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EVALUATION OF NEUTRON NUCLEAR DATA OF NATURAL NICKEL AND ITS ISOTOPES FOR JENDL—2

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Neutron nuclear data of natural nickel and its isotopes have been evaluated. Evaluated are the total, elastic and inelastic scattering, capture, (n,2n), (n,3n), (n,p), (n,α), (n,n'p) and (n,n'α) reaction cross sections, the resonance parameters, the angular and energy distributions of secondary neutrons in the energy range from 10^{-5} eV to 20 MeV. The evaluation has been made on the basis of recently measured data with the aid of the spherical optical model and statistical model. The results of the benchmark tests of JENDL-1 have been also taken into consideration. Special care has been taken on the background cross sections in the resonance region, the remaining resonance structure in the unresolved resonance region up to a few MeV, and grouping of the inelastic scattering levels in the natural nickel file. The problems left for future work are also discussed. The results of the present evaluation were adopted in JENDL-2.

Keywords: Natural Nickel, Isotopic Nickel, Evaluation, JENDL-2, Background Cross Section, Resonance Structure, Level Grouping, Threshold Reactions

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ＪＥＮＤＬ－２のための天然および同位体ニッケルの中性子核データ評価

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天然および同位体ニッケルの中性子核データの評価を行った。評価した量は10^{-5} eVから20 MeVにわたる全断面積，弾性および非弾性散乱，捕獲，（n，2n），（n，3n），（n，p），（n，α），（n，n′p），（n，n′α)反応の各断面積，共鳴パラメータ，二次中性子の角度及びエネルギー分布である。評価は球型光学模型や統計模型を利用しつつ，最近の実験データに基づいて行った。ＪＥＮＤＬ－１のベンチマークテストの結果も考慮に入れた。特に注意を払った点は，共鳴領域のバックグランド断面積，数MeV以下の非分離共鳴領域の共鳴構造，天然ニッケルファイルの非弾性散乱レベルのグループ化である。将来に残された問題も議論した。今回の評価結果はＪＥＮＤＬ－２に採用されている。

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1. Introduction

Neutron nuclear data of nickel are much required, because nickel is a main component of stainless steel and some threshold reactions of its isotopes are important for neutron dosimetry. Various evaluations have so far been made[1-8]. Every large evaluated nuclear data library contains the data of nickel. In spite of this, there still remain considerable discrepancies among the evaluated data.

For the first version of Japanese Evaluated Nuclear Data Library (JENDL-1)[9], a new evaluation of nickel data was made by Kikuchi et al.[10] in 1974. It was pointed out, however, through various benchmark tests[11,12] of JENDL-1 that the following drawbacks existed in the evaluated data of structural materials including nickel:

1) The total and elastic scattering cross sections are overestimated considerably in the energy region above resolved resonances up to several MeV. This causes considerable underestimate of the diffusion coefficients.
2) As to the inelastic scattering to the discrete levels, the natural nickel file contains only a few levels of main isotopes (^{58}Ni and ^{60}Ni) and many low lying levels of a minor odd-mass isotope (^{61}Ni).
3) As to natural nickel, the capture cross section is overestimated above several hundred keV and the inelastic scattering cross section is underestimated.
4) As to the threshold reactions, the evaluation is rather rough except for some important ones.

Considering such a situation, a complete reevaluation of structural material nuclear data was planned for JENDL-2 in 1976. Completion of the entire compilation for JENDL-2 was scheduled at the end of 1981. At the early stage of compilation, however, the highest priority was put to evaluation of the most important nuclides for fast reactors: ^{235}U, ^{238}U, ^{239}Pu, ^{240}Pu, ^{241}Pu, Cr, Fe and Ni, whose cross sections mainly determine characteristics of a typical fast reactor. This decision was made responding to an urgent request to use JENDL-2 for analyses in the JUPITOR project[13], joint USA-Japan mock-up experiments of large fast reactors using ZPPR facility.

The evaluation of the eight nuclides was completed in November 1979. Since then a combined library, called JENDL-2B library, consisting of JENDL-2 for the eight nuclides and of JENDL-1 for the others has been widely used for fast reactor analyses in Japan. Various benchmark tests have also been made and satisfactory results have been obtained[14,15].

As to nickel, only the resonance parameters, cross sections and angular distributions (files 2,3 and 4 in ENDF/B format) of natural nickel were supplied to JENDL-2B with the data of ENDF/B-IV for the energy distributions (file 5). After that the data of isotopes were evaluated. The energy distributions of natural nickel were also evaluated and the file 5 was replaced by the new data. Final data were released in December 1982. As the evaluation of natural nickel was thus made before the evaluation of its isotopes, some inconsistencies remain inevitably between the natural nickel data and its isotope data.

The essence of the present evaluation was already published[16]. Hence this report is intended to provide more complete information for users of JENDL-2. Many figures and tables are provided but less discussion on the evaluation method is given in this report. The status of the presently evaluated quantities are given in Table 1.

2. Isotopic Abundances, Masses and Q-values

The isotopic abundances were taken from the recommendation by evaluation of the most important nuclides for fast reactors: ^{235}U, ^{238}U, ^{239}Pu, ^{240}Pu, ^{241}Pu, Cr, Fe and Ni, whose cross sections mainly determine characteristics of a typical fast reactor. This decision was made responding to an urgent request to use JENDL-2 for analyses in the JUPITOR project[13), joint USA-Japan mock-up experiments of large fast reactors using ZPPR facility.

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3. Thermal Cross Sections

The data recommended in BNL-325, 3rd edition[18] were adopted as the 2200m/s values. They are given in Table 3 with the calculated values from the present resonance parameters.

4. Resonance Region

4.1 Resolved Resonance Parameters

Resonance parameters were evaluated for each isotope on the basis of various measurements listed in Table 4 by taking account of the other evaluation such as ENDF/B-IV, BNL-325, 3rd edition[18] and Moxon's work[3]. For levels whose radiation widths Γ_γ are not known, Γ_γ = 2 eV was assumed for s-wave resonances and Γ_γ = 1 eV for p-wave ones of all the isotopes according to the recommendation by Moxon[3]. The values of effective scattering radius were mainly taken from BNL-325, 3rd edition[18].

In order to reproduce the adopted thermal cross sections, the following adjustment was made: Two negative resonances were added for ^{58}Ni and a negative resonance for each of ^{60}Ni and ^{61}Ni. Parameters of the first positive resonance at 4.6 keV were adjusted for ^{62}Ni. As for natural nickel, a negative resonance was added to ^{58}Ni at -28.5 keV without considering the thermal cross section data of each isotope. Hence there remains the inconsistency in treatment of the negative or lowest positive resonances and in the thermal cross sections between the natural nickel and isotopic nickel data. Table 5 gives the status of resonance parameters together with the values of the effective scattering radius. Tables 6-10 gives the presently adopted resonance parameters

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with the experimentally deduced values as well as various evaluated parameters.

4.2 Background Cross Sections

The resonance region is set up to 600 keV except for ^{61}Ni. The present resonance parameters fail to reproduce the measured total and capture cross sections particularly in the energy region above a few tens of keV. The reason of this disagreement was investigated, and the disagreement was corrected by applying the positive or negative background cross sections. We will detail this problem in Appendix 1. Figure 1 shows the total and capture resonance cross sections of natural nickel with the measured data as well as the data of JENDL-1 and ENDF/B-IV. The resonance cross sections of the isotopic nickels are shown in Figs. 2-6.

4.3 Resonance Integral

The resonance capture integrals (the cut-off energy of 0.5 eV) calculated from the present resonance parameters and the background cross section are compared in Table 11 with the recommended values of BNL-325, 3rd edition[18)]. They agree with each other for natural nickel and the main isotopes but are discrepant for ^{61}Ni and ^{64}Ni.

5. Cross Sections above Resonance Region

5.1 Total Cross Section and Optical Potential

As was pointed out in benchmark tests of JENDL-1[11,12)], the remaining resonance structure in the unresolved resonance region up to a few MeV has an important role for self-shielding effects. In the present evaluation, we traced the resonance structure in high resolution measurements by Cierjacks et al.[27)] up to 3 MeV for natural nickel. This was made by the eye-guide method with Neutron Data Evaluation with the experimentally deduced values as well as various evaluated parameters.

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System(NDES)[28]. Above 3 MeV, the evaluated data were obtained by smoothing the data of Cierjacks et al. The evaluated total cross section is shown in Fig. 7.

For each isotope, on the other hand, no high resolution data exist, and the evaluation was based on the optical model calculation. The potential parameters were obtained by Kawai[29] so as to reproduce the total cross section of natural nickel by taking account of the systematic trends among neighboring nuclides such as Ti, V, Cr, Mn, Fe, Co and Cu. The potential parameters are:

$$V = 51.33 - 0.331 \times E_n \quad \text{(MeV)}$$
$$W_s = 8.068 + 0.112 \times E_n \quad \text{(MeV)}$$
$$V_{so} = 7.00 \quad \text{(MeV)}$$
$$r_o = r_{so} = 1.24 \quad \text{(fm)}$$
$$r_s = 1.4 \quad \text{(fm)}$$
$$a = a_{so} = 0.541 \quad \text{(fm)}$$
$$b = 0.4 \quad \text{(fm)}.$$

This set of parameters is applied to all the isotopes. The calculated total cross sections of ^{58}Ni and ^{60}Ni are compared with the measured data in Figs. 8 and 9, respectively.

5.2 (n,2n), (n,3n), (n,n'α), (n,n'p), (n,p) and (n,α) Reaction Cross Sections

These cross sections were evaluated for each isotope as follows.

<u>(n,2n) reaction</u>

For ^{58}Ni the data of JENDL-1, which were evaluated on the basis of numerous experimental data, were adopted and extended up to 20 MeV. For the other isotopes, on the other hand, experimental data are very scarce. Hence its shape was calculated with the evaporation model based on Pearlstein's approximation[30], and the cross section value was normalized at 15 MeV to the calculated value by Pearlstein with his semi-empirical formula[31]; 510 mb for ^{60}Ni, 870 mb for ^{61}Ni, 910 mb for ^{62}Ni and 1200 mb for ^{64}Ni.

The (n,2n) reaction cross sections of natural and isotopic nickels are shown in Figs. 10-15 with the measured data as well as the other evaluated data. The present data of natural nickel agree fairly well with the measured data by Auchampaugh et al.[32], suggesting the reliability of the present evaluation for the other isotopes than ^{58}Ni.

<u>(n,3n) reaction</u>

The (n,3n) reaction channel is closed below 20 MeV for ^{58}Ni and ^{60}Ni, and is nearly closed for ^{61}Ni and ^{62}Ni. Hence we ignored this cross section for these nuclides. For ^{64}Ni, the shape was calculated with Pearlstein's approximation, and the same normalization factor as the (n,2n) reaction was applied to the (n,3n) reaction cross section. The (n,3n) reaction cross section of ^{64}Ni is also shown in Fig. 15.

<u>(n,n'α) reaction</u>

The (n,n'α) reaction cross section was evaluated only for ^{58}Ni. Its shape was estimated on the analogy of the ^{65}Cu (n,n'α) reaction cross section by considering the difference of Q-values. The ^{65}Cu(n,n'α) reaction was selected because of its numerous experimental data and its similar Z and A values to those of ^{58}Ni, and its shape was obtained by the eye-guide method. The absolute value of ^{58}Ni was obtained by normalizing the curve to the data of Seebeck and Bormann[33] (30 mb at 14 MeV). The (n,n'α) reaction cross section of ^{58}Ni is shown in Fig. 16.

(n,n'p) reaction

The shape of the (n,n'p) reaction was estimated by taking account of the evaporation model calculation with the GROGI code[34], and the absolute value was obtained by considering various measured data near 14 MeV; 480 mb at 14 MeV for ^{58}Ni, 60 mb at 14 MeV for ^{60}Ni, 13 mb at 14.7 MeV for ^{61}Ni and 6 mb at 14.5 MeV for ^{62}Ni. This cross section was ignored for ^{64}Ni. The (n,n'α) reaction cross sections are shown in Figs. 17-20.

(n,p) reaction

For ^{58}Ni and ^{60}Ni, the data of JENDL-1, which were evaluated on the basis of numerous experimental data, were adopted and extended up to 20 MeV. For the other isotopes, the shape was estimated on the analogy of the ^{60}Ni (n,p) reaction cross section by considering the difference of Q-values. The absolute value was obtained by considering various measured data at 15 MeV; 90 mb for ^{61}Ni, 22 mb for ^{62}Ni and 4.5 mb for ^{64}Ni.

The (n,p) reaction cross sections are shown in Figs. 21-26, with the measured data.

(n,α) reaction

For each isotope, the cross section shape was estimated on the analogy of the ^{59}Co (n,α) reaction cross section by shifting the energy scale corresponding to the Q-value difference. The ^{59}Co(n,α) reaction was selected, because of its well-known cross section as a reaction for neutron dosimetry and of its similar Z and A values to those of nickel isotopes. The absolute values were obtained by some measured data; 130 mb at 14 MeV for ^{58}Ni and 21 mb at 14.5 MeV for ^{62}Ni, or by the calculated value by Pearlstein[31] with his semi-empirical formula; 56 mb at 15 MeV for ^{60}Ni, 34 mb at 15 MeV for ^{61}Ni and 6.9 mb at 15 MeV for ^{64}Ni. The (n,α) reaction cross sections are shown in Figs. 27-32.

5.3 Capture Cross Section

The capture, elastic and inelastic scattering cross sections were calculated with the statistical model code CASTHY[35] for each isotope. The (n,2n), (n,3n), (n,n'p), (n,n'α), (n,p) and (n,α) reactions were taken into account as the competing processes. The level fluctuation was considered.

The γ-ray strength functions were obtained so that the calculated capture cross section might reproduce the experimental data of Ernst et al.[36] for ^{58}Ni, ^{60}Ni and ^{61}Ni and of Beer and Spencer[26] for ^{62}Ni and ^{64}Ni. The obtained γ-ray strength functions are given in Table 12. For natural nickel, the γ-ray strength functions were adjusted so that the calculated capture cross section might reproduce the experimental data of Gayther et al.[37]; 9.6 mb at 450 keV. This adjustment was made without considering the capture data of each isotope and the obtained γ-ray strength functions are also given in Table 12. Though the γ-ray strength functions used in the evaluation of natural nickel are different from those used for the isotopes as seen in Table 12, the calculated cross sections of natural nickel agree with those constructed from the isotopic nickel data. The Berman[38] type giant resonance profile function was adopted. The parameters of ^{60}Ni were used for all the nickel-isotopes and are given in Table 13. The capture cross sections of natural and isotope nickels are shown in Figs. 33-38 with the measured data.

5.4 Elastic and Inelastic Scattering Cross Sections

The inelastic scattering cross sections were calculated for each isotope with CASTHY code. The level schemes were taken from Table of Isotopes, 7th edition[39] and are given in Table 14. The level density parameters were evaluated by Yoshida[40] from the resonance level spacing and the staircase plotting of low lying levels by taking account of the systematics among neighboring nuclei. They are given in Table 15.

The direct process was considered only for the inelastic scattering to the first excited state of the even-mass isotopes. They were evaluated on the basis of the measured data up to 7 MeV. Above 7 MeV, the direct processes were calculated with DWBA and added to the compound components calculated with CASTHY. The β_2-values in the DWBA calculation are 0.187 for ^{58}Ni, 0.211 for ^{60}Ni, 0.193 for ^{62}Ni and 0.192 for ^{64}Ni. The inelastic scattering cross sections to the first levels of even-mass isotopes are shown in Figs. 39-42.

Special care is required in constructing the natural nickel data from the isotope data. Each isotope file has about 20 discrete inelastic levels. In the ENDF/B format, however, only 40 discrete inelastic levels are allowed. Hence all the levels of isotopes cannot be adopted in the natural nickel file. In JENDL-1, the lowest 40 levels were adopted as discrete levels and the other levels were added to the continuum levels. As a result, JENDL-1 contains only a few levels of the main isotopes and many low-lying levels of the minor odd-mass isotope. The shielding benchmark tests of iron[12], however, suggested that this treatment was inadequate. In JENDL-2, we combined some levels, whose Q-values are similar, to one level. Table 14 also shows the level grouping in the natural nickel file. The total inelastic scattering cross section of natural nickel is shown in Fig. 46. The present values agree well with the measured data of Broder et al.[42] below 5 MeV but look underestimated above 10 MeV. This problem will be discussed later. The total inelastic scattering cross sections of the isotopic nickels are shown in Figs. 43-48.

Finally the elastic scattering cross section was adjusted by subtracting all the other partial cross sections from the total cross section.

6. Other Quantities

6.1 Angular Distributions of Emitted Neutrons

The angular distribution of the elastically scattered neutrons was calculated with the optical model for each isotope, and that of natural nickel was obtained by averaging the data of isotopes by using $a_i \sigma_{si}$ as weights (a_i and σ_{si} denote the abundance and elastic scattering cross section of isotope i, respectively). For inelastic scattering to the discrete levels, the angular distributions were also calculated with the Hauser-Feshbach model for each isotope, and isotropic scattering in the center-of-mass system was assumed for natural nickel. Isotropic scattering in the laboratory system was assumed for the inelastic scattering to the continuum levels, and for the (n,2n), (n,3n), (n,n'α) and (n,n'p) reactions.

6.2 Energy Distributions of Emitted Neutrons

The energy distributions of emitted neutrons were evaluated for each isotope as follows: The simple evaporation spectrum was assumed for the inelastic scattering to the continuum states (MT=91). The same nuclear temperature was also applied to the (n,n'α) and (n,n'p) reactions. As to the (n,2n) and (n,3n) reactions, the successive evaporation model[43)] was assumed: The first neutron evaporates leaving the residual nucleus in an excited state higher than the neutron separation energy, and the second neutron evaporates from the excited state corresponding to the average energy of the first neutron, and so on.

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In natural nickel file, we mixed the temperatures of ^{58}Ni and ^{60}Ni with the weights of 0.7 × σ (^{58}Ni) and 0.3 × σ (^{60}Ni), respectively, where σ denotes the cross section of the considered reaction.

7. Discussion

7.1 Direct and Semi-direct Reactions

The direct and semi-direct reactions were ignored in the present evaluation except for the inelastic scattering to the first level of the even-A isotopes, where the DWBA calculation was made. This assumption little affects the cross sections in the energy region below a few MeV, which are important for fission reactors. In fact the presently evaluated data were proved through benchmark tests[14,15] to be satisfactory for fission reactor calculations.

On the other hand, however, the direct and semi-direct processes become dominant for the high energy region such as 14 MeV. Recently the energy-angle double-differential cross sections (DDX) have been measured[44] near 14 MeV for materials important for fusion reactors. The results of natural nickel are compared with the DDX calculated from JENDL-2* in Fig. 49. The spectrum calculated with JENDL-2 shows considerable underestimate for emission neutron with energy from 6 to 12 MeV. This means that the inelastic scattering cross sections to the levels between 2 MeV and 8 MeV are much underestimated. On the other hand, the peak near 12.5 MeV is well reproduced by the present calculation, suggesting that the inelastic scattering cross sections to the first level, calculated with DWBA, are adequate. Furthermore, the DDX data apparently show the forward peak in the angular distribution of

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inelastically scattered neutrons even to the continuum states. Such a behavior is not taken into account in the present evaluation.

The above comparison between the measured and calculated data of DDX suggests that the JENDL-2 data are insufficient in the cross section values and angular distributions of the inelastic scattering for fusion neutronics application where 14 MeV neutrons have a dominant role. This problem is an important subject for JENDL-3.

7.2 Threshold Reactions

Various threshold reactions are included. For reactions whose experimental data are numerous, such as the ^{58}Ni(n,2n), ^{58}Ni(n,p) and ^{60}Ni(n,p) reactions, we adopted the evaluation for JENDL-1, which was made by selecting lots of experimental data. For reactions whose experimental data are scarce, the evaluation was based on the simple evaporation model[30,34] with compound nucleus approximation or on the analogy of the other well-known reactions by considering the difference of Q-values. These methods are rather arbitrary and considerable uncertainty remains on the values thus evaluated. More systematic evaluation is now in progress for JENDL-3 by taking account of the pre-equilibrium processes.

The (n,n'α) reaction was considered only for ^{58}Ni. Though the (n,n'α) reaction cross section is much smaller (about 1/5) than the (n,α) reaction cross section at 14 MeV, its contribution becomes the larger in the higher energy region. Furthermore, the measurements are often made for the total α-emission cross section. Figures 50-55 show the total α-emission cross section with the measured data. Naturally the present evaluated value consists of only the (n,α) cross section for ^{60}Ni, ^{61}Ni, ^{62}Ni and ^{64}Ni.

For ^{58}Ni, the (n,α) and (n,n'α) reaction cross sections were evaluated without considering the total α-emission cross section, and the total α-emission cross section is systematically larger than the recent measurements by Grimes[47] and Kneff et al.[48]. The same tendency is observed for the natural nickel. On the other hand, the total α-emission cross section looks underestimated at 15 MeV for ^{60}Ni, ^{61}Ni and ^{64}Ni due to negligence of the (n,n'α) reaction cross section. In order to know the helium production rate precisely, the (n,α) and (n,n'α) reaction cross sections should be evaluated for all the isotopes by considering the total α-emission cross section. This will be also made in JENDL-3.

8. Conclusion

The neutron nuclear data of natural nickel and its isotopes have been evaluated for JENDL-2. The present evaluation was made on the basis of recently measured data with the aid of the model calculation by considering the feedback from the benchmark tests[11,12] of JENDL-1.

Special care was taken on the following points:

1) The disagreement observed between the calculated and measured cross sections in the resonance region was carefully studied and the background conection was made. (See Appendix 1).
2) The remaining resonance structure observed in the unresolved region was adopted in the evaluation of the total cross section for the natural nickel file.
3) The inelastic scattering levels were grouped into 40 pseudo levels in the natural nickel file not to miss the levels of the main isotopes.

Results of the benchmark tests of JENDL-2 reveal reliability of the present data for fission reactor calculations.

On the other hand, the following problems have been pointed out:

1) The direct and semi-direct reactions were ignored. The comparison of

evaluated without considering the total α-emission cross section, and the total α-emission cross section is systematically larger than the recent measurements by Grimes[47] and Kneff et al.[48]. The same tendency is observed for the natural nickel. On the other hand, the total α-emission cross section looks underestimated at 15 MeV for ^{60}Ni, ^{61}Ni and ^{64}Ni due to negligence of the (n,n'α) reaction cross section. In order to know the helium production rate precisely, the (n,α) and (n,n'α) reaction cross sections should be evaluated for all the isotopes by considering the total α-emission cross section. This will be also made in JENDL-3.

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2) Various threshold reactions should be evaluated more systematically.

These problems will be solved in JENDL-3.

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E99: Perey F.G., Le Rigoleur C.O. and Kinney W.E.: "Nickel-60 Neutron Elastic- and Inelastic-Scattering Cross Sections from 6.5 to 8.5 MeV", ORNL-4523 (1970).

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Table 1 Status of presently evaluated quantities

Natural nickel

Quantities	Energy range(eV)*		Comments
	min	max	
a) Resonance data			Constructed from isotopic data
Resonance parameters	-2.85+4	6.0+5	
Capture resonance integral	5.0 -1		Table 11
b) Cross sections			
Total	1.0 -5	2.0+7	Figs. 1 and 7
Elastic scattering	1.0 -5	2.0+7	
Total inelastic scattering	6.85+4	2.0+7	Fig. 43
Inelastic scattering			
to the lowest discrete level (1st)	6.85+4	2.0+7	
to the highest discrete level (40th)	4.55+6	2.0+7	
to the continiuum levels	2.57+6	2.0+7	
Capture	1.0 -5	2.0+7	Figs. 1, 33 and A6
(n,2n) reaction	7.95+6	2.0+7	Fig. 10
(n,3n) reaction	1.68+7	2.0+7	
(n,n'α) reaction	6.51+6	2.0+7	
(n,n'p) reaction	8.31+6	2.0+7	
(n,p) reaction	1.0 -5	2.0+7	Fig. 21
(n,α) reaction	1.0 -5	2.0+7	Fig. 27
c) Angular distributions of secondary neutrons			Optical model
Elastic scattering	1.0 -5	2.0+7	
Inelastic scattering to the discrete levels	6.85+4	2.0+7	
d) Energy distributions of secondary neutrons			Evaporation model
Inelastic scattering to the continuum levels	2.57+6	2.0+7	Fig. 49
(n,2n) reaction	7.95+6	2.0+7	Fig. 49
(n,3n) reaction	1.68+7	2.0+7	
(n,n'α) reaction	6.51+6	2.0+7	
(n,n'p) reaction	8.31+6	2.0+7	
(n,p) reaction	1.0 -5	2.0+7	
(n,α) reaction	1.0 -5	2.0+7	

*2.0+7 denotes 2.0×10^{7}.

^{58}Ni

Quantities	Energy range(eV)* min	max	Comments
a) Resonance data			
Resonance parameters	-2.85+4	6.0+5	Table 6
Capture resonance integral	5.0 -5		Table 11
b) Cross sections			
Total	1.0 -5	2.0+7	Figs. 2 and 8
Elastic scattering	1.0 -5	2.0+7	
Total inelastic scattering	1.48+6	2.0+7	Fig. 44
Inelastic scattering			
to the lowest discrete level (1st)	1.48+6	2.0+7	Fig. 39
to the highest discrete level (22nd)	4.55+6	2.0+7	
to the continiuum levels	4.60+6	2.0+7	
Capture	1.0 -5	2.0+7	Figs. 2 and 34
(n,2n) reaction	1.24+7	2.0+7	Fig. 11
(n,n'α) reaction	6.51+6	2.0+7	Fig. 16
(n,n'p) reaction	8.31+6	2.0+7	Fig. 17
(n,p) reaction	1.0 -5	2.0+7	Fig. 22
(n,α) reaction	1.0 -5	2.0+7	Fig. 28
c) Angular distributions of secondary neutrons			Optical model
Elastic scattering	1.0 -5	2.0+7	
Inelastic scattering to the discrete levels	1.48+6	2.0+7	
d) Energy distributions of secondary neutrons			Evaporation model
Inelastic scattering to the continuum levels	4.60+6	2.0+7	
(n,2n) reaction	1.24+7	2.0+7	
(n,n'α) reaction	6.51+6	2.0+7	
(n,n'p) reaction	8.31+6	2.0+7	
(n,p) reaction	1.0 -5	2.0+7	
(n,α) reaction	1.0 -5	2.0+7	

*2.0+7 denotes 2.0×10^7.

^{60}Ni

Quantities	Energy range(eV)* min	max	Comments
a) Resonance data			
Resonance parameters	-5.5 +3	6.0+5	Table 7
Capture resonance integral	5.0 -5		Table 11
b) Cross sections			
Total	1.0 -5	2.0+7	Figs. 3 and 9
Elastic scattering	1.0 -5	2.0+7	
Total inelastic scattering	1.35+6	2.0+7	Fig. 45
Inelastic scattering			
to the lowest discrete level (1st)	1.35+6	2.0+7	Fig. 40
to the highest discrete level (22nd)	3.94+6	2.0+7	
to the continiuum levels	3.96+6	2.0+7	
Capture	1.0 -5	2.0+7	Figs. 3 and 35
(n,2n) reaction	1.16+7	2.0+7	Fig. 12
(n,n'p) reaction	9.70+6	2.0+7	Fig. 18
(n,p) reaction	2.08+6	2.0+7	Fig. 23
(n,α) reaction	1.0 -5	2.0+7	Fig. 29
c) Angular distributions of secondary neutrons			Optical model
Elastic scattering	1.0 -5	2.0+7	
Inelastic scattering to the discrete levels	1.35+6	2.0+7	
d) Energy distributions of secondary neutrons			Evaporation model
Inelastic scattering to the continuum levels	3.96+6	2.0+7	
(n,2n) reaction	1.16+7	2.0+7	
(n,n'p) reaction	9.70+6	2.0+7	
(n,p) reaction	2.08+6	2.0+7	
(n,α) reaction	1.0 -5	2.0+7	

* 2.0+7 denotes 2.0×10^7.

^{61}Ni

Quantities	Energy range(eV)* min	max	Comments
a) Resonance data			
Resonance parameters	-1.8 +3	6.85+4	Table 8
Capture resonance integral	5.0 -1		Table 11
b) Cross sections			
Total	1.0 -5	2.0+7	Fig. 4
Elastic scattering	1.0 -5	2.0+7	
Total inelastic scattering	6.85+4	2.0+7	Fig. 46
Inelastic scattering			
to the lowest discrete level (1st)	6.85+4	2.0+7	
to the highest discrete level (20th)	2.51+6	2.0+7	
to the continiuum levels	2.57+6	2.0+7	
Capture	1.0 -5	2.0+7	Figs. 4 and 36
(n,2n) reaction	7.95+6	2.0+7	Fig. 13
(n,n'p) reaction	1.00+7	2.0+7	Fig. 19
(n,p) reaction	5.49+5	2.0+7	Fig. 24
(n,α) reaction	1.0 -5	2.0+7	Fig. 30
c) Angular distributions of secondary neutrons			Optical model
Elastic scattering	1.0 -5	2.0+7	
Inelastic scattering to the discrete levels	6.85+4	2.0+7	
d) Energy distributions of secondary neutrons			Evaporation model
Inelastic scattering to the continuum levels	2.57+6	2.0+7	
(n,2n) reaction	7.95+6	2.0+7	
(n,n'p) reaction	1.00+7	2.0+7	
(n,p) reaction	5.49+5	2.0+7	
(n,α) reaction	1.0 -5	2.0+7	

* 2.0+7 denotes 2.0×10^{7}.

^{62}Ni

Quantities	Energy range(eV)* min	max	Comments
a) Resonance data			
Resonance parameters	4.6 +3	6.0+5	Table 9
Capture resonance integral	5.0 -1		Table 11
b) Cross sections			
Total	1.0 -5	2.0+7	Fig. 5
Elastic scattering	1.0 -5	2.0+7	
Total inelastic scattering	1.19+6	2.0+7	Fig. 47
Inelastic scattering			
to the lowest discrete level (1st)	1.19+6	2.0+7	Fig. 41
to the highest discrete level (21st)	3.92+6	2.0+7	
to the continiuum levels	4.03+6	2.0+7	
Capture	1.0 -5	2.0+7	Figs. 5 and 37
(n,2n) reaction	1.08+7	2.0+7	Fig. 14
(n,n'p) reaction	1.13+7	2.0+7	Fig. 20
(n,p) reaction	4.53+6	2.0+7	Fig. 25
(n,α) reaction	4.44+5	2.0+7	Fig. 31
c) Angular distributions of secondary neutrons			Optical model
Elastic scattering	1.0 -5	2.0+7	
Inelastic scattering to the discrete levels	1.19+6	2.0+7	
d) Energy distributions of secondary neutrons			Evaporation model
Inelastic scattering to the continuum levels	4.03+6	2.0+7	
(n,2n) reaction	1.08+7	2.0+7	
(n,n'p) reaction	1.13+7	2.0+7	
(n,p) reaction	4.53+6	2.0+7	
(n,α) reaction	4.44+5	2.0+7	

*2.0+7 denotes 2.0×10^{7}.

^{64}Ni

Quantities	Energy range(eV)* min	max	Comments
a) Resonance data			
Resonance parameters	9.52+3	6.0+5	Table 10
Capture resonance integral	5.0 -1		Table 11
b) Cross sections			
Total	1.0 -5	2.0+7	Fig. 6
Elastic scattering	1.0 -5	2.0+7	
Total inelastic scattering	1.37+6	2.0+7	Fig. 48
Inelastic scattering			
to the lowest discrete level (1st)	1.37+6	2.0+7	Fig. 42
to the highest discrete level (20th)	4.03+6	2.0+7	
to the continiuum levels	4.15+6	2.0+7	
Capture	1.0 -5	2.0+7	Figs. 6 and 38
(n,2n) reaction	9.81+6	2.0+7	Fig. 15
(n,3n) reaction	1.68+7	2.0+7	Fig. 15
(n,p) reaction	6.63+6	2.0+7	Fig. 26
(n,α) reaction	2.48+6	2.0+7	Fig. 32
c) Angular distributions of secondary neutrons			Optical model
Elastic scattering	1.0 -5	2.0+7	
Inelastic scattering to the discrete levels	1.37+6	2.0+7	
d) Energy distributions of secondary neutrons			Evaporation model
Inelastic scattering to the continuum levels	4.15+6	2.0+7	
(n,2n) reaction	9.81+6	2.0+7	
(n,3n) reaction	1.68+7	2.0+7	
(n,p) reaction	6.63+6	2.0+7	
(n,α) reaction	2.48+6	2.0+7	

* 2.0+7 denotes 2.0×10^{7}.

Table 2 Isotopic abundances, exact masses and various reaction Q-values of Ni isotopes.

	^{58}Ni	^{60}Ni	^{61}Ni	^{62}Ni	^{64}Ni
a) Abundance[*]					
(%)	67.86	26.21	1.19	3.66	1.08
b) Exact mass[**]					
(a.m.u.)	57.9354	59.9308	60.9311	61.9284	63.9280
c) Q-values[**]					
(MeV)					
(n,2n)	-12.1970	-11.3890	-7.8206	-10.5980	- 9.6570
(n,3n)	-22.4657[+]	-20.3893[+]	-19.5276[+]	-18.7186[+]	-16.4959
(n,n'α)	- 6.3978	- 6.2910[+]	- 6.4650[+]	- 7.0815[+]	- 8.0858[+]
(n,n'p)	- 8.1711	- 9.533	-9.8617	-11.1376	-12.5371[+]
(n,p)	0.4022	- 2.4011	-0.5396	- 4.4589	- 6.5244
(n,α)	2.901	1.3555	3.5795	- 0.4373	- 2.4412

* Taken from the recommendation by Moxon[3)]

** Taken from the compilation of Wapstra and Bos[17)]

\+ Not evaluated in JENDL-2

Table 3 The 2200m/s cross sections

(barns)

	Total		Capture	
	Present*	BNL-325(3)[18]	Present*	BNL-325(3)[18]
Natural	21.20	—	4.429	4.43 ± 0.16
^{58}Ni	30.62	30.4 ± 0.4	4.605	4.6 ± 0.3
^{60}Ni	3.87	3.8 ± 0.2	2.801	2.8 ± 0.2
^{61}Ni	12.12	12.1 ± 0.8	2.506	2.5 ± 0.8
^{62}Ni	23.70	23.7 ± 0.5	14.20	14.2 ± 0.3
^{64}Ni	1.52	—	1.480	1.49 ± 0.03

* Calculated from the resonance parameters.

Table 4 Measured data on the basis of which the evaluation of resonance parameters was made.

Isotopes	Type*	Measured Data
^{58}Ni	T	Perey et al.[19], Symme and Bowen[20], Farrell et al.[21]
	C	Perey et al.[19], Fröhner[22], Hockenbury et al.[23]
^{60}Ni	T	Symme and Bowen[20], Stieglitz et al.[24], Farrell et al.[21]
	C	Fröhner[22], Stieglitz et al.[24], Hockenbury et al.[23]
^{61}Ni	T	Cho et al.[25]
	C	Fröhner[22], Hockenbury et al.[23]
^{62}Ni	T	Beer and Spencer[26], Farrell et al.[21]
	C	Beer and Spencer[26]
^{64}Ni	T	Beer and Spencer[26], Farrell et al.[21]
	C	Beer and Spencer[26]

* T denotes transmission measurements, and C capture measurements

Table 5 Status of resonance parameters

Isotope	Defined energy range		S-wave resonances				P-wave resonances			Effective scattering radius
	Min (eV)	Max (keV)	No	negative (keV)	E min (keV)	E max (keV)	No	E min (keV)	E max (keV)	(fm)
^{58}Ni	10^{-5}	600	32	-28.5, -5	15.2	600	120	6.9	604	7.5
^{60}Ni	10^{-5}	600	38	-5.5	12.5	595	69	1.3	567	6.5
^{61}Ni	10^{-5}	68.6	32	-1.8	7.15	68.8	25	1.35	30.1	6.4
^{62}Ni	10^{-5}	600	33	non	4.6	592	49	8.9	601	6.2
^{64}Ni	10^{-5}	600	26	non	14.3	584	37	9.52	566	6.4

Table 6 Resonance parameters of ^{58}Ni

ENERGY (KEV)	L	J	NEUTRON WIDTH * (EV)	GAMMA WIDTH * (EV)	WHS ** (EV)	MISCELLANEOUS **	REFERENCE
-28.8	0	0.5	7870	2.0			JENDL-2
-28.5	0	0.5	16544.0	9.0		GT = 16553.0	JENDL-1
-28.5	0	0.5	11817.0	2.14		GT = 11819.0	ENDF-B-4
-28.5 ± 5.0	0	0.5		9.0 ± 0.6		WGH = 98.0 ± 5.4	BNL325(3)
-28.5	0		7870	2.0			73MOXON
-28.5	0	0.5	7870	(2.0)			74MOXON
-28.5	0		16400 ±900	9		GNO = 98.0 ± 5.4	71GARG
-5.5	0	0.5	1060	1.81			JENDL-2
-5.5	0		1081	1.87			73MOXON
-5.5	0	0.5	1081	(1.87)			74MOXON
6.90	1	0.5	0.02	(1.0)	0.020 ± 0.001		JENDL-2
6.89	1	0.5	0.0225	1.0		GT = 1.0225	JENDL-1
6.89	1	0.5	0.023	0.6		GT = 0.623	ENDF-B-4
6.89	(1)				0.022 ± 0.003		BNL325(3)
6.89	▸ 0	0.5	0.022	1.0			73MOXON
6.89	1	0.5	0.022	(1.0)	0.022 ± 0.002		74MOXON
6.89					0.022 ± 0.002	GGS = 8.3 ± 0.8	69HOCKENBURY
6.90	1		A 0.02)		0.020 ± 0.001		77PEREY
12.63	1	0.5	0.025	(1.0)	0.024 ± 0.002		JENDL-2
12.6	1	0.5	0.031	1.0		GT = 1.031	JENDL-1
12.6	▸ 0	0.5	(0.03)	1.0			73MOXON
12.6	1	0.5	(0.03)	(1.0)			74MOXON
12.6							69HOCKENBURY
12.63	1		A 0.02)		0.024 ± 0.002		77PEREY
13.344	1	0.5	9.5	0.712	0.661 ± 0.047		JENDL-2
13.3	1	0.5	0.64	1.0		GT = 1.64	JENDL-1
13.3	1	1.5	0.22	0.6		GT = 0.82	ENDF-B-4
13.34 ± 0.03	(1)				0.39 ± 0.05		BNL325(3)
13.3	▸ 0	0.5	0.47	1.0			73MOXON
13.34	1	0.5	0.5	(1.0)			74MOXON
13.3					0.32 ± 0.03	GGS = 63.2 ± 6.0	69HOCKENBURY
13.34 ± 0.03	(1)				0.49 ± 0.10		72BEER
13.34 ± 0.03	1				0.50 ± 0.08		77FROEHNER
13.344 ± 4	1		A 9.5 ± 0.3	0.712	0.661 ± 0.047		77PEREY
13.42	1		4.9 ± 2.5				77SYME1
13.622	1	0.5	1.8	0.904	0.604 ± 0.015		JENDL-2
13.6	1	1.5	0.4	1.0		GT = 1.4	JENDL-1
13.6	1	1.5	0.46	0.6		GT = 1.06	ENDF-B-4
13.66 ± 0.04	(1)				0.57 ± 0.05		BNL325(3)
13.6	▸ 0	0.5	1.08	1.0			73MOXON
13.66	1	0.5	1.16	(1.0)			74MOXON
13.6					0.52 ± 0.05	GGS = 101 ±10	69HOCKENBURY
13.66 ± 0.04	(1)				0.63 ± 0.12		72BEER
13.68 ± 0.03	1				0.63 ± 0.20		77FROEHNER
13.622 ± 1	1		A 1.8 ± 0.2	0.904	0.604 ± 0.015		77PEREY
13.63	1		2.9 ± 1.2				77SYME1
15.2	0	0.5	1380	2.054	2.052 ± 0.064		JENDL-2
15.5	0	0.5	1200.0	2.1		GT = 1202.1	JENDL-1
15.5	0	0.5	1400.0	2.14		GT = 1402.1	ENDF-B-4
15.50 ± -0.04	0	0.5	A1200 ±100	2.1 ± 0.7		WGH = 9.64 ± 0.80	BNL325(3)
15.42	0		1150	2.0			73MOXON
15.375	0	0.5	1190	2.1			74MOXON
16.5	0					GT = 1540	66FARRELL
						GNO = 11.989	
15.3 ± 0.2	0		1140 ±30			GNO = 9.23 ± 0.24	71GARG
15.4 ± 0.1	0		A1200 ±150	2.1 ± 0.7			72BEER
15.4 ± 0.1	0		1200 ±30	1.42 ± 0.18			75FROEHNER
15.4 ± 0.1	0	0.5	A1140)	B 1.46 ± 0.22			77FROEHNER
15.344 ± 0.01	0		1380 ±20	2.054	2.052 ± 0.064		77PEREY
15.2011 ± 0.0255	0		1368.9 ± 0.16				77SYME
16.5	1	0.5	0.02	1.0		GT = 1.02	JENDL-1
16.5	▸ 0	0.5	(0.02)	1.0			73MOXON
16.5	1	0.5	(0.02)	(1.0)			74MOXON
16.5							69HOCKENBURY
17.21	1	0.5	0.027	(1.0)	0.026 ± 0.004		JENDL-2
17.2	1	0.5	0.02	1.0		GT = 1.02	JENDL-1
17.2	▸ 0	0.5	(0.02)	1.0			73MOXON
17.2	1	0.5	(0.02)	(1.0)			74MOXON
17.2							69HOCKENBURY
17.21 ± 0.04	1				0.02 ± 0.01		77FROEHNER
17.21	1		A 0.03)		0.026 ± 0.004		77PEREY
18.99	1	0.5	0.071	(1.0)	0.067 ± 0.004		JENDL-2
19.0	1	0.5	0.075	1.0		GT = 1.075	JENDL-1
19.0	1	1.5	0.033	0.6		GT = 0.633	ENDF-B-4
19.03 ± 0.05	(1)				0.07 ± 0.01		BNL325(3)
19.0	▸ 0	0.5	0.067	1.0			73MOXON
19.03	1	0.5	0.071	(1.0)			74MOXON
19.0					0.063 ± 0.010	GGS = 8.7 ± 1.3	69HOCKENBURY
19.03 ± 0.05	(1)				0.08 ± 0.02		72BEER
19.05 ± 0.04	1				0.08 ± 0.02		77FROEHNER
18.99	1		A 0.08)		0.067 ± 0.004		77PEREY
20.011	1	0.5	1.5	0.319	0.263 ± 0.008		JENDL-2
20.0	1	0.5	0.282	1.0		GT = 1.282	JENDL-1
20.0	1	1.5	0.12	0.6		GT = 0.72	ENDF-B-4
20.04 ± 0.05	(1)				0.22 ± 0.03		BNL325(3)
20.0	▸ 0	0.5	0.25	1.0			73MOXON

ENERGY (KEV)	L	J	NEUTRON WIDTH (EV)	GAMMA WIDTH (EV)	WWS (EV)	MISCELLANEOUS	REFERENCE
20.04	1	0.5	0.26	(1.0)			74MOXON
20.0					0.20 ± 0.02	GGS = 26.0 ± 2.7	69HOCKENBURY
20.04 ± 0.05	(1)				0.24 ± 0.05		72BEER
20.04 ± 0.04	1				0.24 ± 0.05		77FROEHNER
20.011 ± 6	1		A 1.5 ± 1	0.319	0.263 ± 0.008		77PEREY
21.123	1	0.5	4.7	0.782	0.670 ± 0.020		JENDL-2
21.1	1	1.5	0.388	1.0		GT = 1.388	JENDL-1
21.1	1	0.5	8.4	0.6		GT = 9.0	ENDF-B-4
21.16 ± 0.05	(1)				0.56 ± 0.06		BNL325(3)
21.1	▸ 0	0.5	1.27	1.0			73MOXON
21.16	1	0.5	1.28	(1.0)			74MOXON
21.1					0.56 ± 0.06	GGS = 70 ± 7	69HOCKENBURY
21.16 ± 0.05	(1)				0.57 ± 0.11		72BEER
21.15 ± 0.04	1				0.61 ± 0.10		77FROEHNER
21.123 ± 3	1		A 4.7 ± 1	0.782	0.670 ± 0.020		77PEREY
26.04	1	0.5	0.37	(1.0)	0.271 ± 0.007		JENDL-2
26.08	1	0.5	0.333	1.0		GT = 1.333	JENDL-1
26.08 ± 0.07	(1)				0.25 ± 0.05		BNL325(3)
26.08 ± 0.07	1	0.5	0.33	(1.0)	0.25 ± 0.05		74MOXON
26.08 ± 0.07	(1)				0.25 ± 0.05		72BEER
26.08 ± 0.04	1				0.27 ± 0.05		77FROEHNER
26.04	1		(0.6)		0.271 ± 0.007		77PEREY
26.615	1	0.5	2.1	1.4	0.847 ± 0.017		JENDL-2
26.6	1	0.5	2.33	1.0		GT = 3.33	JENDL-1
26.6	1	1.5	0.84	0.6		GT = 1.44	ENDF-B-4
26.67 ± 0.07	(1)				0.70 ± 0.07		BNL325(3)
26.6	▸ 0	0.5	2.33	1.0			73MOXON
26.67	0	0.5	1.1	(2.0)			74MOXON
26.6					0.70 ± 0.07	GGS = 68 ± 7	69HOCKENBURY
26.67 ± 0.07	(1)				0.73 ± 0.14		72BEER
26.65 ± 0.04	1				0.78 ± 0.15		77FROEHNER
26.615 ± 1	1		A 2.8 ± 0.4	1.216	0.847 ± 0.017		77PEREY
26.63	1		1.925 ± 0.5				77SYME1
26.63	1		2.03 ± 6.3				77SYME2
26.63	1		1.64 ± 0.34				77SYME3
27.62	1	0.5	(0.031)	(1.0)	0.031 ± 0.006		JENDL-2
27.62	1		(0.031)		0.031 ± 0.006		77PEREY
32.23	1	0.5	0.70	(1.0)			JENDL-2
32.23	1		(4)		0.413 ± 0.021		77PEREY
32.355	1	0.5	9.7	1.4	1.211 ± 0.041		JENDL-2
32.4	1	1.5	2.23	1.0		GT = 3.23	JENDL-1
32.4	1	1.5	2.57	1.0		GT = 3.57	ENDF-B-4
32.36 ± 0.08	(1)	(1.5)			1.38 ± 0.15		BNL325(3)
32.4	▸ 0	1.5	2.56	1.0			73MOXON
32.36	0	0.5	3.95	(2.0)			74MOXON
32.4					1.44 ± 0.15	GGS = 114 ± 12	69HOCKENBURY
32.36 ± 0.08	(1)				1.26 ± 0.25		72BEER
32.34 ± 0.05	1				1.40 ± 0.25		77FROEHNER
32.355	1		A 18.4 ± 1.2	1.296	1.211 ± 0.041		77PEREY
32.38	1		15.0 ± 1.2				77SYME1
32.38	1		5.7 ± 0.9				77SYME2
32.38	1		5.7 ± 0.9				77SYME3
34.20	1	0.5	1.97	0.94	0.635 ± 0.025		JENDL-2
34.2	1	1.5	0.5	1.0		GT = 1.5	JENDL-1
34.2	1	1.5	0.71	0.6		GT = 1.31	ENDF-B-4
34.24 ± 0.08	(1)				0.65 ± 0.08		BNL325(3)
34.2	▸ 0	0.5	1.85	1.0			73MOXON
34.24	1	0.5	1.91	(1.0)			74MOXON
34.2					0.65 ± 0.08	GGS = 49.5 ± 5.0	69HOCKENBURY
34.24 ± 0.08	(1)				0.69		72BEER
34.23 ± 0.05	1				0.70 ± 0.11		77FROEHNER
34.20	1		(2)		0.635 ± 0.025		77PEREY
34.22	1		2.5 ± 1.0				77SYME2
34.22	1		1.84 ± 0.5				77SYME3
35.04	1	0.5	0.032	(1.0)	0.031 ± 0.005		JENDL-2
35.04	1		(0.031		0.031 ± 0.005		77PEREY
36.089	0	0.5	16.7	1.24	1.15 ± 0.043		JENDL-2
36.1	1	1.5	0.887	1.0		GT = 1.887	JENDL-1
36.1	1	1.5	1.43	0.6		GT = 2.03	ENDF-B-4
36.12 ± 0.09	(1)				0.86 ± 0.10		BNL325(3)
36.2	▸ 0	0.5	6.12	1.0			73MOXON
36.12	0	0.5	1.60	(2.0)			74MOXON
36.1					0.86 ± 0.10	GGS = 62 ± 7	69HOCKENBURY
36.12 ± 0.09	(1)				1.01		72BEER
36.12 ± 0.05	1				0.99 ± 0.15		77FROEHNER
36.089 ± 0.002	0		14.9 ± 1.2	1.321	1.214 ± 0.043		77PEREY
36.102 ± 0.0037	0		16.97 ± 0.5				77SYME
39.51	1	0.5	2.22	1.1	0.74 ± 0.028		JENDL-2
39.59	1	1.5	0.493	1.0		GT = 1.493	JENDL-1
39.59 ± 0.10	(1)				0.66 ± 0.15		BNL325(3)
39.5	▸ 0	0.5	(1.3)	1.0			73MOXON
39.59 ± 0.10	0	0.5	1.95	(1.0)	0.66 ± 0.13		74MOXON
39.5							69HOCKENBURY
39.59 ± 0.10	(1)				0.66		72BEER
39.55 ± 0.06	1				0.64 ± 0.10		77FROEHNER
39.51	1		(2)		0.750 ± 0.028		77PEREY

ENERGY (KEV)	L	J	NEUTRON WIDTH (EV)	GAMMA WIDTH (EV)	WW5 (EV)	MISCELLANEOUS	REFERENCE
39.54	1		2.25 ± 0.45				77SYME1
39.54	1		2.21 ± 0.8				77SYME2
39.54	1		2.21 ± 0.36				77SYME3
43.95	1	0.5	0.12	(1.0)	0.111 ± 0.009		JENDL-2
43.88 ± 0.06	1				0.14 ± 0.03		77FROEHNER
43.95	1		A 0.1)		0.111 ± 0.009		77PEREY
47.849	1	0.5	7.7	1.46	1.231 ± 0.039		JENDL-2
47.9	1	1.5	1.86	1.0		GT = 2.86	JENDL-1
47.9	1	1.5	3.76	1.0		GT = 4.76	ENDF-B-4
47.8 ± 0.2	(1)	(1.5)			1.3 ± 0.2		BNL325(3)
47.9	0	1.5	3.75	1.0			73MOXON
47.80	(0)	0.5	3.84	(2.0)			74MOXON
47.9					1.58 ± 0.18	GGS = 87.5 ±11.0	69HOCKENBURY
47.8 ± 0.15	(1)				0.98		72BEER
47.81 ± 0.07	1				1.03 ± 0.15		77FROEHNER
47.849 ± 1	1		A 6.8 ± 0.6	1.504	1.231 ± 0.039		77PEREY
47.875	1		8.9 ± 0.85				77SYME1
47.875	1		11.5 ± 1.3				77SYME2
47.875	1		7.0 ± 0.8				77SYME3
51.85	1	1.5	0.85	(1.0)	0.920 ± 0.100		JENDL-2
51.85	1		A 2)		0.920 ± 0.100		77PEREY
52.16	1	1.5	1.36	0.7	0.923 ± 0.043		JENDL-2
52.0	1	1.5	3.0	1.0		GT = 4.0	JENDL-1
52.0 ± 0.2	(1)	(1.5)			1.5 ± 0.3		BNL325(3)
52.00 ± 0.15	(0)	0.5	5.40	(2.0)	1.45 ± 0.30		74MOXON
52.1							69HOCKENBURY
52.00 ± 0.15	(1)				1.46		72BEER
52.01 ± 0.08	1				1.70 ± 0.30		77FROEHNER
52.16	1		A 2)		0.923 ± 0.043		77PEREY
52.2	1		1.265 ± 0.6				77SYME1
52.2	1		0.42 ± 0.8				77SYME2
52.2	1		2.25 ± 0.5				77SYME3
52.26	1		0.53 ± 0.45				77SYME1
54.71	1	0.5	(0.3)	(1.0)	0.23 ± 0.022		JENDL-2
54.8	1	0.5	0.43	1.0		GT = 1.43	JENDL-1
54.8	1	0.5	0.69	0.6		GT = 1.29	ENDF-B-4
54.7 ± 0.2	(1)				0.30 ± 0.10		BNL325(3)
54.8					0.32 ± 0.10	GGS = 16.2 ± 5.0	69HOCKENBURY
54.70 ± 0.15	(1)				0.28		72BEER
54.64 ± 0.08	1				0.30 ± 0.05		77FROEHNER
54.71	1		A 0.3)		0.213 ± 0.022		77PEREY
58.637	1	0.5	1.77	0.99	0.634 ± 0.031		JENDL-2
58.6	1	1.5	0.351	1.0		GT = 1.351	JENDL-1
58.6 ± 0.2	(1)				0.52 ± 0.15		BNL325(3)
58.60 ± 0.15	(1)				0.52		72BEER
58.60 ± 0.10	1				0.60 ± 0.09		77FROEHNER
58.637 ± 6	1		A 1.46 ± 0.4	1.122	0.634 ± 0.031		77PEREY
58.69	1		2.2 ± 0.5				77SYME1
58.69	1		2.6 ± 1.4				77SYME2
58.69	1		1.7 ± 0.55				77SYME3
60.080	1	0.5	21.4	0.707	0.684 ± 0.017		JENDL-2
60.1	1	1.5	0.282	1.0		GT = 1.282	JENDL-1
60.1 ± 0.2	(1)				0.44		BNL325(3)
60.1							69HOCKENBURY
60.10 ± 0.15	(1)				0.44		72BEER
60.10 ± 0.10	1				0.64 ± 0.09		77FROEHNER
60.080 ± 1	1		A 21.4 ± 0.8	0.707	0.684 ± 0.017		77PEREY
60.12	1		20.3 ± 1.0				77SYME1
60.12	1		21.2 ± 3.0				77SYME2
60.12	1		21.2 ± 3.0				77SYME3
61.719	1	0.5	15.5	1.58	1.43 ± 0.045		JENDL-2
61.8	1	1.5	0.55	1.0		GT = 1.55	JENDL-1
61.8 ± 0.2	(1)				0.71 ± 0.15		BNL325(3)
61.8							69HOCKENBURY
61.75 ± 0.15	(1)				0.71		72BEER
61.75 ± 0.10	1				1.11 ± 0.16		77FROEHNER
61.719 ± 2	1		A 14.7 ± 1.1	1.588	1.433 ± 0.045		77PEREY
61.76	1		17.5 ± 2.0				77SYME1
61.76	1		16.1 ± 3.5				77SYME2
61.76	1		16.1 ± 2.4				77SYME3
62.94	0	0.5	3550.0	2.3			JENDL-2
63.0	0	0.5	3600.0	3.2		GT = 3603.2	JENDL-1
62.8	0	0.5	3300.0	2.14		GT = 3302.1	ENDF-B-4
63.0 ± 0.2	0	0.5	A 3600 ±200	3.2 ± 0.8		WGH = 14.34 ± 0.80	BNL325(3)
63.2	0		3580	2.0			73MOXON
63.098	0	0.5	3580	3.2			74MOXON
60.0	0					GT = 3560	66FARRELL
						GNO = 14.534	
63.2 ± 0.3	0		3650 ±330			GNO = 14.52 ± 1.31	71GARG
63.0 ± 0.20	0		A 3600 ±200	3.2 ± 0.8			72BEER
63.0 ± 0.2	0		3600 ±200	2.3 ± 0.3			75FROEHNER
63.0 ± 0.3	0	0.5	A 3600)	B 2.3 ± 0.3			77FROEHNER
63.209 ± 0.07	0		3550 ±100				77PEREY
62.9406 ± 0.0153	0		3441.4 ± 0.19				77SYME
66.39	1	0.5	1.7	(1.0)	0.629 ± 0.035		JENDL-2

ENERGY (KEV)	L	J	NEUTRON WIDTH (EV)	GAMMA WIDTH (EV)	WWS (EV)	MISCELLANEOUS	REFERENCE
66.4	1	0.5	0.56	1.0		GT = 1.56	JENDL-1
66.4 ± 0.2	[1)				0.36		BNL325(3)
66.4							69HOCKENBURY
66.40 ± 0.15	[1)				0.36		72BEER
66.40 ± 0.13	1				0.55 ± 0.08		77FROEHNER
66.39	1		(1.5)		0.629 ± 0.035		77PEREY
68.60	1	0.5	0.3	(1.0)	0.23 ± 0.021		JENDL-2
68.8	1	0.5	0.182	1.0		GT = 1.182	JENDL-1
68.8 ± 0.2	[1)				0.24		BNL325(3)
68.75 ± 0.20	[1)				0.24		72BEER
68.56 ± 0.14	1				0.30 ± 0.05		77FROEHNER
68.60	1		(0.2)		0.220 ± 0.021		77PEREY
69.835	1	0.5	6.8	0.59	0.544 ± 0.030		JENDL-2
69.8	1	1.5	0.298	1.0		GT = 1.298	JENDL-1
69.8 ± 0.2	[1)				0.46		BNL325(3)
69.80 ± 0.20	[1)				0.46		72BEER
69.81 ± 0.15	1				0.56 ± 0.09		77FROEHNER
69.835 ± 3	1		A 5.5 ± 1	0.593	0.544 ± 0.030		77PEREY
69.89	1		13.8 ± 2.8				77SYME1
69.89	1		9.8 ± 3.0				77SYME2
69.89	1		5.1 ± 1.2				77SYME3
77.97	1	0.5	0.28	(1.0)	0.216 ± 0.022		JENDL-2
78.0	1	0.5	0.136	1.0		GT = 1.136	JENDL-1
78.0 ± 0.2	1)				0.12 ± 0.03		BNL325(3)
78.2							69HOCKENBURY
77.95 ± 0.20	[1)				0.12 ± 0.03		72BEER
77.86 ± 0.15	1				0.18 ± 0.05		77FROEHNER
77.97	1		(0.3)		0.216 ± 0.022		77PEREY
81.22	1	1.5	1.43	(1.0)	1.176 ± 0.050		JENDL-2
81.1	1	1.5	0.575	1.0		GT = 1.575	JENDL-1
81.1 ± 0.2	[1)				0.73		BNL325(3)
81.3							69HOCKENBURY
81.10 ± 0.20	[1)				0.73		72BEER
81.10 ± 0.15	1				1.08 ± 0.20		77FROEHNER
81.22	1		(2.5)		1.176 ± 0.050		77PEREY
82.778	1	0.5	65.0	2.44	2.350 ± 0.087		JENDL-2
82.7 ± 0.3	1				2.0 ± 0.5		77FROEHNER
82.778 ± 2	1		A 72.3 ± 3	2.429	2.350 ± 0.087		77PEREY
82.84	1		60.0 ± 3.0				77SYME1
82.84	1		74.0 ± 8.0				77SYME2
82.84	1		63.0 ± 3.0				77SYME3
83.1 ± 0.2	0		A 110 ±40	3.5 ± 0.7		WGH = 0.38 ± 0.14	BNL325(3)
83.10 ± 0.20	0	0.5	110 ±40	3.5 ± 0.7			74MOXON
83.0							69HOCKENBURY
83.10 ± 0.20	0		A 110 ±40	3.5 ± 0.7			72BEER
83.29	1	0.5	2.3	(1.0)	0.696 ± 0.043		JENDL-2
83.29	1		(2)		0.696 ± 0.043		77PEREY
83.750	1	0.5	36.0	1.38	1.329 ± 0.059		JENDL-2
83.6 ± 0.3	1				1.5 ± 0.4		77FROEHNER
83.750 ± 2	1		A 41 ± 2	1.374	1.329 ± 0.059		77PEREY
83.82	1		25.4 ± 2.9				77SYME1
83.82	1		42.1 ± 7.2				77SYME2
83.82	1		36.4 ± 2.2				77SYME3
84.77	1	0.5	0.2	(1.0)	0.164 ± 0.022		JENDL-2
84.77	1		(0.2)		0.164 ± 0.022		77PEREY
89.890	1	0.5	8.1	0.88	0.79 ± 0.048		JENDL-2
89.8	1	1.5	0.29	1.0		GT = 1.29	JENDL-1
89.8 ± 0.2	[1)				0.45		BNL325(3)
89.84 ± 0.20	[1)				0.45		72BEER
89.78 ± 0.20	1				0.69 ± 0.10		77FROEHNER
89.890 ± 7	1		A 7.3 ± 1.2	0.892	0.795 ± 0.048		77PEREY
89.93	1		6.1 ± 3.0				77SYME1
89.93	1		13.0 ± 3.0				77SYME2
89.93	1		8.8 ± 1.5				77SYME3
92.60	1	0.5	0.22	(1.0)	0.18 ± 0.024		JENDL-2
92.3	1	0.5	0.205	1.0		GT = 1.205	JENDL-1
92.3 ± 0.2	1)				0.17		BNL325(3)
92.25 ± 0.20	[1)				0.17		72BEER
92.35 ± 0.22	1				0.25 ± 0.04		77FROEHNER
92.60	1		(0.2)		0.153 ± 0.024		77PEREY
95.55	1	1.5	1.5	(1.0)	1.20 ± 0.068		JENDL-2
94.5	1	1.5	0.818	1.0		GT = 1.818	JENDL-1
94.5 ± 0.3	[1)				0.9 ± 0.2		BNL325(3)
94.45 ± 0.25	[1)				0.9 ± 0.2		72BEER
95.55 ± 0.25	1				1.05 ± 0.15		77FROEHNER
95.55	1		(2.5)		1.207 ± 0.068		77PEREY
95.9							69HOCKENBURY
96.84	1	0.5	3.4	0.60	0.51 ± 0.039		JENDL-2
97.0	1	1.5	0.333	1.0		GT = 1.333	JENDL-1
97.0 ± 0.3	[1)				0.5 ± 0.1		BNL325(3)
97.00 ± 0.25	[1)				0.5 ± 0.1		72BEER
97.00 ± 0.26	1				0.66 ± 0.10		77FROEHNER

ENERGY (KEV)	L	J	NEUTRON WIDTH (EV)	GAMMA WIDTH (EV)	WWS (EV)	MISCELLANEOUS	REFERENCE
96.84	1		A(1)		0.486 ± 0.039		77PEREY
96.88	1		4.1 ± 2.0				77SYME1
96.88	1		1.3 ± 2.2				77SYME2
96.88	1		3.7 ± 1.05				77SYME3
97.487	1	0.5	14.7	0.385	0.375		JENDL-2
97.487 ± 4	1		A 14.7 ± 1.5	0.385	0.375 ± 0.033		77PEREY
97.577	1		15.5 ± 1.9				77SYME1
97.577	1		13.2 ± 1.32				77SYME2
97.577	1		11.2 ± 0.7				77SYME3
101.295	1	0.5	4.5	1.62	1.189 ± 0.065		JENDL-2
101.1	1	1.5	1.0	1.0		GT = 2.0	JENDL-1
101.1 ± 0.3	[1]				1.0 ± 0.2		BNL325(3)
101							69HOCKENBURY
101.10 ± 0.25	[1]				1.0 ± 0.2		72BEER
101.1 ± 0.27	1				0.95 ± 0.24		77FROEHNER
101.295 ± 6	1		A 7.1 ± 1.4	1.428	1.189 ± 0.065		77PEREY
101.38	1		11.25 ± 3.25				77SYME1
101.38	1		2.95 ± 1.6				77SYME2
101.38	1		3.15 ± 0.98				77SYME3
105.315	1	0.5	18.4	2.24	2.0 ± 0.132		JENDL-2
105.3	1	1.5	9.0	1.0		GT = 10.0	JENDL-1
105.3 ± 0.3	[1]				1.8 ± 0.4		BNL325(3)
105							69HOCKENBURY
105.30 ± 0.25	[1]				1.8 ± 0.4		72BEER
105.3 ± 0.28	1				1.60 ± 0.40		77FROEHNER
105.315 ± 4	1		A 14.6 ± 1.4	2.400	2.060 ± 0.132		77PEREY
105.38	1		25.4 ± 2.3				77SYME1
105.38	1		27.7 ± 6.3				77SYME2
105.38	1		21.7 ± 3.3				77SYME3
107.61	1	0.5	7.7	1.68	1.377 ± 0.098		JENDL-2
107.61	1		A(3)		1.377 ± 0.098		77PEREY
107.74	1		7.7 ± 1.9				77SYME1
108.188	0	0.5	1100.0	3.8			JENDL-2
107.7	0	0.5	1400.0	3.5		GT = 1403.5	JENDL-1
107.0	0	0.5	1000.0	2.14		GT = 1002.1	ENDF-B-4
107.7 ± 0.5	0	0.5	A 1400 ±200	3.5 ± 0.8		WGH = 4.27 ± 0.61	BNL325(3)
108.0	0		1280	2.0			73MOXON
107.9	0	0.5	1253	3.5			74MOXON
107.0	0					GT = 2000.	66FARRELL
						GNO = 6.114	
107							69HOCKENBURY
108.0 ± 0.5	0		1470 ±170			GNO = 4.47 ± 0.52	71GARG
107.7 ± 0.5	0		A 1500 ±300	3.5 ± 0.8			72BEER
107.6 ± 0.3	0		1400 ±300	3.8 ± 0.9			75FROEHNER
107.7 ± 0.5	0	0.5	A(1500)	B 3.8 ± 0.8			77FROEHNER
108.188 ± 0.014	0		A 1100 ±50				77PEREY
108.149 ± 0.0103	0		1071.82 ± 0.35				77SYME
110.589	1	0.5	4.8	0.995	0.823 ± 0.052		JENDL-2
110.7	1	1.5	1.86	1.0		GT = 2.86	JENDL-1
110.7 ± 0.3	[1]				1.3 ± 0.3		BNL325(3)
110							69HOCKENBURY
110.7 ± 0.3	[1]				1.3 ± 0.3		72BEER
110.7 ± 0.3	1				1.1 ± 0.3		77FROEHNER
110.589 ± 8	1		A 4.8 ± 1.5	0.995	0.823 ± 0.052		77PEREY
110.67	1		4.3 ± 2.5				77SYME1
110.67	1		9.8 ± 3.5				77SYME2
110.67	1		4.5 ± 1.5				77SYME3
111.30	1	1.5	0.86	(1.0)	0.927 ± 0.058		JENDL-2
111.30	1		A(3)		0.927 ± 0.058		77PEREY
117.733	1	0.5	10.6	1.028	0.939 ± 0.061		JENDL-2
117.5	1	1.5	0.667	1.0		GT = 1.667	JENDL-1
117.5 ± 0.3	[1]				0.8 ± 0.3		BNL325(3)
117.5 ± 0.3	[1]				0.8 ± 0.3		72BEER
117.5 ± 0.3	1				0.75 ± 0.25		77FROEHNER
117.733 ± 5	1		A 10.6 ± 1.4	1.028	0.939 ± 0.061		77PEREY
117.82	1		15.2 ± 2.5				77SYME1
117.82	1		16.9 ± 3.4				77SYME2
117.82	1		10.1 ± 0.7				77SYME3
118.5	1	1.5	4.2	0.7	1.2 ± 0.4		JENDL-2
118.5 ± 0.3	1				1.2 ± 0.4		77FROEHNER
118.07	1		4.2 ± 1.5				77SYME1
119.648	1	1.5	7.2	1.61	2.634 ± 0.114		JENDL-2
120.3 ± 0.3	0	0.5		3.3 ± 0.6			BNL325(3)
120							69HOCKENBURY
120.3 ± 0.3	[0]				3.3 ± 0.6		72BEER
120.0 ± 0.3	1				2.4 ± 0.8		77FROEHNER
119.648 ± 4	1		A 6.5 ± 1.3	4.421	2.634 ± 0.114		77PEREY
119.75	1		8.2 ± 2.4				77SYME1
119.75	1		12.8 ± 3.0				77SYME2
119.75	1		6.6 ± 1.2				77SYME3
123.381	0	0.5	435.0	3.5			JENDL-2
123.8	0	0.5	630.0	2.0		GT = 632.0	JENDL-1
122.5	0	0.5	700.0	2.14		GT = 702.14	ENDF-B-4
125.0 ± 0.5	0	0.5	A 700 ±200	3.2 ± 0.6		WGH = 1.98 ± 0.57	BNL325(3)
123.8	0		630	2.0			73MOXON

