      1.8527-03 1.6141-03 1.4051-03 1.2219-03 9.1106-04 7.9663-0400003000
      6.9762-04 6.1088-04 5.3606-04 4.7077-04 4.1340-04 3.6436-0400003100
      3.2144-04 2.8444-04 2.5200-04 2.2407-04 2.0045-04 1.7891-0400003200
      3.0516-04 2.4812-04 2.1369-04 1.9164-04 1.6038-04 1.3521-0400003300
      1.1447-04 9.7598-05 8.3682-05 7.2417-05 6.3421-05 5.5907-0500003400
      4.3479-05 00003500
FO.0 00003600
4** 00003700
110.0 310.5 712.5 718.5 11116.5 31.4 00003800
5** 00003900
F1.0 00004000
6** 00004100
1.0 00004200
7** 00004300
1.0 00004400
8¥¥ 00004500
      34R1 5Q34 00004600
      34R2 64Q34 00004700
9¥¥ 00004800
-97 -103 00004900
10¥¥ 00005000
      4I97 1Q6 00005100
      4I103 1Q8 1Q6 00005200
      46I109 156 00005300
11¥¥ 00005400
6Z 4I31 36 00005500
6Z 4I91 96 00005600
48Z 00005700
12** 00005800
6R0.0 6R4.9210-5 00005900
6R0.0 6R8.2322-2 00006000
48R0.0 00006100
13** 00006200
-0.97753 -0.90676 -0.82999 -0.74536 -0.64979 -0.53748 00006300
-0.39441 -0.14907 1M8 00006400
14** 00006500
F1.0 00006600
T T 00006700

```

Fig. 6.21 An example of input data of GRTUNCL for DOT analysis.