ENERGY (KEV)	L	J	NEUTRON WIDTH (EV)	GAMMA WIDTH (EV)	WW5 (EV)	MISCELLANEOUS	REFERENCE
124.34	0)	0.5	617	3.2			74MOXON
122.5	0					GT = 1000 GNC = 2.857	66FARRELL
124							69HOCKENBURY
123.8 ± 0.6	0		740 ±200			GNC = 2.10 ± 0.57	71GARG
125.0 ± 0.5	0		A 750 ±250	3.2 ± 0.6	3.1 ± 0.6		72BEER
124.0 ± 0.5	0		700 ±250	3.5 ± 0.6			75FROEHNER
124.0 ± 0.5	0	0.5	A (750)	B 3.5 ± 0.6			77FROEHNER
123.381 ± 0.0081	0		435.0 ± 0.35				77SYME
125.27	1	0.5	4.1	(1.0)			JENDL-2
125.27	1		10.8 ± 3.2				77SYME1
125.27	1		5.1 ± 3.0				77SYME2
125.27	1		3.0 ± 1.2				77SYME3
126.83	1	0.5	7.3	(1.0)			JENDL-2
126.83	1		7.3 ± 2.0				77SYME1
128.29	1	0.5	7.4	(1.0)			JENDL-2
128.29	1		7.4 ± 2.4				77SYME1
130.2	1	0.5	20.5	0.71	0.69 ± 0.14		JENDL-2
130.2 ± 0.4	1				0.69 ± 0.14		77FROEHNER
129.91	1		20.0 ± 3.2				77SYME1
129.91	1		19.65 ± 3.2				77SYME2
129.91	1		20.95 ± 1.6				77SYME3
133.55	1	1.5	21.0	1.05	2.0 ± 0.4		JENDL-2
133.0 ± 0.4	1				2.0 ± 0.4		77FROEHNER
133.55	1		18.5 ± 2.9				77SYME1
133.55	1		179.0 ± 3.5				77SYME2
133.55	1		22.1 ± 1.8				77SYME3
135.72	1	0.5	9.4	(1.0)			JENDL-2
135.72	1		9.4 ± 2.5				77SYME1
136.07	1	0.5	10.6	(1.0)			JENDL-2
136.07	1		10.6 ± 2.5				77SYME1
137.319	0	0.5	2617.28	2.2			JENDL-2
137.5	0	0.5	1760.0	2.0		GT = 1762.0	JENDL-1
136.0	0	0.5	2200.0	2.14		GT = 2202.1	ENDF-B-4
137.5 ± 0.7	0	0.5	A 1760 ±200			WGH = 4.75 ± 0.54	BNL325(3)
137.5	0		1760	2.0			73MOXON
137.5	0	0.5	1760	(2.0)			74MOXON
136.0	0					GT = 3000	66FARRELL
						GNO = 8.135	
137.5 ± 0.7	0		1760 ±200			GNO = 4.76 ± 0.54	71GARG
136.8 ± 0.7	0	0.5	A (1760)	B 2.2 ± 0.4			77FROEHNER
137.319 ± 0.019	0		2617.28 ± 0.52				77SYME
139.913	0	0.5	2867.4	2.2			JENDL-2
140.5	0	0.5	3460.0	2.0		GT = 3462.0	JENDL-1
138.5	0	0.5	3000.0	2.14		GT = 3002.1	ENDF-B-4
140.5 ± 0.8	0	0.5	A 3460 ±500			WGH = 9.23 ± 1.33	BNL325(3)
140.5	0		3460	2.0			73MOXON
140.5	0	0.5	3460	(2.0)			74MOXON
138.5	0					GT = 3000	66FARRELL
						GNO = 8.061	
140.5 ± 0.8	0		3460 ±490			GNO = 9.23 ± 1.31	71GARG
139.7 ± 0.7	0	0.5	A (3460)	B 2.2 ± 0.5			77FROEHNER
139.913 ± 0.021	0		2867.4 ± 0.62				77SYME
145.14	1	1.5	133	1.2	2.4 ± 0.46		JENDL-2
142.9 ± 0.8	1				2.4 ± 0.46		77FROEHNER
145.14	1		141.0 ± 5.1				77SYME1
145.14	1		150.0 ±10.0				77SYME2
145.14	1		121.0 ± 5.0				77SYME3
148.73	1	1.5	136.5	1.25	2.5 ± 0.5		JENDL-2
148.74	1	0.5	160.0	1.0		GT = 161.0	JENDL-1
147.5	1	0.5	160.0	0.6		GT = 160.6	ENDF-B-4
147.5 ± 0.8	*		A 175				BNL325(3)
148.74	0	0.5	160	1.0			73MOXON
147.5	0		A 175 ±15				66FARRELL
146.5 ± 0.9	1		A (175)		2.5 ± 0.5		77FROEHNER
148.73	1		136.5 ± 3.5				77SYME1
148.73	1		141.0 ± 9.2				77SYME2
148.73	1		136.0 ± 5.0				77SYME3
151.32	1	1.5	19.1	(0.9)	1.7		JENDL-2
150.5 ± 1.0	1				1.7 ± 0.4		77FROEHNER
151.32	1		15.75 ± 5.0				77SYME1
151.32	1		20.8 ± 3.3				77SYME2
151.32	1		19.1 ± 1.6				77SYME3
151.73	1	0.5	7.5	(1.0)			JENDL-2
151.73	1		7.5 ± 4.0				77SYME1
156.5	1	0.5	89.0	(1.0)			JENDL-2
156.5	1		75.0 ±18.0				77SYME2
156.5	1		95.0 ±12.0				77SYME3
156.92	1	0.5	56.0	(1.0)			JENDL-2
156.92	1		50.0 ± 6.0				77SYME1
156.92	1		63.0 ±24.0				77SYME2

ENERGY (KEV)	L	J	NEUTRON WIDTH (EV)	GAMMA WIDTH (EV)	WWS (EV)	MISCELLANEOUS	REFERENCE
156.92	1		102.0 ±18.0				77SYME3
157.251	0	0.5	4960.9	3.0			JENDL-2
159.5	0	0.5	6000.0	2.0		GT = 6002.0	JENDL-1
157.4	0	0.5	6250.0	2.14		GT = 6252.1	ENDF-B-4
159.5 ± 0.9	0	0.5	^{A}6000 ±1000			WGH = 15.02 ± 2.50	BNL325(3)
159.0	0		5040	2.0			73MOXON
159.0	0	0.5	7010	(2.0)			74MOXON
157.0	0					GT = 6250	66FARRELL
						GNO = 15.774	
159 ± 1	0		7380 ±2110			GNO = 18.51 ± 5.29	71GARG
159.5 ± 2.0	0	0.5	^{A}6000)	^{B} 3.0 ± 1.0			77FROEHNER
157.251 ± 0.032	0		4960.9 ± 0.66				77SYME
161.12	1	1.5	17.2	1.83	3.3		JENDL-2
161.0 ± 1.2	1				3.3 ± 1.1		77FROEHNER
161.12	1		17.2 ± 3.1				77SYME1
165.97	1	0.5	40.0	(1.0)			JENDL-2
165.97	1		40.0 ± 4.0				77SYME1
165.97	1		32.8 ± 7.3				77SYME2
165.97	1		41.3 ± 4.1				77SYME3
166.98	1	1.5	32.0	1.03	2.0 ± 1.0		JENDL-2
167.0 ± 1.3	1				2.0 ± 1.0		77FROEHNER
166.98	1		32.0 ± 3.5				77SYME1
168.675	0	1	319.73	2.5			JENDL-2
169.0	0	0.5	750.0	2.0		GT = 752.0	JENDL-1
167.5	0	0.5	500.0	2.14		GT = 502.14	ENDF-B-4
169.0 ± 1.0	0	0.5	^{A}750 ±220			WGH = 1.82 ± 0.54	BNL325(3)
169.0	0		640	2.0			73MOXON
169.0	0	0.5	640	(2.0)			74MOXON
167.5	0					GT = 500	66FARRELL
						GNO = 1.222	
169 ± 1	0		870 ±220			GNO = 2.11 ± 0.53	71GARG
169.0 ± 2			^{A}750)	^{B} 2.5 ± 1.0			77FROEHNER
168.675 ± 0.014	0		319.73 ± 0.62				77SYME
175.14	1	1.5	72.5	1.5	3.0		JENDL-2
173.5 ± 1.5	1				3.0 ± 1.0		77FROEHNER
175.14	1		76.5 ± 5.7				77SYME1
175.14	1		65.5 ±10.0				77SYME2
175.14	1		70.5 ± 5.0				77SYME3
180.13	1	0.5	14.5	(1.0)			JENDL-2
180.13	1		14.5 ± 8.8				77SYME1
180.59	1	0.5	15.2	(1.0)			JENDL-2
180.59	1		31.0 ±12.0				77SYME1
180.59	1		14.1 ± 2.5				77SYME2
180.59	1		18.2 ± 6.4				77SYME3
181.28	1	0.5	13.7	(1.0)			JENDL-2
181.28	1		10.8 ± 6.8				77SYME1
181.28	1		12.8 ± 2.9				77SYME2
181.28	1		21.7 ± 6.7				77SYME3
182.9	1	0.5	22.0	(1.0)			JENDL-2
182.9	1		20.5 ± 6.0				77SYME2
182.9	1		23.0 ± 2.5				77SYME3
184.53	1	1.5	140.3	4.0	8.0		JENDL-2
184.74	1	0.5	227.0	1.0		GT = 228.0	JENDL-1
183.5	1	1.5	127.0	0.6		GT = 127.6	ENDF-B-4
183.5 ± 1.1	•		^{A}250				BNL325(3)
184.74	0	0.5	227	1.0			73MOXON
183.5	0		^{A}248.5 ±21.5				66FARRELL
183.8 ± 1.7	1				8.0 ± 3.0		77FROEHNER
184.53	1		131.0 ± 9.0				77SYME1
184.53	1		161.0 ±10.3				77SYME2
184.53	1		138.0 ± 4.1				77SYME3
185.91	1	0.5	32.5	(1.0)			JENDL-2
185.91	1		33.0 ± 4.0				77SYME1
185.91	1		47.4 ± 8.0				77SYME2
185.91	1		30.0 ± 3.0				77SYME3
191.415	0	0.5	2381.32	3.0			JENDL-2
193.0	0	0.5	3500.0	2.0		GT = 3502.0	JENDL-1
190.5	0	0.5	3000.0	2.14		GT = 3002.1	ENDF-B-4
193.0 ± 1.2	0	0.5	^{A}3500 ±500			WGH = 7.97 ± 1.14	BNL325(3)
192.0	0		3620	2.0			73MOXON
192.0	0	0.5	3620	(2.0)			74MOXON
190.5	0					GT = 3000	66FARRELL
						GNO = 6.873	
192 ± 1	0		4050 ±580			GNO = 9.24 ± 1.32	71GARG
193.0 ± 2.0	0	0.5	^{A}3500)	^{B} 3.0 ± 1.0			77FROEHNER
191.415 ± 0.021	0		2381.32 ± 0.64				77SYME
196.08	1	0.5	8.3	(1.0)			JENDL-2
196.08	1		8.7 ± 3.9				77SYME1
196.08	1		27.0 ± 8.5				77SYME2
196.08	1		8.0 ± 2.5				77SYME3
198.05	1	1.5	22.5	(1.9)	3.5		JENDL-2

ENERGY (KEV)	L	J	NEUTRON WIDTH (EV)	GAMMA WIDTH (EV)	WWS (EV)	MISCELLANEOUS	REFERENCE
199.0 ± 2.0	1				3.5 ± 1.2		77FROEHNER
198.05	1		22.5 ± 5.0				77SYME1
201.27	1	0.5	18.0	(1.0)			JENDL-2
201.27	1		18.0 ± 5.0				77SYME1
202.43	1	0.5	11.5	(1.0)			JENDL-2
202.43	1		14.5 ± 4.5				77SYME1
202.43	1		16.0 ± 8.0				77SYME2
202.43	1		9.4 ± 3.1				77SYME3
205.46	0	0.5	6518.8	4.5			JENDL-2
207.0	0	0.5	6800.0	2.0		GT = 6802.0	JENDL-1
204.5	0	0.5	7500.0	2.14		GT = 7502.1	ENDF-B-4
207.0 ± 1.5	0	0.5	A 6800 ±1200			WGH = 14.95 ± 2.64	BNL325(3)
207.0	0		6820	2.0			73MOXON
207.0	0	0.5	6820	(2.0)			74MOXON
204.5	0					GT = 7500	66FARRELL
						GNO = 16.585	
207 ± 1.5	0		6030 ±200			GNO = 13.25 ± 2.64	71GARG
207.8 ± 2.5	0	0.5	A(6800)	B 4.5 ± 2.0			77FROEHNER
205.46 ± 0.045	0		6518.8 ± 0.67				77SYME
207.18	1	0.5	285	(1.0)			JENDL-2
207.18	1		382.0 ±100.0				77SYME1
207.18	1		285.0 ±100.0				77SYME2
207.18	1		185.0 ±100.0				77SYME3
216.52	1	1.5	190.0	4.0	8.0 ± 3.0		JENDL-2
216.24	1	0.5	245.0	1.0		GT = 246.0	JENDL-1
215.8	1	0.5	245.0	0.6		GT = 245.6	ENDF-B-4
215.0 ± 1.5	*		A 260				BNL325(3)
216.24	> 0	0.5	245	1.0			73MOXON
215.0	> 0		A 262.5 ±17.5				66FARRELL
215.8 ± 2.0	1		A(260)		8 ± 3		77FROEHNER
216.52	1		200.0 ±14.6				77SYME1
216.52	1		180.0 ±12.5				77SYME2
216.52	1		190.0 ±17.0				77SYME3
217.9	1	0.5	23.0	(1.0)			JENDL-2
217.9	1		34.5 ± 9.5				77SYME1
217.9	1		17.6 ±11.0				77SYME2
217.9	1		20.8 ± 5.0				77SYME3
230.9	1	0.5	78.5	(1.0)			JENDL-2
230.9	1		78.5 ±11.0				77SYME1
232.289	0	0.5	4227.66	9.0			JENDL-2
232.24	0	0.5	6000.0	2.0		GT = 6002.0	JENDL-1
231.0	0	0.5	6000.0	2.14		GT = 6002.1	ENDF-B-4
231.0 ± 1.8	0	0.5	A 6000			WGH = 12.48	BNL325(3)
232.24	0		6000	2.0			73MOXON
232.24	0	0.5	6000	(2.0)			74MOXON
231.0	0					GT = 6000	66FARRELL
						GNO = 12.484	
230.4 ± 3.0	0	0.5	A(6000)	B 9 ± 4			77FROEHNER
232.289 ± 0.033	0		4227.66 ± 0.87				77SYME
236.0	1	0.5	14.5	(1.0)			JENDL-2
236.0	1		6.7 ± 7.3				77SYME2
236.0	1		16.0 ± 3.1				77SYME3
242.65	1	0.5	36.0	(1.0)			JENDL-2
242.65	1		51.0 ±14.0				77SYME1
242.65	1		23.7 ± 9.0				77SYME2
242.65	1		36.0 ± 4.3				77SYME3
243.85	1	0.5	24.0	(1.0)			JENDL-2
243.85	1		17.0 ± 9.0				77SYME2
243.85	1		25.0 ± 4.0				77SYME3
245.105	0	0.5	138.43	(2.0)			JENDL-2
244.24	0	0.5	250.0	2.0		GT = 252.0	JENDL-1
243.0	0	0.5	250.0	2.14		GT = 252.14	ENDF-B-4
243.0 ± 1.8	0	0.5	A 250			WGH = 0.51	BNL325(3)
244.24	0		250	2.0			73MOXON
244.24	0	0.5	250	(2.0)			74MOXON
243.0	0					GT = 250	66FARRELL
						GNO = 0.507	
245.105 ± 0.031	0		138.43 ± 0.94				77SYME
249.39	1	0.5	281.0	(1.0)			JENDL-2
248.74	1	0.5	343.0	1.0		GT = 344.0	JENDL-1
248.1	1	0.5	343.0	0.6		GT = 343.6	ENDF-B-4
247.5 ± 1.8	*		A 360				BNL325(3)
248.74	> 0	0.5	343	1.0			73MOXON
247.5	> 0		A 363.5 ±20.5				66FARRELL
249.39	1		268.0 ±20.0				77SYME1
249.39	1		290.0 ±16.0				77SYME2
249.39	1		281.0 ± 8.0				77SYME3
250.625	1	0.5	45.0	(1.0)			JENDL-2
250.625	1		68.0 ±16.0				77SYME1
250.625	1		57.5 ±11.0				77SYME2
250.625	1		41.0 ± 4.4				77SYME3
254.18	1	0.5	23.5	(1.0)			JENDL-2

ENERGY (KEV)	L	J	NEUTRON WIDTH (EV)	GAMMA WIDTH (EV)	WWS (EV)	MISCELLANEOUS	REFERENCE
254.18	1		28.0 ±11.2				77SYME1
254.18	1		23.5 ±14.0				77SYME2
254.18	1		21.5 ± 6.5				77SYME3
254.85	1	0.5	32.0	(1.0)			JENDL-2
254.85	1		32.0 ±10.0				77SYME1
259.27	1	0.5	77.0	(1.0)			JENDL-2
258.24	1	0.5	75.0	1.0		GT = 76.0	JENDL-1
258.24	> C	0.5	(75)	1.0			73MOXON
257.5	> 0						66FARRELL
259.27	1		77.0 ±15.0				77SYME1
267.7	1	0.5	36.0	(1.0)			JENDL-2
267.7	1		80.0 ±14.5				77SYME1
267.7	1		9.0 ±16.0				77SYME2
267.7	1		36.0 ± 8.5				77SYME3
269.44	1	0.5	71.0	(1.0)			JENDL-2
269.44	1		54.0 ±13.0				77SYME1
269.44	1		71.0 ±25.0				77SYME2
269.44	1		76.0 ± 9.0				77SYME3
271.608	0	0.5	5510.2	(2.0)			JENDL-2
271.24	0	0.5	6000.0	2.0		GT = 6002.0	JENDL-1
271.5	0	0.5	7500.0	2.14		GT = 7502.1	ENDF-B-4
270.0 ± 2.0	0	0.5	[A]6000			WGH = 11.55	BNL325(3)
271.24	0		6000	2.0			73MOXON
271.24	0	0.5	6000	(2.0)			74MOXON
270.0	0					GT = 6000 GNO = 11.547	66FARRELL
271.608 ± 0.042	0		5510.2 ± 1.0				77SYME
273.55	1	0.5	67.0	(1.0)			JENDL-2
273.55	1		67.0 ±10.0				77SYME1
277.3	1	0.5	81.0	(1.0)			JENDL-2
277.3	1		81.0 ±16.0				77SYME1
278.48	1	0.5	152.0	(1.0)			JENDL-2
278.48	1		114.5 ±16.0				77SYME1
278.48	1		142.0 ±22.0				77SYME2
278.48	1		169.0 ±10.0				77SYME3
280.997	0	0.5	1522.1	(2.0)			JENDL-2
279.24	0	0.5	2000.0	2.0		GT = 2002.0	JENDL-1
279.0	0	0.5	800.0	2.14		GT = 802.14	ENDF-B-4
278.0 ± 2.0	0	0.5	[A]2000			WGH = 3.79	BNL325(3)
279.24	0		2000	2.0			73MOXON
278.0	0					GT = 2000 GNO = 3.793	66FARRELL
280.997 ± 0.027	0		1522.1 ± 1.1				77SYME
289.3	1	0.5	196.0	(1.0)			JENDL-2
287.74	1	0.5	200.0	1.0		GT = 201.0	JENDL-1
287.6	1	0.5	200.0	0.6		GT = 200.6	ENDF-B-4
286.5 ± 2.0	■		[A]215				BNL325(3)
287.74	> 0	0.5	200	1.0			73MOXON
286.5	> 0		[A]215 ±15				66FARRELL
289.3	1		210.0 ±20.0				77SYME1
289.3	1		196.0 ±31.0				77SYME2
289.3	1		187.0 ±14.0				77SYME3
297.5	1	0.5	63.0	(1.0)			JENDL-2
297.5	1		61.5 ±14.0				77SYME2
297.5	1		64.0 ± 6.0				77SYME3
300.01	1	0.5	33.0	(1.0)			JENDL-2
300.01	1		50.0 ±20.0				77SYME1
300.01	1		30.0 ±14.0				77SYME2
300.01	1		32.0 ± 6.0				77SYME3
301.32	1	0.5	90.0	(1.0)			JENDL-2
301.32	1		151.0 ±26.0				77SYME1
301.32	1		93.0 ±30.0				77SYME2
301.32	1		51.0 ±20.0				77SYME3
304.74	0	0.5	750.0	(2.0)			JENDL-2
304.24	0	0.5	750.0	2.0		GT = 752.0	JENDL-1
304.0	0	0.5	750.0	2.14		GT = 752.14	ENDF-B-4
303.0 ± 2.0	0	0.5	[A]750			WGH = 1.36	BNL325(3)
304.24	0		750	2.0			73MOXON
304.74	0	0.5	750	(2.0)			74MOXON
303.5	0					GT = 750 GNO = 1.361	66FARRELL
307.28	1	0.5	155.0	1.0			JENDL-2
307.74	1	0.5	50.0	1.0		GT = 51.0	JENDL-1
307.74	> 0	0.5	(50)	1.0			73MOXON
306.5	> 0						66FARRELL
307.28	1		155.0 ±22.0				77SYME1
316.97	1	0.5	71.0	1.0			JENDL-2
316.97	1		71.0 ±22.0				77SYME1
321.22	1	0.5	96.0	1.0			JENDL-2

ENERGY (KEV)	L	J	NEUTRON WIDTH (EV)	GAMMA WIDTH (EV)	WWS (EV)	MISCELLANEOUS	REFERENCE
321.22	1		96.0 ±25.0				77SYME1
325.2	0	0.5	2000.0	(2.0)			JENDL-2
326.24	0	0.5	2000.0	2.0		GT = 2002.0	JENDL-1
325.0	0	0.5	1500.0	2.14		GT = 1502.1	ENDF-B-4
325.0 ± 2.0	0	0.5	^{A}2000			WGH = 3.51	BNL325(3)
326.24	0		2000	2.0			73MOXON
326.24	0	0.5	2000	(2.0)			74MOXON
325.0	0						66FARRELL
						GT = 2000	
						GNO = 3.508	
334.747	1	0.5	552.0	(1.0)			JENDL-2
335.74	1	0.5	592.0	1.0		GT = 593.0	JENDL-1
333.2	1	0.5	592.0	0.6		GT = 592.6	ENDF-B-4
334.5 ± 2.5	*		^{A}624				BNL325(3)
335.74	▸ 0	0.5	592	1.0			73MOXON
334.5	▸ 0		^{A}624 ±32				66FARRELL
334.747	1		552.0 ±28.0				77SYME1
343.3	1	0.5	151.0	(1.0)			JENDL-2
343.3	1		151.0 ±18.2				77SYME1
344.1	1	0.5	222.0	(1.0)			JENDL-2
344.74	1	0.5	560.0	1.0		GT = 561.0	JENDL-1
342.5	1	0.5	560.0	0.6		GT = 560.6	ENDF-B-4
343.5 ± 2.5	*		^{A}585				BNL325(3)
344.74	▸ 0	0.5	560	1.0			73MOXON
343.5	▸ 0		^{A}585 ±25				66FARRELL
344.1	1		222.0 ±22.0				77SYME1
349.0	0	0.5	1500.0	2.0			JENDL-2
350.24	0	0.5	1500.0	2.0		GT = 1502.0	JENDL-1
348.0	0	0.5	1500.0	2.14		GT = 1502.1	ENDF-B-4
349.0	0	0.5	^{A}1500			WGH = 2.54	BNL325(3)
350.24	0		1500	2.0			73MOXON
350.24	0	0.5	1500	(2.0)			74MOXON
349.0	0						66FARRELL
						GT = 1500	
						GNO = 2.539	
357.59	1	0.5	260.0	(1.0)			JENDL-2
358.74	1	0.5	426.0	1.0		GT = 427.0	JENDL-1
357.5	1	0.5	426.0	0.6		GT = 426.6	ENDF-B-4
357.5	*		^{A}443				BNL325(3)
358.74	▸ 0	0.5	426	1.0			73MOXON
357.5	▸ 0		^{A}443 ±17				66FARRELL
357.59	1		260.0 ±32.0				77SYME1
359.7	1	0.5	148.0	(1.0)			JENDL-2
359.7	1		148.0 ±32.0				77SYME1
367.0	0	0.5	250.0	2.0			JENDL-2
368.24	0	0.5	250.0	2.0		GT = 252.0	JENDL-1
367.0	0	0.5	250.0	2.14		GT = 252.14	ENDF-B-4
367.0	0	0.5	^{A}250			WGH = 0.41	BNL325(3)
368.24	0		250	2.0			73MOXON
368.24	0	0.5	250	(2.0)			74MOXON
367.0	0						66FARRELL
						GT = 250	
						GNO = 0.413	
378.78	1	0.5	200.0	(1.0)			JENDL-2
379.74	1	0.5	426.0	1.0		GT = 427.0	JENDL-1
377.5	1	0.5	480.0	0.6		GT = 480.6	ENDF-B-4
378.5	*		^{A}443				BNL325(3)
379.74	▸ 0	0.5	426	1.0			73MOXON
378.5	▸ 0		^{A}500 ±20				66FARRELL
378.78	1		200.0 ±24.0				77SYME1
379.75	1	0.5	175.0	(1.0)			JENDL-2
379.75	1		175.0 ±24.5				77SYME1
389.74	1	0.5	480.0	1.0		GT = 481.0	JENDL-1
387.5	*		^{A}500				BNL325(3)
389.74	▸ 0	0.5	480	1.0			73MOXON
394.5	0	0.5	750.0	2.0			JENDL-2
395.24	0	0.5	750.0	2.0		GT = 752.0	JENDL-1
392.8	0	0.5	1900.0	2.14		GT = 1902.1	ENDF-B-4
394.0	0	0.5	^{A}750			WGH = 1.20	BNL325(3)
395.24	0		750	2.0			73MOXON
395.24	0	0.5	750	(2.0)			74MOXON
394.0	0						66FARRELL
						GT = 750	
						GNO = 1.195	
397.362	1	0.5	483.0	(1.0)			JENDL-2
397.74	1	0.5	50.0	1.0		GT = 51.0	JENDL-1
397.74	▸ 0	0.5	(50)	1.0			73MOXON
396.5	▸ 0						66FARRELL
397.362	1		483.0 ±36.0				77SYME1
406.63	1	0.5	80.0	(1.0)			JENDL-2
406.63	1		80.0 ±25.0				77SYME1
409.43	1	0.5	120.0	(1.0)			JENDL-2
409.43	1		120.0 ±30.0				77SYME1
413.18	1	0.5	145.0	(1.0)			JENDL-2

ENERGY (KEV)	L	J	NEUTRON WIDTH (EV)	GAMMA WIDTH (EV)	WWS (EV)	MISCELLANEOUS	REFERENCE
414.24	1	0.5	50.0	1.0		GT = 51.0	JENDL-1
410.0	1	1.5	100.0	0.6		GT = 100.6	ENDF-B-4
414.24	▸ 0	0.5	(50)	1.0			73MOXON
413.0	▸ 0						66FARRELL
413.18	1		145.0 ±56.0				77SYMEI
416.04	1	0.5	510.0	(1.0)			JENDL-2
417.24	1	0.5	20.0	1.0		GT = 21.0	JENDL-1
417.24	▸ 0	0.5	(20)	1.0			73MOXON
416.0	▸ 0						66FARRELL
416.04	1		510.0 ±36.0				77SYMEI
418.74	0	0.5	5000.0	2.0			JENDL-2
418.74	0	0.5	5000.0	2.0		GT = 5002.0	JENDL-1
415.0	0	0.5	10500.0	2.14		GT = 10502.0	ENDF-B-4
417.0	0	0.5	[A]5000			WGH = 7.74	BNL325(3)
418.74	0		5000	2.0			73MOXON
418.74	0	0.5	5000	(2.0)		GT = 5000	74MOXON
417.5	0					GNO = 7.738	66FARRELL
429.56	1	0.5	180.0	(1.0)			JENDL-2
427.24	1	1.5	900.0	1.0		GT = 901.0	JENDL-1
426.0	1	1.5	[A]1830 ±400			WGI = 5.2	BNL325(3)
427.24	▸ 0	0.5	1800	1.0			73MOXON
426.0	▸ 0	1.5	[A]915 ±15				66FARRELL
429.56	1		180.0 ±31.0				77SYMEI
425.0	0	0.5	8000.0	2.0			JENDL-2
427.24	0	0.5	8000.0	2.0		GT = 8002.0	JENDL-1
423.6	0	0.5	8000.0	2.14		GT = 8002.1	ENDF-B-4
426.5	0	0.5	[A]8000			WGH = 12.25	BNL325(3)
427.24	0		8000	2.0			73MOXON
427.24	0	0.5	8000	(2.0)		GT = 8000	74MOXON
425.5	0					GNO = 12.250	66FARRELL
432.7	1	0.5	195.0	1.0			JENDL-2
436.74	1	0.5	20.0	1.0		GT = 21.0	JENDL-1
436.74	▸ 0	0.5	(20)	1.0			73MOXON
435.5	▸ 0						66FARRELL
432.7	1		195.0 ±30.0				77SYMEI
446.59	1	0.5	248.0	1.0			JENDL-2
446.24	1	0.5	20.0	1.0		GT = 21.0	JENDL-1
446.24	▸ 0	0.5	(20)	1.0			73MOXON
446.0	▸ 0						66FARRELL
446.59	1		248.0 ±36.0				77SYMEI
451.85	1	0.5	370.0	1.0			JENDL-2
452.24	1	0.5	20.0	1.0		GT = 21.0	JENDL-1
452.24	▸ 0	0.5	(20)	1.0			73MOXON
451.0	▸ 0						66FARRELL
451.85	1		370.0 ±36.0				77SYMEI
454.74	0	0.5	3000.0	2.0			JENDL-2
454.74	0	0.5	3000.0	2.0		GT = 3002.0	JENDL-1
455.25	0	0.5	2200.0	2.14		GT = 2202.1	ENDF-B-4
454.5	0	0.5	[A]3000			WGH = 4.45	BNL325(3)
454.74	0		3000	2.0			73MOXON
455.74	0	0.5	3000	(2.0)		GT = 3000	74MOXON
454.5	0					GNO = 4.450	66FARRELL
459.74	1	0.5	75.0	1.0		GT = 76.0	JENDL-1
459.74	▸ 0	0.5	(75)	1.0			73MOXON
458.5	▸ 0						66FARRELL
462.1	0	0.5	750.0	2.0			JENDL-2
462.74	0	0.5	750.0	2.0		GT = 752.0	JENDL-1
461.5	0	0.5	750.0	2.14		GT = 752.14	ENDF-B-4
461.5	0	0.5	[A]750			WGH = 1.10	BNL325(3)
462.74	0		750	2.0			73MOXON
462.74	0	0.5	750	(2.0)		GT = 750	74MOXON
461.5	0					GNO = 1.104	66FARRELL
475.7	1	1.5	300.0	0.6		GT = 300.6	ENDF-B-4
480.0	1	0.5	100.0	0.6		GT = 100.6	ENDF-B-4
492.966	1	0.5	1675.0	(1.0)			JENDL-2
493.74	1	0.5	1987.0	1.0		GT = 1988.0	JENDL-1
492.2	1	0.5	1050.0	0.6		GT = 1050.6	ENDF-B-4
492.5	*		[A]2000				BNL325(3)
493.74	▸ 0	0.5	1987	1.0			73MOXON
492.5	▸ 0		[A]2016.5 ±29.5				66FARRELL
492.966	1		1675.0 ±75.0				77SYMEI
495.5	0	0.5	2000.0	2.0			JENDL-2
496.74	0	0.5	2000.0	2.0		GT = 2002.0	JENDL-1
495.2	0	0.5	2000.0	2.14		GT = 2002.1	ENDF-B-4
495.5	0	0.5	[A]2000			WGH = 2.84	BNL325(3)
496.74	0		2000	2.0			73MOXON
496.74	0	0.5	2000	(2.0)		GT = 2000	74MOXON
495.5	0					GNO = 2.841	66FARRELL

ENERGY (KEV)	L	J	NEUTRON WIDTH (EV)	GAMMA WIDTH (EV)	WWS (EV)	MISCELLANEOUS	REFERENCE
507.2	0	0.5	2000.0	2.0			JENDL-2
508.24	0	0.5	2000.0	2.0		GT = 2002.0	JENDL-1
507.0	0	0.5	2000.0	2.14		GT = 2002.1	ENDF-B-4
507.0	0	0.5	^{A}2000			WGH = 2.81	BNL325(3)
508.24	0		2000	2.0			73MOXON
508.24	0	0.5	2000	(2.0)			74MOXON
507.0	0					GT = 2000 GNO = 2.809	66FARRELL
509.24	1	0.5	75.0	1.0		GT = 76.0	JENDL-1
509.24	0	0.5	(75)	1.0			73MOXON
508.0	0						66FARRELL
513.74	1	0.5	100.0	1.0		GT = 101.0	JENDL-1
513.74	0	0.5	(100)	1.0			73MOXON
512.5	0						66FARRELL
523.0	0	0.5	750.0	2.0			JENDL-2
523.74	0	0.5	750.0	2.0		GT = 752.0	JENDL-1
522.5	0	0.5	750.0	2.14		GT = 752.14	ENDF-B-4
522.5	0	0.5	^{A}750			WGH = 1.04	BNL325(3)
523.74	0		750	2.0			73MOXON
523.74	0	0.5	750	(2.0)			74MOXON
522.5	0					GT = 750 GNO = 1.038	66FARRELL
530.0	1	0.5	422.0	1.0			JENDL-2
531.24	1	0.5	422.0	1.0		GT = 423.0	JENDL-1
528.9	1	0.5	300.0	0.6		GT = 300.6	ENDF-B-4
530.0	*		^{A}430				BNL325(3)
531.24	0	0.5	422	1.0			73MOXON
530.0	0		^{A}431 ± 9				66FARRELL
541.5	1	0.5	640.0	1.0			JENDL-2
545.24	1	0.5	640.0	1.0		GT = 641.0	JENDL-1
541.1	1	0.5	420.0	0.6		GT = 420.6	ENDF-B-4
544.0	*		^{A}640				BNL325(3)
545.24	0	0.5	640	1.0			73MOXON
544.0	0		^{A}642 ± 2				66FARRELL
554.69	1	0.5	1325.0	(1.0)			JENDL-2
555.74	1	0.5	1600.0	1.0		GT = 1601.0	JENDL-1
553.9	1	0.5	400.0	0.6		GT = 400.6	ENDF-B-4
554.5	1	0.5	^{A}1490 ±300			WGI = 3.3	BNL325(3)
555.74	0	0.5	1600	1.0			73MOXON
554.5	0	0.5	^{A}1615 ±15				66FARRELL
554.69	1		1325.0 ±80.0				77SYME1
559.723	1	0.5	2025.0	(1.0)			JENDL-2
560.74	1	0.5	1260.0	1.0		GT = 1261.0	JENDL-1
559.2	1	1.5	140.0	0.6		GT = 140.6	ENDF-B-4
559.5	*		^{A}1260				BNL325(3)
560.74	0	0.5	1260	1.0			73MOXON
559.5	0		^{A}1263 ± 3				66FARRELL
560.023	1		2025.0 ±95.0				77SYME1
568.0	0	0.5	10000.0	2.0			JENDL-2
572.24	0	0.5	10000.0	2.0		GT = 10002.0	JENDL-1
568.8	0	0.5	10500.0	2.14		GT = 10502.0	ENDF-B-4
571.0	0	0.5	^{A}10000			WGH = 13.23	BNL325(3)
572.24	0		10000	2.0			73MOXON
572.24	0	0.5	10000	(2.0)			74MOXON
571.0	0					GT = 10000 GNO = 13.234	66FARRELL
575.5	1	0.5	300.0	0.6			JENDL-2
574.5	1	0.5	300.0	0.6		GT = 300.6	ENDF-B-4
588.5	0	0.5	2500.0	2.0			JENDL-2
588.74	0	0.5	2500.0	2.0		GT = 2502.0	JENDL-1
587.5	0	0.5	1900.0	2.14		GT = 1902.1	ENDF-B-4
588.5	0	0.5	^{A}2500			WGH = 3.26	BNL325(3)
588.74	0		2500	2.0			73MOXON
589.74	0	0.5	2500	(2.0)			74MOXON
588.5	0					GT = 2500 GNO = 3.259	66FARRELL
600.0	0	0.5	6000.0	2.0			JENDL-2
601.24	0	0.5	6000.0	2.0		GT = 6002.0	JENDL-1
599.8	0	0.5	6000.0	2.14		GT = 6002.1	ENDF-B-4
600.0	0	0.5	^{A}6000			WGH = 7.75	BNL325(3)
601.24	0		6000	2.0			73MOXON
601.24	0	0.5	6000	(2.0)			74MOXON
600.0	0					GT = 6000 GNO = 7.746	66FARRELL
603.975	1	0.5	925.0	(1.0)			JENDL-2
608.7	1	1.5	300.0	0.6		GT = 300.6	ENDF-B-4
603.975	1		925.0 ±82.0				77SYME1
612.0	1	1.5	200.0	0.6		GT = 200.6	ENDF-B-4
625.1	1	1.5	400.0	0.6		GT = 400.6	ENDF-B-4
629.0	1	0.5	130.0	0.6		GT = 130.6	ENDF-B-4
631.2	1	0.5	400.0	0.6		GT = 400.6	ENDF-B-4

ENERGY (KEV)	L	J	NEUTRON WIDTH (EV)	GAMMA WIDTH (EV)	WW5 (EV)	MISCELLANEOUS	REFERENCE
635.3	0	0.5	3000.0	2.14		GT = 3002.1	ENDF-B-4
642.5	1	0.5	600.0	0.6		GT = 600.6	ENDF-B-4
649.85	1		1900.0 ±300.0				77SYME1

* A and B denote $g\Gamma_n$ and $g\Gamma_\gamma$, respectively

** WW5 = $g\Gamma_n\Gamma_\gamma/\Gamma$ (eV), GT = Γ (eV)

WGH = $g\Gamma_n^{(0)}$ (eV), GNO = $\Gamma_n^{(0)}$ (eV)

WGI = $g\Gamma_n^{(1)}$ (eV), GGS = $\sigma_0\Gamma_\gamma$ (b·eV)

References

66Farrell : Ref.(21)

69Hockenbury: Ref.(23)

71Garg : Ref.(49)

72Beer : Ref.(50)

73Moxon : Ref.(51) (Evaluation)

74Moxon : Ref.(3) (Evaluation)

75Fröhner : Ref.(52)

77Fröhner : Ref.(22)

77Perey : Ref.(19)

77Syme : Ref.(20)

Table 7 Resonance parameters of ^{60}Ni

ENERGY (KEV)	L	J	NEUTRON WIDTH * (EV)	GAMMA WIDTH * (EV)	WWS ** (EV)	MISCELLANEOUS **	REFERENCE
-5.5	0	0.5	222	2.85			JENDL-2
-5.50	0		52.5	5.5			73MOXON
-5.50	0	0.5	52.5	5.5			74MOXON
1.292	1	0.5	0.0003	1.0			JENDL-2
1.292	1	0.5	0.0003	1.0		GT = 1.0003	JENDL-1
1.292	1	0.5	0.001	0.6		GT = 0.601	ENDF-B-4
1.293 ± 0.009					0.0003 ± 0.0001		BNL325(3)
1.292	0	0.5	0.0003	1.0			73MOXON
1.292 ± 0.004	1	0.5	0.0003	(1.0)	0.0003 ± 0.0001		74MOXON
1.294							69HOCKENBURY
1.292 ± 0.004	1				0.0003 ± 0.0001		70STIEGLITZ
2.257	1	0.5	0.073	1.0			JENDL-2
2.257	1	0.5	0.073	1.0		GT = 1.073	JENDL-1
2.257	1	1.5	0.034	0.6		GT = 0.634	ENDF-B-4
2.257 ± 0.009	(1)				0.065 ± 0.007		BNL325(3)
2.257	0	0.5	0.073	1.0			73MOXON
2.257	1	0.5	0.071	(1.0)			74MOXON
2.26					0.065 ± 0.007	GGS = 75.7 ± 8.0	69HOCKENBURY
2.257 ± 0.009	1				0.068 ± 0.011		70STIEGLITZ
5.53	1	0.5	0.0593	1.0			JENDL-2
5.53	1	0.5	0.0593	1.0		GT = 1.0593	JENDL-1
5.53	1	1.5	0.028	0.6		GT = 0.628	ENDF-B-4
5.53 ± 0.02	(1)				0.056 ± 0.009		BNL325(3)
5.53	0	0.5	0.059	1.0			73MOXON
5.53	1	0.5	0.059	(1.0)			74MOXON
5.52					0.055 ± 0.006	GGS = 25.9 ± 3.0	69HOCKENBURY
5.53 ± 0.02	1				0.056 ± 0.009		70STIEGLITZ
12.23	1	0.5	0.28	(1.0)	0.22 ± 0.05		JENDL-2
12.23	1	0.5	0.0706	1.0		GT = 1.0706	JENDL-1
12.23 ± 0.03	(1)				0.11 ± 0.02		BNL325(3)
12.20	0	0.5	0.044	1.0			73MOXON
12.22	1	0.5	0.046	(1.0)			74MOXON
12.2					0.17 ± 0.02	GGS = 37 ± 4	69HOCKENBURY
12.2 ± 0.04	1				0.042 ± 0.007		70STIEGLITZ
12.23 ± 0.03	(1)					WWC = 0.09 ± 0.02	72BEER
12.23 ± 0.03	1				0.22 ± 0.05		77FROEHNER
12.46	0	0.5	2353.5	2.73			JENDL-2
12.5	0	0.5	2660.0	3.3		GT = 2663.3	JENDL-1
12.43	0	0.5	2500.0	2.14		GT = 2502.1	ENDF-B-4
12.5 ± 0.1	0		A 2660 ±100	3.3 ± 0.3		WGH = 23.79 ± 0.89	BNL325(3)
12.47	0		2110	3.3			73MOXON
12.46	0	0.5	2112	3.33			74MOXON
14.5	0					GT = 2600	66FARRELL
						GNO = 21.640	
12.47 ± 0.06	0		2660 ±100	3.30 ± 0.30			70STIEGLITZ
12.4 ± 0.1	0		1910 ±50			GNO = 17.16 ± 0.54	71GARG
12.5 ± 0.1	0		A 2650 ±100	3.4 ± 0.4			72BEER
12.3 ± 0.1	0		2660 ±100	2.65 ± 0.28			75FROEHNER
12.3 ± 0.2	0	0.5	A 2660	B 2.73 ± 0.50			77FROEHNER
12.2244 ± 0.046	0		2353.5 ± 0.6				77SYME
13.62	1	0.5	0.52	(1.0)	0.34 ± 0.05		JENDL-2
13.62	1	0.5	0.13	1.0		GT = 1.13	JENDL-1
13.62 ± 0.03	(1)				0.11 ± 0.03		BNL325(3)
13.60	0	0.5	0.099	1.0			73MOXON
13.616	1	0.5	0.13	(1.0)			74MOXON
13.8							69HOCKENBURY
13.6 ± 0.05	1				0.090 ± 0.013		70STIEGLITZ
13.62 ± 0.03	(1)					WWC = 0.14 ± 0.03	72BEER
13.62 ± 0.03	1				0.34 ± 0.05		77FROEHNER
17.20	1	0.5	0.064	(1.0)	0.06 ± 0.02		JENDL-2
17.20 ± 0.05	1				0.06 ± 0.02		77FROEHNER
23.89	1	1.5	0.56	(1.0)	0.72 ± 0.12		JENDL-2
23.8	1	1.5	0.613	1.0		GT = 1.613	JENDL-1
23.8	1	1.5	0.7	1.2		GT = 1.9	ENDF-B-4
23.88 ± 0.06	1	1.5			0.78 ± 0.10		BNL325(3)
23.8	0	1.5	0.85	1.0			73MOXON
23.86	1	1.5	0.58	(1.0)			74MOXON
23.8					0.78 ± 0.10	GGS = 85.7 ±12.2	69HOCKENBURY
23.8 ± 0.10	1				0.921 ± 0.140		70STIEGLITZ
23.88 ± 0.06	(1)					WWC = 0.60 ± 0.12	72BEER
23.89 ± 0.06	1				0.72 ± 0.12		77FROEHNER
28.47	1	0.5	0.11	(1.0)	0.10 ± 0.03		JENDL-2
28.47	1	0.5	0.171	1.2		GT = 1.371	JENDL-1
28.47 ± 0.07	(1)				0.15 ± 0.05		BNL325(3)
28.47 ± 0.07	1	0.5	0.087	(1.0)	0.08 ± 0.04		74MOXON
28.5					0.26 ± 0.05	GGS = 23.2 ± 5.0	69HOCKENBURY
28.47 ± 0.07	(1)					WWC = 0.08 ± 0.02	72BEER
28.47 ± 0.07	1				0.10 ± 0.03		77FROEHNER
28.650	0	0.5	681.6	0.60			JENDL-2
28.6	0	0.5	850.0	1.1		GT = 851.1	JENDL-1
28.7	0	0.5	650.0	2.14		GT = 652.14	ENDF-B-4
28.60 ± 0.10	0	0.5	A 850 ±100	1.1 ± 0.1		WGH = 5.02 ± 0.59	BNL325(3)
28.642	0		752	1.1			73MOXON
28.64	0	0.5	750	1.11			74MOXON
30.0	0					GT = 1100	66FARRELL
						GNO = 6.380	

ENERGY (KEV)	L	J	NEUTRON WIDTH (EV)	GAMMA WIDTH (EV)	WWS (EV)	MISCELLANEOUS	REFERENCE
28.64 ± 0.10	0		800 ±50	1.10 ± 0.10			70STIEGLITZ
28.65 ± 0.05	0		690 ±40			GNO = 4.08 ± 0.24	71GARG
28.60 ± 0.1	0		[A]900 ±200	0.8 ± 0.3			72BEER
28.6 ± 0.1	0		800 ±50	0.6 ± 0.15			75FROEHNER
28.64 ± 0.10	0	0.5	[A](800)	[B] 0.60 ± 0.15			77FROEHNER
28.650 ± 0.001	0		681.6 ± 0.23				77SYME
29.46	1	0.5	0.042	(1.0)	0.04 ± 0.01		JENDL-2
29.47	1	0.5	0.0989	1.0		GT = 1.0989	JENDL-1
29.47 ± 0.08	(1)				0.09 ± 0.02		BNL325(3)
29.47 ± 0.08	1	0.5	0.099	(1.0)	0.09 ± 0.03		74MOXON
29.47 ± 0.08	(1)					WWC = 0.09 ± 0.02	72BEER
29.46 ± 0.08	1				0.04 ± 0.01		77FROEHNER
30.25	1	0.5	0.52	(1.0)	0.34 ± 0.05		JENDL-2
30.24	1	0.5	0.471	1.0		GT = 1.471	JENDL-1
30.1	1	1.5	0.22	0.6		GT = 0.82	ENDF-B-4
30.24 ± 0.08	(1)				0.35 ± 0.06		BNL325(3)
30.1	▸ 0	0.5	0.475	1.0			73MOXON
30.20	1	0.5	0.5	(1.0)			74MOXON
30.2					0.39 ± 0.06	GGS = 33 ± 5	69HOCKENBURY
30.1 ± 0.12	1				0.321 ± 0.050		70STIEGLITZ
30.24 ± 0.08	(1)					WWC = 0.31 ± 0.06	72BEER
30.25 ± 0.08	1				0.34 ± 0.05		77FROEHNER
33.03	1	0.5	8.5	0.42	0.40 ± 0.07		JENDL-2
32.9	1	1.5	0.205	1.0		GT = 1.205	JENDL-1
32.9	1	1.5	0.24	0.6		GT = 0.84	ENDF-B-4
33.03 ± 0.08	1	1.5			0.34 ± 0.06		BNL325(3)
32.9	▸ 0	0.5	0.540	1.0			73MOXON
33.01	1	1.5	0.21	(1.0)			74MOXON
32.9 ± 0.13	1				0.351 ± 0.055		70STIEGLITZ
33.03 ± 0.08	(1)					WWC = 0.33 ± 0.07	72BEER
33.04 ± 0.08	1				0.40 ± 0.07		77FROEHNER
33.03	1		12.8 ± 3.1				77SYME2
33.03	1		7.1 ± 1.9				77SYME3
33.55	1	0.5	3.1	0.25	0.23 ± 0.04		JENDL-2
33.3	1	0.5	0.25	1.0		GT = 1.25	JENDL-1
33.3	1	0.5	0.3	0.6		GT = 0.9	ENDF-B-4
33.3 ± 0.1	(1)				0.20 ± 0.03		BNL325(3)
33.3	▸ 0	0.5	0.235	1.0			73MOXON
33.37	1	0.5	0.24	(1.0)			74MOXON
33.4							69HOCKENBURY
33.3 ± 0.13	1				0.190 ± 0.031		70STIEGLITZ
33.40 ± 0.08	(1)					WWC = 0.20 ± 0.05	72BEER
33.42 ± 0.08	1				0.23 ± 0.04		77FROEHNER
33.55	1		1.7 ± 2.3				77SYME2
33.55	1		3.6 ± 1.3				77SYME3
39.52	1	0.5	0.75	(1.0)	0.43 ± 0.07		JENDL-2
39.4	1	1.5	0.325	1.0		GT = 1.325	JENDL-1
39.4	1	1.5	0.27	1.0		GT = 1.27	ENDF-B-4
39.5 ± 0.1					0.49 ± 0.08		BNL325(3)
39.4	▸ 0	0.5	1.30	1.0			73MOXON
39.5							69HOCKENBURY
39.4 ± 0.15	1				0.565 ± 0.100		70STIEGLITZ
39.54 ± 0.10	(0)					WWC = 0.41 ± 0.08	72BEER
39.52 ± 0.10	1				0.43 ± 0.07		77FROEHNER
43.050	0	0.5	84.09	0.98			JENDL-2
43.0	0	0.5	90.0	1.3		GT = 91.3	JENDL-1
43.08	0	0.5	77.0	2.14		GT = 79.14	ENDF-B-4
43.0 ± 0.1	0	0.5	[A] 90 ±30	1.3 ± 0.3		WGH = 0.43 ± 0.15	BNL325(3)
43.08	0		77	1.73			73MOXON
42.9					0.77 ± 0.12	GGS = 47 ± 6	69HOCKENBURY
43.08 ± 0.23	0		77 ±15	1.73 ± 0.18			70STIEGLITZ
43.1 ± 0.1	0		140 ±30			GNO = 0.67 ± 0.15	71GARG
42.93 ± 0.11	0		[A]120 ±30	1.0 ± 0.2			72BEER
42.9 ± 0.1	0		120 ±30	0.92 ± 0.18			75FROEHNER
42.92 ± 0.11	0	0.5	[A](120)	[B] 0.98 ± 0.16			77FROEHNER
43.050 ± 0.0036	0		84.09 ± 0.13				77SYME
47.60	1	1.5	1.04	(1.0)	1.02 ± 0.16		JENDL-2
47.6	1	0.5	9.23	0.9		GT = 10.13	JENDL-1
47.4	1	1.5	0.7	1.2		GT = 1.9	ENDF-B-4
47.6 ± 0.1	1	0.5	[A] 10	0.9 ± 0.2		WGI = 0.49	BNL325(3)
47.4	▸ 0	1.5	0.76	1.0			73MOXON
47.55	0	0.5	1.41	(2.0)			74MOXON
47.4 ± 0.22	1				0.862 ± 0.130		70STIEGLITZ
47.60 ± 0.12	(0)		[A](10)	1.0 ± 0.4		WWC = 0.78 ± 0.16	72BEER
47.60 ± 0.12	1				1.02 ± 0.16		77FROEHNER
49.83	1	0.5	0.43	(1.0)	0.30 ± 0.05		JENDL-2
49.8	1	0.5	0.351	1.0		GT = 1.351	JENDL-1
49.6	1	0.5	0.45	0.6		GT = 1.05	ENDF-B-4
49.8 ± 0.1	(1)				0.26 ± 0.04		BNL325(3)
49.6	▸ 0	0.5	0.345	1.0			73MOXON
49.6 ± 0.25	1				0.257 ± 0.043		70STIEGLITZ
49.80 ± 0.12	(1)					WWC = 0.27 ± 0.05	72BEER
49.83 ± 0.12	1				0.30 ± 0.05		77FROEHNER
50.88	1	0.5	0.16	(1.0)	0.14 ± 0.03		JENDL-2
50.99	1	0.5	0.124	1.0		GT = 1.124	JENDL-1
50.9 ± 0.2	1				0.11 ± 0.02		BNL325(3)
50.8	▸ 0	0.5	(0.1)	1.0			73MOXON

ENERGY (KEV)	L	J	NEUTRON WIDTH (EV)	GAMMA WIDTH (EV)	WWS (EV)	MISCELLANEOUS	REFERENCE
50.8 ± 0.26	1						70STIEGLITZ
50.99 ± 0.15	1)					WWC = 0.11 ± 0.02	72BEER
50.88 ± 0.15	1				0.14 ± 0.03		77FROEHNER
51.57	1	0.5	0.92	(1.0)	0.48 ± 0.05		JENDL-2
51.64	1	1.5	0.266	1.0		GT = 1.266	JENDL-1
51.5	1	1.5	0.36	0.6		GT = 0.96	ENDF-B-4
51.5 ± 0.2	1	1.5					BNL325(3)
51.5	0	0.5	0.84	1.0			73MOXON
51.9							69HOCKENBURY
51.5 ± 0.26	1				0.456 ± 0.078		70STIEGLITZ
51.64 ± 0.15	1)					WWC = 0.38 ± 0.08	72BEER
51.57 ± 0.15	1				0.48 ± 0.05		77FROEHNER
52.7	0	0.5	(0.1)	1.0			73MOXON
52.7 ± 0.27	1						70STIEGLITZ
56.29	1	0.5	2.6	0.35	0.31 ± 0.04		JENDL-2
56.0	1	0.5	0.266	1.0		GT = 1.266	JENDL-1
56.3	1	0.5	1.06	0.6		GT = 1.66	ENDF-B-4
56.0 ± 0.2	1)				0.20 ± 0.06		BNL325(3)
56.3	0	0.5	0.60	1.0			73MOXON
56.3 ± 0.28	1				0.374 ± 0.063		70STIEGLITZ
56.00 ± 0.15	1)					WWC = 0.15 ± 0.03	72BEER
56.12 ± 0.15	1				0.31 ± 0.04		77FROEHNER
56.29	1		2.2 ± 2.8				77SYME2
56.29	1		2.8 ± 1.3				77SYME3
56.94	1	0.5	0.91	0.57	0.35 ± 0.05		JENDL-2
56.74	1	1.5	0.282	1.0		GT = 1.282	JENDL-1
56.9	1	1.5	0.32	0.6		GT = 0.92	ENDF-B-4
56.7 ± 0.2	1)				0.44 ± 0.09		BNL325(3)
56.9	0	0.5	0.71	1.0			73MOXON
57.0							69HOCKENBURY
56.9 ± 0.29	1				0.416 ± 0.070		70STIEGLITZ
56.74 ± 0.15	1)					WWC = 0.45 ± 0.09	72BEER
56.78 ± 0.15	1				0.35 ± 0.05		77FROEHNER
56.94	1		0.94 ± 0.94				77SYME2
56.94	1		0.9 ± 0.39				77SYME3
65.1101	0	0.5	459.9	1.90			JENDL-2
65.42	0	0.5	500.0	2.1		GT = 502.1	JENDL-1
65.3	0	0.5	390.0	2.43		GT = 392.43	ENDF-B-4
65.42 ± 0.16	0	0.5	^{A}500 ±150	2.1 ± 0.3		WGH = 1.96 ± 0.59	BNL325(3)
65.13	0		440	2.33			73MOXON
65.35	0	0.5	440	2.39			74MOXON
62.0	0					GT = 700	66FARRELL
						GNO = 2.838	
65.2							69HOCKENBURY
65.13 ± 0.40	0		390 ±30	2.43 ± 0.25			70STIEGLITZ
65.3 ± 0.2	0		810 ±140			GNO = 3.17 ± 0.78	71GARG
65.42 ± 0.16	0		^{A}500 ±150	2.0 ± 0.4			72BEER
65.4 ± 0.2	0		500 ±150	1.79 ± 0.26			75FROEHNER
65.12 ± 0.16	0	0.5	^{A}600)	^{B} 1.90 ± 0.30			77FROEHNER
65.1101 ± 0.0235	0		459.9 ± 0.75				77SYME
71.39	1	0.5	0.56	(1.0)	0.36 ± 0.06		JENDL-2
71.51	1	1.5	0.22	1.0		GT = 1.22	JENDL-1
71.3	1	1.5	0.29	0.6		GT = 0.89	ENDF-B-4
71.5 ± 0.2	1)				0.36 ± 0.07		BNL325(3)
71.3	0	0.5	0.66	1.0			73MOXON
71.3 ± 0.45	1				0.396 ± 0.066		70STIEGLITZ
71.51 ± 0.18	1)					WWC = 0.33 ± 0.07	72BEER
71.39 ± 0.18	1				0.36 ± 0.06		77FROEHNER
73.16	1	0.5	1.0	(1.0)	0.50 ± 0.08		JENDL-2
73.25	1	1.5	0.351	1.0		GT = 1.351	JENDL-1
73.3 ± 0.2	1)				0.48 ± 0.09		BNL325(3)
73.2	0	0.5	1.56	1.0			73MOXON
72.8							69HOCKENBURY
73.2 ± 0.50	1				0.610 ± 0.100		70STIEGLITZ
73.25 ± 0.18	1)					WWC = 0.44 ± 0.09	72BEER
73.16 ± 0.18	1				0.50 ± 0.08		77FROEHNER
78.08	1	0.5	0.28	(1.0)	0.22 ± 0.04		JENDL-2
78.26	1	0.5	0.333	1.0		GT = 1.333	JENDL-1
78.3 ± 0.2	1)				0.23 ± 0.04		BNL325(3)
78.2	0	0.5	0.875	1.0			73MOXON
78.2 ± 0.55	1				0.308 ± 0.051		70STIEGLITZ
78.26 ± 0.20	1)					WWC = 0.19 ± 0.04	72BEER
78.08 ± 0.20	1				0.22 ± 0.04		77FROEHNER
79.74	1	0.5	0.59	(1.0)	0.37 ± 0.06		JENDL-2
79.98	1	1.5	0.19	1.0		GT = 1.19	JENDL-1
80.0 ± 0.2	1)				0.33 ± 0.07		BNL325(3)
79.9	0	0.5	1.75	1.0			73MOXON
79.9 ± 0.58	1				0.447 ± 0.073		70STIEGLITZ
79.98 ± 0.20	1)					WWC = 0.33 ± 0.07	72BEER
79.74 ± 0.20	1				0.37 ± 0.06		77FROEHNER
81.61	1	0.5	0.33	(1.0)	0.25 ± 0.04		JENDL-2
81.95	1	0.5	0.282	1.0		GT = 1.282	JENDL-1
82.0 ± 0.2	1	(0.5)	^{A}110 ±40		0.22 ± 0.05		BNL325(3)
82.8 ± 0.3	0		110 ±40			GNO = 0.39 ± 0.14	71GARG
81.95 ± 0.20	1)					WWC = 0.22 ± 0.05	72BEER
81.61 ± 0.20	1				0.25 ± 0.04		77FROEHNER

ENERGY (KEV)	L	J	NEUTRON WIDTH (EV)	GAMMA WIDTH (EV)	WWS (EV)	MISCELLANEOUS	REFERENCE
83.41	1	0.5	7.15	0.51	0.48 ± 0.09		JENDL-2
84.94	1	1.5	80.0	0.2		GT = 80.2	JENDL-1
84.9 ± 0.2	1	(1.5)	A 90 ±40	0.20 ± 0.04		WGI = 1.61	BNL325(3)
84.7 ± 0.59	1						70STIEGLITZ
83.8 ± 0.3	0		80 ±40			GNO = 0.29 ± 0.14	71GARG
84.94 ± 0.20	(1)					WWC = 0.41 ± 0.08	72BEER
85.02 ± 0.20	1				0.48 ± 0.09		77FROEHNER
83.41	1		7.15 ± 7.15				77SYME2
83.41	1		7.15 ± 1.9				77SYME3
86.6671	0	0.5	341.9	1.50			JENDL-2
86.3	0	0.5	330.0	2.0		GT = 332.0	JENDL-1
87.0	0	0.5	310.0	2.14		GT = 312.14	ENDF-B-4
86.3 ± 0.2	0	0.5	A 330 ±25			WGH = 1.12 ± 0.09	BNL325(3)
86.80	0		320	2.0			73MOXON
86.7	0	0.5	286	1.4			74MOXON
84.5	0					GT = 500	66FARRELL
						GNO = 1.742	
87.0							69HOCKENBURY
86.8 ± 0.60	0		330 ±25				70STIEGLITZ
86.7 ± 0.3	0		160 ±40			GNO = 0.53 ± 0.14	71GARG
86.33 ± 0.22	0		A 330 ±25	1.4 ± 0.3			72BEER
86.3 ± 0.2	0		330 ±25	1.51 ± 0.30			75FROEHNER
86.35 ± 0.22	0	0.5	A (330)	B 1.50 ± 0.30			77FROEHNER
86.6671 ± 0.0067	0		341.9 ± 2.3				77SYME
87.9	1	0.5	8.0	0.8	0.73 ± 0.07		JENDL-2
87.89	1	1.5	0.47	1.0		GT = 1.47	JENDL-1
87.9 ± 0.2	(1)				0.64 ± 0.13		BNL325(3)
87.6 ± 0.61	1						70STIEGLITZ
87.89 ± 0.22	(1)					WWC = 0.64 ± 0.13	72BEER
87.80 ± 0.22	1				0.73 ± 0.07		77FROEHNER
87.9	1		6.3 ± 4.6				77SYME2
87.9	1		9.0 ± 1.9				77SYME3
89.865	1	0.5	16.0	0.21	0.21		JENDL-2
89.93	1	0.5	0.205	1.0		GT = 1.205	JENDL-1
89.9 ± 0.3	(1)				0.17 ± 0.04		BNL325(3)
89.93 ± 0.25	(1)					WWC = 0.17 ± 0.04	72BEER
89.44 ± 0.25	1				0.21 ± 0.05		77FROEHNER
89.865	1		7.5 ± 5.2				77SYME2
89.865	1		19.0 ± 2.9				77SYME3
91.69	1	0.5	6.0	0.35	0.33		JENDL-2
91.6	1	0.5	0.333	1.0		GT = 1.333	JENDL-1
91.6 ± 0.3	(1)				0.25 ± 0.05		BNL325(3)
91.60 ± 0.25	(1)					WWC = 0.25 ± 0.05	72BEER
91.40 ± 0.25	1				0.33 ± 0.06		77FROEHNER
91.69	1		5.2 ± 4.8				77SYME2
91.69	1		6.6 ± 2.1				77SYME3
92.13	1	0.5	7.1	0.62	0.56		JENDL-2
93.94	1	1.5	0.316	1.0		GT = 1.316	JENDL-1
93.9 ± 0.3	(1)				0.48 ± 0.10		BNL325(3)
93.3 ± 0.65	1						70STIEGLITZ
93.94 ± 0.25	(1)					WWC = 0.48 ± 0.10	72BEER
93.39 ± 0.25	1				0.56 ± 0.08		77FROEHNER
92.13	1		8.7 ± 3.0				77SYME2
92.13	1		6.9 ± 1.1				77SYME3
96.5 ± 0.68	1						70STIEGLITZ
97.851	0	0.5	835.6	1.20			JENDL-2
97.5	0	0.5	1000.0	1.0		GT = 1001.0	JENDL-1
98.6	0	0.5	690.0	2.14		GT = 692.14	ENDF-B-4
97.5 ± 0.3	0	0.5	A 1000 ±200	1.0 ± 0.2		WGH = 3.20 ± 0.64	BNL325(3)
98.10	0		940	2.0			73MOXON
97.81	0	0.5	940	1.0			74MOXON
96.5	0					GT = 1250	66FARRELL
						GNO = 4.084	
97.2							69HOCKENBURY
98.1 ± 0.70	0		870 ±70				70STIEGLITZ
97.7 ± 0.4	0		1070 ±160			GNO = 3.42 ± 0.51	71GARG
97.20 ± 0.25	0		A 1000 ±200	1.0 ± 0.2			72BEER
97.2 ± 0.3	0		1000 ±200	1.13 ± 0.20			75FROEHNER
96.79 ± 0.30	0	0.5	A (870)	B 1.20 ± 0.25			77FROEHNER
97.851 ± 0.011	0		835.6 ± 0.23				77SYME
99.44	1	0.5	8.2	0.87	0.79		JENDL-2
99.24	1	1.5	0.852	1.0		GT = 1.852	JENDL-1
99.2 ± 0.3	(1)				0.92 ± 0.20		BNL325(3)
99.24 ± 0.25	(1)					WWC = 0.92 ± 0.20	72BEER
98.94 ± 0.30	1				0.79 ± 0.09		77FROEHNER
99.44	1		7.5 ± 4.0				77SYME2
99.44	1		8.5 ± 1.8				77SYME3
101.18	1	0.5	0.18	(1.0)	0.15 ± 0.04		JENDL-2
101.9	1	0.5	0.111	1.0		GT = 1.111	JENDL-1
101.9 ± 0.3	(1)				0.10 ± 0.05		BNL325(3)
101.9 ± 0.25	(1)					WWC = 0.10 ± 0.05	72BEER
101.18 ± 0.30	1				0.15 ± 0.04		77FROEHNER
107.479	0	0.5	265.3	1.35			JENDL-2
108.3	0	0.5	700.0	1.1		GT = 701.1	JENDL-1
106.8	0	0.5	840.0	2.14		GT = 842.14	ENDF-B-4
108.3 ± 0.3	0	0.5	A 700 ±100	1.1 ± 0.3		WGH = 2.13 ± 0.31	BNL325(3)

ENERGY (KEV)	L	J	NEUTRON WIDTH (EV)	GAMMA WIDTH (EV)	WWS (EV)	MISCELLANEOUS	REFERENCE
107.8	0		660	2.0			73MOXON
108.3	0	0.5	695	1.1			74MOXON
106.0	0					GT = 840	66FARRELL
						GNO = 2.622	
107.8 ± 0.75	0		610 ±60				70STIEGLITZ
109.5 ± 0.5	0		1750			GNO = 5.29	71GARG
108.0 ± 0.25	0		A700 ±100	1.1 ± 0.3			72BEER
108.0 ± 0.3	0		700 ±100	1.35 ± 0.20			75FROEHNER
107.77 ± 0.30	0	0.5	A610)	B 1.35 ± 0.25			77FROEHNER
107.479 ± 0.004	0		265.3 ± 0.53				77SYME
111.5	1	1.5	8.2	1.34	2.30 ± 0.38		JENDL-2
111.6	1	0.5	27.0	3.0		GT = 30.0	JENDL-1
111.6 ± 0.3	1	0.5		2.7 ± 0.6			BNL325(3)
111.3 ± 1.0	1				3.74 ± 0.80		70STIEGLITZ
111.6 ± 0.25	1	)				WHC = 2.7 ± 0.6	72BEER
111.46 ± 0.30	1				2.30 ± 0.38		77FROEHNER
111.5	1		4.0 ± 8.0				77SYME2
111.5	1		9.25 ± 3.9				77SYME3
121.4	1	1.5	18.8	0.97	1.85 ± 0.15		JENDL-2
120.6 ± 1.1	1	1.5		1.3' ± 0.3			BNL325(3)
120.6 ± 1.1	1				2.31 ± 0.50		70STIEGLITZ
120.2 ± 0.35	1				1.85 ± 0.15		77FROEHNER
121.4	1		27.4 ± 6.0				77SYME2
121.4	1		17.4 ± 2.5				77SYME3
123.2	1	0.5	1.94	[1.0]	0.66 ± 0.12		JENDL-2
123.6	1	1.5	0.538	1.0		GT = 1.538	JENDL-1
123.8 ± 1.2	1						BNL325(3)
123.8 ± 1.2	1						70STIEGLITZ
123.2 ± 0.4	1				0.66 ± 0.12		77FROEHNER
127.7	1	0.5	61.0	[1.0]			JENDL-2
126.5	1	0.5	40.0	0.6		GT = 40.6	ENDF-B-4
127.74	▸ 0	0.5	40				73MOXON
126.5	▸ 0		A 43 ± 3				66FARRELL
127.7	1		61.1 ± 5.75				77SYME2
127.7	1		61.0 ± 2.5				77SYME3
129.0	1	0.5	32.0	[1.0]	0.97 ± 0.16		JENDL-2
129.2	1	1.5	1.0	1.0		GT = 2.0	JENDL-1
129.7 ± 1.3	1						BNL325(3)
129.7 ± 1.3	1						70STIEGLITZ
129.0 ± 0.4					0.97 ± 0.16		77FROEHNER
135.7	1	1.5	16.7	[1.8]	3.25 ± 0.54		JENDL-2
136.5	1	1.5	3.7	3.7		GT = 7.4	JENDL-1
136.5 ± 1.4	1	0.5		4.3 ± 0.9			BNL325(3)
136.5 ± 1.4	1				4.31 ± 0.90		70STIEGLITZ
135.7 ± 0.5					3.25 ± 0.54		77FROEHNER
141.9	1	1.5	41.0	1.6	3.0 ± 0.5		JENDL-2
139.6	1	1.5	3.5	3.5		GT = 7.0	JENDL-1
138.5	1	0.5	70.0	0.6		GT = 70.6	ENDF-B-4
139.6 ± 1.4	1	0.5		4.0 ± 0.9			BNL325(3)
139.74	▸ 0	0.5	70				73MOXON
138.5	▸ 0		A 77 ± 7				66FARRELL
139.6 ± 1.4	1				3.95 ± 0.90		70STIEGLITZ
138.95 ± 0.6					3.0 ± 0.5		77FROEHNER
141.9	1		40.5 ± 6.3				77SYME2
141.9	1		41.5 ± 2.6				77SYME3
154.4	1	0.5	140.0	1.09	1.09 ± 0.18		JENDL-2
148.4	1	1.5	1.5	1.0		GT = 2.5	JENDL-1
153.5	1	0.5	200.0	0.6		GT = 200.6	ENDF-B-4
148.1 ± 0.4					1.09 ± 0.18		77FROEHNER
154.4	1		165.0 ±20.0				77SYME2
154.4	1		136.0 ± 8.0				77SYME3
156.0	0	0.5	[440]	0.70			JENDL-2
156.4	0	0.5	440.0	2.0		GT = 442.0	JENDL-1
156.0	1	0.5	380.0	0.6		GT = 380.6	ENDF-B-4
156.4 ± 1.2	0		A440 ±50			WGH = 1.11 ± 0.13	BNL325(3)
157.24	▸ 0	0.5	380				73MOXON
156.4	0	0.5	440	[2.0]			74MOXON
156.0	▸ 0		A419 ±39				66FARRELL
156.4 ± 1.2	0		440 ±50				70STIEGLITZ
155.4 ± 0.5	0		440 ±50	0.85 ± 0.17			75FROEHNER
154.8 ± 0.7	0	0.5	A440]	B 0.70 ± 0.12			77FROEHNER
156	0		[100]				77SYME
161.407	0	0.5	1009.5	2.2			JENDL-2
162.0	0	0.5	1400.0	2.2		GT = 1402.2	JENDL-1
160.8	0	0.5	1800.0	2.14		GT = 1802.1	ENDF-B-4
162.0 ± 0.4	0	0.5	A1400 ±200	2.2 ± 0.5		WGH = 3.48 ± 0.50	BNL325(3)
162.1	0		1330	2.0			73MOXON
161.62	0	0.5	1340	2.2			74MOXON
160.0	0					GT = 1800	66FARRELL
						GNO = 4.611	
162.1 ± 1.3	0		1250 ±130				70STIEGLITZ
161 ± 1	0		5300 ±2000			GNO = 13.20 ± 5.00	71GARG
161.7 ± 0.4	0		A1400 ±200	2.2 ± 0.5			72BEER
161.7 ± 0.5	0		1400 ±200	1.9 ± 0.4			75FROEHNER
160.9 ± 0.9	0	0.5	A1250]	B 2.2 ± 0.4			77FROEHNER
161.407 ± 0.017	0		1009.5 ± 1.0				77SYME