```

FNS-DOT35 GRAPHITE ASSEMBLY #4 AIR(20)-C(60.96) JACKAS(J3PR2 E-FLAT)      00000100
0                                                                              00000200
61¥¥ 0                                                                              00000300
      0          5          2          34          71          1250000400
      4          5          129         72          0          000000500
    156         1          160         1          1          000000600
      0          0          1          10         15         400000700
      6          2          0          0          0          000000800
      0          0          0          0          0          000000900
      0          0          0          0          3          000001000
      0          0          0          0          0          000001100
      0          0          2          1          1          000001200
      0          0          0          0          18         800001300
      0          0          0          0          0          00001400
62¥¥ 0          0          0          0          0          00001500
      2          3          4          14         15         900001600
    10         11         12         13          8         6000001700
      0          0          0          0          0          00001800
63** 0.0          1.000E-02  0.0          0.0          0.0          0.0          00002000
      0.0          0.0          0.0          0.0          0.0          0.0          00002100
      0.0          0.0          0.0          0.0          0.0          0.0          00002200
T     00002300
7**  -0.21082      -0.14907  1M1          00002400
      -0.42164      -0.39441      -0.14907  1M2          00002500
      -0.55777      -0.53748      -0.39441      -0.14907  1M3          00002600
      -0.66667      -0.64979      -0.53748      -0.39441      -0.14907  1M4          00002700
      -0.76012      -0.74536      -0.64979      -0.53748      -0.39441      -0.14907  00002800
1M5  -0.84327      -0.82999      -0.74536      -0.64979      -0.53748      -0.39441  00002900
      -0.14907      1M6          -0.82999      -0.74536      -0.64979      -0.53748  00003000
      -0.91894      -0.90676      -0.82999      -0.74536      -0.64979      -0.53748  00003100
      -0.39441      -0.14907      1M7          -0.82999      -0.74536      -0.64979  00003200
      -0.98883      -0.97753      -0.90676      -0.82999      -0.74536      -0.64979  00003300
      -0.53748      -0.39441      -0.14907      1M8          00003400
1Q80 00003500
3R-0.97753  5R-0.90676  7R-0.82999  9R-0.74536  11R-0.64979  13R-0.53748  00003600
15R-0.39441  17R-0.14907  3R0.97753  5R0.90676  7R0.82999  9R0.74536  00003700
11R0.64979  13R0.53748  15R0.39441  17R0.14907  00003800
T     00003900
6**  0.0          2R0.13586-1  0.0          4R0.97681-2  00004000
      0.0          0.64738-2  0.50390-2  0.64738-2  1N3          00004100
      0.0          0.64634-2  2R0.71124-2  0.64634-2  1N4          00004200
      0.0          0.64634-2  0.14381-2  0.36342-2  0.14381-2  0.64634-2  200004600
1N5  00004300
      0.0          0.64738-2  0.71124-2  0.36342-2  1N3          1Q6          00004400
      0.0          0.97681-2  0.50390-2  0.71124-2  0.14381-2  0.71124-2  200004900
      0.0          0.50390-2  0.97681-2  1N7          00005000
      0.0          0.13586-1  0.97681-2  2R0.64738-2  1N4          1Q8          00005100
1Q80 00005200
T     00005300
3**  00005400
FO.0 00005500
T     00005600
1**  00005700
FO.0 00005800
2**  00005900
110.0 3I18.0 3I20.0 3I22.0 54I25.0 1I80.0 00006000
80.96 00006100
4**  00006200
110.0 3I0.5 7I2.5 7I8.5 11I16.5 31.4 00006300
5**  00006400
99R1.0 8R1.0 18R0.0 00006500
8¥¥ 00006600
      34R1          5Q34
      34R2          64Q34
9¥¥ 00006700
-97 -103 00006800
10¥¥ 00006900
      4I97          102          1Q6
      4I103         108          1Q6
      46I109        156
11¥¥ 00007000
6Z  4I31 36 00007100
6Z  4I91 96 00007200
48Z 00007300
12** 00007400
6R0.0 6R4.9210-5 00007500
6R0.0 6R8.2322-2 00007600
48R0.0 00007700
T     00007800
      00007900
      00008000
      00008100
      00008200
      00008300

```

Fig. 6.22 An example of input data for DOT analysis.

1.7 Integral Experiment on Li<sub>2</sub>O Cylindrical Assembly

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K. Kosako, M. Yoshizawa and T. Nakamura

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Tokai-mura, Naka-gun, Ibaraki-ken, 319-11, Japan

**Facility** FNS, Japan Atomic Energy Research Institute

**Date** 1983

**Measured Quantities**

## (i) Tritium Production Rate

Li-Pellet with Liquid Scintillation Counter

Li-Glass Counter

NE213 Counter (indirect method)

## (ii) Fission Rate

Micro-Fission Chambers: Th-232, U-235, Np-237 and U-238

Fission Track Detectors: Th-232 and U-238

## (iii) Reaction Rate

Foil Activation Technique

## (iv) In-System Neutron Spectrum

14 mm Diam. Sphere NE213

**Experimental Method and Material / Geometry / Configuration**

Three types of Li<sub>2</sub>O blocks were made to construct a experimental assembly. The outside dimensions of these blocks had an area of 5.06 cm x 5.06 cm and lengths of 5.06, 10.12 and 20.24 cm. The bricks, which were almost cubic, were made from Li<sub>2</sub>O powder by cold pressing. Density of Li<sub>2</sub>O bricks was 75.5 % of theoretical density. One, two and four Li<sub>2</sub>O bricks were encapsulated, respectively, in a 0.2 mm-thick stainless steel box, edge-welded with a 2.5 mm deep rim.

These blocks were supported by a framework consisting of thin-walled, aluminum square tubes. Sectional views of the cylindrical slab assembly and Li<sub>2</sub>O blocks are shown in Fig. 7.1. The size of the assembly was 63.0 cm in average diameter and 61.0 cm in length.

Homogenized nuclear densities in each region are presented in Table 7.1.

An experimental channel, that is, a set of square tube and drawer made of 0.2 mm-thick stainless steel (SS304), was prepared for saving the time to change the detector location and thus minimizing the personnel exposure. This experimental channel was set at the central axis of the assembly. Three types of special-sized Li<sub>2</sub>O blocks were manufactured for loading in the drawer. The cross section of special-sized blocks is a little smaller than of the standard ones, i. e., 4.98 cm x 4.98 cm. While the length of them equals that of the standard blocks. Lithium-oxide blocks with an experimental hole were also made to allow insertion of a detector. This outer size was 4.98 cm cube and the hole size was 2.0 cm x 2.0 cm. Four small blocks were stacked and fixed by stainless steel solder to form the experimental hole. An additional experimental channel was placed at off-central axis located three units above the center (d=15.2 cm).

Detailed explanations about each measurement technique are given in Ref. 1.

### **Neutron Source Characteristics**

The 80° beam line in the first target room of the FNS facility was used for the present experiment. An experimental layout is shown in Fig. 7.2. A high speed water-cooled target assembly<sup>2)</sup> was set at the end of the beam line. A 20 Ci Ti-T target was mounted on the target assembly. Neutrons were generated at the distance of 20 cm from the assembly surface on its central axis. The setting accuracy is estimated to be within  $\pm 0.1$  cm. The layout of the first 15 m x 15 m target room is shown in Fig. 7.3. The distances from the target to the west and south walls are 5.5 m, and those to the ceiling, the grating floor and the basement floor are 7.9, 1.8 and 3.8 m, respectively.

Neutron yields were determined by means of the associated alpha-particle detection method.<sup>3)</sup> A small silicon surface-barrier detector was mounted in the target assembly to detect the alpha-particle of  ${}^3\text{T}(d,n){}^4\text{He}$  reaction. Source characteristics, that is, neutron yield, angular distribution and spectra, of the target assembly were measured by the time-of-flight technique,<sup>4)</sup> foil activation and an NE213 spectrometer.<sup>5,6)</sup>

The agreement between neutron yields measured by different methods was well within the experimental error. An analysis by Monte Carlo computation<sup>7)</sup> also showed fairly good agreement with measured neutron energy spectra as well as angular distributions, the latter obtained by foil activation. Thus, the calculated source spectrum and other characteristics were essentially confirmed and can be used as input information in the benchmark calculations. Source neutron spectrum is given in Table 7.21. The spectrum can be used for the experimental analysis. It should be noticed that the number of neutrons emitted toward 0 degree with respect to the d<sup>+</sup> beam must be normalized as 1.1767 per unit D-T reaction at the target.

### Experimental Data with Errors

Tritium production rate (TPR) measured by the liquid scintillation method with sintered Li<sub>2</sub>O pellets are shown in Table 7.2. Error estimation for the TPR measurement is presented in Table 7.3. Measured TPR of <sup>6</sup>Li by a pair of lithium glass scintillators is shown in Table 7.4 and Fig. 7.4. Its error analysis is in Table 7.5. Measured TPR of <sup>7</sup>Li by a small spherical NE213 spectrometer is shown in Table 7.6.

Fission rate distributions measured by micro fission chambers are shown in Table 7.7 and Fig. 7.5. Those measured by fission track detectors are shown in Table 7.13 and Fig. 7.6.

Reaction rate distributions by the foil activation method, decay data needed for reaction rate calculation and error analysis for the measurement are shown in Tables 7.9, 7.8 and 7.10, respectively.

Measured neutron spectra are given in Tables 7.14 to 7.20 and Fig. 7.7 to 7.13. Detector location and alpha count of the measurement are given in Table 7.11. Systematic errors in the unfolded spectra are shown in Table 7.12.

### Error Assessment and Example of Experimental Analysis

Some descriptions about error assessment are given in the Tables of this chapter. Examples of calculation model and input data for GRTUNCL and DOT are given in Figs. 7.14 - 7.16. Detailed descriptions about error assessment and experimental analysis are given in Ref. 2.

### References

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- 2) Seki M., et al.: J. Nucl. Sci. Technol., 16, 838 (1979).
- 3) Maekawa H., et al.: Neutron Yield Monitor for the Fusion Neutronics Source (FNS) -- for 80° Beam Line --," JAERI-M 83-219 (1983).
- 4) Oyama Y. and Maekawa H.: Nucl. Instr. Meth., A245, 173 (1986).
- 5) Oyama Y., et al.: "Development of a Spherical NE213 Spectrometer with 14 mm Diameter," JAERI-M 84-124 (in Japanese, 1984).
- 6) Oyama Y., et al.: Nucl. Instr. Meth., A256, 333 (1987).
- 7) Seki Y., et al.: J. Nucl. Sci. Technol., 20, 686 (1983).

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Table 7.1 Homogenized nuclide density for each region of Li<sub>2</sub>O assembly.

Region	Inner Li <sub>2</sub> O	Stainless steel	Outer Li <sub>2</sub> O
Outer Radius	2.719 cm	2.866 cm	31.5 cm
<sup>6</sup> Li	4.221-3*	-----	4.191-3
<sup>7</sup> Li	5.277-2	-----	5.240-2
O	2.850-2	-----	2.830-2
Fe	5.205-4	2.324-2	1.112-3
Ni	6.296-5	2.812-3	1.352-4
Cr	1.433-4	6.398-3	3.068-4
Mn	7.245-6	3.295-4	1.880-5

\* Read as  $4.2211 \times 10^{-3} [10^{24} \text{ atoms / cm}^3]$

Table 7.2 Measured tritium production rates (TPR) in the 60 cm-thick Li<sub>2</sub>O cylindrical slab assembly by liquid scintillation method with sintered Li<sub>2</sub>O pellets. The unit is [<sup>3</sup>T / source neutron / atom].

Position* <sup>1</sup> [cm]	<sup>6</sup> Li(n,t) <sup>4</sup> He			<sup>7</sup> Li(n,n' <sup>+</sup> t) <sup>4</sup> He
	Measured TPR	Corrected TPR for self-shielding	Corrected TPR for both effects* <sup>4</sup>	Measured TPR
19.9	7.58-29* <sup>2</sup> (4.8%)* <sup>3</sup>	7.71-29	7.66-29	6.32-29 (4.2%)
22.4	8.81-29 (4.5%)	8.98-29	8.93-29	4.60-29 (4.9%)
24.9	9.30-29 (4.5%)	9.48-29	9.44-29	3.85-29 (5.6%)
27.5	9.17-29 (4.5%)	9.28-29	9.23-29	2.67-29 (6.4%)
30.0	9.01-29 (4.5%)	9.19-29	9.15-29	2.08-29 (7.6%)
35.1	8.05-29 (4.7%)	8.23-29	8.18-29	1.26-29 (10.7%)
40.2	6.89-29 (4.9%)	7.06-29	7.01-29	4.57-30 (23.8%)
45.3	5.61-29 (5.3%)	5.75-29	5.71-29	3.92-30 (28.1%)
50.3	4.48-29 (5.8%)	4.60-29	4.55-29	
55.4	3.42-29 (6.5%)	3.52-29	3.48-29	
60.5	2.73-29 (7.3%)	2.81-29	2.76-29	
65.6	2.01-29 (8.7%)	2.08-29	2.03-29	
70.7	1.47-29 (10.5%)	1.52-29	1.46-29	
75.7	8.65-30 (15.7%)	8.94-30	8.36-30	
80.8	7.11-30 (18.3%)	7.34-30	-----* <sup>5</sup>	

\*1 Distance from the target

\*2 Read as  $7.58 \times 10^{-29}$

\*3 Experimental error

\*4 Self-shielding and room-return effects

\*5 Room-return effect was very large and estimated to be over 200 %

Table 7.3 Error analysis for the TPR measurement by liquid scintillation method with sintered Li<sub>2</sub>O pellet. The measured data are presented in Table 7.2.

Item	Systematic error	Random error
Neutron yield	± 1.5 %	negligible
Efficiency curve	± 1 %	± 2 %
Tritium count	-----	± 2.8 ~ 24 %
Li atom number	± 0.1 %	negligible
Tritium decay	negligible	-----
Tritium escape	-----	± 0.9 ~ 1.3 %

Table 7.4 Measured tritium production rates (TPR) of <sup>6</sup>Li in the Li<sub>2</sub>O assembly by a pair of Li-glass scintillators.

Location [cm]		TPR/ <sup>6</sup> Li atom/source neutron (error [%]) <sup>*1</sup>		Systematic error <sup>*1</sup>	Random error	
Z	R				Δs/s	ΔCα/Cα
<i>Central axis</i>						
20.25	0.0	5.44-29	(± 11.0)	± 5.4 <sup>*2</sup>	± 3.6	± 2.0
22.53	0.0	7.05-29	(± 9.9)		± 2.6	± 1.9
25.06	0.0	8.49-29	(± 9.1)		± 1.7	± 2.0
27.61	0.0	7.63-29	(± 10.5)		± 3.1	± 2.0
30.12	0.0	7.32-29	(± 8.3)		± 1.3	± 1.6
40.24	0.0	6.21-29	(± 7.9)		± 0.90	± 1.6
50.38	0.0	4.23-29	(± 7.1)		± 0.60	± 1.1
60.50	0.0	2.52-29	(± 7.3)		± 0.76	± 1.1
70.64	0.0	1.33-29	(± 6.9)		± 0.72	± 0.80
75.72	0.0	8.28-30	(± 6.8)		± 0.75	± 0.65
80.70	0.0	8.13-29	(± 6.6)		± 0.63	± 0.56
<i>Off-central axis</i>						
20.25	15.2	6.10-29	(± 9.5)		± 2.4	± 1.7
25.06	15.2	6.56-29	(± 8.3)		± 1.3	± 1.6
30.12	15.2	6.04-29	(± 8.6)		± 1.3	± 1.9
50.38	15.2	3.57-29	(± 7.7)		± 0.88	± 1.4
70.64	15.2	1.11-29	(± 6.8)		± 0.70	± 0.70

\*1 Fitting and self-shielding errors are excluded.

\*2 Systematic error is same for all data.

Table 7.5 Error Analysis for the TPR measurement by Li-glass scintillators.

items	systematic	random
count ( $\Delta s/s$ ) <sup>*1</sup>	-----	$\pm (0.6 \sim 3.6) \%$
<sup>6</sup> Li Atom Number	$\pm 0.5 \%$	-----
Edge Effect	$< 2.0 \%$	-----
Void Effect	$< 1.0 \%$	-----
Neutron Yield	$\pm 1.9 \%$	$\pm (0.6 \sim 2.0) \%$
Self-Shielding	3.0 ~ 25 %	-----
Fitting <sup>*2</sup>	5.0 ~ 40 %	-----

\*1 Statistical error for subtracted count.

\*2 This error is originated from the ambiguity of fitting region. (22)

Table 7.6 Measured tritium production rates (TPR) of <sup>7</sup>Li(n,n't)<sup>4</sup>He in the Li<sub>2</sub>O assembly by a small spherical NE213 spectrometer.

Position <sup>*1</sup> [cm]	Measured TPR of <sup>7</sup> Li [ <sup>3</sup> T / atom / source neutron]		
21.6	4.61-29 <sup>*2</sup>	(2.1%) <sup>*3</sup>	(3.3%) <sup>*4</sup>
31.5	1.66-29	(1.0%)	(2.7%)
41.6	6.23-30	(1.0%)	(2.7%)
51.7	2.40-30	(2.4%)	(2.5%)
61.8	9.04-31	(3.2%)	(2.4%)
72.0	3.46-31	(4.1%)	(2.4%)
82.1	1.25-31	(3.6%)	(2.3%)

\*1 Distance from the target.

\*2 Read as  $4.61 \times 10^{-29}$ .

\*3 Experimental error due to the unfolding process.

\*4 Experimental error for source intensity. (See Tables 7.11 and 7.12)

Table 7.7 Fission-rate distribution in the Li<sub>2</sub>O cylindrical slab assembly.

Position <sup>*1</sup> [cm]	Fission rate [ fission / Source neutron / atom ]							
	U-235		U-238		Np-237		Th-232	
23.9	5.00-28 <sup>*2</sup>	(4.1%) <sup>*3</sup>	1.85-28	(3.9%)	4.71-28	(5.1%)	5.74-29	(4.7%)
26.4	4.25-28	(4.2%)	1.41-28	(3.9%)	3.67-28	(5.1%)	4.29-29	(4.7%)