ENERGY (KEV)	L	J	NEUTRON WIDTH (EV)	GAMMA WIDTH (EV)	WWS (EV)	MISCELLANEOUS	REFERENCE
167.05	1	1.5	65.0	1.54			JENDL-2
167.0	1	1.5	3.0	3.0		GT = 6.0	JENDL-1
167.0 ± 1.0					3.0 ± 0.8		77FROEHNER
167.05	1		75.5 ±11.0				77SYME2
167.05	1		60.5 ± 6.0				77SYME3
173.7	1	1.5	20.0	1.0	1.9 ± 0.5		JENDL-2
173.7	1	1.5	19.0	1.0		GT = 20.0	JENDL-1
173.7 ± 1.3					1.9 ± 0.5		77FROEHNER
185.409	0	0.5	9150.4	3.2			JENDL-2
186.5	0	0.5	5850.0	2.0		GT = 5852.0	JENDL-1
186.2	0	0.5	6000.0	2.14		GT = 6002.1	ENDF-B-4
186.6 ± 1.5	0	0.5	A5800 ±800			WGH = 13.43 ± 1.85	BNL325(3)
186.5	0		5850	2.0			73MOXON
186.3	0	0.5	5870	(2.0)			74MOXON
186.2	0					GT = 6000 GNO = 14.303	66FARRELL
186.5 ± 1.5	0		6000 ±800				70STIEGLITZ
186 ± 1	0		5700 ±2300			GNO = 13.22 ± 5.34	71GARG
184.0 ± 1.5	0	0.5	A(5800)	B 3.2 ± 0.8			77FROEHNER
185.409 ± 0.108	0		9150.4 ± 2.2				77SYME
197.034	0	0.5	3692.3	4.1			JENDL-2
198.0	0	0.5	3100.0	2.0		GT = 3102.0	JENDL-1
197.0	0	0.5	3500.0	2.14		GT = 3502.1	ENDF-B-4
198.0 ± 1.8	0	0.5	A3100 ±350			WGH = 6.97 ± 0.79	BNL325(3)
198.0	0		3280	2.0			73MOXON
196.5	0	0.5	3290	(2.0)			74MOXON
197.0	0					GT = 3500 GNO = 8.125	66FARRELL
198.0 ± 1.8	0		3100 ±350				70STIEGLITZ
196 ± 1	0		3500 ±2300			GNO = 7.90 ± 5.20	71GARG
195.0 ± 2.0	0	0.5	A(3100)	B 4.1 ± 1.0			77FROEHNER
197.034 ± 0.046	0		3692.3 ± 1.7				77SYME
201.6	1	1.5	185.0	1.4	2.8		JENDL-2
202.0 ± 2.5			A(120)		2.8 ± 0.7		77FROEHNER
201.6	1		179.0 ±19.7				77SYME2
201.6	1		186.0 ± 7.58				77SYME3
207.24	1	0.5	119.0	(1.0)			JENDL-2
207.24	1	0.5	110.0	1.0		GT = 111.0	JENDL-1
206.0	1	0.5	110.0	0.6		GT = 110.6	ENDF-B-4
206.0 ± 1.6	■		A120				BNL325(3)
207.24	▸ 0	0.5	110				73MOXON
206.0	▸ 0		A119 ± 9				66FARRELL
214.\5	1	0.5	85.0	(1.0)			JENDL-2
215.24	1	0.5	94.0	0.6		GT = 94.6	JENDL-1
214.0	1	0.5	94.0	0.6		GT = 94.6	ENDF-B-4
214.0 ± 1.8	■		A 74				BNL325(3)
215.24	▸ 0	0.5	94				73MOXON
214.0	▸ 0		A102 ± 8				66FARRELL
214.15	1		98.0 ±17.0				77SYME2
214.15	1		83.7 ± 6.5				77SYME3
220.1	1	0.5	70.0	(1.0)			JENDL-2
221.24	1	0.5	98.0	0.6		GT = 98.6	JENDL-1
220.0	1	0.5	98.0	0.6		GT = 98.6	ENDF-B-4
220.0 ± 1.8	■		A106				BNL325(3)
221.24	▸ 0	0.5	98				73MOXON
220.0	▸ 0		A106 ± 8				66FARRELL
220.1	1		38.0 ±26.0				77SYME2
220.1	1		83.0 ±11.0				77SYME3
221.8	1	0.5	54.0	(1.0)			JENDL-2
221.8	1		57.0 ±28.0				77SYME2
221.8	1		53.0 ±10.5				77SYME3
230.2	1	0.5	46.0	(1.0)			JENDL-2
230.24	1	0.5	208.0	0.6		GT = 208.6	JENDL-1
229.0	1	0.5	208.0	0.6		GT = 208.6	ENDF-B-4
229.0 ± 1.8	■		A224				BNL325(3)
230.24	▸ 0	0.5	208				73MOXON
229.0	▸ 0		A224 ±16				66FARRELL
230.2	1		60.0 ±18.0				77SYME2
230.2	1		44.0 ± 7.0				77SYME3
231.05	1	0.5	82.5	(1.0)			JENDL-2
231.05	1		84.0 ±20.0				77SYME2
231.05	1		82.5 ± 8.0				77SYME3
252.2	1	0.5	420.0	(1.0)			JENDL-2
253.24	1	0.5	870.0	0.6		GT = 870.6	JENDL-1
252.0	1	0.5	540.0	0.6		GT = 540.6	ENDF-B-4
252.0 ± 2.0	■		A910				BNL325(3)
253.24	▸ 0	0.5	870				73MOXON
252.0	▸ 0		A905 ±35				66FARRELL
252.2	1		397.0 ±40.0				77SYME2
252.2	1		425.0 ±17.0				77SYME3
253.05	1	0.5	250.0	(1.0)			JENDL-2
253.05	1		260.0 ±31.0				77SYME2
253.05	1		248.0 ±12.0				77SYME3
256.3	1	0.5	470.0	(1.0)			JENDL-2

ENERGY (KEV)		L	J	NEUTRON WIDTH (EV)		GAMMA WIDTH (EV)	WW5 (EV)	MISCELLANEOUS	REFERENCE
256.3		1		520.0	±40.0				77SYME?
256.3		1		460.0	±15.0				77SYME3
257.8		0	0.5	3500.0		2.0			JENDL-2
257.8		0	0.5	3500.0		2.0		GT = 3502.0	JENDL-1
257.0		0	0.5	3750.0		2.14		GT = 3752.1	ENDF-B-4
257.8	± 2.1	0	0.5	^{A}3500	±600			WGH = 6.89 ± 1.18	BNL325(3)
257.8		0		3620		2.0			73MOXON
257.8		0	0.5	3530		(2.0)			74MOXON
257.0		0						GT = 3750	66FARRELL
								GNO = 7.690	
257.8	± 2.1	0		3500	±600				70STIEGLITZ
273.0		1	0.5	150.0		0.6		GT = 150.6	ENDF-B-4
277.1		1	0.5	207.0		(1.0)			JENDL-2
274.0		1	0.5	150.0		0.6		GT = 150.6	ENDF-B-4
277.1		1		186.5	±50.0				77SYME2
277.1		1		211.5	±19.5				77SYME3
279.6		0	0.5	750.0		2.0			JENDL-2
279.6		0	0.5	750.0		2.0		GT = 752.0	JENDL-1
279.6		1	0.5	700.0		0.6		GT = 700.6	ENDF-B-4
279.6	± 2.3	0	0.5	^{A}750	±160			WGH = 1.42 ± 0.30	BNL325(3)
279.6		0		750		2.0			73MOXON
279.6	± 2.3	0		750	±160				70STIEGLITZ
283.0		1	0.5	620.0		1.0			JENDL-2
283.74		1	0.5	620.0		0.6		GT = 620.6	JENDL-1
282.5		1	0.5	620.0		0.6		GT = 620.6	ENDF-B-4
282.5	± 2.4	*		^{A}647					BNL325(3)
283.74		▸ 0	0.5	620					73MOXCN
282.5		▸ 0		^{A}647	±27				66FARRELL
292.3		1	0.5	116.0		(1.0)			JENDL-2
293.74		1	0.5	360.0		0.6		GT = 360.6	JENDL-1
292.2		1	0.5	360.0		0.6		GT = 360.6	ENDF-B-4
292.5	± 2.4	■		^{A}378					BNL325(3)
293.74		▸ 0	0.5	360					73MOXON
292.5		▸ 0		^{A}378	±18				66FARRELL
292.3		1		124.0	±25.0				77SYME2
292.3		1		114.0	±10.0				77SYME3
292.8		1	0.5	170.0		(1.0)			JENDL-2
292.8		1		186.0	±30.0				77SYME2
292.8		1		169.0	±11.0				77SYME3
295.65		1	0.5	130.0		(1.0)			JENDL-2
295.5		1	0.5	600.0		0.6		GT = 600.6	ENDF-B-4
295.65		1		100.0	±37.0				77SYME2
295.65		1		130.0	±11.0				77SYME3
302.0		1	0.5	150.0		0.6		GT = 150.6	ENDF-B-4
303.7		1	0.5	90.0		0.6		GT = 90.6	ENDF-B-4
307.0		1	0.5	500.0		1.0			JENDL-2
307.24		1	0.5	500.0		0.6		GT = 500.6	JENDL-1
305.3		1	0.5	500.0		0.6		GT = 500.6	ENDF-B-4
306	± 2.5	*		^{A}525					BNL325(3)
307.24		▸ 0	0.5	500					73MOXON
306.0		▸ 0		^{A}525	±25				66FARRELL
316.8		0	0.5	3200.0		2.0		GT = 3202.0	JENDL-2
316.0		0	0.5	3200.0		2.0		GT = 3202.0	JENDL-1
316.0		0	0.5	3200.0		2.14		GT = 3202.1	ENDF-B-4
316.0	± 2.5	0	0.5	^{A}3200	±600			WGH = 5.69 ± 1.07	BNL325(3)
316.8		0		3200		2.0			73MOXON
316.8		0	0.5	3200		(2.0)			74MOXON
316.0		0						GT = 3200	66FARRELL
								GNO = 5.969	
316.8	± 3.1	0		3200	±600				70STIEGLITZ
326.3		0	0.5	6800.0		2.0		GT = 6802.0	JENDL-2
326.3		0	0.5	7000.0		2.0		GT = 7002.0	JENDL-1
325.0		0	0.5	8500.0		2.14		GT = 8502.1	ENDF-B-4
326.3	± 2.5	0	0.5	^{A}7000	±1100			WGH = 12.25 ± 1.93	BNL325(3)
326.3		0		7370		2.0			73MOXON
326.3		0	0.5	6900		(2.0)			74MOXON
325.0		0						GT = 8500	66FARRELL
								GNO = 15.655	
326.3	± 3.3	0		6800	±1100				70STIEGLITZ
339.5		0	0.5	7500.0		2.0		GT = 7502.0	JENDL-2
339.5		0	0.5	6500.0		2.0		GT = 6502.0	JENDL-1
338.3		0	0.5	4400.0		2.14		GT = 4402.1	ENDF-B-4
339.5	± 2.5	0	0.5	^{A}6500	±1500			WGH = 11.16 ± 2.57	BNL325(3)
339.5		0		6050		2.0			73MOXON
339.5		0	0.5	6950		(2.0)			74MOXON
338.0		0						GT = 5250	66FARRELL
								GNO = 9.500	
339.5	± 3.5	0		7500	±1500				70STIEGLITZ
347.24		0	0.5	250.0		2.0		GT = 252.0	JENDL-2
347.24		0	0.5	250.0		2.0		GT = 252.0	JENDL-1
346.0		0	0.5	250.0		2.14		GT = 252.14	ENDF-B-4

ENERGY (KEV)	L	J	NEUTRON WIDTH (EV)	GAMMA WIDTH (EV)	WW5 (EV)	MISCELLANEOUS	REFERENCE
347.24	0		250	2.0			73MOXON
347.24	0	0.5	250	(2.0)			74MOXON
346.0	0					GT = 250	66FARRELL
						GNO = 0.448	
357.2	0	0.5	1000.0	2.0		GT = 1002.0	JENDL-2
357.2	0	0.5	1000.0	2.0		GT = 1002.0	JENDL-1
357.2	0	0.5	1000.0	2.14		GT = 1002.1	ENDF-B-4
357.2 ± 2.6	0	0.5	^{A}1000			WGH = 1.67	BNL325(3)
358.44	0		1000	2.0			73MOXON
358.44	0	0.5	1000	(2.0)			74MOXON
357.2	0					GT = 1000	66FARRELL
						GNO = 1.765	
359.4	1	0.5	1076.0	(1.0)		GT = 1077.0	JENDL-2
359.74	1	0.5	1076.0	0.6		GT = 1076.6	JENDL-1
358.5	1	0.5	1076.0	0.6		GT = 1076.6	ENDF-B-4
358.5 ± 2.6	*		^{A}1113				BNL325(3)
359.74	▸ 0	0.5	1076				73MOXON
358.5	▸ 0		^{A}1113 ±37				66FARRELL
376.74	0	0.5	4000.0	2.0		GT = 4002.0	JENDL-2
375.5	0	0.5	4000.0	2.0		GT = 4002.0	JENDL-1
375.5	0	0.5	4000.0	2.14		GT = 4002.1	ENDF-B-4
375.5	0	0.5	^{A}4000				BNL325(3)
376.74	0		4000	2.0			73MOXON
376.74	0	0.5	4000	(2.0)			74MOXON
375.5	0					GT = 4000	66FARRELL
						GNO = 6.905	
379.0	1	0.5	220.0	(1.0)		GT = 221.00	JENDL-2
379.74	1	0.5	220.0	0.6		GT = 220.6	JENDL-1
378.5	1	0.5	220.0	0.6		GT = 220.6	ENDF-B-4
378.5	*		^{A}226				BNL325(3)
379.74	▸ 0	0.5	220				73MOXON
378.5	▸ 0		^{A}226 ± 6				66FARRELL
387.74	1	0.5	280.0	(1.0)		GT = 281.0	JENDL-2
387.74	1	0.5	280.0	0.6		GT = 280.6	JENDL-1
387.5	1	0.5	280.0	0.6		GT = 280.6	ENDF-B-4
387.5	*		^{A}290				BNL325(3)
387.74	▸ 0	0.5	280				73MOXON
387.5	▸ 0		^{A}290 ±10				66FARRELL
393.0	1	0.5	266.0	(1.0)		GT = 267.0	JENDL-2
393.24	1	0.5	266.0	0.6		GT = 266.6	JENDL-1
392.0	1	0.5	266.0	0.6		GT = 266.6	ENDF-B-4
392.0	*		^{A}225				BNL325(3)
393.24	▸ 0	0.5	266				73MOXON
392.0	▸ 0		^{A}275 ± 9				66FARRELL
397.4	1	0.5	312.0	(1.0)		GT = 313.0	JENDL-2
398.24	1	0.5	312.0	0.6		GT = 312.6	JENDL-1
397.0	1	0.5	312.0	0.6		GT = 312.6	ENDF-B-4
397.0	*		^{A}321				BNL325(3)
398.24	▸ 0	0.5	312				73MOXON
397.0	▸ 0		^{A}321 ± 9				66FARRELL
402.74	1	0.5	390.0	(1.0)		GT = 391.0	JENDL-2
402.74	1	0.5	390.0	0.6		GT = 390.6	JENDL-1
401.5	1	0.5	390.0	0.6		GT = 390.6	ENDF-B-4
401.5	*		^{A}400				BNL325(3)
402.74	▸ 0	0.5	390				73MOXON
401.5	▸ 0		^{A}400 ±10				66FARRELL
406.4	1	0.5	200.0	0.6		GT = 200.6	ENDF-B-4
408.5	1	0.5	200.0	0.6		GT = 200.6	ENDF-B-4
412.3	0	0.5	750.0	2.0		GT = 752.0	JENDL-2
412.3	0	0.5	750.0	2.0		GT = 752.0	JENDL-1
412.3	0	0.5	750.0	2.14		GT = 752.14	ENDF-B-4
412.3	0	0.5	^{A}750			WGH = 1.17	BNL325(3)
413.54	0		750	2.0			73MOXON
413.54	0	0.5	750	(2.0)			74MOXON
412.3	0					GT = 750	66FARRELL
						GNO = 1.242	
422.24	0	0.5	2000.0	2.0		GT = 2002.0	JENDL-2
421.0	0	0.5	2000.0	2.0		GT = 2002.0	JENDL-1
421.7	0	0.5	2000.0	2.14		GT = 2002.1	ENDF-B-4
421.0	0	0.5	^{A}2000			WGH = 3.08	BNL325(3)
422.24	0		2000	2.0			73MOXON
422.24	0	0.5	2000	(2.0)			74MOXON
421.0	0					GT = 2000	66FARRELL
						GNO = 3.282	
426.5	0	0.5	500.0	2.0		GT = 502.0	JENDL-2
426.5	0	0.5	500.0	2.0		GT = 502.0	JENDL-1
427.0	0	0.5	500.0	2.14		GT = 502.14	ENDF-B-4
426.5	0	0.5	^{A}500			WGH = 0.77	BNL325(3)
427.74	0		500	2.0			73MOXON
427.74	0	0.5	500	(2.0)			74MOXON
426.5	0					GT = 500	66FARRELL
						GNO = 0.816	
432.74	1	0.5	220.0	(1.0)		GT = 221.0	JENDL-2

ENERGY (KEV)	L	J	NEUTRON WIDTH (EV)	GAMMA WIDTH (EV)	WWS (EV)	MISCELLANEOUS	REFERENCE
432.74	1	0.5	220.0	0.6		GT = 220.6	JENDL-1
431.5	1	0.5	220.0	0.6		GT = 220.6	ENDF-B-4
431.5	■		A230				BNL325(3)
432.74	▸ 0	0.5	220				73MOXON
431.5	▸ 0		A230 ±10				66FARRELL
434.0	1	0.5	80.0	0.6		GT = 80.6	ENDF-B-4
437.24	0	0.5	1000.0	2.0		GT = 1002.0	JENDL-2
437.24	0	0.5	1000.0	2.0		GT = 1002.0	JENDL-1
436.5	0	0.5	1000.0	2.14		GT = 1002.1	ENDF-B-4
437.24	0		1000	2.0			73MOXON
437.24	0	0.5	1000	(2.0)		GT = 1000	74MOXON
436.0	0					GNO = 1.616	66FARRELL
447.24	0	0.5	3000.0	2.0		GT = 3002.0	JENDL-2
447.24	0	0.5	3000.0	2.0		GT = 3002.0	JENDL-1
447.5	0	0.5	3000.0	2.14		GT = 3002.1	ENDF-B-4
446.0	0	0.5	A3000			WGH = 4.49	BNL325(3)
447.24	0		3000	2.0			73MOXON
447.24	0	0.5	3000	(2.0)		GT = 3000	74MOXON
446.0	0					GNO = 4.800	66FARRELL
454.24	0	0.5	1500.0	2.0		GT = 1502.0	JENDL-2
453.0	0	0.5	1500.0	2.0		GT = 1502.0	JENDL-1
453.0	0	0.5	1500.0	2.14		GT = 1502.1	ENDF-B-4
453.0	0	0.5	A1500			WGH = 2.23	BNL325(3)
454.24	0		1500	2.0			73MOXON
454.24	0	0.5	1500	(2.0)		GT = 1500	74MOXON
453.0	0					GNO = 2.384	66FARRELL
463.24	0	0.5	1000.0	2.0		GT = 1002.0	JENDL-2
462.0	0	0.5	1000.0	2.0		GT = 1002.0	JENDL-1
462.0	0	0.5	1000.0	2.14		GT = 1002.1	ENDF-B-4
462.0	0	0.5	A1000			WGH = 1.47	BNL325(3)
463.24	0		1000	2.0			73MOXON
463.24	0	0.5	1000	(2.0)		GT = 1000	74MOXON
462.0	0					GNO = 1.576	66FARRELL
479.1	1	1.5	100.0	0.6		GT = 100.6	ENDF-B-4
474.24	0	0.5	500.0	2.0		GT = 502.0	JENDL-2
474.24	0	0.5	500.0	2.0		GT = 502.0	JENDL-1
474.7	0	0.5	300.0	2.14		GT = 302.14	ENDF-B-4
473.0	0	0.5	A500			WGH = 0.73	BNL325(3)
474.24	0		500	2.0			73MOXON
474.24	0	0.5	500	(2.0)		GT = 500	74MOXON
473.0	0					GNO = 0.780	66FARRELL
485.84	0	0.5	3750.0	2.0		GT = 3752.0	JENDL-2
484.6	0	0.5	3750.0	2.0		GT = 3752.0	JENDL-1
484.5	0	0.5	6600.0	2.14		GT = 6602.1	ENDF-B-4
484.6	0	0.5	A3750			WGH = 5.39	BNL325(3)
485.84	0		3750	2.0			73MOXON
485.84	0	0.5	3750	(2.0)		GT = 3750	74MOXON
484.6	0					GNO = 5.788	66FARRELL
498.74	1	0.5	565.0	(1.0)		GT = 566.0	JENDL-2
498.74	1	0.5	565.0	0.6		GT = 565.6	JENDL-1
497.8	1	0.5	565.0	0.6		GT = 565.6	ENDF-B-4
497.5	■		A578				BNL325(3)
498.74	▸ 0	0.5	565				73MOXON
497.5	▸ 0		A577.5 ±12.5				66FARRELL
498.0	0	0.5	5000.0	2.0		GT = 5002.0	JENDL-2
498.0	0	0.5	5000.0	2.0		GT = 5002.0	JENDL-1
498.0	0	0.5	5000.0	2.14		GT = 5002.1	ENDF-B-4
498.0			A5000			WGH = 7.63	BNL325(3)
499.24	0		5000	2.0			73MOXON
499.24	0	0.5	5000	(2.0)		GT = 5000	74MOXON
498.0	0					GNO = 7.628	66FARRELL
503.74	1	0.5	325.0	(1.0)		GT = 326.0	JENDL-2
503.74	1	0.5	325.0	0.6		GT = 325.6	JENDL-1
502.5	1	0.5	325.0	0.6		GT = 325.6	ENDF-B-4
502.5	■		A333				BNL325(3)
503.74	▸ 0	0.5	325				73MOXON
502.5	▸ 0		A332.5 ± 7.5				66FARRELL
512.74	1	1.5	1270.0	(1.0)		GT = 1271.0	JENDL-2
512.74	1	1.5	2565.0	0.6		GT = 2565.6	JENDL-1
511.5	1	1.5	850.0	0.6		GT = 850.6	ENDF-B-4
511.5	1	1.5	A2420				BNL325(3)
512.74	▸ 0	0.5	2565				73MOXON
511.5	▸ 0	1.5	A1276 ± 6				66FARRELL
516.0	0	0.5	2250.0	2.0		GT = 2252.0	JENDL-2
514.74	0	0.5	2250.0	2.0		GT = 2252.0	JENDL-1
514.5	0	0.5	1350.0	2.14		GT = 1352.1	ENDF-B-4

ENERGY (KEV)	L	J	NEUTRON WIDTH (EV)	GAMMA WIDTH (EV)	WW5 (EV)	MISCELLANEOUS	REFERENCE
513.5	0	0.5	A2250			WGH = 3.14 ± 6.3	BNL325(3)
514.74	0		2250	2.0			73MOXON
514.74	0	0.5	2250	(2.0)			74MOXON
513.5	0					GT = 2250	66FARRELL
						GNO = 3.388	
520.3	0	0.5	5000.0	2.0		GT = 5002.0	JENDL-2
521.54	0	0.5	5000.0	2.0		GT = 5002.0	JENDL-1
520.8	0	0.5	2950.0	2.14		GT = 2952.1	ENDF-B-4
520.3	0	0.5	A5000			WGH = 6.93	BNL325(3)
521.54	0		5000	2.0			73MOXON
521.54	0	0.5	5000	(2.0)			74MOXON
520.3	0					GT = 5000	66FARRELL
						GNO = 7.486	
527.0	0	0.5	3000.0	2.0		GT = 3002.0	JENDL-2
526.24	0	0.5	3000.0	2.0		GT = 3002.0	JENDL-1
526.5	0	0.5	3000.0	2.14		GT = 3002.1	ENDF-B-4
525.5	0	0.5	A3000			WGH = 4.14	BNL325(3)
526.24	0		3000	2.0			73MOXON
526.74	0	0.5	3000	(2.0)			74MOXON
525.5	0					GT = 3000	66FARRELL
						GNO = 4.473	
528.0	1	0.5	300.0	0.6		GT = 300.6	ENDF-B-4
534.24	0	0.5	500.0	2.0		GT = 502.0	JENDL-2
534.24	0	0.5	500.0	2.0		GT = 502.0	JENDL-1
533.0	0	0.5	500.0	2.14		GT = 502.14	ENDF-B-4
533.0	0	0.5	A500			WGH = 0.69	BNL325(3)
534.24	0		500	2.0			73MOXON
534.24	0	0.5	500	(2.0)			74MOXON
533.0	0					GT = 500	66FARRELL
						GNO = 0.741	
553.74	1	0.5	700.0	(1.0)		GT = 701.0	JENDL-2
553.74	1	0.5	700.0	0.6		GT = 700.6	JENDL-1
553.4	1	0.5	700.0	0.6		GT = 700.6	ENDF-B-4
552.5	*		A710				BNL325(3)
553.74	> 0	0.5	700				73MOXON
552.5	> 0		A710 ±10				66FARRELL
557.74	0	0.5	500.0	2.0		GT = 502.0	JENDL-2
557.74	0	0.5	500.0	2.0		GT = 502.0	JENDL-1
557.4	0	0.5	800.0	2.14		GT = 802.14	ENDF-B-4
556.5	0	0.5	A500			WGH = 0.67	BNL325(3)
557.74	0		500	2.0			73MOXON
557.74	0	0.5	500	(2.0)			74MOXON
556.5	0					GT = 500	66FARRELL
						GNO = 0.728	
567.24	1	0.5	260.0	1.0		GT = 261.0	JENDL-2
567.24	1	0.5	260.0	1.0		GT = 261.0	JENDL-1
566.5	1	0.5	260.0	0.6		GT = 260.6	ENDF-B-4
566.0	*		A260				BNL325(3)
567.24	> 0	0.5	260				73MOXON
566.0	> 0		A260				66FARRELL
581.74	0	0.5	250.0	2.0		GT = 252.0	JENDL-2
581.74	0	0.5	250.0	2.0		GT = 252.0	JENDL-1
581.3	0	0.5	500.0	2.14		GT = 502.14	ENDF-B-4
580.3	0	0.5	A250			WGH = 0.33	BNL325(3)
581.74	0		250	2.0			73MOXON
581.74	0	0.5	250	(2.0)			74MOXON
580.3	0					GT = 250	66FARRELL
						GNO = 0.357	
589.74	0	0.5	500.0	2.0		GT = 502.0	JENDL-2
589.74	0	0.5	500.0	2.0		GT = 502.0	JENDL-1
590.0	0	0.5	500.0	2.14		GT = 502.14	ENDF-B-4
588.5	0	0.5	A500			WGH = 0.65	BNL325(3)
589.74	0		500	2.0			73MOXON
589.74	0	0.5	500	(2.0)			74MOXON
588.5	0					GT = 500	66FARRELL
						GNO = 0.711	
594.8	0	0.5	2500.0	2.0		GT = 2502.0	JENDL-2
596.04	0	0.5	2500.0	2.0		GT = 2502.0	JENDL-1
594.8	0	0.5	2800.0	2.14		GT = 2802.1	ENDF-B-4
594.8	0	0.5	A2500			WGH = 3.24	BNL325(3)
596.04	0		2500	2.0			73MOXON
596.04	0	0.5	2500	(2.0)			74MOXON
594.8	0					GT = 250	66FARRELL
						GNO = 3.538	
604.0	0	0.5	5500.0	2.14		GT = 5502.1	ENDF-B-4
617.0	0	0.5	4500.0	2.14		GT = 4502.1	ENDF-B-4
627.0	0	0.5	7500.0	2.14		GT = 7502.1	ENDF-B-4
637.0	0	0.5	2500.0	2.14		GT = 2502.1	ENDF-B-4
652.0	0	0.5	7000.0	2.14		GT = 7002.1	ENDF-B-4

* A and B denote $g\Gamma_n$ and $g\Gamma_\gamma$, respectively

** WW5 = $g\Gamma_n\Gamma_\gamma/\Gamma$ (eV), GT = Γ (eV)

GGS = $\sigma_0\Gamma_\gamma$ (b·eV), WWC = $\Gamma_n\Gamma_\gamma/\Gamma$ (eV)

WGH = $g\Gamma_n^{(0)}$ (eV), GNO = $\Gamma_n^{(0)}$ (eV)

WGI = $g\Gamma_n^{(1)}$ (eV)

References

66Farrell : Ref.(21)

69Hockenbury: Ref.(23)

70Stieglitz : Ref.(24)

71Garg : Ref.(49)

72Beer : Ref.(50)

73Moxon : Ref.(51) (Evaluation)

74Moxon : Ref.(3) (Evaluation)

75Fröhner : Ref.(52)

77Fröhner : Ref.(22)

77Syme : Ref.(20)

Table 8 Resonance parameters of ^{61}Ni

ENERGY (KEV)	L	J	NEUTRON WIDTH * (EV)	GAMMA WIDTH (EV)	WW5 ** (EV)	MISCELLANEOUS **	REFERENCE
-1.8	0	1.5	212	0.62			JENDL-2
1.354	1	1.5	0.92	(1.0)	0.24 ± 0.03		JENDL-2
1.354	1	1.5	0.315	1.0		GT = 1.315	JENDL-1
1.35 ± 0.01						WW0 = 0.48 ± 0.060	BNL325(3)
1.354	> 0	0.5	A 0.315	1.0			73MOXON
1.354	1	1.5	0.32	(1.0)	0.24 ± 0.03		74MOXON
1.354					0.24 ± 0.03	GGS = 478 ±60	69HOCKENBURY
1.35							72HOCKENBURY
2.35	1	1.5	0.01	1.0		GT = 1.01	JENDL-1
2.35 ± 0.01							BNL325(3)
2.35	> 0	0.5	A 0.01)	1.0			73MOXON
2.35	1	1.5	(0.01)	(1.0)			74MOXON
2.35							69HOCKENBURY
2.35							72HOCKENBURY
3.14	1	1.5	0.20	(1.0)	0.084 ± 0.018		JENDL-2
3.14	1	1.5	0.092	1.0		GT = 1.092	JENDL-1
3.14 ± 0.01						WW0 = 0.17 ± 0.04	BNL325(3)
3.14	> 0	0.5	A 0.092	1.0			73MOXON
3.14	1	1.5	0.092	(1.0)	0.084 ± 0.018		74MOXON
3.14					0.084 ± 0.018	GGS = 71 ±14	69HOCKENBURY
3.14							72HOCKENBURY
3.30	1	1.5	24.0	(1.0)	0.48 ± 0.06		JENDL-2
3.3	1	1.5	0.92	1.0		GT = 1.92	JENDL-1
3.30 ± 0.01						WW0 = 0.96 ± 0.12	BNL325(3)
3.30	> 0	0.5	A 0.92	1.0			73MOXON
3.30	1	1.5	0.92	(1.0)	0.48 ± 0.06		74MOXON
3.30					0.48 ± 0.06	GGS = 341 ±44	69HOCKENBURY
3.30							72HOCKENBURY
(3.39)							72HOCKENBURY
(4.59)							72HOCKENBURY
6.38	1	1.5	0.52	(1.0)	0.17 ± 0.04		JENDL-2
6.36 ± 0.01							BNL325(3)
6.36							72HOCKENBURY
6.38 ± 0.02	1				0.17 ± 0.04		77FROEHNER
6.47	1	1.5	15.7	(1.0)	0.47 ± 0.10		JENDL-2
6.47	1	1.5	0.54	1.0		GT = 1.54	JENDL-1
6.47 ± 0.01						WW0 = 0.70 ± 0.20	BNL325(3)
6.47	> 0	0.5	A 0.54	1.0			73MOXON
6.47	1	1.5	0.54	(1.0)	0.35 ± 0.10		74MOXON
6.47					0.35 ± 0.10	GGS = 145 ±43	69HOCKENBURY
6.46							72HOCKENBURY
6.47 ± 0.01	1				0.47 ± 0.10		77FROEHNER
7.12	> 0	0.5	A 3.54	1.0			73MOXON
7.12					0.78 ± 0.12	GGS = 285 ±42	69HOCKENBURY
7.11							72HOCKENBURY
7.15	0	1	(74)	2.53			JENDL-2
7.15	0	1.0	74.0	2.5		GT = 76.5	JENDL-1
7.15 ± 0.02	0	1	A 50 ± 6	2.5 ± 0.4		WG0 = 0.59 ± 0.07	BNL325(3)
7.15	0	1	74	2.5			73MOXON
7.152	0	1	74	2.5			74MOXON
6.97			23			GN0 = 0.28	66GOOD
7.15		1	74				70CHO
7.15 ± 0.02	0	0		2.5 ± 0.5		WGM = 74 ± 8	72BEER ***
7.15 ± 0.02	0	1	74 ± 8	2.55 ± 0.35			75FROEHNER
7.15 ± 0.01	0	1				WGM =(74)	77FROEHNER ***
						WW1 = 2.53 ± 0.42	
7.53	> 0	0.5	A 0.1)	1.0			73MOXON
7.53							69HOCKENBURY
7.52							72HOCKENBURY
7.57	0	2	(177)	2.19			JENDL-2
7.55	0	2.0	177.0	2.3		GT = 179.3	JENDL-1
7.55 ± 0.02	0	2	A 225 ±20	2.3 ± 0.6		WG0 = 2.59 ± 0.23	BNL325(3)
7.55	0	2	177	2.3			73MOXON
7.545	0	2	177	2.3			74MOXON
7.37			238			GN0 = 2.79	66GOOD
7.55		2	177				70CHO
7.54 ± 0.02	0	2		2.3 ± 0.6		WGM = 177 ±16	72BEER
7.58 ± 0.02	0	2	177 ±16	2.23 ± 0.35			75FROEHNER
7.57 ± 0.01	0	2				WGM =(177)	77FROEHNER
						WW1 = 2.19 ± 0.14	
8.71	> 0	0.5	A 1.86	1.0			73MOXON
8.71					0.65 ± 0.13	GGS = 196 ±38	69HOCKENBURY
8.70							72HOCKENBURY
8.75	0	2	(6)	2.20			JENDL-2
8.74	0	2.0	6.0	2.6		GT = 8.6	JENDL-1
8.73 ± 0.02	0	2	A 7.5 ± 2.5	2.6 ± 0.8		WG0 = 0.080 ± 0.027	BNL325(3)
8.74	0	2	6	2.6			73MOXON
8.745	0	2	6	2.6			74MOXON
8.74		2	6				70CHO
8.74 ± 0.20	0	2		2.6 ± 0.8		WGM = 6 ± 2	72BEER
8.75 ± 0.02	0	2	6 ± 2	2.6 ± 0.8			75FROEHNER
8.75 ± 0.02	0	2				WGM =(6)	77FROEHNER
						WW1 = 2.20 ± 0.30	

ENERGY (KEV)	L	J	NEUTRON WIDTH (EV)	GAMMA WIDTH (EV)	WW5 (EV)	MISCELLANEOUS	REFERENCE
9.94	1	1.5	0.22	(1.0)	0.09 ± 0.02		JENDL-2
9.91	1	1.5	0.22	1.0		GT = 1.22	JENDL-1
9.91 ± 0.02	(1)					WWD = 0.18 ± 0.06	BNL325(3)
9.93 ± 0.02	1	1.5	0.099	(1.0)	0.09 ± 0.03		74MOXON
9.90							69HOCKENBURY
9.93 ± 0.02	(1)					WWC = 0.09 ± 0.03	72BEER ***
9.87							72HOCKENBURY
9.94 ± 0.06	1				0.09 ± 0.02		77FROEHNER
10.17	1	1.5	0.47	(1.0)	0.16 ± 0.02		JENDL-2
10.2	1	1.5	0.613	1.0		GT = 1.613	JENDL-1
10.20 ± 0.03	(1)					WWD = 0.38 ± 0.10	BNL325(3)
10.18 ± 0.03	1	1.5	0.24	(1.0)	0.19 ± 0.05		74MOXON
10.2							69HOCKENBURY
10.18 ± 0.03	(1)					WWC = 0.19 ± 0.05	72BEER
10.1							72HOCKENBURY
10.17 ± 0.06	1				0.16 ± 0.02		77FROEHNER
10.90 ± 0.03							BNL325(3)
10.9							72HOCKENBURY
11.4 ± 0.03							BNL325(3)
11.4							72HOCKENBURY
11.8 ± 0.03							BNL325(3)
11.8							72HOCKENBURY
12.67	0	2	(75)	1.75			JENDL-2
12.64	0	2.0	75.0	1.7		GT = 76.7	JENDL-1
12.64 ± 0.03	0	2	A 90 ±10	1.7 ± 0.4		WGO = 0.80 ± 0.09	BNL325(3)
12.64	0	2	75	1.7			73MOXON
12.64	0	2	75	1.7			74MOXON
12.4			67.7			GNO = 0.61	66GOOD
12.6							69HOCKENBURY
12.64		2	75				70CHO
12.64 ± 0.03	0	2		1.7 ± 0.4		WGM = 75 ± 4	72BEER
12.6							72HOCKENBURY
12.67 ± 0.03	0	2	75 ± 4	1.72 ± 0.25			75FROEHNER
12.67 ± 0.03	0	2				WGM = (75)	77FROEHNER
						WW1 = 1.75 ± 0.30	
13.42	1	1.5	1.38	(1.0)	0.29 ± 0.04		JENDL-2
13.43 ± 0.03	1	1.5	0.525	(1.0)	0.31 ± 0.08		74MOXON
13.43 ± 0.03	1					WWC = 0.31 ± 0.08	72BEER
13.3							72HOCKENBURY
13.42 ± 0.03	1				0.29 ± 0.04		77FROEHNER
13.67	0	2	(61)	1.70			JENDL-2
13.63	0	2.0	61.0	1.6		GT = 62.6	JENDL-1
13.60 ± 0.03	0	2	A 76 ± 5	1.6 ± 0.4		WGO = 0.65 ± 0.04	BNL325(3)
13.63	0	2	61	1.6			73MOXON
13.63	0	2	61	1.6			74MOXON
13.3			75.6			GNO = 0.66	66GOOD
13.63		2	61				70CHO
13.63 ± 0.03	0	2		1.6 ± 0.4		WGM = 61 ± 4	72BEER
13.5							72HOCKENBURY
13.68 ± 0.05	0	2	61 ± 4	1.65 ± 0.25			75FROEHNER
13.67 ± 0.03	0	2				WGM = (61)	77FROEHNER
						WW1 = 1.70 ± 0.28	
14.06	0	1	(17)	3.1			JENDL-2
14.02	0	1.0	17.0	3.1		GT = 20.1	JENDL-1
14.02 ± 0.03	0	1	A 13 ± 3	3.1 ± 0.5		WGO = 0.11 ± 0.03	BNL325(3)
14.02	0	1	17	3.1			73MOXON
14.02	0	1	17	3.1			74MOXON
13.7			13.0			GNO = 0.11	66GOOD
14.0							69HOCKENBURY
14.02		1	17				70CHO
14.02 ± 0.03	0	1		3.1 ± 0.5		WGM = 17 ± 4	72BEER
13.9							72HOCKENBURY
14.06 ± 0.05	0	1	17 ± 4	3.20 ± 0.45			75FROEHNER
14.06 ± 0.03	0	1				WGM = (17)	77FROEHNER
						WW1 = 3.1 ± 0.5	
14.45	1	1.5	1.63	(1.0)	0.31 ± 0.05		JENDL-2
14.45	1	1.5	1.5	1.0		GT = 2.5	JENDL-1
14.45 ± 0.04	(1)					WWD = 0.60 ± 0.60	BNL325(3)
14.45 ± 0.04	1	1.5	0.4	(1.0)	0.30 ± 0.08		74MOXON
14.3							69HOCKENBURY
14.45 ± 0.04	(1)					WWC = 0.30 ± 0.08	72BEER
14.3							72HOCKENBURY
14.45 ± 0.04	1				0.31 ± 0.05		77FROEHNER
15.44	1	1.5	0.56	(1.0)	0.18 ± 0.03		JENDL-2
15.38	1	1.5	0.515	1.0		GT = 1.515	JENDL-1
15.38 ± 0.04	(1)					WWD = 0.34 ± 0.08	BNL325(3)
15.38 ± 0.04	1	1.5	0.2	(1.0)	0.17 ± 0.04		74MOXON
15.3							69HOCKENBURY
15.38 ± 0.04	(1)					WWC = 0.17 ± 0.04	72BEER
15.3							72HOCKENBURY
15.44 ± 0.04	1				0.18 ± 0.03		77FROEHNER
15.72	1	1.5	0.28	(1.0)	0.11 ± 0.02		JENDL-2
15.72 ± 0.04	1				0.11 ± 0.02		77FROEHNER
16.61	0	1	(817)	2.3			JENDL-2

ENERGY (KEV)	L	J	NEUTRON WIDTH (EV)	GAMMA WIDTH (EV)	WW5 (EV)	MISCELLANEOUS	REFERENCE
16.7	0	1.0	817.0	2.2		GT = 819.2	JENDL-1
16.70 ± 0.05	0	1	^{A}600 ±20	2.2 ± 0.4		WGO = 4.64 ± 0.15	BNL325(3)
16.70	0	1	817	2.2			73MOXON
16.7	0	1	814	2.2			74MOXON
16.3			411			GNO = 3.21	66GOOD
16.7							69HOCKENBURY
16.70		1	817				70CHO
16.70 ± 0.05	0	1		2.2 ± 0.4		WGM = 817 ±16	72BEER
16.7							72HOCKENBURY
16.61 ± 0.10	0	1	817 ±16	2.07 ± 0.30			75FROEHNER
16.61 ± 0.05	0	1				WGM = (817) WW1 = 2.3 ± 0.4	77FROEHNER
16.82	1	1.5	0.56	(1.0)	0.18 ± 0.03		JENDL-2
16.8	1	1.5	0.389	1.0		GT = 1.389	JENDL-1
16.80 ± 0.05	(1)					WWO = 0.28 ± 0.08	BNL325(3)
16.80 ± 0.05	1	1.5	0.16	(1.0)	0.14 ± 0.04		74MOXON
16.80 ± 0.05	(1)					WWC = 0.14 ± 0.04	72BEER
16.82 ± 0.05	1				0.18 ± 0.03		77FROEHNER
17.93	0	1	(177)	4.1			JENDL-2
17.86	0	1.0	177.0	1.6		GT = 178.6	JENDL-1
17.83 ± 0.05	0	1	^{A}140 ±10	1.6 ± 0.5		WGO = 1.05 ± 0.08	BNL325(3)
17.86	0	1	177	1.6			73MOXON
17.86	0	1	177	1.5			74MOXON
17.5			174			GNO = 1.32	66GOOD
17.8							69HOCKENBURY
17.86		1	177				70CHO
17.86 ± 0.05	0	1		1.6 ± 0.5		WGM = 177 ± 8	72BEER
17.7							72HOCKENBURY
17.99 ± 0.10	0	1	177 ± 8	1.4 ± 0.4			75FROEHNER
17.93 ± 0.05	0	1				WGM = (177) WW1 = 4.1 ± 0.7	77FROEHNER
18.97	0	2	(69)	0.78			JENDL-2
18.87	0	2.0	69.0	0.9		GT = 69.9	JENDL-1
18.83 ± 0.05	0	2	^{A} 90 ±10	0.9 ± 0.3		WGO = 0.66 ± 0.07	BNL325(3)
18.87	0	2	69	0.9			73MOXON
18.87	0	2	69	0.9			74MOXON
18.3			181			GNO = 1.34	66GOOD
19.0							69HOCKENBURY
18.87		2	69				70CHO
18.87 ± 0.05	0	2		0.9 ± 0.3		WGM = 69 ± 4	72BEER
18.8							72HOCKENBURY
18.97 ± 0.10	0	2	69 ± 4	0.78 ± 0.11			75FROEHNER
18.97 ± 0.06	0	2				WGM = (69) WW1 = 0.78 ± 0.13	77FROEHNER
20.35	1	1.5	0.22	(1.0)	0.09 ± 0.02		JENDL-2
20.25	1	1.5	0.22	1.0		GT = 1.22	JENDL-1
20.25 ± 0.05	(1)					WWO = 0.18 ± 0.06	BNL325(3)
20.25 ± 0.05	0	1.5	0.099	(1.0)	0.09 ± 0.3		74MOXON
20.4							69HOCKENBURY
20.25 ± 0.05	(1)					WWC = 0.09 ± 0.03	72BEER
20.0							72HOCKENBURY
20.35 ± 0.06	1				0.09 ± 0.02		77FROEHNER
20.67	1	1.5	0.22	(1.0)	0.09 ± 0.02		JENDL-2
20.5	1	1.5	0.282	1.0		GT = 1.282	JENDL-1
20.50 ± 0.05	(1)					WWO = 0.22 ± 0.06	BNL325(3)
20.55 ± 0.05	1	1.5	0.125	(1.0)	0.11 ± 0.3		74MOXON
20.55 ± 0.05	(1)					WWC = 0.11 ± 0.03	72BEER
20.4							72HOCKENBURY
20.67 ± 0.06	1				0.09 ± 0.02		77FROEHNER
21.41	1	1.5	1.63	(1.0)	0.31 ± 0.10		JENDL-2
21.35	1	1.5	14.7	2.0		GT = 16.7	JENDL-1
21.35 ± 0.05	(0)					WWO = 1.76 ± 0.40	BNL325(3)
21.40 ± 0.05	1	1.5	7.3	(1.0)	0.88 ± 0.2		74MOXON
21.40 ± 0.05	(0)					WWC = 0.88 ± 0.20	72BEER
21.3							72HOCKENBURY
21.41 ± 0.10	1				0.31 ± 0.10		77FROEHNER
21.61	1	1.5	4.42	(1.5)	0.56 ± 0.19		JENDL-2
21.61 ± 0.10	1				0.56 ± 0.19		77FROEHNER
24.17	1	1.5	1.94	(1.0)	0.33 ± 0.05		JENDL-2
24.12	1	1.5	2.57	1.0		GT = 3.57	JENDL-1
24.12 ± 0.05	(1)					WWO = 0.72 ± 0.18	BNL325(3)
24.12 ± 0.05	1	1.5	0.56	(1.0)	0.36 ± 0.09		74MOXON
24.12 ± 0.05	(1)					WWC = 0.36 ± 0.09	72BEER
24.17 ± 0.07	1				0.33 ± 0.05		77FROEHNER
24.62	0	1	(129)	1.4			JENDL-2
24.62	0	1.0	129.0	1.4		GT = 130.4	JENDL-1
24.62 ± 0.06	0	1	^{A} 97 ± 8	1.4 ± 0.3		WGO = 0.62 ± 0.05	BNL325(3)
24.62	0	1	129	1.4			73MOXON
24.62	0	1	129	1.4			74MOXON
23.8			100			GNO = 0.64	66GOOD
24.8					3.98 ± 1.3	GGS = 425 ±120	69HOCKENBURY
24.62		1	129				70CHO
24.62 ± 0.06	0	1		1.4 ± 0.3		WGM = 129 ±10	72BEER
24.73 ± 0.07	0	1	129 ±10	1.41 ± 0.20			75FROEHNER
24.62 ± 0.07	0	1				WGM = (129) WW1 = 1.4 ± 0.2	77FROEHNER
25.28	1	1.5	1.0	(1.0)	0.25 ± 0.05		JENDL-2

ENERGY (KEV)	L	J	NEUTRON WIDTH (EV)	GAMMA WIDTH (EV)	WWS (EV)	MISCELLANEOUS	REFERENCE
25.12 ± 0.06	(1)					WWD = 0.50 ± 0.12	BNL325(3)
25.12 ± 0.06	1	1.5	0.33	(1.0)	0.25 ± 0.06		74MOXON
25.12 ± 0.06	(1)					WWC = 0.25 ± 0.06	72BEER
25.28 ± 0.07	1				0.25 ± 0.05		77FROEHNER
26.10	1	1.5	0.92	(1.0)	0.24 ± 0.06		JENDL-2
25.96	1	1.5	0.923	1.0		GT = 1.923	JENDL-1
25.96 ± 0.06	(1)					WWD = 0.48 ± 0.12	BNL325(3)
25.96 ± 0.06	1	1.5	0.31	(1.0)	0.24 ± 0.06		74MOXON
25.96 ± 0.06	(1)					WWC = 0.24 ± 0.06	72BEER
26.10 ± 0.10	1				0.24 ± 0.06		77FROEHNER
26.58	1	1.5	0.56	(1.0)	0.18 ± 0.05		JENDL-2
26.45	1	1.5	0.563	1.0		GT = 1.563	JENDL-1
26.45 ± 0.06	(1)					WWD = 0.36 ± 0.10	BNL325(3)
26.45 ± 0.06	1	1.5	0.22	(1.0)	0.18 ± 0.05		74MOXON
26.45 ± 0.06	(1)					WWC = 0.18 ± 0.05	72BEER
26.58 ± 0.07	1				0.18 ± 0.05		77FROEHNER
27.22	1	1.5	0.67	(1.0)	0.20 ± 0.05		JENDL-2
27.1	1	1.5	0.667	1.0		GT = 1.667	JENDL-1
27.10 ± 0.07	(1)					WWD = 0.40 ± 0.10	BNL325(3)
27.10 ± 0.07	1	1.5	0.25	(1.0)	0.20 ± 0.05		74MOXON
27.10 ± 0.07	(1)					WWC = 0.20 ± 0.05	72BEER
27.22 ± 0.07	1				0.20 ± 0.05		77FROEHNER
27.78	1	1.5	10.0	(1.0)	0.45 ± 0.09		JENDL-2
27.65	1	1.5	4.0	1.0		GT = 5.0	JENDL-1
27.65 ± 0.07	(1)					WWD = 0.80 ± 0.20	BNL325(3)
27.65	1	1.5	0.67	(1.0)			74MOXON
27.6					1.74 ± 0.85	GGS = 164 ±80	69HOCKENBURY
27.65 ± 0.07	(1)					WWC = 0.40 ± 0.10	72BEER
27.78 ± 0.08	1				0.45 ± 0.09		77FROEHNER
28.15	1	1.5	2.33	(1.0)	0.35 ± 0.13		JENDL-2
28.15 ± 0.08	1				0.35 ± 0.13		77FROEHNER
28.40	0	2	(5)	1.09	0.56 ± 0.20		JENDL-2
28.21	0	2.0	3.0	3.0		GT = 6.0	JENDL-1
28.21 ± 0.07	0	2	[A] 6.3 ± 5.0	3.0 ± 1.0		WGO = 0.038 ± 0.030	BNL325(3)
28.21	0	2	3	3.0			73MOXON
28.21	0	2	5	3.0			74MOXON
28.21		2	3				70CHO
28.21 ± 0.07	0	2		3.0 ± 1		WGM = 5 ± 4	72BEER
28.35 ± 0.07	0	2	5 ± 4	2.2 ± 0.8			75FROEHNER
28.40 ± 0.08	0	2			0.56 ± 0.20	WGM = (5)	77FROEHNER
29.08	0	1	(409)	1.7			JENDL-2
29.11	0	1.0	409.0	2.4		GT = 411.4	JENDL-1
29.11 ± 0.07	0	1	[A] 310 ±20	2.4 ± 0.4		WGO = 1.82 ± 0.12	BNL325(3)
29.11	0	1	409	2.4			73MOXON
29.11	0	1	409	2.4			74MOXON
28.2			236			GNO = 1.40	66GOOD
29.0							69HOCKENBURY
29.11		1	409				70CHO
29.11 ± 0.07	0	1		2.4 ± 0.4		WGM = 409 ±22	72BEER
29.3 ± 0.1	0	1	409 ±22	1.6 ± 0.3			75FROEHNER
29.08 ± 0.08	0	1				WGM = (409)	77FROEHNER
						WWI = 1.7 ± 0.4	
29.35	1	1.5	3.0	(1.5)	0.50 ± 0.20		JENDL-2
29.35 ± 0.08	1				0.50 ± 0.20		77FROEHNER
30.10	1	1.5	0.28	(1.0)	0.11 ± 0.04		JENDL-2
30.10 ± 0.08	1				0.11 ± 0.04		77FROEHNER
30.64	0	2	(15)	2			JENDL-2
30.64	0	2.0	13.0	2.0		GT = 15.0	JENDL-1
30.64 ± 0.08	0	2	[A] 19 ±10			WGO = 0.11 ± 0.06	BNL325(3)
30.64	0	2	13	2.0			73MOXON
30.64 ± 0.08	0	2	15 ± 8	(2.0)			74MOXON
30.2			423			GNO = 2.43	66GOOD
30.8							69HOCKENBURY
30.64		2	13				70CHO
30.64 ± 0.08	0	2				WGM = 15 ± 8	72BEER
30.64 ± 0.08	0	2				WGM = (15)	77FROEHNER
						WWI = 2 ± 1	
31.13	0	1.0	788.0	2.0		GT = 790.0	JENDL-2
31.13	0	1.0	788.0	2.0		GT = 790.0	JENDL-1
31.13	0	1	788	2.0			73MOXON
31.13 ± 0.08	0	1	788 ±28	(2.0)			74MOXON
31.13		1	788				70CHO
31.13 ± 0.08	0	1				WGM = 788 ±28	72BEER
31.83	0	2.0	10.0	2.0		GT = 12.0	JENDL-2
31.83	0	2.0	10.0	2.0		GT = 12.0	JENDL-1
31.83 ± 0.08	0	2	[A] 12.5 ± 7.5			WGO = 0.070 ± 0.042	BNL325(3)
31.83	0	2	8	2.0			73MOXON
31.83 ± 0.08	0	2	10 ± 6	(2.0)			74MOXON
31.6			392			GNO = 2.20	66GOOD
31.7							69HOCKENBURY
31.83		2	8				70CHO
31.83 ± 0.08	0	2				WGM = 10 ± 6	72BEER
32.7	0	2.0	220.0	2.0		GT = 222.0	JENDL-2

ENERGY (KEV)	L	J	NEUTRON WIDTH (EV)	GAMMA WIDTH (EV)	WWS (EV)	MISCELLANEOUS	REFERENCE
32.7	0	2.0	220.0	2.0		GT = 222.0	JENDL-1
32.70 ± 0.08	0	2	A 265 ±25			WGO = 1.47 ± 0.14	BNL325(3)
32.70	0	2	220	2.0			73MOXON
32.70 ± 0.08	0	2	220 ±10	(2.0)			74MOXON
32.7			120			GNO = 0.66	66GOOD
32.70		2	220				70CHO
32.70 ± 0.08	0	2				WGM = 220 ±10	72BEER
33.68	0	1.0	58.0	2.8		GT = 60.8	JENDL-2
33.68	0	1.0	58.0	2.8		GT = 60.8	JENDL-1
33.68 ± 0.08	0	1	A 50 ±10	2.8 ± 0.5		WGO = 0.27 ± 0.05	BNL325(3)
33.68	0	1	58	2.8			73MOXON
33.68	0	1	58	2.8			74MOXON
33.8			123			GNO = 0.67	66GOOD
33.8							69HOCKENBURY
33.68		1	58				70CHO
33.68 ± 0.08	0	1		2.8 ± 0.5		WGM = 58 ±10	72BEER
33.68 ± 0.08	0	1				WGM = (58) WW1 = 2.8 ± 0.5	77FROEHNER
34.65 ± 0.1	1	1.5	(0.1)	(1.0)			74MOXON
34.65 ± 0.10	(1)						72BEER
36.02 ± 0.1	1	1.5	(0.1)	(1.0)			74MOXON
36.02 ± 0.10	(1)						72BEER
37.13	0	2.0	133.0	3.0		GT = 136.0	JENDL-2
37.13	0	2.0	133.0	3.0		GT = 136.0	JENDL-1
37.13 ± 0.09	0	2	A 180 ±20	3.0 ± 0.5		WGO = 0.93 ± 0.10	BNL325(3)
37.13	0	2	133	3.0			73MOXON
37.13	0	2	133	3.0			74MOXON
36.0			294			GNO = 1.55	66GOOD
37.3							69HOCKENBURY
37.13		2	133				70CHO
37.13 ± 0.09	0	2		3.0 ± 0.5		WGM = 133 ±12	72BEER
37.13 ± 0.09	0	2				WGM = (133) WW1 = 3.0 ± 0.5	77FROEHNER
39.77 ± 0.11	(1)						72BEER
41.34	0	1.0	176.0	2.0		GT = 178.0	JENDL-2
41.34	0	1.0	176.0	2.0		GT = 178.0	JENDL-1
41.34 ± 0.10	0	1	A 150 ±20			WGO = 0.74 ± 0.10	BNL325(3)
41.34	0	1	176	2.0			73MOXON
41.34	0	1	176	(2.0)			74MOXON
40.0			243			GNO = 1.21	66GOOD
41.3							69HOCKENBURY
41.34		1	176				70CHO
41.34 ± 0.10	0	1				WGM = 176 ±22	72BEER
43.25	0	2.0	10.0	2.0		GT = 12.0	JENDL-2
43.25	0	2.0	10.0	2.0		GT = 12.0	JENDL-1
43.25 ± 0.11			A 12.5 ±10.0			WGO = 0.060 ± 0.048	BNL325(3)
43.25	0	2	10	2.0			73MOXON
42.2			133			GNO = 0.65	66GOOD
43.25		2	10				70CHO
43.25 ± 0.11	0	2				WGM = 10 ± 8	72BEER
43.61	0	2.0	30.0	2.0		GT = 32.0	JENDL-2
43.6	0	2.0	30.0	2.0		GT = 32.0	JENDL-1
43.61 ± 0.11	0	2	A 37.5 ±17.5			WGO = 0.18 ± 0.08	BNL325(3)
43.60	0	2	30	2.0			73MOXON
43.60	0	2	30	(2.0)			74MOXON
43.61		2	30				70CHO
43.61 ± 0.11	0	2				WGM = 30 ±14	72BEER
45.49	0	1.0	66.0	2.0		GT = 68.0	JENDL-2
45.49	0	1.0	66.0	2.0		GT = 68.0	JENDL-1
45.49 ± 0.11	0	1	A 50 ± 6			WGO = 0.23 ± 0.03	BNL325(3)
45.49	0	1	66	2.0			73MOXON
45.49	0	1	66	(2.0)			74MOXON
44.0			169			GNO = 0.80	66GOOD
45.49		1	66				70CHO
45.49 ± 0.11	0	1				WGM = 66 ± 8	72BEER
46.16	0	1.0	54.0	2.0		GT = 56.0	JENDL-2
46.16	0	1.0	54.0	2.0		GT = 56.0	JENDL-1
46.16 ± 0.12	0	1	A 40.5 ± 6.0			WGO = 0.19 ± 0.03	BNL325(3)
46.16	0	1	54	2.0			73MOXON
46.16	0	1	54	(2.0)			74MOXON
46.1							69HOCKENBURY
46.16		1	54				70CHO
46.16 ± 0.12	0	1				WGM = 54 ± 8	72BEER
50.51	0	1.0	133.0	2.0		GT = 135.0	JENDL-2
50.51	0	1.0	133.0	2.0		GT = 135.0	JENDL-1
50.51 ± 0.12	0	1	A 100 ± 9			WGO = 0.45 ± 0.04	BNL325(3)
50.51	0	1	133	2.0			73MOXON
50.51	0	1	133	(2.0)			74MOXON
48.4			83			GNO = 0.38	66GOOD
50.7							69HOCKENBURY
50.51		1	133				70CHO
50.51 ± 0.12	0	1				WGM = 133 ±12	72BEER
53.3	0	2.0	141.0	2.0		GT = 143.0	JENDL-2
53.3	0	2.0	141.0	2.0		GT = 143.0	JENDL-1

ENERGY (KEV)	L	J	NEUTRON WIDTH (EV)	GAMMA WIDTH (EV)	WH5 (EV)	MISCELLANEOUS	REFERENCE
53.30 ± 0.13	0	2	[A]176 ±13			WGO = 0.76 ± 0.06	BNL325(3)
53.30	0	2	141	2.0			73MOXON
53.30	0	2	141	(2.0)			74MOXON
53.30		2	141				70CHO
53.30 ± 0.13	0	2				WGM = 141 ±10	72BEER
54.81	0	1.0	189.0	2.0		GT = 191.0	JENDL-2
54.81	0	1.0	189.0	2.0		GT = 191.0	JENDL-1
54.81 ± 0.14	0	1	[A]142 ±14			WGO = 0.61 ± 0.06	BNL325(3)
54.81	0	1	189	2.0			73MOXON
54.81	0	1	189	(2.0)			74MOXON
54.81		1	189				70CHO
54.81 ± 0.14	0	1				WGM = 189 ±18	72BEER
56.49	0	2.0	119.0	2.0		GT = 121.0	JENDL-2
56.49	0	2.0	119.0	2.0		GT = 121.0	JENDL-1
56.49 ± 0.14	0	2	[A]149 ±13			WGO = 0.63 ± 0.06	BNL325(3)
56.49	0	2	119	2.0			73MOXON
56.49	0	2	119	(2.0)			74MOXON
56.49		2	119				70CHO
56.49 ± 0.14	0	2				WGM = 119 ±10	72BEER
58.16	0	1.0	178.0	2.0		GT = 180.0	JENDL-2
58.16	0	1.0	178.0	2.0		GT = 180.0	JENDL-1
58.16 ± 0.15	0	1	[A]133 ±15			WGO = 0.55 ± 0.06	BNL325(3)
58.16	0	1	178	2.0			73MOXON
58.16	0	1	178	(2.0)			74MOXON
58.7							69HOCKENBURY
58.16		1	178				70CHO
58.16 ± 0.15	0	1				WGM = 178 ±20	72BEER
64.07	0	2.0	54.0	2.0		GT = 56.0	JENDL-2
64.07	0	2.0	54.0	2.0		GT = 56.0	JENDL-1
64.07 ± 0.16	0	2	[A] 68 ± 6			WGO = 0.27 ± 0.02	BNL325(3)
64.07	0	2	535	2.0			73MOXON
64.07	0	2	535	(2.0)			74MOXON
64.07		2	535				70CHO
64.07 ± 0.16	0	2				WGM = 54 ± 2	72BEER
65.87	0	2.0	1430.0	2.0		GT = 1432.0	JENDL-2
65.87	0	2.0	1430.0	2.0		GT = 1432.0	JENDL-1
65.87 ± 0.16	0	2	[A]1790 ±225			WGO = 6.97 ± 0.09	BNL325(3)
65.87	0	2	1430	2.0			73MOXON
65.87	0	2	1430	(2.0)			74MOXON
65.87		2	1430				70CHO
65.87 ± 0.16	0	2				WGM = 1430 ±180	72BEER
68.77	0	2.0	1100.0	2.0		GT = 1102.0	JENDL-2
68.77	0	2.0	1100.0	2.0		GT = 1102.0	JENDL-1
68.77 ± 0.17	0	2	[A]1375 ±625			WGO = 5.24 ± 2.38	BNL325(3)
68.77	0	2	1100	2.0			73MOXON
68.77	0	2	1100	(2.0)			74MOXON
68.77		2	1100				70CHO
68.77 ± 0.17	0	2				WGM = 1100 ±500	72BEER
70.8							69HOCKENBURY
89.6							69HOCKENBURY

* A denotes $2g\Gamma_n$

** WW5 = $g\Gamma_n\Gamma_\gamma/\Gamma$ (eV), GT = Γ (eV)

WWD = $2g\Gamma_n\Gamma_\gamma/\Gamma$ (eV), GGS = $\sigma_0\Gamma_\gamma$ (b•eV)

WGO = $2g\Gamma_n^{(0)}$ (eV), WGM = $g\Gamma_n$ (eV)

WWI = $g\Gamma_\gamma$ (eV), WWC = $\Gamma_n\Gamma_\gamma/\Gamma$ (eV)

GNO = $\Gamma_n^{(0)}$ (eV)

*** 1) $g\Gamma_n$ reported in 72 Beer and 77 Fröhner should probably be read as Γ_n.

2) $g\Gamma_\gamma$ reported in 77 Fröhner should probably be read as Γ_γ.

3) $\Gamma_n\Gamma_\gamma/\Gamma$ reported in 72 Beer should probably be read as $g\Gamma_n\Gamma_\gamma/\Gamma$.