29.0	3.67-28	(4.1%)	1.05-28	(3.9%)	2.93-28	(5.1%)	3.29-29	(4.7%)
31.5	3.15-28	(4.1%)	8.04-29	(3.9%)	2.38-28	(5.1%)	2.45-29	(4.7%)
36.6	2.40-28	(4.1%)	4.87-29	(3.9%)	1.51-28	(5.1%)	1.44-29	(4.7%)
41.7	1.83-28	(4.1%)	2.97-29	(3.9%)	9.57-29	(5.1%)	8.73-30	(4.7%)
46.7	1.40-28	(4.1%)	1.81-29	(3.9%)	6.33-29	(5.1%)	5.40-30	(4.7%)
51.8	1.06-28	(4.1%)	1.14-29	(3.9%)	4.05-29	(5.1%)	3.29-30	(4.8%)
56.9	7.96-29	(4.1%)	7.05-30	(3.9%)	2.68-29	(5.2%)	2.05-30	(5.2%)
62.0	5.90-29	(4.1%)	4.42-30	(4.0%)	1.68-29	(5.2%)	-----	
67.1	4.18-29	(4.1%)	2.80-30	(4.0%)	1.10-29	(5.2%)	7.87-31	(6.4%)
72.1	2.81-29	(4.1%)	1.72-30	(4.0%)	7.13-30	(5.3%)	5.22-31	(5.6%)
77.2	1.68-29	(4.2%)	9.97-31	(4.2%)	4.31-30	(5.2%)	3.30-31	(5.7%)

\*1 Distance from the target.

\*2 Read as  $5.00 \times 10^{-28}$ .

\*3 Estimated error

Table 7.8 Decay data needed for reaction-rate calculation.

Reaction	Half life	Detected $\gamma$ -ray energy [keV]	$\gamma$ -ray branching ratio [%]
$^{27}\text{Al}(n,\alpha)^{24}\text{Na}$	15.02 h	1368.6	100.
$^{58}\text{Ni}(n,2n)^{57}\text{Ni}$	36.0 h	1377.6	77.6
$^{115}\text{In}(n,n')^{115\text{m}}\text{In}$	4.49 h	336.	45.9
$^{115}\text{In}(n,\gamma)^{116}\text{In}$	54.1 m	1293.5	85.0

Table 7.9 Reaction rate distribution in the Li2O assembly.

(a)  $^{115}\text{In}(n,n')^{115\text{m}}\text{In}$  and  $^{115}\text{In}(n,\gamma)^{116}\text{In}$

Position *1 [cm]	$^{115}\text{In}(n,n')^{115\text{m}}\text{In}$ [ reaction rate / atom / source neutron ]		$^{115}\text{In}(n,\gamma)^{116}\text{In}$	
29.96	2.01-29*2	(3.8%)*3	3.38-29	(5.6%)*3
40.12	9.12-30	(4.1%)	2.65-29	(4.9%)
50.29	3.77-30	(4.6%)	1.79-29	(4.3%)
60.45	1.62-30	(7.2%)	1.13-29	(4.7%)
70.61	6.58-31	(9.5%)	4.92-30	(4.5%)

(b)  $^{27}\text{Al}(n,\alpha)^{24}\text{Na}$

(c)  $^{58}\text{Ni}(n,2n)^{57}\text{Ni}$

Position [cm] [reaction rate/atom/source]			Position [cm] [reaction rate/atom/source]		
19.95	2.12-29	(3.2 %)*3	19.85	8.00-30	(3.1 %)*3
22.44	1.57-29	(3.1 %)	22.34	5.19-30	(2.8 %)
24.98	1.18-29	(3.1 %)	24.88	3.61-30	(3.2 %)
27.52	8.61-30	(3.3 %)	27.42	2.34-30	(4.5 %)
30.06	6.31-30	(3.3 %)	29.96	1.62-30	(5.3 %)
35.14	3.60-30	(3.3 %)	35.04	8.84-31	(5.3 %)
40.22	2.12-30	(3.5 %)	40.12	4.10-31	(6.6 %)
45.30	1.28-30	(3.5 %)	45.20	2.35-31	(6.7 %)
50.29	7.62-31	(3.5 %)	50.29	1.23-31	(7.1 %)
55.47	4.49-31	(3.1 %)	55.37	6.13-32	(2.8 %)
60.55	2.84-31	(3.8 %)	60.45	3.22-32	(9.5 %)
65.63	1.67-31	(3.8 %)	65.53	2.01-32	(9.6 %)
70.71	9.87-32	(3.7 %)	70.61	1.16-32	(10.3 %)
75.79	6.11-32	(3.6 %)	75.69	6.12-33	(8.9 %)

\*1 Distance from the target.

\*2 Read as  $2.01 \times 10^{-28}$ .

\*3 Estimated error

Table 7.10 Error analysis for the reaction-rate measurements. The measured data are presented in Table 7.9.

Item	Error [ ± % ]
Counting statistics	0.5 ~ 9
Detector efficiency	2.5
Natural abundance	< 0.2
Foil weight	< 0.1
Sum peak	0.5 (only for <sup>24</sup> Na)
Saturation factor	0.3 for <sup>57</sup> Ni
	0.5 for <sup>24</sup> Na
	1.0 for <sup>115m</sup> In
	2.0 for <sup>116</sup> In
Source neutron yield	3.0
Times for irradiation, Cooling and measuring	~negligible
Decay data	< 0.5

Table 7.11 Detector location and alpha count of in-system neutron spectral measurement.

Data No.	Position <sup>*1</sup> [ cm ]	Alpha count [ counts ]	
1	21.6 ± 0.1	1,962	(3.3%) <sup>*2</sup>
2	31.5 ± 0.1	5,474	(2.7%)
3	41.6 ± 0.1	5,389	(2.7%)
4	51.7 ± 0.1	10,319	(2.5%)
5	61.8 ± 0.1	35,654	(2.4%)
6	72.0 ± 0.1	88,963	(2.4%)
7	82.1 ± 0.1	318,777	(2.3%)

\*1 Distance from the target.

\*2 Experimental error for source intensity. (See Table 7.12)

Table 7.12 Systematic errors in the unfolded spectra<sup>\*1</sup>.

Item	Error [%]	Comment
Source intensity	$\pm \sqrt{(2.34)^2 + (10^4 / C\alpha)}$	Alpha monitor
Efficiency	(+0.4 ~ -1.6) %	Calibration error <sup>*2</sup>

\*1 Except the error related to the unfolding process.

\*2 The calibration was performed by using the same D-T neutron source and alpha-monitor. Therefore, the systematic error (2.34%) is excluded in the value.

Table 7.13 Absolute fission rates in Li2O assembly measured with FTD method.

Position <sup>*1</sup>	Absolute fission rate [ fissions/atom/source neutron ]			
	Th-232		U-238	
24.86	4.37-29 <sup>*2</sup>	(2.9%) <sup>*3</sup>	1.54-28	(2.4%)
29.92	1.58-29	(2.1%)	9.71-29	(3.0%)
34.98	1.28-29	(2.6%)	5.51-29	(3.9%)
40.04	7.97-30	(2.6%)	3.00-29	(2.4%)
45.10	5.62-30	(3.0%)	1.94-29	(2.6%)
50.16	2.91-30	(2.7%)	1.23-29	(3.3%)
55.22	1.78-30	(2.8%)	7.77-30	(3.3%)
60.28	1.15-30	(3.0%)	5.09-30	(2.2%)
65.34	7.05-31	(2.9%)	2.74-30	(3.1%)
70.40	-----		1.77-30	(3.8%)

\*1 Distance from the target.

\*2 Read as  $4.37 \times 10^{29}$

\*3 Experimental error due to the statistics of etch-pit counting.

The errors of source neutron (~ 2.4 %), prime sensitivity (2 ~ 3%) and unknown factors are excluded.

Table 7.14 Neutron spectrum in the lithium-oxide assembly (z=21.6 cm).

Energy [MeV]	Flux/Leth.	Error	Window	Energy [MeV]	Flux/Leth.	Error	Window
2.102E+05	-2.906E-04	1.0000	81.68	1.995E+06	2.106E-05	.1243	36.00
2.210E+05	-3.579E-04	1.0000	80.51	2.097E+06	2.110E-05	.1278	35.14
2.323E+05	-4.312E-04	1.0000	79.34	2.204E+06	2.416E-05	.1056	34.31
2.442E+05	-5.257E-04	1.0000	78.16	2.317E+06	2.862E-05	.0827	33.55
2.568E+05	-6.289E-04	1.0000	77.00	2.436E+06	3.245E-05	.0695	32.80
2.699E+05	-7.569E-04	1.0000	75.82	2.561E+06	3.404E-05	.0652	32.04
2.838E+05	-9.024E-04	1.0000	74.66	2.692E+06	3.286E-05	.0683	31.25
2.983E+05	-1.054E-03	1.0000	73.48	2.830E+06	2.941E-05	.0836	30.49
3.136E+05	-1.220E-03	1.0000	72.32	2.975E+06	2.490E-05	.1208	29.74
3.297E+05	-1.393E-03	1.0000	71.14	3.128E+06	2.062E-05	.1768	29.02
3.466E+05	-1.561E-03	1.0000	69.98	3.288E+06	1.769E-05	.2235	28.30
3.644E+05	-1.713E-03	1.0000	68.80	3.457E+06	1.694E-05	.2173	27.58
3.830E+05	-1.823E-03	1.0000	67.68	3.634E+06	1.864E-05	.1552	26.82
4.027E+05	-1.885E-03	1.0000	66.60	3.821E+06	2.228E-05	.1060	26.06
4.233E+05	-1.889E-03	1.0000	65.63	4.016E+06	2.658E-05	.1083	25.27
4.450E+05	-1.810E-03	1.0000	64.69	4.222E+06	2.996E-05	.1150	24.55
4.678E+05	-1.654E-03	1.0000	63.83	4.439E+06	3.119E-05	.1096	23.94
4.918E+05	-1.447E-03	1.0000	62.96	4.666E+06	2.972E-05	.1033	23.33
5.170E+05	-1.184E-03	1.0000	62.10	4.906E+06	2.575E-05	.1174	22.72
5.436E+05	-8.910E-04	1.0000	61.20	5.157E+06	2.015E-05	.1677	22.18
5.714E+05	-6.319E-04	1.0000	60.30	5.422E+06	1.483E-05	.2475	21.67
6.007E+05	-4.033E-04	1.0000	59.36	5.700E+06	1.227E-05	.3076	21.10
6.315E+05	-2.345E-04	1.0000	58.43	5.992E+06	1.323E-05	.2864	20.56
6.639E+05	-1.193E-04	1.0000	57.49	6.299E+06	1.556E-05	.2691	20.02
6.979E+05	-4.962E-05	1.0000	56.56	6.622E+06	1.689E-05	.2774	19.48
7.337E+05	-1.478E-05	1.0000	55.62	6.961E+06	1.689E-05	.2857	18.97
7.713E+05	6.093E-07	1.0000	54.72	7.318E+06	1.611E-05	.3465	18.49
8.109E+05	6.085E-06	14.3370	53.86	7.694E+06	1.478E-05	.4460	18.04
8.525E+05	7.655E-06	2.2298	52.99	8.088E+06	1.267E-05	.5654	17.62
8.962E+05	8.016E-06	.4356	52.16	8.503E+06	9.673E-06	.8504	17.22
9.421E+05	8.294E-06	.2414	51.34	8.939E+06	8.257E-06	1.2641	16.78
9.904E+05	9.003E-06	.1962	50.47	9.397E+06	1.051E-05	1.1018	16.36
1.041E+06	1.048E-05	.1591	49.57	9.879E+06	1.437E-05	.8146	15.93
1.095E+06	1.300E-05	.1178	48.64	1.039E+07	1.490E-05	.8784	15.47
1.151E+06	1.666E-05	.0853	47.59	1.092E+07	5.672E-06	2.3430	15.07
1.210E+06	2.142E-05	.0693	46.51	1.148E+07	-6.214E-06	1.0000	14.76
1.272E+06	2.697E-05	.0662	45.40	1.207E+07	-2.238E-05	1.0000	14.54
1.337E+06	3.281E-05	.0682	44.21	1.268E+07	-5.248E-05	1.0000	14.42
1.406E+06	3.817E-05	.0708	42.95	1.334E+07	1.040E-04	.2818	14.40
1.478E+06	4.199E-05	.0715	41.72	1.402E+07	8.113E-04	.0512	14.40
1.553E+06	4.325E-05	.0693	40.57	1.474E+07	1.486E-03	.0578	14.40
1.633E+06	4.138E-05	.0641	39.53	1.549E+07	9.841E-04	.0345	14.40
1.717E+06	3.662E-05	.0589	38.56	1.629E+07	8.528E-05	.5505	14.40
1.805E+06	3.029E-05	.0645	37.69	1.712E+07	-1.759E-04	1.0000	14.40
1.897E+06	2.444E-05	.0929	36.86	1.800E+07	-1.019E-04	1.0000	14.40

Table 7.15 Neutron spectrum in the lithium-oxide assembly (z=31.5 cm).

Energy [MeV]	Flux/Leth.	Error	Window	Energy [MeV]	Flux/Leth.	Error	Window
2.102E+05	5.892E-04	21.1410	81.68	1.995E+06	1.886E-05	.0531	36.00
2.210E+05	7.180E-04	21.1570	80.51	2.097E+06	1.920E-05	.0526	35.14
2.323E+05	8.731E-04	21.1540	79.34	2.204E+06	2.036E-05	.0489	34.31
2.442E+05	1.056E-03	21.1800	78.16	2.317E+06	2.177E-05	.0447	33.55
2.568E+05	1.272E-03	21.1830	77.00	2.436E+06	2.273E-05	.0422	32.80
2.699E+05	1.523E-03	21.1660	75.82	2.561E+06	2.271E-05	.0420	32.04
2.838E+05	1.806E-03	21.1600	74.66	2.692E+06	2.155E-05	.0445	31.25
2.983E+05	2.111E-03	21.2200	73.48	2.830E+06	1.949E-05	.0505	30.49
3.136E+05	2.442E-03	21.2180	72.32	2.975E+06	1.698E-05	.0621	29.74
3.297E+05	2.801E-03	21.0670	71.14	3.128E+06	1.459E-05	.0794	29.02
3.466E+05	3.091E-03	21.3170	69.98	3.288E+06	1.288E-05	.0942	28.30
3.644E+05	3.405E-03	21.1360	68.80	3.457E+06	1.233E-05	.0956	27.58
3.830E+05	3.606E-03	21.2260	67.68	3.634E+06	1.317E-05	.0824	26.82

4.027E+05	3.734E-03	21.1370	66.60	3.821E+06	1.509E-05	.0679	26.06
4.233E+05	3.716E-03	21.1290	65.63	4.016E+06	1.721E-05	.0639	25.27
4.450E+05	3.528E-03	21.2500	64.69	4.222E+06	1.849E-05	.0646	24.55
4.678E+05	3.209E-03	21.2700	63.83	4.439E+06	1.841E-05	.0673	23.94
4.918E+05	2.781E-03	21.1580	62.96	4.666E+06	1.726E-05	.0716	23.33
5.170E+05	2.251E-03	21.1790	62.10	4.906E+06	1.578E-05	.0805	22.72
5.436E+05	1.697E-03	21.1810	61.20	5.157E+06	1.437E-05	.0937	22.18
5.714E+05	1.181E-03	21.1440	60.30	5.422E+06	1.314E-05	.1089	21.67
6.007E+05	7.484E-04	21.1140	59.36	5.700E+06	1.233E-05	.1214	21.10
6.315E+05	4.273E-04	21.0290	58.43	5.992E+06	1.229E-05	.1235	20.56
6.639E+05	2.185E-04	20.6990	57.49	6.299E+06	1.308E-05	.1238	20.02
6.979E+05	9.930E-05	19.9150	56.56	6.622E+06	1.432E-05	.1237	19.48
7.337E+05	4.160E-05	17.6720	55.62	6.961E+06	1.553E-05	.1177	18.97
7.713E+05	1.824E-05	12.4010	54.72	7.318E+06	1.636E-05	.1241	18.49
8.109E+05	1.065E-05	5.2403	53.86	7.694E+06	1.644E-05	.1405	18.04
8.525E+05	8.805E-06	1.2327	52.99	8.088E+06	1.564E-05	.1559	17.62
8.962E+05	8.570E-06	.2232	52.16	8.503E+06	1.451E-05	.1863	17.22
9.421E+05	8.767E-06	.0929	51.34	8.939E+06	1.350E-05	.2456	16.78
9.904E+05	9.246E-06	.0736	50.47	9.397E+06	1.367E-05	.2628	16.36
1.041E+06	1.010E-05	.0671	49.57	9.879E+06	1.587E-05	.2313	15.93
1.095E+06	1.140E-05	.0598	48.64	1.039E+07	1.718E-05	.2377	15.47
1.151E+06	1.313E-05	.0531	47.59	1.092E+07	1.632E-05	.2428	15.07
1.210E+06	1.520E-05	.0478	46.51	1.148E+07	1.665E-05	.2331	14.76
1.272E+06	1.746E-05	.0445	45.40	1.207E+07	1.599E-05	.2954	14.54
1.337E+06	1.970E-05	.0426	44.21	1.268E+07	1.770E-05	.3421	14.42
1.406E+06	2.169E-05	.0427	42.95	1.334E+07	7.660E-05	.0915	14.40
1.478E+06	2.313E-05	.0430	41.72	1.402E+07	2.626E-04	.0355	14.40
1.553E+06	2.378E-05	.0421	40.57	1.474E+07	3.966E-04	.0460	14.40
1.633E+06	2.353E-05	.0415	39.53	1.549E+07	2.123E-04	.0352	14.40
1.717E+06	2.245E-05	.0409	38.56	1.629E+07	-2.718E-05	1.0000	14.40
1.805E+06	2.092E-05	.0432	37.69	1.712E+07	-6.680E-05	1.0000	14.40
1.897E+06	1.952E-05	.0488	36.86	1.800E+07	-2.930E-05	1.0000	14.40

Table 7.16 Neutron spectrum in the lithium-oxide assembly (z=41.6 cm).

Energy [MeV]	Flux/Leth.	Error	Window	Energy [MeV]	Flux/Leth.	Error	Window
2.102E+05	5.894E-04	10.9950	81.68	1.995E+06	1.054E-05	.0400	36.00
2.210E+05	7.198E-04	10.9780	80.51	2.097E+06	1.072E-05	.0394	35.14
2.323E+05	8.752E-04	10.9770	79.34	2.204E+06	1.111E-05	.0379	34.31
2.442E+05	1.061E-03	10.9740	78.16	2.317E+06	1.151E-05	.0363	33.55
2.568E+05	1.278E-03	10.9740	77.00	2.436E+06	1.167E-05	.0353	32.80
2.699E+05	1.527E-03	10.9770	75.82	2.561E+06	1.145E-05	.0355	32.04
2.838E+05	1.812E-03	10.9710	74.66	2.692E+06	1.079E-05	.0379	31.25
2.983E+05	2.121E-03	10.9860	73.48	2.830E+06	9.777E-06	.0418	30.49
3.136E+05	2.456E-03	10.9800	72.32	2.975E+06	8.597E-06	.0490	29.74
3.297E+05	2.795E-03	10.9810	71.14	3.128E+06	7.476E-06	.0584	29.02
3.466E+05	3.120E-03	10.9870	69.98	3.288E+06	6.657E-06	.0675	28.30
3.644E+05	3.409E-03	10.9830	68.80	3.457E+06	6.356E-06	.0700	27.58
3.830E+05	3.621E-03	10.9920	67.68	3.634E+06	6.634E-06	.0658	26.82
4.027E+05	3.735E-03	10.9920	66.60	3.821E+06	7.322E-06	.0589	26.06
4.233E+05	3.716E-03	10.9920	65.63	4.016E+06	8.042E-06	.0564	25.27
4.450E+05	3.545E-03	11.0020	64.69	4.222E+06	8.448E-06	.0564	24.55
4.678E+05	3.226E-03	11.0080	63.83	4.439E+06	8.432E-06	.0583	23.94
4.918E+05	2.783E-03	11.0000	62.96	4.666E+06	8.132E-06	.0619	23.33
5.170E+05	2.253E-03	11.0070	62.10	4.906E+06	7.743E-06	.0670	22.72
5.436E+05	1.696E-03	11.0230	61.20	5.157E+06	7.288E-06	.0745	22.18
5.714E+05	1.179E-03	11.0140	60.30	5.422E+06	6.721E-06	.0850	21.67
6.007E+05	7.468E-04	11.0070	59.36	5.700E+06	6.196E-06	.0966	21.10
6.315E+05	4.246E-04	11.0110	58.43	5.992E+06	6.114E-06	.0984	20.56
6.639E+05	2.148E-04	10.9510	57.49	6.299E+06	6.602E-06	.0960	20.02
6.979E+05	9.640E-05	10.6710	56.56	6.622E+06	7.198E-06	.0964	19.48
7.337E+05	3.851E-05	9.9260	55.62	6.961E+06	7.637E-06	.0927	18.97
7.713E+05	1.519E-05	7.7404	54.72	7.318E+06	8.262E-06	.0934	18.49
8.109E+05	7.568E-06	3.8351	53.86	7.694E+06	8.915E-06	.0968	18.04
8.525E+05	5.699E-06	.9892	52.99	8.088E+06	8.988E-06	.0999	17.62
8.962E+05	5.456E-06	.1778	52.16	8.503E+06	8.531E-06	.1135	17.22
9.421E+05	5.593E-06	.0676	51.34	8.939E+06	7.917E-06	.1461	16.78



9.904E+05	5.864E-06	.0526	50.47	9.397E+06	7.465E-06	.1658	16.36
1.041E+06	6.265E-06	.0497	49.57	9.879E+06	7.521E-06	.1696	15.93
1.095E+06	6.802E-06	.0469	48.64	1.039E+07	7.923E-06	.1781	15.47
1.151E+06	7.457E-06	.0443	47.59	1.092E+07	8.667E-06	.1548	15.07
1.210E+06	8.207E-06	.0419	46.51	1.148E+07	1.010E-05	.1284	14.76
1.272E+06	9.003E-06	.0396	45.40	1.207E+07	1.211E-05	.1230	14.54
1.337E+06	9.788E-06	.0379	44.21	1.268E+07	1.879E-05	.0900	14.32
1.406E+06	1.050E-05	.0371	42.95	1.334E+07	4.133E-05	.0476	14.30
1.478E+06	1.105E-05	.0369	41.72	1.402E+07	8.454E-05	.0301	14.30
1.553E+06	1.138E-05	.0368	40.57	1.474E+07	1.030E-04	.0419	14.30
1.633E+06	1.145E-05	.0363	39.53	1.549E+07	4.752E-05	.0387	14.30
1.717E+06	1.126E-05	.0362	38.56	1.629E+07	-1.073E-05	1.0000	14.40
1.805E+06	1.093E-05	.0369	37.69	1.712E+07	-1.849E-05	1.0000	14.40
1.897E+06	1.063E-05	.0387	36.86	1.800E+07	-8.684E-06	1.0000	14.40

Table 7.17 Neutron spectrum in the lithium-oxide assembly (z=51.7 cm).

Energy [MeV]	Flux/Leth.	Error	Window	Energy [MeV]	Flux/Leth.	Error	Window
2.102E+05	-8.603E-05	1.0000	81.68	1.995E+06	5.069E-06	.0353	36.00
2.210E+05	-1.046E-04	1.0000	80.51	2.097E+06	5.141E-06	.0348	35.14
2.323E+05	-1.265E-04	1.0000	79.34	2.204E+06	5.253E-06	.0339	34.31
2.442E+05	-1.540E-04	1.0000	78.16	2.317E+06	5.338E-06	.0331	33.55
2.568E+05	-1.851E-04	1.0000	77.00	2.436E+06	5.315E-06	.0329	32.80
2.699E+05	-2.209E-04	1.0000	75.82	2.561E+06	5.140E-06	.0335	32.04
2.838E+05	-2.621E-04	1.0000	74.66	2.692E+06	4.823E-06	.0354	31.25
2.983E+05	-3.080E-04	1.0000	73.48	2.830E+06	4.414E-06	.0385	30.49
3.136E+05	-3.556E-04	1.0000	72.32	2.975E+06	3.978E-06	.0430	29.74
3.297E+05	-4.036E-04	1.0000	71.14	3.128E+06	3.565E-06	.0491	29.02
3.466E+05	-4.516E-04	1.0000	69.98	3.288E+06	3.225E-06	.0551	28.30
3.644E+05	-4.926E-04	1.0000	68.80	3.457E+06	3.022E-06	.0584	27.58
3.830E+05	-5.235E-04	1.0000	67.68	3.634E+06	3.005E-06	.0590	26.82
4.027E+05	-5.398E-04	1.0000	66.60	3.821E+06	3.152E-06	.0560	26.06
4.233E+05	-5.373E-04	1.0000	65.63	4.016E+06	3.354E-06	.0549	25.27
4.450E+05	-5.113E-04	1.0000	64.69	4.222E+06	3.491E-06	.0554	24.55
4.678E+05	-4.655E-04	1.0000	63.83	4.439E+06	3.518E-06	.0565	23.94
4.918E+05	-3.989E-04	1.0000	62.96	4.666E+06	3.477E-06	.0591	23.33
5.170E+05	-3.223E-04	1.0000	62.10	4.906E+06	3.397E-06	.0624	22.72
5.436E+05	-2.429E-04	1.0000	61.20	5.157E+06	3.249E-06	.0678	22.18
5.714E+05	-1.674E-04	1.0000	60.30	5.422E+06	3.022E-06	.0759	21.67
6.007E+05	-1.047E-04	1.0000	59.36	5.700E+06	2.817E-06	.0852	21.10
6.315E+05	-5.833E-05	1.0000	58.43	5.992E+06	2.828E-06	.0859	20.56
6.639E+05	-2.792E-05	1.0000	57.49	6.299E+06	3.135E-06	.0800	20.02
6.979E+05	-1.088E-05	1.0000	56.56	6.622E+06	3.533E-06	.0764	19.48