References

66Good : Ref.(53)

69Hockenbury: Ref.(23)

70Cho : Ref.(25)

72Beer : Ref.(50)

72Hockenbury: Ref.(54)

73Moxon : Ref.(51)

74Moxon : Ref.(3)

75Fröhner : Ref.(52)

77Fröhner : Ref.(22)

Table 9 Resonance parameters of ^{62}Ni

ENERGY (KEV)	L	J	NEUTRON WIDTH * (EV)	GAMMA WIDTH * (EV)	WWS** (EV)	MISCELLANEOUS **	REFERENCE
2.34							69HOCKENBURY
4.6	0	0.5	2026	2.376			JENDL-2
4.6	0	0.5	1820.0	2.31		GT = 1822.31	JENDL-1
4.6	0	0.5	1700.0	2.14		GT = 1702.1	ENDF-B-4
4.54 ± 0.05	0	0.5	[A]1600 ±160	0.76 ± 0.12		WGH = 23.75 ± 2.29	BNL325(3)
4.599	0		2075	2.31			73MOXON
4.599	0	0.5	2075	2.31			74MOXON
6.0	0					GT = (10000) GNO = (130.0)	66FARRELL
4.6			(1300)	0.76 ± 0.12			69HOCKENBURY
4.54 ± 0.05	0		1340 ±90			GNO = 19.89 ± 1.34	71GARG
8.91	1	0.5	0.089	1.0		GT = 1.089	JENDL-2
8.91	1	0.5	0.089	1.0		GT = 1.089	JENDL-1
8.91 ± 0.1	1	0.5	0.089	(1.0)	0.082 ± 0.016		74MOXON
8.91 ± 0.10	0				0.082 ± 0.016		75BEER
9.42	1	0.5	0.315	1.0		GT = 1.315	JENDL-2
9.42	1	0.5	0.315	1.0		GT = 1.315	JENDL-1
9.42 ± 0.1	1	0.5	0.32	(1.0)	0.24 ± 0.04		74MOXON
9.42 ± 0.10	0				0.24 ± 0.04		75BEER
17.69	1	0.5	0.15	1.0		GT = 1.15	JENDL-2
17.69	1	0.5	0.113	1.0		GT = 1.113	JENDL-1
17.69 ± 0.07	1	0.5	0.15	(1.0)	0.13 ± 0.03		74MOXON
17.69 ± 0.07	0				0.13 ± 0.03		75BEER
24.46	1	0.5	0.205	1.0		GT = 1.205	JENDL-2
24.46	1	0.5	0.205	1.0		GT = 1.205	JENDL-1
24.46 ± 0.11	1	0.5	0.21	(1.0)	0.17 ± 0.03		74MOXON
24.46 ± 0.11	0				0.17 ± 0.03		75BEER
28.22	1	0.5	0.351	1.0		GT = 1.351	JENDL-2
28.22	1	0.5	0.351	1.0		GT = 1.351	JENDL-1
28.22 ± 0.14	1	0.5	0.35	(1.0)	0.26 ± 0.04		74MOXON
28.22 ± 0.14	0				0.26 ± 0.04		75BEER
29.29	1	0.5	1.0	1.0		GT = 2.0	JENDL-2
29.29	1	0.5	1.0	1.0		GT = 2.0	JENDL-1
29.29 ± 0.14	1	0.5	1.0	(1.0)	0.50 ± 0.07		74MOXON
29.29 ± 0.14	0				0.50 ± 0.07		75BEER
34.28	1	0.5	0.563	1.0		GT = 1.563	JENDL-2
34.28	1	0.5	0.563	1.0		GT = 1.563	JENDL-1
34.28 ± 0.18	1	0.5	0.56	(1.0)	0.36 ± 0.06		74MOXON
34.28 ± 0.18	0				0.36 ± 0.06		75BEER
38.04	1	0.5	3.35	1.0		GT = 4.35	JENDL-2
38.04	1	0.5	3.35	1.0		GT = 4.35	JENDL-1
38.04 ± 0.20	1	0.5	3.35	(1.0)	0.77 ± 0.11		74MOXON
38.04 ± 0.20	0				0.77 ± 0.11		75BEER
40.3	1	0.5	0.136	1.0		GT = 1.136	JENDL-2
40.3	1	0.5	0.136	1.0		GT = 1.136	JENDL-1
40.3 ± 0.3	0				0.12 ± 0.03		75BEER
41.0	1	0.5	0.235	1.0		GT = 1.235	JENDL-2
41.0	1	0.5	0.235	1.0		GT = 1.235	JENDL-1
41.0 ± 0.3	0				0.19 ± 0.04		75BEER
42.87	0	0.5	340.0	0.36		GT = 340.36	JENDL-2
42.87	0	0.5	340.0	0.36		GT = 340.36	JENDL-1
38.5	0	0.5	250.0	2.14		GT = 252.14	ENDF-B-4
42.87 ± 0.01	0	0.5	[A]340 ±10			WGH = 1.64 ± 0.05	BNL325(3)
42.872	0		340	2.0			73MOXON
42.87	0	0.5	340	0.36			74MOXON
42.5	0					GT = (1000) GNO = (4.9)	66FARRELL
42.87 ± 0.14	0		340 ±15	0.36 ± 0.07			75BEER
44.8	1	0.5	0.515	1.0		GT = 1.515	JENDL-2
44.8	1	0.5	0.515	1.0		GT = 1.515	JENDL-1
44.8 ± 0.3	0				0.34 ± 0.07		75BEER
53.1	1	0.5	0.176	1.0		GT = 1.176	JENDL-2
53.1	1	0.5	0.176	1.0		GT = 1.176	JENDL-1
53.1 ± 0.3	0				0.15 ± 0.05		75BEER
56.91	1	0.5	56.0	0.28		GT = 56.28	JENDL-2
56.91	1	0.5	56.0	0.28		GT = 56.28	JENDL-1
53.8	0	0.5	100.0	2.14		GT = 102.14	ENDF-B-4
56.91 ± 0.02	(1)		[A] 56 ± 4			WGI = 2.5	BNL325(3)
56.5	0					GT = (200) GNO = (0.83)	66FARRELL
56.91 ± 0.19	0		[A] 56 ±17	[B] 0.28 ± 0.11	0.28 ± 0.07		75BEER
63.1	1	0.5	0.37	1.0		GT = 1.37	JENDL-2
63.1	1	0.5	0.37	1.0		GT = 1.37	JENDL-1
63.1 ± 0.4	0				0.27 ± 0.07		75BEER
74.0	1	0.5	0.887	1.0		GT = 1.887	JENDL-2
74.0	1	0.5	0.887	1.0		GT = 1.887	JENDL-1
74.0 ± 0.5	0				0.47 ± 0.09		75BEER
77.2	0	0.5	70.0	2.0		GT = 72.0	JENDL-2

ENERGY (KEV)	L	J	NEUTRON WIDTH (EV)	GAMMA WIDTH (EV)	WWS (EV)	MISCELLANEOUS	REFERENCE
77.23	0	0.5	70.0	2.0		GT = 72.0	JENDL-1
76.0	1	0.5	175.0	0.6		GT = 175.6	ENDF-B-4
77.23 ± 0.03	0	0.5	A 70 ± 7			WGH = 0.25 ± 0.03	BNL325(3)
77.23	0		70	2.0			73MOXON
77.2 ± 0.3	0	0.5	70 ±30	(2.0)			74MOXON
77.2 ± 0.3	0		70 ±30				75BEER
78.4	1	0.5	48.0	0.14		GT = 48.14	JENDL-2
78.42	1	0.5	48.0	0.14		GT = 48.14	JENDL-1
78.42 ± 0.04	1		A 48 ± 7			WGT = 1.4	BNL325(3)
78.4 ± 0.3	0				0.14 ± 0.04		75BEER
89.3 ± 0.35	0		250 ±120			GNO = 2.64 ± 0.40	71GARG
93.4	1	0.5	1.22	1.0		GT = 2.22	JENDL-2
93.4	1	0.5	1.22	1.0		GT = 2.22	JENDL-1
93.4 ± 0.8	0				0.55 ± 0.12		75BEER
94.7	0	0.5	2500.0	0.56		GT = 2500.56	JENDL-2
94.7	0	0.5	2500.0	0.56		GT = 2500.56	JENDL-1
93.5	0	0.5	2250.0	2.14		GT = 2252.1	ENDF-B-4
94.7 ± 0.02	0	0.5	A 2500 ±100			WGH = 8.12 ± 0.33	BNL325(3)
94.74	0		2500	2.0			73MOXON
94.74	0	0.5	2440	0.56			74MOXON
93.5	0					GT = 2250 GNO = 7.483	66FARRELL
95.5 ± 0.40	0		1620 ±400			GNO = 5.29 ± 1.31	71GARG
94.7 ± 0.4	0		2500 ±100	0.56 ± 0.13			75BEER
103.3	1	1.5	1.86	1.0		GT = 2.86	JENDL-2
103.3	1	1.5	1.86	1.0		GT = 2.86	JENDL-1
103.3 ± 0.8	0				1.30 ± 0.22		75BEER
105.6	0	0.5	4600.0	1.4		GT = 4601.4	JENDL-2
105.6	0	0.5	4600.0	1.4		GT = 4601.4	JENDL-1
104.7	0	0.5	3700.0	2.14		GT = 3702.1	ENDF-B-4
105.65 ± 0.03	0	0.5	A 4600 ±200			WGH = 14.15 ± 0.62	BNL325(3)
105.65	0		4600	2.0			73MOXON
105.6	0	0.5	4600	1.4			74MOXON
104.5	0					GT = 4500 GNO = 14.183	66FARRELL
104.5 ± 0.5	0		3850			GNO = 11.90	71GARG
105.6 ± 0.4	0		4600 ±200	1.40 ± 0.31			75BEER
112.0	1	0.5	4.26	1.0		GT = 5.26	JENDL-2
112.0	1	0.5	4.26	1.0		GT = 5.26	JENDL-1
112.0 ± 0.9	0				0.81 ± 0.20		75BEER
118.5	1	1.5	3.17	1.0		GT = 4.17	JENDL-2
118.5	1	1.5	3.17	1.0		GT = 4.17	JENDL-1
118.5 ± 1.1	0				1.52 ± 0.33		75BEER
137.4	1	0.5	127.0	1.8		GT = 128.8	JENDL-2
137.4	1	0.5	113.0	1.8		GT = 114.8	JENDL-1
137.5	1	0.5	113.0	0.6		GT = 113.6	ENDF-B-4
137.5	*		A 127				BNL325(3)
138.74	0	0.5	113	1.0			73MOXON
137.5	0		A 126.5 ±13.5				66FARRELL
137.4 ± 1.4	0				1.77 ± 0.44		75BEER
145.0	1	1.5	309.0	1.55		GT = 310.55	JENDL-2
145.0	1	1.5	309.0	1.55		GT = 310.55	JENDL-1
145.0 ± 1.5	0				3.09 ± 0.62		75BEER
149.3	0	0.5	140.0	2.0		GT = 142.0	JENDL-2
149.3	0	0.5	140.0	2.0		GT = 142.0	JENDL-1
148.5	0	0.5	200.0	2.14		GT = 202.14	ENDF-B-4
149.3 ± 0.1	0	0.5	A 140 ±20			WGH = 0.36 ± 0.05	BNL325(3)
149.3	0		140	2.0			73MOXON
149.3	0	0.5	140	(2.0)			74MOXON
148.5	0					GT = 200 GNO = 0.533	66FARRELL
148.5 ± 0.8	0		200			GNO = 0.53	71GARG
149.3 ± 0.7	0		140 ±70				75BEER
160.5	1	1.5	21.9	1.45		GT = 23.35	JENDL-2
160.5	1	1.5	15.1	1.45		GT = 16.55	JENDL-1
160.5 ± 1.8	0				2.72 ± 0.60		75BEER
188.2	0	0.5	90.0	2.0		GT = 92.0	JENDL-2
188.2	0	0.5	90.0	2.0		GT = 92.0	JENDL-1
188.2 ± 0.2	0		A 90 ±20			WGH = 0.21 ± 0.05	BNL325(3)
188.2	0		90	2.0			73MOXON
188.2	0	0.5	90	(2.0)			74MOXON
188.2 ± 0.9	0		(90)				75BEER
190.74	1	0.5	125.0	1.0		GT = 126.0	JENDL-2
190.74	1	0.5	125.0	1.0		GT = 126.0	JENDL-1
189.5	1	0.5	125.0	0.6		GT = 125.6	ENDF-B-4
190.74	0	0.5	125	1.0			73MOXON
189.5	0		A 137.5 ±12.5				66FARRELL
214.7	0	0.5	190.0	2.0		GT = 192.0	JENDL-2
214.7	0	0.5	190.0	2.0		GT = 192.0	JENDL-1
214.7 ± 0.2	0	0.5	A 190 ±20			WGH = 0.41 ± 0.04	BNL325(3)
214.7	0		190	2.0			73MOXON

ENERGY (KEV)	L	J	NEUTRON WIDTH (EV)	GAMMA WIDTH (EV)	WWS (EV)	MISCELLANEOUS	REFERENCE
214.7	0	0.5	190	(2.0)			74MOXON
214.7 ± 1.1	0		190 ±130				75BEER
217.74	1	0.5	175.0	1.0		GT = 176.0	JENDL-2
217.74	1	0.5	175.0	1.0		GT = 176.0	JENDL-1
216.5	1	0.5	175.0	0.6		GT = 175.6	ENDF-B-4
217.74	> 0	0.5	175	1.0			73MOXON
216.5	> 0		^{A}190.5 ±15.5				66FARRELL
229.5	0	0.5	6180.0	2.0		GT = 6182.0	JENDL-2
229.5	0	0.5	6180.0	2.0		GT = 6182.0	JENDL-1
230.2	0	0.5	7250.0	2.14		GT = 7252.1	ENDF-B-4
229.5 ± 0.04	0	0.5	^{A}6250 ±80			WGH = 13.05 ± 0.17	BNL325(3)
229.5	0		6180	2.0			73MOXON
229.5	0	0.5	6180	(2.0)			74MOXON
229.5	0					GT = 7250 GNO = 15.761	66FARRELL
229.5 ± 1.2	0		6180 ±160				75BEER
243.23	0	0.5	780.0	2.0		GT = 782.0	JENDL-2
243.23	0	0.5	780.0	2.0		GT = 782.0	JENDL-1
243.0	0	0.5	1250.0	2.14		GT = 1252.1	ENDF-B-4
242.2 ± 0.08	0	0.5	^{A}780 ±40			WGH = 1.58 ± 0.08	BNL325(3)
243.23	0		780	2.0			73MOXON
243.2	0	0.5	780	(2.0)			74MOXON
242.2	0					GT = 750 GNO = 1.591	66FARRELL
243.2 ± 1.3	0		780 ±150				75BEER
260.74	1	0.5	105.0	1.0		GT = 106.0	JENDL-2
260.74	1	0.5	105.0	1.0		GT = 106.0	JENDL-1
259.5	1	0.5	105.0	0.6		GT = 105.6	ENDF-B-4
259.5	*		^{A}113				BNL325(3)
260.74	> 0	0.5	105	1.0			73MOXON
259.5	> 0		^{A}112.5 ± 7.5				66FARRELL
273.74	1	0.5	315.0	1.0		GT = 316.0	JENDL-2
273.74	1	0.5	315.0	1.0		GT = 316.0	JENDL-1
273.1	1	0.5	315.0	0.6		GT = 315.6	ENDF-B-4
272.5	*		^{A}333				BNL325(3)
273.74	> 0	0.5	315	1.0			73MOXON
272.5	> 0		^{A}332.5 ±17.5				66FARRELL
281.1	0	0.5	4800.0	2.0		GT = 4802.0	JENDL-2
281.1	0	0.5	4800.0	2.0		GT = 4802.0	JENDL-1
282.1	0	0.5	5200.0	2.14		GT = 5202.1	ENDF-B-4
280.5	0	0.5	^{A}4800 ±200			WGH = 9.06 ± 0.38	BNL325(3)
281.1	0		4800	2.0			73MOXON
281.1	0	0.5	4800	(2.0)			74MOXON
280.5	0					GT = 5500 GNO = 10.911	66FARRELL
281.1 ± 1.6	0		4800 ±400				75BEER
287.24	0	0.5	1500.0	2.0		GT = 1502.0	JENDL-2
287.24	0	0.5	1500.0	2.0		GT = 1502.0	JENDL-1
286.4	0	0.5	1500.0	2.14		GT = 1502.1	ENDF-B-4
286.0	0	0.5	^{A}1500 ±500			WGH = 2.81 ± 0.93	BNL325(3)
287.24	0		1500	2.0			73MOXON
287.0	0	0.5	1250	(2.0)			74MOXON
286.0	0					GT = 1500 GNO = 2.950	66FARRELL
(288.0)	0		(1000)				75BEER
298.24	1	0.5	190.0	1.0		GT = 191.0	JENDL-2
298.24	1	0.5	190.0	1.0		GT = 191.0	JENDL-1
297.0	1	0.5	190.0	0.6		GT = 190.6	ENDF-B-4
297.0	*		^{A}200				BNL325(3)
298.24	> 0	0.5	190	1.0			73MOXON
297.0	> 0		^{A}200 ±10				66FARRELL
300.74	1	0.5	470.0	1.0		GT = 471.0	JENDL-2
300.74	1	0.5	470.0	1.0		GT = 471.0	JENDL-1
299.5	1	0.5	470.0	0.6		GT = 470.6	ENDF-B-4
299.5	*		^{A}500				BNL325(3)
300.74	> 0	0.5	470	1.0			73MOXON
299.5	> 0		^{A}495 ±25				66FARRELL
305.24	0	0.5	800.0	2.0		GT = 802.0	JENDL-2
305.24	0	0.5	800.0	2.0		GT = 802.0	JENDL-1
304.5	0	0.5	1000.0	2.14		GT = 1002.1	ENDF-B-4
304.0	0	0.5	^{A}800			WGH = 1.45	BNL325(3)
305.24	0		800	2.0			73MOXON
305.24	0	0.5	800	(2.0)			74MOXON
304.0	0					GT = 800 GNO = 1.531	66FARRELL
316.74	1	0.5	225.0	1.0		GT = 226.0	JENDL-2
316.74	1	0.5	225.0	1.0		GT = 226.0	JENDL-1
314.8	1	0.5	225.0	0.6		GT = 225.6	ENDF-B-4
315.5	*		^{A}238				BNL325(3)
316.74	> 0	0.5	225	1.0			73MOXON
315.5	> 0		^{A}237.5 ±12.5				66FARRELL
320.24	1	0.5	356.0	1.0		GT = 357.0	JENDL-2
320.24	1	0.5	356.0	1.0		GT = 357.0	JENDL-1
319.5	1	0.5	356.0	0.6		GT = 356.6	ENDF-B-4

ENERGY (KEV)	L	J	NEUTRON WIDTH (EV)	GAMMA WIDTH (EV)	WWS (EV)	MISCELLANEOUS	REFERENCE
319.0	*		^{A}375				BNL325(3)
320.24	▸ 0	0.5	356	1.0			73MOXON
319.0	▸ 0		^{A}375 ±19				66FARRELL
324.24	1	0.5	560.0	1.0		GT = 561.0	JENDL-2
324.24	1	0.5	560.0	1.0		GT = 561.0	JENDL-1
323.4	1	0.5	560.0	0.6		GT = 560.6	ENDF-B-4
323.0	*		^{A}580				BNL325(3)
324.24	▸ 0	0.5	560	1.0			73MOXON
323.0	▸ 0		^{A}600 ±40				66FARRELL
328.24	0	0.5	5500.0	2.0		GT = 5502.0	JENDL-2
328.24	0	0.5	5500.0	2.0		GT = 5502.0	JENDL-1
328.0	0	0.5	5500.0	2.14		GT = 5502.1	ENDF-B-4
327.0	0	0.5	^{A}5500			WGH = 9.62	BNL325(3)
328.24	0		5500	2.0			73MOXON
328.24	0	0.5	5500	(2.0)			74MOXON
327.0	0					GT = 5500 GNO = 10.186	66FARRELL
345.44	0	0.5	7500.0	2.0		GT = 7502.0	JENDL-2
345.44	0	0.5	7500.0	2.0		GT = 7502.0	JENDL-1
345.0	0	0.5	7500.0	2.14		GT = 7502.1	ENDF-B-4
344.2	0	0.5	^{A}7500			WGH = 12.78	BNL325(3)
345.44	0		7500	2.0			73MOXON
345.44	0	0.5	7500	(2.0)			74MOXON
344.2	0					GT = 7500 GNO = 13.578	66FARRELL
353.24	1	0.5	267.0	1.0		GT = 268.0	JENDL-2
353.24	1	0.5	267.0	1.0		GT = 268.0	JENDL-1
352.5	1	0.5	267.0	0.6		GT = 267.6	ENDF-B-4
352.0	*		^{A}279				BNL325(3)
353.24	▸ 0	0.5	267	1.0			73MOXON
352.0	▸ 0		^{A}278.5 ±11.5				66FARRELL
357.44	0	0.5	2000.0	2.0		GT = 2002.0	JENDL-2
357.44	0	0.5	2000.0	2.0		GT = 2002.0	JENDL-1
357.7	0	0.5	2000.0	2.14		GT = 2002.1	ENDF-B-4
356.2	0	0.5	^{A}2000			WGH = 3.35	BNL325(3)
357.44	0		2000	2.0			73MOXON
357.44	0	0.5	2000	(2.0)			74MOXON
356.2	0					GT = 2000 GNO = 3.567	66FARRELL
365.27	1	0.5	187.0	1.0		GT = 188.0	JENDL-2
365.27	1	0.5	187.0	1.0		GT = 188.0	JENDL-1
364.7	1	0.5	187.0	0.6		GT = 187.6	ENDF-B-4
364.0	*		^{A}194				BNL325(3)
365.24	▸ 0	0.5	187	1.0			73MOXON
364.0	▸ 0		^{A}193.5 ± 6.5				66FARRELL
375.74	0	0.5	250.0	2.0		GT = 252.0	JENDL-2
375.74	0	0.5	250.0	2.0		GT = 252.0	JENDL-1
375.5	0	0.5	250.0	2.14		GT = 252.14	ENDF-B-4
374.5	0	0.5	^{A}250			WGH = 0.41	BNL325(3)
375.74	0		250	2.0			73MOXON
375.74	0	0.5	250	(2.0)			74MOXON
374.5	0					GT = 250 GNO = 0.436	66FARRELL
383.74	0	0.5	1250.0	2.0		GT = 1252.0	JENDL-2
383.74	0	0.5	1250.0	2.0		GT = 1252.0	JENDL-1
383.5	0	0.5	1150.0	2.14		GT = 1152.1	ENDF-B-4
382.5	0	0.5	^{A}1250			WGH = 2.02	BNL325(3)
383.74	0		1250	2.0			73MOXON
383.74	0	0.5	1250	(2.0)			74MOXON
382.5	0					GT = 1250 GNO = 2.161	66FARRELL
389.74	0	0.5	4500.0	2.0		GT = 4502.0	JENDL-2
389.74	0	0.5	4500.0	2.0		GT = 4502.0	JENDL-1
389.5	0	0.5	4500.0	2.14		GT = 4502.1	ENDF-B-4
388.5	0	0.5	^{A}4500			WGH = 7.22	BNL325(3)
389.74	0		4500	2.0			73MOXON
389.74	0	0.5	4500	(2.0)			74MOXON
388.5	0					GT = 4500 GNO = 7.726	66FARRELL
402.44	0	0.5	1500.0	2.0		GT = 1502.0	JENDL-2
402.44	0	0.5	1500.0	2.0		GT = 1502.0	JENDL-1
402.2	0	0.5	1750.0	2.14		GT = 1752.1	ENDF-B-4
401.5	0	0.5	^{A}1500			WGH = 2.37	BNL325(3)
402.44	0		1500	2.0			73MOXON
402.44	0	0.5	1500	(2.0)			74MOXON
401.2	0					GT = 1500 GNO = 2.540	66FARRELL
404.54	1	0.5	435.0	1.0		GT = 436.0	JENDL-2
404.5	1	0.5	392.0	1.0		GT = 393.0	JENDL-1
403.9	1	0.5	404.0	0.6		GT = 404.6	ENDF-B-4
403.3	*		^{A}392				BNL325(3)
404.54	▸ 0	0.5	4035	1.0			73MOXON
403.3	▸ 0		^{A}407.5 ±27.5				66FARRELL
421.54	1	0.5	800.0	1.0		GT = 801.0	JENDL-2

ENERGY (KEV)	L	J	NEUTRON WIDTH (EV)	GAMMA WIDTH (EV)	WW5 (EV)	MISCELLANEOUS	REFERENCE
421.54	1	0.5	800.0	1.0		GT = 801.0	JENDL-1
420.7	1	0.5	800.0	0.6		GT = 800.6	ENDF-B-4
420.3	*		^{A}813				BNL325(3)
421.54	▸ 0	0.5	800	1.0			73MOXON
420.3	▸ 0		^{A}813 ±13				66FARRELL
424.24	0	0.5	1500.0	2.0		GT = 1502.0	JENDL-2
424.24	0	0.5	1500.0	2.0		GT = 1502.0	JENDL-1
423.9	0	0.5	1500.0	2.14		GT = 1502.1	ENDF-B-4
423.0	0	0.5	^{A}1500			WGH = 2.31	BNL325(3)
424.24	0		1500	2.0			73MOXON
424.24	0	0.5	1500	(2.0)			74MOXON
423.0	0					GT = 1500 GNO = 2.483	66FARRELL
434.24	0	0.5	6500.0	2.0		GT = 6502.0	JENDL-2
434.24	0	0.5	6500.0	2.0		GT = 6502.0	JENDL-1
434.7	0	0.5	6500.0	2.14		GT = 6502.1	ENDF-B-4
433.0	0	0.5	^{A}6500			WGH = 9.88	BNL325(3)
434.24	0		6500	2.0			73MOXON
434.24	0	0.5	6500	(2.0)			74MOXON
433.0	0					GT = 6500 GNO = 10.650	66FARRELL
445.24	0	0.5	350.0	2.0		GT = 352.0	JENDL-2
445.24	0	0.5	350.0	2.0		GT = 352.0	JENDL-1
445.0	0	0.5	350.0	2.14		GT = 352.14	ENDF-B-4
444.0	0	0.5	^{A}350			WGH = 0.53	BNL325(3)
445.24	0		350	2.0			73MOXON
445.24	0	0.5	350	(2.0)			74MOXON
444.0	0					GT = 350 GNO = 0.567	66FARRELL
447.74	1	0.5	150.0	1.0		GT = 151.0	JENDL-2
447.74	1	0.5	150.0	1.0		GT = 151.0	JENDL-1
446.5	1	0.5	350.0	0.6		GT = 350.6	ENDF-B-4
447.74	▸ 0	0.5	(150)	1.0			73MOXON
446.5	▸ 0						66FARRELL
451.04	1	0.5	248.0	1.0		GT = 249.0	JENDL-2
451.04	1	0.5	248.0	1.0		GT = 249.0	JENDL-1
449.8	*		^{A}250				BNL325(3)
451.04	▸ 0	0.5	248	1.0			73MOXON
449.8	▸ 0		^{A}249 ± 1				66FARRELL
451.24	1	0.5	231.0	1.0		GT = 232.0	JENDL-2
451.24	1	0.5	231.0	1.0		GT = 232.0	JENDL-1
451.2	1	0.5	600.0	0.6		GT = 600.6	ENDF-B-4
450.0	*		^{A}236				BNL325(3)
451.24	▸ 0	0.5	231	1.0			73MOXON
450.0	▸ 0		^{A}235.5 ± 4.5				66FARRELL
459.24	0	0.5	500.0	2.0		GT = 502.0	JENDL-2
459.24	0	0.5	500.0	2.0		GT = 502.0	JENDL-1
458.9	0	0.5	500.0	2.14		GT = 502.14	ENDF-B-4
458.0	0	0.5	^{A}500			WGH = 0.74	BNL325(3)
459.24	0		500	2.0			73MOXON
459.24	0	0.5	500	(2.0)			74MOXON
458.0	0					GT = 500 GNO = 0.800	66FARRELL
463.04	1	0.5	540.0	1.0		GT = 541.0	JENDL-2
463.04	1	0.5	540.0	1.0		GT = 541.0	JENDL-1
462.52	1	0.5	540.0	0.6		GT = 540.6	ENDF-B-4
461.8	*		^{A}550				BNL325(3)
463.04	▸ 0	0.5	540	1.0			73MOXON
461.8	▸ 0		^{A}550 ±10				66FARRELL
476.24	0	0.5	1500.0	2.0		GT = 1502.0	JENDL-2
476.24	0	0.5	1500.0	2.0		GT = 1502.0	JENDL-1
475.5	0	0.5	1900.0	2.14		GT = 1902.1	ENDF-B-4
475.0	0	0.5	^{A}1500			WGH = 2.18	BNL325(3)
476.24	0		1500	2.0			73MOXON
476.24	0	0.5	1500	(2.0)			74MOXON
475.0	0					GT = 1500 GNO = 2.363	66FARRELL
481.24	1	0.5	318.0	1.0		GT = 319.0	JENDL-2
481.24	1	0.5	318.0	1.0		GT = 319.0	JENDL-1
481.2	1	0.5	318.0	0.6		GT = 318.6	ENDF-B-4
480.0	*		^{A}324				BNL325(3)
481.24	▸ 0	0.5	318	1.0			73MOXON
480.0	▸ 0		^{A}339 ±2:				66FARRELL
489.74	0	0.5	4000.0	2.0		GT = 4002.0	JENDL-2
489.74	0	0.5	4000.0	2.0		GT = 4002.0	JENDL-1
488.5	0	0.5	4000.0	2.14		GT = 4002.1	ENDF-B-4
488.5	0	0.5	^{A}4000			WGH = 5.72	BNL325(3)
489.74	0		4000	2.0			73MOXON
489.74	0	0.5	4000	(2.0)			74MOXON
488.5	0					GT = 4000 GNO = 6.228	66FARRELL
494.24	1	0.5	890.0	1.0		GT = 891.0	JENDL-2
494.24	1	0.5	890.0	1.0		GT = 891.0	JENDL-1
493.5	1	0.5	890.0	0.6		GT = 890.6	ENDF-B-4

ENERGY (KEV)	L	J	NEUTRON WIDTH (EV)	GAMMA WIDTH (EV)	WHS (EV)	MISCELLANEOUS	REFERENCE
493.5	1	0.5	^{A}934			WG1 = 2.8	BNL325(3)
494.24	0	0.5	890	1.0			73MOXON
493.5	0	0.5	^{A}901 ±11				66FARRELL
499.24	0	0.5	1500.0	2.0		GT = 1502.0	JENDL-2
499.24	0	0.5	1500.0	2.0		GT = 1502.0	JENDL-1
499.2	0	0.5	1500.0	2.14		GT = 1502.1	ENDF-B-4
498.0	0	0.5	^{A}1500			WGH = 2.13	BNL325(3)
499.24	0		1500	2.0			73MOXON
499.24	0	0.5	1500	(2.0)			74MOXON
498.0	0					GT = 1500	66FARRELL
						GNO = 2.317	
509.74	0	0.5	500.0	2.0		GT = 502.0	JENDL-2
509.74	0	0.5	500.0	2.0		GT = 502.0	JENDL-1
509.1	0	0.5	1500.0	2.14		GT = 1502.1	ENDF-B-4
508.5	0	0.5	^{A}500			WGH = 0.70	BNL325(3)
509.74	0		500	2.0			73MOXON
509.74	0	0.5	500	(2.0)			74MOXON
508.5	0					GT = 500	66FARRELL
						GNO = 0.766	
513.2	1	0.5	170.0	0.6		GT = 170.6	ENDF-B-4
516.74	1	0.5	140.0	1.0		GT = 141.0	JENDL-2
516.74	1	0.5	140.0	1.0		GT = 141.0	JENDL-1
515.5	1	0.5	140.0	0.6		GT = 140.6	ENDF-B-4
515.5	*		^{A}145				BNL325(3)
516.74	0	0.5	140	1.0			73MOXON
515.5	0		^{A}145 ± 5				66FARRELL
523.24	1	0.5	380.0	1.0		GT = 381.0	JENDL-2
523.24	1	0.5	380.0	1.0		GT = 381.0	JENDL-1
522.45	1	0.5	380.0	0.6		GT = 380.6	ENDF-B-4
522.0	*		^{A}390				BNL325(3)
523.24	0	0.5	380	1.0			73MOXON
522.0	0		^{A}390 ±10				66FARRELL
530.24	1	1.5	925.0	1.0		GT = 926.0	JENDL-2
530.24	1	1.5	1725.0	1.0		GT = 1726.0	JENDL-1
529.0	1	1.5	925.0	0.6		GT = 925.6	ENDF-B-4
529.0	1	1.5	^{A}1690			WG1 = 4.7	BNL325(3)
530.24	0	0.5	1725	1.0			73MOXON
529.0	0	1.5	^{A}894 ±31				66FARRELL
536.74	1	0.5	1600.0	1.0		GT = 1601.0	JENDL-2
536.74	1	0.5	1600.0	1.0		GT = 1601.0	JENDL-1
535.5	1	0.5	1600.0	0.6		GT = 1600.6	ENDF-B-4
535.5	1	0.5	^{A}1390				BNL325(3)
536.74	0	0.5	1600	1.0			73MOXON
535.5	0	0.5	^{A}1630 ±30				66FARRELL
540.24	0	0.5	2000.0	2.0		GT = 2002.0	JENDL-2
540.24	0	0.5	2000.0	2.0		GT = 2002.0	JENDL-1
539.0	0	0.5	2000.0	2.14		GT = 2002.1	ENDF-B-4
539.0	0	0.5	^{A}2000			WGH = 2.72	BNL325(3)
540.24	0		2000	2.0			73MOXON
540.24	0	0.5	2000	(2.0)			74MOXON
539.0	0					GT = 2000	66FARRELL
						GNO = 2.989	
543.0	1	0.5	150.0	0.6		GT = 150.6	ENDF-B-4
544.4	1	0.5	150.0	0.6		GT = 150.6	ENDF-B-4
555.24	1	0.5	655.0	1.0		GT = 656.0	JENDL-2
555.24	1	0.5	655.0	1.0		GT = 656.0	JENDL-1
554.0	1	0.5	655.0	0.6		GT = 655.6	ENDF-B-4
554.0	*		^{A}675				BNL325(3)
555.24	0	0.5	655	1.0			73MOXON
554.0	0		^{A}668 ±13				66FARRELL
569.74	1	0.5	825.0	1.0		GT = 826.0	JENDL-2
569.74	1	0.5	825.0	1.0		GT = 826.0	JENDL-1
568.2	1	0.5	500.0	0.6		GT = 500.6	ENDF-B-4
568.5	*		^{A}843				BNL325(3)
569.74	0	0.5	825	1.0			73MOXON
568.5	0		^{A}843 ±18				66FARRELL
573.04	0	0.5	4000.0	2.0		GT = 4002.0	JENDL-2
573.04	0	0.5	4000.0	2.0		GT = 4002.0	JENDL-1
571.8	0	0.5	3300.0	2.14		GT = 3302.1	ENDF-B-4
571.8	0	0.5	^{A}4000			WGH = 5.29	BNL325(3)
573.04	0		4000	2.0			73MOXON
573.04	0	0.5	4000	(2.0)			74MOXON
571.8	0					GT = 4000	66FARRELL
						GNO = 5.836	
582.24	0	0.5	500.0	2.0		GT = 502.0	JENDL-2
582.24	0	0.5	500.0	2.0		GT = 502.0	JENDL-1
581.6	0	0.5	1100.0	2.14		GT = 1102.1	ENDF-B-4
581.0	0	0.5	^{A}500			WGH = 0.66	BNL325(3)
582.24	0		500	2.0			73MOXON
582.24	0	0.5	500	(2.0)			74MOXON
581.0	0					GT = 500	66FARRELL
						GNO = 0.725	

ENERGY (KEV)	L	J	NEUTRON WIDTH (EV)	GAMMA WIDTH (EV)	WW5 (EV)	MISCELLANEOUS	REFERENCE
584.74	0	0.5	10000.0	2.0		GT = 10002.0	JENDL-2
584.74	0	0.5	10000.0	2.0		GT = 10002.0	JENDL-1
583.9	0	0.5	10000.0	2.14		GT = 10002.0	ENDF-B-4
583.5	0	0.5	^{A}10000			WGH = 13.09	BNL325(3)
584.74	0		10000	2.0			73MOXON
584.74	0	0.5	10000	(2.0)			74MOXON
583.5	0					GT = 10000 GNO = 14.471	66FARRELL
591.74	0	0.5	2000.0	2.0		GT = 2002.0	JENDL-2
591.74	0	0.5	2000.0	2.0		GT = 2002.0	JENDL-1
590.5	0	0.5	2000.0	2.14		GT = 2002.1	ENDF-B-4
590.5	0	0.5	^{A}2000			WGH = 2.60	BNL325(3)
591.74	0		2000	2.0			73MOXON
591.74	0	0.5	2000	(2.0)			74MOXON
590.5	0					GT = 2000 GNO = 2.880	66FARRELL
600.74	1	0.5	810.0	1.0		GT = 811.0	JENDL-2
600.74	1	0.5	810.0	1.0		GT = 811.0	JENDL-1
599.5	1	0.5	375.0	0.6		GT = 375.6	ENDF-B-4
599.5	1	0.5	^{A}905			WGI = 2.2	BNL325(3)
600.74	0	0.5	810	1.0			73MOXON
599.5	0	0.5	^{A}825 ±15				66FARRELL
605.5	1	0.5	300.0	0.6		GT = 300.6	ENDF-B-4
611.0	0	0.5	7000.0	2.14		GT = 7002.1	ENDF-B-4
621.5	1	0.5	300.0	0.6		GT = 300.6	ENDF-B-4
628.5	0	0.5	1300.0	2.14		GT = 1302.1	ENDF-B-4
631.0	1	1.5	500.0	0.6		GT = 500.6	ENDF-B-4
635.5	1	1.5	600.0	0.6		GT = 600.6	ENDF-B-4
640.3	0	0.5	400.0	2.14		GT = 402.14	ENDF-B-4
642.5	1	0.5	300.0	0.6		GT = 300.6	ENDF-B-4
653.0	0	0.5	9000.0	2.14		GT = 9002.1	ENDF-B-4

* A and B denote $g\Gamma_n$ and $g\Gamma_\gamma$, respectively

** WW5 = $g\Gamma_n\Gamma_\gamma/\Gamma$ (eV), GT = Γ (eV)

WGH = $g\Gamma_n^{(0)}$ (eV), GNO = $\Gamma_n^{(0)}$ (eV)

WGI = $g\Gamma_n^{(1)}$ (eV)

References

66Farrell : Ref.(21)

69Hockenbury: Ref.(23)

71Garg : Ref.(49)

73Moxon : Ref.(51) (Evaluation)

74Moxon : Ref.(3) (Evaluation)

75Beer : Ref.(26)

Table 10 Resonance parameters of ^{64}Ni

ENERGY (KEV)	L	J	NEUTRON WIDTH * (EV)	GAMMA WIDTH (EV)	HWS ** (EV)	MISCELLANEOUS **	REFERENCE
9.52	1	1.5	6.9	(1.0)	1.73 ± 0.2		JENDL-2
9.52	1	1.5	6.18	1.0		GT : 7.18	ENDF-B-4
9.52					1.7 ± 0.2		BNL325(3)
9.52	0	1.5	6.41	1.0			73MOXON
9.52	1	1.5	6.9	(1.0)	1.73 ± 0.2		74MOXON
9.52					1.73 ± 0.2	GGS = 473 ±70	69HOCKENBURY
14.3	0	0.5	2900.0	1.9		GT = 2901.9	JENDL-2
14.3	0	0.5	2900.0	1.9		GT = 2901.9	JENDL-1
13.8	0	0.5	800.0	2.14		GT = 802.14	ENDF-B-4
14.3 ± 0.2	0	0.5	^{A}2900 ±500	0.76 ± 0.15		WGH = 24.25 ± 4.18	BNL325(3)
14.3	0		2900	2.0			73MOXON
14.3	0	0.5	2900	1.9			74MOXON
13.8	0					GT = 3000 GNO = 25.7	66FARRELL
14.3							72HOCKENBURY
14.3 ± 0.2	0		2900 ±500	1.9 ± 0.4			75BEER
14.8	1	0.5	0.316	1.0		GT = 1.316	JENDL-2
14.8	1	0.5	0.316	1.0		GT = 1.316	JENDL-1
14.8 ± 0.1	1	0.5	0.32	(1.0)	0.24 ± 0.05		74MOXON
14.8 ± 0.1	0				0.24 ± 0.05		75BEER
25.8 ± 0.1							BNL325(3)
26.0							69HOCKENBURY
25.8							72HOCKENBURY
31.85	1	0.5	3.0	1.0		GT = 4.0	JENDL-2
31.85	1	0.5	3.0	1.0		GT = 4.0	JENDL-1
31.85 ± 0.15	1	0.5	3.0	(1.0)	0.75 ± 0.11		74MOXON
31.8							72HOCKENBURY
31.85 ± 0.15	0				0.75 ± 0.11		75BEER
33.82	0	0.5	8900.0	2.9		GT = 8902.9	JENDL-2
33.82	0	0.5	8900.0	2.9		GT = 8902.9	JENDL-1
33.2	0	0.5	950.0	2.14		GT = 952.14	ENDF-B-4
33.81 ± 0.04	0	0.5	^{A}8900 ±500			WGH = 48.40 ± 2.72	BNL325(3)
33.81	0		8900	2.0			73MOXON
33.82	0	0.5	8900	2.9			74MOXON
33.2	0					GT = 9500 GNO = 52.5	66FARRELL
(33.5 ± 1.5)							72HOCKENBURY
33.82 ± 0.10	0		8900 ±50	2.9 ± 0.6			75BEER
39.2							69HOCKENBURY
(39.2)							72HOCKENBURY
46.1							69HOCKENBURY
(45.8)							72HOCKENBURY
53.9							69HOCKENBURY
(60.0)							72HOCKENBURY
62.8	1	0.5	5.7	1.0		GT = 6.7	JENDL-2
62.8	1	0.5	5.7	1.0		GT = 6.7	JENDL-1
64.0							69HOCKENBURY
62.4							72HOCKENBURY
62.8 ± 0.4	0				0.85 ± 0.18		75BEER
83.4							69HOCKENBURY
82.8							72HOCKENBURY
106.5	1	0.5	110.0	1.0		GT = 111.0	JENDL-2
106.52	1	0.5	110.0	1.0		GT = 111.0	JENDL-1
105.0	1	0.5	115.0	0.5		GT = 115.6	ENDF-B-4
106.52 ± 0.08	*		^{A}110 ±30				BNL325(3)
106.52	0	0.5	110	1.0			73MOXON
105.0	0		^{A}122.5 ± 7.5				66FARRELL
106.5 ± 0.4	0		^{A}110 ±50				75BEER
129.3	0	0.5	1340.0	2.0		GT = 1342.0	JENDL-2
129.32	0	0.5	1340.0	2.0		GT = 1342.0	JENDL-1
128.8	0	0.5	1700.0	2.14		GT = 1702.1	ENDF-B-4
129.32 ± 0.03	0	0.5	^{A}1400 ±50			WGH = 3.89 ± 0.14	BNL325(3)
129.32	0		1340	2.0			73MOXON
129.3	0	0.5	1340	(2.0)			74MOXON
128.8	0					GT = 1700 GNO = 4.847	66FARRELL
129.3 ± 0.5	0		1340 ±70				75BEER
142.0	1	0.5	170.0	1.0		GT = 171.0	JENDL-2
141.97	1	0.5	170.0	1.0		GT = 171.0	JENDL-1
141.5	1	0.5	140.0	0.6		GT = 140.6	ENDF-B-4
141.5 ± 0.1	*		^{A}170 ±20				BNL325(3)
141.97	0	0.5	170	1.0			73MOXON
141.5	0		^{A}150 ±10				66FARRELL
142.0 ± 0.6	0		^{A}170 ±70				75BEER
148.8	0	0.5	80.0	2.0		GT = 82.0	JENDL-2
148.8	0	0.5	80.0	2.0		GT = 82.0	JENDL-1
148.8 ± 0.1	0	0.5	^{A}80 ±20			WGH = 0.21 ± 0.05	BNL325(3)
148.8	0		80	2.0			73MOXON
148.8 ± 0.7	0	0.5	80 ±70	(2.0)			74MOXON
148.8 ± 0.7	0		80 ±70				75BEER
155.0	0	0.5	3900.0	2.0		GT 3902.0	JENDL-2

ENERGY (KEV)	L	J	NEUTRON WIDTH (EV)	GAMMA WIDTH (EV)	WWS (EV)	MISCELLANEOUS	REFERENCE
154.96	0	0.5	3890.0	2.0		GT = 3892.0	JENDL-1
155.1	0	0.5	5000.0	2.14		GT = 5002.1	ENDF-B-4
155.0 ± 0.1	0	0.5	[A]3950 ±100			WGH = 10.04 ± 0.25	BNL325(3)
154.96	0		3890	2.0			73MOXON
155.0	0	0.5	3900	(2.0)			74MOXON
154.5	0					GT = 5000	66FARRELL
						GNO = 13.076	
155.0 ± 0.7	0		3900 ±100				75BEER
163.2	0	0.5	140.0	2.0		GT = 142.0	JENDL-2
163.2	0	0.5	140.0	2.0		GT = 142.0	JENDL-1
163.0	0	0.5	300.0	2.14		GT = 302.14	ENDF-B-4
163.2 ± 0.1	0	0.5	[A]160 ±20			WGH = 0.40 ± 0.05	BNL325(3)
163.2	0		140	2.0			73MOXON
163.2	0	0.5	140	(2.0)			74MOXON
163.0	0					GT = 300	66FARRELL
						GNO = 0.765	
163.2 ± 0.8	0		140 ±80				75BEER
177.7	0	0.5	470.0	2.0		GT = 472.0	JENDL-2
177.7	0	0.5	470.0	2.0		GT = 472.0	JENDL-1
177.5	0	0.5	500.0	2.14		GT = 502.14	ENDF-B-4
177.7 ± 0.1	0	0.5	[A]470 ±30			WGH = 1.12 ± 0.07	BNL325(3)
177.7	0		470	2.0			73MOXON
177.7	0	0.5	470	(2.0)			74MOXON
177.5	0					GT = 500	66FARRELL
						GNO = 1.225	
177.7 ± 0.8	0		470 ±90				75BEER
191.5	1	0.5	160.0	1.0		GT = 161.0	JENDL-2
191.5	1	0.5	160.0	1.0		GT = 161.0	JENDL-1
190.0	1	0.5	105.0	0.6		GT = 105.6	ENDF-B-4
191.0 ± 0.2	(1)		[A]140 ±30				BNL325(3)
191.5	▸ 0	0.5	160	1.0			73MOXON
191.0	▸ 0		[A]109.5 ± 4.5				66FARRELL
191.5 ± 0.9	▸ 0		[A]160 ±110				75BEER
205.3	0	0.5	60.0	2.0		GT = 62.0	JENDL-2
205.3	0	0.5	60.0	2.0		GT = 62.0	JENDL-1
205.3 ± 0.2	0	0.5	[A]60 ±20			WGH = 0.13 ± 0.04	BNL325(3)
205.3	0		60	2.0			73MOXON
205.3 ± 1.1	0	0.5	60	(2.0)			74MOXON
205.3 ± 1.1	0		(60)				75BEER
214.7	1	0.5	80.0	1.0		GT = 81.0	JENDL-2
214.7	1	0.5	80.0	1.0		GT = 81.0	JENDL-1
213.7	1	0.5	150.0	0.6		GT = 150.6	ENDF-B-4
214.7 ± 0.3	*		[A]90 ±20				BNL325(3)
214.7	▸ 0	0.5	80	1.0			73MOXON
213.7	▸ 0		[A]155 ± 5				66FARRELL
214.7 ± 1.1	▸ 0		[A](80)				75BEER
219.8	0	0.5	30.0	2.0		GT = 32.0	JENDL-2
219.8	0	0.5	30.0	2.0		GT = 32.0	JENDL-1
221.0	1	0.5	400.0	0.6		GT = 400.6	ENDF-B-4
219.8 ± 0.1	0	0.5	[A]30 ±20			WGH = 0.064 ± 0.043	BNL325(3)
219.8	0		30	2.0			73MOXON
219.8 ± 1.1	0	0.5	30	(2.0)			74MOXON
219.8 ± 1.1	0		(30)				75BEER
226.9	0	0.5	120.0	2.0		GT = 122.0	JENDL-2
226.9	0	0.5	120.0	2.0		GT = 122.0	JENDL-1
226.9 ± 0.3	0	0.5	[A]120 ±30			WGH = 0.25 ± 0.06	BNL325(3)
226.9	0		120	2.0			73MOXON
226.9 ± 1.2	0	0.5	120	(2.0)			74MOXON
226.9 ± 1.2	0		(120)				75BEER
231.9	0	0.5	3770.0	2.0		GT = 3772.0	JENDL-2
231.95	0	0.5	3770.0	2.0		GT = 3772.0	JENDL-1
231.0	0	0.5	4000.0	2.14		GT = 4002.1	ENDF-B-4
231.95 ± 0.04	0	0.5	[A]3770 ±90			WGH = 7.83 ± 0.19	BNL325(3)
231.95	0		3770	2.0			73MOXON
231.9	0	0.5	3770	(2.0)			74MOXON
231.0	0					GT = 4000	66FARRELL
						GNO = 8.670	
231.9 ± 1.2	0		3770 ±160				75BEER
237.9	1	0.5	320.0	1.0		GT = 321.0	JENDL-2
237.9	1	0.5	320.0	1.0		GT = 321.0	JENDL-1
236.2	1	0.5	395.0	0.6		GT = 395.6	ENDF-B-4
237.9 ± 0.1	*		[A]320 ±40				BNL325(3)
237.9	▸ 0	0.5	320	1.0			73MOXON
235.7	▸ 0		[A]402.5 ± 7.5				66FARRELL
237.9 ± 1.3	▸ 0		[A]320 ±130				75BEER
238.7	1	1.5	400.0	0.6		GT = 400.6	ENDF-B-4
255.7	1	0.5	170.0	1.0		GT = 171.0	JENDL-2
255.7	1	0.5	170.0	1.0		GT = 171.0	JENDL-1
257.9	1	0.5	570.0	0.6		GT = 570.6	ENDF-B-4
255.7 ± 0.3	*		[A]170 ±40				BNL325(3)
255.7	▸ 0	0.5	170	1.0			73MOXON
254.0	▸ 0		[A]589 ±19				66FARRELL
255.7 ± 1.4	▸ 0		[A]170 ±150				75BEER
[illegible]	0	0.5	2200.0	2.0		GT = 2202.0	JENDL-2

ENERGY (KEV)	L	J	NEUTRON WIDTH (EV)	GAMMA WIDTH (EV)	WWS (EV)	MISCELLANEOUS	REFERENCE
269.68	0	0.5	2210.0	2.0		GT = 2212.0	JENDL-1
272.2	0	0.5	2200.0	2.14		GT = 2202.1	ENDF-B-4
269.7 ± 0.1	0	0.5	A2210 ±90			WGH = 4.26 ± 0.17	BNL325(3)
269.68	0		2210	2.0			73MOXON
269.7	0	0.5	2200	(2.0)			74MOXON
268.0	0					GT = 3000	66FARRELL
						GNO = 6.076	
269.7 ± 1.5	0		2200 ±700				75BEER
275.24	1	0.5	310.0	1.0		GT = 311.0	JENDL-2
275.24	1	0.5	310.0	1.0		GT = 311.0	JENDL-1
278.2	1	0.5	310.0	0.6		GT = 310.6	ENDF-B-4
275.24	▸ 0	0.5	310	1.0			73MOXON
274.0	▸ 0		A320 ±10				66FARRELL
283.5	0	0.5	350.0	2.0		GT = 352.0	JENDL-2
283.5	0	0.5	350.0	2.0		GT = 352.0	JENDL-1
283.5 ± 0.4	0	0.5	A350 ±70			WGH = 0.66 ± 0.13	BNL325(3)
283.5	0		350	2.0			73MOXON
283.5 ± 1.6	0	0.5	350 ±190	(2.0)			74MOXON
283.5 ± 1.6	0		350 ±190				75BEER
290.24	1	0.5	105.0	1.0		GT = 106.0	JENDL-2
290.24	1	0.5	105.0	1.0		GT = 106.0	JENDL-1
288.4	1	0.5	105.0	0.6		GT = 105.6	ENDF-B-4
290.24	▸ 0	0.5	105	1.0			73MOXON
289.0	▸ 0		A107.5 ± 2.5				66FARRELL
299.24	0	0.5	1000.0	2.0		GT = 1002.0	JENDL-2
299.24	0	0.5	1000.0	2.0		GT = 1002.0	JENDL-1
298.0	0	0.5	1000.0	2.14		GT = 1002.1	ENDF-B-4
298.0 ± 2.5	0	0.5	A1000			WGH = 1.83	BNL325(3)
299.24	0		1000	2.0			73MOXON
299.24	0	0.5	1000	(2.0)			74MOXON
298.0	0					GT = 1000	66FARRELL
						GNO = 1.930	
309.74	0	0.5	1500.0	2.0		GT = 1502.0	JENDL-2
309.74	0	0.5	1500.0	2.0		GT = 1502.0	JENDL-1
309.1	0	0.5	1500.0	2.14		GT = 1502.1	ENDF-B-4
308.5 ± 2.5	0	0.5	A1500			WGH = 2.70	BNL325(3)
309.74	0		1500	2.0			73MOXON
309.74	0	0.5	1500	(2.0)			74MOXON
308.5	0					GT = 1500 *-	66FARRELL
						GNO = 2.851	
321.24	1	0.5	50.0	1.0		GT = 51.0	JENDL-2
321.24	1	0.5	50.0	1.0		GT = 51.0	JENDL-1
320.0	1	1.5	100.0	0.6		GT = 100.6	ENDF-B-4
321.24	▸ 0	0.5	(50)	1.0			73MOXON
320.0	▸ 0						66FARRELL
327.74	1	0.5	585.0	1.0		GT = 586.0	JENDL-2
327.74	1	0.5	585.0	1.0		GT = 586.0	JENDL-1
326.5	1	0.5	585.0	0.6		GT = 585.6	ENDF-B-4
327.0 ± 2.5	■		A597				BNL325(3)
327.74	▸ 0	0.5	585	1.0			73MOXON
326.5	▸ 0		A596 ±11				66FARRELL
334.24	0	0.5	250.0	2.0		GT = 252.0	JENDL-2
333.0	0	0.5	250.0	2.14		GT = 252.14	ENDF-B-4
333.0 ± 2.5	0	0.5	A250			WGH = 0.43	BNL325(3)
334.24	0		250	2.0			73MOXON
334.24	0	0.5	250	(2.0)			74MOXON
333.0	0					GT = 250	66FARRELL
						GNO = 0.459	
335.24	1	0.5	50.0	1.0		GT = 51.0	JENDL-2
335.24	1	0.5	50.0	1.0		GT = 51.0	JENDL-1
334.0	1	1.5	100.0	0.6		GT = 100.6	ENDF-B-4
335.24	▸ 0	0.5	(50)	1.0			73MOXON
334.0	▸ 0						66FARRELL
341.44	0	0.5	500.0	2.0		GT = 502.0	JENDL-2
341.44	0	0.5	500.0	2.0		GT = 502.0	JENDL-1
340.2	0	0.5	500.0	2.14		GT = 502.14	ENDF-B-4
340.2	0	0.5	A500			WGH = 0.86	BNL325(3)
341.44	0		500	2.0			73MOXON
341.44	0	0.5	500	(2.0)			74MOXON
340.2	0					GT = 500	66FARRELL
						GNO = 0.910	
353.24	1	0.5	200.0	1.0		GT = 201.0	JENDL-2
353.24	1	0.5	200.0	1.0		GT = 201.0	JENDL-1
352.0	1	1.5	100.0	0.6		GT = 100.6	ENDF-B-4
353.24	▸ 0	0.5	(200)	1.0			73MOXON
352.0	▸ 0						66FARRELL
360.54	1	0.5	715.0	1.0		GT = 716.0	JENDL-2
360.54	1	0.5	715.0	1.0		GT = 716.0	JENDL-1
360.3	1	0.5	725.0	0.6		GT = 725.6	ENDF-B-4
360.3	■		A728				BNL325(3)
360.54	▸ 0	0.5	715	1.0			73MOXON
360.3	▸ 0		A728 ±13				66FARRELL
[illegible]	1	1.5	950.0	1.0		GT 951.0	JENDL-2

ENERGY (KEV)	L	J	NEUTRON WIDTH (EV)	GAMMA WIDTH (EV)	WHS (EV)	MISCELLANEOUS	REFERENCE
366.24	1	0.5	1870.0	1.0		GT = 1871.0	JENDL-1
365.0	1	1.5	960.0	0.6		GT = 960.6	ENDF-B-4
365.0	1	(1.5)	^{A}1857			WGI = 7.6	BNL325(3)
366.24	0	0.5	1870	1.0			73MOXON
365.0	0	1.5	^{A}943 ± 7				66FARRELL
369.24	1	0.5	200.0	1.0		GT = 201.0	JENDL-2
369.24	1	0.5	200.0	1.0		GT = 201.0	JENDL-1
367.6	1	1.5	100.0	0.6		GT = 100.6	ENDF-B-4
369.24	0	0.5	(200)	1.0			73MOXON
368.0	0						66FARRELL
372.74	1	1.5	695.0	1.0		GT = 696.0	JENDL-2
372.74	1	0.5	1365.0	1.0		GT = 1366.0	JENDL-1
371.0	1	1.5	465.0	0.6		GT = 465.6	ENDF-B-4
371.5	1	(1.5)	^{A}1318			WGI = 5.3	BNL325(3)
372.74	0	0.5	1365	1.0			73MOXON
371.5	0	1.5	^{A}689 ± 6				66FARRELL
377.24	1	0.5	270.0	1.0		GT = 271.0	JENDL-2
377.24	1	0.5	270.0	1.0		GT = 271.0	JENDL-1
376.35	1	0.5	270.0	0.6		GT = 270.6	ENDF-B-4
377.24	0	0.5	270	1.0			73MOXON
376.0	0		^{A}275 ± 5				66FARRELL
380.15	1	0.5	150.0	0.6		GT = 150.6	ENDF-B-4
384.24	1	1.5	875.0	1.0		GT = 876.0	JENDL-2
384.24	1	0.5	1730.0	1.0		GT = 1731.0	JENDL-1
383.0	1	1.5	600.0	0.6		GT = 600.6	ENDF-B-4
383.0	1	(1.5)	^{A}1597				BNL325(3)
384.24	0	0.5	1730	1.0			73MOXON
383.0	0	1.5	^{A}870 ± 5				66FARRELL
390.24	0	0.5	6000.0	2.0		GT = 6002.0	JENDL-2
390.24	0	0.5	6000.0	2.0		GT = 6002.0	JENDL-1
388.4	0	0.5	7200.0	2.14		GT = 7202.1	ENDF-B-4
389.0	0	0.5	^{A}6000			WGH = 9.62	BNL325(3)
390.24	0		6000	2.0			73MOXON
390.24	0	0.5	6000	(2.0)			74MOXON
389.0	0					GT = 6000 GNO = 10.296	66FARRELL
393.74	1	0.5	230.0	1.0		GT = 231.0	JENDL-2
393.74	1	0.5	230.0	1.0		GT = 231.0	JENDL-1
392.75	1	0.5	130.0	0.6		GT = 130.6	ENDF-B-4
392.5	•		^{A}235				BNL325(3)
393.74	0	0.5	230	1.0			73MOXON
392.5	0		^{A}235 ± 5				66FARRELL
396.74	1	0.5	810.0	1.0		GT = 811.0	JENDL-2
396.74	1	0.5	810.0	1.0		GT = 811.0	JENDL-1
395.5	1	0.5	810.0	0.6		GT = 810.6	ENDF-B-4
395.5	•		^{A}815				BNL325(3)
396.74	0	0.5	810	1.0			73MOXON
395.5	0		^{A}815 ± 5				66FARRELL
408.24	1	1.5	1010.0	1.0		GT = 1011.0	JENDL-2
408.24	1	0.5	2030.0	1.0		GT = 2031.0	JENDL-1
406.6	1	1.5	1020.0	0.6		GT = 1020.6	ENDF-B-4
407.0	1	(1.5)	^{A}2020			WGI = 7.4	BNL325(3)
408.24	0	0.5	2030	1.0			73MOXON
407.0	0	1.5	^{A}1013 ± 3				66FARRELL
415.24	1	0.5	750.0	1.0		GT = 751.0	JENDL-2
415.24	1	0.5	750.0	1.0		GT = 751.0	JENDL-1
413.6	1	0.5	300.0	0.6		GT = 300.6	ENDF-B-4
414.0	•		^{A}759				BNL325(3)
415.24	0	0.5	750	1.0			73MOXON
414.0	0		^{A}759 ± 9				66FARRELL
422.04	0	0.5	8000.0	2.0		GT = 8002.0	JENDL-2
422.04	0	0.5	8000.0	2.0		GT = 8002.0	JENDL-1
420.8	0	0.5	8000.0	2.14		GT = 8002.1	ENDF-B-4
420.8	0	0.5	^{A}8000			WGH = 12.33	BNL325(3)
422.04	0		8000	2.0			73MOXON
422.04	0	0.5	8000	(2.0)			74MOXON
420.8	0					GT = 8000 GNO = 13.270	66FARRELL
445.3	1	0.5	800.0	0.6		GT = 800.6	ENDF-B-4
456.74	1	0.5	470.0	1.0		GT = 471.0	JENDL-2
456.74	1	0.5	470.0	1.0		GT = 471.0	JENDL-1
455.5	1	0.5	800.0	0.6		GT = 800.6	ENDF-B-4
455.5	1	(0.5)	^{A}560				BNL325(3)
456.74	0	0.5	470	1.0			73MOXON
455.5	0	0.5	^{A}465 ± 5				66FARRELL
460.74	1	1.5	580.0	1.0		GT = 581.0	JENDL-2
460.74	1	0.5	1160.0	1.0		GT = 1161.0	JENDL-1
459.5	1	1.5	750.0	0.6		GT = 750.6	ENDF-B-4
459.5	1	(1.5)	^{A}1100				BNL325(3)
460.74	0	0.5	1160	1.0			73MOXON
459.5	0	1.5	^{A}580 ± 0				66FARRELL
467.74	1	0.5	985.0	1.0		GT = 986.0	JENDL-2

ENERGY (KEV)	L	J	NEUTRON WIDTH (EV)	GAMMA WIDTH (EV)	WW5 (EV)	MISCELLANEOUS	REFERENCE
467.74	1	0.5	985.0	1.0		GT = 986.0	JENDL-1
466.5	1	0.5	985.0	0.6		GT = 985.6	ENDF-B-4
466.5	1	(0.5)	^{A}995				BNL325(3)
467.74	0	0.5	985	1.0			73MOXON
466.5	0	0.5	^{A}993 ± 8				66FARRELL
471.24	1	0.5	530.0	1.0		GT = 531.0	JENDL-2
471.24	1	0.5	530.0	1.0		GT = 531.0	JENDL-1
470.0	1	0.5	530.0	0.6		GT = 530.6	ENDF-B-4
470.0	*		^{A}535				BNL325(3)
471.24	0	0.5	530	1.0			73MOXON
470.0	0		^{A}535 ± 5				66FARRELL
472.0	1	0.5	130.0	0.6		GT = 130.6	ENDF-B-4
473.1	1	0.5	110.0	0.6		GT = 110.6	ENDF-B-4
480.24	1	0.5	1130.0	1.0		GT = 1131.0	JENDL-2
480.24	1	0.5	1130.0	1.0		GT = 1131.0	JENDL-1
479.0	1	0.5	1130.0	0.6		GT = 1130.6	ENDF-B-4
479.0	1	(0.5)	^{A}1090				BNL325(3)
480.24	0	0.5	1130	1.0			73MOXON
479.0	0	0.5	^{A}1135 ±135				66FARRELL
484.24	0	0.5	5000.0	2.0		GT = 5002.0	JENDL-2
484.24	0	0.5	5000.0	2.0		GT = 5002.0	JENDL-1
483.0	0	0.5	5000.0	2.14		GT = 5002.1	ENDF-B-4
483.0	0	0.5	^{A}5000			WGH = 7.19	BNL325(3)
484.24	0		5000	2.0			73MOXON
484.24	0	0.5	5000	(2.0)			74MOXON
483.0	0					GT = 5000 GNO = 7.822	66FARRELL
489.04	1	0.5	430.0	1.0		GT = 431.0	JENDL-2
489.04	1	0.5	430.0	1.0		GT = 431.0	JENDL-1
487.8	1	0.5	430.0	0.6		GT = 430.6	ENDF-B-4
489.04	0	0.5	430	1.0			73MOXON
487.8	0		^{A}435 ± 5				66FARRELL
500.74	1	0.5	530.0	1.0		GT = 531.0	JENDL-2
500.74	1	0.5	530.0	1.0		GT = 531.0	JENDL-1
499.5	1	0.5	530.0	0.6		GT = 530.6	ENDF-B-4
499.5	*		^{A}535				BNL325(3)
500.74	0	0.5	530	1.0			73MOXON
499.5	0		^{A}535 ± 5				66FARRELL
504.24	1	0.5	760.0	1.0		GT = 761.0	JENDL-2
504.24	1	0.5	760.0	1.0		GT = 761.0	JENDL-1
503.0	1	0.5	760.0	0.6		GT = 760.6	ENDF-B-4
503.0	*		^{A}766				BNL325(3)
504.24	0	0.5	760	1.0			73MOXON
503.0	0		^{A}766 ± 6				66FARRELL
512.9	1	0.5	200.0	0.6		GT = 200.6	ENDF-B-4
514.8	1	0.5	100.0	0.6		GT = 100.6	ENDF-B-4
520.24	1	0.5	475.0	1.0		GT = 476.0	JENDL-2
520.24	1	0.5	475.0	1.0		GT = 476.0	JENDL-1
519.0	1	0.5	700.0	0.6		GT = 700.6	ENDF-B-4
519.0	*		^{A}477				BNL325(3)
520.24	0	0.5	475	1.0			73MOXON
519.0	0		^{A}478 ± 3				66FARRELL
524.24	0	0.5	1000.0	2.0		GT = 1002.0	JENDL-2
524.24	0	0.5	1000.0	2.0		GT = 1002.0	JENDL-1
522.9	0	0.5	2100.0	2.14		GT = 2102.1	ENDF-B-4
523.0	0	0.5	^{A}1000			WGH = 1.38	BNL325(3)
524.24	0		1000	2.0			73MOXON
524.24	0	0.5	1000	(2.0)			74MOXON
523.0	0					GT = 1000 GNO = 1.513	66FARRELL
530.54	0	0.5	750.0	2.0		GT = 752.0	JENDL-2
530.54	0	0.5	750.0	2.0		GT = 752.0	JENDL-1
529.3	0	0.5	2300.0	2.14		GT = 2302.1	ENDF-B-4
530.54	0		750	2.0			73MOXON
530.54	0	0.5	750	(2.0)			74MOXON
529.3	0					GT = 750 GNO = 1.129	66FARRELL
537.74	0	0.5	10000.0	2.0		GT = 10002.0	JENDL-2
537.74	0	0.5	10000.0	2.0		GT = 10002.0	JENDL-1
536.5	0	0.5	10000.0	2.14		GT = 10002.0	ENDF-B-4
536.5	0	0.5	^{A}10000			WGH = 13.65	BNL325(3)
537.74	0		10000	2.0			73MOXON
537.74	0	0.5	10000	(2.0)			74MOXON
536.5	0					GT = 10000 GNO = 14.976	66FARRELL
542.74	1	1.5	870.0	1.0		GT = 871.0	JENDL-2
542.74	1	0.5	1700.0	1.0		GT = 1701.0	JENDL-1
541.5	1	0.5	1700.0	0.6		GT = 1700.6	ENDF-B-4
541.5	1	(1.5)	^{A}1670			WGI = 4.5	BNL325(3)
542.74	0	0.5	1700	1.0			73MOXON
541.5	0	1.5	^{A}860 ±10				66FARRELL

ENERGY (KEV)	L	J	NEUTRON WIDTH (EV)	GAMMA WIDTH (EV)	WWS (EV)	MISCELLANEOUS	REFERENCE
553.24	0	0.5	2000.0	2.0		GT = 2002.0	JENDL-2
553.24	0	0.5	2000.0	2.0		GT = 2002.0	JENDL-1
552.0	0	0.5	2000.0	2.14		GT = 2002.1	ENDF-B-4
552.0	0	0.5	A2000			WGH = 2.69	BNL325(3)
553.24	0		2000	2.0			73MOXON
553.24	0	0.5	2000	(2.0)			74MOXON
552.0	0					GT = 2000	66FARRELL
						GNO = 2.960	
566.24	1	0.5	890.0	1.0		GT = 891.0	JENDL-2
566.24	1	0.5	890.0	1.0		GT = 891.0	JENDL-1
565.0	1	0.5	890.0	0.6		GT = 890.6	ENDF-B-4
565.0	*		A900				BNL325(3)
566.24	0	0.5	890	1.0			73MOXON
565.0	0		A901 ±11				66FARRELL
577.24	0	0.5	4000.0	2.0		GT = 4002.0	JENDL-2
577.24	0	0.5	4000.0	2.0		GT = 4002.0	JENDL-1
576.9	0	0.5	3800.0	2.14		GT = 3802.1	ENDF-B-4
576.0	0	0.5	A4000			WGH = 5.27	BNL325(3)
577.24	0		4000	2.0			73MOXON
577.24	0	0.5	4000	(2.0)			74MOXON
576.0	0					GT = 4000	66FARRELL
						GNO = 5.819	
584.24	0	0.5	300.0	2.0		GT = 302.0	JENDL-2
584.24	0	0.5	300.0	2.0		GT = 302.0	JENDL-1
583.0	0	0.5	300.0	2.14		GT = 302.14	ENDF-B-4
583.0	0	0.5	A300			WGH = 0.39	BNL325(3)
584.24	0		300	2.0			73MOXON
584.24	0	0.5	300	(2.0)			74MOXON
583.0	0					GT = 300	66FARRELL
						GNO = 0.434	
603.8	0	0.5	11500.0	2.14		GT = 11502.0	ENDF-B-4
620.4	0	0.5	9400.0	2.14		GT = 9402.1	ENDF-B-4
628.8	0	0.5	3600.0	2.14		GT = 3602.1	ENDF-B-4
633.3	1	1.5	800.0	0.6		GT = 800.6	ENDF-B-4
638.2	1	1.5	800.0	0.6		GT = 800.6	ENDF-B-4

* A denotes $g\Gamma_n$

** $WW5 = g\Gamma_n\Gamma_\gamma/\Gamma$ (eV), $GT = \Gamma$ (eV)

$GGS = \sigma_0\Gamma_\gamma$ (b•eV), $WGH = g\Gamma_n^{(0)}$ (eV)

$GNO = \Gamma_n^{(0)}$ (eV), $WGI = g\Gamma_n^{(1)}$ (eV)

References

66Farrell : Ref.(21)

69Hockenbury: Ref.(23)

72Hockenbury: Ref.(54)

73Moxon : Ref.(51) (Evaluation)

74Moxon : Ref.(3) (Evaluation)

75Beer : Ref.(26)

Table 11 Capture resonance integrals with cut-off energy of 0.5 eV

(barns)

	Calculated	BNL-325 (3rd)[18]
natural	2.2	2.2 ± 0.2
^{58}Ni	2.2	2.2 ± 0.2
^{60}Ni	1.5	1.5 ± 0.2
^{61}Ni	2.4	1.6 ± 0.4
^{62}Ni	6.9	6.8 ± 0.2
^{64}Ni	0.82	1.1 ± 0.2

Table 12 The γ-ray strength functions used for natural nickel files and for isotope nickel files.

($\times 10^{-4}$)

Isotope	Natural nickel file	Isotope nickel file
^{58}Ni	0.462	0.462
^{60}Ni	0.277	0.231
^{61}Ni	1.94	4.65
^{62}Ni	0.0952	0.138
^{64}Ni	0.0587	0.0767

Table 13 Profile function of giant resonance.

$$\sigma_{(E)} = \sum_{i=1}^{2} \frac{\sigma_{mi}}{1 + [(E^2 - E_{mi}^2)^2/E^2\Gamma_i^{\,2}]}$$

$E_{m1} = 16.30$ MeV $\qquad E_{m2} = 18.51$ MeV

$\sigma_{m1} = 34.10$ $\qquad \sigma_{m2} = 55.2$

$\Gamma_1 = 2.44$ MeV $\qquad \Gamma_2 = 6.37$ MeV

Table 14 Discrete levels of isotopic nickel and level grouping in natural nickel file.

MT	Natural	^{58}Ni		^{60}Ni		^{61}Ni		^{62}Ni		^{64}Ni	
	-Q(MeV)*	-Q(MeV)	I^π	-Q(MeV)	I^π	-Q(MeV)	I^π	-Q(MeV)	I^π	-Q(MeV)	I^π
51	0.0674					0.0674	$5/2^-$				
52	0.2828					0.2830	$1/2^-$				
53	0.6556					0.6560	$3/2^-$				
54	0.9082					0.9088	$5/2^-$				
55	1.0144					1.0150	$7/2^-$				
56	1.0993					1.1000	$3/2^-$				
						1.1323	$5/2^-$				
57	1.1719					1.1857	$3/2^-$	1.1729	2^+		
58	1.3320			1.3325	2^+					1.3459	2^+
59	1.4549	1.4545	2^+			1.4580	$7/2^-$				
						1.6100	$5/2^-$				
						1.7298	$3/2^-$				
						1.808	$7/2^-$				
60	1.9768					1.978	$9/2^+$	2.0486	0^+		
						1.997	$3/2^-$				
						2.003	$7/2^-$				
						2.019	$7/2^-$				
						2.114	$9/2^+$				
						2.123	$1/2^-$				
61	2.1582			2.1589	2^+					2.275	0^+
62	2.2840			2.2848	0^+	2.410	$5/2^-$	2.3018	2^+		
								2.3364	4^+		
63	2.4601	2.4595	4^+			2.466	$7/2^-$				
64	2.5049			2.5058	4^+					2.608	4^+
65	2.6253			2.6262	3^+					2.750	2^+
66	2.7763	2.7757	2^+					2.8912	0^+	2.865	0^+
										2.885	2^+
67	2.9033	2.9026	1^+								
68	2.9435	2.9428	0^+							2.971	2^+
										3.028	0^+
69	3.0390	3.0383	2^+					3.0582	2^+		
70	3.1179			3.1190	4^+			3.1580	2^+	3.165	4^+
				3.1241	2^+			3.1765	4^+		
				3.1300	4^+						

to be continued

Table 14 (continued)

MT	Natural	^{58}Ni		^{60}Ni		^{61}Ni		^{62}Ni		^{64}Ni	
	-Q(MeV)*	-Q(MeV)	I^{π}	-Q(MeV)	I^{π}	-Q(MeV)	I^{π}	-Q(MeV)	I^{π}	-Q(MeV)	I^{π}
71	3.1853			3.1864	3^+			3.2577	2^+		
				3.1941	1^+			3.2620	4^+		
72	3.2652	3.2645	2^+	3.2694	2^+			3.2699	2^+	3.273	2^+
								3.2774	4^+		
73	3.3172			3.3183	0^+			3.3703	1^+		
74	3.3798			3.3810	4^+					3.393	3^+
				3.3936	2^+						
75	3.4216	3.4208	3^+					3.4620	4^+	3.459	1^+
								3.4860	0^+	3.483	4^+
								3.5185	2^+		
								3.5229	3^+		
76	3.5248	3.5240	4^+	3.5300	0^+					3.560	3^-
		3.5313	0^+								
77	3.5878	3.5942	1^+	3.5890	3^+					3.647	2^+
78	3.6185	3.6202	4^+	3.6197	3^+						
79	3.6697			3.6710	4^+						
80	3.7277			3.7290	3^+			3.7570	3^-	3.748	4^+
				3.7355	1^+						
				3.7410	0^+						
81	3.7761	3.7752	4^+					3.8493	1^+	3.795	1^+
								3.8530	2^+	3.808	3^+
								3.8600	2^+	3.848	5^-
82	3.8701			3.8714	2^+						
83	3.8998	3.8989	2^+							3.965	4^+
84	4.1089	4.108	2^+								
85	4.2910	4.290	3^+								
86	4.3440	4.343	6^+								
		4.349	4^+								
87	4.3810	4.380	5^-								
88	4.4020	4.401	4^+								
89	4.4508	4.4498	0^+								
90	4.4730	4.472	3^-								
91	2.5264	4.517		3.895		2.528		3.967		4.084	

* The Q-values of natural nickel file was recalculated with the effective mass of natural nickel so as to keep the threshold values.

Table 15 Level density parameters of Nickel isotopes.