7.337E+05	-2.479E-06	1.0000	55.62	6.961E+06	3.699E-06	.0750	18.97
7.713E+05	9.963E-07	55.9710	54.72	7.318E+06	3.642E-06	.0820	18.49
8.109E+05	2.211E-06	6.2287	53.86	7.694E+06	3.644E-06	.0895	18.04
8.525E+05	2.581E-06	1.0359	52.99	8.088E+06	3.773E-06	.0895	17.62
8.962E+05	2.709E-06	.1681	52.16	8.503E+06	3.767E-06	.0967	17.22
9.421E+05	2.798E-06	.0606	51.34	8.939E+06	3.441E-06	.1257	16.78
9.904E+05	2.910E-06	.0468	50.47	9.397E+06	3.150E-06	.1447	16.36
1.041E+06	3.066E-06	.0448	49.57	9.879E+06	3.376E-06	.1397	15.93
1.095E+06	3.275E-06	.0431	48.64	1.039E+07	3.904E-06	.1339	15.47
1.151E+06	3.526E-06	.0415	47.59	1.092E+07	4.483E-06	.1080	15.07
1.210E+06	3.810E-06	.0398	46.51	1.148E+07	5.330E-06	.0859	14.76
1.272E+06	4.107E-06	.0380	45.40	1.207E+07	6.913E-06	.0728	14.54
1.337E+06	4.398E-06	.0365	44.21	1.268E+07	1.027E-05	.0542	14.23
1.406E+06	4.664E-06	.0358	42.95	1.334E+07	1.749E-05	.0352	14.21
1.478E+06	4.882E-06	.0356	41.72	1.402E+07	2.734E-05	.0295	14.21
1.553E+06	5.036E-06	.0353	40.57	1.474E+07	2.763E-05	.0481	14.21
1.633E+06	5.120E-06	.0346	39.53	1.549E+07	1.103E-05	.0516	14.21
1.717E+06	5.133E-06	.0342	38.56	1.629E+07	-3.233E-06	1.0000	14.40
1.805E+06	5.098E-06	.0343	37.69	1.712E+07	-4.610E-06	1.0000	14.40
1.897E+06	5.060E-06	.0351	36.86	1.800E+07	-2.070E-06	1.0000	14.40

Table 7.18 Neutron spectrum in the lithium-oxide assembly (z=61.8 cm).

Energy [MeV]	Flux/Leth.	Error	Window	Energy [MeV]	Flux/Leth.	Error	Window
2.102E+05	-3.404E-05	1.0000	81.68	1.995E+06	2.212E-06	.0327	36.00
2.210E+05	-4.131E-05	1.0000	80.51	2.097E+06	2.236E-06	.0321	35.14
2.323E+05	-5.024E-05	1.0000	79.34	2.204E+06	2.264E-06	.0314	34.31
2.442E+05	-6.077E-05	1.0000	78.16	2.317E+06	2.271E-06	.0312	33.55
2.568E+05	-7.340E-05	1.0000	77.00	2.436E+06	2.228E-06	.0314	32.80
2.699E+05	-8.770E-05	1.0000	75.82	2.561E+06	2.121E-06	.0323	32.04
2.838E+05	-1.039E-04	1.0000	74.66	2.692E+06	1.960E-06	.0345	31.25
2.983E+05	-1.219E-04	1.0000	73.48	2.830E+06	1.773E-06	.0378	30.49
3.136E+05	-1.407E-04	1.0000	72.32	2.975E+06	1.592E-06	.0420	29.74
3.297E+05	-1.605E-04	1.0000	71.14	3.128E+06	1.440E-06	.0470	29.02
3.466E+05	-1.789E-04	1.0000	69.98	3.288E+06	1.332E-06	.0515	28.30
3.644E+05	-1.952E-04	1.0000	68.80	3.457E+06	1.279E-06	.0537	27.58
3.830E+05	-2.077E-04	1.0000	67.68	3.634E+06	1.280E-06	.0546	26.82
4.027E+05	-2.136E-04	1.0000	66.60	3.821E+06	1.314E-06	.0540	26.06
4.233E+05	-2.125E-04	1.0000	65.63	4.016E+06	1.355E-06	.0538	25.27
4.450E+05	-2.026E-04	1.0000	64.69	4.222E+06	1.388E-06	.0542	24.55
4.678E+05	-1.840E-04	1.0000	63.83	4.439E+06	1.416E-06	.0552	23.94
4.918E+05	-1.582E-04	1.0000	62.96	4.666E+06	1.442E-06	.0559	23.33
5.170E+05	-1.275E-04	1.0000	62.10	4.906E+06	1.456E-06	.0575	22.72
5.436E+05	-9.570E-05	1.0000	61.20	5.157E+06	1.439E-06	.0596	22.18
5.714E+05	-6.582E-05	1.0000	60.30	5.422E+06	1.383E-06	.0643	21.67
6.007E+05	-4.178E-05	1.0000	59.36	5.700E+06	1.303E-06	.0715	21.10
6.315E+05	-2.292E-05	1.0000	58.43	5.992E+06	1.250E-06	.0745	20.56
6.639E+05	-1.097E-05	1.0000	57.49	6.299E+06	1.275E-06	.0749	20.02
6.979E+05	-4.171E-06	1.0000	56.56	6.622E+06	1.371E-06	.0748	19.48
7.337E+05	-8.611E-07	1.0000	55.62	6.961E+06	1.475E-06	.0708	18.97
7.713E+05	5.197E-07	45.8060	54.72	7.318E+06	1.541E-06	.0732	18.49
8.109E+05	1.006E-06	5.8431	53.86	7.694E+06	1.565E-06	.0781	18.04
8.525E+05	1.161E-06	.9830	52.99	8.088E+06	1.562E-06	.0799	17.62
8.962E+05	1.218E-06	.1590	52.16	8.503E+06	1.533E-06	.0873	17.22
9.421E+05	1.257E-06	.0564	51.34	8.939E+06	1.490E-06	.1045	16.78
9.904E+05	1.303E-06	.0435	50.47	9.397E+06	1.481E-06	.1112	16.36
1.041E+06	1.364E-06	.0418	49.57	9.879E+06	1.529E-06	.1108	15.93
1.095E+06	1.443E-06	.0407	48.64	1.039E+07	1.589E-06	.1175	15.47
1.151E+06	1.538E-06	.0398	47.59	1.092E+07	1.725E-06	.0998	15.07
1.210E+06	1.644E-06	.0384	46.51	1.148E+07	2.236E-06	.0708	14.76
1.272E+06	1.754E-06	.0369	45.40	1.207E+07	3.203E-06	.0524	14.54
1.337E+06	1.862E-06	.0354	44.21	1.268E+07	4.540E-06	.0398	14.17
1.406E+06	1.965E-06	.0347	42.95	1.334E+07	6.431E-06	.0298	14.14
1.478E+06	2.054E-06	.0344	41.72	1.402E+07	8.458E-06	.0286	14.14
1.553E+06	2.125E-06	.0340	40.57	1.474E+07	7.667E-06	.0514	14.14
1.633E+06	2.173E-06	.0332	39.53	1.549E+07	2.788E-06	.0592	14.14
1.717E+06	2.196E-06	.0325	38.56	1.629E+07	-9.108E-07	1.0000	14.40
1.805E+06	2.201E-06	.0323	37.69	1.712E+07	-1.189E-06	1.0000	14.40
1.897E+06	2.201E-06	.0326	36.86	1.800E+07	-5.336E-07	1.0000	14.40

Table 7.19 Neutron spectrum in the lithium-oxide assembly (z=72.0 cm).

Energy [MeV]	Flux/Leth.	Error	Window	Energy [MeV]	Flux/Leth.	Error	Window
2.102E+05	-4.907E-05	1.0000	81.68	1.995E+06	9.116E-07	.0314	36.00
2.210E+05	-5.987E-05	1.0000	80.51	2.097E+06	9.160E-07	.0309	35.14
2.323E+05	-7.275E-05	1.0000	79.34	2.204E+06	9.194E-07	.0305	34.31
2.442E+05	-8.807E-05	1.0000	78.16	2.317E+06	9.146E-07	.0303	33.55
2.568E+05	-1.061E-04	1.0000	77.00	2.436E+06	8.931E-07	.0304	32.80
2.699E+05	-1.270E-04	1.0000	75.82	2.561E+06	8.504E-07	.0315	32.04
2.838E+05	-1.504E-04	1.0000	74.66	2.692E+06	7.878E-07	.0335	31.25
2.983E+05	-1.763E-04	1.0000	73.48	2.830E+06	7.143E-07	.0364	30.49
3.136E+05	-2.039E-04	1.0000	72.32	2.975E+06	6.415E-07	.0402	29.74
3.297E+05	-2.321E-04	1.0000	71.14	3.128E+06	5.804E-07	.0446	29.02
3.466E+05	-2.597E-04	1.0000	69.98	3.288E+06	5.369E-07	.0488	28.30
3.644E+05	-2.833E-04	1.0000	68.80	3.457E+06	5.143E-07	.0515	27.58
3.830E+05	-3.009E-04	1.0000	67.68	3.634E+06	5.114E-07	.0529	26.82

4.027E+05	-3.106E-04	1.0000	66.60	3.821E+06	5.232E-07	.0528	26.06
4.233E+05	-3.079E-04	1.0000	65.63	4.016E+06	5.387E-07	.0526	25.27
4.450E+05	-2.938E-04	1.0000	64.69	4.222E+06	5.473E-07	.0531	24.55
4.678E+05	-2.671E-04	1.0000	63.83	4.439E+06	5.462E-07	.0556	23.94
4.918E+05	-2.298E-04	1.0000	62.96	4.666E+06	5.414E-07	.0578	23.33
5.170E+05	-1.858E-04	1.0000	62.10	4.906E+06	5.363E-07	.0606	22.72
5.436E+05	-1.397E-04	1.0000	61.20	5.157E+06	5.240E-07	.0639	22.18
5.714E+05	-9.681E-05	1.0000	60.30	5.422E+06	5.057E-07	.0685	21.67
6.007E+05	-6.096E-05	1.0000	59.36	5.700E+06	4.975E-07	.0728	21.10
6.315E+05	-3.424E-05	1.0000	58.43	5.992E+06	5.123E-07	.0719	20.56
6.639E+05	-1.694E-05	1.0000	57.49	6.299E+06	5.488E-07	.0687	20.02
6.979E+05	-7.113E-06	1.0000	56.56	6.622E+06	5.963E-07	.0669	19.48
7.337E+05	-2.346E-06	1.0000	55.62	6.961E+06	6.360E-07	.0640	18.97
7.713E+05	-4.031E-07	1.0000	54.72	7.318E+06	6.496E-07	.0667	18.49
8.109E+05	2.529E-07	9.3212	53.86	7.694E+06	6.371E-07	.0731	18.04
8.525E+05	4.350E-07	1.0520	52.99	8.088E+06	6.269E-07	.0758	17.62
8.962E+05	4.832E-07	.1606	52.16	8.503E+06	6.474E-07	.0777	17.22
9.421E+05	5.043E-07	.0561	51.34	8.939E+06	6.717E-07	.0871	16.78
9.904E+05	5.252E-07	.0430	50.47	9.397E+06	6.472E-07	.0945	16.36
1.041E+06	5.507E-07	.0414	49.57	9.879E+06	6.094E-07	.1034	15.93
1.095E+06	5.828E-07	.0404	48.64	1.039E+07	6.530E-07	.1052	15.47
1.151E+06	6.199E-07	.0394	47.59	1.092E+07	7.806E-07	.0801	15.07
1.210E+06	6.611E-07	.0380	46.51	1.148E+07	9.605E-07	.0599	14.76
1.272E+06	7.052E-07	.0365	45.40	1.207E+07	1.277E-06	.0473	14.22
1.337E+06	7.500E-07	.0349	44.21	1.268E+07	1.828E-06	.0341	13.69
1.406E+06	7.936E-07	.0340	42.95	1.334E+07	2.511E-06	.0271	13.66
1.478E+06	8.325E-07	.0336	41.72	1.402E+07	2.799E-06	.0273	13.66
1.553E+06	8.641E-07	.0331	40.57	1.474E+07	2.063E-06	.0507	13.66
1.633E+06	8.871E-07	.0323	39.53	1.549E+07	6.280E-07	.0704	13.99
1.717E+06	9.007E-07	.0316	38.56	1.629E+07	-2.145E-07	1.0000	14.40
1.805E+06	9.066E-07	.0312	37.69	1.712E+07	-2.579E-07	1.0000	14.40
1.897E+06	9.086E-07	.0315	36.86	1.800E+07	-1.126E-07	1.0000	14.40

Table 7.20 Neutron spectrum in the lithium-oxide assembly (z=82.1 cm).

Energy [MeV]	Flux/Leth.	Error	Window	Energy [MeV]	Flux/Leth.	Error	Window
2.102E+05	-3.833E-07	1.0000	81.68	1.995E+06	3.051E-07	.0319	36.00
2.210E+05	-4.567E-07	1.0000	80.51	2.097E+06	3.085E-07	.0313	35.14
2.323E+05	-5.365E-07	1.0000	79.34	2.204E+06	3.109E-07	.0308	34.31
2.442E+05	-6.530E-07	1.0000	78.16	2.317E+06	3.099E-07	.0305	33.55
2.568E+05	-7.803E-07	1.0000	77.00	2.436E+06	3.025E-07	.0308	32.80
2.699E+05	-9.186E-07	1.0000	75.82	2.561E+06	2.874E-07	.0318	32.04
2.838E+05	-1.104E-06	1.0000	74.66	2.692E+06	2.656E-07	.0340	31.25
2.983E+05	-1.305E-06	1.0000	73.48	2.830E+06	2.406E-07	.0372	30.49
3.136E+05	-1.487E-06	1.0000	72.32	2.975E+06	2.162E-07	.0410	29.74
3.297E+05	-1.723E-06	1.0000	71.14	3.128E+06	1.951E-07	.0456	29.02
3.466E+05	-1.685E-06	1.0000	69.98	3.288E+06	1.787E-07	.0503	28.30
3.644E+05	-2.215E-06	1.0000	68.80	3.457E+06	1.682E-07	.0542	27.58
3.830E+05	-2.328E-06	1.0000	67.68	3.634E+06	1.644E-07	.0570	26.82
4.027E+05	-1.958E-06	1.0000	66.60	3.821E+06	1.665E-07	.0575	26.06
4.233E+05	-2.161E-06	1.0000	65.63	4.016E+06	1.714E-07	.0575	25.27
4.450E+05	-2.001E-06	1.0000	64.69	4.222E+06	1.760E-07	.0580	24.55
4.678E+05	-1.820E-06	1.0000	63.83	4.439E+06	1.790E-07	.0597	23.94
4.918E+05	-1.494E-06	1.0000	62.96	4.666E+06	1.819E-07	.0611	23.33
5.170E+05	-1.131E-06	1.0000	62.10	4.906E+06	1.864E-07	.0621	22.72
5.436E+05	-8.590E-07	1.0000	61.20	5.157E+06	1.908E-07	.0628	22.18
5.714E+05	-4.862E-07	1.0000	60.30	5.422E+06	1.916E-07	.0650	21.67
6.007E+05	-2.190E-07	1.0000	59.36	5.700E+06	1.875E-07	.0695	21.10
6.315E+05	-9.211E-08	1.0000	58.43	5.992E+06	1.815E-07	.0722	20.56
6.639E+05	1.614E-08	1.0000	57.49	6.299E+06	1.795E-07	.0751	20.02
6.979E+05	7.635E-08	1.0000	56.56	6.622E+06	1.864E-07	.0769	19.48
7.337E+05	1.097E-07	86.3170	55.62	6.961E+06	2.021E-07	.0720	18.97
7.713E+05	1.228E-07	23.7020	54.72	7.318E+06	2.177E-07	.0723	18.49
8.109E+05	1.299E-07	5.5341	53.86	7.694E+06	2.246E-07	.0758	18.04
8.525E+05	1.347E-07	1.0360	52.99	8.088E+06	2.235E-07	.0788	17.62
8.962E+05	1.392E-07	.1707	52.16	8.503E+06	2.217E-07	.0844	17.22
9.421E+05	1.445E-07	.0614	51.34	8.939E+06	2.243E-07	.0960	16.78

9.904E+05	1.515E-07	.0473	50.47	9.397E+06	2.254E-07	.1009	16.36
1.041E+06	1.608E-07	.0453	49.57	9.879E+06	2.239E-07	.1059	15.93
1.095E+06	1.723E-07	.0439	48.64	1.039E+07	2.485E-07	.1029	15.47
1.151E+06	1.856E-07	.0427	47.59	1.092E+07	3.155E-07	.0736	15.07
1.210E+06	2.000E-07	.0412	46.51	1.148E+07	3.938E-07	.0539	14.76
1.272E+06	2.151E-07	.0393	45.40	1.207E+07	4.824E-07	.0456	14.13
1.337E+06	2.304E-07	.0375	44.21	1.268E+07	6.570E-07	.0354	13.56
1.406E+06	2.459E-07	.0364	42.95	1.334E+07	9.299E-07	.0267	13.54
1.478E+06	2.607E-07	.0358	41.72	1.402E+07	1.057E-06	.0271	13.54
1.553E+06	2.741E-07	.0349	40.57	1.474E+07	7.953E-07	.0565	13.54
1.633E+06	2.854E-07	.0338	39.53	1.549E+07	2.375E-07	.0750	13.96
1.717E+06	2.935E-07	.0326	38.56	1.629E+07	-1.054E-07	1.0000	14.40
1.805E+06	2.986E-07	.0321	37.69	1.712E+07	-1.194E-07	1.0000	14.40
1.897E+06	3.019E-07	.0320	36.86	1.800E+07	-6.001E-08	1.0000	14.40

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Table 7.21 Neutron source spectrum of FNS water cooled D-T target for 0 degree to the d<sup>+</sup>-beam. The units of energy and spectrum are [eV] and [neutrons/energy-bin/D-T reaction], respectively.

Group	Upper Energy	Spectrum	Group	Upper energy	Spectrum
1	1.6487e+07	0.0	64	1.1943e+06	9.6236e-03
2	1.6231e+07	0.0	65	1.0540e+06	9.7275e-03
3	1.5980e+07	2.7828e-03	66	9.3013e+05	9.9713e-03
4	1.5732e+07	1.7363e-02	67	8.2084e+05	9.7540e-03
5	1.5488e+07	7.1310e-02	68	7.2438e+05	9.3421e-03
6	1.5248e+07	2.3566e-01	69	6.3927e+05	8.6681e-03
7	1.5012e+07	2.8044e-01	70	5.6415e+05	7.7929e-03
8	1.4779e+07	1.9088e-01	71	4.9786e+05	6.8688e-03
9	1.4550e+07	8.8741e-02	72	4.3936e+05	5.9791e-03
10	1.4324e+07	1.9619e-02	73	3.8774e+05	4.9397e-03
11	1.4102e+07	4.7824e-03	74	3.4217e+05	3.8479e-03
12	1.3883e+07	3.6889e-03	75	3.0197e+05	3.2890e-03
13	1.3668e+07	4.0824e-03	76	2.6649e+05	2.8136e-03
14	1.3456e+07	3.0739e-03	77	2.3517e+05	2.4317e-03
15	1.3248e+07	2.0627e-03	78	2.0754e+05	2.1040e-03
16	1.3042e+07	1.5353e-03	79	1.8315e+05	1.8527e-03
17	1.2840e+07	1.3058e-03	80	1.6163e+05	1.6141e-03
18	1.2641e+07	1.0510e-03	81	1.4264e+05	1.4051e-03
19	1.2445e+07	9.1815e-04	82	1.2588e+05	1.2219e-03
20	1.2252e+07	6.6341e-04	83	1.1109e+05	9.1106e-04
21	1.2062e+07	4.9328e-04	84	9.8035e+04	7.9663e-04
22	1.1875e+07	4.3340e-04	85	8.6515e+04	6.9762e-04
23	1.1691e+07	3.5410e-04	86	7.6349e+04	6.1088e-04
24	1.1510e+07	3.3956e-04	87	6.7378e+04	5.3606e-04
25	1.1331e+07	3.3951e-04	88	5.9461e+04	4.7077e-04
26	1.1156e+07	4.7551e-04	89	5.2474e+04	4.1340e-04
27	1.0983e+07	5.2166e-04	90	4.6308e+04	3.6436e-04
28	1.0812e+07	5.4544e-04	91	4.0867e+04	3.2144e-04
29	1.0645e+07	6.0839e-04	92	3.6065e+04	2.8444e-04
30	1.0480e+07	5.8562e-04	93	3.1827e+04	2.5200e-04
31	1.0317e+07	5.9851e-04	94	2.8087e+04	2.2407e-04
32	1.0157e+07	5.9892e-04	95	2.4787e+04	2.0045e-04
33	9.9999e+06	2.3220e-03	96	2.1874e+04	1.7891e-04
34	9.3940e+06	2.1711e-03	97	1.9304e+04	3.0516e-04
35	8.8249e+06	1.9259e-03	98	1.5034e+04	2.4812e-04
36	8.2902e+06	2.0821e-03	99	1.1709e+04	2.1369e-04
37	7.7879e+06	2.4699e-03	100	9.1186e+03	1.9164e-04
38	7.3161e+06	2.3331e-03	101	7.1016e+03	1.6038e-04
39	6.8728e+06	2.1203e-03	102	5.5307e+03	1.3521e-04
40	6.4564e+06	2.3830e-03	103	4.3073e+03	1.1447e-04
41	6.0652e+06	2.7193e-03	104	3.3546e+03	9.7598e-05
42	5.6978e+06	2.5754e-03	105	2.6125e+03	8.3682e-05
43	5.3525e+06	2.5194e-03	106	2.0346e+03	7.2417e-05
44	5.0282e+06	2.9628e-03	107	1.5846e+03	6.3421e-05
45	4.7236e+06	3.5164e-03	108	1.2341e+03	5.5907e-05
46	4.4374e+06	3.9704e-03	109	9.6110e+02	4.3479e-05
47	4.1686e+06	4.3379e-03	110	5.8293e+02	0.0
48	3.9160e+06	4.2412e-03	111	3.5357e+02	0.0
49	3.6787e+06	3.6099e-03	112	2.1445e+02	0.0
50	3.4559e+06	3.3610e-03	113	1.3007e+02	0.0
51	3.2465e+06	3.4485e-03	114	7.8891e+01	0.0
52	3.0498e+06	3.7938e-03	115	4.7850e+01	0.0
53	2.8650e+06	4.3795e-03	116	2.9023e+01	0.0
54	2.6914e+06	4.7354e-03	117	1.7603e+01	0.0
55	2.5284e+06	5.0664e-03	118	1.0677e+01	0.0
56	2.3752e+06	5.2928e-03	119	6.4758e+00	0.0
57	2.2313e+06	5.3299e-03	120	3.9278e+00	0.0
58	2.0961e+06	5.3383e-03	121	2.3823e+00	0.0
59	1.9691e+06	5.3194e-03	122	1.4449e+00	0.0
60	1.8498e+06	5.3179e-03	123	8.7640e-01	0.0
61	1.7377e+06	1.0130e-02	124	5.3156e-01	0.0
62	1.5335e+06	9.9677e-03	125	3.2241e-01	0.0
63	1.3533e+06	9.7640e-03	126	1.0010e-01	0.0

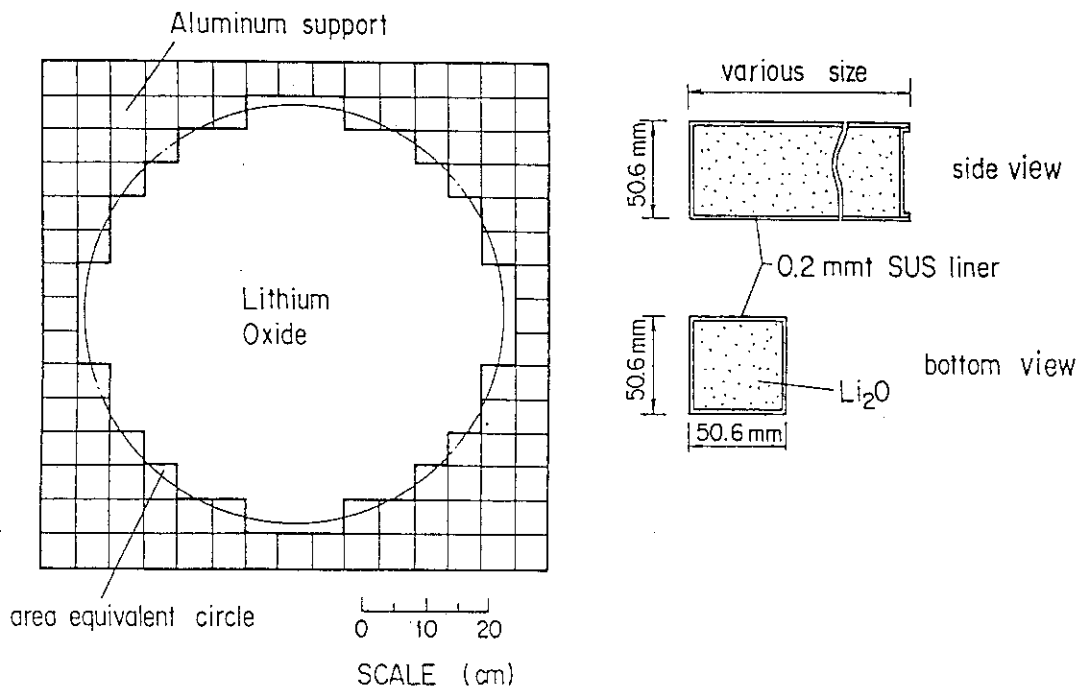


Fig. 7.1 Sectional views of the cylindrical assembly and Li<sub>2</sub>O blocks.

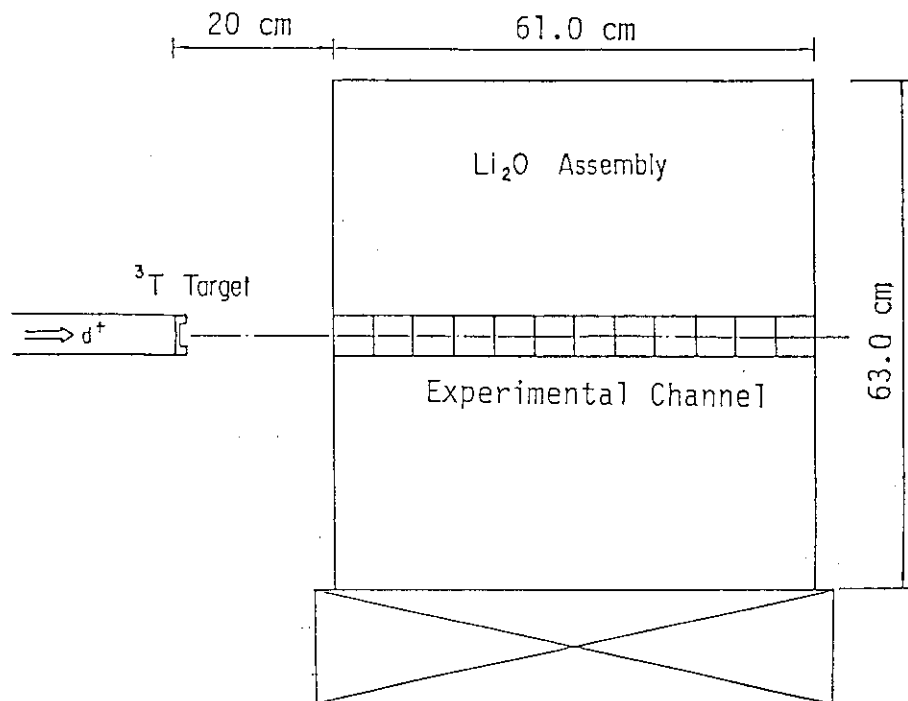
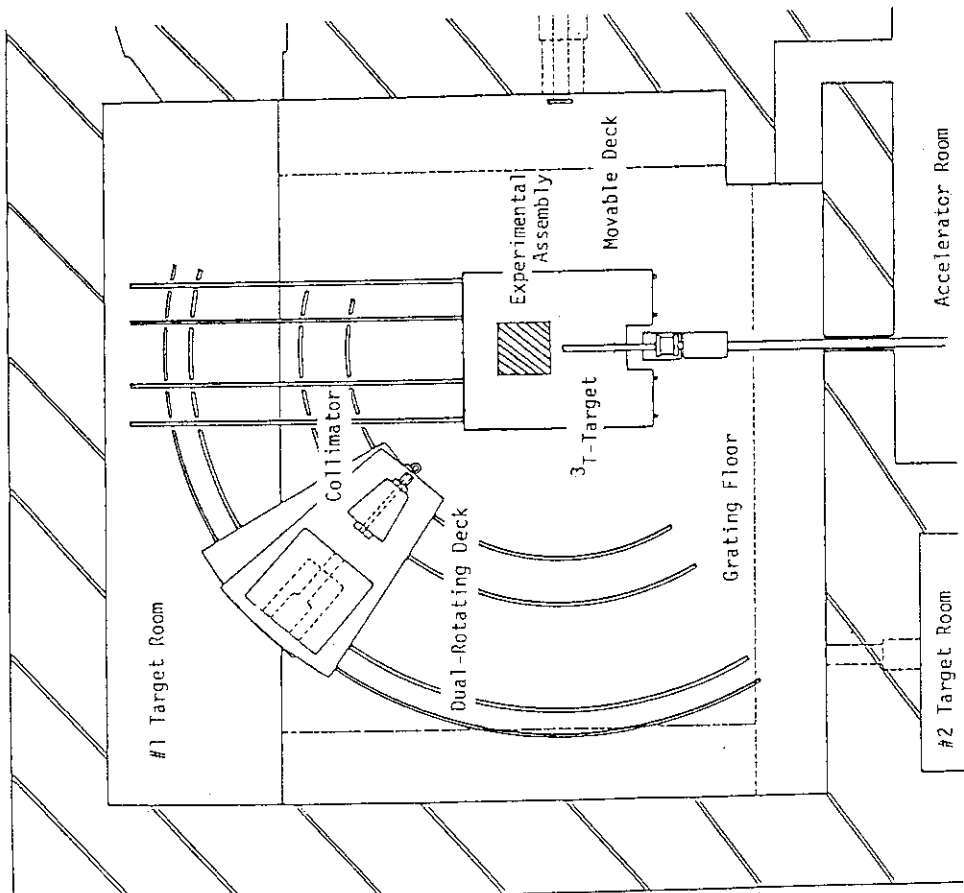


Fig. 7.2 Experimental layout.



Experimental layout

Fig. 7.3 Layout of the FNS first target room.

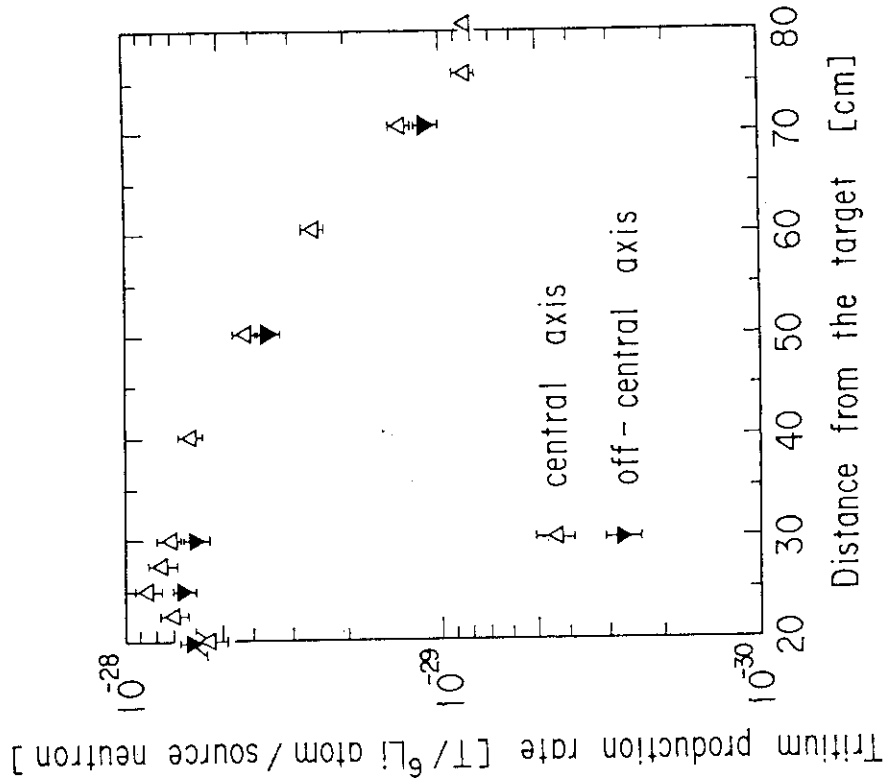


Fig. 7.4 Tritium production-rate distribution measured by a pair of Li-glass scintillators.

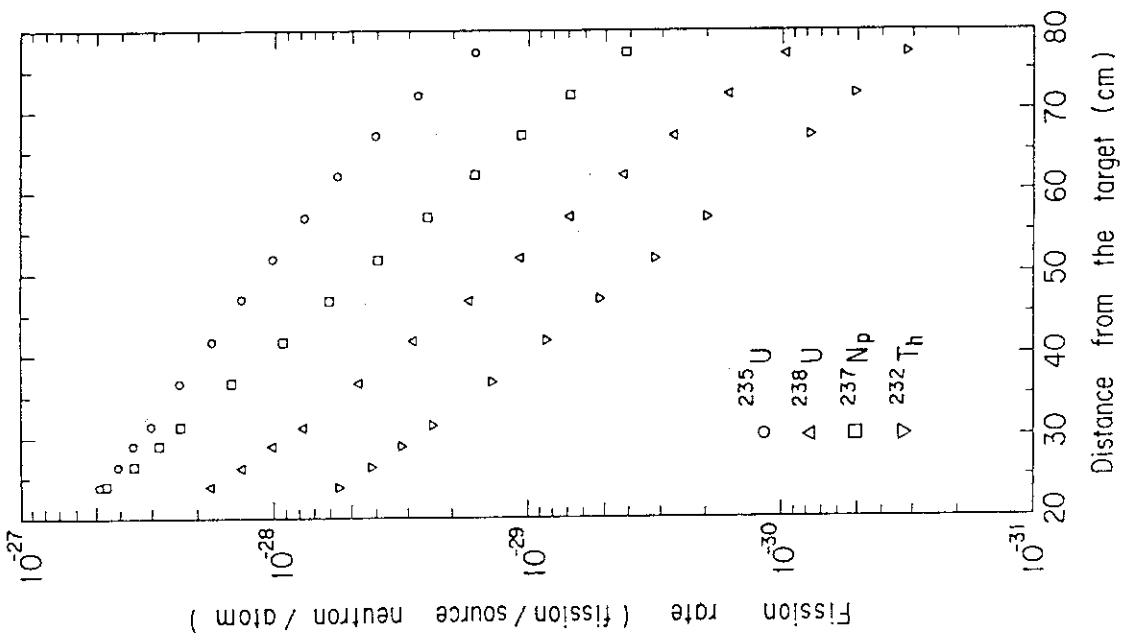


Fig. 7.5 Absolute fission-rate distributions in the  $\text{Li}_2\text{O}$  assembly.

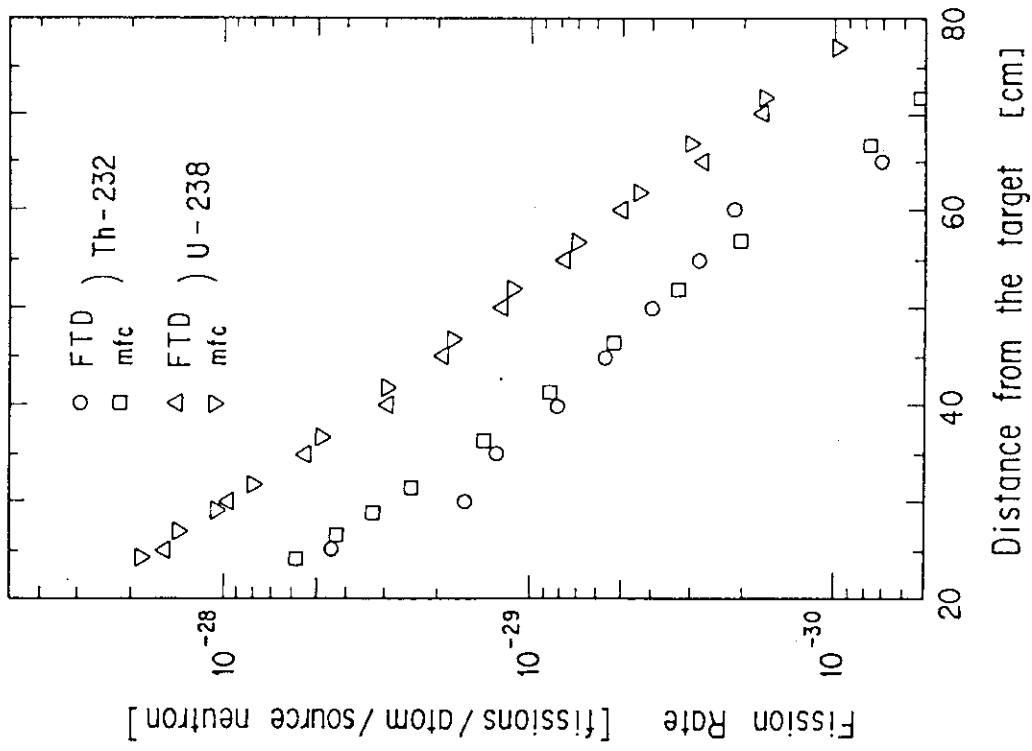


Fig. 7.6 Fission rate distributions measured by FTDs in the  $\text{Li}_2\text{O}$  assembly.



60 cm Li<sub>2</sub>O [6L001N5]

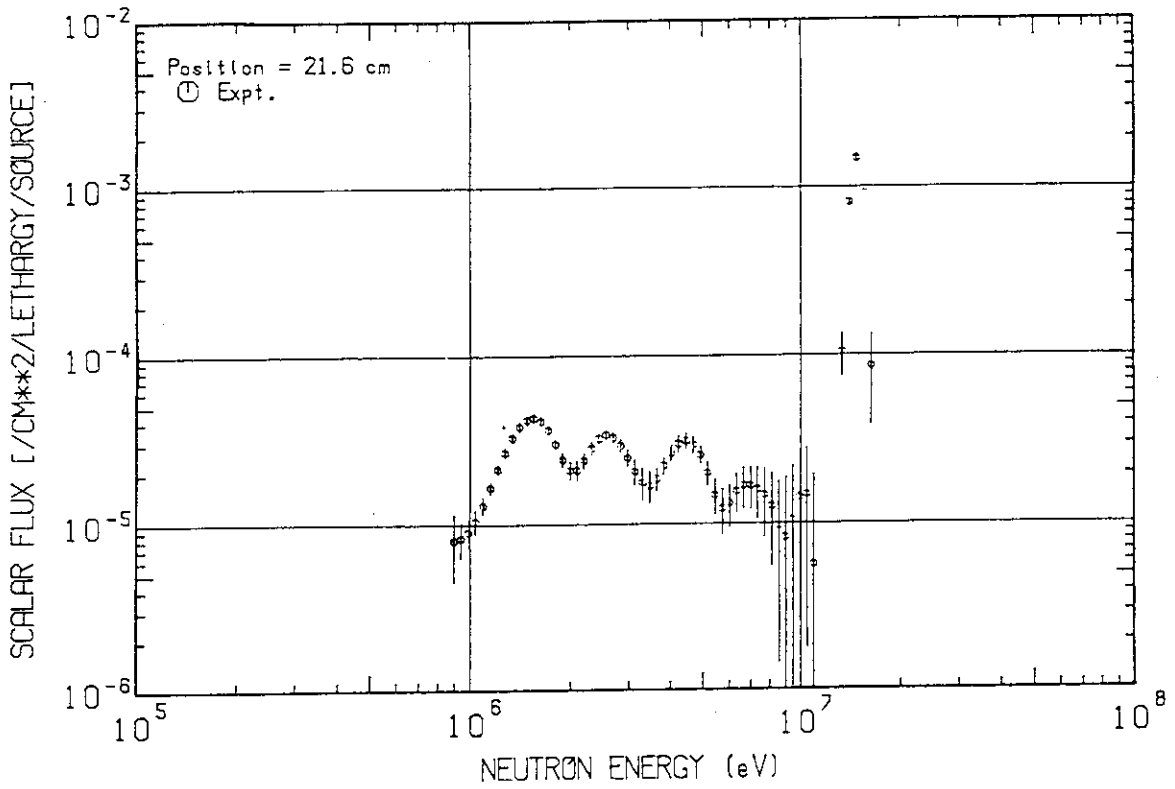


Fig. 7.7 Measured neutron scalar spectrum in the Li<sub>2</sub>O assembly (z=21.6cm).

60 cm Li<sub>2</sub>O [6L002N5]

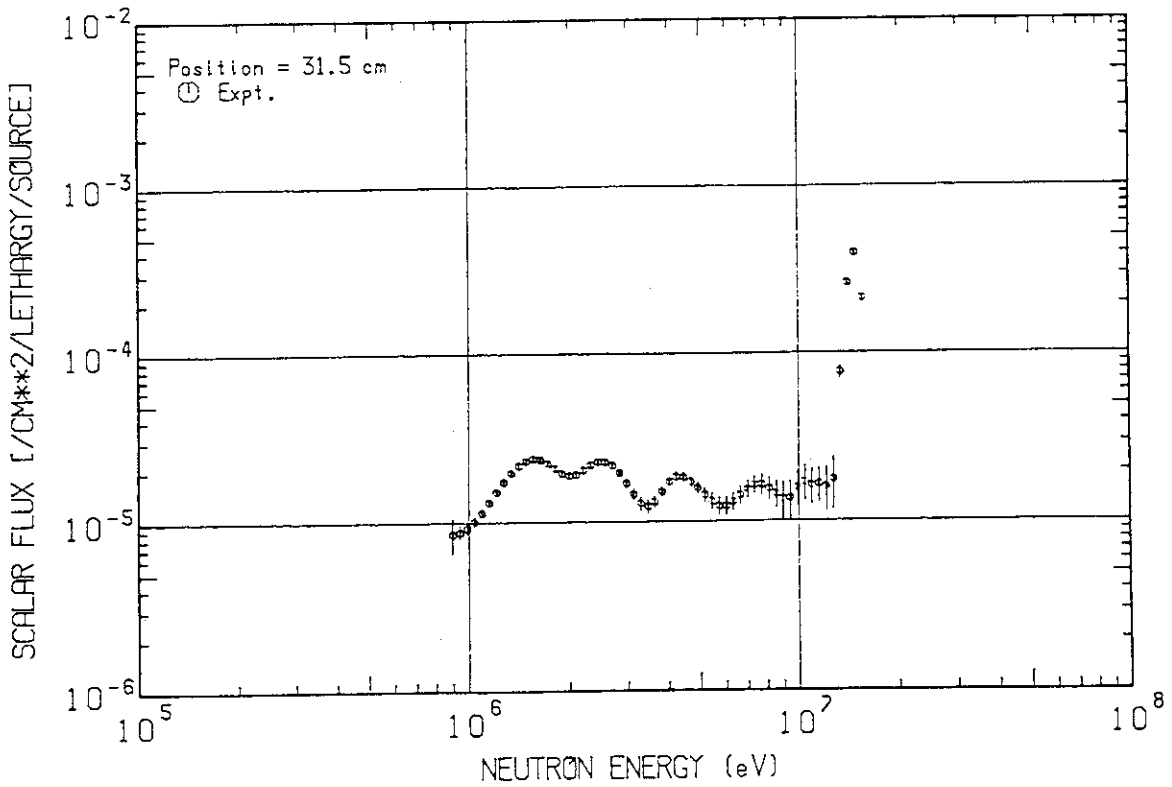


Fig. 7.8 Measured neutron scalar spectrum in the Li<sub>2</sub>O assembly (z=31.5cm).

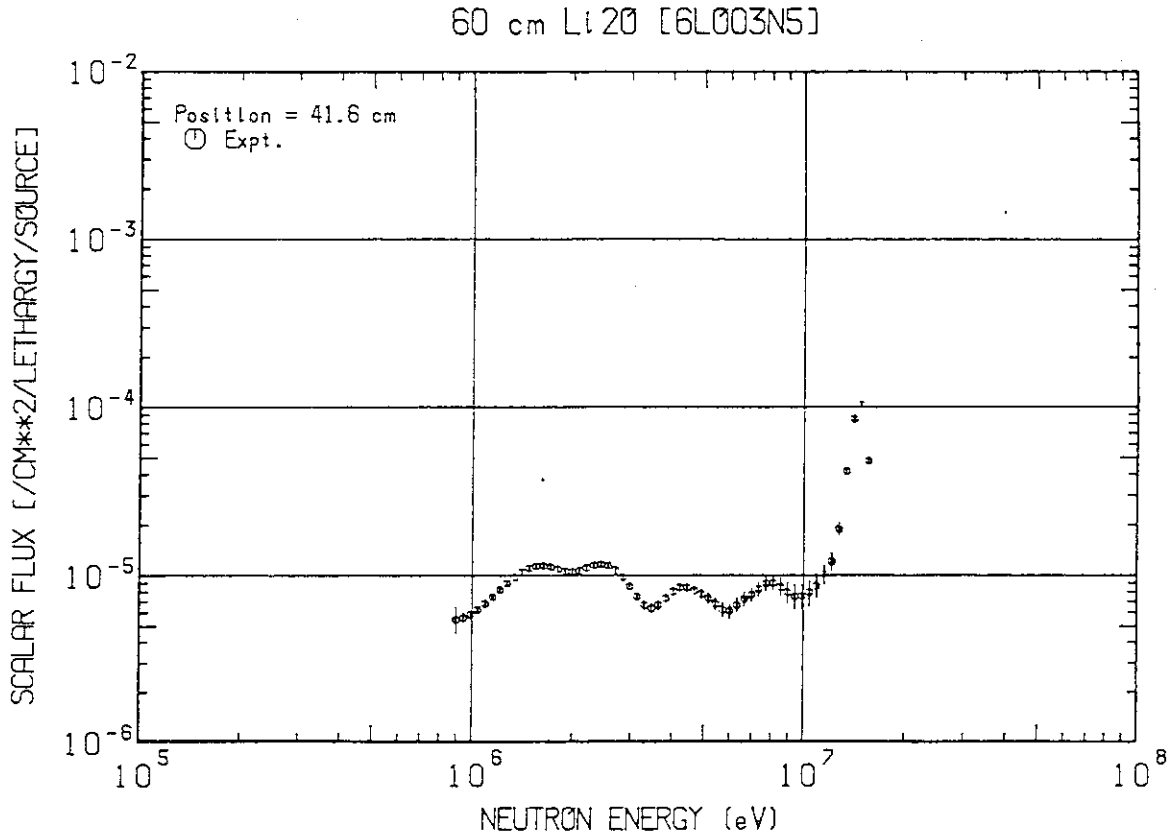


Fig. 7.9 Measured neutron scalar spectrum in the Li<sub>2</sub>O assembly (z=41.6cm).

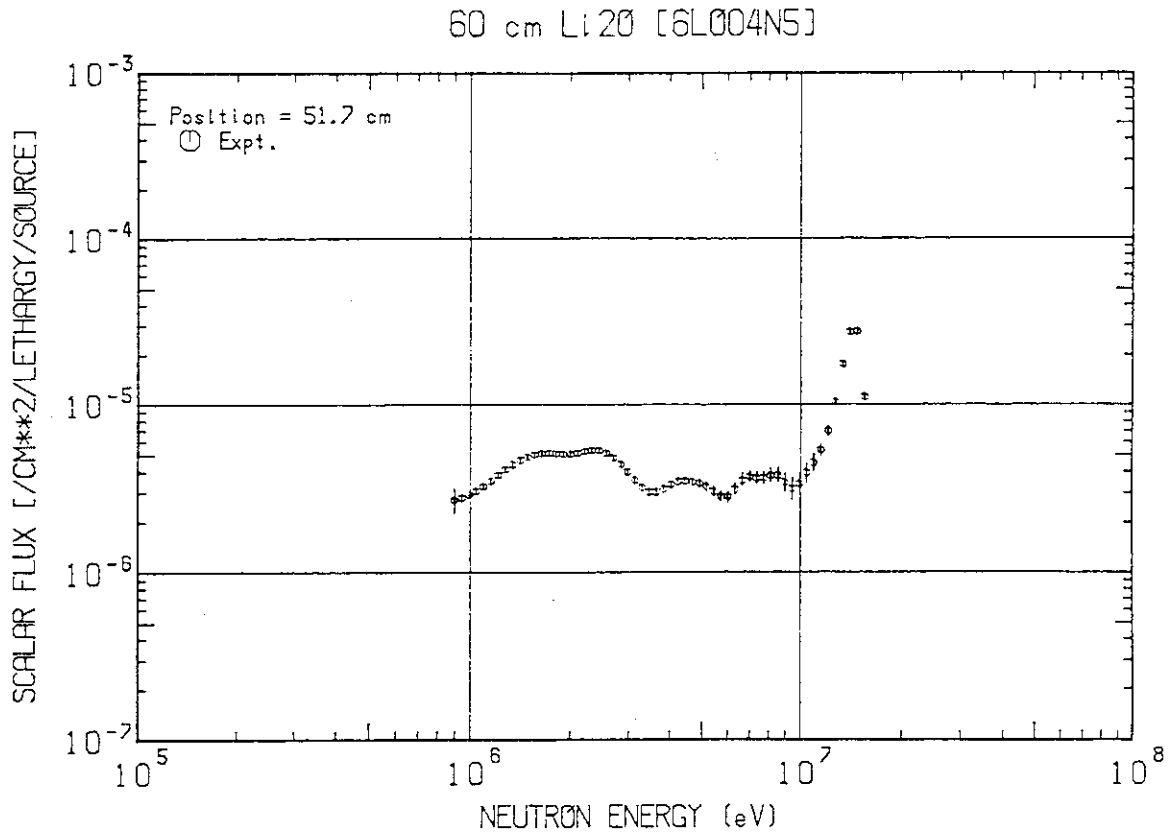


Fig. 7.10 Measured neutron scalar spectrum in the Li<sub>2</sub>O assembly (z=51.7cm).

60 cm Li<sub>2</sub>O [6L005N5]

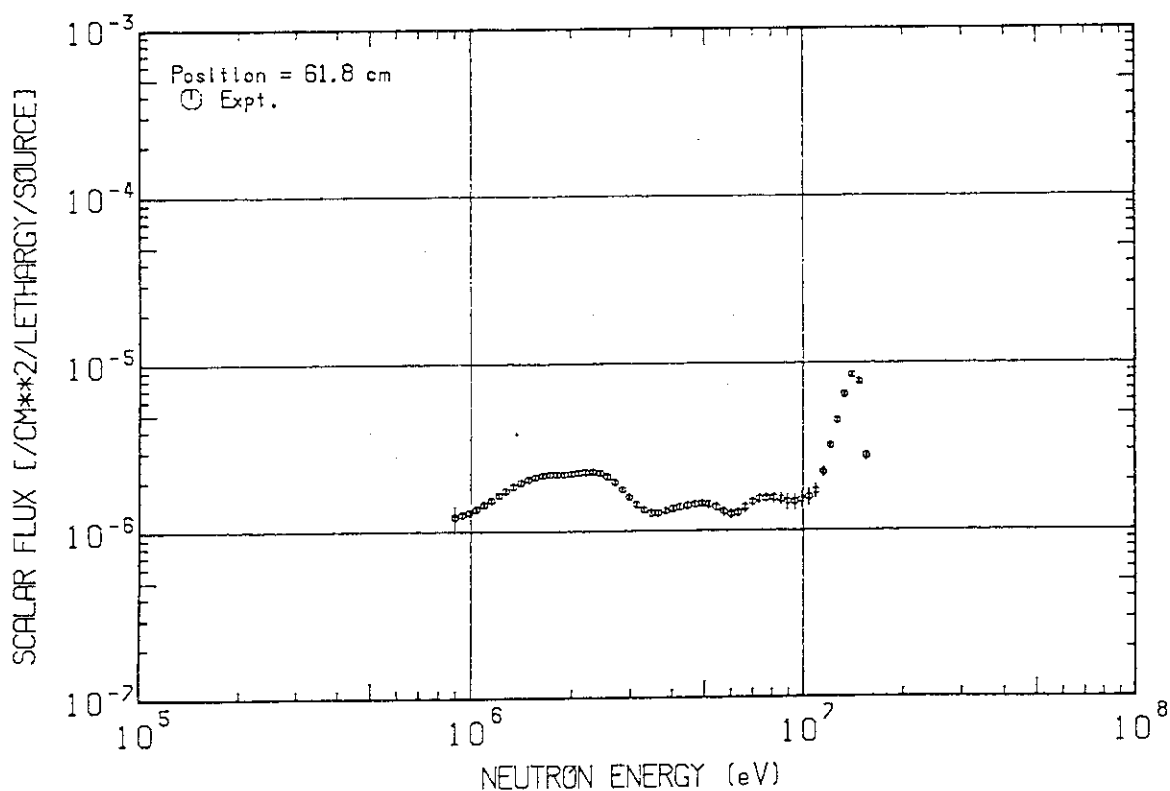


Fig. 7.11 Measured neutron scalar spectrum in the Li<sub>2</sub>O assembly (z=61.8cm).

60 cm Li<sub>2</sub>O [6L006N5]

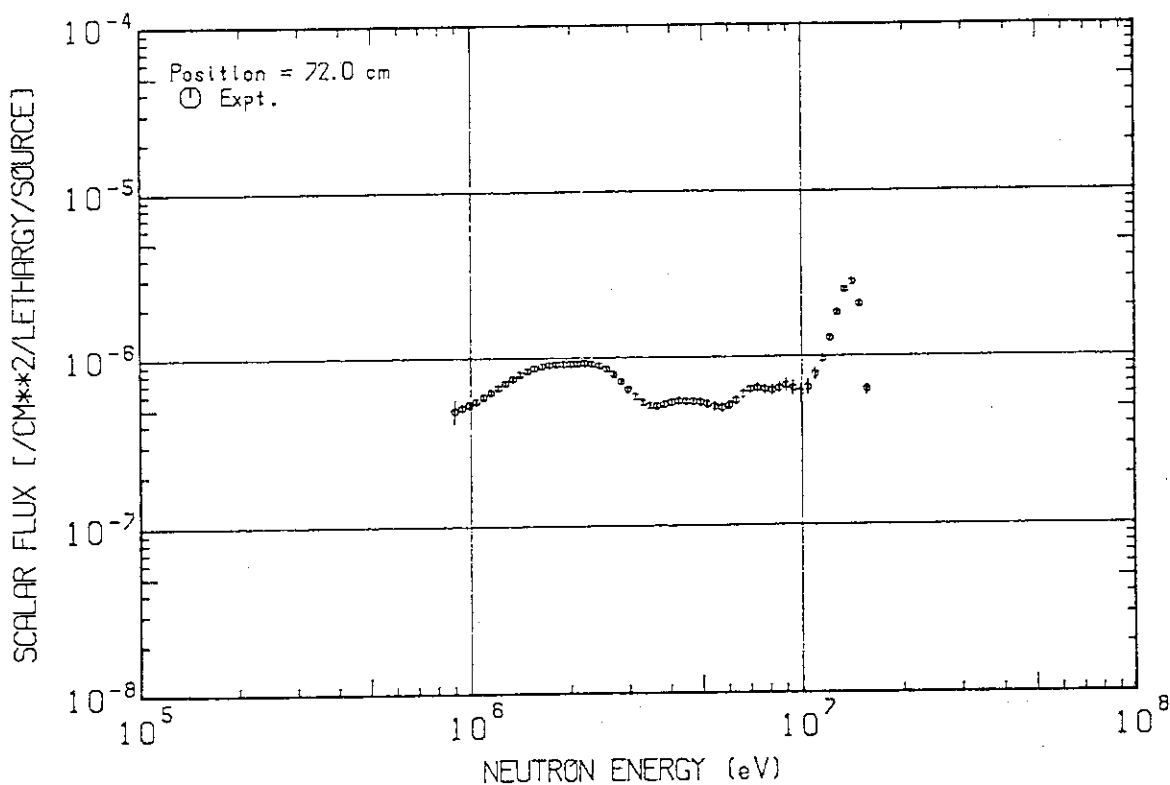


Fig. 7.12 Measured neutron scalar spectrum in the Li<sub>2</sub>O assembly (z=72.0cm).

60 cm Li<sub>2</sub>O [6L007N5]

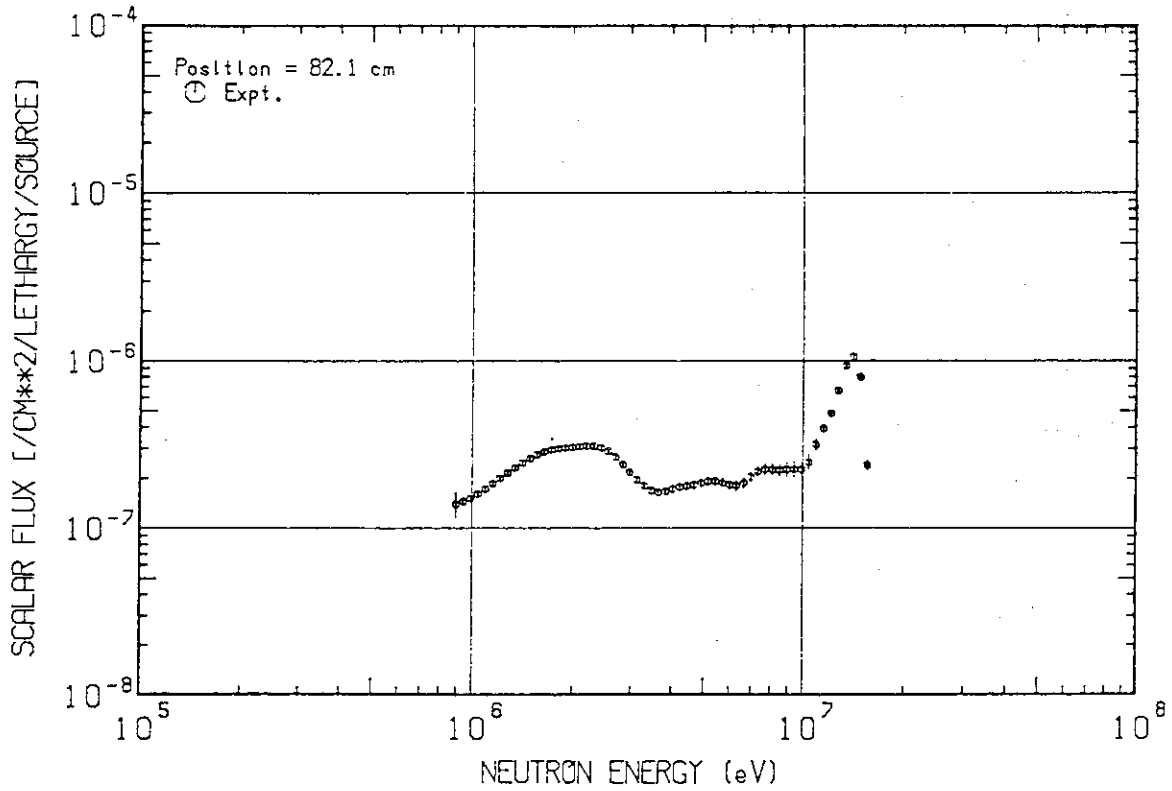


Fig. 7.13 Measured neutron scalar spectrum in the Li<sub>2</sub>O assembly (z=82.1cm).

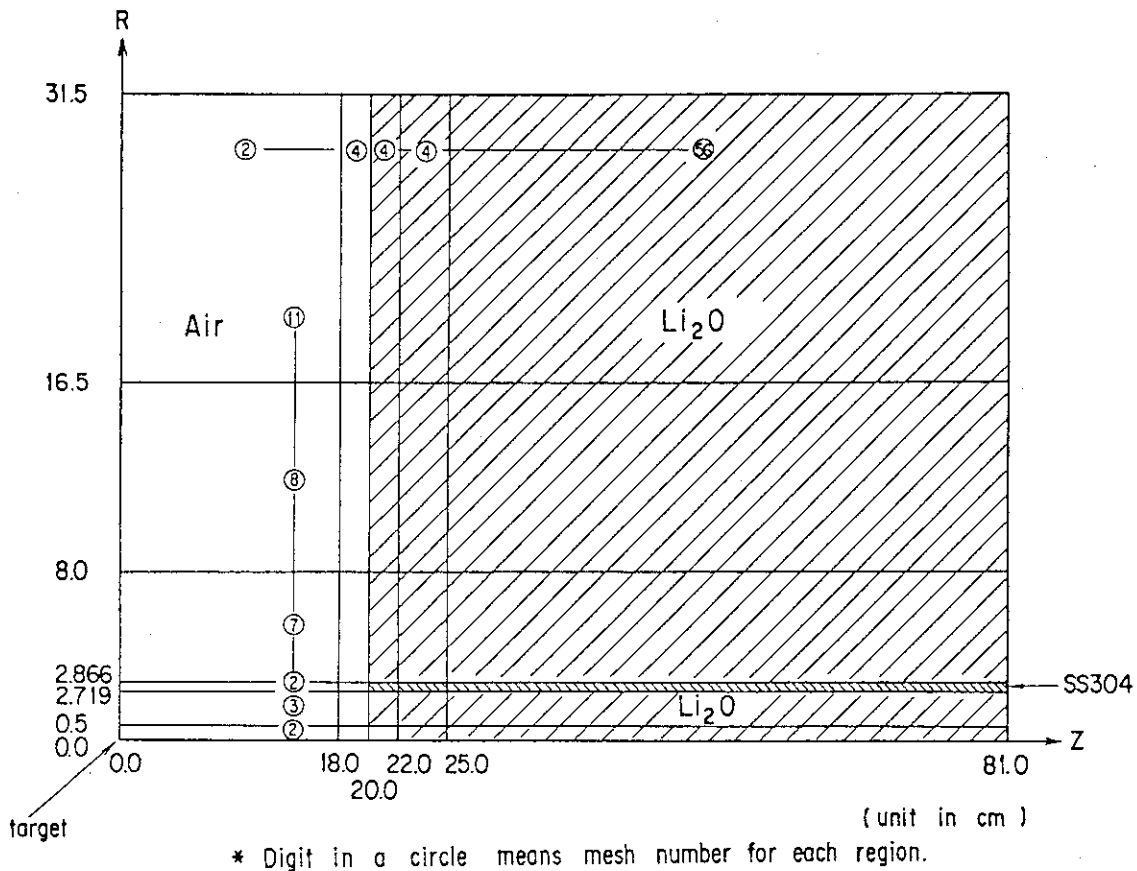


Fig. 7.14 Calculation model for the two-dimensional transport code DOT 3.5.

```

THH-GRUNCL L120 SLAB ASSEMBLY #4 AIR(20)-LI20(61.0) OPTIONS JFPGIX      00010000  LOS4GU
0                                     00020000  LOS4GU
1¥¥                                     00030002  LOS4GU
      0           5           4           33           70      12500040002  LOS4GU
      4           5           129          156           0      15600050001  LOS4GU
      156         2           1           30000         10      000060001  LOS4GU
      1           0           18           0           0      1600070002  LOS4GU
2**                                     00080002  LOS4GU
1.1767+00  0.0           0.0                                     00090002  LOS4GU
T                                     00100002  LOS4GU
1**                                     00110002  LOS4GU
FO.0                                     00120000  LOS4GU
2**                                     00130000  LOS4GU
110.0          3118.0          3120.0          3122.0          55125.0          81.0      00140002  LOS4GU
3**                                     00150002  LOS4GU
0.0           0.0           2.7828-03      1.7363-02      7.1310-02      2.3566-0100160002  LOS4GU
2.8044-01      1.9088-01      8.8741-02      1.9619-02      4.7824-03      3.6889-0300170002  LOS4GU
4.0824-03      3.0739-03      2.0627-03      1.5353-03      1.3058-03      1.0510-0300180002  LOS4GU
9.1815-04      6.6341-04      4.9328-04      4.3340-04      3.5410-04      3.3956-0400190002  LOS4GU
3.3951-04      4.7551-04      5.2166-04      5.4544-04      6.0839-04      5.8562-0400200002  LOS4GU
5.9851-04      5.9892-04      2.3220-03      2.1711-03      1.9259-03      2.0821-0300210002  LOS4GU
2.4699-03      2.3331-03      2.1203-03      2.3830-03      2.7193-03      2.5754-0300220002  LOS4GU
2.5194-03      2.9628-03      3.5164-03      3.9704-03      4.3379-03      4.2412-0300230002  LOS4GU
3.6099-03      3.3610-03      3.4485-03      3.7938-03      4.3795-03      4.7354-0300240002  LOS4GU
5.0664-03      5.2928-03      5.3299-03      5.3383-03      5.3194-03      5.3179-0300250002  LOS4GU
1.0130-02      9.9677-03      9.7640-03      9.6236-03      9.7275-03      9.9713-0300260002  LOS4GU
9.7540-03      9.3421-03      8.6681-03      7.7929-03      6.8688-03      5.9791-0300270002  LOS4GU
4.9397-03      3.8479-03      3.2890-03      2.8136-03      2.4317-03      2.1040-0300280002  LOS4GU
1.8527-03      1.6141-03      1.4051-03      1.2219-03      9.1106-04      7.9663-0400290002  LOS4GU
6.9762-04      6.1088-04      5.3606-04      4.7077-04      4.1340-04      3.6436-0400300002  LOS4GU
3.2144-04      2.8444-04      2.5200-04      2.2407-04      2.0045-04      1.7891-0400310002  LOS4GU
3.0516-04      2.4812-04      2.1369-04      1.9164-04      1.6038-04      1.3521-0400320002  LOS4GU
1.1447-04      9.7598-05      8.3682-05      7.2417-05      6.3421-05      5.5907-0500330002  LOS4GU
4.3479-05                                     00340002  LOS4GU
FO.0                                     00350002  LOS4GU
4**                                     00360000  LOS4GU
110.0          210.5          112.719          612.866          718.0          10116.5      00370002  LOS4GU
31.5                                     00380002  LOS4GU
5**                                     00390002  LOS4GU
F1.0                                     00400002  LOS4GU
6**                                     00410002  LOS4GU
1.0                                     00420002  LOS4GU
7**                                     00430002  LOS4GU
1.0                                     00440002  LOS4GU
8¥¥                                     00450000  LOS4GU
      33R1                                     5Q33      00460002  LOS4GU
      SR2          2R3          26R4          63Q33      00470002  LOS4GU
9¥¥                                     00480000  LOS4GU
-97          -103          -109          -115      00490001  LOS4GU
10¥¥                                     00500000  LOS4GU
      4I97          102          106      00510001  LOS4GU
      4I103         108          606      00520001  LOS4GU
      4I109         114          306      00530001  LOS4GU
      4I115         120          606      00540001  LOS4GU
      34I121        156      00550001  LOS4GU
11¥¥                                     00560000  LOS4GU
6Z          4I31          36      00570002  LOS4GU
6Z          4I1          6          4I7          12          4I31          36      00580002  LOS4GU
      4I61         66          4I67         72          4I73         78      00590002  LOS4GU
6Z          4I61         66          4I67         72          4I73         78      00600002  LOS4GU
6Z          4I1          6          4I7          12          4I31         36      00610002  LOS4GU
      4I61         66          4I67         72          4I73         78      00620002  LOS4GU
36Z                                     00630001  LOS4GU
12**                                     00640000  LOS4GU
6R0.0          6R4.9210-5      00650002  LOS4GU
6R0.0          6R4.2211-3      6R5.2774-2      6R2.8498-2      6R1.4333-4      6R5.2773-6400660002  LOS4GU
      6R6.2963-5      00670002  LOS4GU
6R0.0          6R6.3975-3      6R2.3574-2      6R2.8121-3      00680002  LOS4GU
6R0.0          6R4.1915-3      6R5.2404-2      6R2.8298-2      6R3.0675-4      6R1.1307-3      00690002  LOS4GU
      6R1.3516-4      00700002  LOS4GU
36R0.0          00710001  LOS4GU
13**                                     00720002  LOS4GU
-0.97753      -0.90676      -0.82999      -0.74536      -0.64979      -0.53748      00730002  LOS4GU
-0.39441      -0.14907      1M8      00740002  LOS4GU
14**                                     00750002  LOS4GU
F1.0                                     00760002  LOS4GU
T                                     00770002  LOS4GU
T

```

Fig. 7.15 Example of input data of GRTUNCL for DOT analysis.

THH-DOT35 LI20 SLAB ASSEMBLY #4 AIR(20)-LI20(61.0) OPTION JEF61X							00010000	LOS40T
0							00020000	LOS40T
61**							00030001	LOS40T
0	0	5	4	33	70	12500040001	LOS40T	
	4	5	129	156	0	000050001	LOS40T	
	156	1	160	1	1	000060001	LOS40T	
	0	0	1	10	15	400070001	LOS40T	
	6	2	0	0	0	000080001	LOS40T	
	0	0	0	0	0	000090001	LOS40T	
	0	0	0	0	3	000100001	LOS40T	
	0	0	0	0	0	000110001	LOS40T	
	0	0	2	1	1	000120001	LOS40T	
	0	0	0	0	18	800130001	LOS40T	
	0					00140001	LOS40T	
	0					00150001	LOS40T	
62**						900160001	LOS40T	
	2	3	4	14	15	6000170001	LOS40T	
	10	11	12	13	8	00180001	LOS40T	
	0	0				00190001	LOS40T	
63**						00200001	LOS40T	
0.0	1.000E-02	0.0	0.0	0.0	0.0	00210001	LOS40T	
0.0	0.0	0.0	0.0	0.0	0.0	00220001	LOS40T	
0.0	0.0	0.0	0.0	0.0	0.0	00230000	LOS40T	
T						00240001	LOS40T	
7**						00250001	LOS40T	
-0.21082	-0.14907	1M1	-0.14907	1M2		00260001	LOS40T	
-0.42164	-0.39441		-0.39441		1M3	00270001	LOS40T	
-0.55777	-0.53748	-0.39441	-0.14907			00280001	LOS40T	
-0.66667	-0.64979	-0.53748	-0.39441	-0.14907	1M4	00290001	LOS40T	
-0.76012	-0.74536	-0.64979	-0.53748	-0.39441	-0.14907	00300001	LOS40T	
1M5						00310001	LOS40T	
-0.84327	-0.82999	-0.74536	-0.64979	-0.53748	-0.39441	00320001	LOS40T	
-0.14907	1M6					00330001	LOS40T	
-0.91894	-0.90676	-0.82999	-0.74536	-0.64979	-0.53748	00340001	LOS40T	
-0.39441	-0.14907	1M7				00350001	LOS40T	
-0.98883	-0.97753	-0.90676	-0.82999	-0.74536	-0.64979	00360001	LOS40T	
-0.53748	-0.39441	-0.14907	1M8			00370001	LOS40T	
1Q80						00380001	LOS40T	
3R-0.97753	5R-0.90676	7R-0.82999	9R-0.74536	11R-0.64979	13R-0.53748	00390001	LOS40T	
15R-0.39441	17R-0.14907	3R0.97753	5R0.90676	7R0.82999	9R0.74536	00400001	LOS40T	
11R0.64979	13R0.53748	15R0.39441	17R0.14907			00410001	LOS40T	
T						00420001	LOS40T	
6**						00430001	LOS40T	
0.0	2R0.13586-1		0.0	4R0.97681-2		00440001	LOS40T	
0.0	0.64738-2	0.50390-2	0.64738-2	1N3		00450001	LOS40T	
0.0	0.64634-2	2R0.71124-2	0.64634-2	1N4		00460001	LOS40T	
0.0	0.64634-2	0.14381-2	0.36342-2	0.14381-2	0.64634-2	200460001	LOS40T	
	1N5					00470001	LOS40T	
0.0	0.64738-2	0.71124-2	0.36342-2	1N3	1Q6	00480001	LOS40T	
0.0	0.97681-2	0.50390-2	0.71124-2	0.14381-2	0.71124-2	200490001	LOS40T	
	0.50390-2	0.97681-2	1N7			00500001	LOS40T	
0.0	0.13586-1	0.97681-2	2R0.64738-2	1N4	1Q8	00510001	LOS40T	
1Q80						00520001	LOS40T	
T						00530001	LOS40T	
3**						00540001	LOS40T	
FO.0						00550001	LOS40T	
T						00560001	LOS40T	
1**						00570001	LOS40T	
FO.0						00580000	LOS40T	
2**						00590000	LOS40T	
110.0	3118.0	3120.0	3122.0	55125.0	81.0	00600001	LOS40T	
4**						00610000	LOS40T	
110.0	210.5	112.719	612.866	718.0	10116.5	00620001	LOS40T	
31.5						00630001	LOS40T	
5**						00640001	LOS40T	
FO.0						00650001	LOS40T	
8**						00660001	LOS40T	
	33R1				5Q33	00670001	LOS40T	
		5R2	2R3	26R4	63Q33	00680001	LOS40T	
9**						00690001	LOS40T	
-97	-103	-109	-115			00700001	LOS40T	
10**						00710001	LOS40T	
	4I97	102	1Q6			00720001	LOS40T	
	4I103	108	6Q6			00730001	LOS40T	
	4I109	114	3Q6			00740001	LOS40T	
	4I115	120	6Q6			00750001	LOS40T	
	34I121	156				00760001	LOS40T	
11**						00770001	LOS40T	
6Z	4I31	36				00780001	LOS40T	
6Z	4I1	6	4I7	12	4I31	36	00790001	LOS40T
	4I61	66	4I67	72	4I73	78	00800001	LOS40T
6Z	4I61	66	4I67	72	4I73	78	00810001	LOS40T
6Z	4I1	6	4I7	12	4I31	36	00820001	LOS40T
	4I61	66	4I67	72	4I73	78	00830001	LOS40T
36Z						00840001	LOS40T	
12**						00850001	LOS40T	
6R0.0	6R4.9210-5					00860001	LOS40T	
6R0.0	6R4.2211-3	6R5.2774-2	6R2.8498-2	6R1.4333-4	6R5.2773-4	00870001	LOS40T	
	6R6.2963-5					00880001	LOS40T	
6R0.0	6R6.3975-3	6R2.3574-2	6R2.8121-3			00890001	LOS40T	
6R0.0	6R4.1915-3	6R5.2404-2	6R2.8298-2	6R3.0675-4	6R1.1307-3	00900001	LOS40T	
	6R1.3516-4					00910001	LOS40T	
36R0.0						00920001	LOS40T	
T						00930001	LOS40T	

Fig. 7.16 Example of input data for DOT analysis.

## 1.8 Integral Experiment on Beryllium Cylindrical Assembly

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**Organization** Department of Reactor Engineering, Japan Atomic Energy Research Institute  
Tokai-mura, Naka-gun, Ibaraki-ken, 319-11, Japan

**Facility** FNS, Japan Atomic Energy Research Institute

**Date** 1988

**Measured Quantities**

(i) In-System Neutron Spectrum

2 MeV < En

14 mm Diam. Spherical NE213 Scintillator

3 keV < En < 600 keV

Proton Recoil Gas Proportional Counters

(ii) Tritium Production Rate of Lithium-6 with Li-Glass Counters

(iii) Reaction Rate by Foil Activation Technique

(iv) Fission Rate with Micro-Fission Chambers of U-235

**Experimental Method and Material / Geometry / Configuration*****Assembly and Arrangement***

The 80-degree beam line in the first target room of the FNS facility was used for the present experiment. A sketch of the experimental arrangement is shown in Fig. 8.1. The Be assembly was formed by loading Be blocks of 50.8 mm x 50.8 mm x 25.4, 50.8 and 101.6 mm in a structural frame consisting of thin-walled aluminum square tubes. Atomic density of the Be blocks is given in Table 8.1. The loading method and experimental arrangement were similar to the previous experiments <sup>1)</sup>. The area equivalent radius and length were 315 mm and 456 mm, respectively. The distance between the D-T neutron source and the surface of assembly was 200 mm.

***In-System Neutron Spectrum***

The neutron spectrum in the assembly above 2 MeV was measured by the 14 mm diameter spherical NE213 spectrometer <sup>2)</sup>. The measurement was carried out at eight points along the central axis. The detector was inserted into the special beryllium blocks equipped

with an experimental hole of 21 mm diam. The positions of detector center were 214, 265, 316, 417, 519, 620, 327 and 479 mm from the target. The later two positions are the same as the points measured by proton-recoil proportional counters mentioned below. The anode signal from the photomultiplier tube was split into two signal lines after the preamplifier, and analyzed by independent pulse height analyzers with different amplifier gain and with pulse shape discrimination systems. This scheme provides a linear response and a good n-gamma discrimination over the wide dynamic range. The two pulse height spectra obtained were joined at an appropriate energy point. This combined recoil-proton spectrum was unfolded by the FORIST code <sup>3)</sup> and normalized to the total neutron yield.

The neutron spectrum in the assembly below 600 keV was measured by two proton recoil proportional counters (PRC), i.e., Hydrogen counter and Krypton counter. These counters were developed by E. F. Bennett for the Phase-II experiments of JAERI/USDOE collaborative program on fusion blanket neutronics <sup>4)</sup>. Figure 8.2 shows a sectional view of the counter. The feature and high voltage supplied are summarized in Table 8.2. The counters were inserted in an experimental hole prepared perpendicular to the central axis. The positions of detector center were 327 and 479 mm from the target. The data acquisition and processing methods are described in the reference 4).

### **Reaction Rates**

Reaction rate of  ${}^6\text{Li}(n,t){}^4\text{He}$ , i.e., tritium production rate was measured by a thin  ${}^6\text{Li}$ -glass scintillator (10mm diam. x 0.1 mm thick). In the previous experiments <sup>4)</sup>, tritium production rate distributions were measured by using the difference between the response of  ${}^6\text{Li}$ -glass scintillator and that of  ${}^7\text{Li}$ -glass in a mixed neutron gamma-ray field <sup>5)</sup>. In the present experiment, the contribution of gamma-rays was low because the scintillator was thin and the media was beryllium. Moreover most of neutrons were lower than the threshold of parasitic reactions such as  ${}^6\text{Li}(n,n'd){}^4\text{He}$ . Therefore the reaction rate was obtained from the peak area of pulse height spectrum after the corrections of self-shielding and edge effects.

Spatial distributions of ten reaction rates were measured by the foil activation method. The reactions used are tabulated in Table 8.3. Eight foils of Al, Fe, Ti, Ni, Zr, Nb, In and Au were placed between the Be blocks along the central axis. The positions measured were 200, 248, 349, 451, 552 and 656 mm from the target. Total neutron yield and irradiation time were  $5.42 \times 10^{15}$  and 7.33 hours, respectively.

Fission rate distribution of  ${}^{235}\text{U}$  was measured with a Type FC4A micro-fission chamber manufactured by T. C. Centronic Ltd. The experimental procedure was the same as that used in previous experiment <sup>1)</sup>.



### Neutron Source Characteristics

The 80-degree beam line in the first target room of the FNS facility was used for the present experiment. A high speed water-cooled target was set at the end of the beam line. A  $7.4 \times 10^{11}$  Bq (20 Ci) Ti-T target was mounted on the target assembly. Neutrons were generated at the distance of 200 mm from the assembly surface on its central axis. The setting accuracy is estimated to be within  $\pm 1$  mm.

Neutron yields were determined by means of the associated alpha-particle detection method<sup>6)</sup>. A small silicon surface-barrier detector with a aperture of about 1 mm diam. was mounted inside the beam line to detect the alpha-particle of  ${}^3\text{T}(d,n){}^4\text{He}$  reaction. Source characteristics, that is, neutron yield, angular distribution and spectra of the target assembly were measured by the time-of-flight technique<sup>7)</sup>, foil activation and an NE213 spectrometer<sup>2)</sup>.

A good agreement was obtained between neutron yields measured by different methods within the experimental error. An analysis by Monte Carlo computation<sup>8)</sup> also showed fairly good agreement with measured neutron energy spectra as well as angular distributions, the latter obtained by foil activation. Thus, the calculated source spectrum and other characteristics were essentially confirmed can be used as input information in the benchmark calculations. Source neutron spectrum is given in Table 8.16. The spectrum can be used for the experimental analysis. It should be noticed that the number of neutrons emitted toward 0 degree with respect to the  $d^+$  beam must be normalized as 1.1262 per unit D-T reaction at the target.

### Experimental Data with Errors

Experimental data with errors are presented as follows.

- Neutron spectra by the NE213:      Tables 8.7 - 8.14      and Figs. 8.3 - 8.6
- Neutron spectra by the PRC:      Table 8.15      and Fig. 8.7
- Tritium production rate of  ${}^6\text{Li}$ :      Table 8.4
- Reaction rate distributions:      Tables 8.6
- Fission rate distributions:      Table 8.5

### Error Assessment and Example of Experimental Analysis

Errors for all the measured items are estimated as similar to those given for graphite or lithium oxide slabs (See chapters 6 or 7). For examples of experimental analysis, input data of MCNP, GRTUNCL and DOT are given in Figs. 8.8 - 8.10.

### References

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  - 8) Seki Y., et al.: J. Nucl. Sci. Technol., 20, 686 (1983).

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Fig. 8.7 Neutron spectra at 127 and 279 mm from the target measured by the PRC.

Fig. 8.8 Example of input data for MCNP-3 analysis.

Fig. 8.9 Example of input data of GRTUNCL for DOT analysis.

Fig. 8.10 Example of input data for DOT analysis.

Table 8.1 Atomic density of beryllium blocks.

Nuclide	Density [ $\times 10^{24}$ atoms/cm <sup>3</sup> ]
Be	$1.2152 \times 10^{-1}$
C	$7.7109 \times 10^{-5}$
O	$4.9713 \times 10^{-4}$
Al	$2.9013 \times 10^{-5}$
Fe	$2.4678 \times 10^{-5}$

Table 8.2 Feature of proton-recoil proportional counters.

Counter	Hydrogen	Krypton
Energy range	3~150 keV	150~600 keV
Gas		
H <sub>2</sub>	5.60 atm	4.37 atm
Kr		4.30 atm
He-3	negligible	negligible
High voltage	3000, 3300, 3600, 3900, 4200 V	2900, 3300, 3600 V
Calibration	Iron resonance (27.9keV)	<sup>3</sup> He(n,p) <sup>3</sup> T (764.5keV)

Table 8.3 Threshold energy and decay data needed for reaction rates data reduction.

Reaction	Q-value [MeV]	Threshold energy [MeV]	Half life	gamma-ray energy [keV]	branching ratio [%]
<sup>27</sup> Al(n, $\alpha$ ) <sup>24</sup> Na	-3.13	6	15.02h	1368.6	100.0
<sup>56</sup> Fe(n,p) <sup>56</sup> Mn	-2.91	4	2.5785h	846.75	98.87
Ti(n,x) <sup>47</sup> Sc <sup>*1</sup>	0.18, -11.4	1	3.422d	159.38	68.5
Ti(n,x) <sup>48</sup> Sc <sup>*2</sup>	-3.21, -11.4	5	43.67h	983.5	100.0
<sup>58</sup> Ni(n,p) <sup>58</sup> Co	0.40	1	70.78d	810.76	99.44
<sup>58</sup> Ni(n,2n) <sup>57</sup> Ni	-12.2	13	36.0h	1377.6	77.6
<sup>90</sup> Zr(n,2n) <sup>89</sup> Zr	-12.0	12	78.43h	909.2	99.01
<sup>93</sup> Nb(n,2n) <sup>92m</sup> Nb	-8.8	10	10.14d	934.5	99.2
<sup>115</sup> In(n,n') <sup>115m</sup> In		0.5	4.49h	336.2	45.9
<sup>197</sup> Au(n, $\gamma$ ) <sup>198</sup> Au		thermal	2.696d	411.8	95.40

\*1 <sup>47</sup>Ti(n,p)<sup>47</sup>Sc, <sup>48</sup>Ti(n,np)<sup>47</sup>Sc\*2 <sup>48</sup>Ti(n,p)<sup>48</sup>Sc, <sup>49</sup>Ti(n,np)<sup>48</sup>Sc

Table 8.4 Tritium production rates in the Be assembly measured by Li-glass scintillators.

position [mm]	Tritium production rate [tritium/atom/source]	error [%]
201.1	$3.583 \times 10^{-26}$	3.07
251.7	$2.065 \times 10^{-25}$	3.19
302.3	$2.983 \times 10^{-25}$	3.06
327.6	$3.226 \times 10^{-25}$	2.35
403.5	$3.254 \times 10^{-25}$	2.35
479.4	$2.339 \times 10^{-25}$	2.92
504.7	$2.007 \times 10^{-25}$	2.92
605.9	$7.863 \times 10^{-26}$	2.71
631.2	$5.050 \times 10^{-26}$	3.01

Table 8.5 Fission rates in the Be assembly measured by  $^{235}\text{U}$  micro-fission chambers.

position [mm]	Fission rate [fission / atom / source neutron]	Error [%]
241.2	$9.267 \cdot 26^{*1}$	3.81
266.6	1.307-25	3.80
292.0	1.579-25	3.80
317.4	1.794-25	3.80
342.8	1.906-25	3.80
419.0	1.771-25	3.80
469.8	1.432-25	3.80
520.6	1.073-25	3.80
571.4	7.071-26	3.80
622.2	3.368-26	3.81

\*1 Read as  $9.267 \times 10^{-26}$

Table 8.6 Reaction rate distributions measured by the foil activation technique.

Reaction	Distance from the Surface [cm]						
	0.0	48.0	14.92	25.06	35.20	45.59	
$^{197}\text{Au}(n,\gamma)^{198}\text{Au}$	8.628e-27 (3.0)	4.806e-26 (2.7)	7.272e-26 (2.7)	4.957e-26 (3.0)	2.330e-26 (2.9)	2.151e-27 (3.0)	(2.9)