Isotope	57	58	59	60	61	62	63	64	65
a (MeV^{-1})	5.00*	6.45	6.97	7.55	8.14	8.77	9.37	9.98	10.57
$\sigma_M^2/\sqrt{U}$ $(MeV^{-1/2})$	4.78	5.557	5.841	6.145	6.455	6.773	7.076	7.380	7.673
Δ (MeV)	1.2*	2.47	1.20	2.47	1.20	2.60	1.20	2.70	1.20
E_x (MeV)	6.33*	7.30	8.00	10.00	7.00	9.00	3.00	4.32	4.00
T_c (MeV)	1.44*	1.49	1.35	1.26	1.17	1.08	1.36	1.15	0.947
σ_{exp}^2 **	-	5.95	6.58	4.47	5.17	4.26	4.34	5.03	4.30

* Values of Gilbert and Cameron[41)]

** The spin cut off parameters of the present work are given as

$$\sigma_M^2 = 0.146\sqrt{a(E-\Delta)}\,A^{2/3} \qquad E > E_x$$

$$= \sigma_{exp}^2 + (\sigma_M^2(E_x) - \sigma_{exp}^2)\frac{E}{E_x} \qquad E < E_x$$

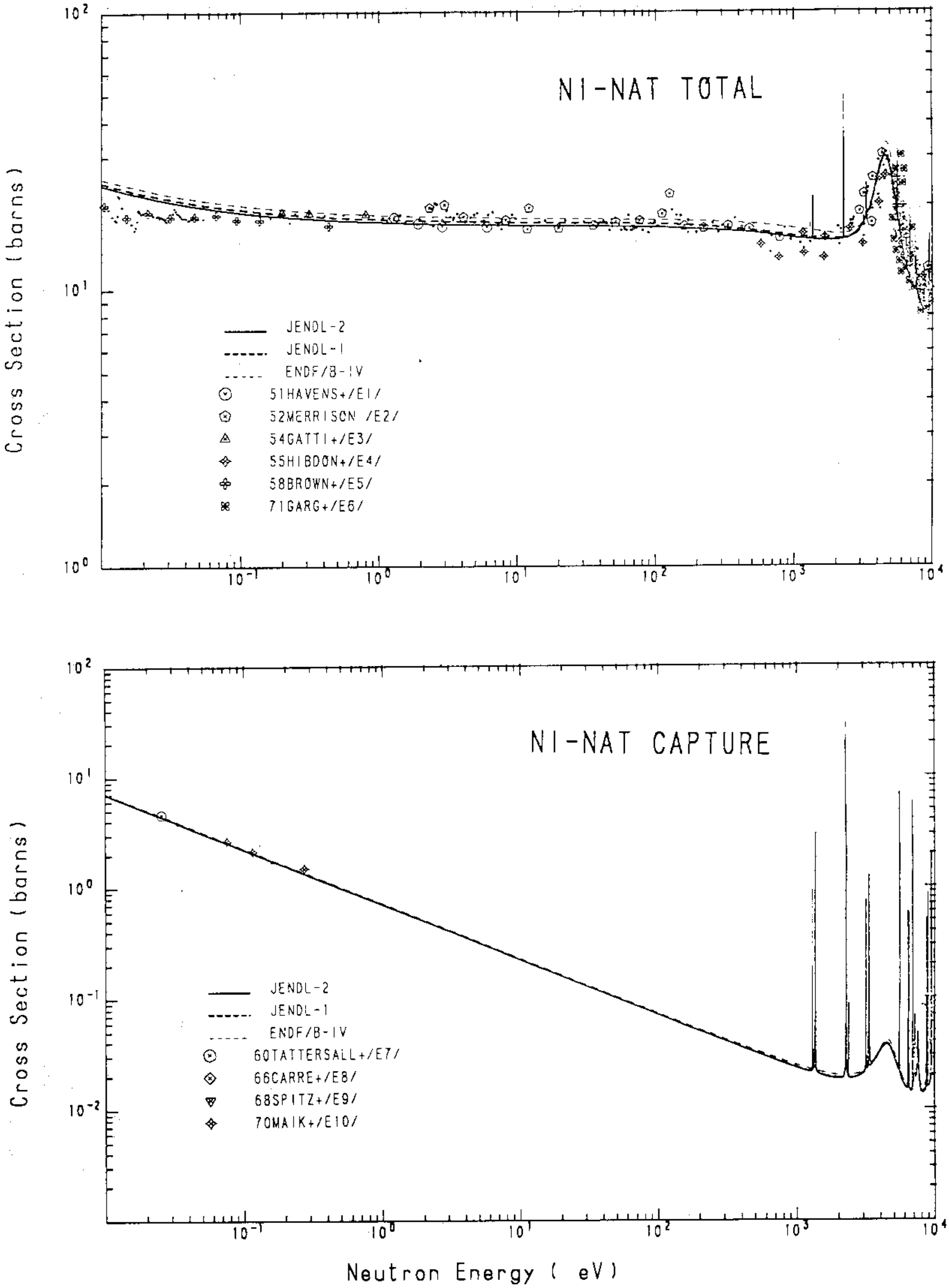


Fig. 1(a) Total and capture cross sections of natural nickel in the resonance region.

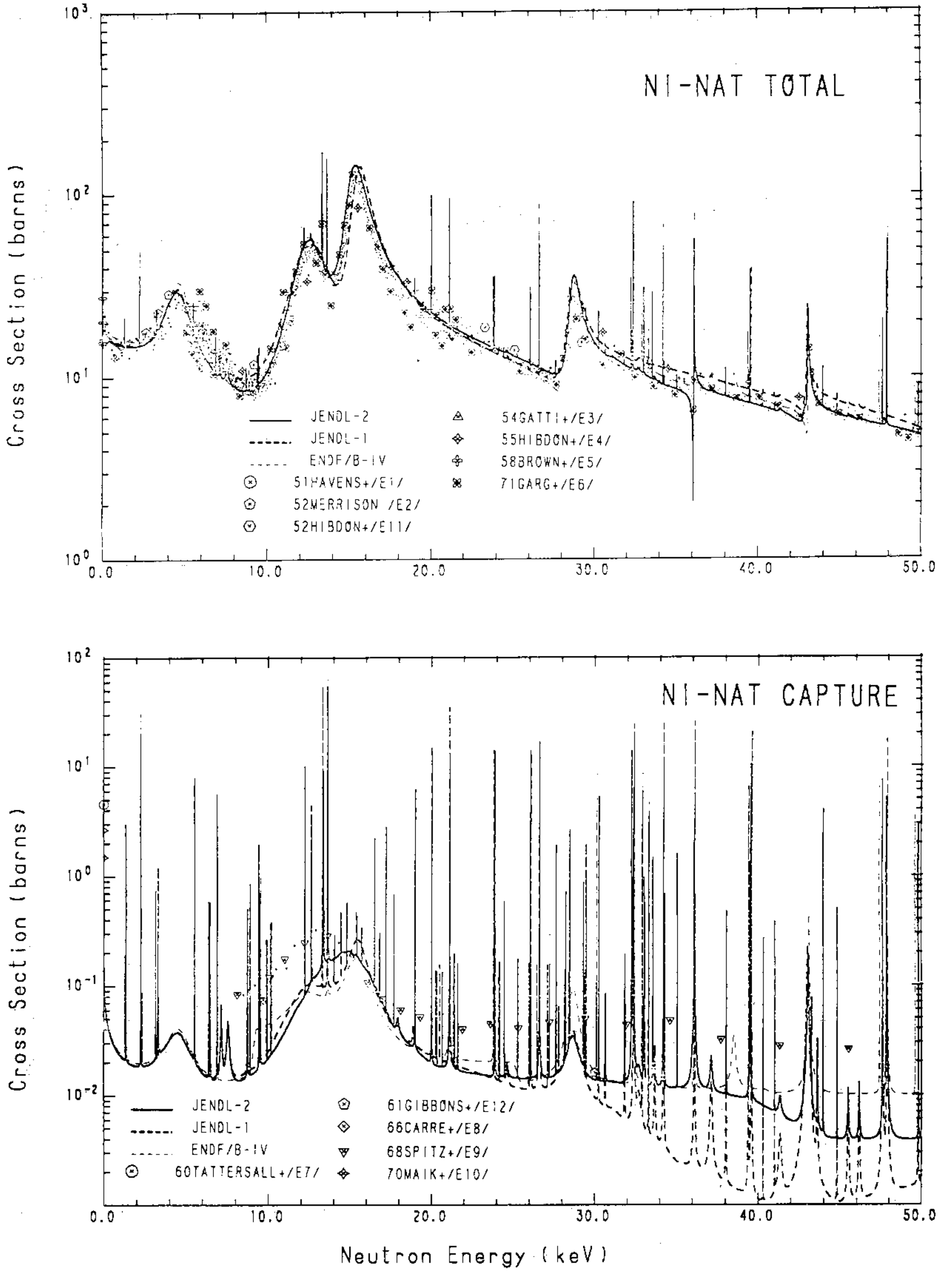


Fig. 1(b) Total and capture cross sections of natural nickel in the resonance region.

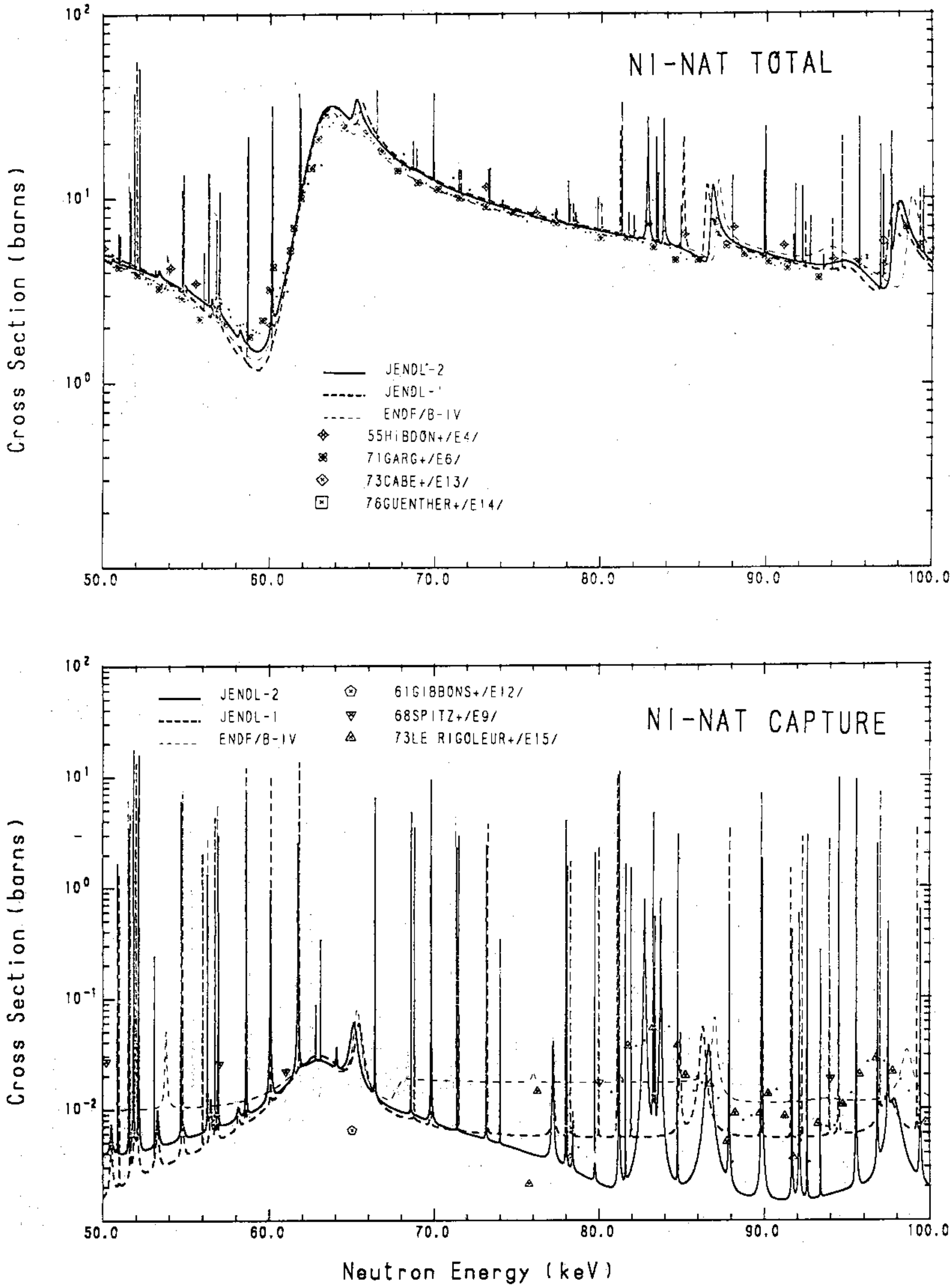


Fig. 1(c) Total and capture cross sections of natural nickel in the resonance region.

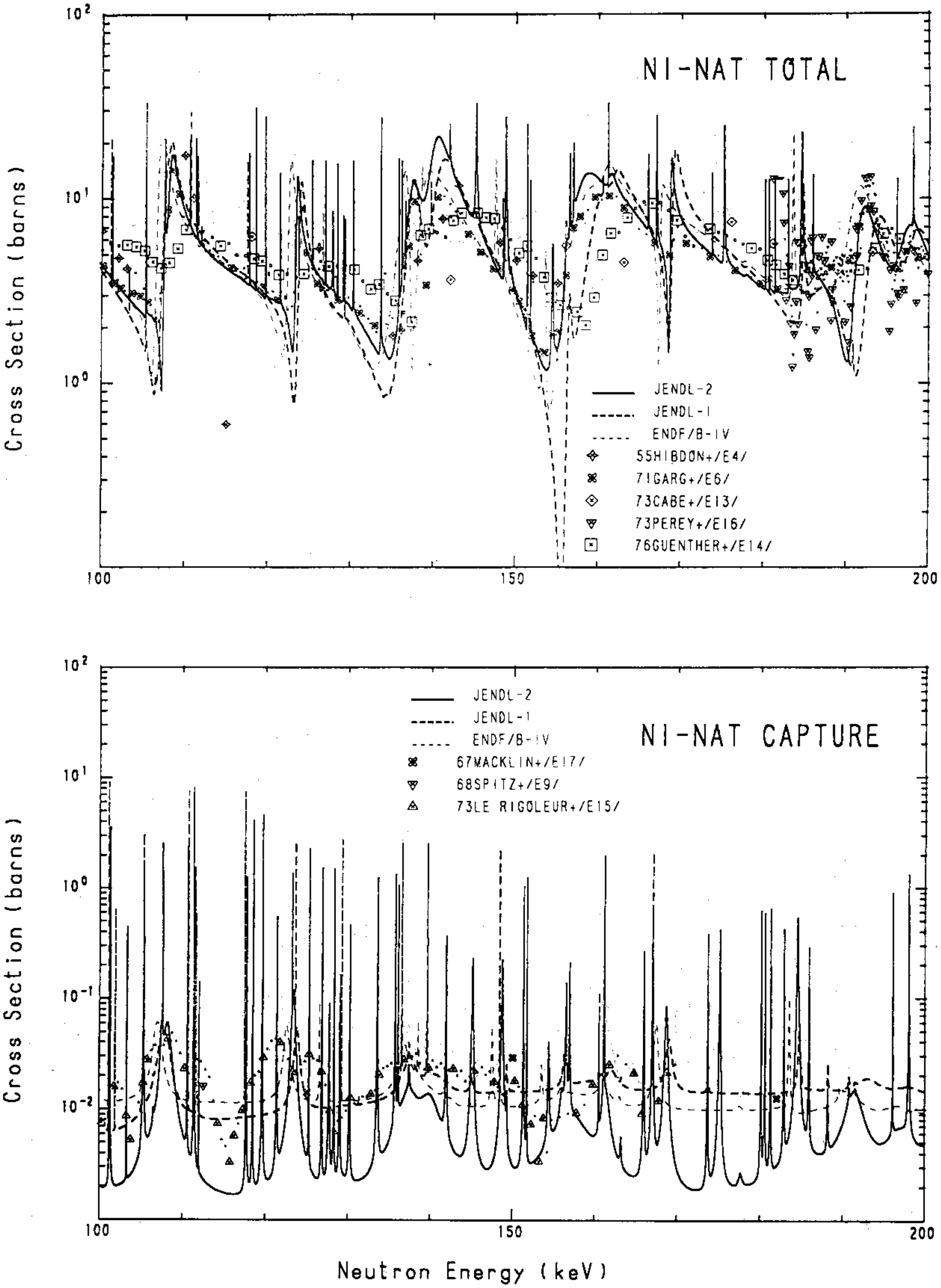
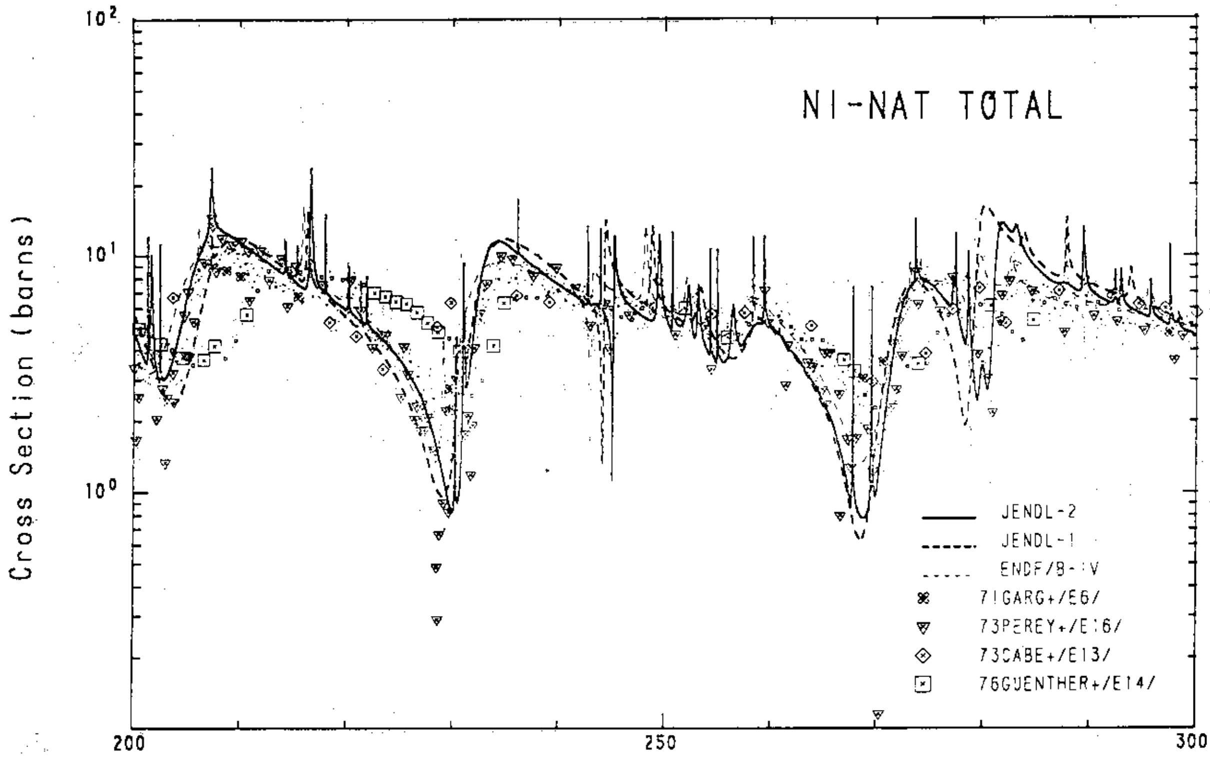


Fig. 1(d) Total and capture cross sections of natural nickel in the resonance region.



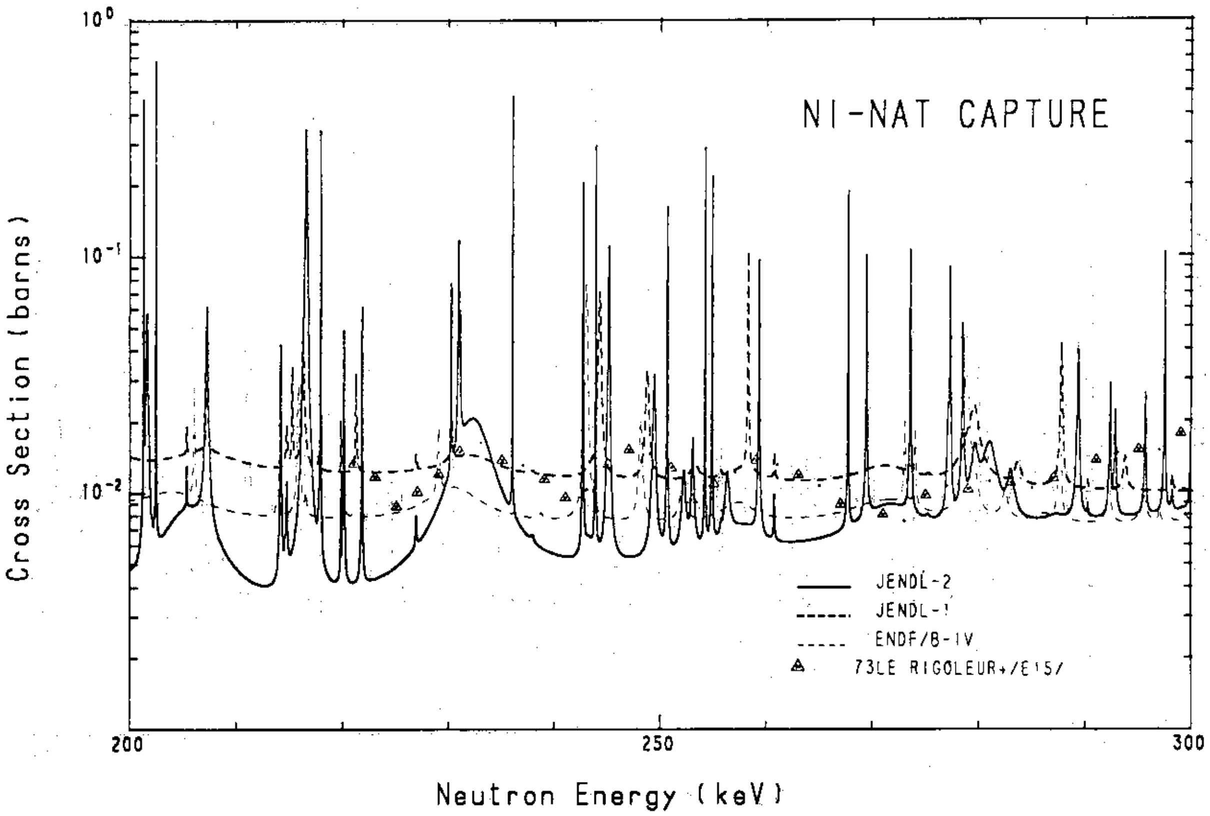
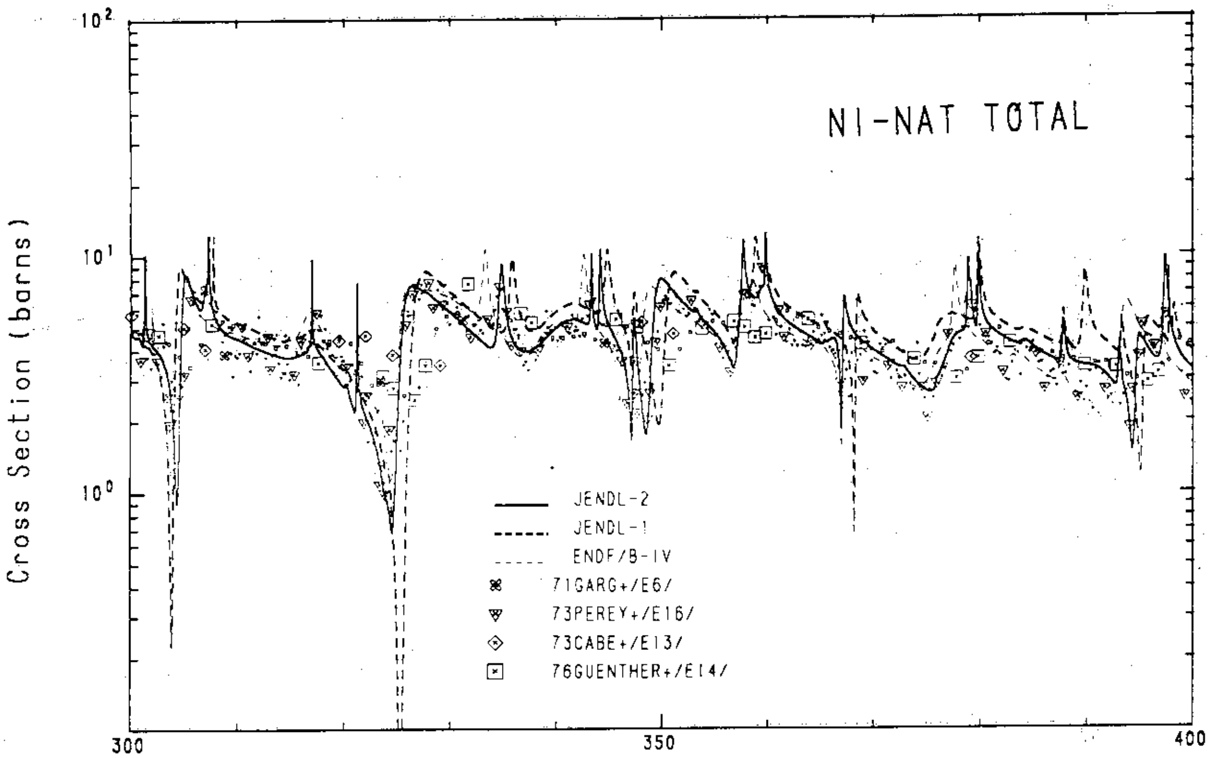


Fig. 1(e) Total and capture cross sections of natural nickel in the resonance region.



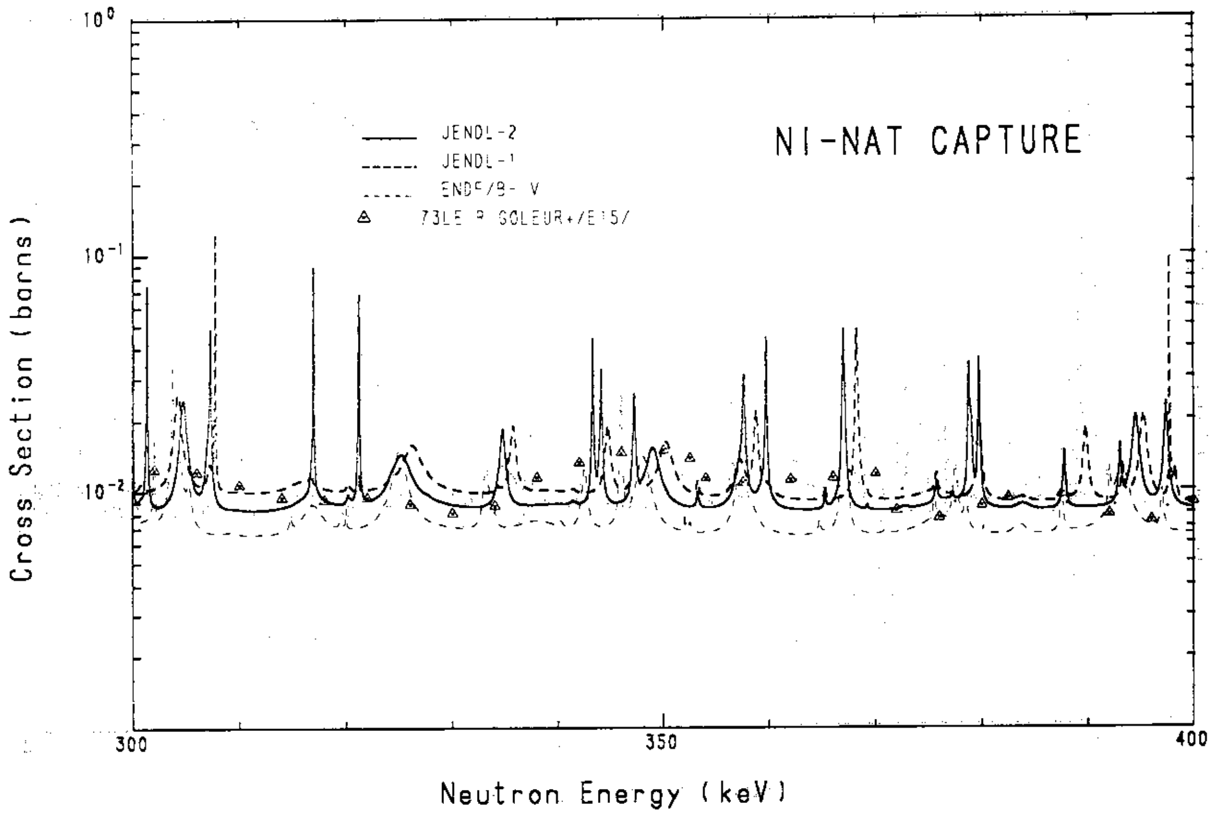


Fig. 1(f) Total and capture cross sections of natural nickel in the resonance region.

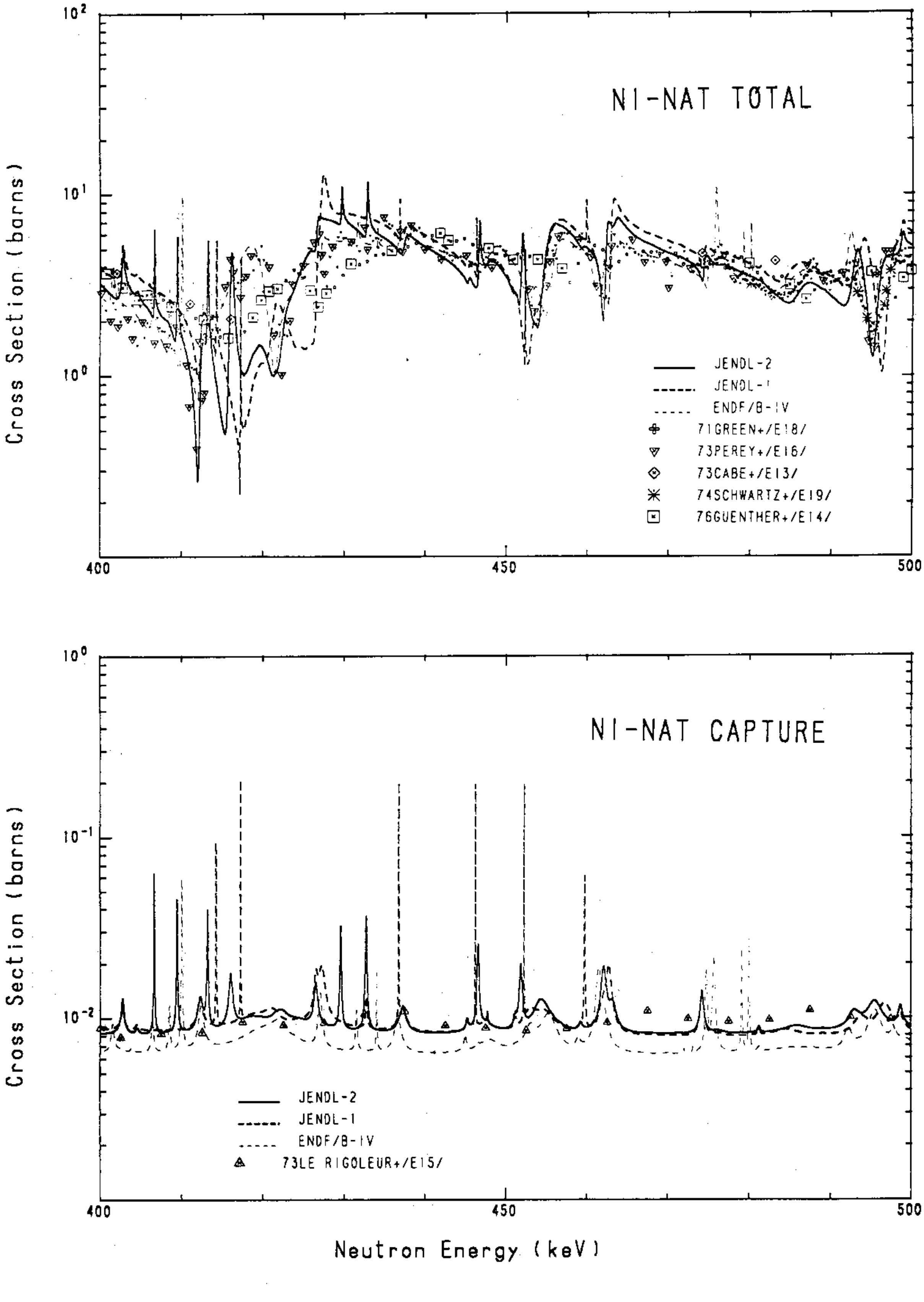
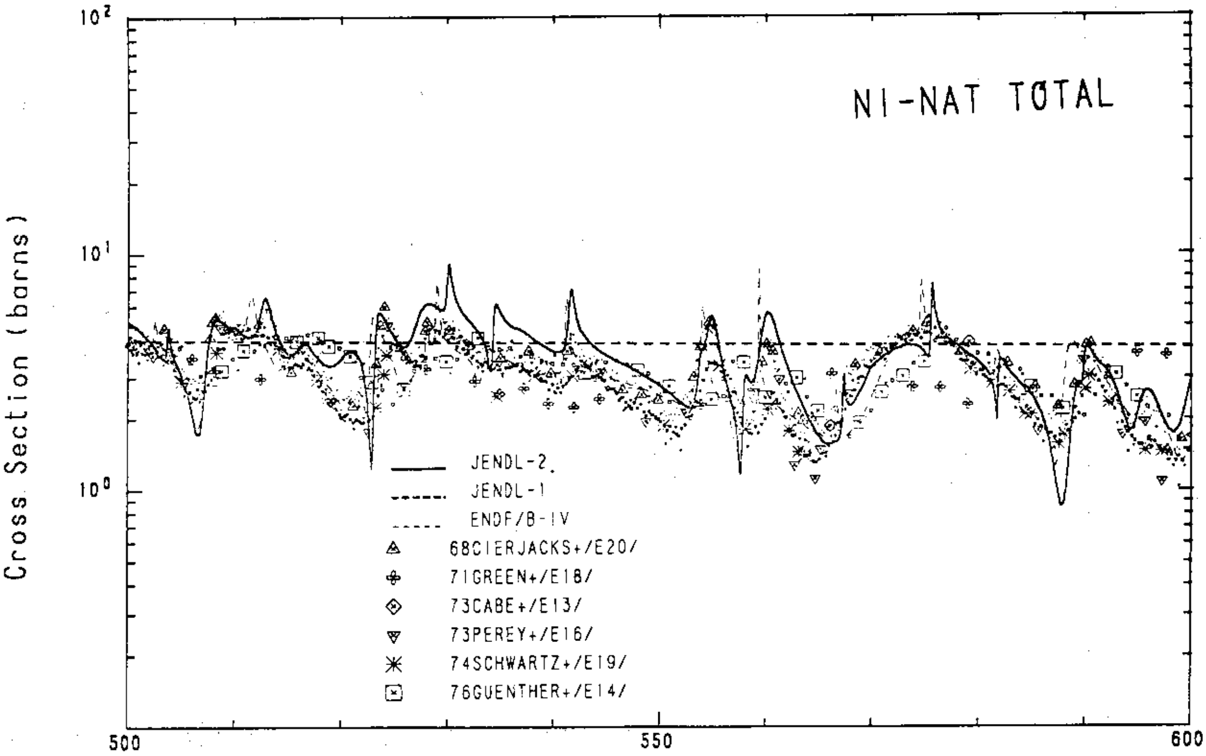


Fig. 1(g) Total and capture cross sections of natural nickel in the resonance region.



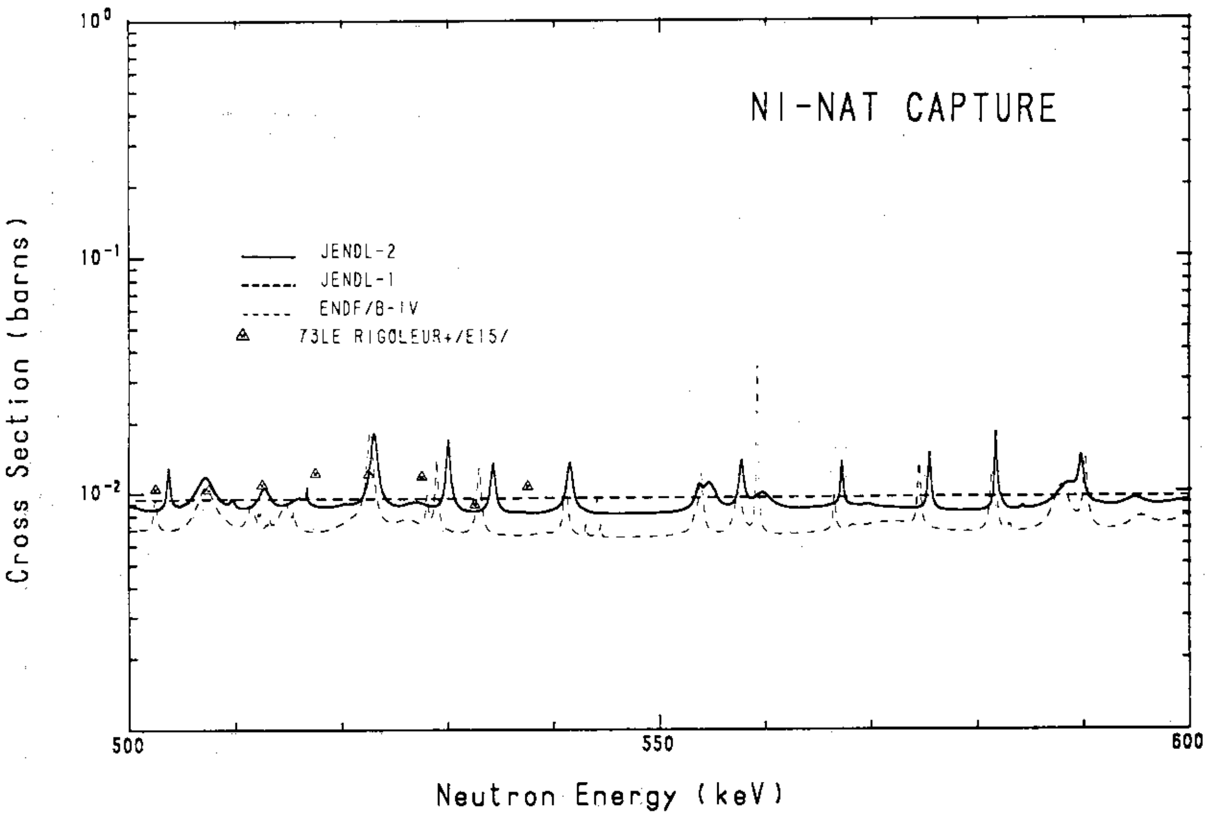


Fig. 1(h) Total and capture cross sections of natural nickel in the resonance region.

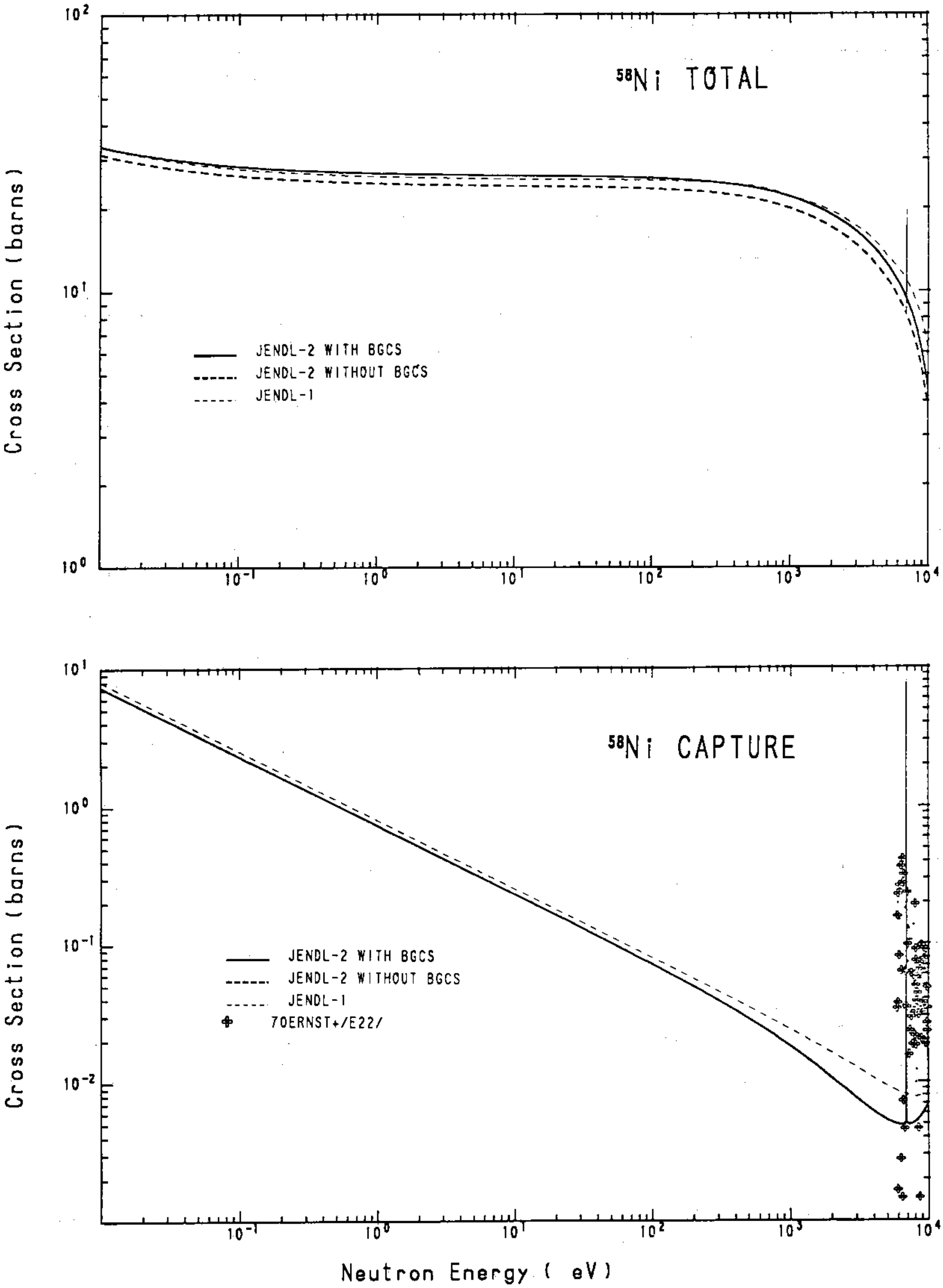


Fig. 2(a) Total and capture cross sections of ^{58}Ni in the resonance region.

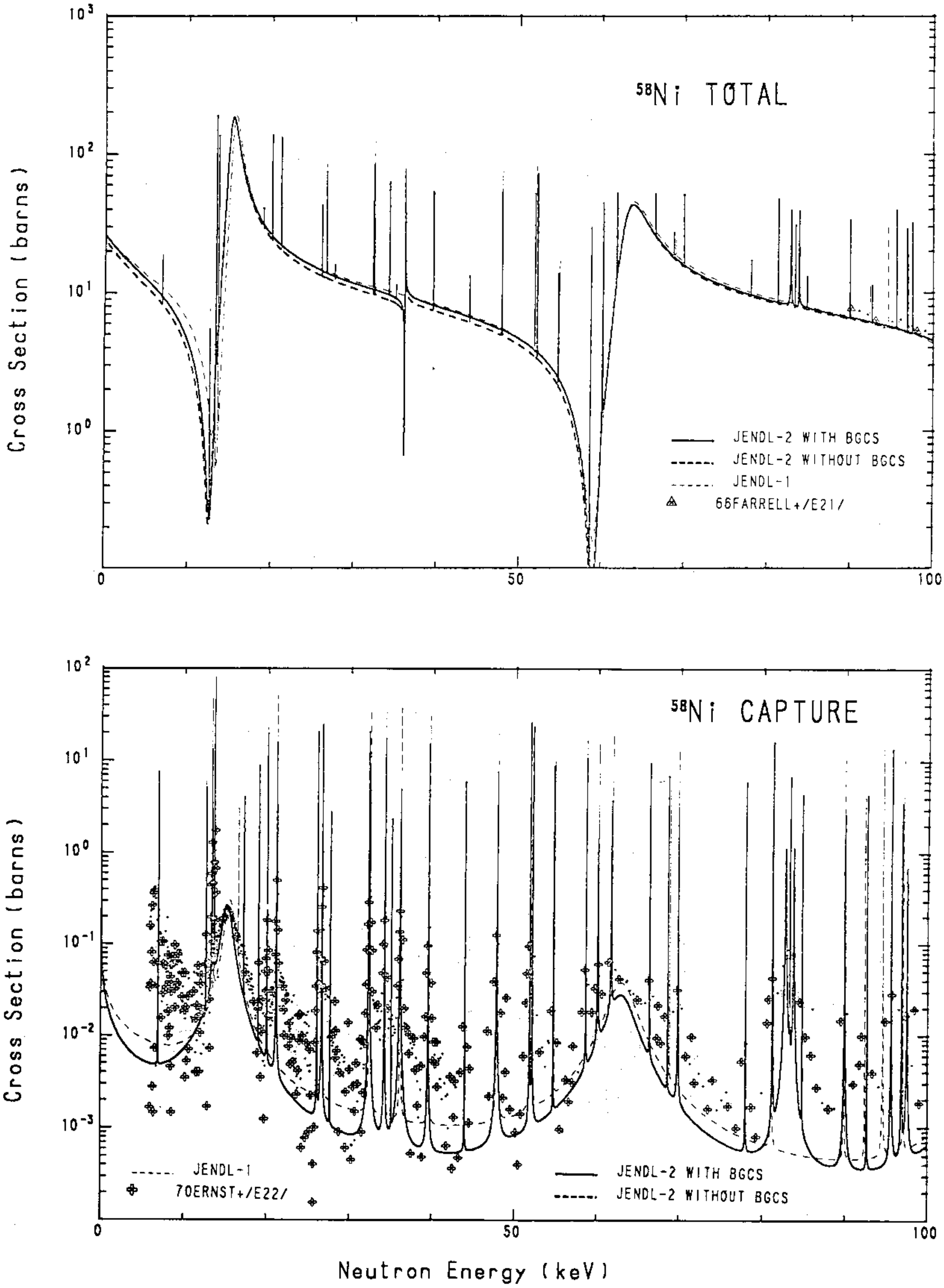


Fig. 2(b) Total and capture cross sections of ^{58}Ni in the resonance region.

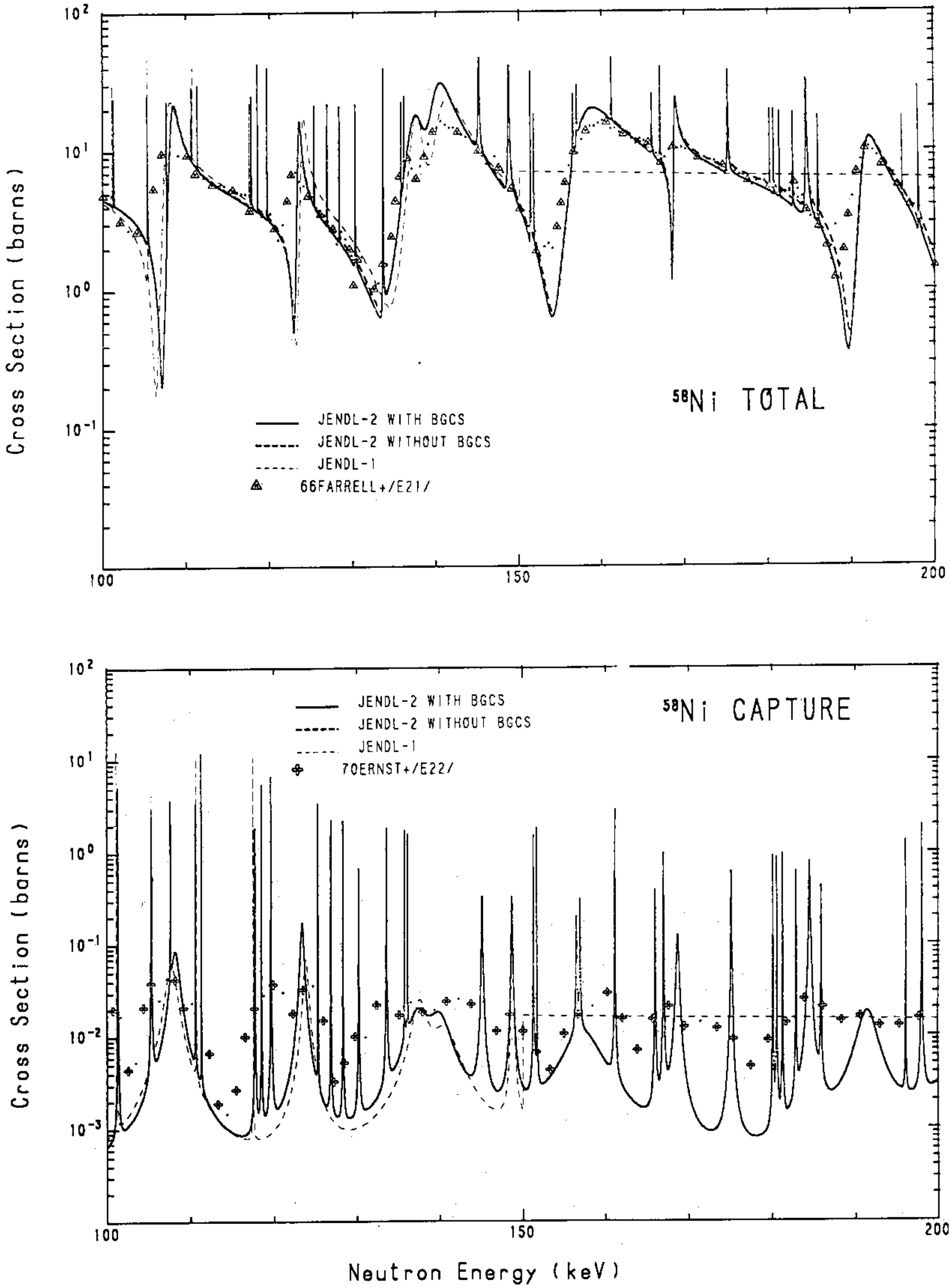
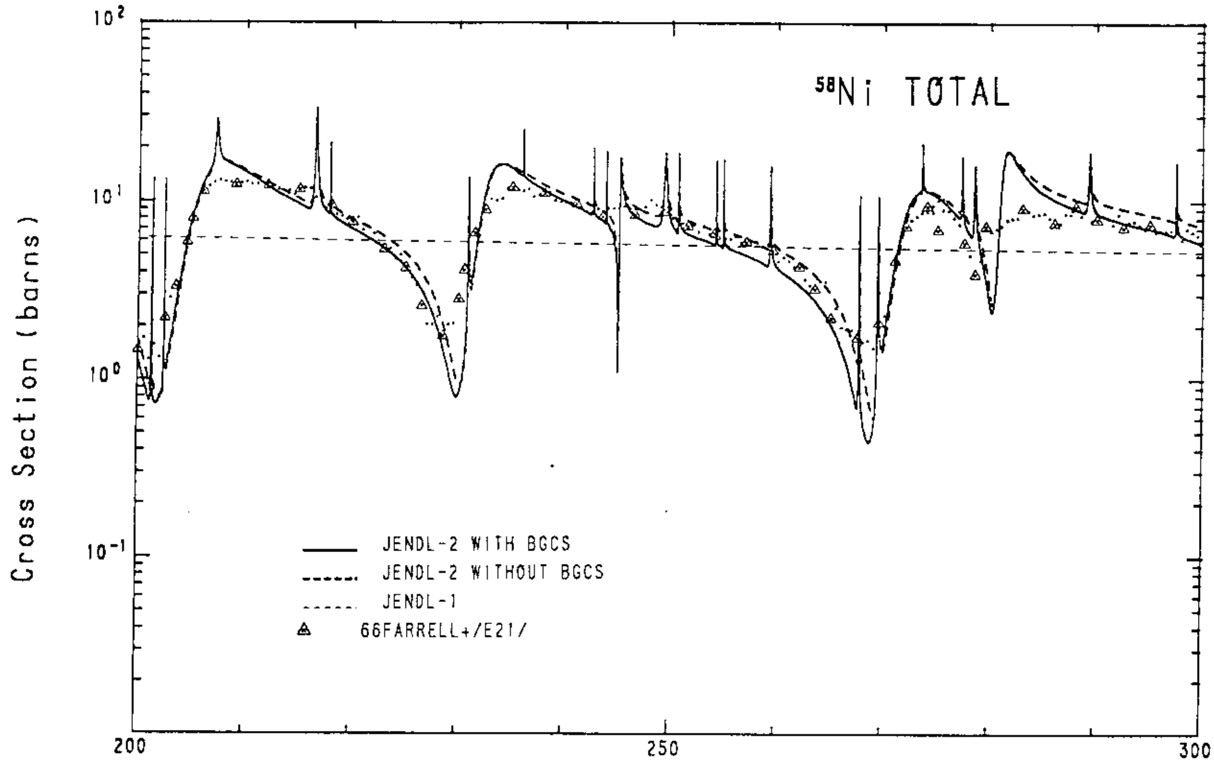


Fig. 2(c) Total and capture cross sections of ^{58}Ni in the resonance region.



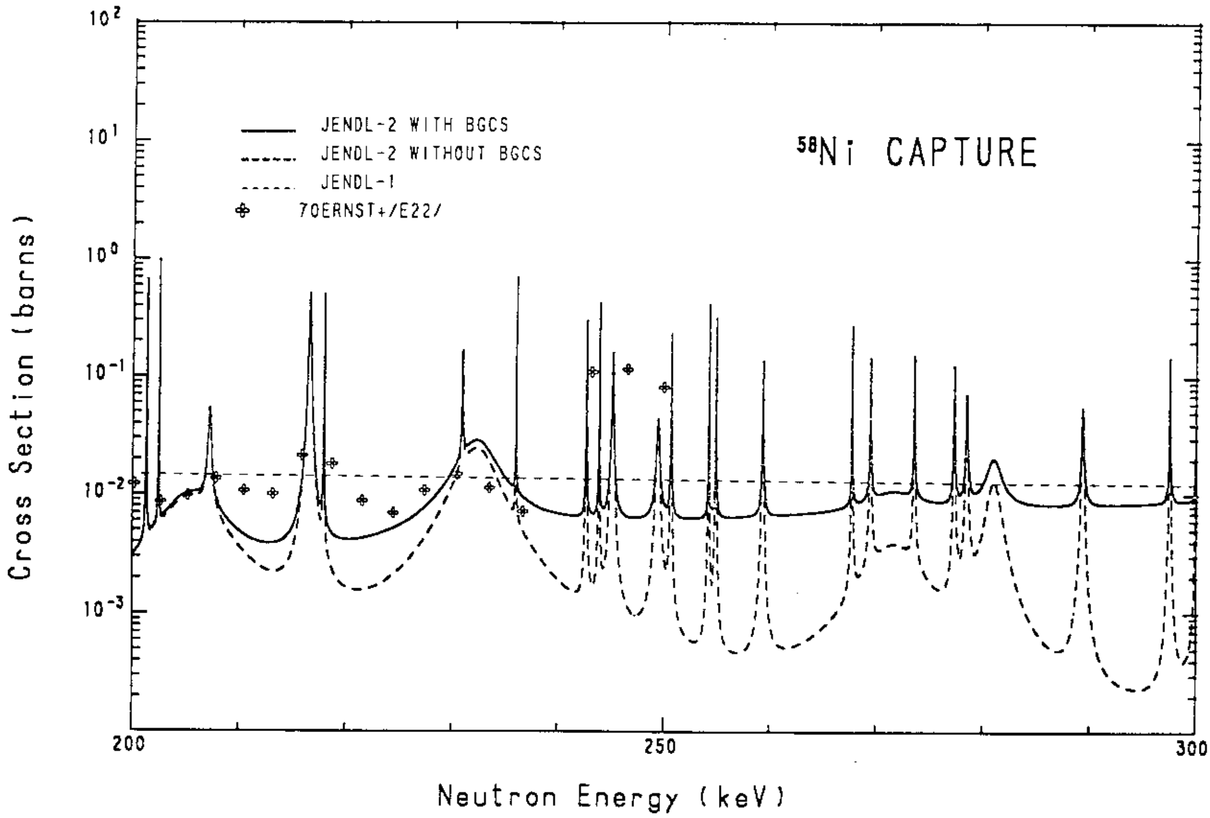


Fig. 2(d) Total and capture cross sections of ^{58}Ni in the resonance region.

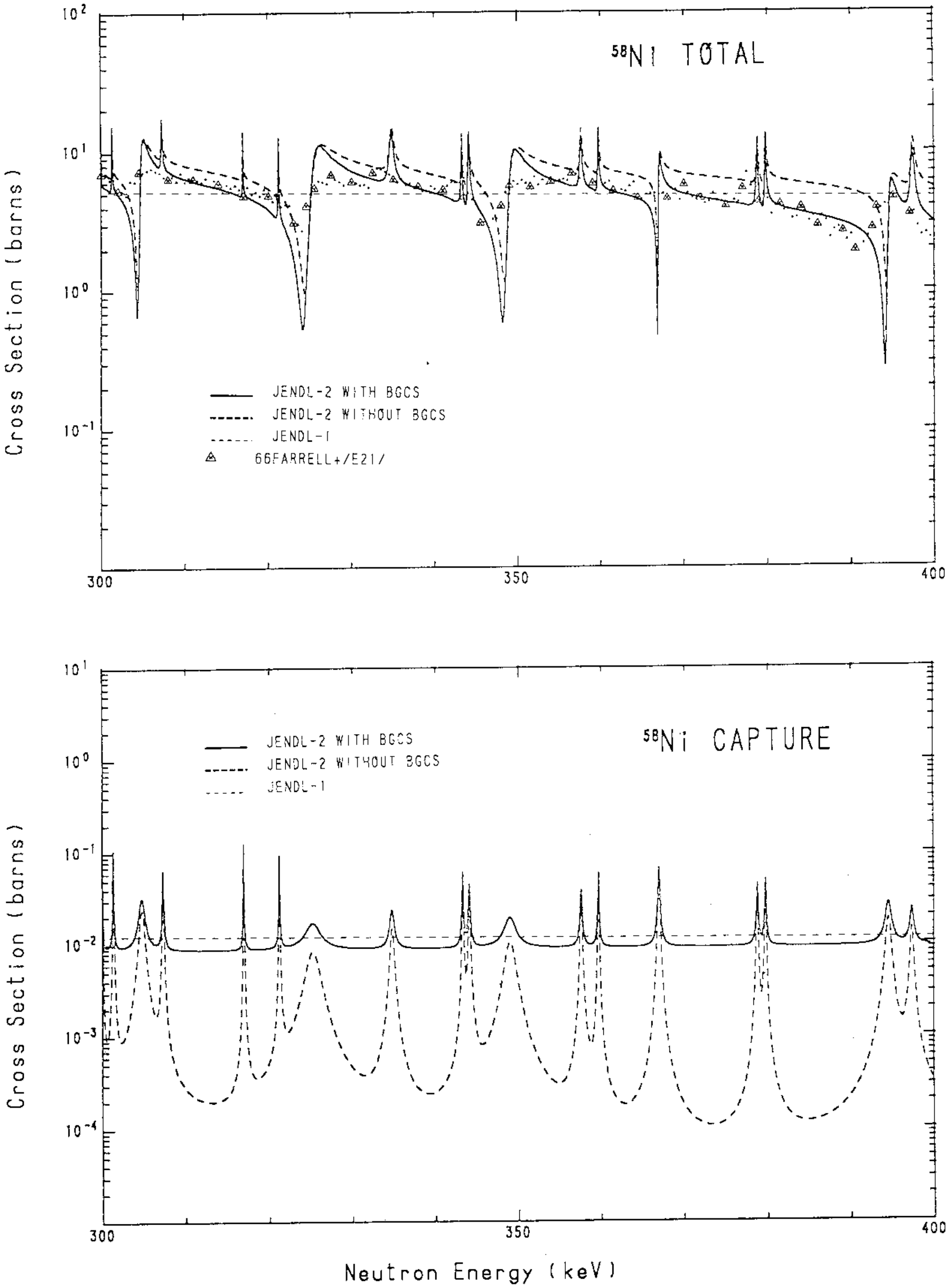
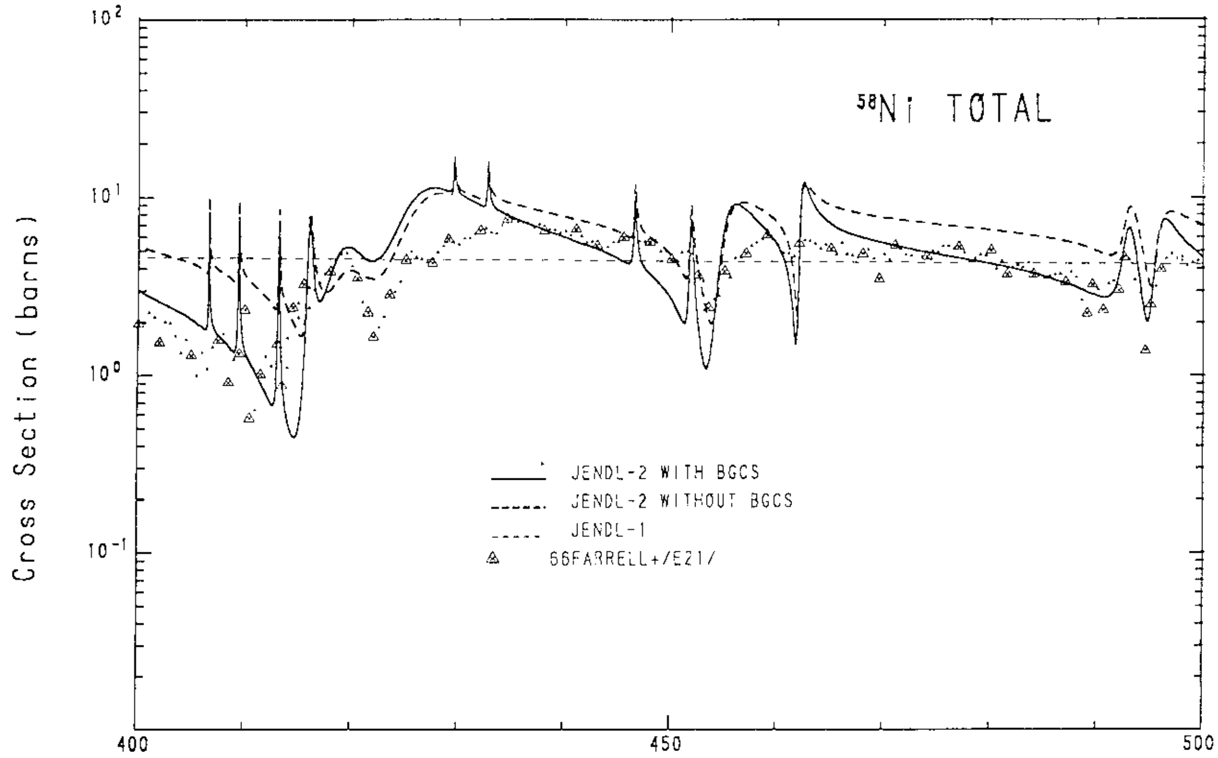


Fig. 2(e) Total and capture cross sections of ^{58}Ni in the resonance region.



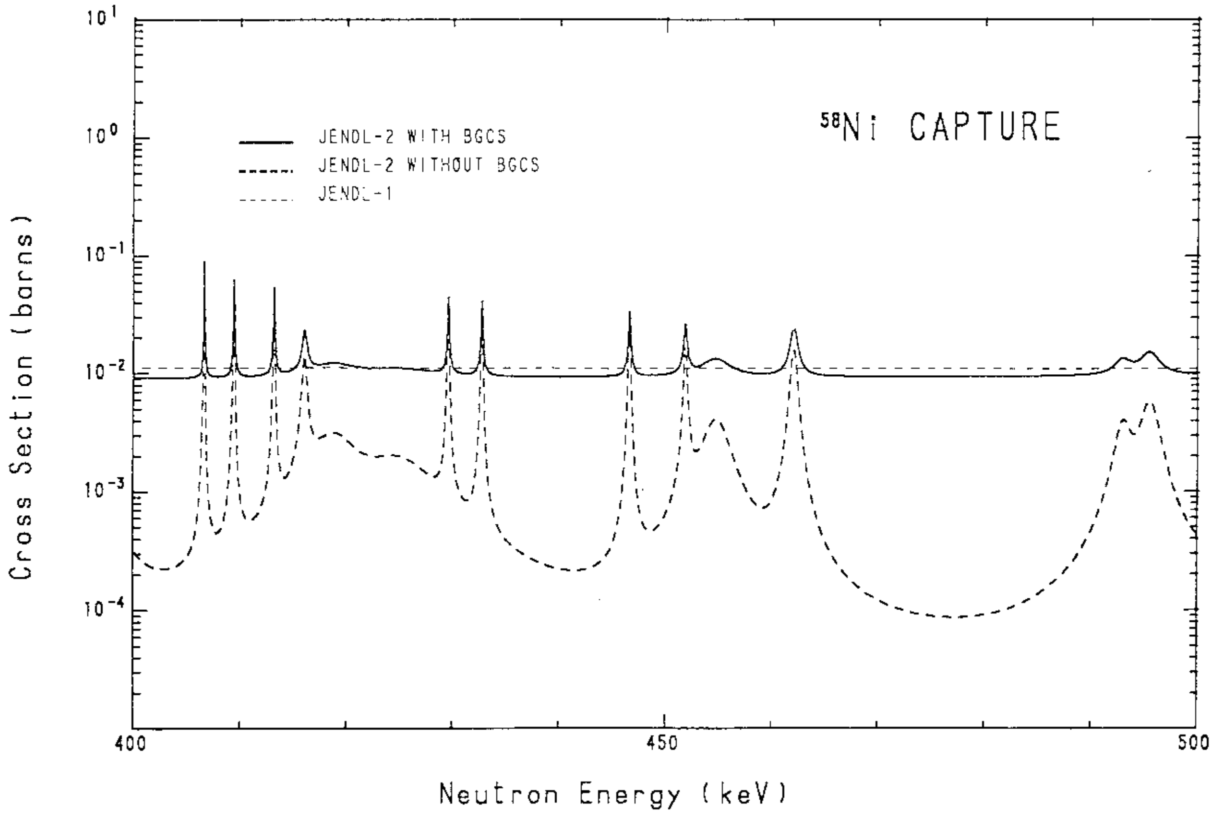


Fig. 2(f) Total and capture cross sections of ^{58}Ni in the resonance region.

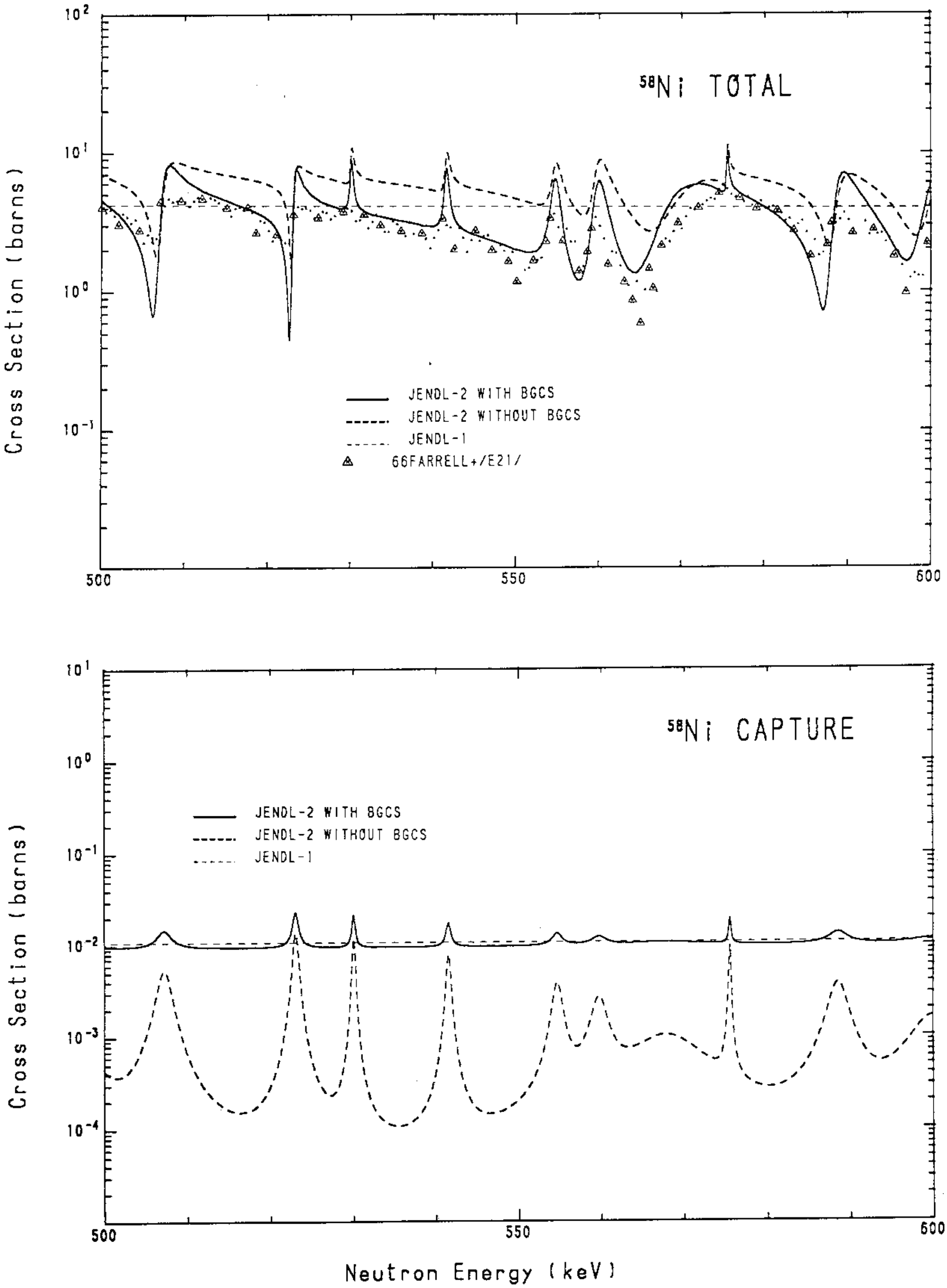


Fig. 2(g) Total and capture cross sections of ^{58}Ni in the resonance region.

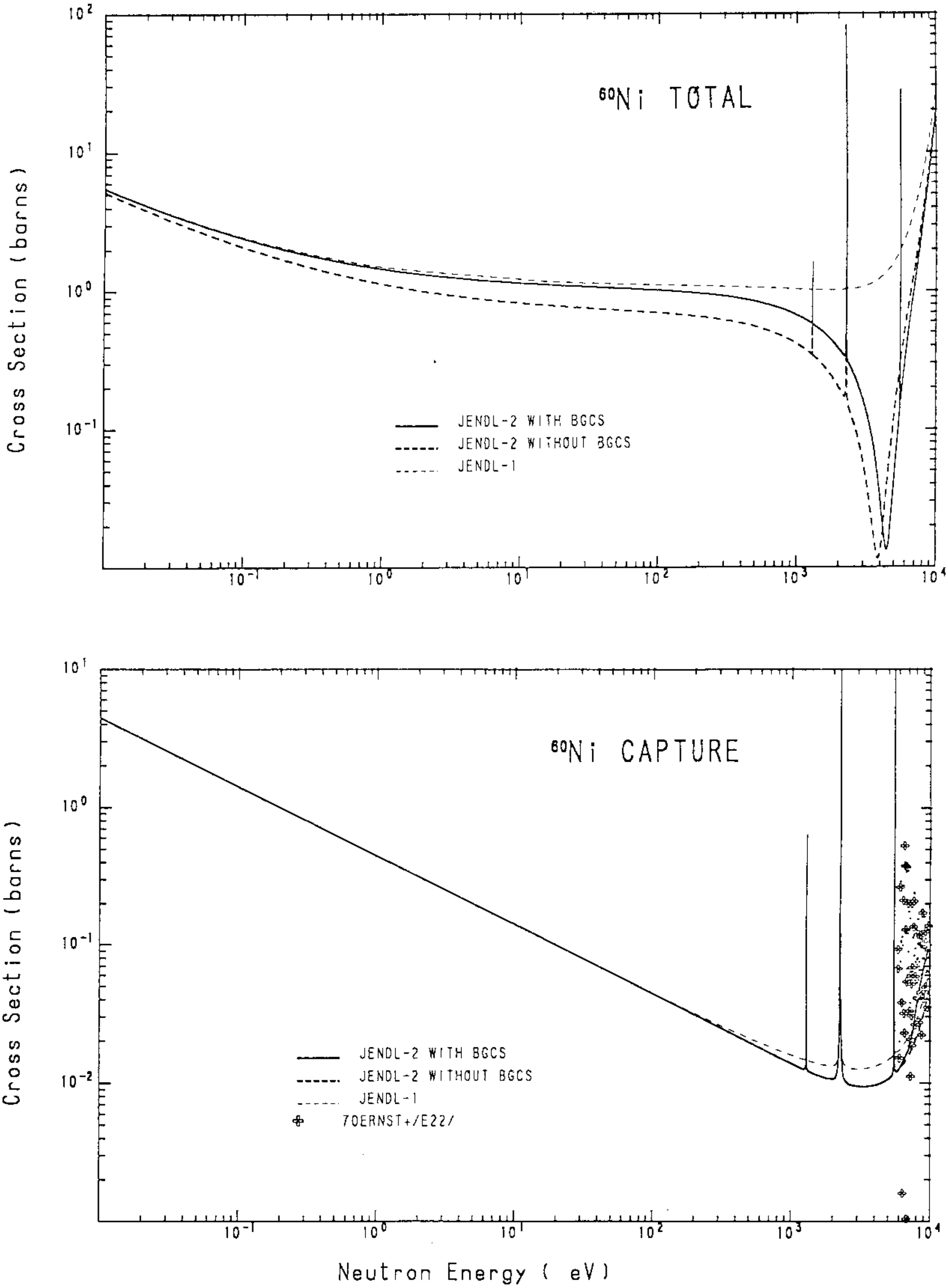
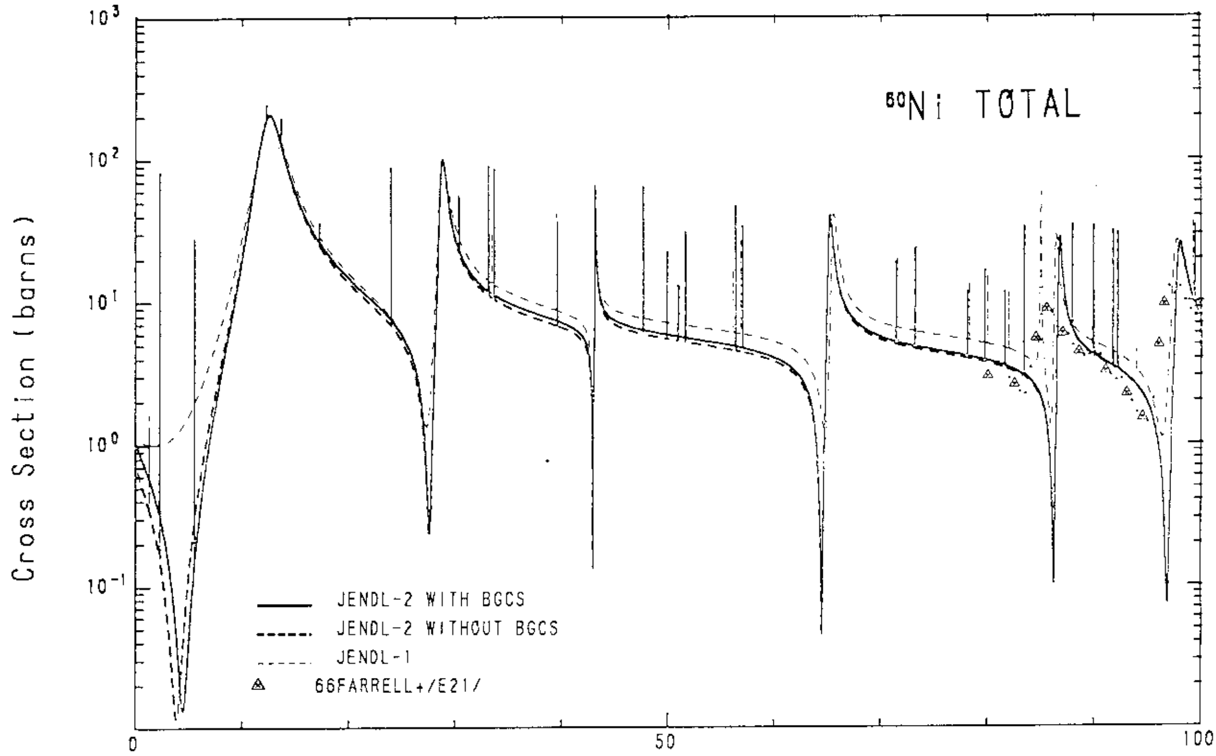


Fig. 3(a) Total and capture cross sections of ^{60}Ni in the resonance region.



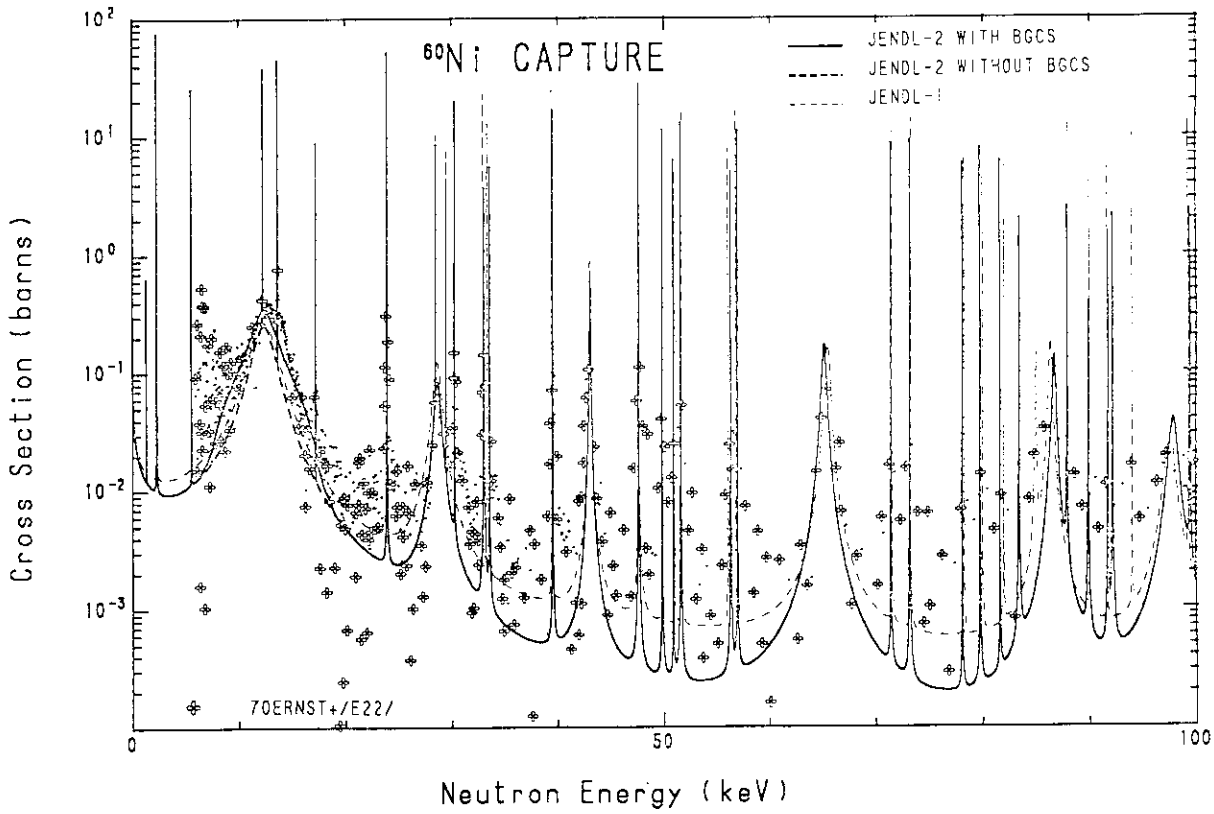
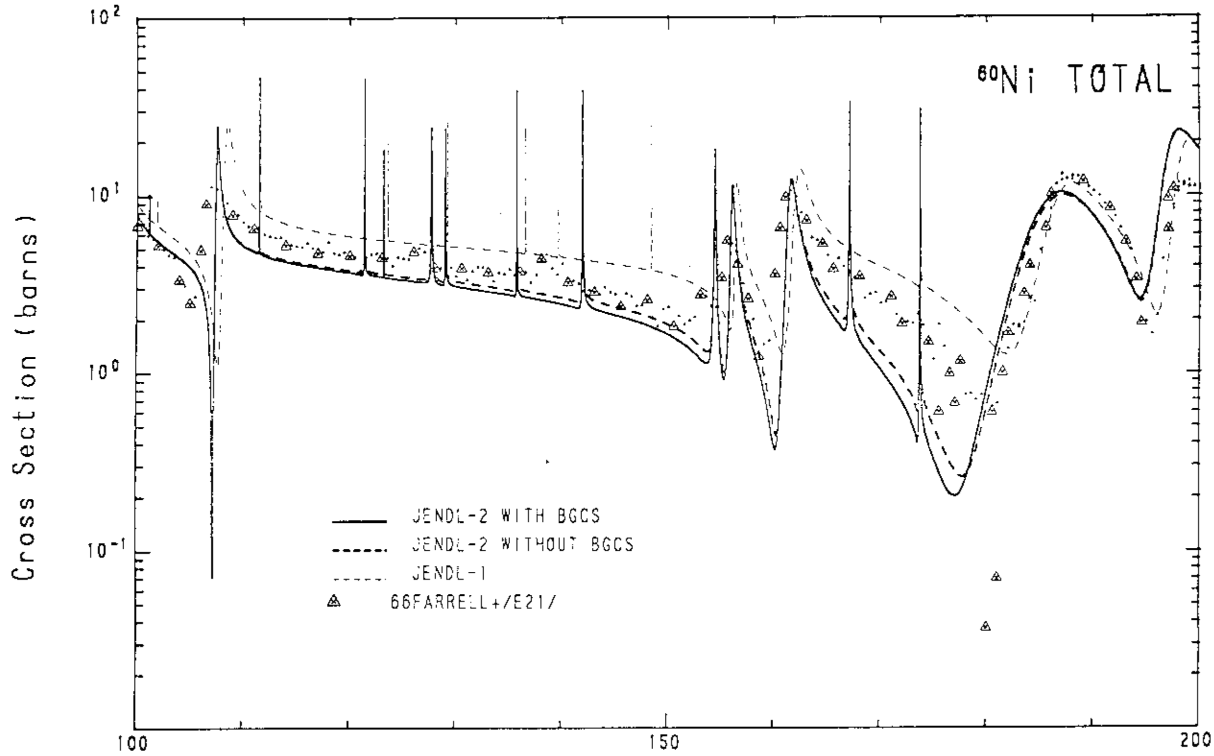


Fig. 3(b) Total and capture cross sections of ^{60}Ni in the resonance region.



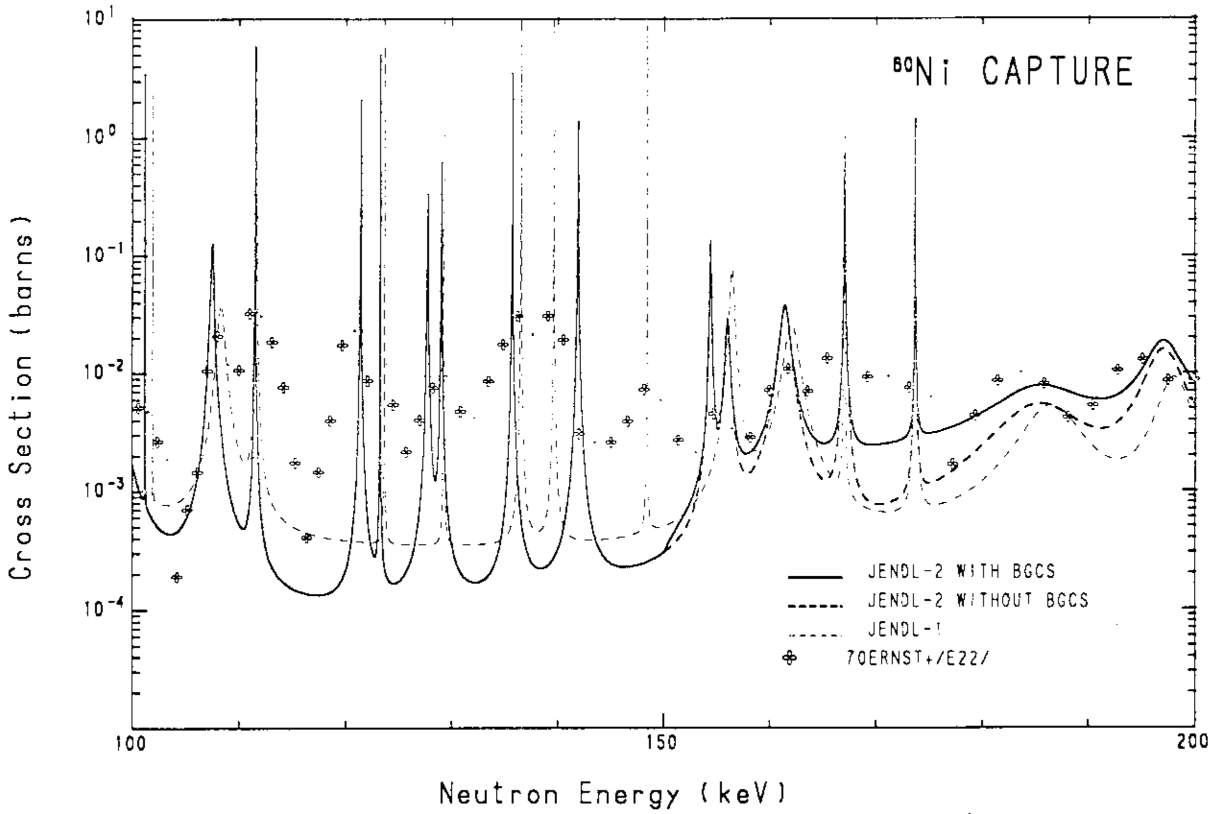


Fig. 3(c) Total and capture cross sections of ^{60}Ni in the resonance region.

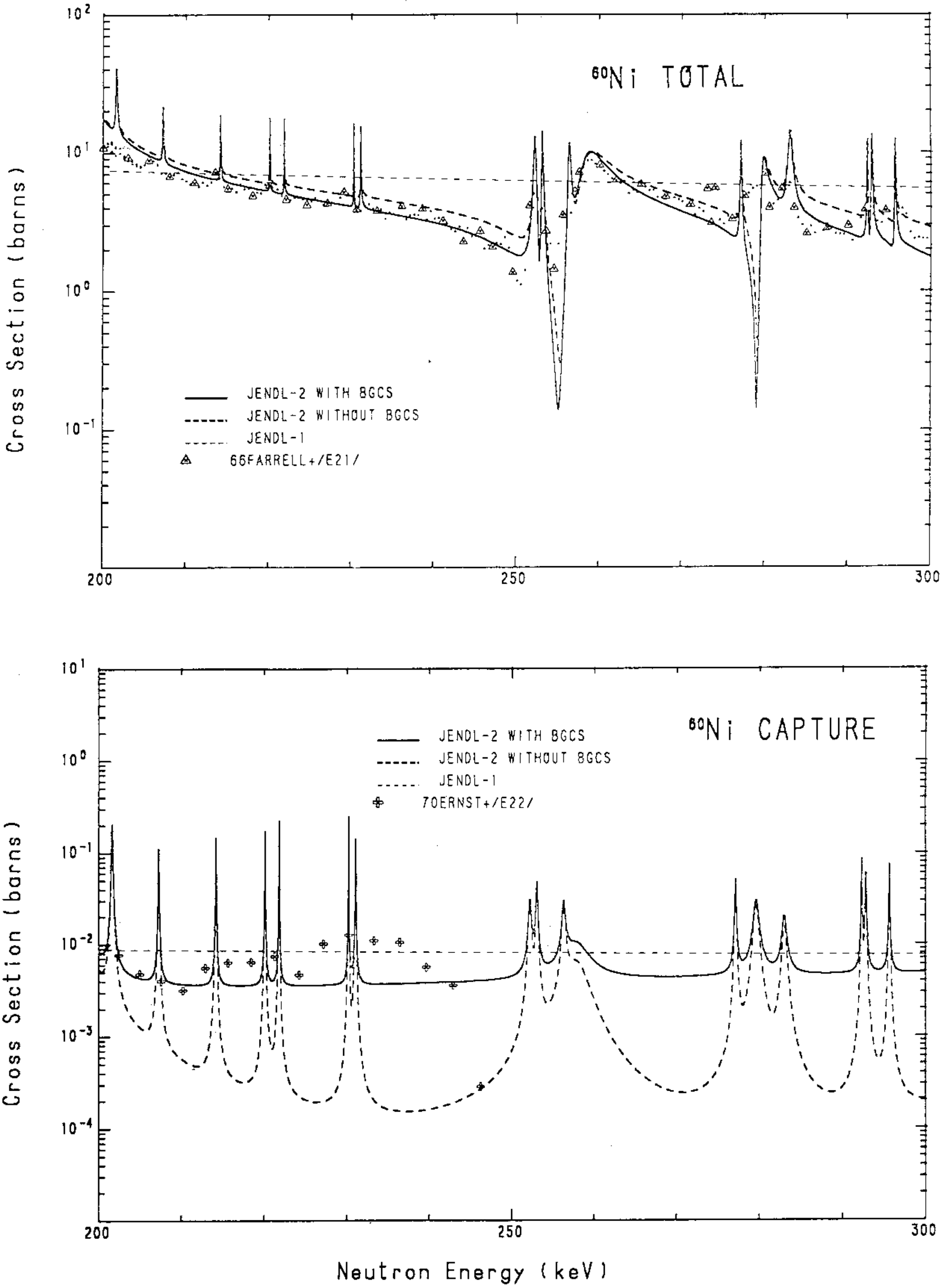


Fig. 3(d) Total and capture cross sections of ^{60}Ni in the resonance region.

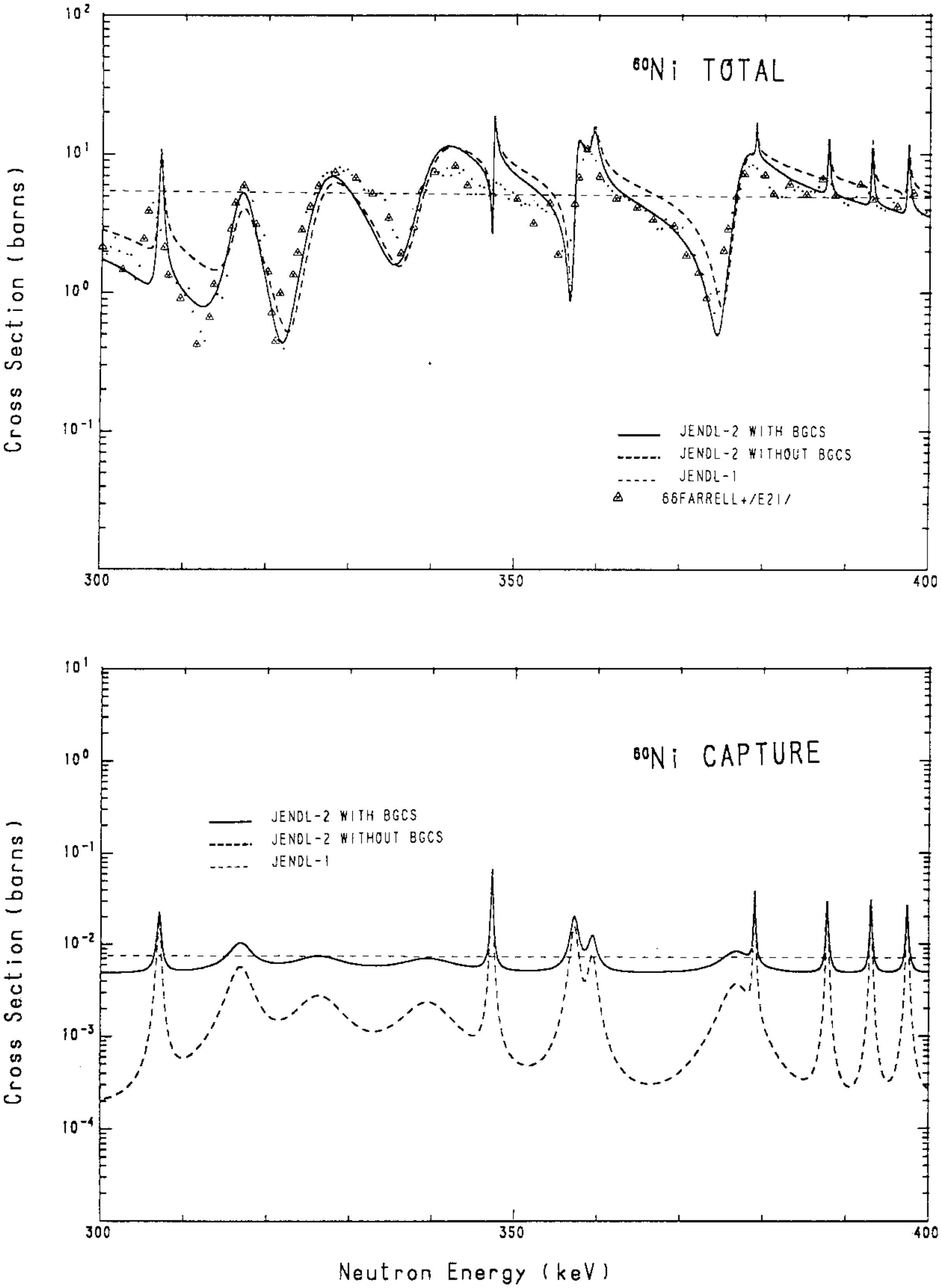


Fig. 3(e) Total and capture cross sections of ^{60}Ni in the resonance region.

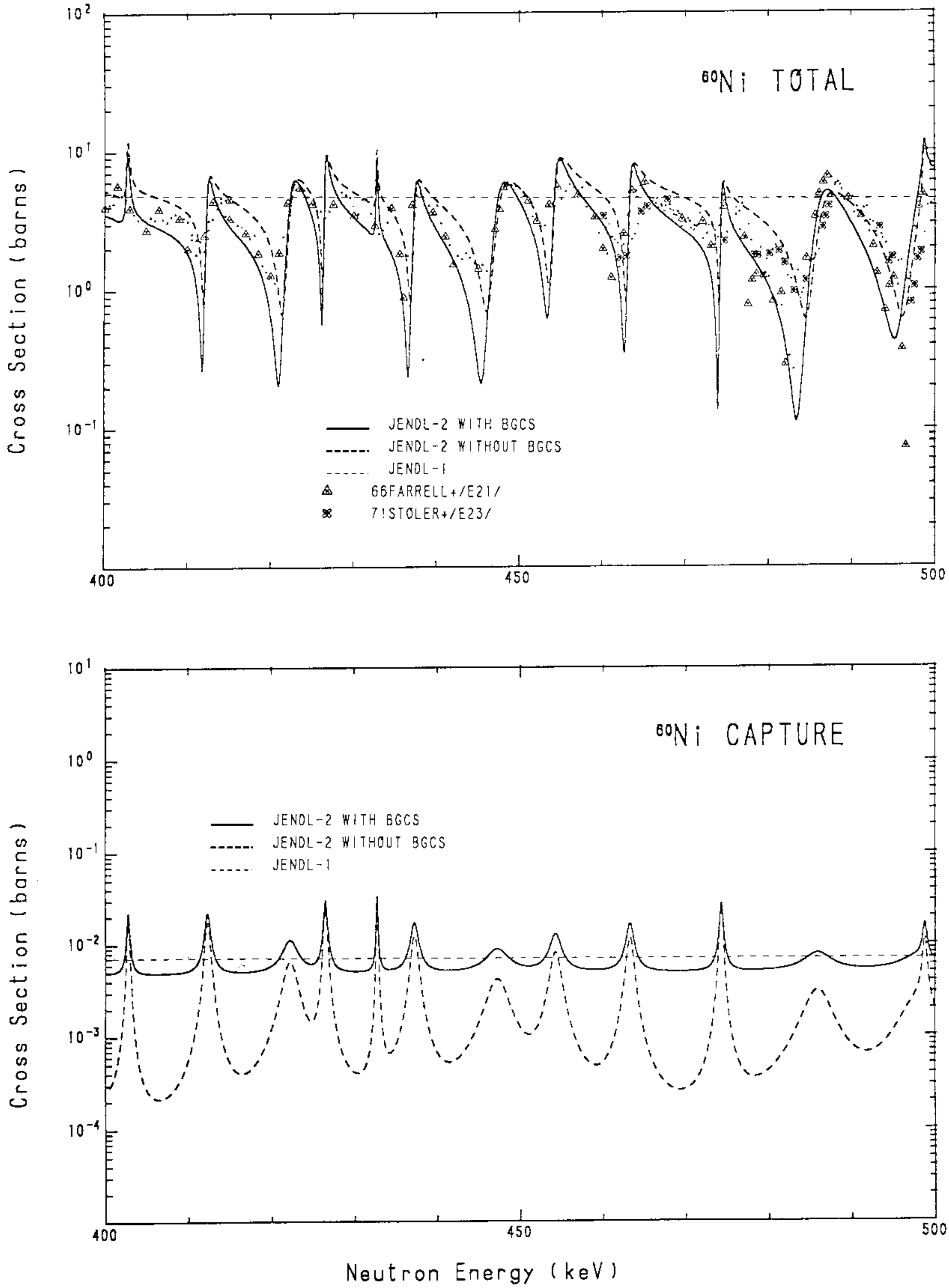


Fig. 3(f) Total and capture cross sections of ^{60}Ni in the resonance region.

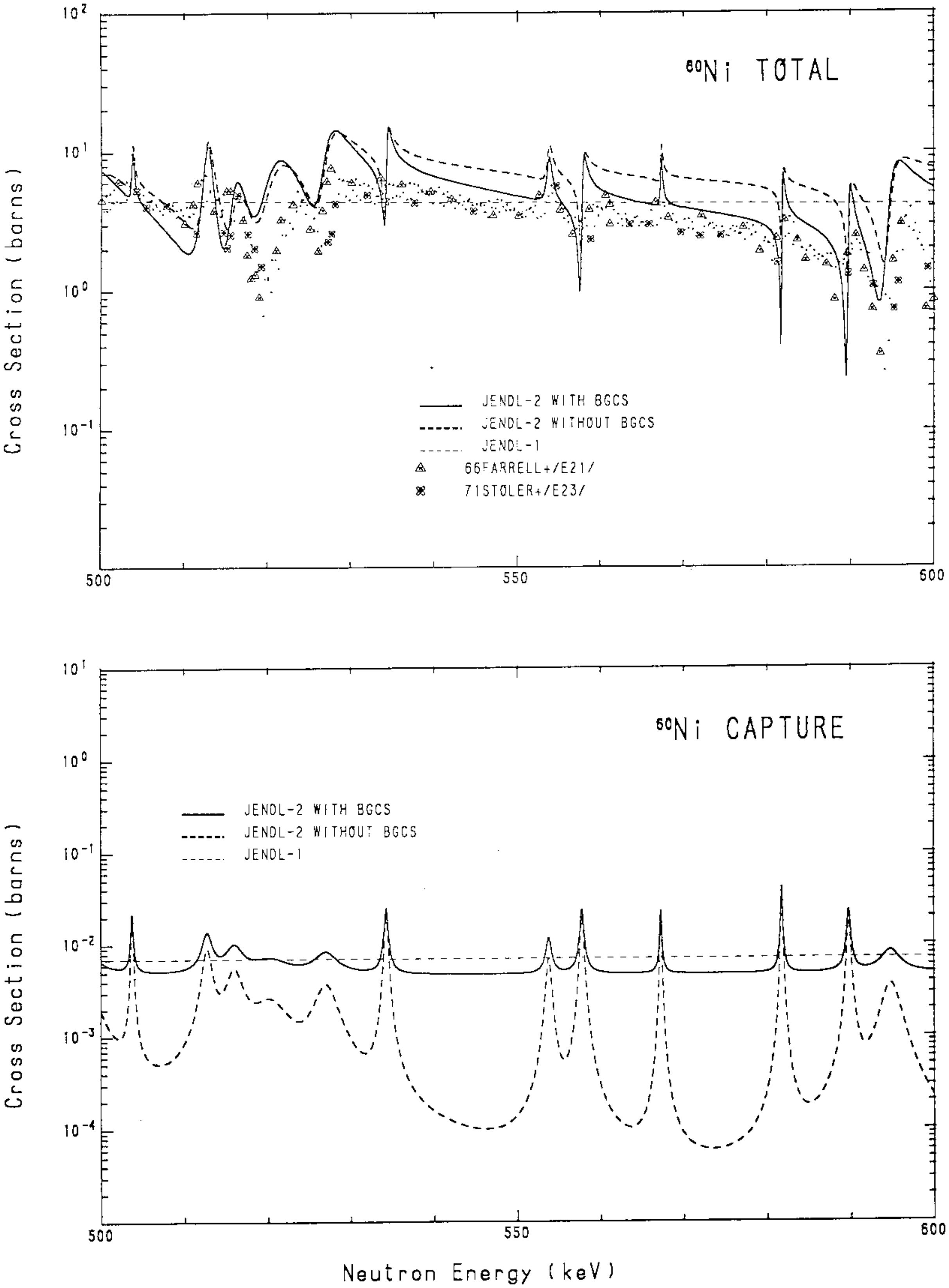
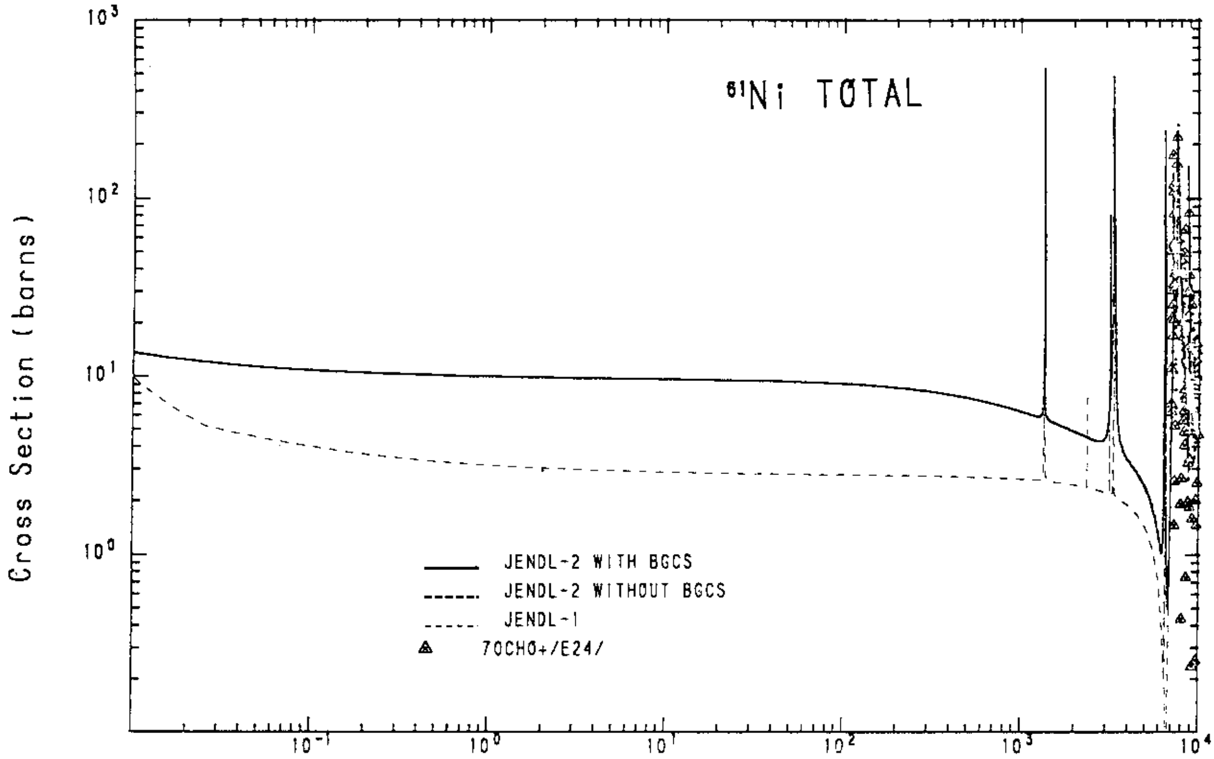


Fig. 3(g) Total and capture cross sections of ^{60}Ni in the resonance region.



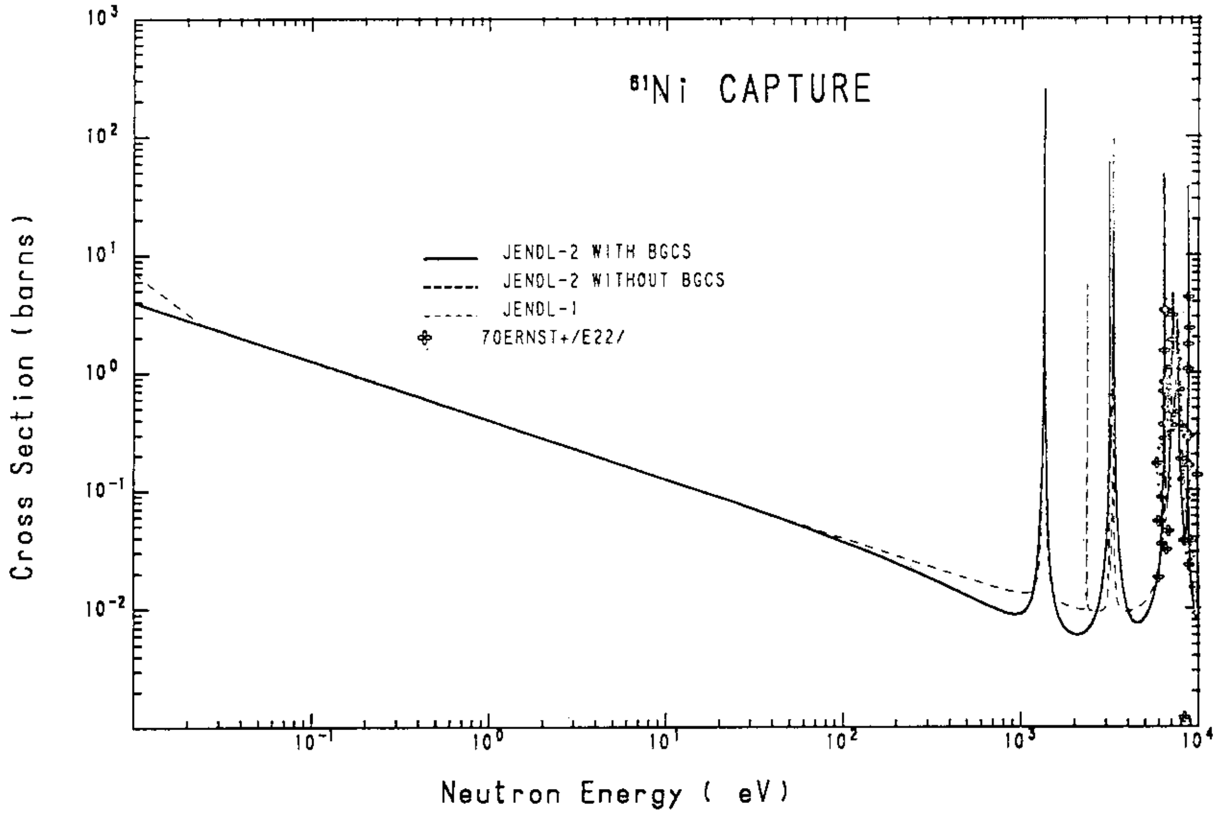
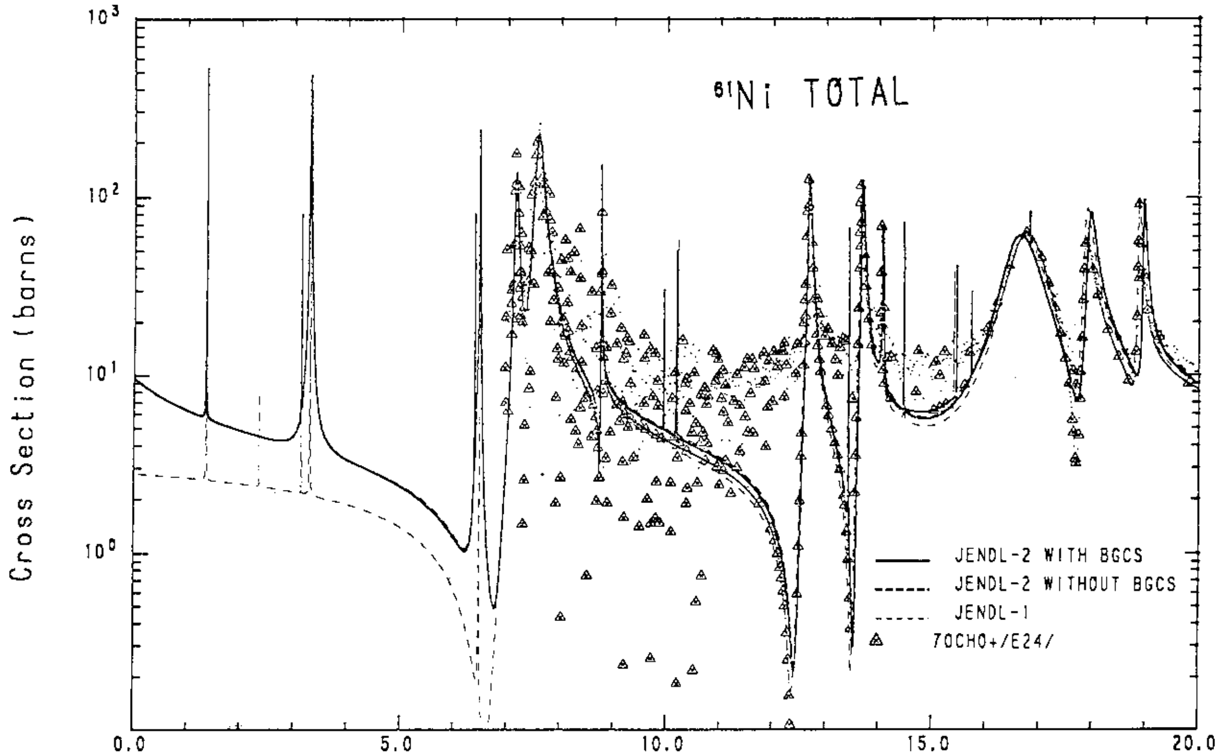


Fig. 4(a) Total and capture cross sections of ^{61}Ni in the resonance region.



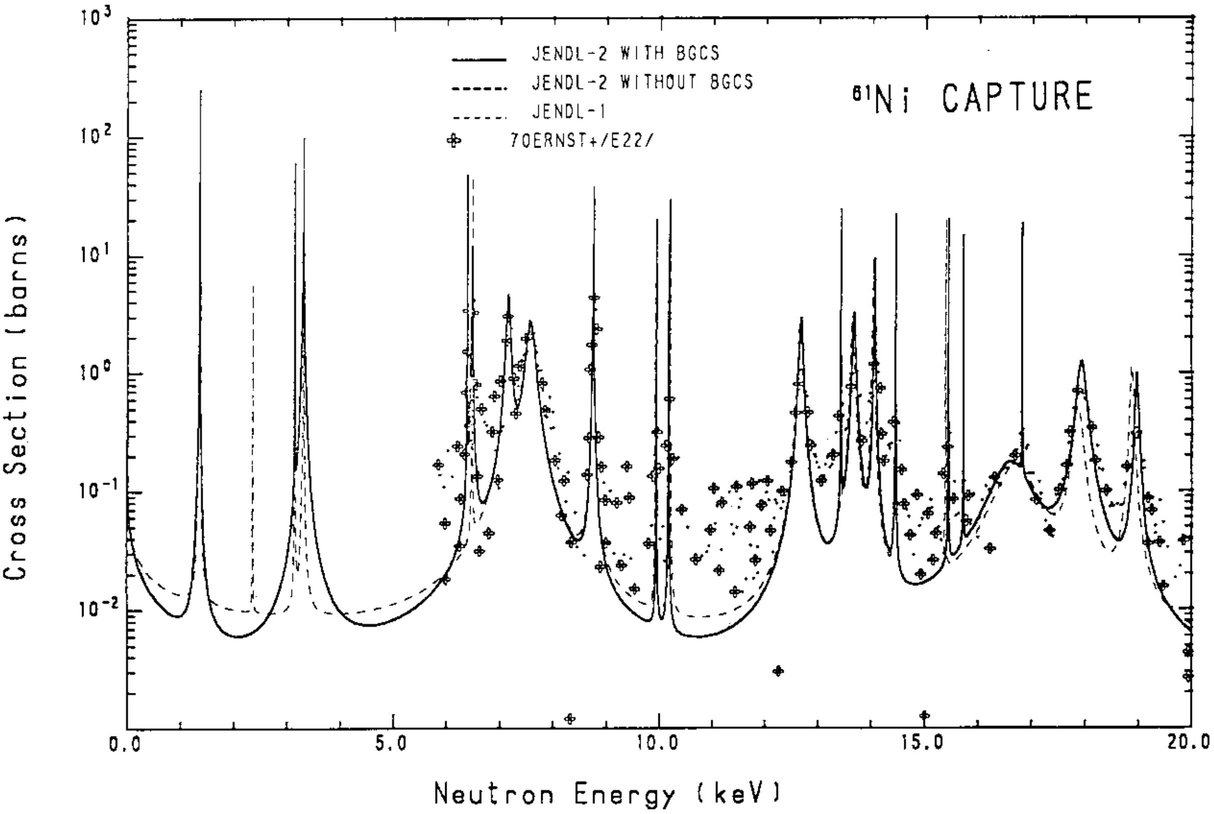


Fig. 4(b) Total and capture cross sections of ^{61}Ni in the resonance region.

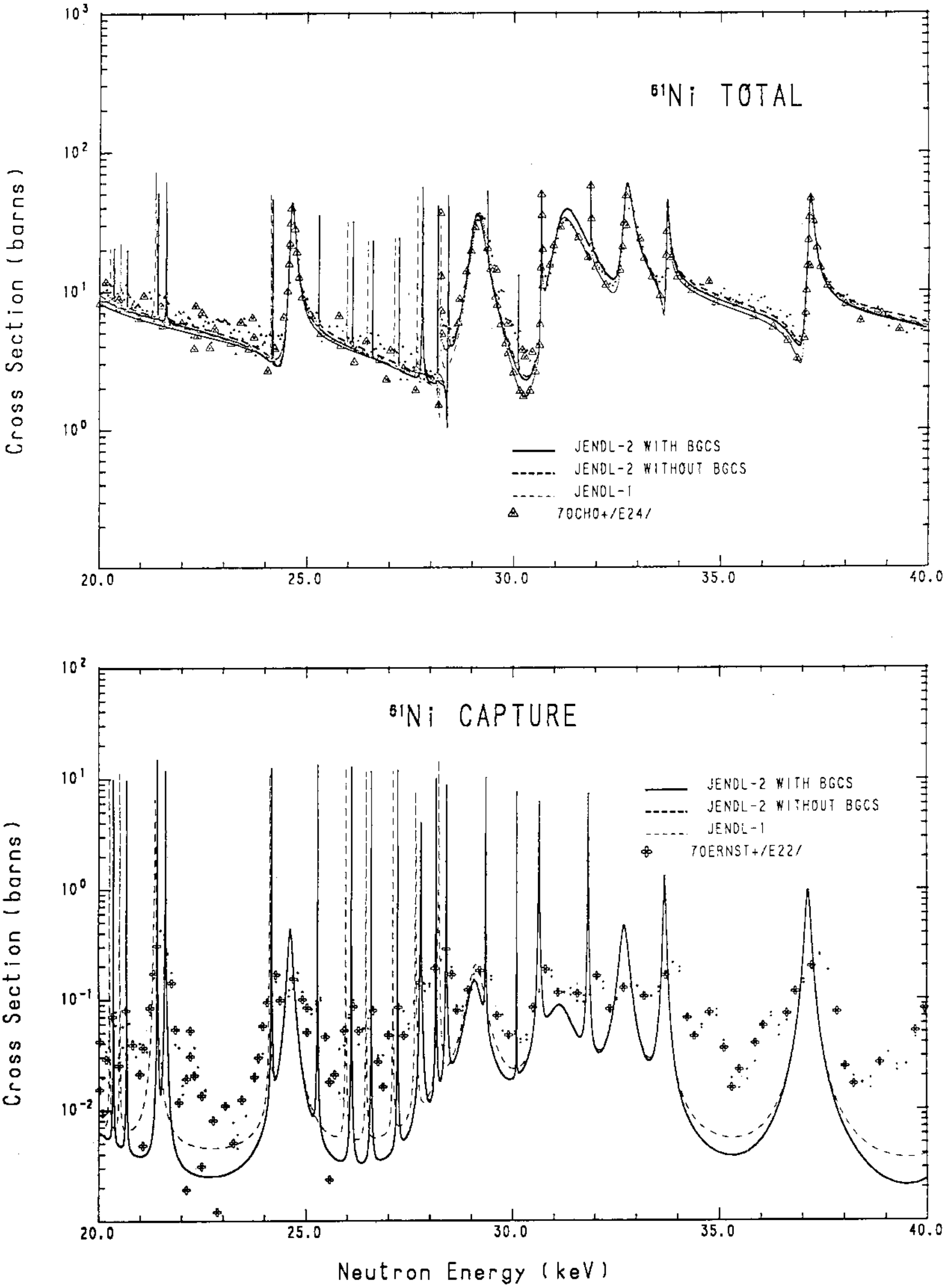


Fig. 4(c) Total and capture cross sections of ^{61}Ni in the resonance region.

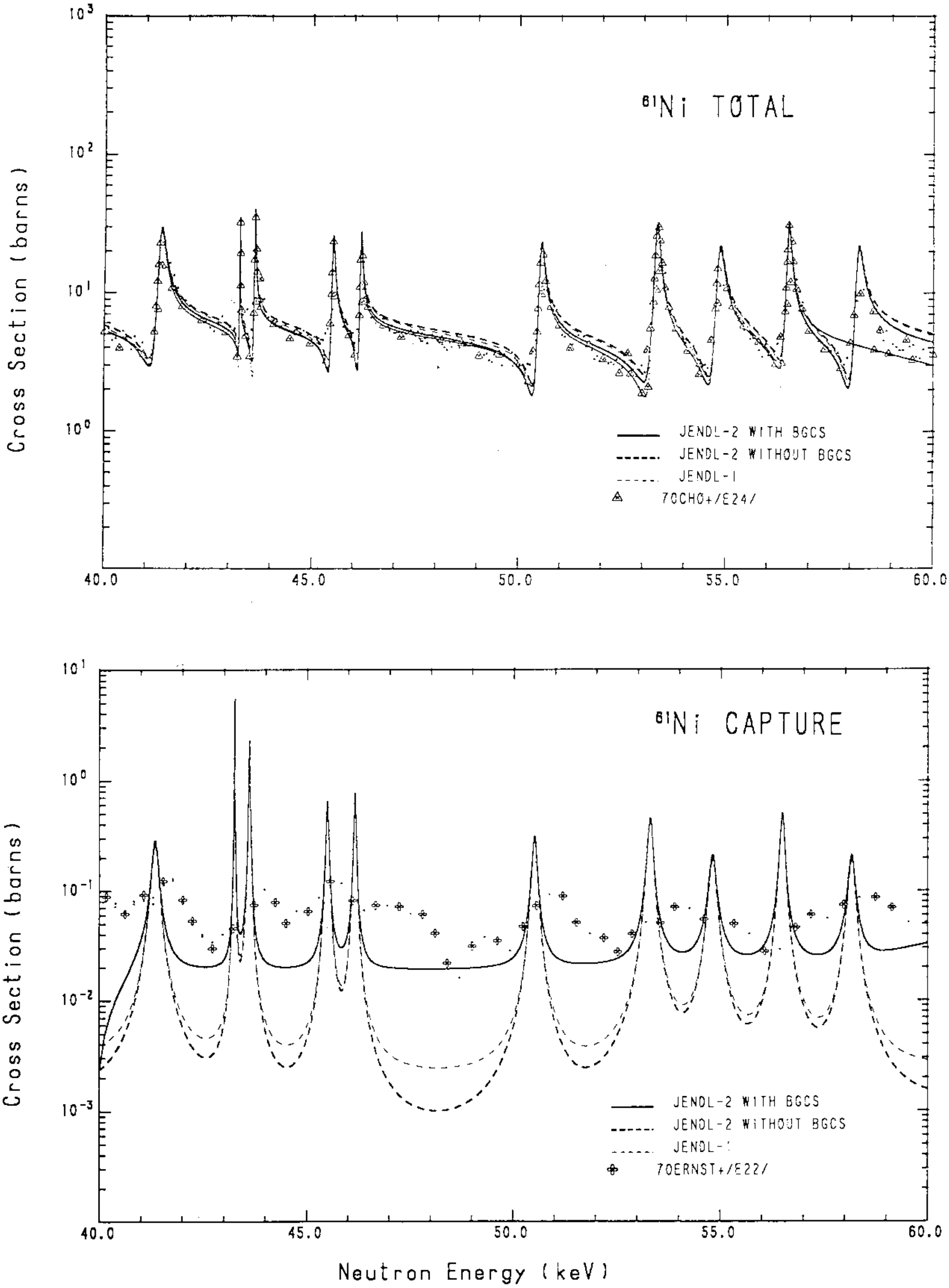


Fig. 4(d) Total and capture cross sections of ^{61}Ni in the resonance region.

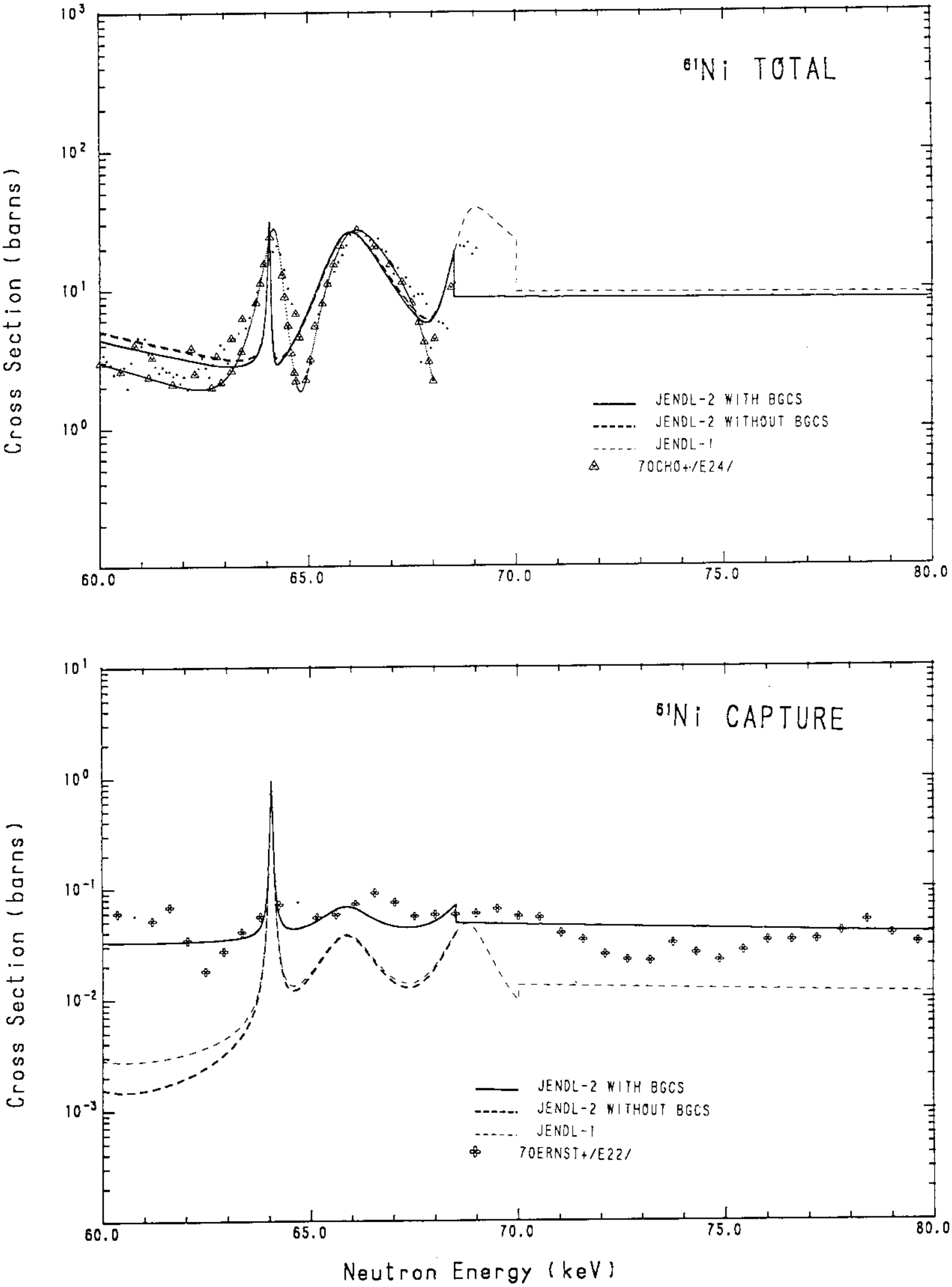


Fig. 4(e) Total and capture cross sections of ^{61}Ni in the resonance region.

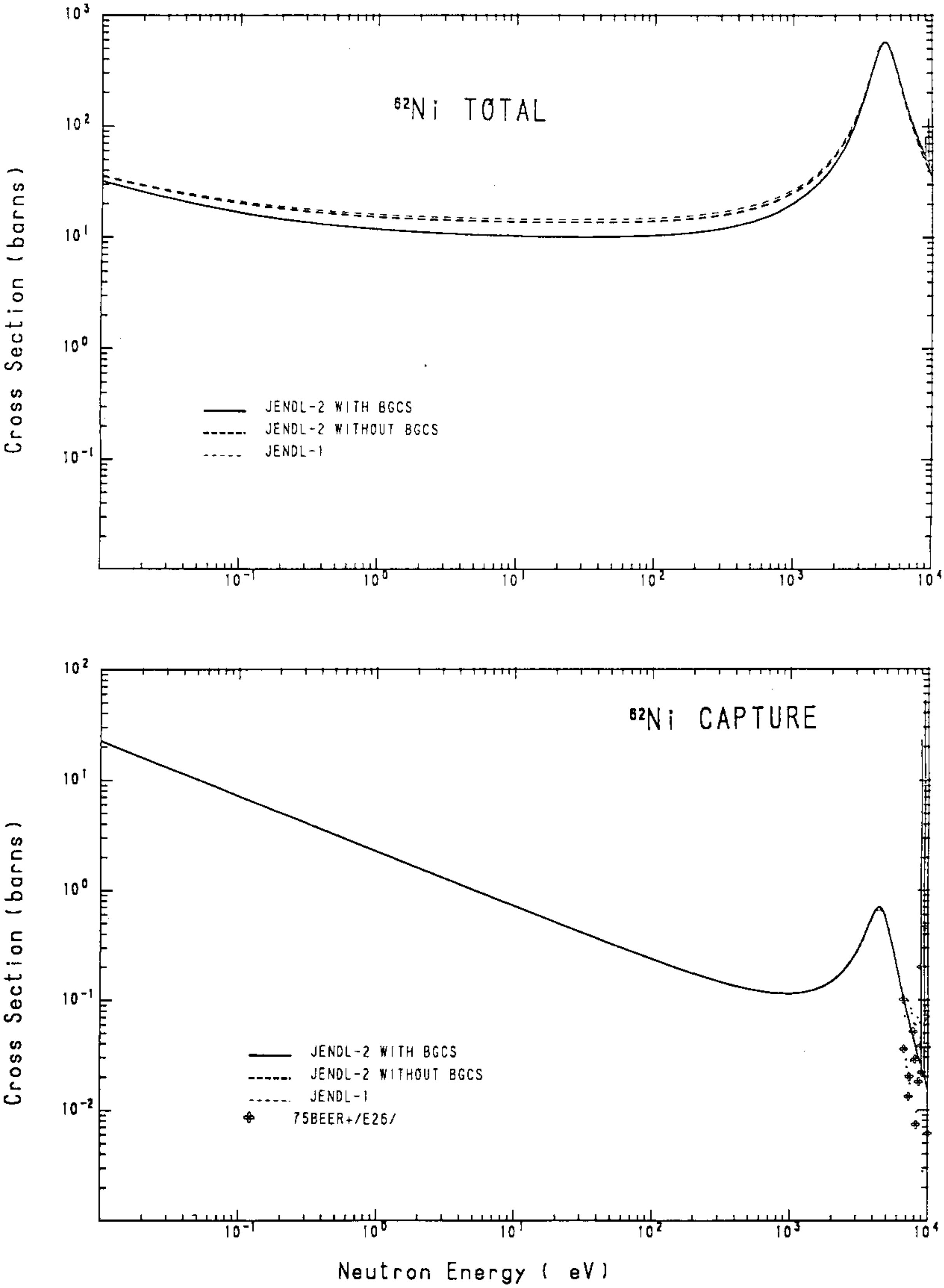
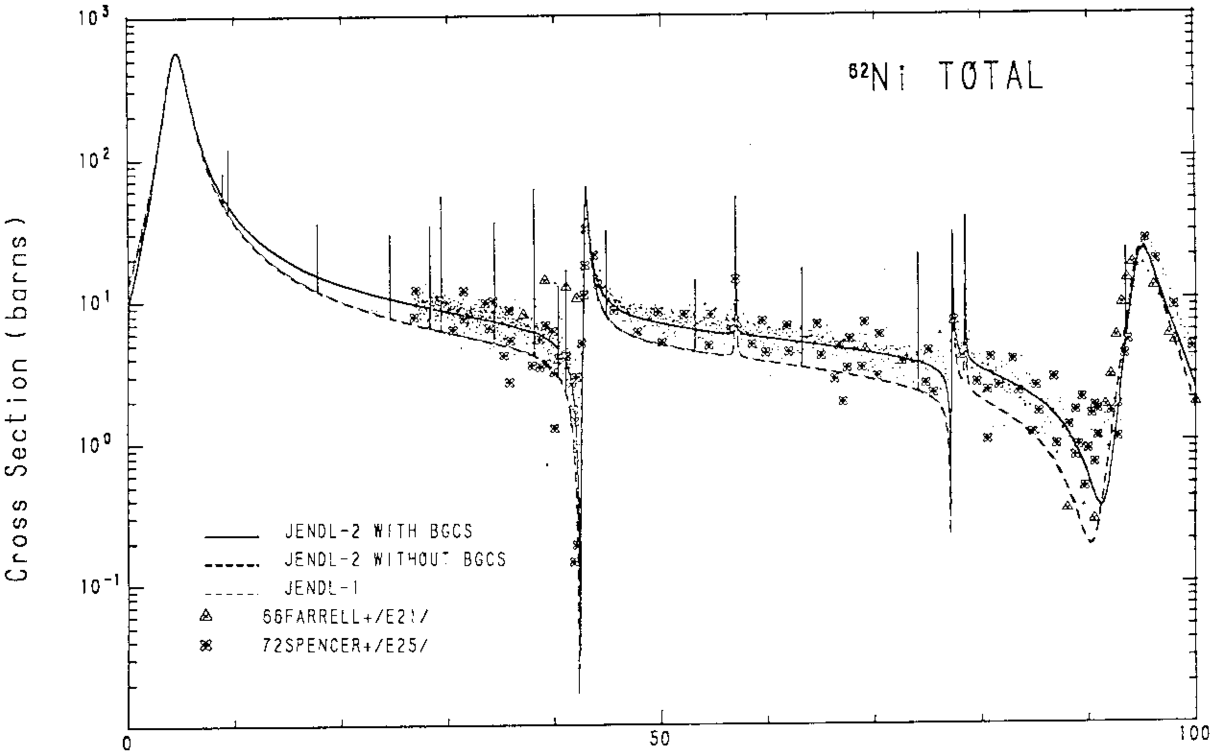


Fig. 5(a) Total and capture cross sections of ^{62}Ni in the resonance region.



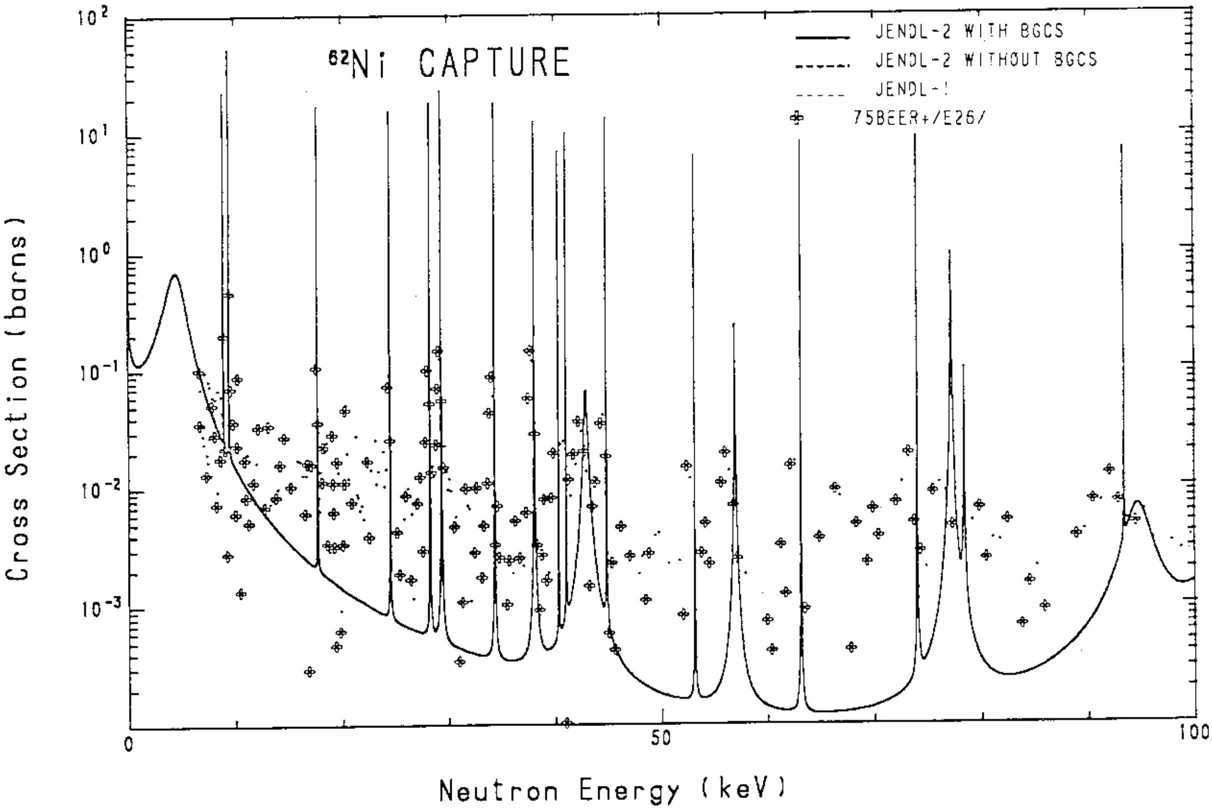


Fig. 5(b) Total and capture cross sections of ^{62}Ni in the resonance region.

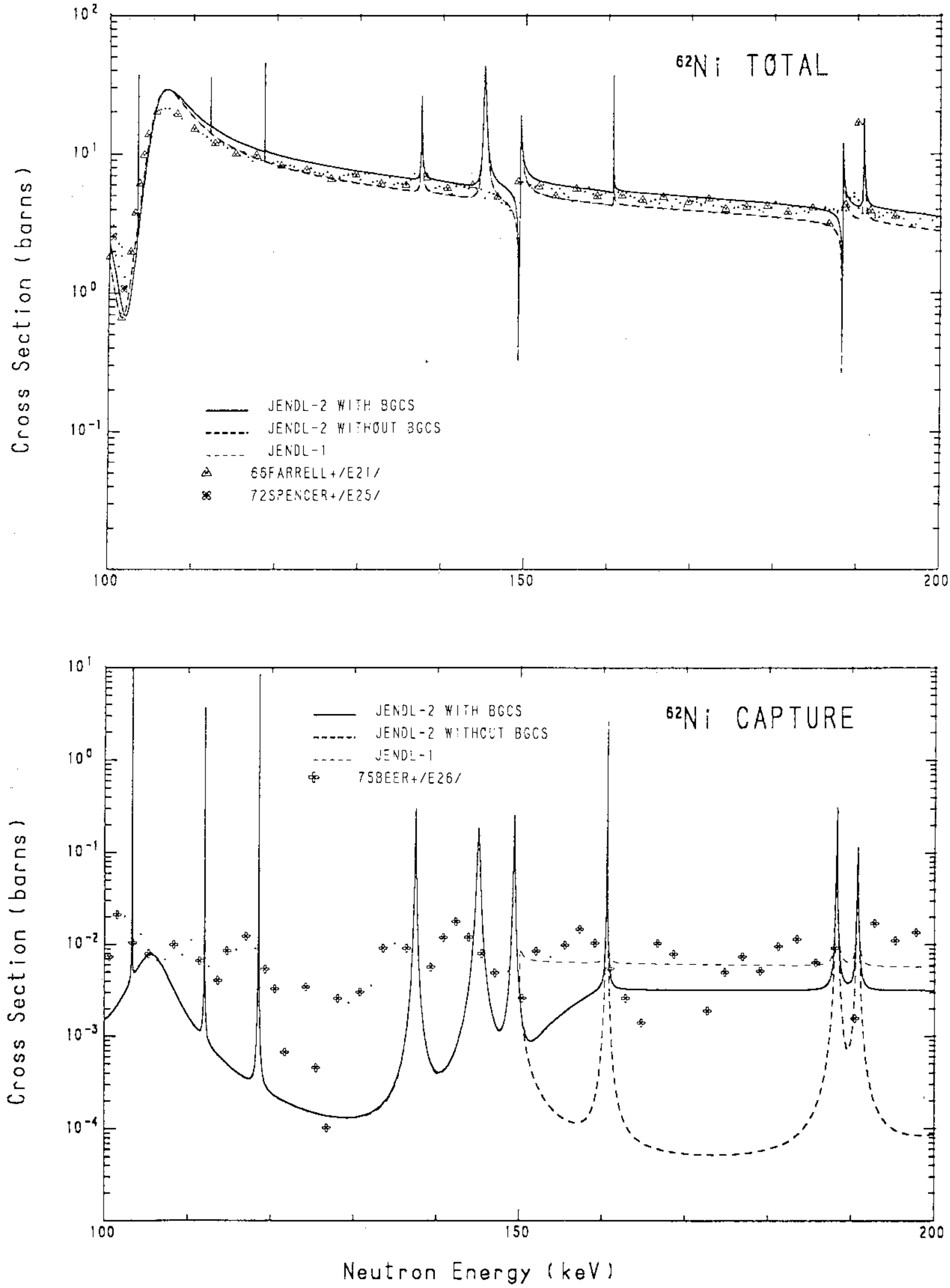
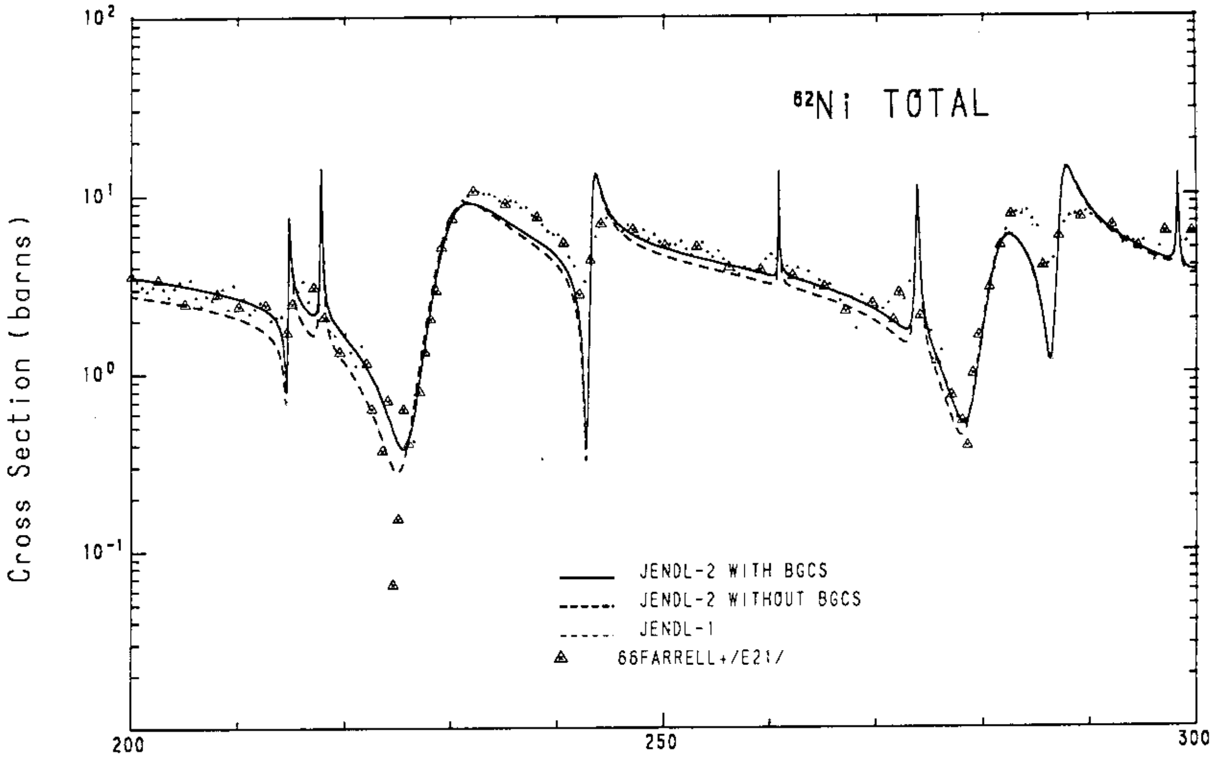


Fig. 5(c) Total and capture cross sections of ^{62}Ni in the resonance region.