$^{115}\text{In}(n,n')^{115m}\text{In}$	3.388e-29 (2.9)	3.912e-29 (2.9)	1.719e-29 (2.9)	6.006e-30 (2.9)	1.925e-30 (3.2)	4.603e-31 (3.4)	(5.2)
$^{27}\text{Al}(n,\alpha)^{24}\text{Na}$	2.588e-29 (2.7)	1.382e-29 (2.9)	3.750e-30 (2.9)	1.039e-30 (3.0)	2.853e-31 (3.2)	7.559e-32 (3.2)	(3.2)
$^{93}\text{Nb}(n,2n)^{92m}\text{Nb}$	9.933e-29 (2.7)	4.961e-29 (2.7)	1.305e-29 (2.7)	3.326e-30 (2.9)	9.015e-31 (3.1)	2.295e-31 (3.1)	(3.3)
$^{58}\text{Ni}(n,2n)^{57}\text{Ni}$	9.416e-30 (2.9)	3.675e-30 (2.7)	6.881e-31 (2.7)	1.338e-31 (3.6)	3.271e-32 (4.3)	7.543e-33 (9.0)	(9.0)
$\text{Ti}(n,x)^{48}\text{Sc}$	1.344e-29 (2.8)	6.593e-30 (3.0)	1.792e-30 (3.0)	4.494e-31 (3.6)	1.181e-31 (4.6)		(8.6)
$\text{Ti}(n,x)^{47}\text{Sc}$	6.131e-30 (2.9)	2.983e-30 (3.2)	7.545e-31 (3.2)	2.100e-31 (3.4)	6.063e-32 (4.2)	1.380e-32 (25.)	(10.4)
$^{56}\text{Fe}(n,p)^{56}\text{Mn}$	2.240e-29 (2.7)	1.221e-29 (2.7)	3.365e-30 (2.7)	9.886e-31 (2.8)	2.746e-31 (3.0)	7.412e-32 (3.7)	(3.2)
$^{90}\text{Zr}(n,2n)^{89}\text{Zr}$	1.772e-28 (2.7)	7.627e-29 (2.7)	1.465e-29 (2.7)	3.316e-30 (2.7)	7.508e-31 (3.4)	1.682e-31 (3.4)	(4.1)
$^{58}\text{Ni}(n,p)^{58}\text{Co}$	7.632e-29 (2.7)	6.162e-29 (2.7)	2.292e-29 (2.7)	7.628e-30 (2.8)	2.304e-30 (3.4)	6.001e-31 (4.1)	(3.1)

Table 8.7 Neutron spectrum in the beryllium assembly (z=214mm).

Energy [MeV]	Flux/Leth.	Error	Window	Energy [MeV]	Flux/Leth.	Error	Window
2.102E+05	5.710E-08	1.0949	81.68	1.995E+06	2.035E-05	.1675	36.00
2.210E+05	7.201E-08	1.0864	80.51	2.097E+06	2.341E-05	.1535	35.14
2.323E+05	9.116E-08	1.0756	79.34	2.204E+06	2.521E-05	.1511	34.31
2.442E+05	1.159E-07	1.0622	78.16	2.317E+06	2.591E-05	.1559	33.55
2.568E+05	1.479E-07	1.0458	77.00	2.436E+06	2.589E-05	.1597	32.80
2.699E+05	1.892E-07	1.0263	75.82	2.561E+06	2.537E-05	.1517	32.04
2.838E+05	2.427E-07	1.0032	74.66	2.692E+06	2.459E-05	.1232	31.25
2.983E+05	3.120E-07	.9762	73.48	2.830E+06	2.420E-05	.1104	30.49
3.136E+05	4.016E-07	.9450	72.32	2.975E+06	2.514E-05	.1838	29.74
3.297E+05	5.172E-07	.9094	71.14	3.128E+06	2.759E-05	.2361	29.02
3.466E+05	6.656E-07	.8691	69.98	3.288E+06	3.017E-05	.2443	28.30
3.644E+05	8.555E-07	.8237	68.80	3.457E+06	3.006E-05	.2217	27.58
3.830E+05	1.097E-06	.7736	67.68	3.634E+06	2.517E-05	.1812	26.82
4.027E+05	1.401E-06	.7185	66.60	3.821E+06	1.660E-05	.2228	26.06
4.238E+05	1.780E-06	.6589	65.63	4.016E+06	8.756E-06	.7236	25.27
4.450E+05	2.248E-06	.5954	64.69	4.222E+06	6.352E-06	1.2886	24.55
4.678E+05	2.817E-06	.5289	63.83	4.439E+06	1.089E-05	.7733	23.94
4.918E+05	3.497E-06	.4612	62.96	4.666E+06	1.937E-05	.3701	23.33
5.170E+05	4.296E-06	.3941	62.10	4.906E+06	2.662E-05	.1988	22.72
5.436E+05	5.216E-06	.3305	61.20	5.157E+06	2.897E-05	.1452	22.18
5.714E+05	6.251E-06	.2741	60.30	5.422E+06	2.673E-05	.2045	21.67
6.007E+05	7.395E-06	.2286	59.36	5.700E+06	2.191E-05	.2777	21.10
6.315E+05	8.631E-06	.1971	58.43	5.992E+06	1.833E-05	.2992	20.56
6.639E+05	9.944E-06	.1791	57.49	6.299E+06	1.911E-05	.2959	20.02
6.979E+05	1.132E-05	.1709	56.56	6.622E+06	2.281E-05	.2978	19.48
7.337E+05	1.274E-05	.1682	55.62	6.961E+06	2.398E-05	.2642	18.97
7.713E+05	1.422E-05	.1693	54.72	7.318E+06	2.098E-05	.4119	18.49
8.109E+05	1.572E-05	.1722	53.86	7.694E+06	1.790E-05	.5059	18.04
8.525E+05	1.724E-05	.1735	52.99	8.088E+06	1.851E-05	.4966	17.62
8.962E+05	1.873E-05	.1702	52.16	8.503E+06	2.610E-05	.4185	17.22
9.421E+05	2.017E-05	.1607	51.34	8.939E+06	4.034E-05	.4066	16.78
9.904E+05	2.154E-05	.1452	50.47	9.397E+06	5.155E-05	.3462	16.36
1.041E+06	2.285E-05	.1243	49.57	9.879E+06	4.590E-05	.3174	15.93
1.095E+06	2.414E-05	.0985	48.64	1.039E+07	3.220E-05	.5398	15.47
1.151E+06	2.535E-05	.0707	47.59	1.092E+07	1.926E-05	.9391	15.07
1.210E+06	2.633E-05	.0688	46.51	1.148E+07	8.420E-06	2.5484	14.76
1.272E+06	2.667E-05	.0974	45.40	1.207E+07	2.022E-05	1.3849	14.54
1.337E+06	2.590E-05	.1300	44.21	1.268E+07	6.135E-05	.5005	14.42
1.406E+06	2.368E-05	.1690	42.95	1.334E+07	2.223E-04	.3874	14.40
1.478E+06	2.020E-05	.2161	41.72	1.402E+07	5.396E-04	.3231	13.92
1.553E+06	1.624E-05	.2684	40.57	1.474E+07	8.287E-04	.1972	13.92
1.633E+06	1.312E-05	.3058	39.53	1.549E+07	9.439E-04	.0987	13.92
1.717E+06	1.201E-05	.2935	38.56	1.629E+07	7.243E-04	.2358	13.92
1.805E+06	1.337E-05	.2420	37.69	1.712E+07	3.432E-04	.3022	14.16
1.897E+06	1.658E-05	.1960	36.86	1.800E+07	9.759E-05	.2994	14.40

Table 8.8 Neutron spectrum in the beryllium assembly (z=265mm).

Energy [MeV]	Flux/Leth.	Error	Window	Energy [MeV]	Flux/Leth.	Error	Window
2.102E+05	6.063E-08	.8404	81.68	1.995E+06	2.941E-05	.0612	36.00
2.210E+05	7.631E-08	.8352	80.51	2.097E+06	3.142E-05	.0585	35.14
2.323E+05	9.640E-08	.8285	79.34	2.204E+06	3.221E-05	.0603	34.31
2.442E+05	1.222E-07	.8201	78.16	2.317E+06	3.184E-05	.0667	33.55
2.568E+05	1.554E-07	.8098	77.00	2.436E+06	3.074E-05	.0718	32.80
2.699E+05	1.979E-07	.7974	75.82	2.561E+06	2.922E-05	.0708	32.04
2.838E+05	2.527E-07	.7826	74.66	2.692E+06	2.745E-05	.0625	31.25
2.983E+05	3.229E-07	.7650	73.48	2.830E+06	2.607E-05	.0900	30.49
3.136E+05	4.128E-07	.7445	72.32	2.975E+06	2.536E-05	.1303	29.74
3.297E+05	5.276E-07	.7205	71.14	3.128E+06	2.564E-05	.1639	29.02
3.466E+05	6.729E-07	.6929	69.98	3.288E+06	2.645E-05	.1727	28.30
3.644E+05	8.568E-07	.6613	68.80	3.457E+06	2.684E-05	.1540	27.58
3.830E+05	1.086E-06	.6253	67.68	3.634E+06	2.600E-05	.1152	26.82



4.027E+05	1.372E-06	.5850	66.60	3.821E+06	2.398E-05	.1053	26.06
4.233E+05	1.721E-06	.5401	65.63	4.016E+06	2.183E-05	.1790	25.27
4.450E+05	2.144E-06	.4907	64.69	4.222E+06	2.103E-05	.2277	24.55
4.678E+05	2.650E-06	.4374	63.83	4.439E+06	2.238E-05	.2164	23.94
4.918E+05	3.245E-06	.3812	62.96	4.666E+06	2.518E-05	.1657	23.33
5.170E+05	3.935E-06	.3234	62.10	4.906E+06	2.763E-05	.1177	22.72
5.436E+05	4.724E-06	.2668	61.20	5.157E+06	2.828E-05	.1064	22.18
5.714E+05	5.613E-06	.2145	60.30	5.422E+06	2.786E-05	.1217	21.67
6.007E+05	6.607E-06	.1709	59.36	5.700E+06	2.697E-05	.1356	21.10
6.315E+05	7.710E-06	.1399	58.43	5.992E+06	2.587E-05	.1471	20.56
6.639E+05	8.929E-06	.1226	57.49	6.299E+06	2.445E-05	.1641	20.02
6.979E+05	1.027E-05	.1143	56.56	6.622E+06	2.418E-05	.1626	19.48
7.337E+05	1.175E-05	.1098	55.62	6.961E+06	2.712E-05	.1590	18.97
7.713E+05	1.335E-05	.1072	54.72	7.318E+06	3.203E-05	.1576	18.49
8.109E+05	1.507E-05	.1058	53.86	7.694E+06	3.443E-05	.1486	18.04
8.525E+05	1.686E-05	.1039	52.99	8.088E+06	3.207E-05	.1998	17.62
8.962E+05	1.869E-05	.0996	52.16	8.503E+06	3.063E-05	.2357	17.22
9.421E+05	2.050E-05	.0926	51.34	8.939E+06	3.466E-05	.2360	16.78
9.904E+05	2.228E-05	.0840	50.47	9.397E+06	4.017E-05	.2132	16.36
1.041E+06	2.401E-05	.0740	49.57	9.879E+06	3.908E-05	.2260	15.93
1.095E+06	2.569E-05	.0621	48.64	1.039E+07	3.854E-05	.2428	15.47
1.151E+06	2.724E-05	.0490	47.59	1.092E+07	4.205E-05	.2282	15.07
1.210E+06	2.852E-05	.0517	46.51	1.148E+07	4.136E-05	.2758	14.76
1.272E+06	2.927E-05	.0654	45.40	1.207E+07	4.910E-05	.2728	14.54
1.337E+06	2.923E-05	.0812	44.21	1.268E+07	8.094E-05	.1794	14.42
1.406E+06	2.828E-05	.0979	42.95	1.334E+07	1.688E-04	.1831	14.40
1.478E+06	2.651E-05	.1134	41.72	1.402E+07	3.117E-04	.2453	14.12
1.553E+06	2.446E-05	.1230	40.57	1.474E+07	4.187E-04	.2118	14.12
1.633E+06	2.295E-05	.1199	39.53	1.549E+07	4.201E-04	.0817	14.12
1.717E+06	2.274E-05	.1031	38.56	1.629E+07	2.935E-04	.2829	14.12
1.805E+06	2.413E-05	.0821	37.69	1.712E+07	1.366E-04	.3860	14.26
1.897E+06	2.669E-05	.0667	36.86	1.800E+07	4.073E-05	.3658	14.40

Table 8.9 Neutron spectrum in the beryllium assembly (z=316mm).

Energy [MeV]	Flux/Leth.	Error	Window	Energy [MeV]	Flux/Leth.	Error	Window
2.102E+05	3.518E-08	1.0958	81.68	1.995E+06	2.400E-05	.0490	36.00
2.210E+05	4.430E-08	1.0877	80.51	2.097E+06	2.503E-05	.0472	35.14
2.323E+05	5.599E-08	1.0773	79.34	2.204E+06	2.534E-05	.0460	34.31
2.442E+05	7.105E-08	1.0643	78.16	2.317E+06	2.483E-05	.0476	33.55
2.568E+05	9.046E-08	1.0484	77.00	2.436E+06	2.366E-05	.0503	32.80
2.699E+05	1.154E-07	1.0291	75.82	2.561E+06	2.200E-05	.0532	32.04
2.838E+05	1.477E-07	1.0061	74.66	2.692E+06	2.006E-05	.0541	31.25
2.983E+05	1.891E-07	.9797	73.48	2.830E+06	1.816E-05	.0690	30.49
3.136E+05	2.424E-07	.9491	72.32	2.975E+06	1.673E-05	.0925	29.74
3.297E+05	3.106E-07	.9136	71.14	3.128E+06	1.606E-05	.1151	29.02
3.466E+05	3.977E-07	.8727	69.98	3.288E+06	1.617E-05	.1239	28.30
3.644E+05	5.085E-07	.8261	68.80	3.457E+06	1.682E-05	.1137	27.58
3.830E+05	6.485E-07	.7736	67.68	3.634E+06	1.761E-05	.0921	26.82
4.027E+05	8.237E-07	.7147	66.60	3.821E+06	1.835E-05	.0830	26.06
4.233E+05	1.041E-06	.6499	65.63	4.016E+06	1.880E-05	.1045	25.27
4.450E+05	1.309E-06	.5793	64.69	4.222E+06	1.950E-05	.1182	24.55
4.678E+05	1.637E-06	.5049	63.83	4.439E+06	2.072E-05	.1154	23.94
4.918E+05	2.033E-06	.4274	62.96	4.666E+06	2.197E-05	.0995	23.33
5.170E+05	2.505E-06	.3496	62.10	4.906E+06	2.233E-05	.0826	22.72
5.436E+05	3.061E-06	.2749	61.20	5.157E+06	2.137E-05	.0848	22.18
5.714E+05	3.708E-06	.2075	60.30	5.422E+06	1.984E-05	.0980	21.67
6.007E+05	4.457E-06	.1523	59.36	5.700E+06	1.881E-05	.1047	21.10
6.315E+05	5.314E-06	.1133	58.43	5.992E+06	1.881E-05	.1063	20.56
6.639E+05	6.288E-06	.0916	57.49	6.299E+06	1.907E-05	.1268	20.02
6.979E+05	7.386E-06	.0810	56.56	6.622E+06	1.895E-05	.1472	19.48
7.337E+05	8.613E-06	.0749	55.62	6.961E+06	1.914E-05	.1262	18.97
7.713E+05	9.969E-06	.0711	54.72	7.318E+06	2.092E-05	.1409	18.49
8.109E+05	1.145E-05	.0690	53.86	7.694E+06	2.417E-05	.1431	18.04
8.525E+05	1.305E-05	.0664	52.99	8.088E+06	2.707E-05	.1246	17.62
8.962E+05	1.476E-05	.0622	52.16	8.503E+06	2.754E-05	.1269	17.22
9.421E+05	1.657E-05	.0561	51.34	8.939E+06	2.605E-05	.1902	16.78

9.904E+05	1.850E-05	.0508	50.47	9.397E+06	2.534E-05	.2068	16.36
1.041E+06	2.053E-05	.0460	49.57	9.879E+06	2.638E-05	.1895	15.93
1.095E+06	2.259E-05	.0415	48.64	1.039E+07	3.143E-05	.1829	15.47
1.151E+06	2.462E-05	.0397	47.59	1.092E+07	3.323E-05	.1455	15.07
1.210E+06	2.629E-05	.0402	46.51	1.148E+07	2.888E-05	.2107	14.76
1.272E+06	2.740E-05	.0417	45.40	1.207E+07	2.898E-05	.2049	14.54
1.337E+06	2.769E-05	.0434	44.21	1.268E+07	4.469E-05	.2142	14.42
1.406E+06	2.711E-05	.0479	42.95	1.334E+07	9.630E-05	.1851	14.40
1.478E+06	2.574E-05	.0534	41.72	1.402E+07	1.919E-04	.1496	14.39
1.553E+06	2.393E-05	.0580	40.57	1.474E+07	2.511E-04	.1128	14.39
1.633E+06	2.230E-05	.0590	39.53	1.549E+07	1.985E-04	.0979	14.39
1.717E+06	2.141E-05	.0558	38.56	1.629E+07	1.025E-04	.2968	14.39
1.805E+06	2.159E-05	.0525	37.69	1.712E+07	4.233E-05	.4667	14.40
1.897E+06	2.264E-05	.0498	36.86	1.800E+07	1.382E-05	.4378	14.40

Table 8.10 Neutron spectrum in the beryllium assembly (z=327mm).

Energy [MeV]	Flux/Leth.	Error	Window	Energy [MeV]	Flux/Leth.	Error	Window
2.102E+05	2.818E-08	1.2649	81.68	1.995E+06	2.153E-05	.0431	36.00
2.210E+05	3.549E-08	1.2557	80.51	2.097E+06	2.223E-05	.0423	35.14
2.323E+05	4.486E-08	1.2438	79.34	2.204E+06	2.214E-05	.0418	34.31
2.442E+05	5.691E-08	1.2288	78.16	2.317E+06	2.137E-05	.0425	33.55
2.568E+05	7.247E-08	1.2103	77.00	2.436E+06	2.020E-05	.0464	32.80
2.699E+05	9.247E-08	1.1880	75.82	2.561E+06	1.879E-05	.0501	32.04
2.838E+05	1.183E-07	1.1612	74.66	2.692E+06	1.725E-05	.0533	31.25
2.983E+05	1.516E-07	1.1295	73.48	2.830E+06	1.567E-05	.0656	30.49
3.136E+05	1.946E-07	1.0924	72.32	2.975E+06	1.441E-05	.0877	29.74
3.297E+05	2.496E-07	1.0494	71.14	3.128E+06	1.372E-05	.1097	29.02
3.466E+05	3.202E-07	.9998	69.98	3.288E+06	1.370E-05	.1167	28.30
3.644E+05	4.102E-07	.9433	68.80	3.457E+06	1.424E-05	.1029	27.58
3.830E+05	5.243E-07	.8795	67.68	3.634E+06	1.511E-05	.0763	26.82
4.027E+05	6.684E-07	.8083	66.60	3.821E+06	1.607E-05	.0877	26.06
4.233E+05	8.485E-07	.7298	65.63	4.016E+06	1.694E-05	.1009	25.27
4.450E+05	1.072E-06	.6449	64.69	4.222E+06	1.765E-05	.1032	24.55
4.678E+05	1.348E-06	.5545	63.83	4.439E+06	1.814E-05	.0970	23.94
4.918E+05	1.685E-06	.4616	62.96	4.666E+06	1.831E-05	.0886	23.33
5.170E+05	2.092E-06	.3686	62.10	4.906E+06	1.818E-05	.0834	22.72
5.436E+05	2.582E-06	.2801	61.20	5.157E+06	1.800E-05	.0814	22.18
5.714E+05	3.163E-06	.2022	60.30	5.422E+06	1.774E-05	.0878	21.67
6.007E+05	3.849E-06	.1439	59.36	5.700E+06	1.720E-05	.1003	21.10
6.315E+05	4.655E-06	.1057	58.43	5.992E+06	1.622E-05	.1070	20.56
6.639E+05	5.587E-06	.0846	57.49	6.299E+06	1.577E-05	.1106	20.02
6.979E+05	6.646E-06	.0745	56.56	6.622E+06	1.708E-05	.1220	19.48
7.337E+05	7.831E-06	.0683	55.62	6.961E+06	1.972E-05	.1030	18.97
7.713E+05	9.129E-06	.0637	54.72	7.318E+06	2.154E-05	.1072	18.49
8.109E+05	1.052E-05	.0609	53.86	7.694E+06	2.042E-05	.1399	18.04
8.525E+05	1.201E-05	.0583	52.99	8.088E+06	1.736E-05	.1617	17.62
8.962E+05	1.357E-05	.0532	52.16	8.503E+06	1.677E-05	.1670	17.22
9.421E+05	1.524E-05	.0473	51.34	8.939E+06	2.119E-05	.1564	16.78
9.904E+05	1.703E-05	.0418	50.47	9.397E+06	2.588E-05	.1459	16.36
1.041E+06	1.890E-05	.0384	49.57	9.879E+06	2.699E-05	.1361	15.93
1.095E+06	2.083E-05	.0385	48.64	1.039E+07	2.736E-05	.1533	15.47
1.151E+06	2.260E-05	.0395	47.59	1.092E+07	2.740E-05	.1445	15.07
1.210E+06	2.398E-05	.0396	46.51	1.148E+07	2.830E-05	.1314	14.76
1.272E+06	2.471E-05	.0393	45.40	1.207E+07	3.619E-05	.1199	14.54
1.337E+06	2.461E-05	.0396	44.21	1.268E+07	5.187E-05	.1247	14.42
1.406E+06	2.370E-05	.0423	42.95	1.334E+07	8.757E-05	.1523	14.40
1.478E+06	2.217E-05	.0465	41.72	1.402E+07	1.469E-04	.1482	14.40
1.553E+06	2.046E-05	.0514	40.57	1.474E+07	1.751E-04	.1099	14.40
1.633E+06	1.914E-05	.0546	39.53	1.549E+07	1.427E-04	.1040	14.40
1.717E+06	1.866E-05	.0532	38.56	1.629E+07	8.248E-05	.2824	14.40
1.805E+06	1.914E-05	.0498	37.69	1.712E+07	3.511E-05	.4268	14.40
1.897E+06	2.029E-05	.0459	36.86	1.800E+07	1.050E-05	.4324	14.40

Table 8.11 Neutron spectrum in the beryllium assembly (z=417mm).

Energy [MeV]	Flux/Leth.	Error	Window	Energy [MeV]	Flux/Leth.	Error	Window
2.102E+05	9.797E-09	1.8212	81.68	1.995E+06	1.045E-05	.0388	36.00
2.210E+05	1.236E-08	1.8052	80.51	2.097E+06	1.069E-05	.0379	35.14
2.323E+05	1.565E-08	1.7844	79.34	2.204E+06	1.054E-05	.0383	34.31
2.442E+05	1.992E-08	1.7584	78.16	2.317E+06	9.997E-06	.0406	33.55
2.568E+05	2.544E-08	1.7272	77.00	2.436E+06	9.168E-06	.0450	32.80
2.699E+05	3.258E-08	1.6890	75.82	2.561E+06	8.193E-06	.0519	32.04
2.838E+05	4.188E-08	1.6446	74.66	2.692E+06	7.245E-06	.0604	31.25
2.983E+05	5.393E-08	1.5920	73.48	2.830E+06	6.506E-06	.0699	30.49
3.136E+05	6.962E-08	1.5309	72.32	2.975E+06	6.098E-06	.0793	29.74
3.297E+05	8.995E-08	1.4612	71.14	3.128E+06	6.051E-06	.0854	29.02
3.466E+05	1.164E-07	1.3814	69.98	3.288E+06	6.310E-06	.0832	28.30
3.644E+05	1.505E-07	1.2924	68.80	3.457E+06	6.779E-06	.0728	27.58
3.830E+05	1.944E-07	1.1933	67.68	3.634E+06	7.300E-06	.0634	26.82
4.027E+05	2.508E-07	1.0848	66.60	3.821E+06	7.768E-06	.0675	26.06
4.233E+05	3.228E-07	.9678	65.63	4.016E+06	8.062E-06	.0700	25.27
4.450E+05	4.142E-07	.8440	64.69	4.222E+06	8.210E-06	.0711	24.55
4.678E+05	5.292E-07	.7159	63.83	4.439E+06	8.297E-06	.0719	23.94
4.918E+05	6.733E-07	.5874	62.96	4.666E+06	8.421E-06	.0713	23.33
5.170E+05	8.520E-07	.4628	62.10	4.906E+06	8.597E-06	.0703	22.72
5.436E+05	1.072E-06	.3479	61.20	5.157E+06	8.569E-06	.0679	22.18
5.714E+05	1.340E-06	.2488	60.30	5.422E+06	8.207E-06	.0784	21.67
6.007E+05	1.665E-06	.1716	59.36	5.700E+06	7.735E-06	.0867	21.10
6.315E+05	2.051E-06	.1188	58.43	5.992E+06	7.484E-06	.0835	20.56
6.639E+05	2.503E-06	.0897	57.49	6.299E+06	7.521E-06	.0925	20.02
6.979E+05	3.024E-06	.0757	56.56	6.622E+06	7.777E-06	.0996	19.48
7.337E+05	3.616E-06	.0682	55.62	6.961E+06	8.257E-06	.0893	18.97
7.713E+05	4.282E-06	.0639	54.72	7.318E+06	8.840E-06	.0885	18.49
8.109E+05	5.037E-06	.0621	53.86	7.694E+06	9.332E-06	.0943	18.04
8.525E+05	5.896E-06	.0605	52.99	8.088E+06	9.752E-06	.0949	17.62
8.962E+05	6.879E-06	.0565	52.16	8.503E+06	1.016E-05	.1067	17.22
9.421E+05	8.018E-06	.0517	51.34	8.939E+06	1.044E-05	.1378	16.78
9.904E+05	9.323E-06	.0471	50.43	9.397E+06	1.009E-05	.1424	16.36
1.041E+06	1.076E-05	.0445	49.04	9.879E+06	9.496E-06	.1523	15.93
1.095E+06	1.225E-05	.0420	47.38	1.039E+07	1.036E-05	.1657	15.47
1.151E+06	1.360E-05	.0394	45.58	1.092E+07	1.157E-05	.1188	15.07
1.210E+06	1.460E-05	.0370	43.77	1.148E+07	1.222E-05	.1038	14.76
1.272E+06	1.506E-05	.0336	42.37	1.207E+07	1.550E-05	.1218	14.54
1.337E+06	1.484E-05	.0308	41.67	1.268E+07	2.352E-05	.1133	14.42
1.406E+06	1.399E-05	.0318	41.14	1.334E+07	3.767E-05	.0918	14.40
1.478E+06	1.273E-05	.0371	40.66	1.402E+07	5.235E-05	.0877	14.40
1.553E+06	1.136E-05	.0428	40.25	1.474E+07	5.193E-05	.0882	14.40
1.633E+06	1.025E-05	.0460	39.53	1.549E+07	3.508E-05	.1277	14.40
1.717E+06	9.653E-06	.0455	38.56	1.629E+07	1.683E-05	.3594	14.40
1.805E+06	9.621E-06	.0434	37.69	1.712E+07	6.538E-06	.5720	14.40
1.897E+06	9.984E-06	.0409	36.86	1.800E+07	2.034E-06	.5275	14.40

Table 8.12 Neutron spectrum in the beryllium assembly (z=479mm).

Energy [MeV]	Flux/Leth.	Error	Window	Energy [MeV]	Flux/Leth.	Error	Window
2.102E+05	4.006E-09	2.5044	81.68	1.995E+06	5.545E-06	.0378	36.00
2.210E+05	5.065E-09	2.4773	80.51	2.097E+06	5.557E-06	.0387	35.14
2.323E+05	6.433E-09	2.4431	79.34	2.204E+06	5.389E-06	.0386	34.31
2.442E+05	8.214E-09	2.4002	78.16	2.317E+06	5.080E-06	.0381	33.55
2.568E+05	1.054E-08	2.3492	77.00	2.436E+06	4.680E-06	.0401	32.80
2.699E+05	1.356E-08	2.2876	75.82	2.561E+06	4.243E-06	.0443	32.04
2.838E+05	1.752E-08	2.2174	74.66	2.692E+06	3.807E-06	.0505	31.25
2.983E+05	2.270E-08	2.1352	73.48	2.830E+06	3.421E-06	.0599	30.49
3.136E+05	2.952E-08	2.0402	72.32	2.975E+06	3.146E-06	.0733	29.74
3.297E+05	3.848E-08	1.9334	71.14	3.128E+06	3.038E-06	.0848	29.02
3.466E+05	5.022E-08	1.8146	69.98	3.288E+06	3.101E-06	.0886	28.30
3.644E+05	6.564E-08	1.6827	68.80	3.457E+06	3.295E-06	.0844	27.58
3.830E+05	8.575E-08	1.5399	67.68	3.634E+06	3.560E-06	.0761	26.82

4.027E+05	1.121E-07	1.3862	66.60	3.821E+06	3.849E-06	.0660	26.06
4.233E+05	1.462E-07	1.2244	65.63	4.016E+06	4.131E-06	.0587	25.27
4.450E+05	1.903E-07	1.0573	64.69	4.222E+06	4.396E-06	.0669	24.55
4.678E+05	2.469E-07	.8888	63.83	4.439E+06	4.611E-06	.0718	23.94
4.918E+05	3.189E-07	.7238	62.96	4.666E+06	4.711E-06	.0712	23.33
5.170E+05	4.094E-07	.5676	62.10	4.906E+06	4.628E-06	.0656	22.72
5.436E+05	5.224E-07	.4266	61.20	5.157E+06	4.352E-06	.0672	22.18
5.714E+05	6.612E-07	.3061	60.30	5.422E+06	3.974E-06	.0847	21.67
6.007E+05	8.292E-07	.2118	59.36	5.700E+06	3.682E-06	.0855	21.10
6.315E+05	1.029E-06	.1471	58.43	5.992E+06	3.753E-06	.0960	20.56
6.639E+05	1.264E-06	.1103	57.49	6.299E+06	4.326E-06	.0908	20.02
6.979E+05	1.536E-06	.0912	56.56	6.622E+06	4.999E-06	.0719	19.48
7.337E+05	1.849E-06	.0808	55.62	6.961E+06	4.993E-06	.0941	18.97
7.713E+05	2.210E-06	.0756	54.72	7.318E+06	4.251E-06	.0985	18.49
8.109E+05	2.633E-06	.0738	53.86	7.694E+06	3.666E-06	.1432	18.04
8.525E+05	3.143E-06	.0721	52.99	8.088E+06	3.849E-06	.1415	17.62
8.962E+05	3.770E-06	.0679	52.16	8.503E+06	4.519E-06	.1106	17.22
9.421E+05	4.547E-06	.0617	51.34	8.939E+06	5.094E-06	.1283	16.78
9.904E+05	5.491E-06	.0556	49.80	9.397E+06	5.127E-06	.1472	16.36
1.041E+06	6.571E-06	.0503	47.75	9.879E+06	4.812E-06	.1334	15.93
1.095E+06	7.715E-06	.0458	45.39	1.039E+07	5.460E-06	.1388	15.47
1.151E+06	8.748E-06	.0408	42.85	1.092E+07	6.861E-06	.1043	15.07
1.210E+06	9.484E-06	.0349	40.27	1.148E+07	7.603E-06	.1067	14.76
1.272E+06	9.737E-06	.0291	38.79	1.207E+07	7.775E-06	.1120	14.54
1.337E+06	9.443E-06	.0336	38.66	1.268E+07	1.085E-05	.1438	14.42
1.406E+06	8.656E-06	.0405	38.83	1.334E+07	1.847E-05	.0892	14.40
1.478E+06	7.594E-06	.0487	39.10	1.402E+07	2.447E-05	.0535	14.40
1.553E+06	6.536E-06	.0538	39.45	1.474E+07	2.185E-05	.1160	14.40
1.633E+06	5.741E-06	.0503	39.43	1.549E+07	1.294E-05	.1577	14.40
1.717E+06	5.327E-06	.0423	38.56	1.629E+07	5.547E-06	.3834	14.40
1.805E+06	5.263E-06	.0380	37.69	1.712E+07	1.993E-06	.6749	14.40
1.897E+06	5.397E-06	.0370	36.86	1.800E+07	6.151E-07	.6626	14.40

Table 8.13 Neutron spectrum in the beryllium assembly (z=519mm).

Energy [MeV]	Flux/Leth.	Error	Window	Energy [MeV]	Flux/Leth.	Error	Window
2.102E+05	3.758E-09	1.8806	81.68	1.995E+06	3.712E-06	.0377	36.00
2.210E+05	4.729E-09	1.8680	80.51	2.097E+06	3.753E-06	.0366	35.14
2.323E+05	5.976E-09	1.8508	79.34	2.204E+06	3.628E-06	.0354	34.31
2.442E+05	7.577E-09	1.8297	78.16	2.317E+06	3.365E-06	.0383	33.55
2.568E+05	9.632E-09	1.8047	77.00	2.436E+06	3.007E-06	.0451	32.80
2.699E+05	1.227E-08	1.7741	75.82	2.561E+06	2.620E-06	.0534	32.04
2.838E+05	1.567E-08	1.7372	74.66	2.692E+06	2.273E-06	.0613	31.25
2.983E+05	2.003E-08	1.6932	73.48	2.830E+06	2.037E-06	.0682	30.49
3.136E+05	2.562E-08	1.6422	72.32	2.975E+06	1.963E-06	.0744	29.74
3.297E+05	3.277E-08	1.5821	71.14	3.128E+06	2.053E-06	.0758	29.02
3.466E+05	4.187E-08	1.5123	69.98	3.288E+06	2.256E-06	.0731	28.30
3.644E+05	5.342E-08	1.4321	68.80	3.457E+06	2.486E-06	.0655	27.58
3.830E+05	6.799E-08	1.3398	67.68	3.634E+06	2.666E-06	.0601	26.82
4.027E+05	8.622E-08	1.2356	66.60	3.821E+06	2.768E-06	.0614	26.06
4.233E+05	1.090E-07	1.1188	65.63	4.016E+06	2.810E-06	.0633	25.27
4.450E+05	1.373E-07	.9903	64.69	4.222E+06	2.798E-06	.0661	24.55
4.678E+05	1.721E-07	.8518	63.83	4.439E+06	2.764E-06	.0679	23.94
4.918E+05	2.148E-07	.7066	62.96	4.666E+06	2.769E-06	.0628	23.33
5.170E+05	2.671E-07	.5604	62.10	4.906E+06	2.857E-06	.0704	22.72
5.436E+05	3.313E-07	.4276	61.20	5.157E+06	3.018E-06	.0704	22.18
5.714E+05	4.100E-07	.3176	60.30	5.422E+06	3.119E-06	.0651	21.67
6.007E+05	5.061E-07	.2305	59.36	5.700E+06	3.010E-06	.0702	21.10
6.315E+05	6.241E-07	.1710	58.43	5.992E+06	2.760E-06	.0820	20.56
6.639E+05	7.688E-07	.1374	57.49	6.299E+06	2.631E-06	.0799	20.02
6.979E+05	9.462E-07	.1199	56.56	6.622E+06	2.815E-06	.0839	19.48
7.337E+05	1.164E-06	.1089	55.62	6.961E+06	3.087E-06	.0774	18.97
7.713E+05	1.431E-06	.1020	54.72	7.318E+06	3.047E-06	.0855	18.49
8.109E+05	1.761E-06	.0974	53.86	7.694E+06	2.640E-06	.1167	18.04
8.525E+05	2.175E-06	.0922	52.99	8.088E+06	2.241E-06	.1412	17.62
8.962E+05	2.696E-06	.0842	52.16	8.503E+06	2.462E-06	.1364	17.22
9.421E+05	3.346E-06	.0745	51.00	8.939E+06	3.087E-06	.1473	16.78

9.904E+05	4.137E-06	.0652	49.10	9.397E+06	3.374E-06	.1608	16.36
1.041E+06	5.040E-06	.0575	46.70	9.879E+06	3.445E-06	.1620	15.93
1.095E+06	5.986E-06	.0505	43.96	1.039E+07	4.026E-06	.1236	15.47
1.151E+06	6.826E-06	.0443	40.93	1.092E+07	4.644E-06	.1028	15.07
1.210E+06	7.396E-06	.0369	38.22	1.148E+07	4.657E-06	.1064	14.76
1.272E+06	7.533E-06	.0296	36.75	1.207E+07	5.107E-06	.1696	14.54
1.337E+06	7.188E-06	.0371	36.86	1.268E+07	7.845E-06	.1718	14.42
1.406E+06	6.432E-06	.0473	37.41	1.334E+07	1.314E-05	.0827	14.40
1.478E+06	5.460E-06	.0613	38.17	1.402E+07	1.566E-05	.0999	14.40
1.553E+06	4.522E-06	.0714	38.98	1.474E+07	1.196E-05	.2366	14.40
1.633E+06	3.832E-06	.0684	39.34	1.549E+07	6.749E-06	.2315	14.40
1.717E+06	3.478E-06	.0562	38.56	1.629E+07	3.158E-06	.3257	14.40
1.805E+06	3.430E-06	.0453	37.69	1.712E+07	1.165E-06	.5801	14.40
1.897E+06	3.561E-06	.0381	36.86	1.800E+07	3.551E-07	.5286	14.40

Table 8.14 Neutron spectrum in the beryllium assembly (z=620mm).

Energy [MeV]	Flux/Leth.	Error	Window	Energy [MeV]	Flux/Leth.	Error	Window
2.102E+05	1.548E-09	1.3184	81.68	1.995E+06	1.119E-06	.0514	36.00
2.210E+05	1.945E-09	1.3122	80.51	2.097E+06	1.117E-06	.0530	35.14
2.323E+05	2.450E-09	1.3044	79.34	2.204E+06	1.073E-06	.0548	34.31
2.442E+05	3.093E-09	1.2947	78.16	2.317E+06	9.981E-07	.0565	33.55
2.568E+05	3.918E-09	1.2825	77.00	2.436E+06	9.069E-07	.0586	32.80
2.699E+05	4.963E-09	1.2680	75.82	2.561E+06	8.126E-07	.0606	32.04
2.838E+05	6.300E-09	1.2502	74.66	2.692E+06	7.243E-07	.0607	31.25
2.983E+05	8.002E-09	1.2285	73.48	2.830E+06	6.543E-07	.0577	30.49
3.136E+05	1.016E-08	1.2025	72.32	2.975E+06	6.151E-07	.0726	29.74
3.297E+05	1.288E-08	1.1716	71.14	3.128E+06	6.138E-07	.0856	29.02
3.466E+05	1.630E-08	1.1350	69.98	3.288E+06	6.460E-07	.0851	28.30
3.644E+05	2.055E-08	1.0917	68.80	3.457E+06	7.035E-07	.0770	27.58
3.830E+05	2.579E-08	1.0407	67.68	3.634E+06	7.751E-07	.0704	26.82
4.027E+05	3.221E-08	.9810	66.60	3.821E+06	8.478E-07	.0677	26.06
4.233E+05	3.998E-08	.9116	65.63	4.016E+06	9.011E-07	.0657	25.27
4.450E+05	4.930E-08	.8318	64.69	4.222E+06	9.277E-07	.0637	24.55
4.678E+05	6.041E-08	.7418	63.83	4.439E+06	9.368E-07	.0605	23.94
4.918E+05	7.362E-08	.6423	62.96	4.666E+06	9.486E-07	.0578	23.33
5.170E+05	8.917E-08	.5356	62.10	4.906E+06	9.539E-07	.0620	22.72
5.436E+05	1.078E-07	.4274	61.20	5.157E+06	9.321E-07	.0639	22.18
5.714E+05	1.300E-07	.3242	60.30	5.422E+06	8.767E-07	.0741	21.67
6.007E+05	1.566E-07	.2394	59.36	5.700E+06	8.182E-07	.0878	21.10
6.315E+05	1.892E-07	.1762	58.43	5.992E+06	7.882E-07	.0834	20.56
6.639E+05	2.296E-07	.1367	57.49	6.299E+06	7.839E-07	.0974	20.02
6.979E+05	2.800E-07	.1125	56.56	6.622E+06	8.117E-07	.1104	19.48
7.337E+05	3.432E-07	.0961	55.62	6.961E+06	8.645E-07	.0885	18.97
7.713E+05	4.244E-07	.0895	54.72	7.318E+06	9.086E-07	.1233	18.49
8.109E+05	5.255E-07	.0853	53.86	7.694E+06	9.236E-07	.1554	18.04
8.525E+05	6.522E-07	.0796	52.99	8.088E+06	9.491E-07	.1494	17.62
8.962E+05	8.113E-07	.0712	52.16	8.503E+06	9.837E-07	.1460	17.22
9.421E+05	1.011E-06	.0606	50.90	8.939E+06	1.045E-06	.1373	16.78
9.904E+05	1.255E-06	.0498	48.89	9.397E+06	1.140E-06	.1186	16.36
1.041E+06	1.536E-06	.0408	46.41	9.879E+06	1.186E-06	.1166	15.93
1.095E+06	1.828E-06	.0343	43.63	1.039E+07	1.255E-06	.1315	15.47
1.151E+06	2.085E-06	.0307	40.61	1.092E+07	1.423E-06	.1188	15.07
1.210E+06	2.256E-06	.0363	38.03	1.148E+07	1.591E-06	.1016	14.76
1.272E+06	2.282E-06	.0415	36.70	1.207E+07	1.718E-06	.1541	14.54
1.337E+06	2.151E-06	.0442	37.01	1.268E+07	2.028E-06	.1563	14.42
1.406E+06	1.898E-06	.0468	37.59	1.334E+07	3.139E-06	.1328	14.40
1.478E+06	1.593E-06	.0521	38.35	1.402E+07	3.860E-06	.1579	14.40
1.553E+06	1.318E-06	.0547	39.13	1.474E+07	3.183E-06	.2448	14.40
1.633E+06	1.133E-06	.0493	39.45	1.549E+07	1.652E-06	.1994	14.40
1.717E+06	1.052E-06	.0429	38.56	1.629E+07	7.082E-07	.6976	14.40
1.805E+06	1.050E-06	.0446	37.69	1.712E+07	2.296E-07	1.6020	14.40
1.897E+06	1.087E-06	.0485	36.86	1.800E+07	6.052E-08	1.6791	14.40

Table 8.15 Neutron spectra in the beryllium assembly measured by proton recoil gas proportional counter. Measurement points are at 127 mm and 279 mm from the front surface of the assembly.

127 mm			279 mm		
Energy [MeV]	Flux [1/Lethargy/Source]	Error	Energy [MeV]	Flux [1/Lethargy/Source]	Error
5.9023e-01	3.2760e-05	1.7500e-06	6.1974e-01	5.5650e-06	6.8200e-07
5.6212e-01	4.0550e-05	1.5800e-06	5.9023e-01	6.5780e-06	7.2300e-07
5.3536e-01	4.3760e-05	1.4600e-06	5.6212e-01	5.9130e-06	6.4500e-07
5.0986e-01	4.0370e-05	1.3300e-06	5.3536e-01	9.8630e-06	5.9300e-07
4.8558e-01	4.3990e-05	1.2200e-06	5.0986e-01	1.1910e-05	5.4000e-07
4.6246e-01	5.4250e-05	1.6400e-06	4.8558e-01	1.2520e-05	4.9700e-07
4.4044e-01	5.5750e-05	9.4100e-07	4.6246e-01	1.2260e-05	6.7200e-07
4.1947e-01	5.5550e-05	1.0200e-06	4.4044e-01	1.3180e-05	3.5100e-07
3.9949e-01	5.1320e-05	9.7700e-07	4.1947e-01	1.3250e-05	3.7700e-07
3.8047e-01	5.0740e-05	9.0000e-07	3.9949e-01	1.2790e-05	3.6100e-07
3.6235e-01	5.3260e-05	9.7200e-07	3.8047e-01	1.2590e-05	3.3200e-07
3.4510e-01	5.0580e-05	9.2300e-07	3.6235e-01	1.2750e-05	3.5200e-07
3.2866e-01	5.0470e-05	8.7900e-07	3.4510e-01	1.1430e-05	3.3600e-07
3.1301e-01	5.1270e-05	8.5900e-07	3.2866e-01	1.1190e-05	3.2000e-07
2.9811e-01	4.6770e-05	1.3000e-06	3.1301e-01	1.2360e-05	3.1700e-07
2.8391e-01	4.3450e-05	1.1900e-06	2.9811e-01	1.2920e-05	4.2700e-07
2.7039e-01	4.8910e-05	1.1900e-06	2.8391e-01	1.1170e-05	3.9300e-07
2.5752e-01	5.0850e-05	1.1800e-06	2.7039e-01	1.1350e-05	3.9400e-07
2.4525e-01	4.5630e-05	1.1900e-06	2.5752e-01	1.1480e-05	3.8900e-07
2.3357e-01	4.3800e-05	1.2000e-06	2.4525e-01	1.1620e-05	3.9200e-07
2.2245e-01	4.6410e-05	1.1000e-06	2.3357e-01	1.0130e-05	3.9300e-07
2.1186e-01	4.5870e-05	1.0200e-06	2.2245e-01	1.0550e-05	3.6100e-07
2.0177e-01	4.6210e-05	1.0300e-06	2.1186e-01	1.0320e-05	3.3200e-07
1.9216e-01	4.5280e-05	1.0600e-06	2.0177e-01	1.0720e-05	3.3800e-07
1.8301e-01	4.4410e-05	9.6500e-07	1.9216e-01	1.0130e-05	3.4400e-07
1.7430e-01	4.2170e-05	8.9100e-07	1.8301e-01	8.9430e-06	3.1300e-07
1.6600e-01	4.1850e-05	8.0800e-07	1.7430e-01	8.3660e-06	2.8700e-07
1.5809e-01	4.3340e-05	8.4200e-07	1.6600e-01	9.5730e-06	2.6300e-07
1.5056e-01	4.5730e-05	7.7600e-07	1.5809e-01	1.0720e-05	2.7200e-07
1.4340e-01	4.7060e-05	7.3400e-07	1.5056e-01	1.0780e-05	2.5000e-07
1.3657e-01	3.8600e-05	1.8100e-06	1.4340e-01	1.1460e-05	2.3700e-07
1.3006e-01	4.1520e-05	1.4600e-06	1.3657e-01	9.8870e-06	5.8900e-07
1.2387e-01	4.3840e-05	1.5400e-06	1.3006e-01	9.5530e-06	4.7800e-07
1.1797e-01	4.0120e-05	1.4200e-06	1.2387e-01	1.1420e-05	5.0300e-07
1.1235e-01	3.4860e-05	1.5000e-06	1.1797e-01	1.0620e-05	4.6400e-07
1.0700e-01	4.4710e-05	1.3900e-06	1.1235e-01	9.1210e-06	4.9100e-07
1.0191e-01	4.7100e-05	1.5000e-06	1.0700e-01	9.3010e-06	4.5600e-07
9.7055e-02	4.1380e-05	1.6700e-06	1.0191e-01	1.1280e-05	4.9400e-07
9.2433e-02	3.7850e-05	1.5300e-06	9.7055e-02	1.0460e-05	5.4500e-07
8.8032e-02	3.8570e-05	1.4100e-06	9.2433e-02	9.3440e-06	5.0500e-07
8.3840e-02	4.1140e-05	1.3100e-06	8.8032e-02	1.0880e-05	4.6600e-07
7.9848e-02	4.3990e-05	1.2100e-06	8.3840e-02	1.0020e-05	4.3100e-07
7.6045e-02	4.0220e-05	1.3700e-06	7.9848e-02	9.6650e-06	4.0000e-07
7.2424e-02	3.9810e-05	1.2700e-06	7.6045e-02	9.8020e-06	4.5200e-07
6.8975e-02	3.9910e-05	1.1700e-06	7.2424e-02	1.0320e-05	4.2000e-07
6.5691e-02	3.9340e-05	1.0800e-06	6.8975e-02	1.0210e-05	3.8600e-07
6.2563e-02	3.9540e-05	1.2600e-06	6.5691e-02	8.7940e-06	3.5600e-07
5.9583e-02	3.9360e-05	9.9000e-07	6.2563e-02	9.6320e-06	4.1900e-07
5.6746e-02	3.8420e-05	8.8600e-07	5.9583e-02	9.9440e-06	3.2100e-07
5.4044e-02	3.6350e-05	1.6000e-06	5.6746e-02	9.5920e-06	2.8700e-07
5.1470e-02	3.9050e-05	1.6700e-06	5.4044e-02	1.0240e-05	4.9800e-07
4.9019e-02	4.1420e-05	1.5400e-06	5.1470e-02	8.8610e-06	5.1700e-07
4.6685e-02	3.7240e-05	1.6300e-06	4.9019e-02	9.5430e-06	4.8200e-07
4.4462e-02	3.4570e-05	1.5000e-06	4.6685e-02	8.8580e-06	5.0600e-07
4.2345e-02	3.5820e-05	1.6100e-06	4.4462e-02	8.8610e-06	4.6900e-07
4.0328e-02	3.1430e-05	1.4800e-06	4.2345e-02	1.0080e-05	5.0100e-07
3.8408e-02	3.4810e-05	1.3800e-06	4.0328e-02	8.0640e-06	4.6300e-07
3.6579e-02	3.7690e-05	1.4900e-06	3.8408e-02	8.8540e-06	4.3000e-07
3.4837e-02	3.3860e-05	1.3700e-06	3.6579e-02	8.2880e-06	4.6600e-07
3.3178e-02	3.5280e-05	1.5200e-06	3.4837e-02	9.1420e-06	4.3100e-07
3.1598e-02	3.4350e-05	1.4100e-06	3.3178e-02	9.0670e-06	4.7700e-07

Table 8.15 Continued

127 mm			279 mm		
Energy [MeV]	Flux [1/Lethargy/Source]	Error	Energy [MeV]	Flux [1/Lethargy/Source]	Error
3.0094e-02	3.1160e-05	1.3000e-06	3.1598e-02	8.6350e-06	4.4300e-07
2.8661e-02	3.2410e-05	1.2100e-06	3.0094e-02	8.2940e-06	4.0800e-07
2.7296e-02	3.3140e-05	1.3700e-06	2.8661e-02	8.1880e-06	3.7900e-07
2.5996e-02	3.2310e-05	1.0300e-06	2.7296e-02	8.5730e-06	4.2900e-07
2.4758e-02	3.4440e-05	1.1700e-06	2.5996e-02	8.6260e-06	3.2400e-07
2.3579e-02	3.3920e-05	1.0800e-06	2.4758e-02	8.8690e-06	3.6900e-07
2.2456e-02	3.0660e-05	9.9600e-07	2.3579e-02	8.6820e-06	3.4000e-07
2.1387e-02	3.0770e-05	1.1700e-06	2.2456e-02	8.1580e-06	3.1400e-07
2.0369e-02	3.2440e-05	8.7900e-07	2.1387e-02	8.6180e-06	3.7100e-07
1.9399e-02	3.1670e-05	1.3900e-06	2.0369e-02	8.4580e-06	2.8600e-07
1.8475e-02	3.0140e-05	1.4200e-06	1.9399e-02	8.4620e-06	4.8000e-07
1.7595e-02	3.0130e-05	1.4800e-06	1.8475e-02	7.2060e-06	4.9500e-07
1.6757e-02	3.4450e-05	1.5400e-06	1.7595e-02	7.8330e-06	5.1200e-07
1.5959e-02	2.8250e-05	1.4200e-06	1.6757e-02	8.5050e-06	5.3400e-07
1.5199e-02	2.6650e-05	1.3200e-06	1.5959e-02	8.1930e-06	4.9400e-07
1.4476e-02	3.1540e-05	1.3900e-06	1.5199e-02	8.3460e-06	4.6000e-07
1.3786e-02	3.0820e-05	1.2900e-06	1.4476e-02	9.1410e-06	4.8600e-07
1.3130e-02	2.8840e-05	1.2000e-06	1.3786e-02	7.2090e-06	4.5000e-07
1.2505e-02	3.1510e-05	1.2800e-06	1.3130e-02	7.1070e-06	4.1800e-07
1.1909e-02	3.5560e-05	1.1900e-06	1.2505e-02	8.8880e-06	4.4800e-07
1.1342e-02	3.1640e-05	1.3000e-06	1.1909e-02	1.0100e-05	4.1700e-07
1.0802e-02	3.1490e-05	1.2100e-06	1.1342e-02	8.7910e-06	4.5700e-07
1.0288e-02	3.5360e-05	1.1200e-06	1.0802e-02	9.0610e-06	4.2600e-07
9.7980e-03	3.5220e-05	1.0500e-06	1.0288e-02	9.3650e-06	3.9400e-07
9.3310e-03	2.9720e-05	1.1500e-06	9.7980e-03	9.5460e-06	3.6800e-07
8.8870e-03	3.1130e-05	1.0800e-06	9.3310e-03	9.1340e-06	4.0800e-07
8.4640e-03	3.3140e-05	1.0000e-06	8.8870e-03	8.9570e-06	3.8300e-07
8.0610e-03	3.2640e-05	1.1400e-06	8.4640e-03	9.7790e-06	3.5400e-07
7.6770e-03	3.1480e-05	8.6500e-07	8.0610e-03	1.0560e-05	4.0400e-07
7.3110e-03	3.3790e-05	9.9100e-07	7.6770e-03	9.2270e-06	3.0800e-07
6.9630e-03	3.3360e-05	9.2000e-07	7.3110e-03	8.7930e-06	3.5400e-07
6.6310e-03	3.1160e-05	1.0700e-06	6.9630e-03	9.4000e-06	3.2900e-07
6.3160e-03	3.5660e-05	1.4000e-06	6.6310e-03	9.1970e-06	3.8300e-07
6.0150e-03	3.0180e-05	1.4300e-06	6.3160e-03	7.8610e-06	4.6800e-07
5.7280e-03	2.7240e-05	1.2100e-06	6.0150e-03	9.8740e-06	4.8000e-07
5.4560e-03	2.9100e-05	1.2400e-06	5.7280e-03	9.4690e-06	4.0300e-07
5.1960e-03	2.9110e-05	1.2700e-06	5.4560e-03	8.0860e-06	4.1500e-07
4.9480e-03	2.8360e-05	1.1800e-06	5.1960e-03	8.1580e-06	4.2500e-07
4.7130e-03	2.6870e-05	1.2200e-06	4.9480e-03	7.8660e-06	3.9500e-07
4.4880e-03	2.5080e-05	1.1200e-06	4.7130e-03	8.2820e-06	4.1000e-07
4.2750e-03	2.4190e-05	1.1700e-06	4.4880e-03	7.4250e-06	3.7900e-07
4.0710e-03	2.1950e-05	1.0800e-06	4.2750e-03	8.5340e-06	3.9800e-07
3.8770e-03	2.2550e-05	1.1400e-06	4.0710e-03	7.9420e-06	3.6700e-07
3.6930e-03	2.5490e-05	9.2500e-07	3.8770e-03	6.9770e-06	3.8900e-07
3.5170e-03	2.3580e-05	9.7500e-07	3.6930e-03	7.4750e-06	3.1600e-07
3.3490e-03	2.1590e-05	9.0200e-07	3.5170e-03	8.0000e-06	3.3400e-07
3.1900e-03	2.2230e-05	8.3300e-07	3.3490e-03	7.2470e-06	3.0900e-07
3.0380e-03	2.3570e-05	1.0400e-06	3.1900e-03	6.9080e-06	2.8600e-07
2.8930e-03	2.1590e-05	8.2000e-07	3.0380e-03	6.0560e-06	3.5800e-07
2.7560e-03	2.2020e-05	7.6000e-07	2.8930e-03	6.8180e-06	2.8200e-07
2.6240e-03	2.1360e-05	8.2500e-07	2.7560e-03	6.7620e-06	2.6200e-07
2.4990e-03	2.1940e-05	7.6000e-07	2.6240e-03	6.2560e-06	2.8400e-07
2.3800e-03	2.2300e-05	8.4200e-07	2.4990e-03	5.9740e-06	2.6200e-07
2.2670e-03	2.2180e-05	7.7900e-07	2.3800e-03	6.7280e-06	2.9000e-07
2.1590e-03	2.1350e-05	7.1900e-07	2.2670e-03	7.7550e-06	2.6900e-07
2.0560e-03	2.0540e-05	6.6500e-07	2.1590e-03	7.9190e-06	2.4900e-07
			2.0560e-03	7.0290e-06	2.3000e-07

Table 8.16 Neutron source spectrum of FNS new water cooled D-T target for 0 degree to the d<sup>+</sup>-beam. The spectrum is calculated by MORSE-DD. The units of energy and spectrum are [eV] and [neutrons/energy-bin/D-T reaction], respectively.

Group	Upper Energy	Spectrum	Group	Upper energy	Spectrum
1	1.6487e+07	0.0	64	1.1943e+06	2.5765e-03
2	1.6231e+07	0.0	65	1.0540e+06	2.5872e-03
3	1.5980e+07	0.0	66	9.3013e+05	2.5709e-03
4	1.5732e+07	0.0	67	8.2084e+05	2.5211e-03
5	1.5488e+07	1.4419e-01	68	7.2438e+05	2.3040e-03
6	1.5248e+07	2.2296e-01	69	6.3927e+05	2.2042e-03
7	1.5012e+07	4.0901e-01	70	5.6415e+05	2.0605e-03
8	1.4779e+07	2.3565e-01	71	4.9786e+05	1.8238e-03
9	1.4550e+07	3.0897e-02	72	4.3936e+05	1.6473e-03
10	1.4324e+07	5.1474e-03	73	3.8774e+05	1.5803e-03
11	1.4102e+07	9.5007e-04	74	3.4217e+05	1.3867e-03
12	1.3883e+07	2.6083e-03	75	3.0197e+05	1.2232e-03
13	1.3668e+07	9.1020e-04	76	2.6649e+05	1.0785e-03
14	1.3456e+07	4.6458e-04	77	2.3517e+05	9.5392e-04
15	1.3248e+07	4.5938e-04	78	2.0754e+05	8.0965e-04
16	1.3042e+07	5.1771e-04	79	1.8315e+05	7.0593e-04
17	1.2840e+07	7.8183e-04	80	1.6163e+05	6.0762e-04
18	1.2641e+07	7.4899e-04	81	1.4264e+05	5.3824e-04
19	1.2445e+07	4.1363e-04	82	1.2588e+05	4.9933e-04
20	1.2252e+07	2.1025e-04	83	1.1109e+05	3.7225e-04
21	1.2062e+07	1.6563e-04	84	9.8035e+04	1.7906e-04
22	1.1875e+07	1.5985e-04	85	8.6515e+04	1.4874e-04
23	1.1691e+07	1.6798e-04	86	7.6349e+04	1.2632e-04
24	1.1510e+07	1.1227e-04	87	6.7378e+04	1.0531e-04
25	1.1331e+07	8.7841e-05	88	5.9461e+04	9.7450e-05
26	1.1156e+07	8.8737e-05	89	5.2474e+04	8.3190e-05
27	1.0983e+07	7.9567e-05	90	4.6308e+04	8.0602e-05
28	1.0812e+07	9.3708e-05	91	4.0867e+04	6.9230e-05
29	1.0645e+07	9.1407e-05	92	3.6065e+04	5.7202e-05
30	1.0480e+07	9.2862e-05	93	3.1827e+04	5.0292e-05
31	1.0317e+07	8.2287e-05	94	2.8087e+04	4.8831e-05
32	1.0157e+07	9.0768e-05	95	2.4787e+04	5.3362e-05
33	1.0000e+07	3.5649e-04	96	2.1874e+04	3.7185e-05
34	9.3940e+06	4.1280e-04	97	1.9304e+04	6.1572e-05
35	8.8249e+06	5.1007e-04	98	1.5034e+04	4.6320e-05
36	8.2902e+06	5.0750e-04	99	1.1709e+04	4.4237e-05
37	7.7879e+06	5.1710e-04	100	9.1186e+03	3.7633e-05
38	7.3161e+06	6.2956e-04	101	7.1016e+03	2.4899e-05
39	6.8728e+06	6.9228e-04	102	5.5307e+03	2.8404e-05
40	6.4564e+06	7.5872e-04	103	4.3073e+03	1.7624e-05
41	6.0652e+06	7.9293e-04	104	3.3546e+03	1.4791e-05
42	5.6978e+06	7.9827e-04	105	2.6125e+03	1.6544e-05
43	5.3525e+06	8.8451e-04	106	2.0346e+03	1.1820e-05
44	5.0282e+06	1.0018e-03	107	1.5846e+03	1.4320e-05
45	4.7236e+06	1.0563e-03	108	1.2341e+03	7.8013e-06
46	4.4374e+06	1.1937e-03	109	9.6110e+02	8.7622e-06
47	4.1686e+06	1.1711e-03	110	5.8293e+02	7.2049e-06
48	3.9160e+06	1.2741e-03	111	3.5357e+02	6.9372e-06
49	3.6787e+06	1.2861e-03	112	2.1445e+02	2.2612e-06
50	3.4559e+06	1.4053e-03	113	1.3007e+02	3.0541e-06
51	3.2465e+06	1.3518e-03	114	7.8891e+01	3.8068e-06
52	3.0498e+06	1.4558e-03	115	4.7850e+01	2.9754e-07
53	2.8650e+06	1.4329e-03	116	2.9023e+01	1.6817e-07
54	2.6914e+06	1.3760e-03	117	1.7603e+01	1.3922e-07
55	2.5284e+06	1.4312e-03	118	1.0677e+01	2.2450e-07
56	2.3752e+06	1.3820e-03	119	6.4758e+00	1.8398e-07
57	2.2313e+06	1.3489e-03	120	3.9278e+00	8.3975e-08
58	2.0961e+06	1.3270e-03	121	2.3823e+00	1.4264e-08
59	1.9691e+06	1.4298e-03	122	1.4449e+00	7.4848e-09
60	1.8498e+06	1.3898e-03	123	8.7640e-01	4.2225e-09
61	1.7377e+06	2.5945e-03	124	5.3156e-01	2.2732e-09
62	1.5335e+06	2.8528e-03	125	3.2241e-01	1.5142e-07
63	1.3533e+06	2.7699e-03	126	1.0010e-05	



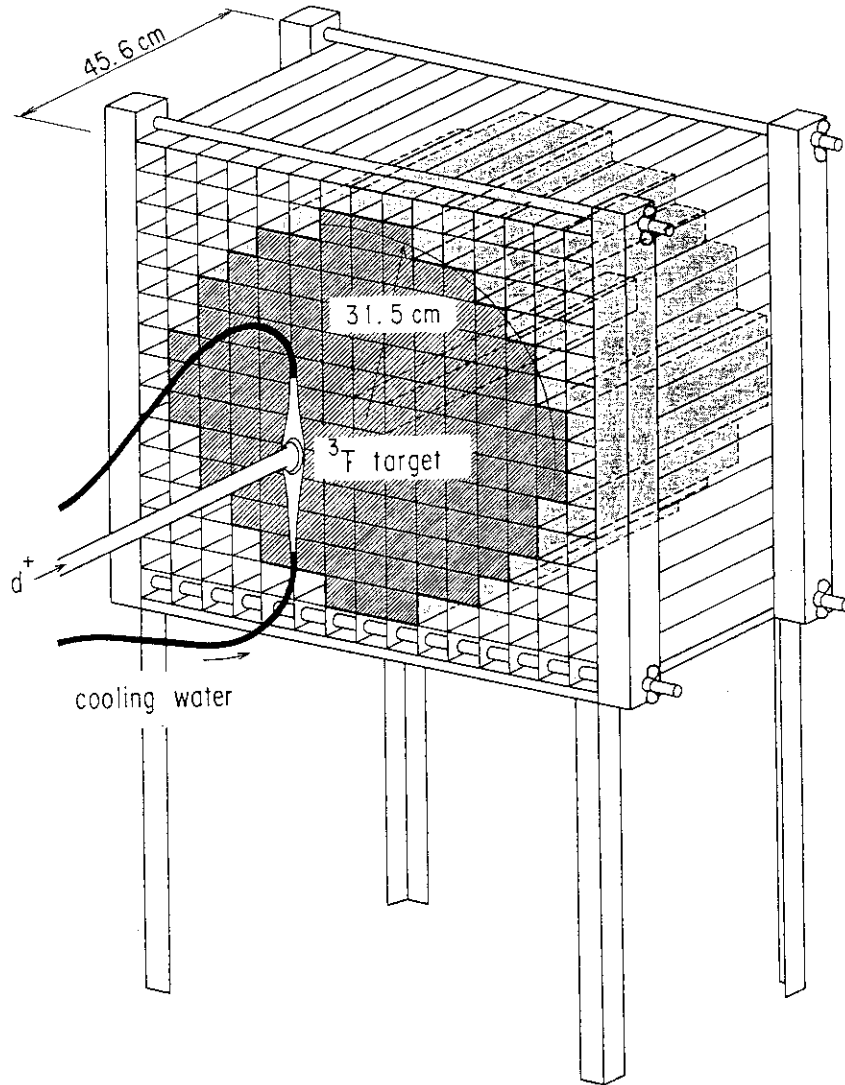


Fig. 8.1 Experimental arrangement.

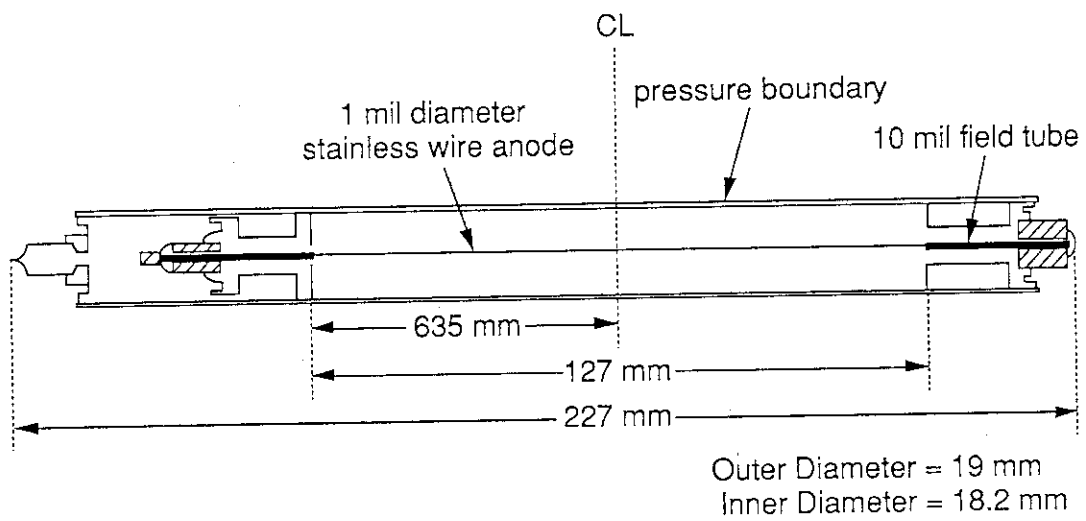


Fig. 8.2 Sectional view of proton recoil proportional counter.

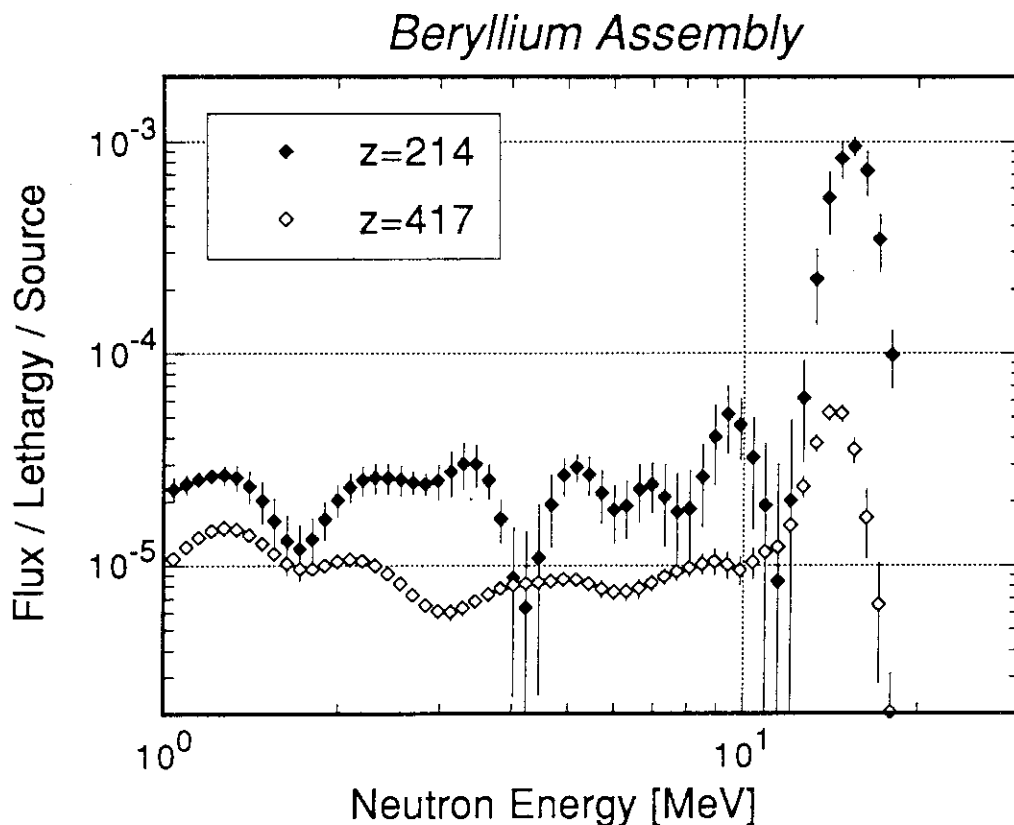


Fig. 8.3 Neutron spectra at 214 and 417 mm from the surface of the beryllium assembly measured by NE213.

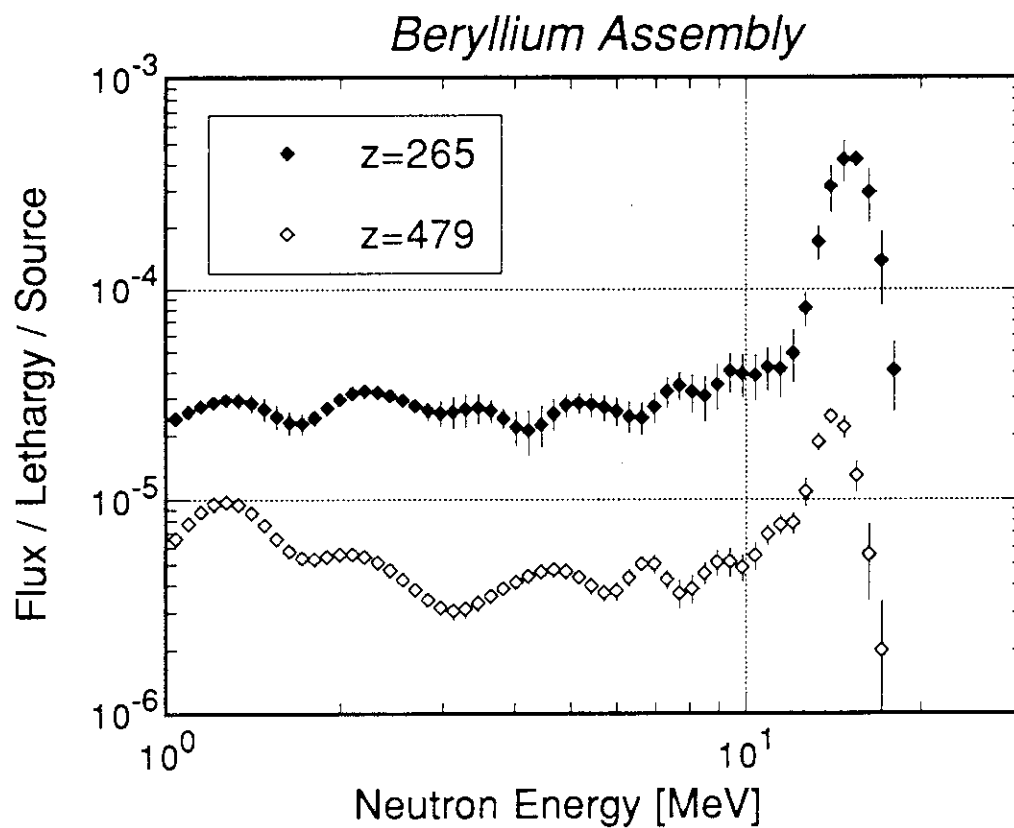


Fig. 8.4 Neutron spectra at 265 and 479 mm from the surface of the beryllium assembly measured by NE213.

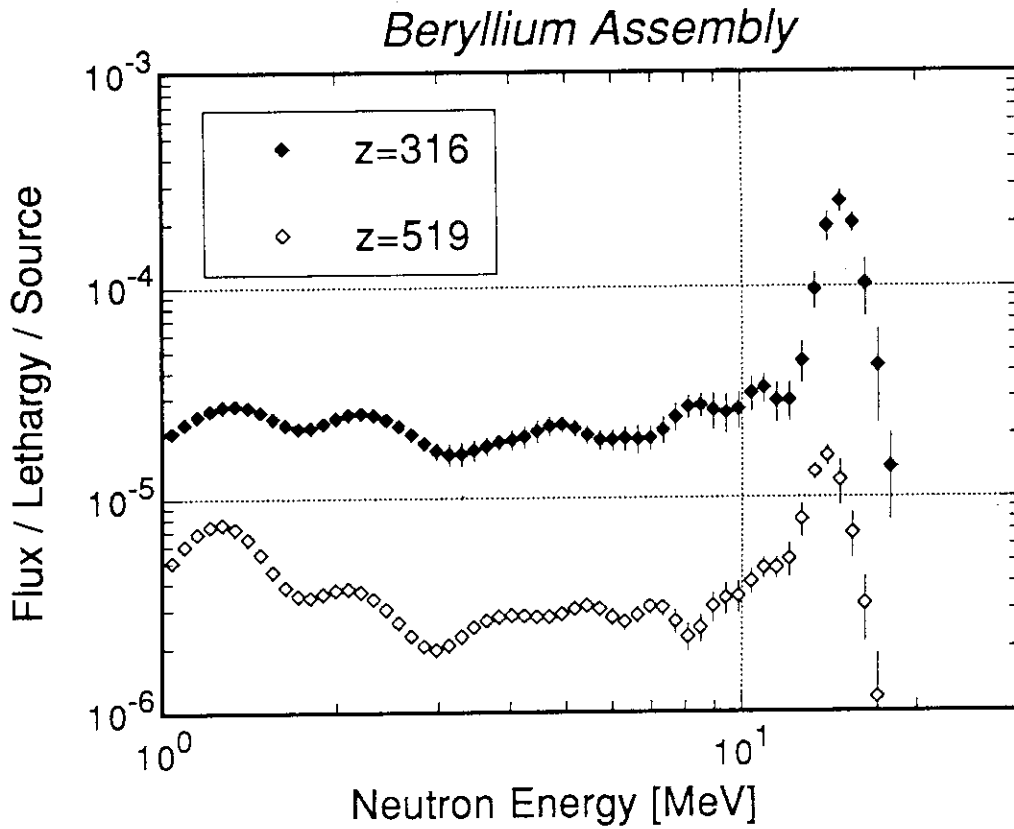


Fig. 8.5 Neutron spectra at 316 and 519 mm from the surface of the beryllium assembly measured by NE213.

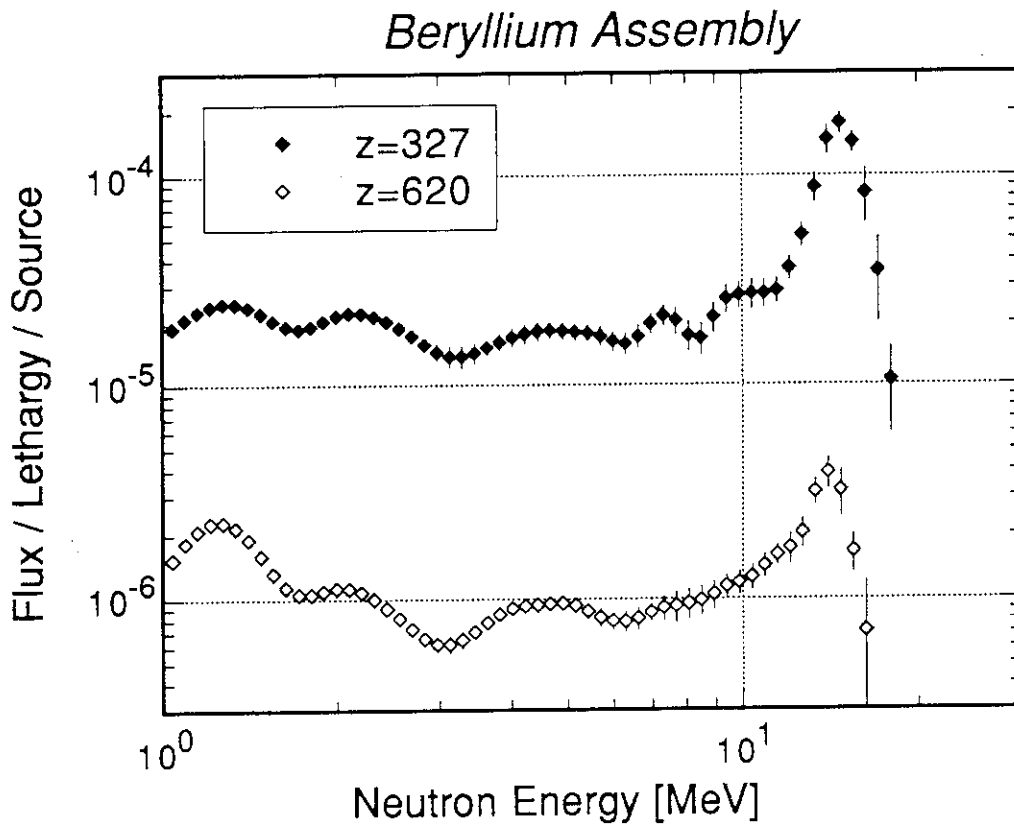


Fig. 8.6 Neutron spectra at 327 and 620 mm from the surface of the beryllium assembly measured by NE213.

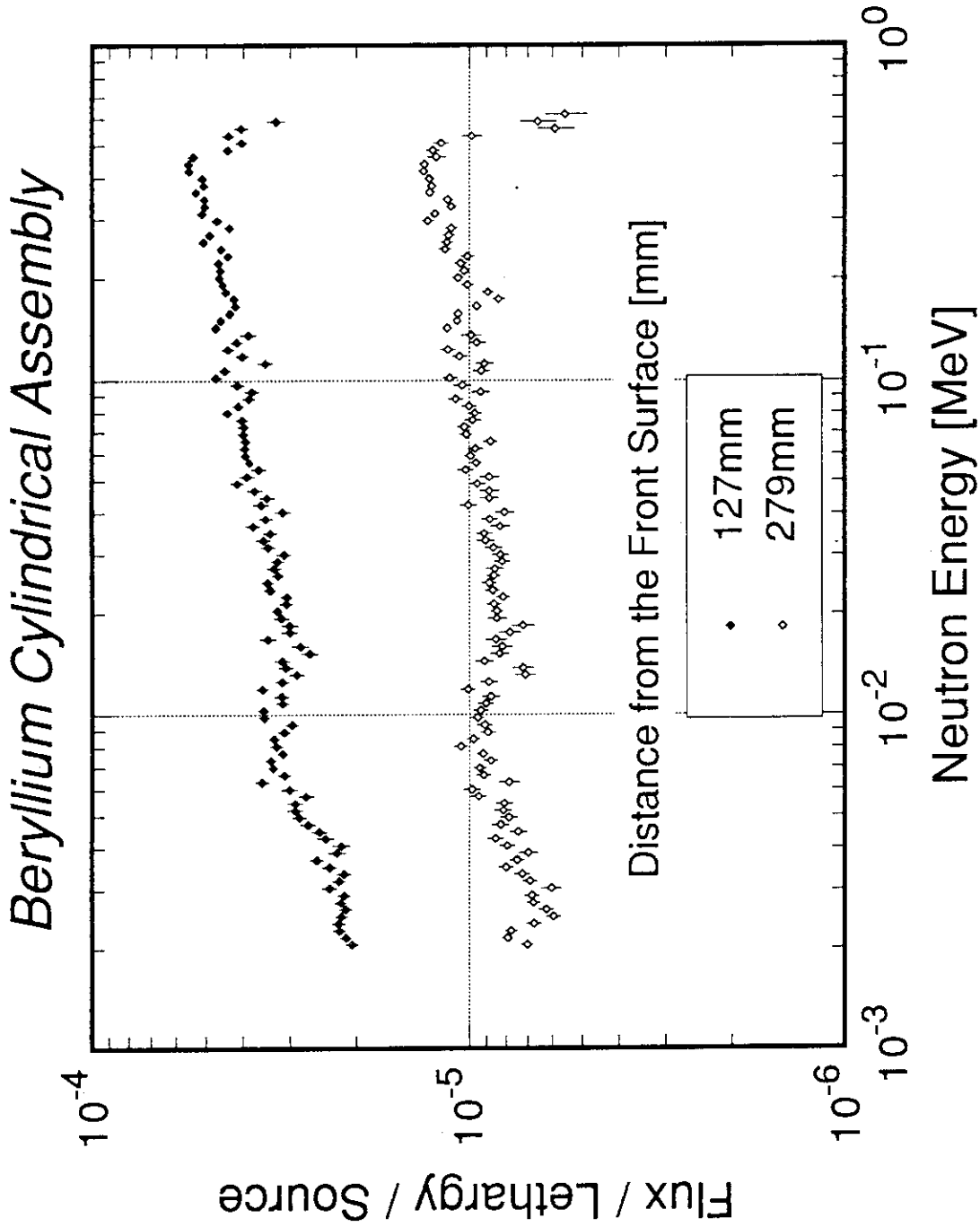


Fig. 8.7 Neutron spectra at 127 and 279 mm from the target measured by the PRC.

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FNS-MCNP3 BE SLAB ASSEMBLY : ACCURATE ANALYSIS - BE 45.54CM-THICK
C NWCT SOURCE, CENTER DRAWER - CELL DETECTORS
C *****
C * CELL CARD
C *****
C -----< VOID - AIR >-----
1 1 4.92100-5 1 -2 -5 38 #5
2 1 4.92100-5 3 -4 -5 #28
C -----< BE OUTSIDE REGION >---
3 2 1.22149-1 2 -3 -5 -9 : 2 -3 -5 10 : 2 -3 -5 -13 :
2 -3 -5 14
C -----< DRAWER TUBE >-----
4 3 2.00898-2 2 -3 9 -7 13 -14 : 2 -3 8 -10 13 -14 :
2 -3 7 -8 13 -11 : 2 -3 7 -8 12 -14
C -----< CENTER DETECTOR CELLS >---
5 1 4.92100-5 15 -2 7 -8 11 -12
6 2 1.22149-1 2 -16 7 -8 11 -12
7 2 1.22149-1 16 -17 7 -8 11 -12
8 2 1.22149-1 17 -18 7 -8 11 -12
9 2 1.22149-1 18 -19 7 -8 11 -12
10 2 1.22149-1 19 -20 7 -8 11 -12
11 2 1.22149-1 20 -21 7 -8 11 -12
12 2 1.22149-1 21 -22 7 -8 11 -12
13 2 1.22149-1 22 -23 7 -8 11 -12
14 2 1.22149-1 23 -24 7 -8 11 -12
15 2 1.22149-1 24 -25 7 -8 11 -12
16 2 1.22149-1 25 -26 7 -8 11 -12
17 2 1.22149-1 26 -27 7 -8 11 -12
18 2 1.22149-1 27 -28 7 -8 11 -12
19 2 1.22149-1 28 -29 7 -8 11 -12
20 2 1.22149-1 29 -30 7 -8 11 -12
21 2 1.22149-1 30 -31 7 -8 11 -12
22 2 1.22149-1 31 -32 7 -8 11 -12
23 2 1.22149-1 32 -33 7 -8 11 -12
24 2 1.22149-1 33 -34 7 -8 11 -12
25 2 1.22149-1 34 -35 7 -8 11 -12
26 2 1.22149-1 35 -36 7 -8 11 -12
27 2 1.22149-1 36 -3 7 -8 11 -12
28 1 4.92100-5 3 -37 7 -8 11 -12
C -----< SOURCE REGION >-----
29 1 4.92100-5 -38
C -----< ESCAPE REGION >-----
30 0 39 -1 -6 : 1 -4 -6 5 : 4 -40 -6
C -----< BLANK DELIMETER >-----
C *****
C * SURFACE CARD
C *****
C -----< MATERIAL BASIC BOUNDARY >---
1 PZ -10.0
2 PZ 20.0
3 PZ 65.54
4 PZ 70.0
5 CZ 31.5
6 CZ 35.0
C -----< CENTER DRAWER >-----
7 PX -2.46
8 PX 2.46
9 PX -2.54
10 PX 2.54
11 PY -2.46
12 PY 2.46
13 PY -2.54
14 PY 2.54
C -----< CELL DETECTOR BOUNDARY >---
15 PZ 19.9
16 PZ 21.0
17 PZ 22.0
18 PZ 23.4
19 PZ 24.0
20 PZ 25.0
21 PZ 27.0
22 PZ 29.0
23 PZ 31.0
24 PZ 33.0
25 PZ 35.0
26 PZ 37.0
27 PZ 39.0
28 PZ 41.0
29 PZ 43.0