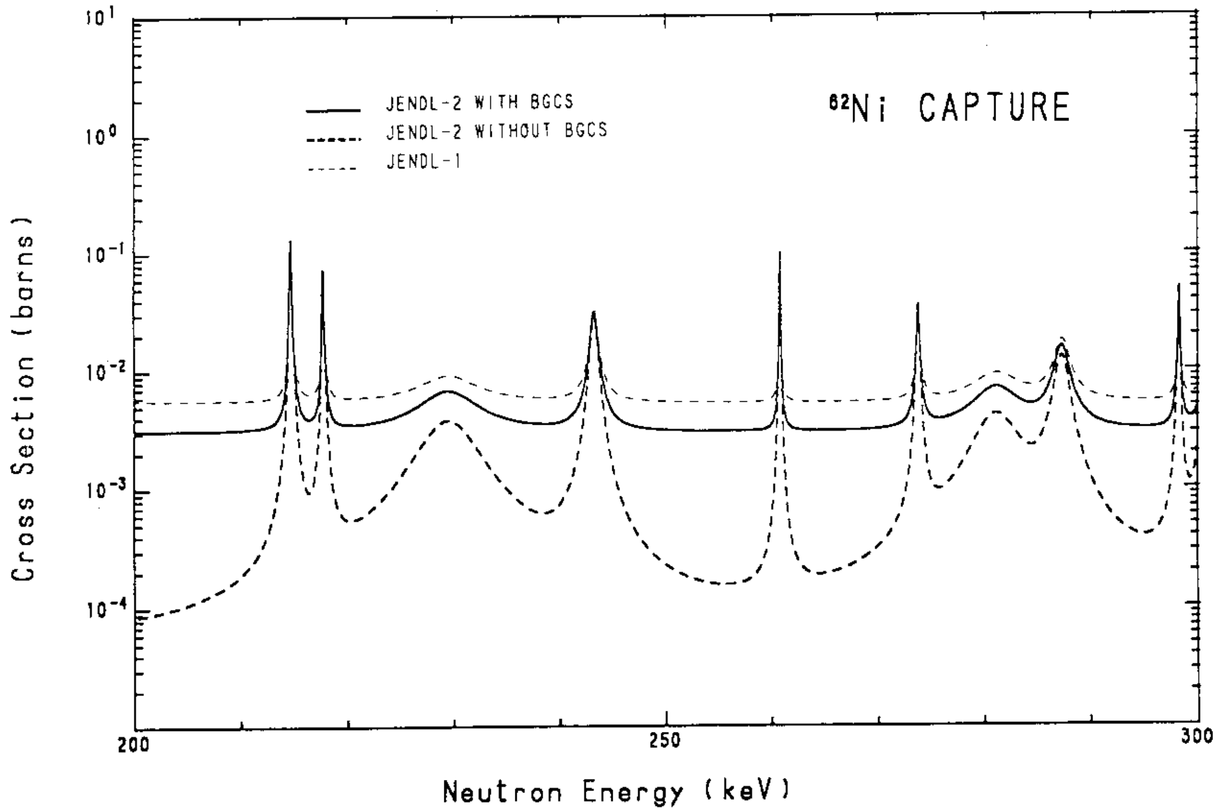


Fig. 5(d) Total and capture cross sections of ^{62}Ni in the resonance region.

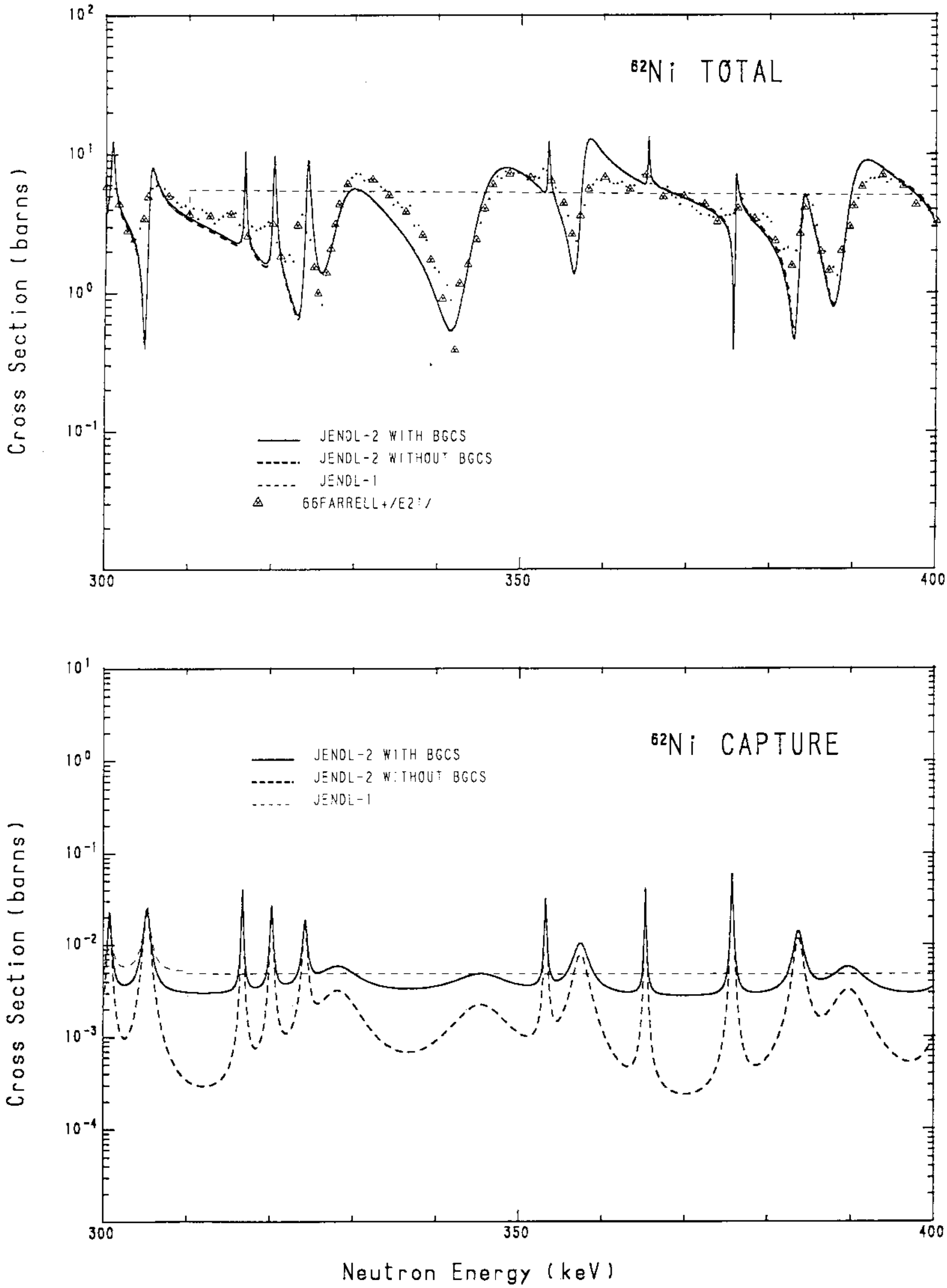


Fig. 5(e) Total and capture cross sections of ^{62}Ni in the resonance region.

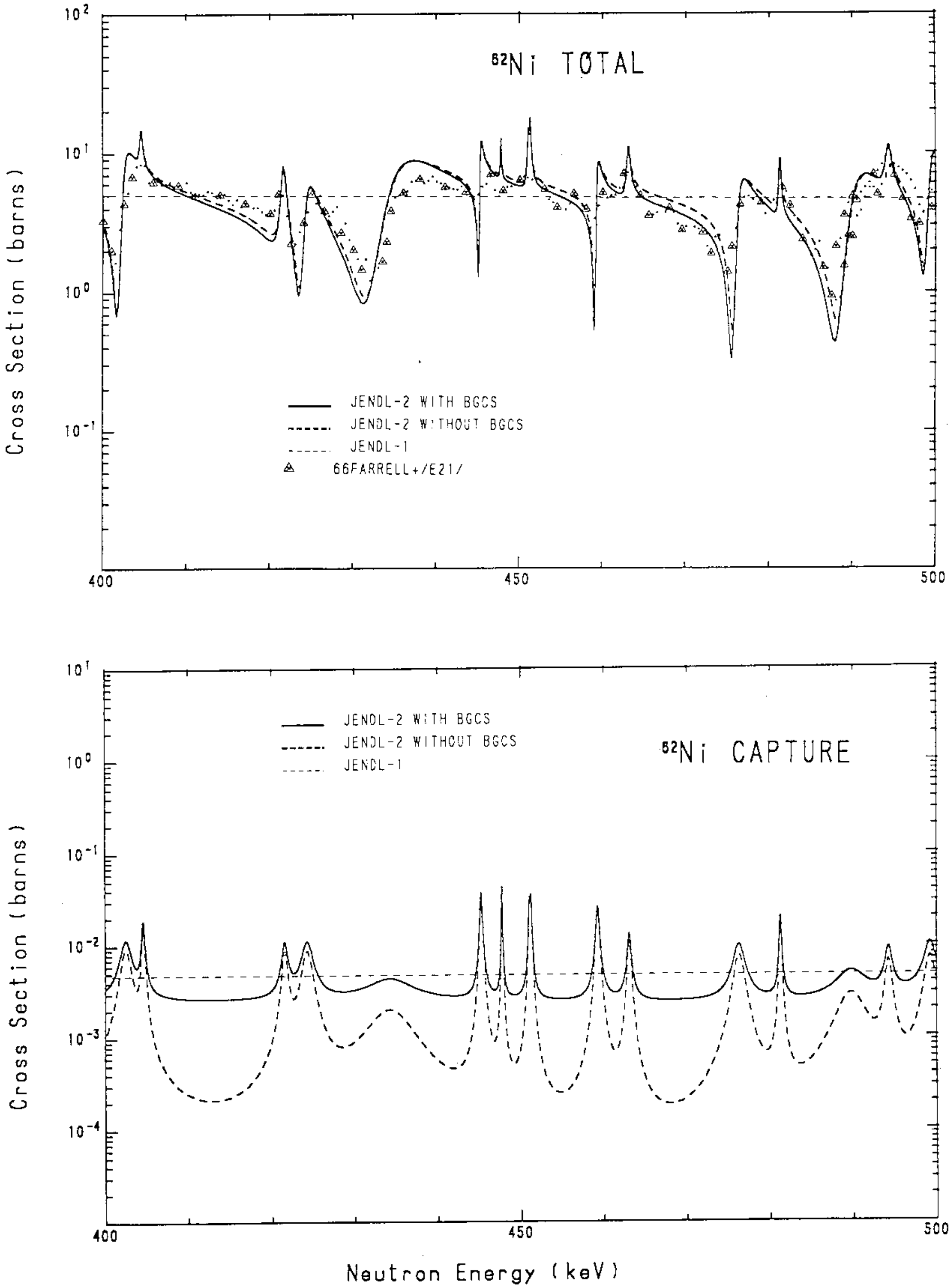


Fig. 5(f) Total and capture cross sections of ^{62}Ni in the resonance region.

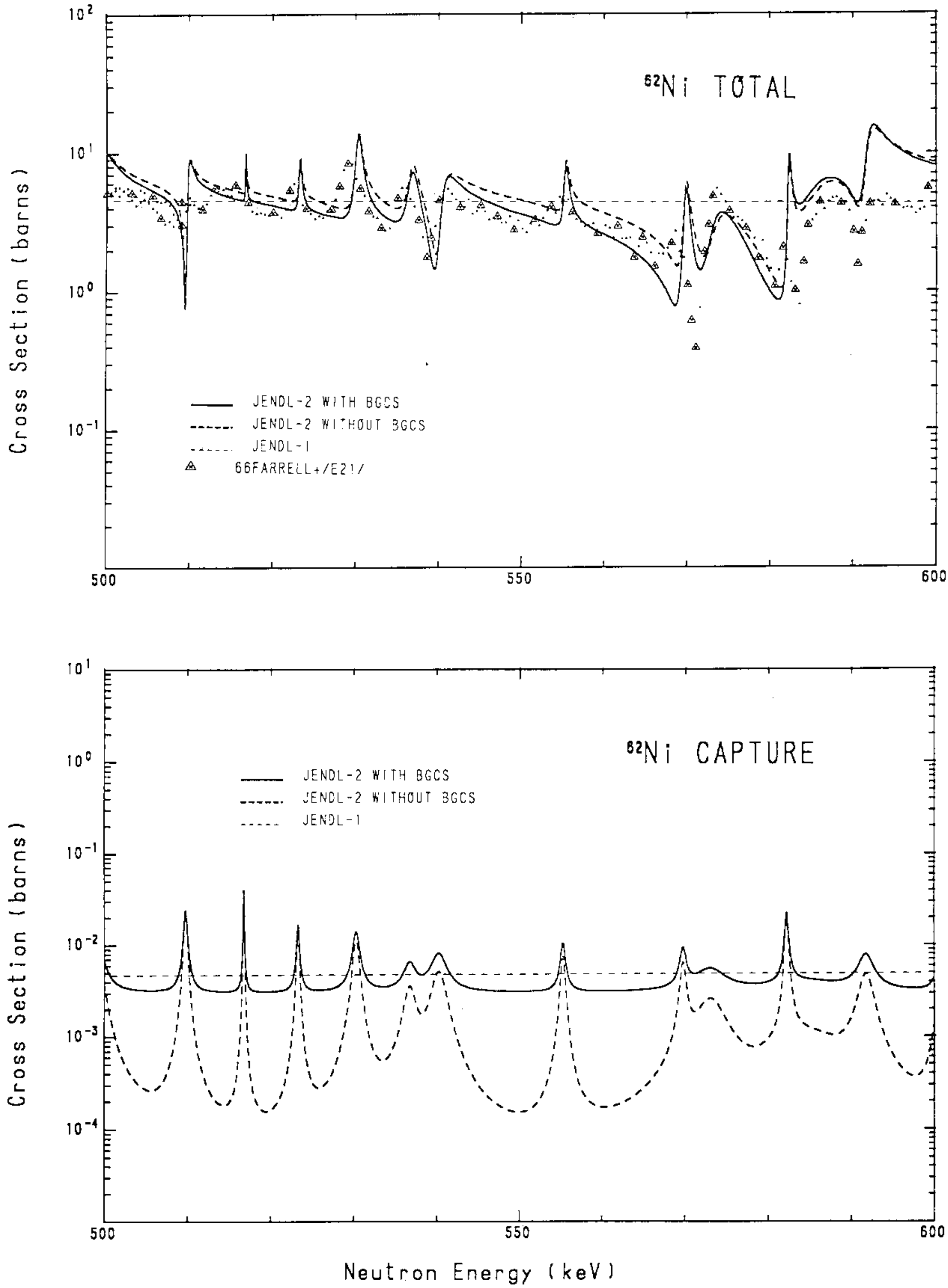


Fig. 5(g) Total and capture cross sections of ^{62}Ni in the resonance region.

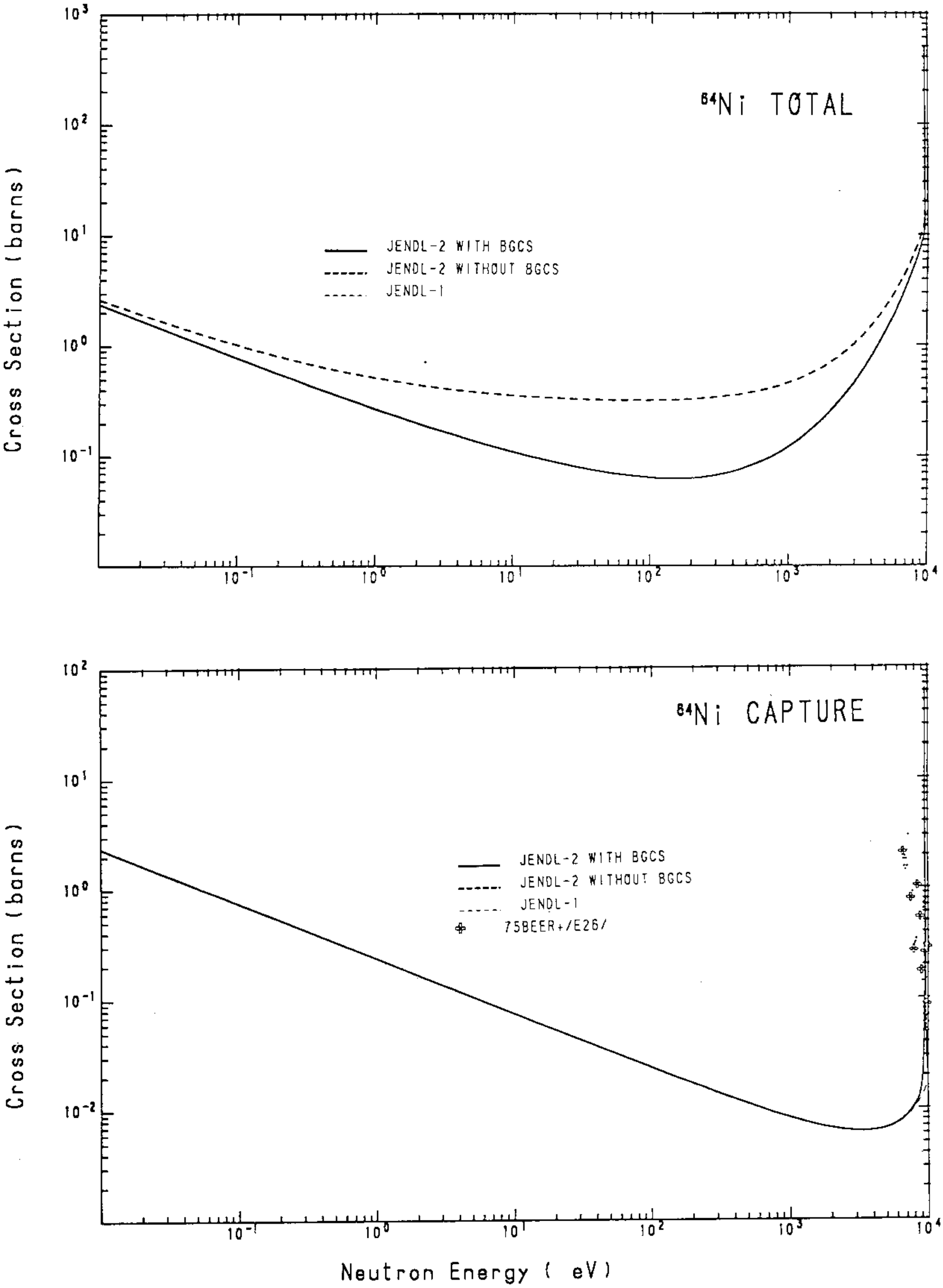


Fig. 6(a) Total and capture cross sections of ^{64}Ni in the resonance region.

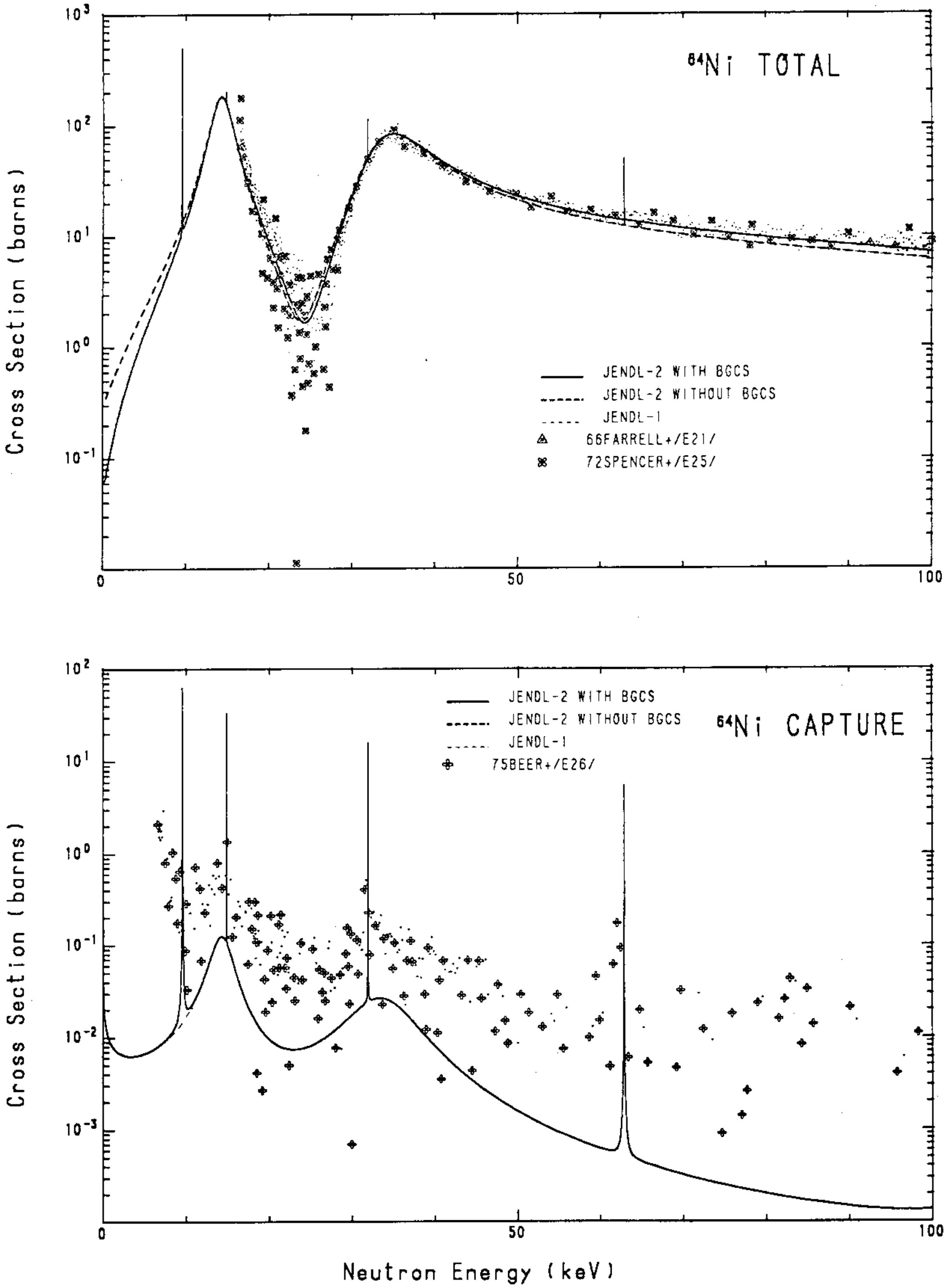


Fig. 6(b) Total and capture cross sections of ^{64}Ni in the resonance region.

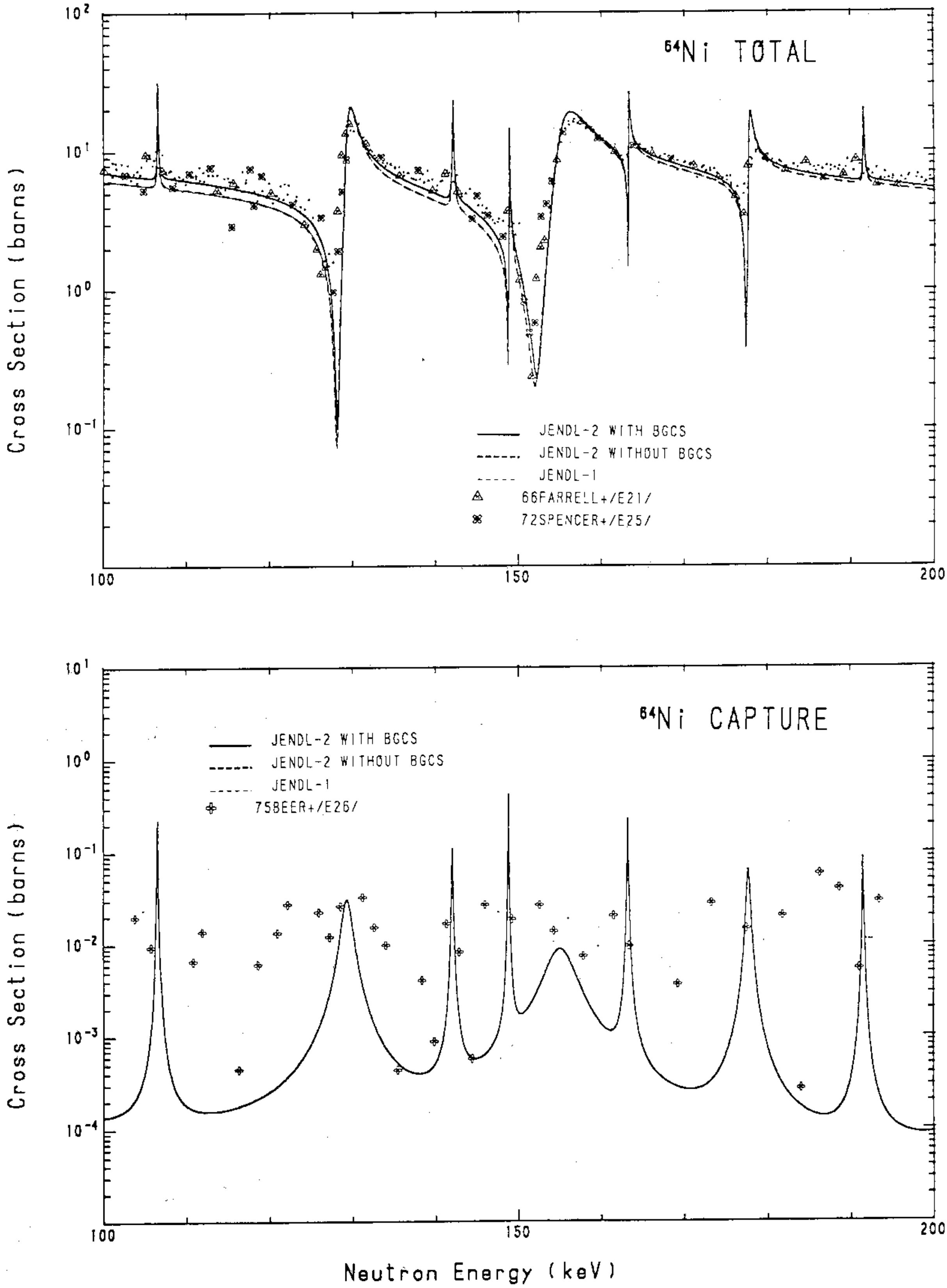


Fig. 6(c) Total and capture cross sections of ^{64}Ni in the resonance region.

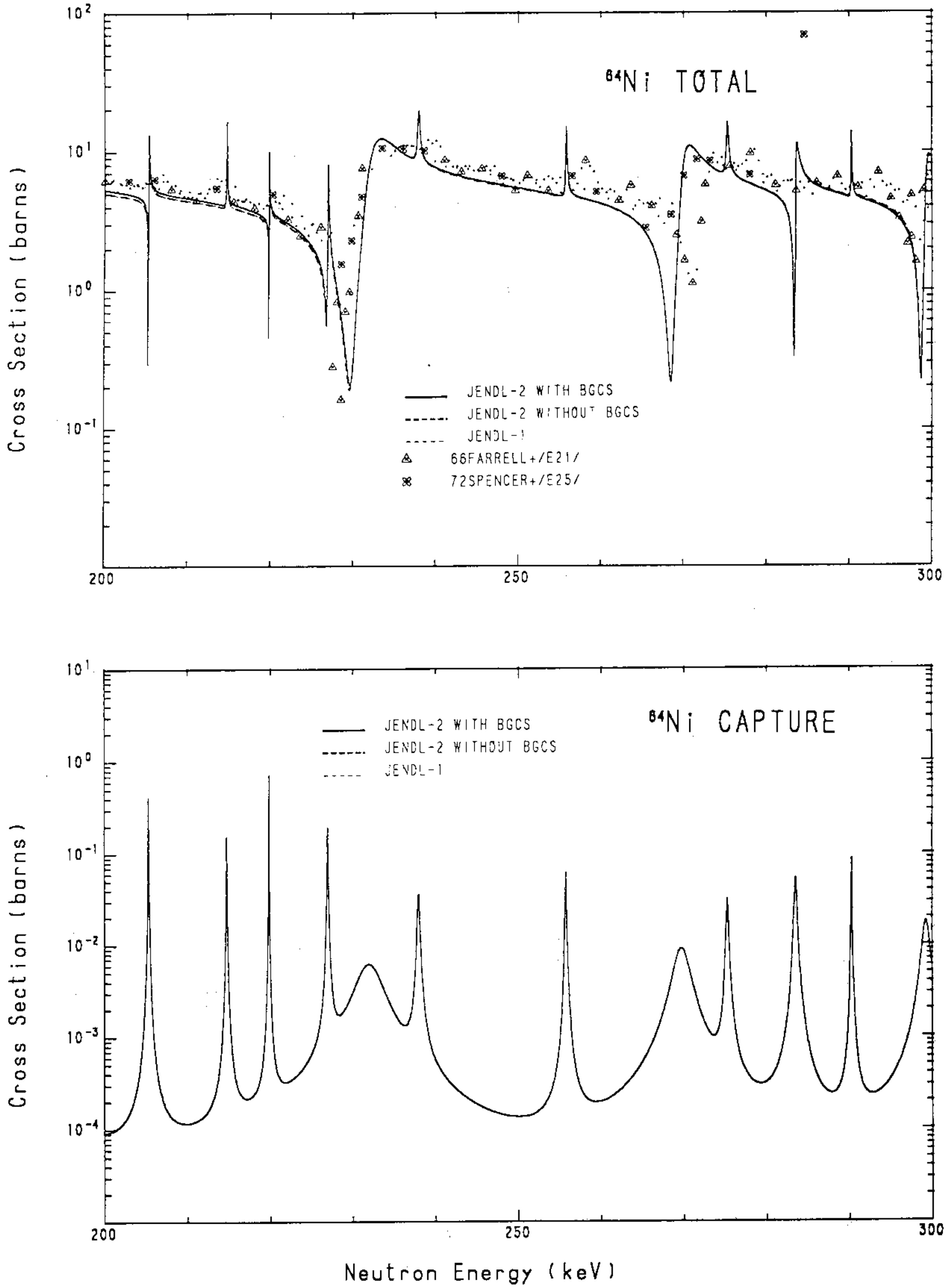


Fig. 6(d) Total and capture cross sections of ^{64}Ni in the resonance region.

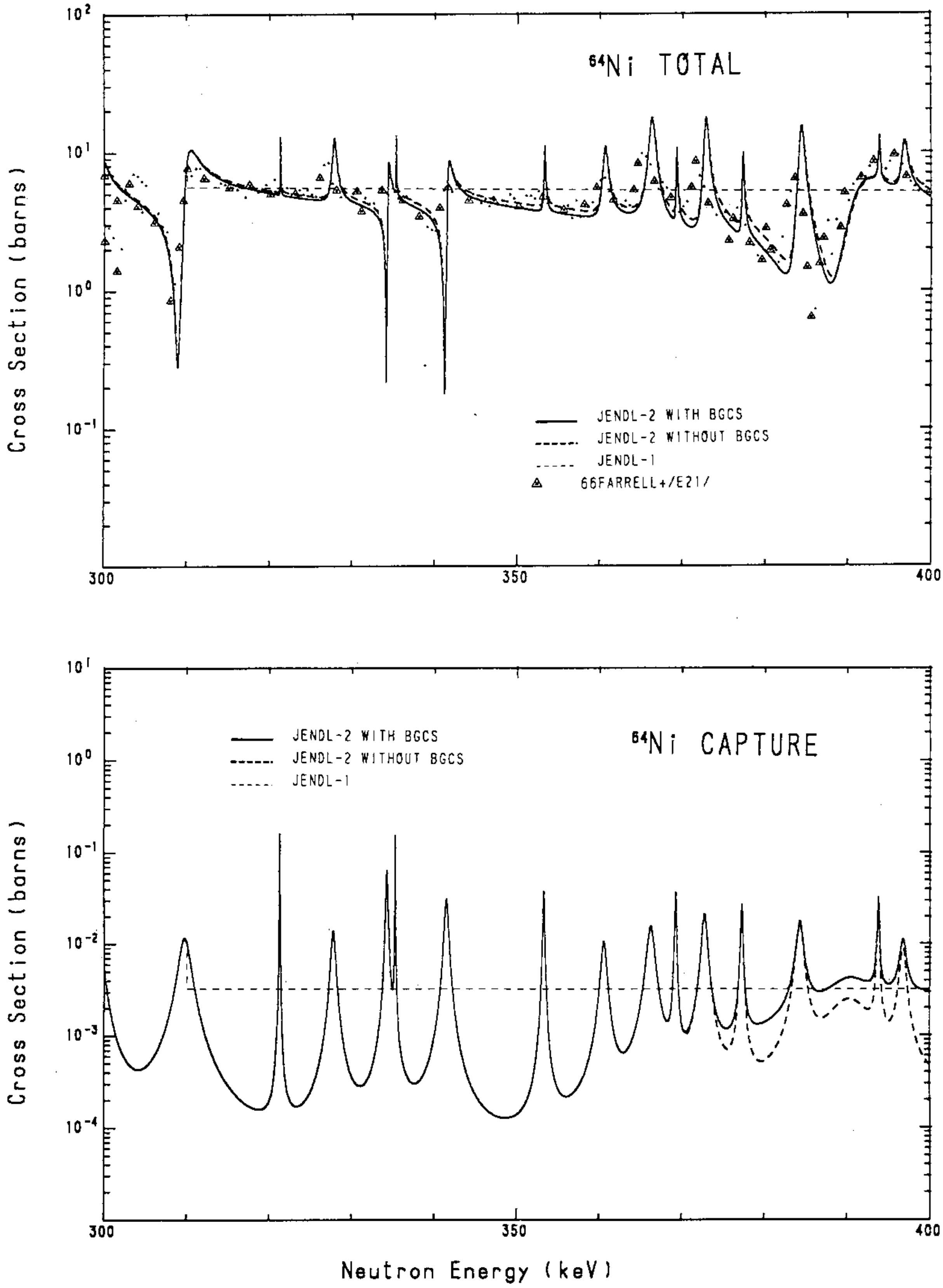
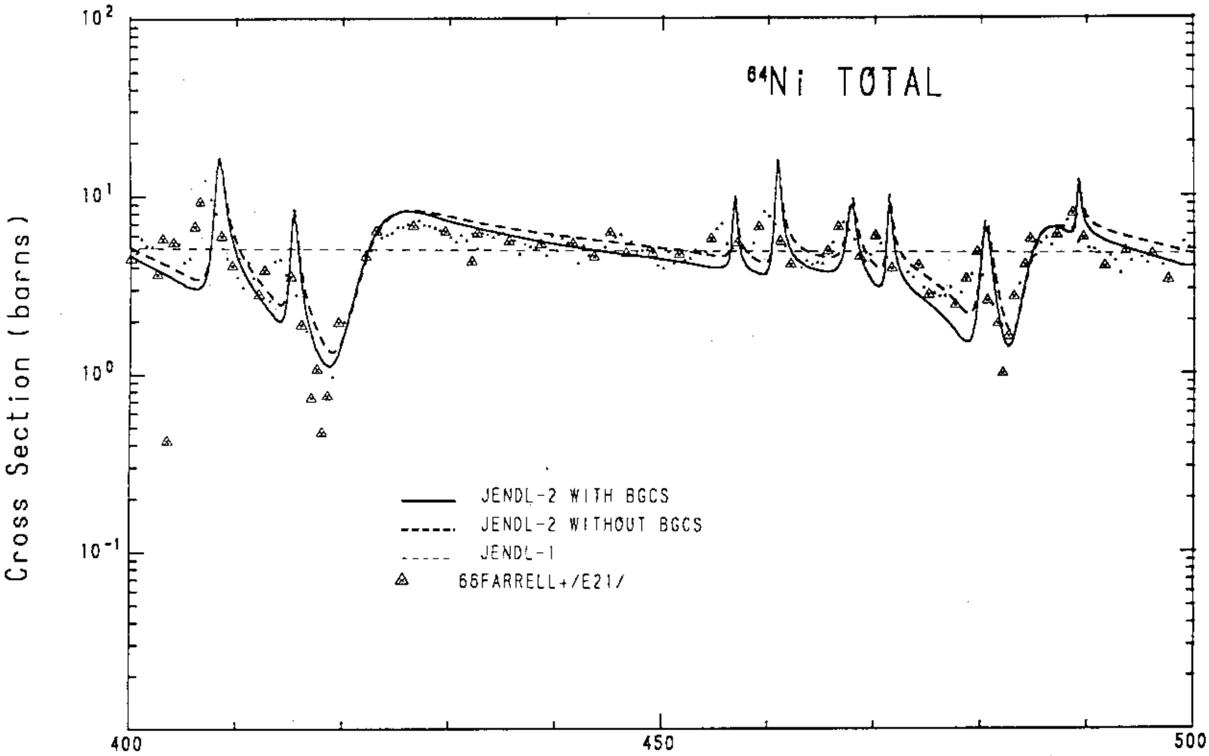


Fig. 6(e) Total and capture cross sections of ^{64}Ni in the resonance region.



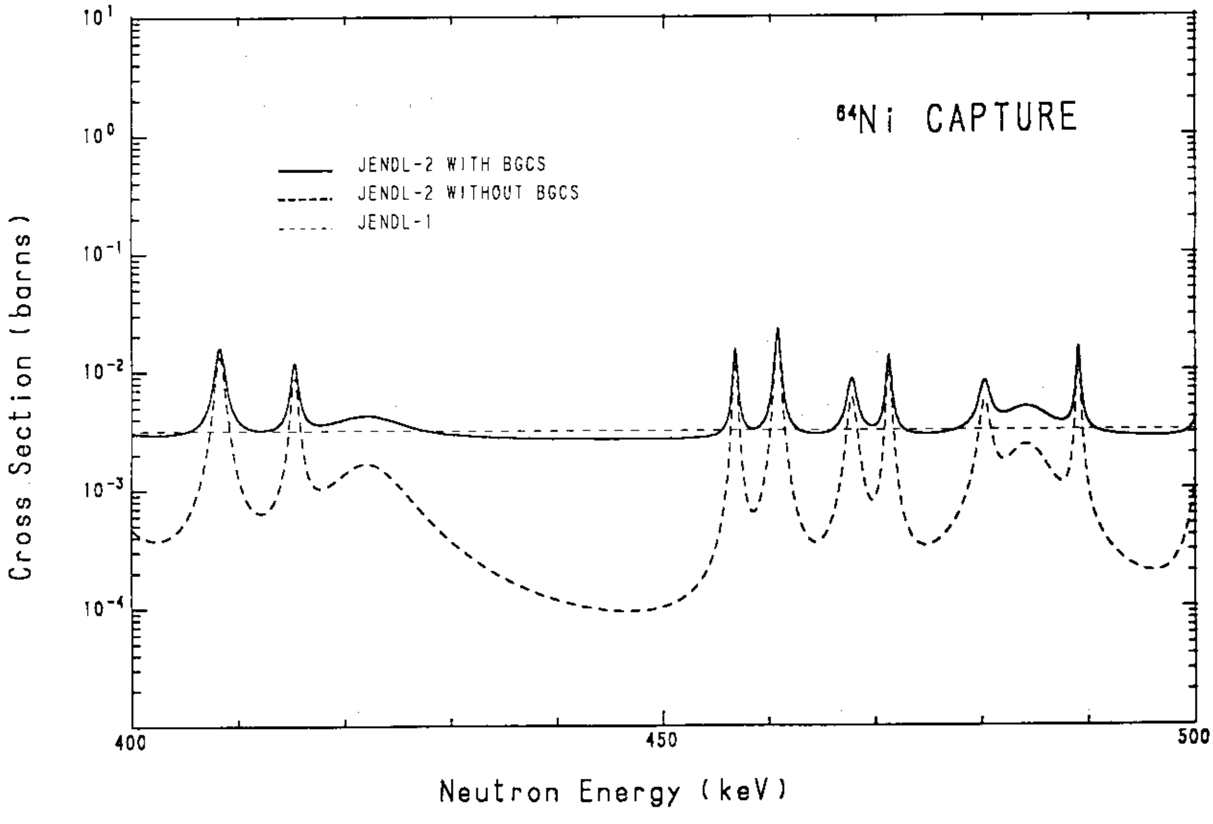


Fig. 6(f) Total and capture cross sections of ^{64}Ni in the resonance region.

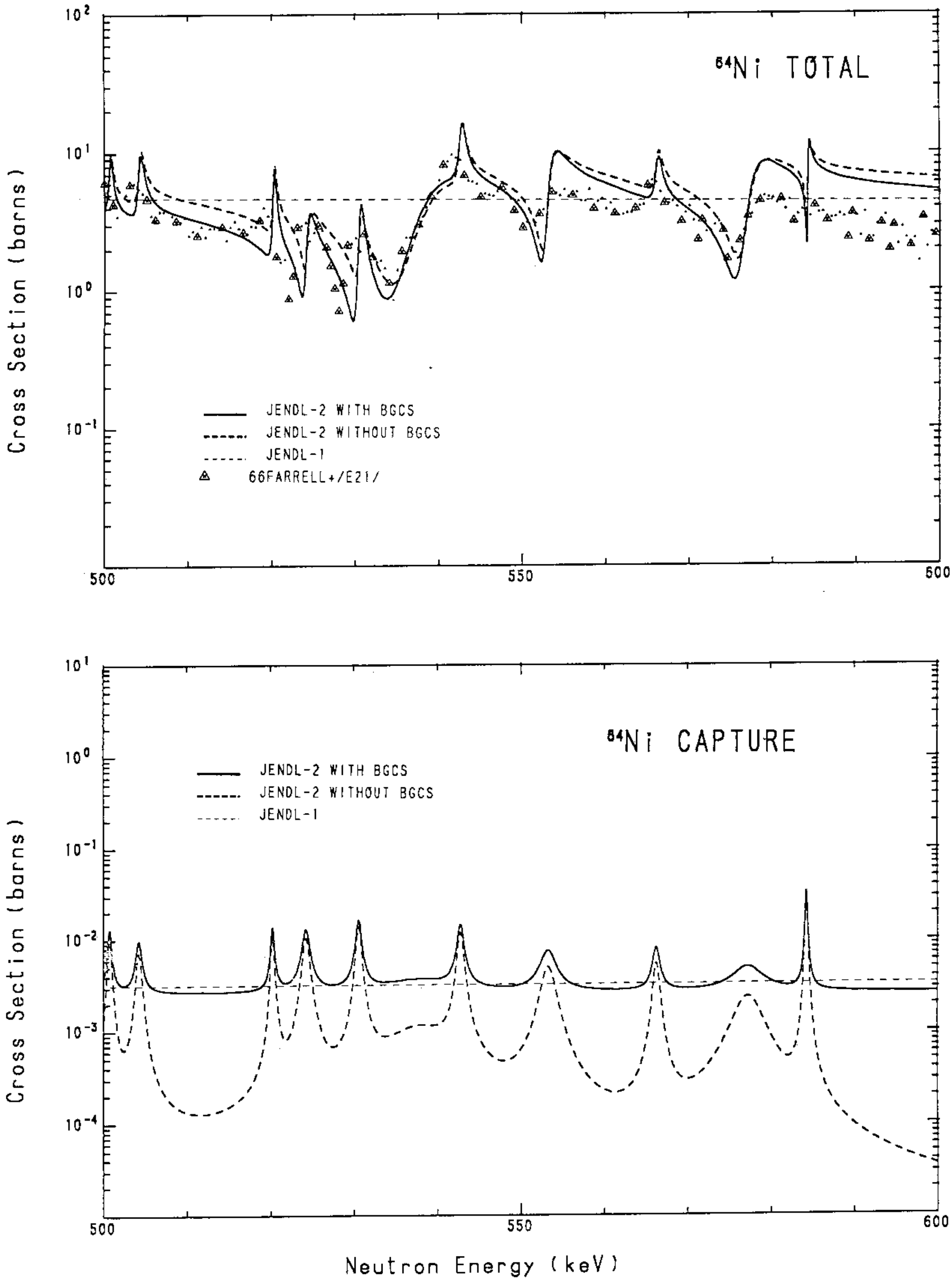


Fig. 6(g) Total and capture cross sections of ^{64}Ni in the resonance region.

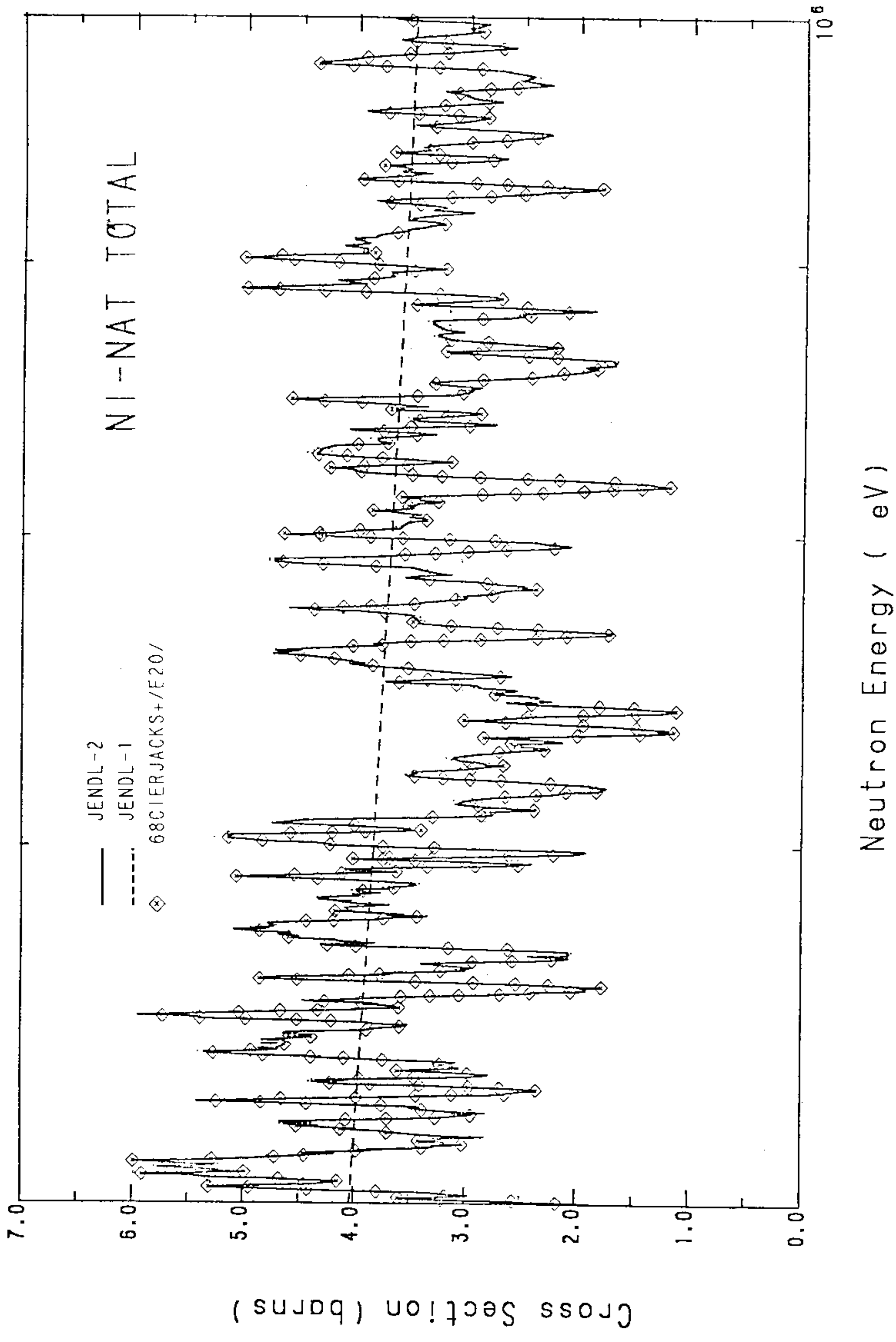


Fig. 7(a) Total cross sections of natural nickel.

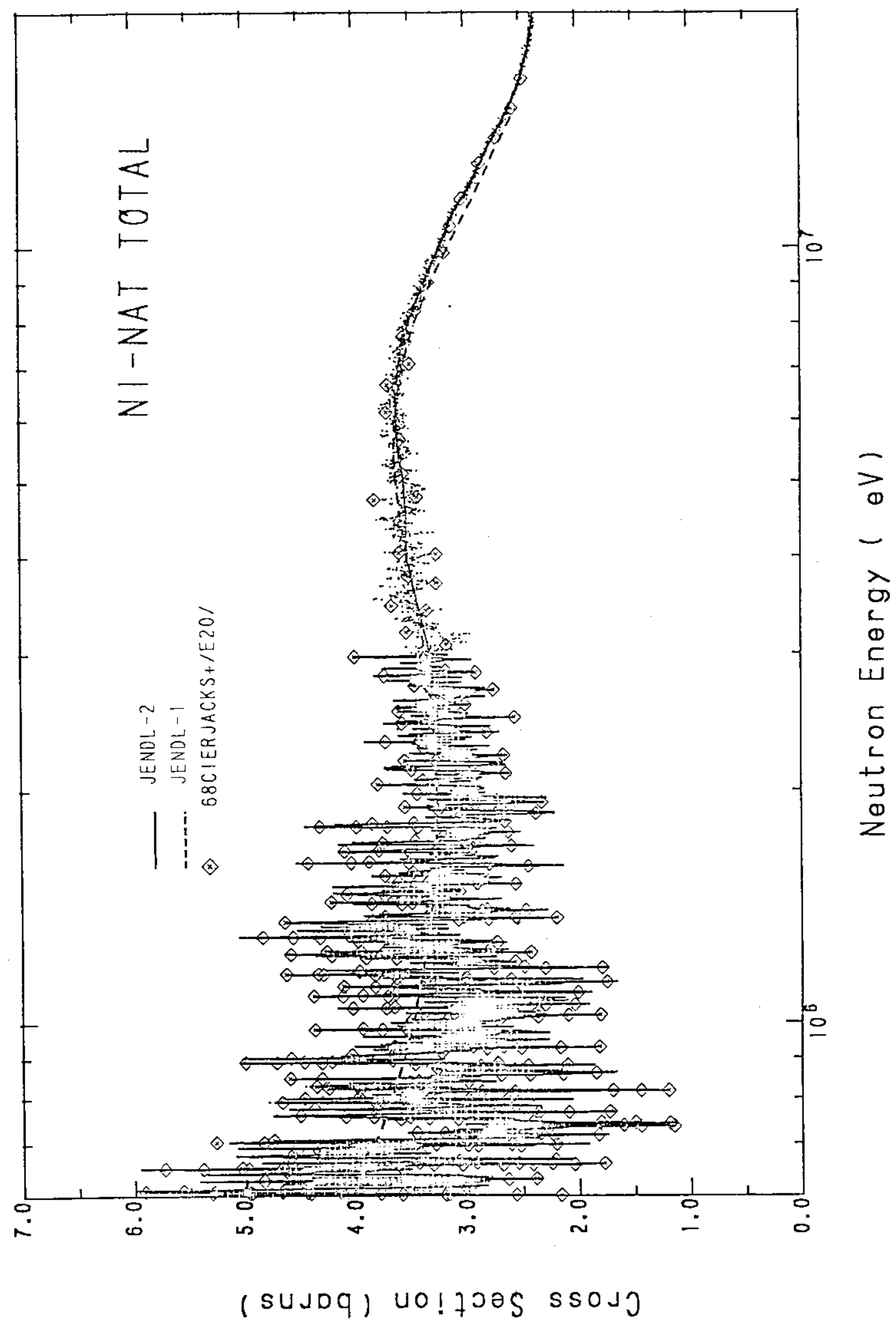


Fig. 7(b) Total cross sections of natural nickel.

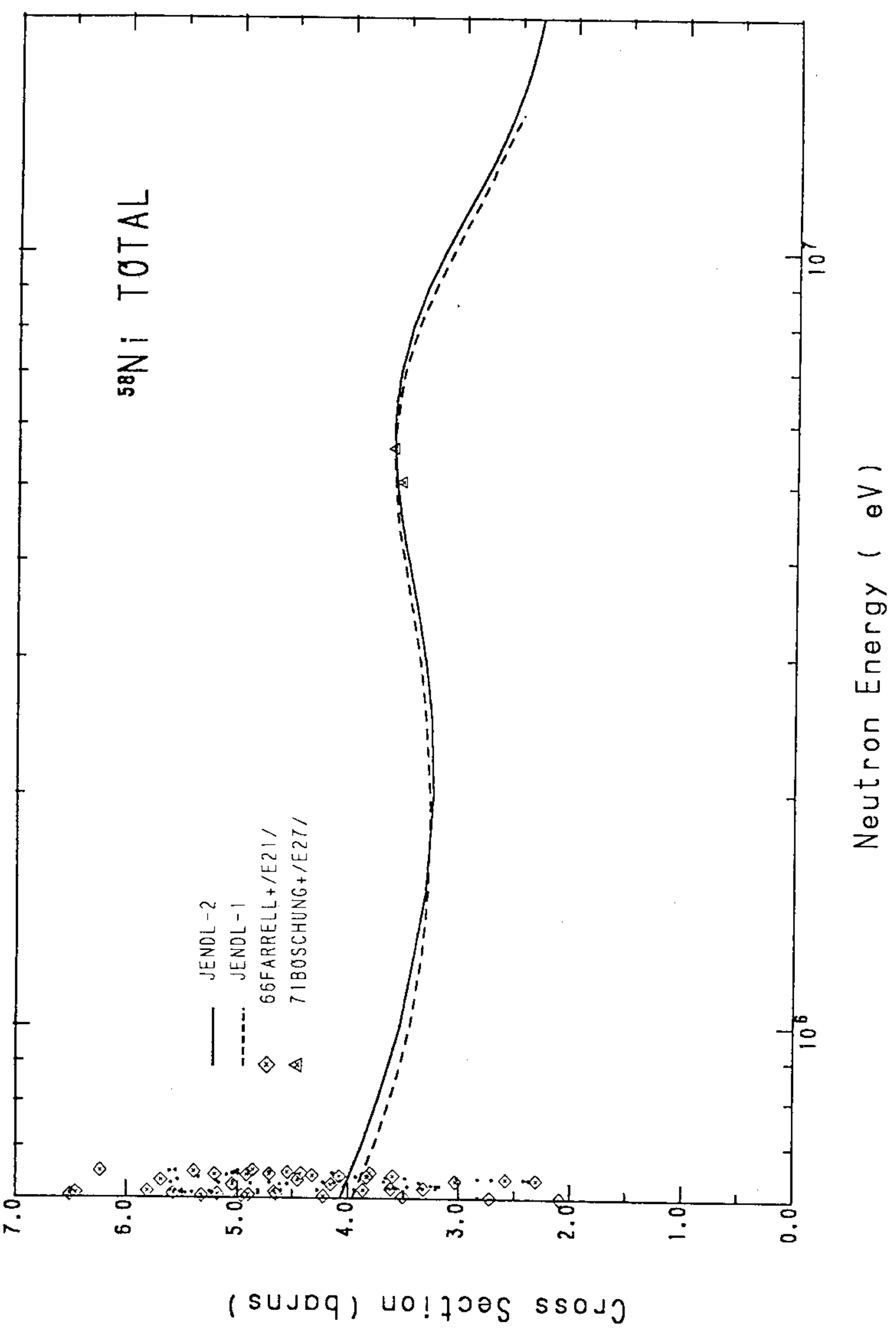


Fig. 8 Total cross section of ^{58}Ni.

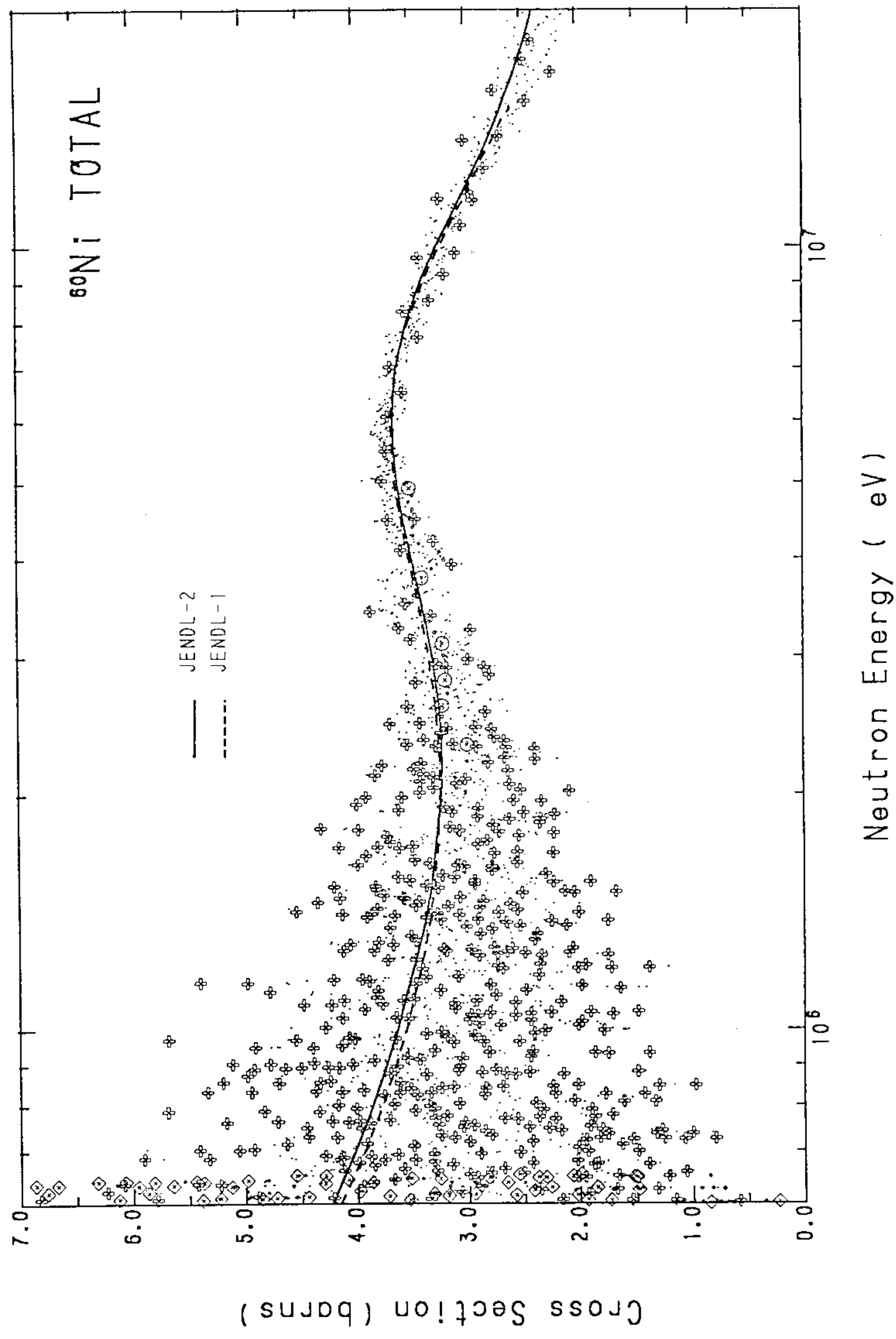


Fig. 9 Total cross section of ^{60}Ni.

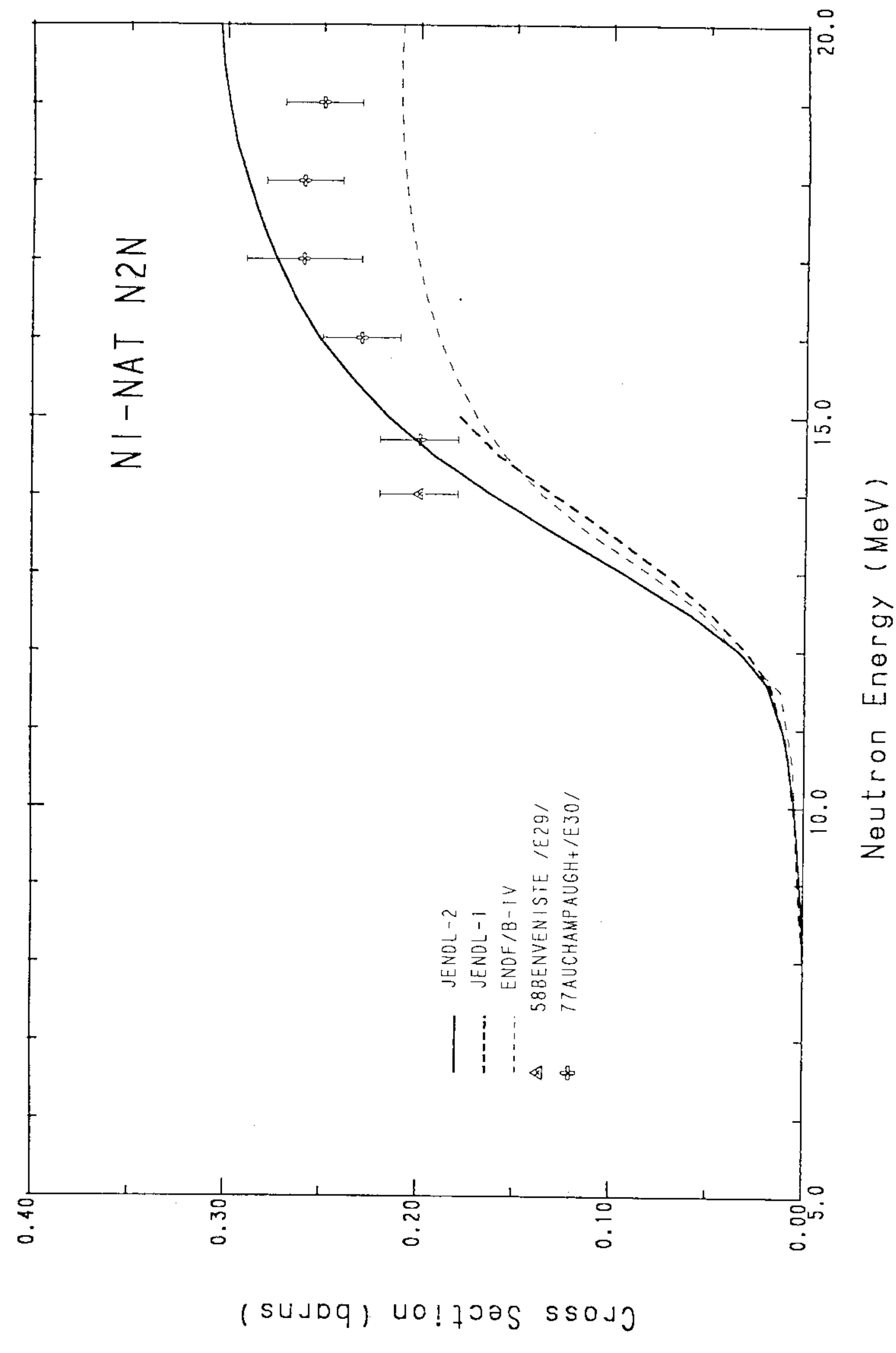


Fig. 10 (n,2n) reaction cross section of natural nickel.

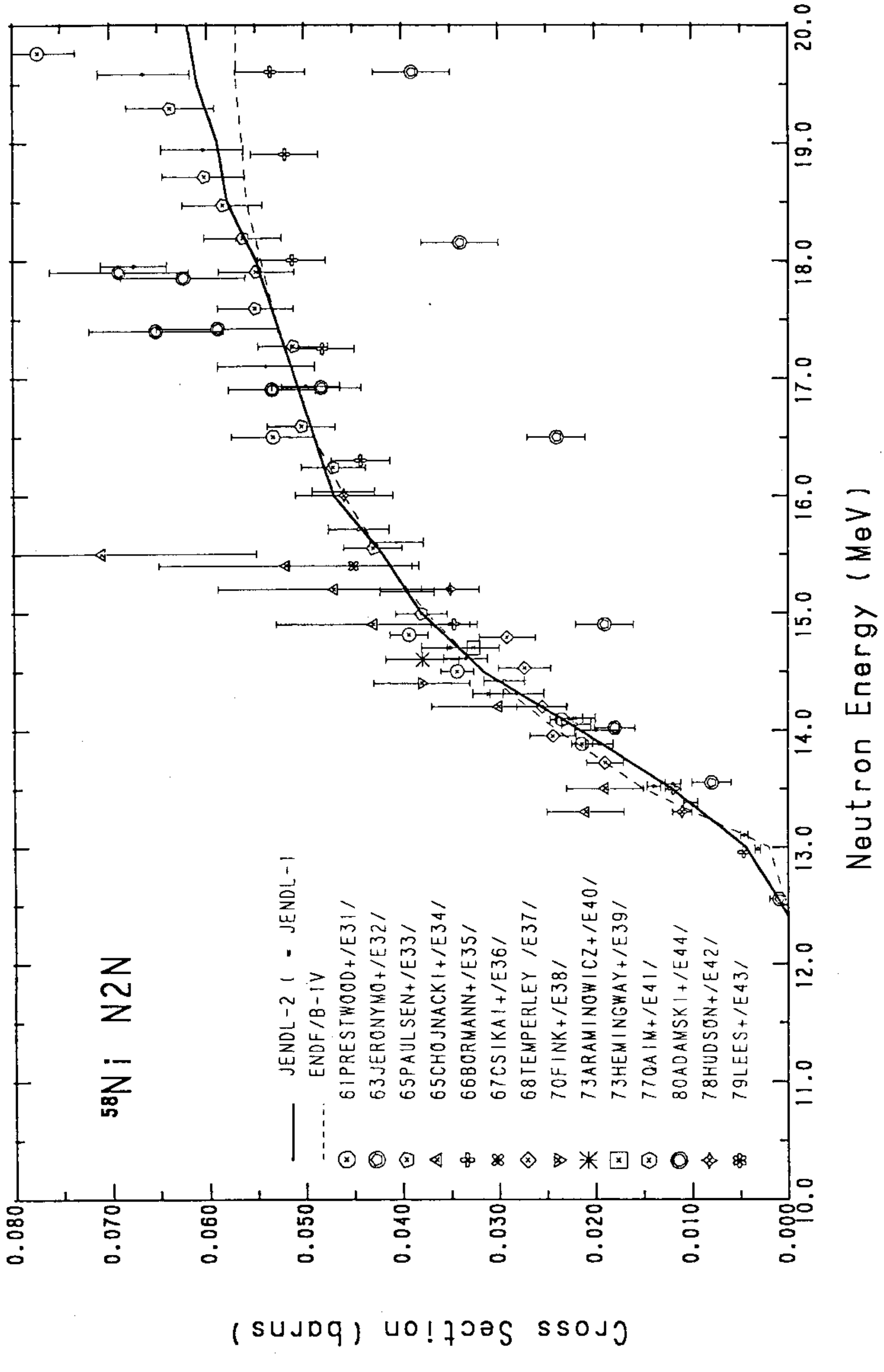


Fig. 11 (n,2n) reaction cross section of ^{58}Ni.

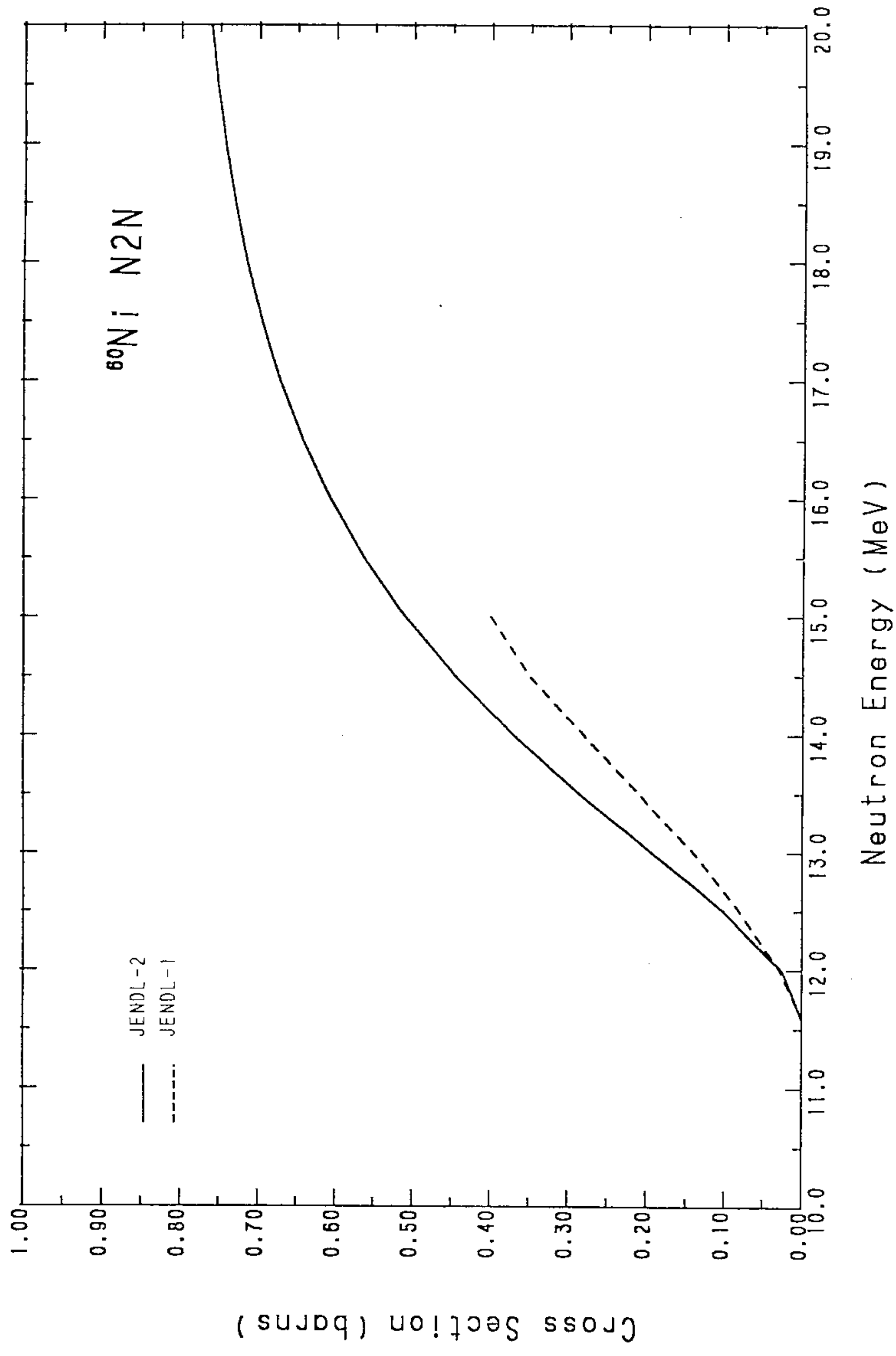


Fig. 12 (n,2n) reaction cross section of ^{60}Ni.