```

Fig. 8.8 Example of input data for MCNP-3 analysis.

```

30          PZ          45.0
31          PZ          48.0
32          PZ          51.0
33          PZ          54.0
34          PZ          57.0
35          PZ          60.0
36          PZ          63.0
37          PZ          66.0
C -----< SOURCE REGION >-----
38          SO          0.5
C -----< ESCAPE REGION >-----
39          PZ          -15.0
40          PZ          75.0
C -----< BLANK DELIMETER >-----

C *****
C * MODE CARD - NEUTRON ONLY *
C *****
MODE 0
C *****
C * CELL PARAMETER CARDS *
C *****
IN  1  1  1  1  1  1  1  1  1  1  1  1
    1  1  1  1  1  1  1  1  1  1  1  1
    1  1  1  1  1  0
C *****
C * SOURCE SPECIFICATION CARDS *
C * SRC1=POINT ISOTROPIC OPTION *
C * SDIR DIRC. BIASING - HEIGHT REDUCTION CONSIDERED*
C * SI(ENG.) AND SP(PROB.) TAKEN FROM 1TR NEW WATER *
C * COOLED TARGET 125-G *
C *****
SRC1 0 0 0.0 29 1.1261
SDIR 0 0 1 1 0.5360081
SI 1.0010-11 3.2241-07
    5.3156-07 8.7640-07 1.4449-06 2.3823-06 3.9278-06
    6.4758-06 1.0677-05 1.7603-05 2.9023-05 4.7850-05
    7.8891-05 1.3007-04 2.1445-04 3.5357-04 5.8293-04
    9.6110-04 1.2341-03 1.5846-03 2.0346-03 2.6125-03
    3.3546-03 4.3073-03 5.5307-03 7.1016-03 9.1186-03
    1.1709-02 1.5034-02 1.9304-02 2.1874-02 2.4787-02
    2.8087-02 3.1827-02 3.6065-02 4.0867-02 4.6308-02
    5.2474-02 5.9461-02 6.7378-02 7.6349-02 8.6515-02
    9.8035-02 1.1109-01 1.2588-01 1.4264-01 1.6163-01
    1.8315-01 2.0754-01 2.3517-01 2.6649-01 3.0197-01
    3.4217-01 3.8774-01 4.3936-01 4.9786-01 5.6415-01
    6.3927-01 7.2438-01 8.2084-01 9.3013-01 1.0540+00
    1.1943+00 1.3533+00 1.5335+00 1.7377+00 1.8498+00
    1.9691+00 2.0961+00 2.2313+00 2.3752+00 2.5284+00
    2.6914+00 2.8650+00 3.0498+00 3.2465+00 3.4559+00
    3.6787+00 3.9160+00 4.1686+00 4.4374+00 4.7236+00
    5.0282+00 5.3525+00 5.6978+00 6.0652+00 6.4564+00
    6.8728+00 7.3161+00 7.7879+00 8.2902+00 8.8249+00
    9.3940+00 9.9999+00 1.0157+01 1.0317+01 1.0480+01
    1.0645+01 1.0812+01 1.0983+01 1.1156+01 1.1331+01
    1.1510+01 1.1691+01 1.1875+01 1.2062+01 1.2252+01
    1.2445+01 1.2641+01 1.2840+01 1.3042+01 1.3248+01
    1.3456+01 1.3668+01 1.3883+01 1.4102+01 1.4324+01
    1.4550+01 1.4779+01 1.5012+01 1.5248+01 1.5488+01
SP 0.0 1.5142-07
    2.2732-09 4.2225-09 7.4848-09 1.4264-08 8.3975-08
    1.8398-07 2.2450-07 1.3922-07 1.6817-07 2.9754-07
    3.8068-06 3.0541-06 2.2612-06 6.9372-06 7.2049-06
    8.7622-06 7.8013-06 1.4320-05 1.1820-05 1.6544-05
    1.4791-05 1.7624-05 2.8404-05 2.4899-05 3.7633-05
    4.4237-05 4.6320-05 6.1572-05 3.7185-05 5.3362-05
    4.8831-05 5.0292-05 5.7202-05 6.9230-05 8.0602-05
    8.3190-05 9.7450-05 1.0531-04 1.2632-04 1.4874-04
    1.7906-04 3.7225-04 4.9933-04 5.3824-04 6.0762-04
    7.0593-04 8.0965-04 9.5392-04 1.0785-03 1.2232-03
    1.3867-03 1.5803-03 1.6473-03 1.8238-03 2.0605-03
    2.2042-03 2.3040-03 2.5211-03 2.5709-03 2.5872-03
    2.5765-03 2.7699-03 2.8528-03 2.5945-03 1.3898-03
    1.4298-03 1.3270-03 1.3489-03 1.3820-03 1.4312-03
    1.3760-03 1.4329-03 1.4558-03 1.3518-03 1.4053-03
    1.2861-03 1.2741-03 1.1711-03 1.1937-03 1.0563-03
    1.0018-03 8.8451-04 7.9827-04 7.9293-04 7.5872-04
    6.9228-04 6.2956-04 5.1710-04 5.0750-04 5.1007-04
    4.1280-04 3.5649-04 9.0768-05 8.2287-05 9.2862-05
    9.1407-05 9.3708-05 7.9567-05 8.8737-05 8.7841-05

```

Fig. 8.8 Continued

```

1.1227-04 1.6798-04 1.5985-04 1.6563-04 2.1025-04
4.1363-04 7.4899-04 7.8183-04 5.1771-04 4.5938-04
4.6458-04 9.1020-04 2.6083-03 9.5007-04 5.1474-03
3.0897-02 2.3565-01 4.0901-01 2.2296-01 1.4419-01
*****
C * MATERIAL SPECIFICATION CARDS *
C *****
C -----< AIR >-----
M1 7014.04C 3.8810-5 8016.31C 1.0400-5
C -----< BE BLOCK >-----
M2 4009.31C 1.2152-1 6012.32C 7.7109-5 8016.31C 4.9813-4
C 13027.04C 2.9013-4 26000.31C 2.4678-5
C -----< CENTER DRAWER >---
M3 24000.31C 3.9167-3 25055.04C 2.0032-4 26000.31C 1.4240-2
C 28000.31C 1.7328-3
C DRXS
C *****
C * TALLY SPECIFICATION CARDS *
C *****
FC4 AVERAGE FLUX FOR CENTER CELL REGIONS
F4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22
23 24 25 26 27 28 T
DD 0.1 50
EO 1.0010-11 3.2241-07
5.3156-07 8.7640-07 1.4449-06 2.3823-06 3.9278-06
6.4758-06 1.0677-05 1.7603-05 2.9023-05 4.7850-05
7.8891-05 1.3007-04 2.1445-04 3.5357-04 5.8293-04
9.6110-04 1.2341-03 1.5846-03 2.0346-03 2.6125-03
3.3546-03 4.3073-03 5.5307-03 7.1016-03 9.1186-03
1.1709-02 1.5034-02 1.9304-02 2.1874-02 2.4787-02
2.8087-02 3.1827-02 3.6065-02 4.0867-02 4.6308-02
5.2474-02 5.9461-02 6.7378-02 7.6349-02 8.6515-02
9.8035-02 1.1109-01 1.2588-01 1.4264-01 1.6163-01
1.8315-01 2.0754-01 2.3517-01 2.6649-01 3.0197-01
3.4217-01 3.8774-01 4.3936-01 4.9786-01 5.6415-01
6.3927-01 7.2438-01 8.2084-01 9.3013-01 1.0540+00
1.1943+00 1.3533+00 1.5335+00 1.7377+00 1.8498+00
1.9691+00 2.0961+00 2.2313+00 2.3752+00 2.5284+00
2.6914+00 2.8650+00 3.0498+00 3.2465+00 3.4559+00
3.6787+00 3.9160+00 4.1686+00 4.4374+00 4.7236+00
5.0282+00 5.3525+00 5.6978+00 6.0652+00 6.4564+00
6.8728+00 7.3161+00 7.7879+00 8.2902+00 8.8249+00
9.3940+00 9.9999+00 1.0157+01 1.0317+01 1.0480+01
1.0645+01 1.0812+01 1.0983+01 1.1156+01 1.1331+01
1.1510+01 1.1691+01 1.1875+01 1.2062+01 1.2252+01
1.2445+01 1.2641+01 1.2840+01 1.3042+01 1.3248+01
1.3456+01 1.3668+01 1.3883+01 1.4102+01 1.4324+01
1.4550+01 1.4779+01 1.5012+01 1.5248+01 1.5488+01
FQ0 E F
C *****
C * PROBLEM CUTOFF CARDS *
C *****
CUTN 0 1.0010-11 -0.1 -0.05
NPS 2000000
CIME 120
C *****
C * PERIPHERAL CRADS *
C *****
PRDMP 40000 40000
LOST 10 10
PRINT

```

Fig. 8.8 Continued

```

FNS-GRUNCL BE SLAB ASSEMBLY -- N-WATER SOURCE, JACKAS&JENGIX
ACCURATE ANALYSIS -- #0-1, BE 45.54CM-THICK, CENTER DRAWER
O
1$$
      0      5      4      46      79      125
      4      5      129     114      0      156
      156     2      1     30000     10      0
      1      0      18      0      0      16
2**
1.1261+00  0.0      0.0
T
1**
FO.0
2**
0.0      5I1.0      2I18.0      7I20.0      6I22.53      9I25.06
43I30.12
3**
0.0      0.0      0.0      0.0      1.4419-01      2.2296-01
4.0901-01      2.3565-01      3.0897-02      5.1474-03      9.5007-04      2.6083-03
9.1020-04      4.6458-04      4.5938-04      5.1771-04      7.8183-04      7.4899-04
4.1363-04      2.1025-04      1.6563-04      1.5985-04      1.6798-04      1.1227-04
8.7841-05      8.8737-05      7.9567-05      9.3708-05      9.1407-05      9.2862-05
8.2287-05      9.0768-05      3.5649-04      4.1280-04      5.1007-04      5.0750-04
5.1710-04      6.2956-04      6.9228-04      7.5872-04      7.9293-04      7.9827-04
8.8451-04      1.0018-03      1.0563-03      1.1937-03      1.1711-03      1.2741-03
1.2861-03      1.4053-03      1.3518-03      1.4558-03      1.4329-03      1.3760-03
1.4312-03      1.3820-03      1.3489-03      1.3270-03      1.4298-03      1.3898-03
2.5945-03      2.8528-03      2.7699-03      2.5765-03      2.5872-03      2.5709-03
2.5211-03      2.3040-03      2.2042-03      2.0605-03      1.8238-03      1.6473-03
1.5803-03      1.3867-03      1.2232-03      1.0785-03      9.5392-04      8.0965-04
7.0593-04      6.0762-04      5.3824-04      4.9933-04      3.7225-04      1.7906-04
1.4874-04      1.2632-04      1.0531-04      9.7450-05      8.3190-05      8.0602-05
6.9230-05      5.7202-05      5.0292-05      4.8831-05      5.3362-05      3.7185-05
6.1572-05      4.6320-05      4.4237-05      3.7633-05      2.4899-05      2.8404-05
1.7624-05      1.4791-05      1.6544-05      1.1820-05      1.4320-05      7.8013-06
8.7622-06      7.2049-06      6.9372-06      2.2612-06      3.0541-06      3.8068-06
2.9754-07      1.6817-07      1.3922-07      2.2450-07      1.8398-07      8.3975-08
1.4264-08      7.4848-09      4.2225-09      2.2732-09      1.5142-07
4**
2I0.0      6I0.5      1I2.769      4I2.866      7I5.0      20I10.0
31.5
6**
1.0
7**
1.0
8$$
      46R1      9Q46
      10R2      2R3      34R4      68Q46
9$$
-97      -103      -109      -103
10$$
      4I97      102      1Q6
      4I103      108      5Q6
      4I109      114      3Q6
      40I115      156
11$$
6Z      4I31      36
6Z      4I19      24      4I25      30      4I31      36
      4I43      48      4I67      72
6Z      4I61      66      4I67      72      4I73      78
42Z
12**
6R0.0      6R4.9210-5
6R0.0      6R1.2152-1      6R7.7109-5      6R4.9813-4      6R2.9013-5      6R2.4678-5
6R0.0      6R3.9167-3      6R1.4440-2      6R1.7328-3
42R0.0
13**
-0.97753      -0.90676      -0.82999      -0.74536      -0.64979      -0.53748
-0.39441      -0.14907      1M8
14**
F1.0
T      T

```

Fig. 8.9 Example of input data of GRTUNCL for DOT analysis.



```

FNS-DOT35 BE SLAB ASSEMBLY -- N-WATER SOURCE, JACKAS&JENGLX
          ACCURACY ANALYSIS -- #0-1, BE 45.54CM-THICK, CENTER DRAWER
O
61$$
    0          5          4          46          79          125
    4          5          129         114          0          0
  156         1          160          1          1          0
    0          0          1          10          15          4
    6          2          0          0          0          0
    0          0          0          0          0          0
    0          0          0          0          3          0
    0          0          0          0          0          0
    0          0          2          1          1          0
    0          0          0          0          0          8
    0
62$$
    2          3          4          14          15          9
   10         11         12         13          8          60
    0
63**
  0.0          1.000E-02  0.0          0.0          0.0          0.0
  0.0          0.0          0.0          0.0          0.0          0.0
  0.0          0.0          0.0          0.0          0.0          0.0
T
7**
-0.21082     -0.14907  1M1          -0.14907  1M2          -0.14907  1M3
-0.42164     -0.39441          -0.39441          -0.14907  1M3          -0.14907  1M4
-0.55777     -0.53748          -0.39441          -0.39441          -0.14907  1M4
-0.66667     -0.64979          -0.53748          -0.39441          -0.39441          -0.14907
-0.76012     -0.74536          -0.64979          -0.53748          -0.39441          -0.14907
1M5
-0.84327     -0.82999          -0.74536          -0.64979          -0.53748          -0.39441
-0.14907     1M6          -0.90676          -0.82999          -0.74536          -0.64979          -0.53748
-0.91894     -0.90676          -0.82999          -0.74536          -0.64979          -0.53748
-0.39441     -0.14907  1M7          -0.90676          -0.82999          -0.74536          -0.64979
-0.98883     -0.97753          -0.90676          -0.82999          -0.74536          -0.64979
-0.53748     -0.39441          -0.14907  1M8
1Q80
3R-0.97753   5R-0.90676   7R-0.82999   9R-0.74536  11R-0.64979  13R-0.53748
15R-0.39441  17R-0.14907  3R0.97753    5R0.90676   7R0.82999   9R0.74536
11R0.64979  13R0.53748  15R0.39441  17R0.14907
T
6**
  0.0          2R0.13586-1          0.0          4R0.97681-2
  0.0          0.64738-2          0.50390-2          0.64738-2  1N3
  0.0          0.64634-2  2R0.71124-2          0.64634-2  1N4
  0.0          0.64634-2          0.14381-2          0.36342-2          0.14381-2          0.64634-2
  0.0          1N5          0.64738-2          0.71124-2          0.36342-2  1N3          1Q6
  0.0          0.97681-2          0.50390-2          0.71124-2          0.14381-2          0.71124-2
  0.0          0.50390-2          0.97681-2  1N7
  0.0          0.13586-1          0.97681-2  2R0.64738-2  1N4          1Q8
1Q80
T
3**
F0.0
T
1**
F0.0
2**
  0.0          5I1.0          2I18.0          7I20.0          6I22.53          9I25.06
43I30.12     65.54
4**
2I0.0          6I0.5          1I2.769          4I2.866          7I5.0          20I10.0
31.5
5**
F1.0
8$$
          46R1          2R3          34R4          9Q46
          10R2          68Q46
9$$
-97          -103          -109          -103
10$$
          4I97          102          1Q6
          4I103          108          5Q6
          4I109          114          3Q6
          40I115          156

```

Fig. 8.10 Example of input data for DOT analysis.

11\$\$						
6Z	4I31	36				
6Z	4I19	24	4I25	30	4I31	36
	4I43	48	4I67	72		
6Z	4I61	66	4I67	72	4I73	78
42Z						
12**						
6R0.0	6R4.9210-5					
6R0.0	6R1.2152-1	6R7.7109-5	6R4.9813-4	6R2.9013-5	6R2.4678-5	
6R0.0	6R3.9167-3	6R1.4440-2	6R1.7328-3			
42R0.0						
T						
T						

Fig. 8.10 Continued

## Acknowledgments

The present work was done as the activity under the Fusion Reactor Subcommittee of Reactor Physics Committee. The working group acknowledges the members of the subcommittee. Dr. H. Maekawa, the chairman of the subcommittee, in particular, is grateful for promising and encouraging the present activity. Thanks are due to all participants of the benchmark data collection. Without their kind offers, this report could not be issued.