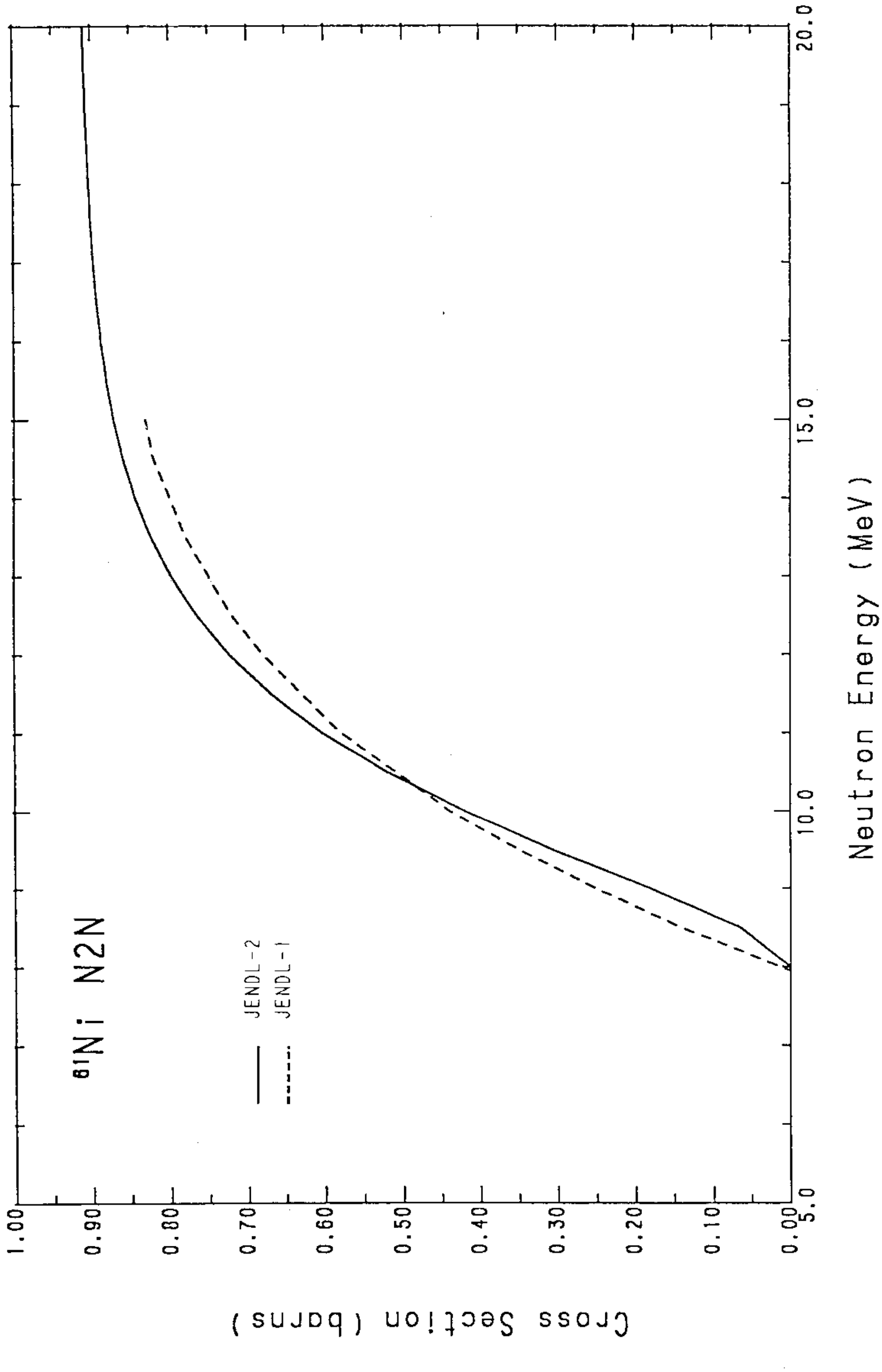


Fig. 13 (n,2n) reaction cross section of ^{61}Ni.

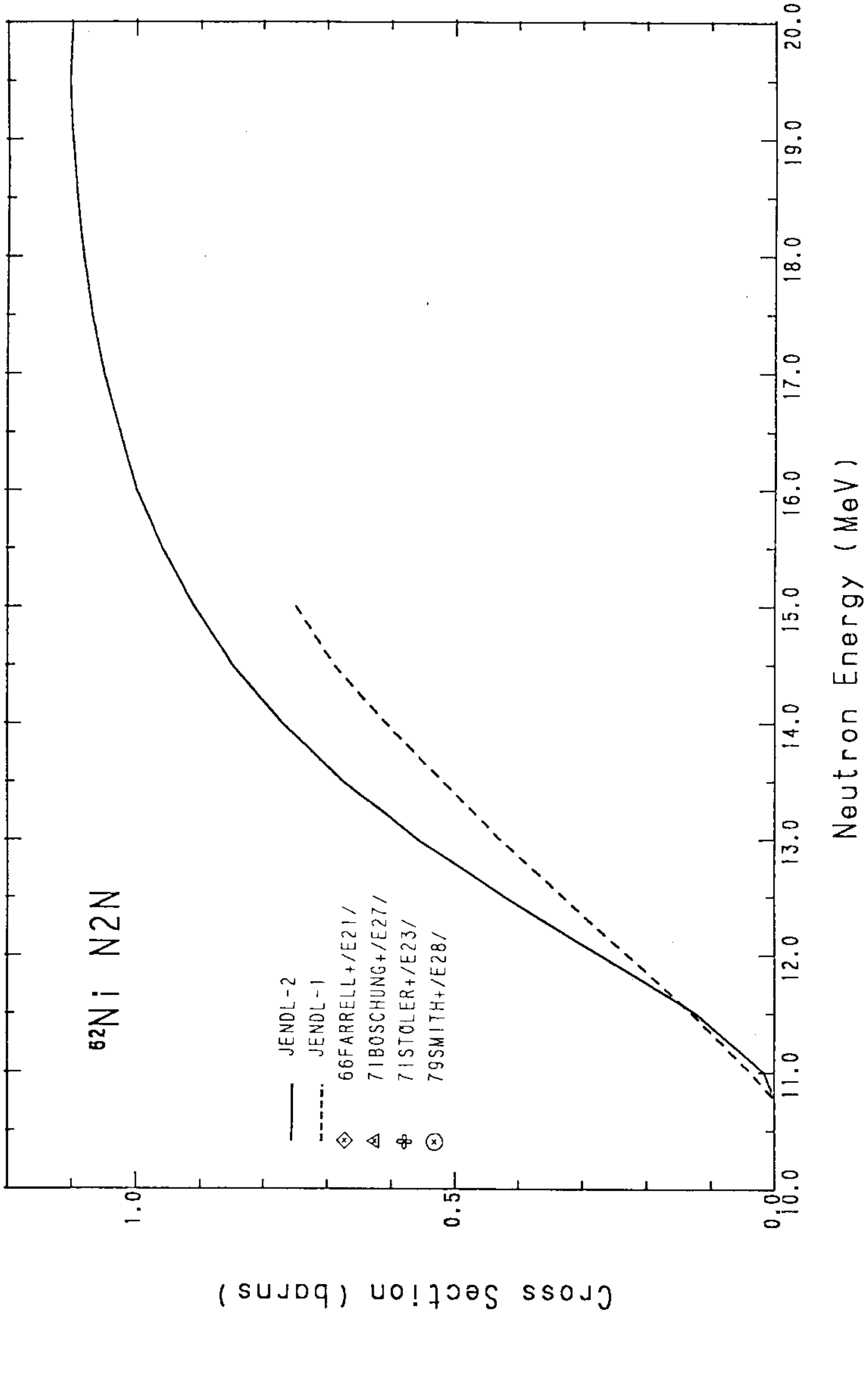


Fig. 14 (n,2n) reaction cross section of ^{62}Ni.

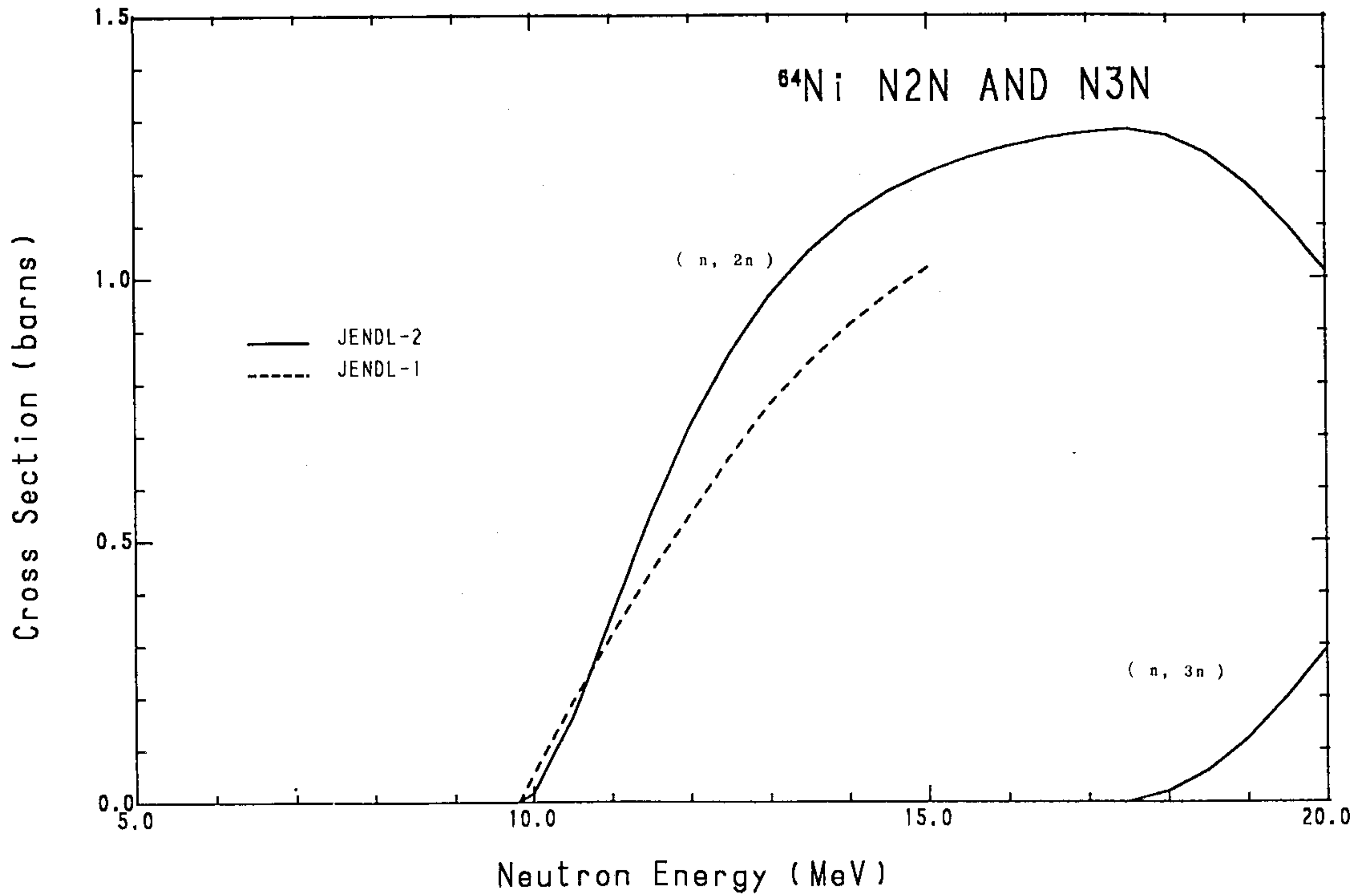


Fig. 15 (n,2n) and (n,3n) reaction cross sections of ^{64}Ni.

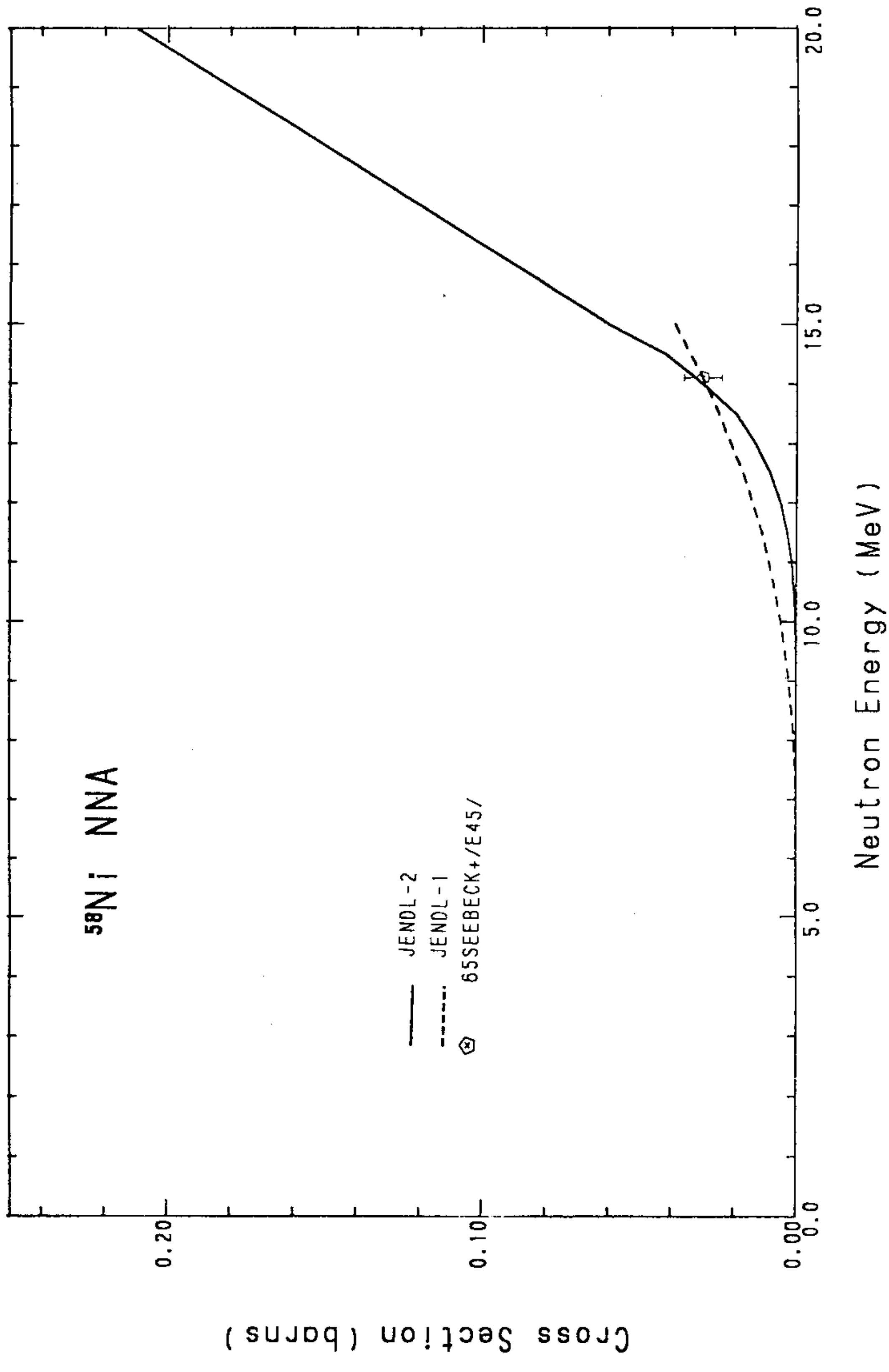


Fig. 16 (n,n'α) reaction cross section of ^{58}Ni.

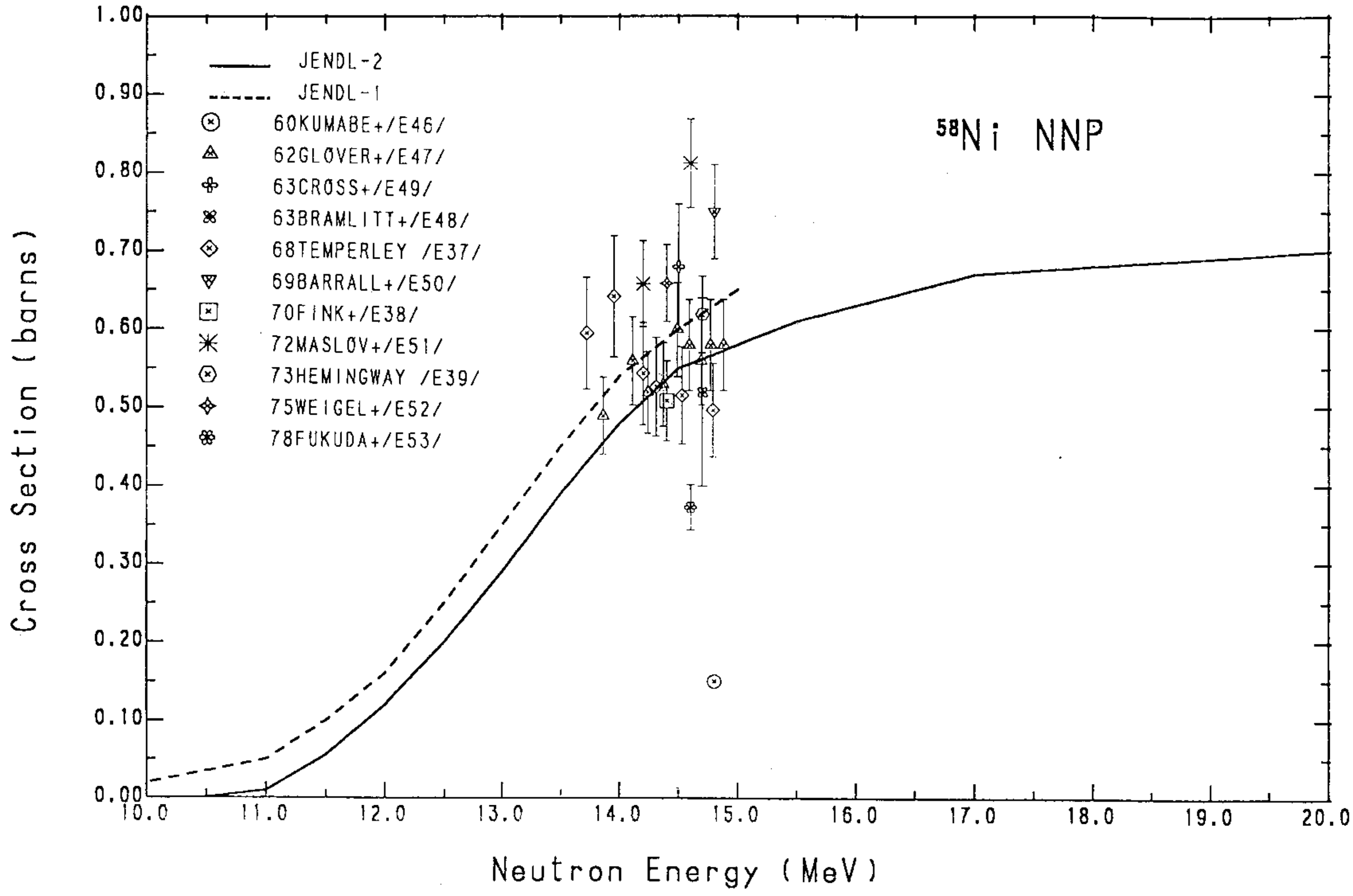


Fig. 17 (n,n'p) reaction cross section of ^{58}Ni.

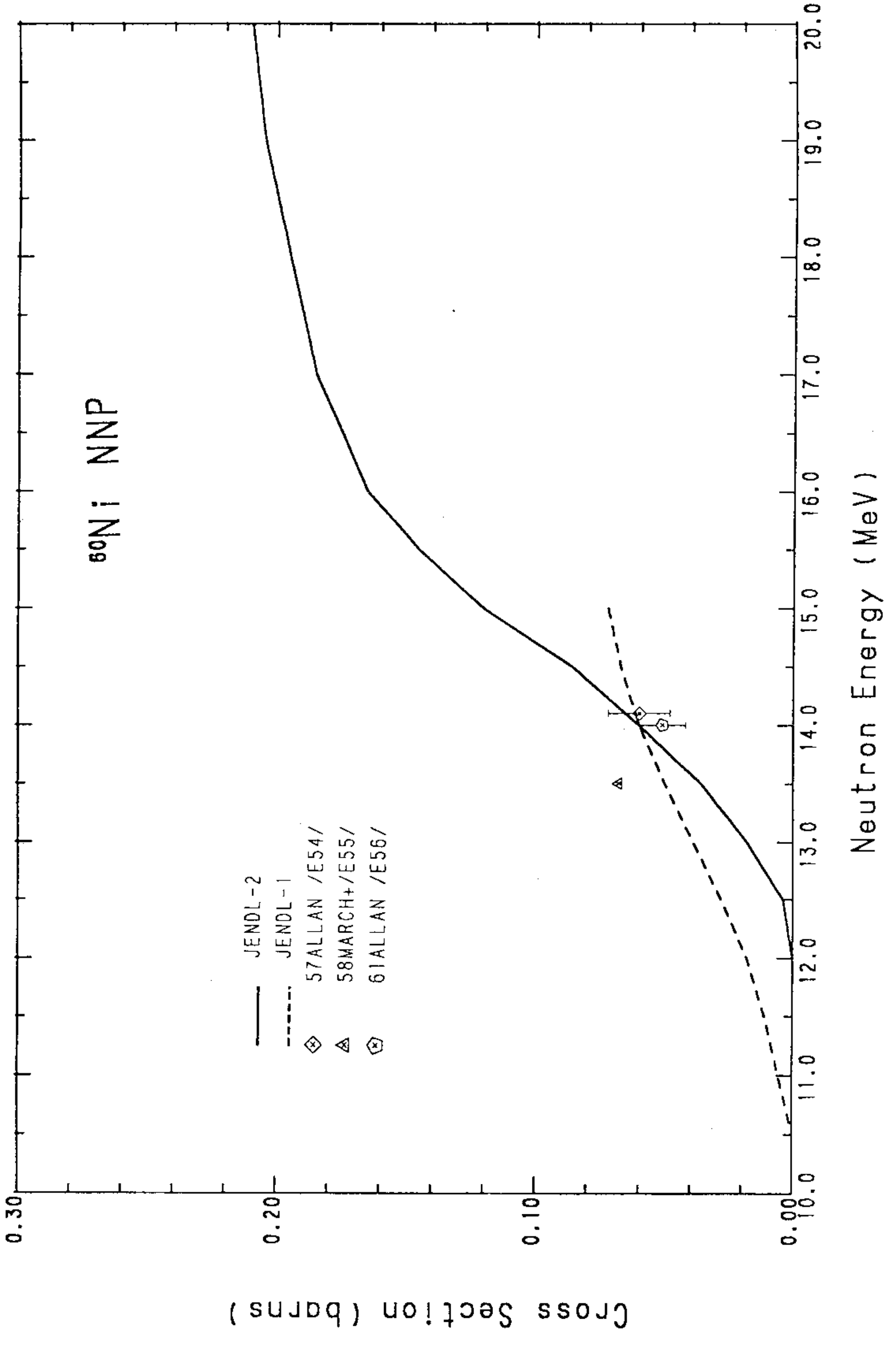


Fig. 18 (n,n'p) reaction cross section of ^{60}Ni.

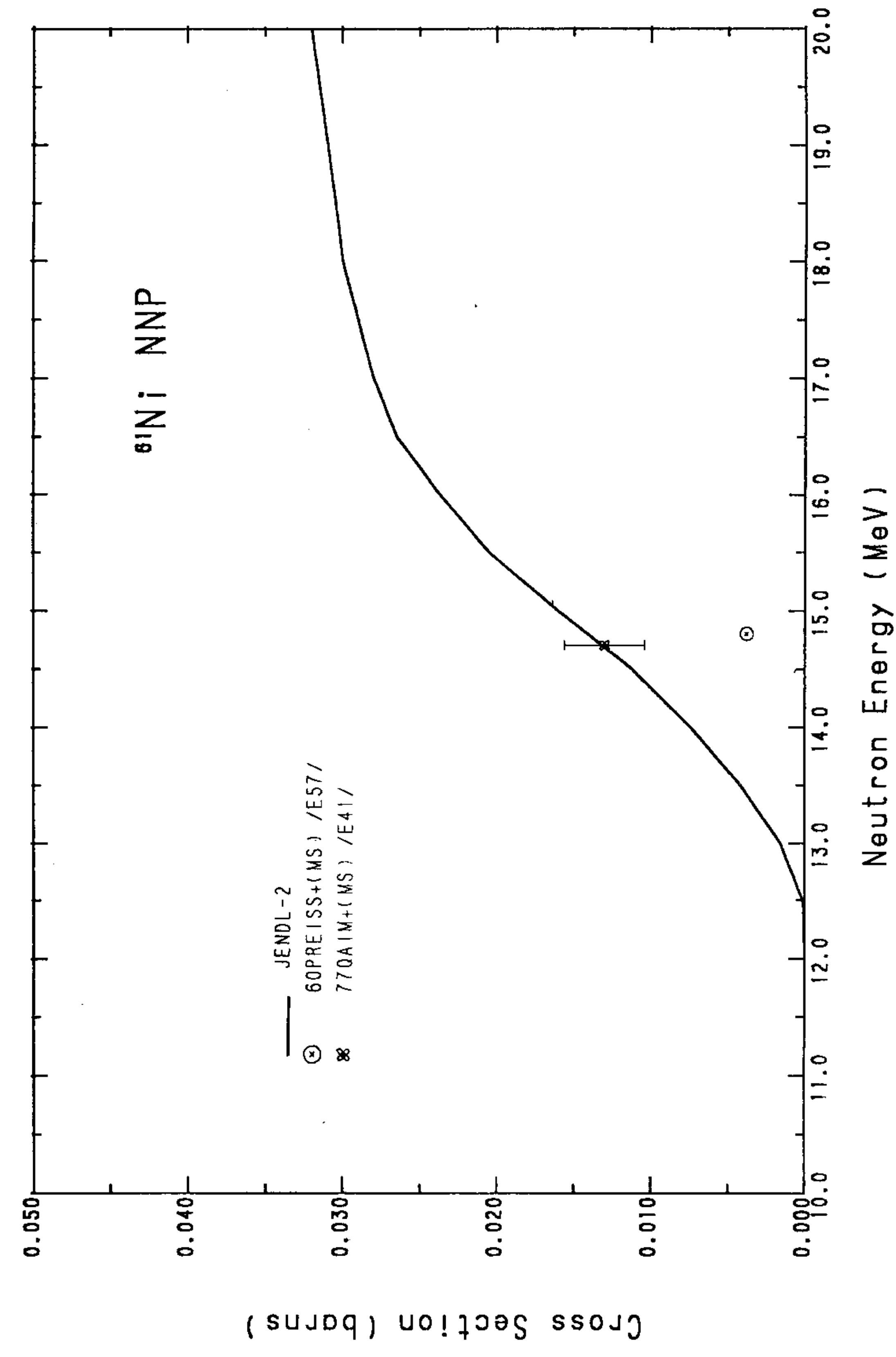


Fig. 19 (n,n'p) reaction cross section of ^{61}Ni.

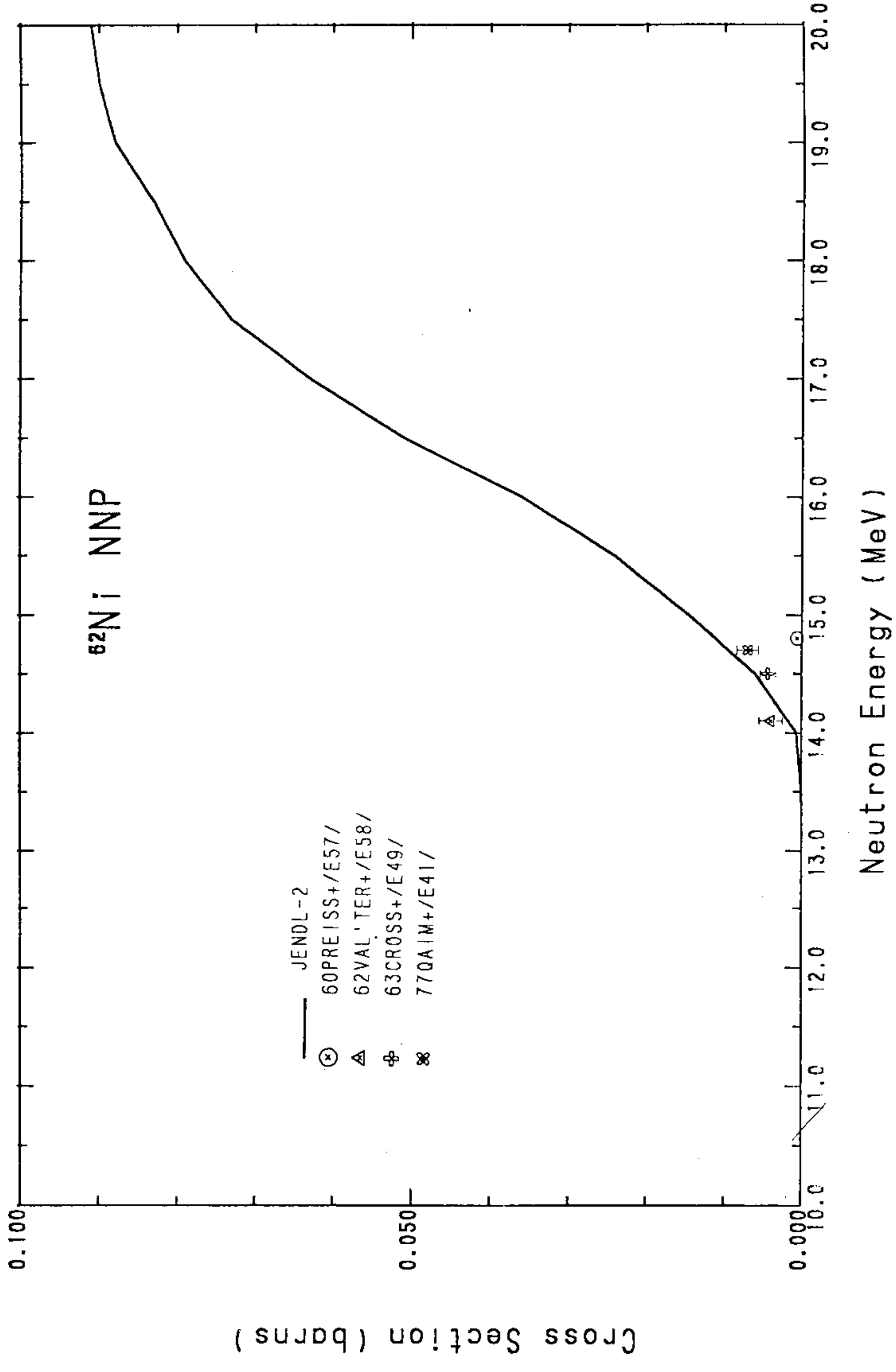


Fig. 20 (n,n'p) reaction cross section of ^{62}Ni.

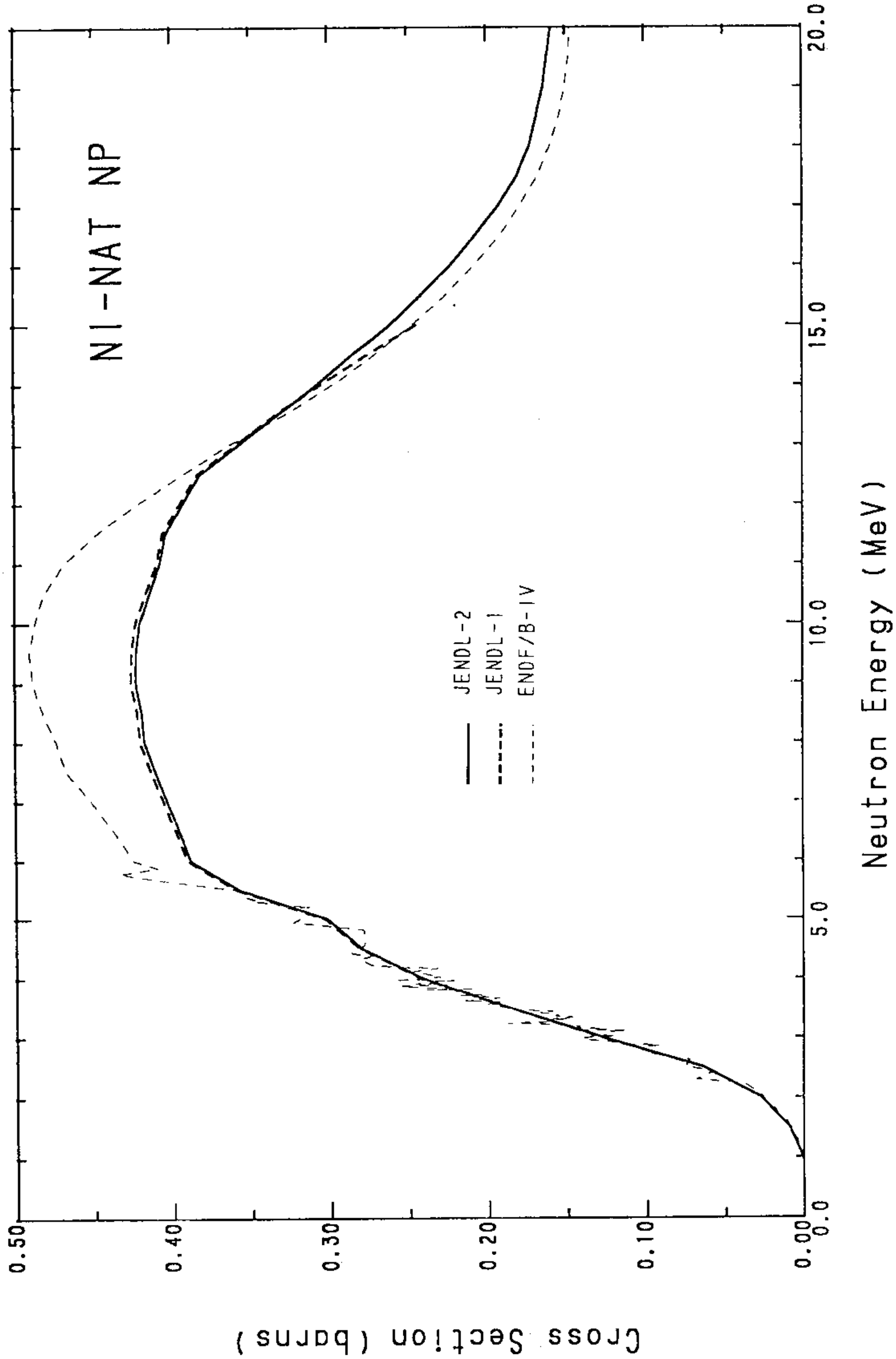


Fig. 21 (n,p) reaction cross section of natural nickel.

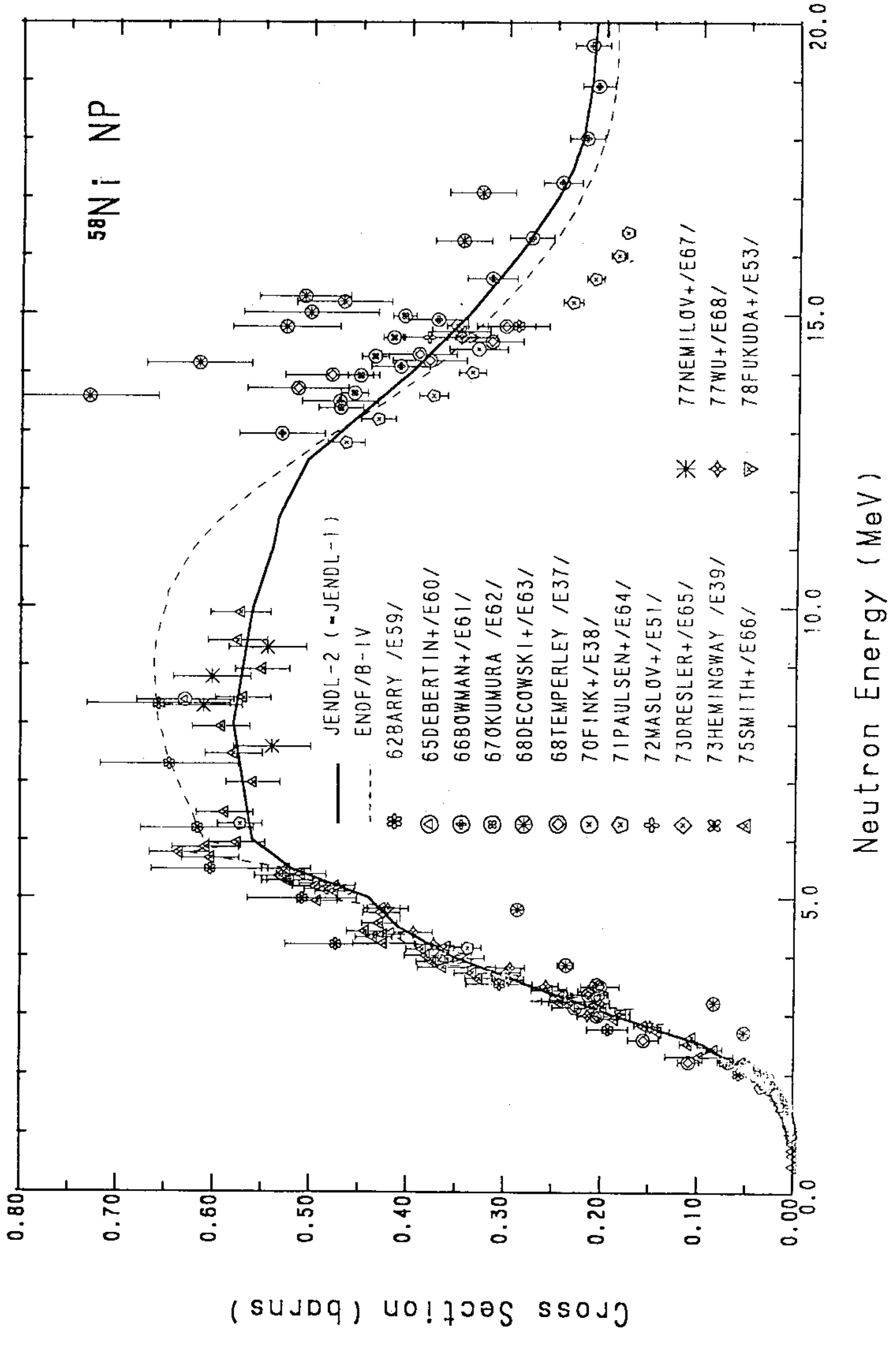


Fig. 22 (n,p) reaction cross section of ^{58}Ni.

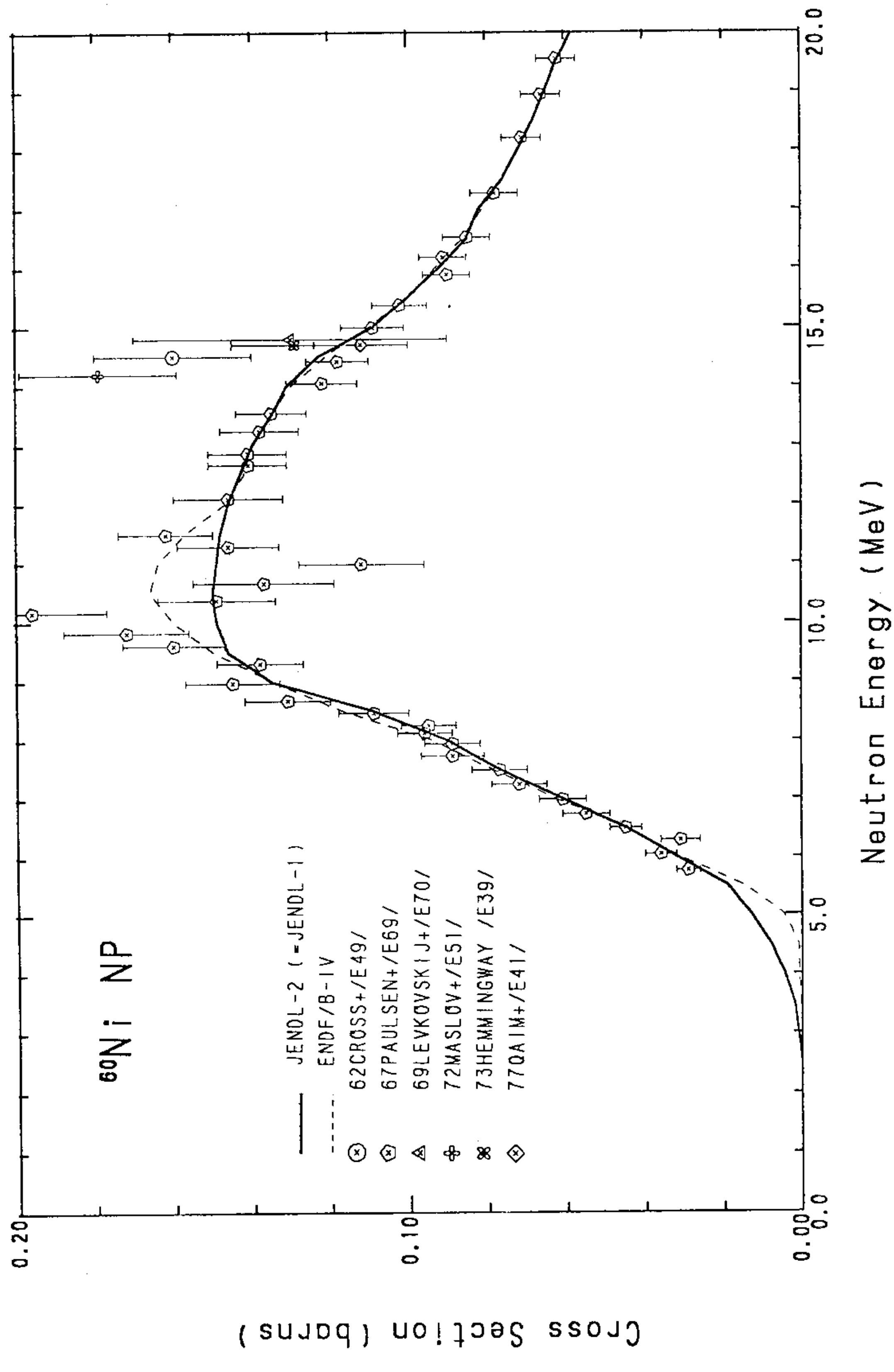


Fig. 23 (n,p) reaction cross section of ^{60}Ni.

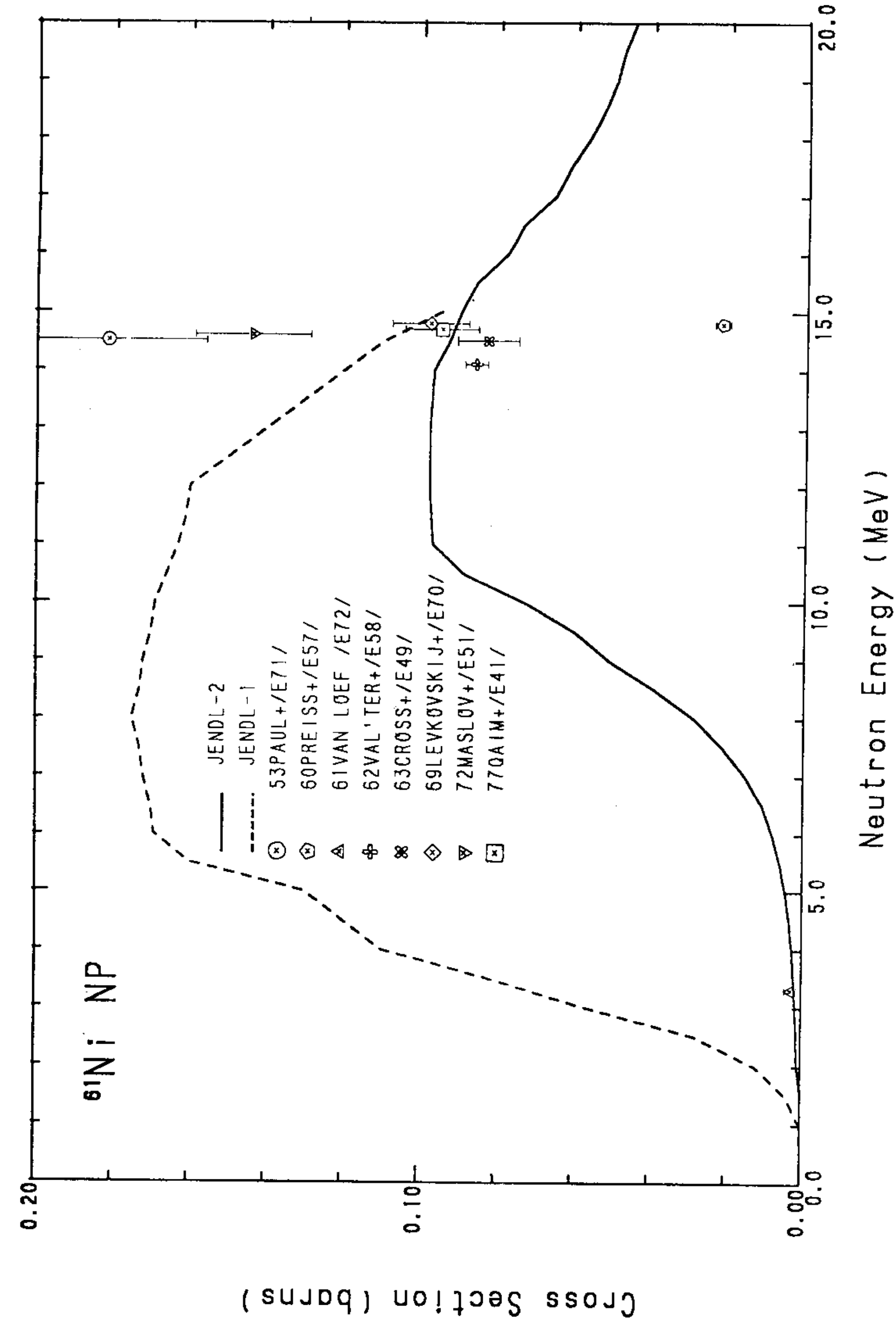


Fig. 24 (n,p) reaction cross section of ^{61}Ni.

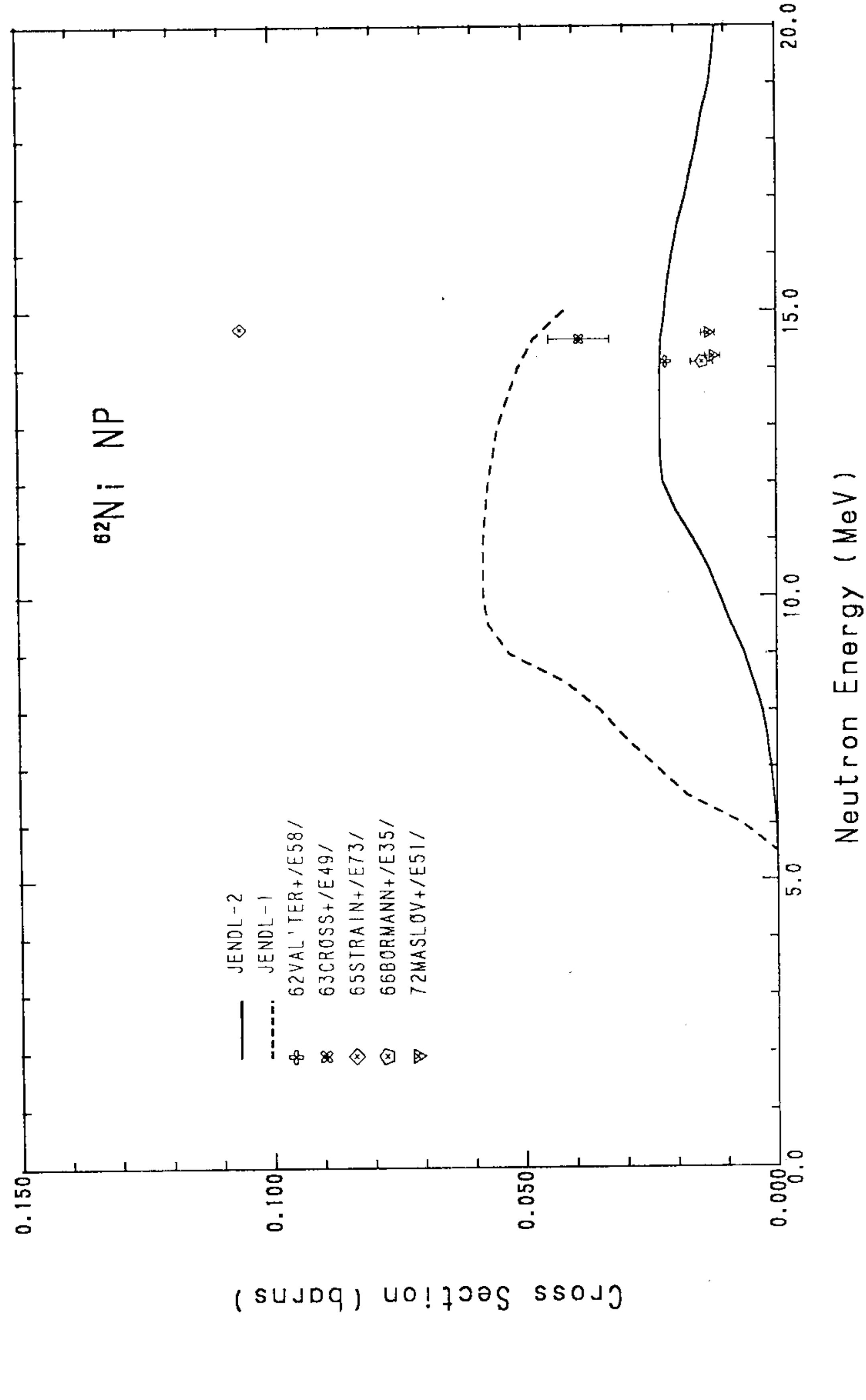


Fig. 25 (n,p) reaction cross section of ^{62}Ni.

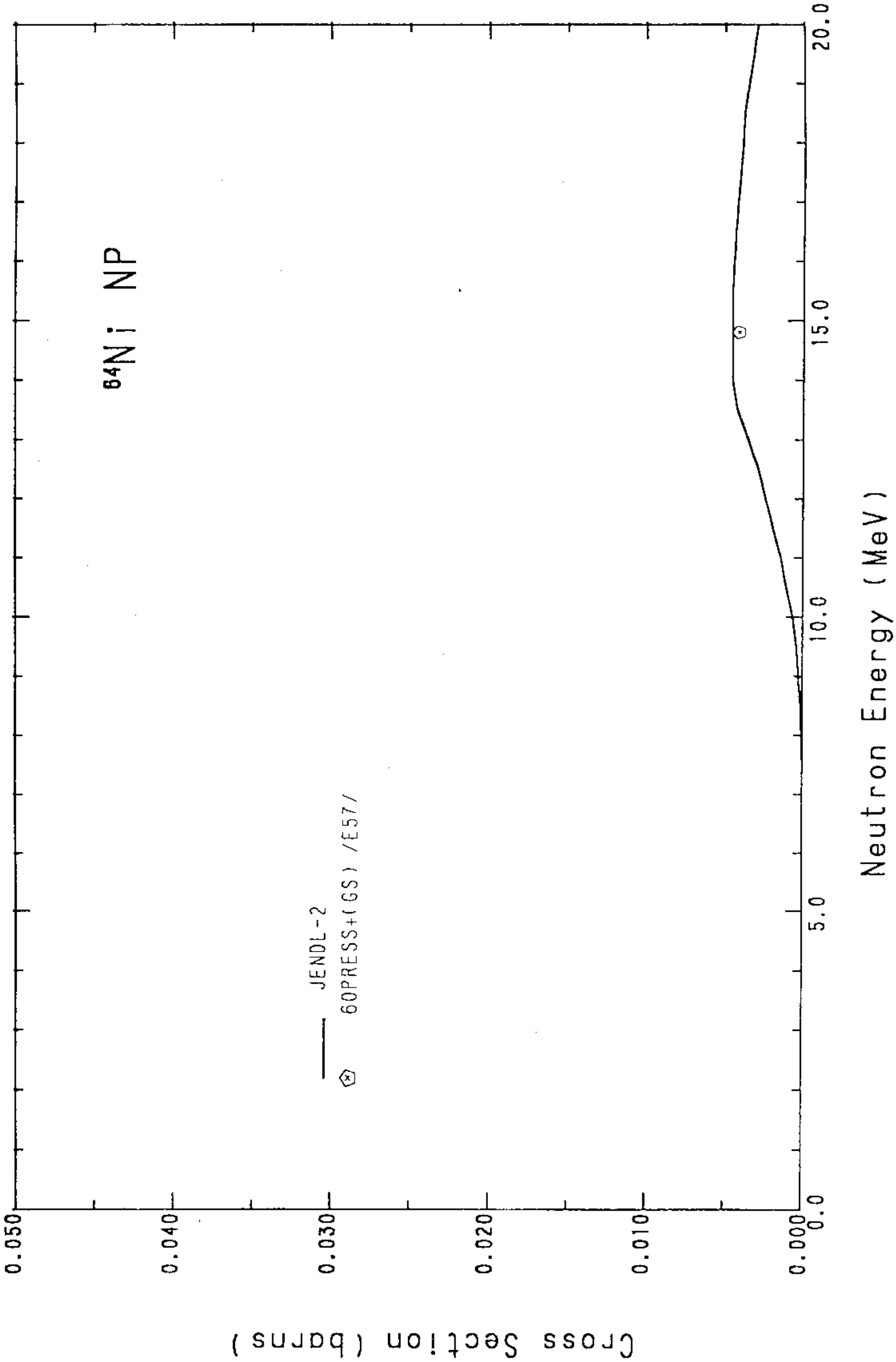


Fig. 26 (n,p) reaction cross section of ^{64}Ni.

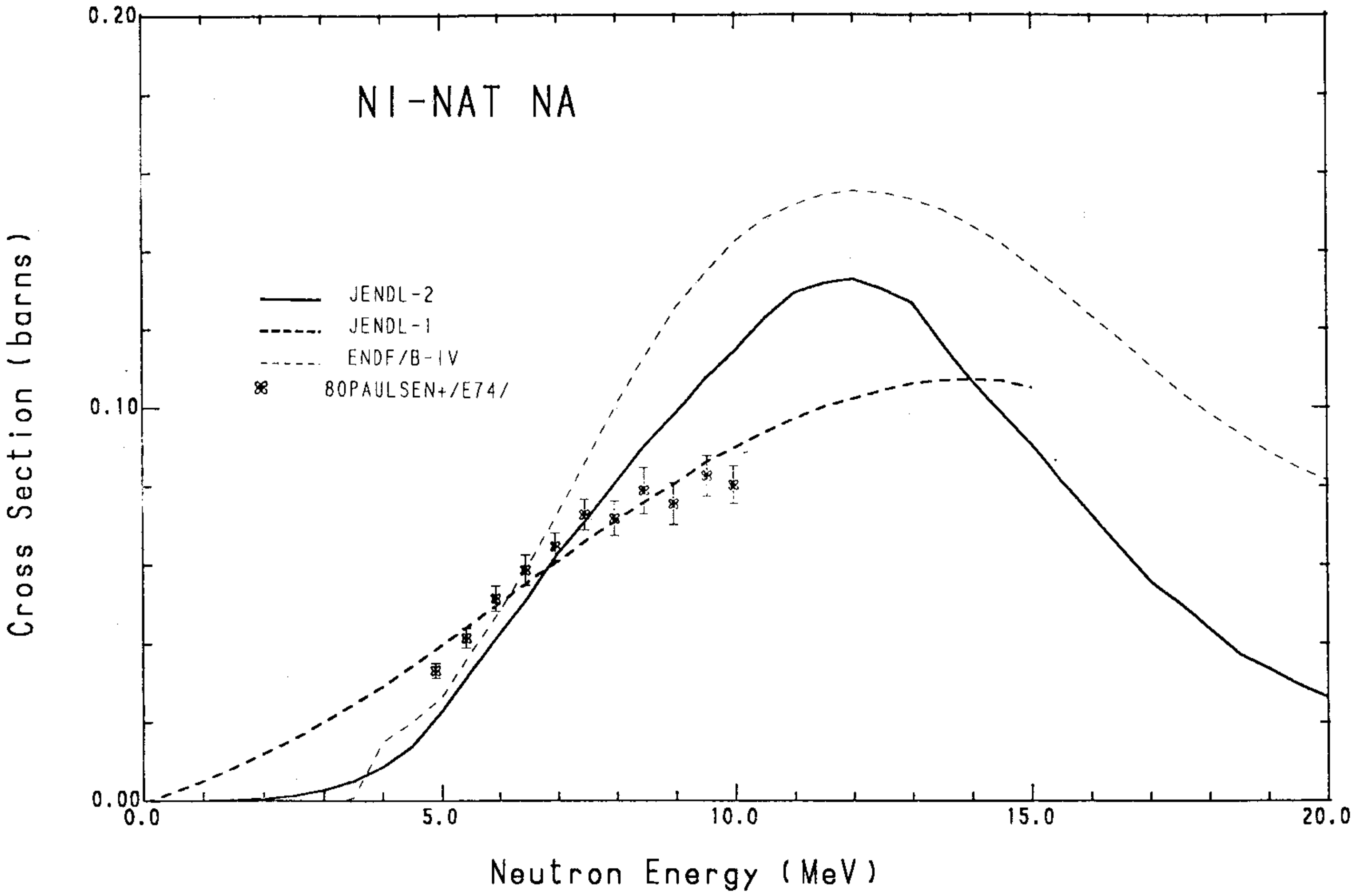


Fig. 27 (n,α) reaction cross section of natural nickel.

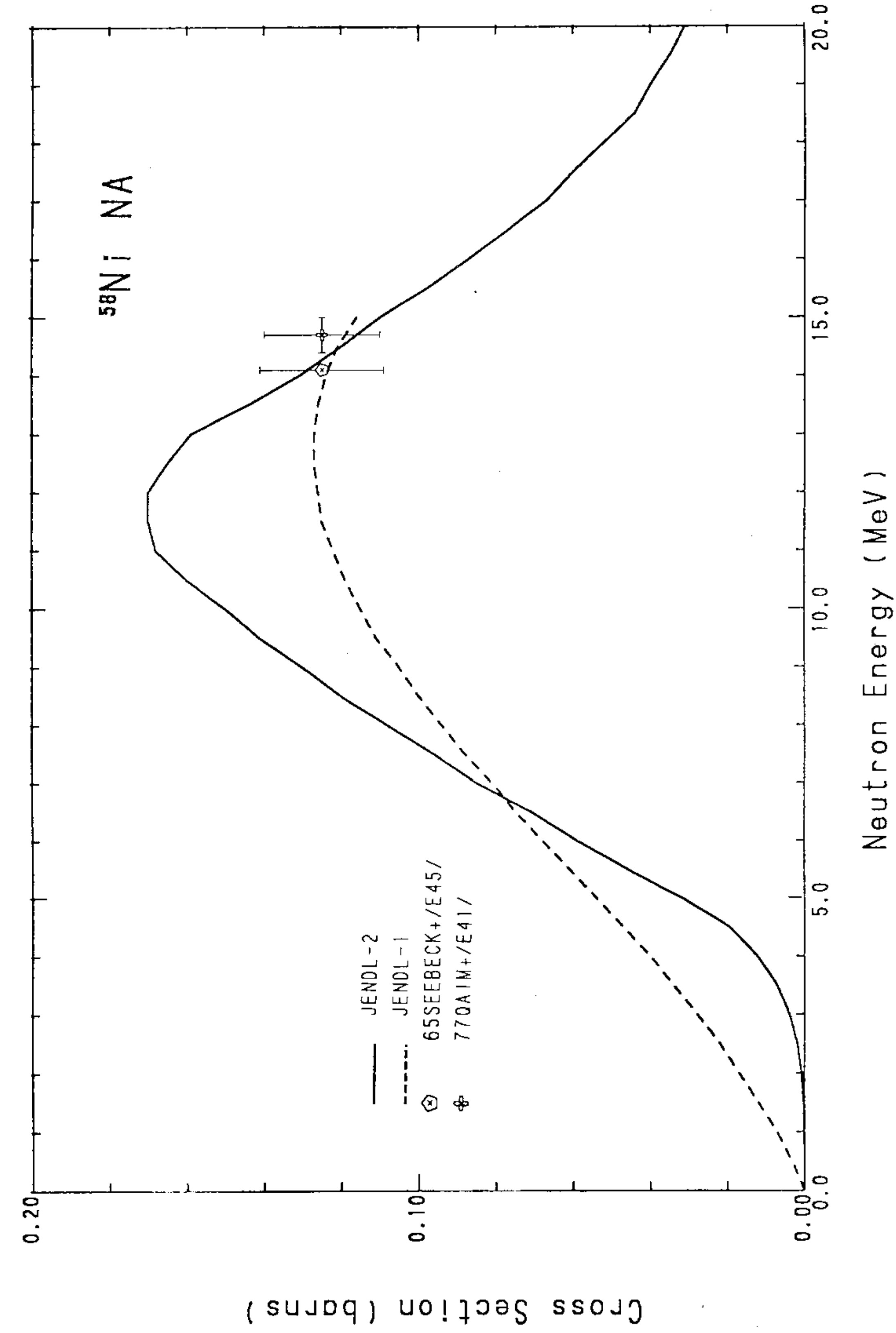


Fig. 28 (n,α) reaction cross section of ^{58}Ni.

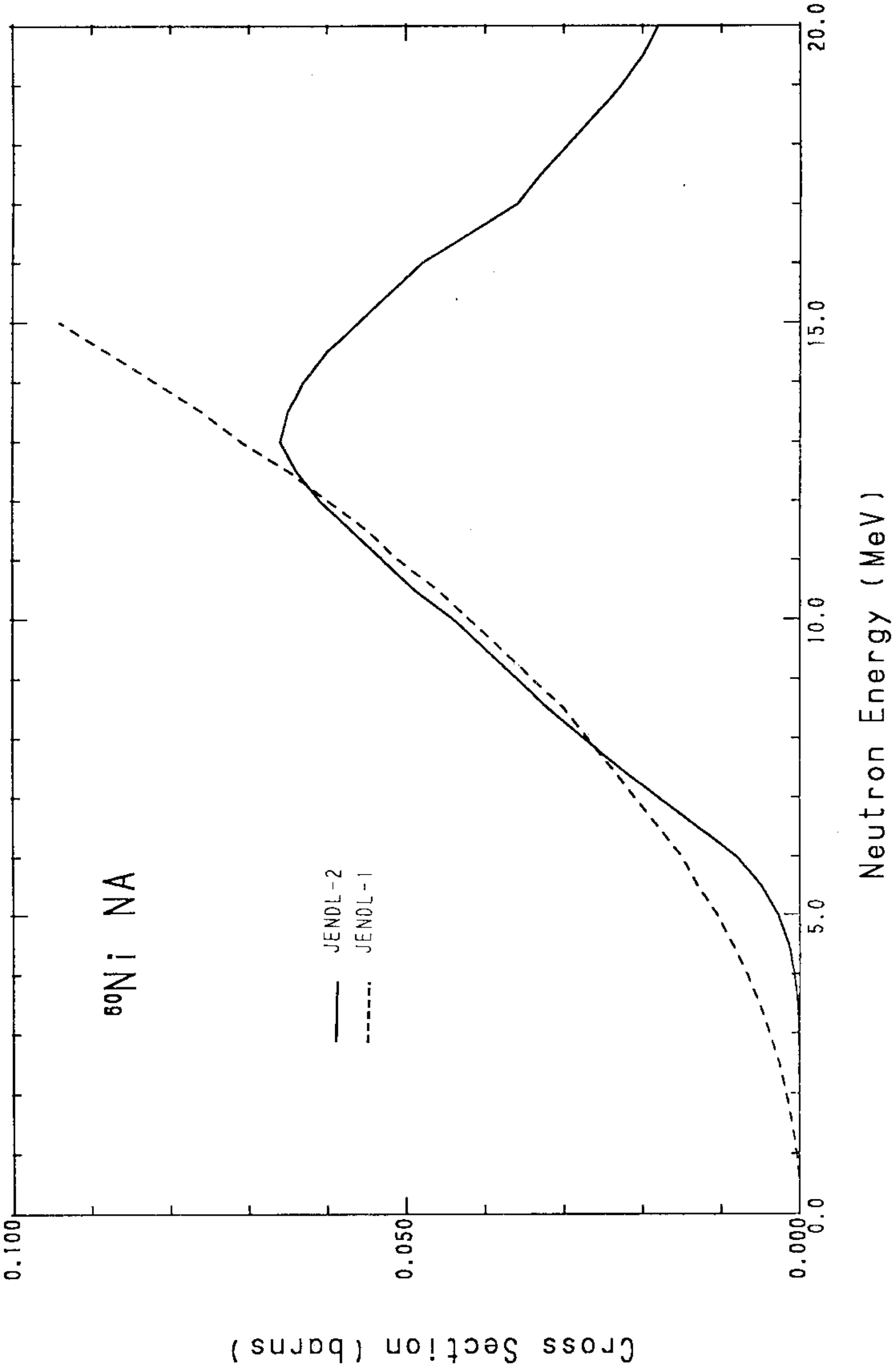


Fig. 29 (n,α) reaction cross section of ^{60}Ni.

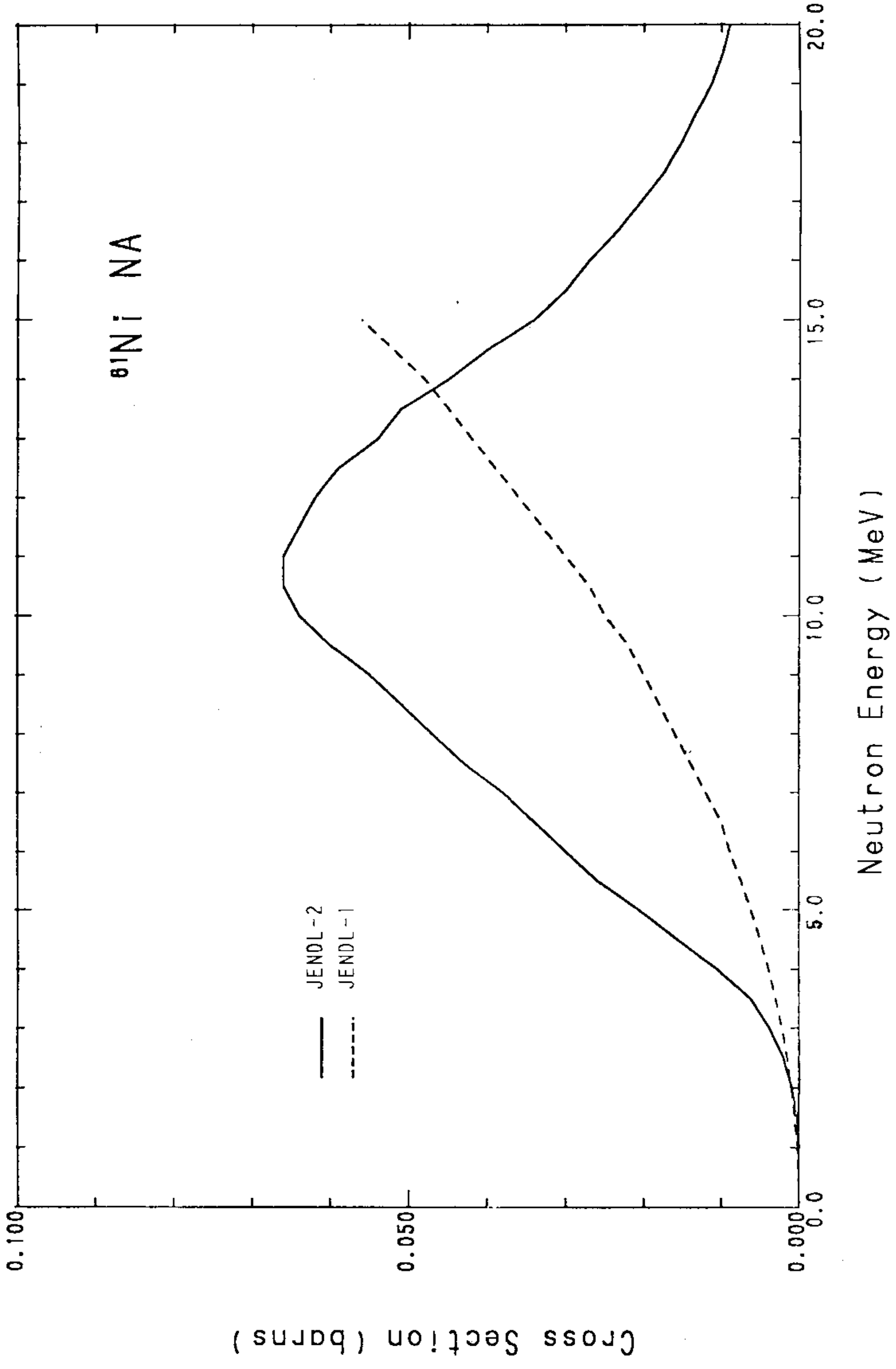


Fig. 30 (n,α) reaction cross section of ^{61}Ni.

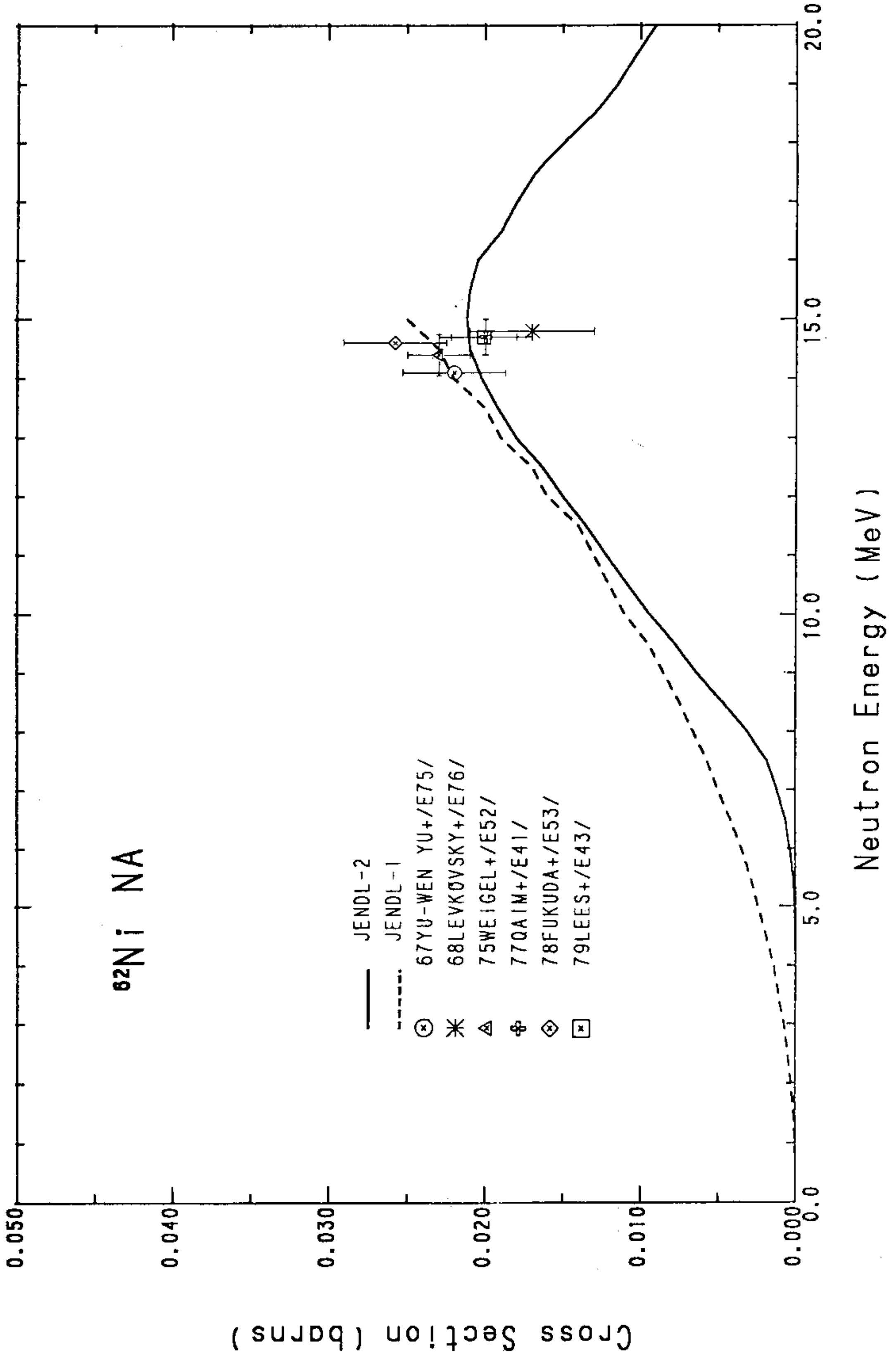


Fig. 31 (n,α) reaction cross section of ^{62}Ni.

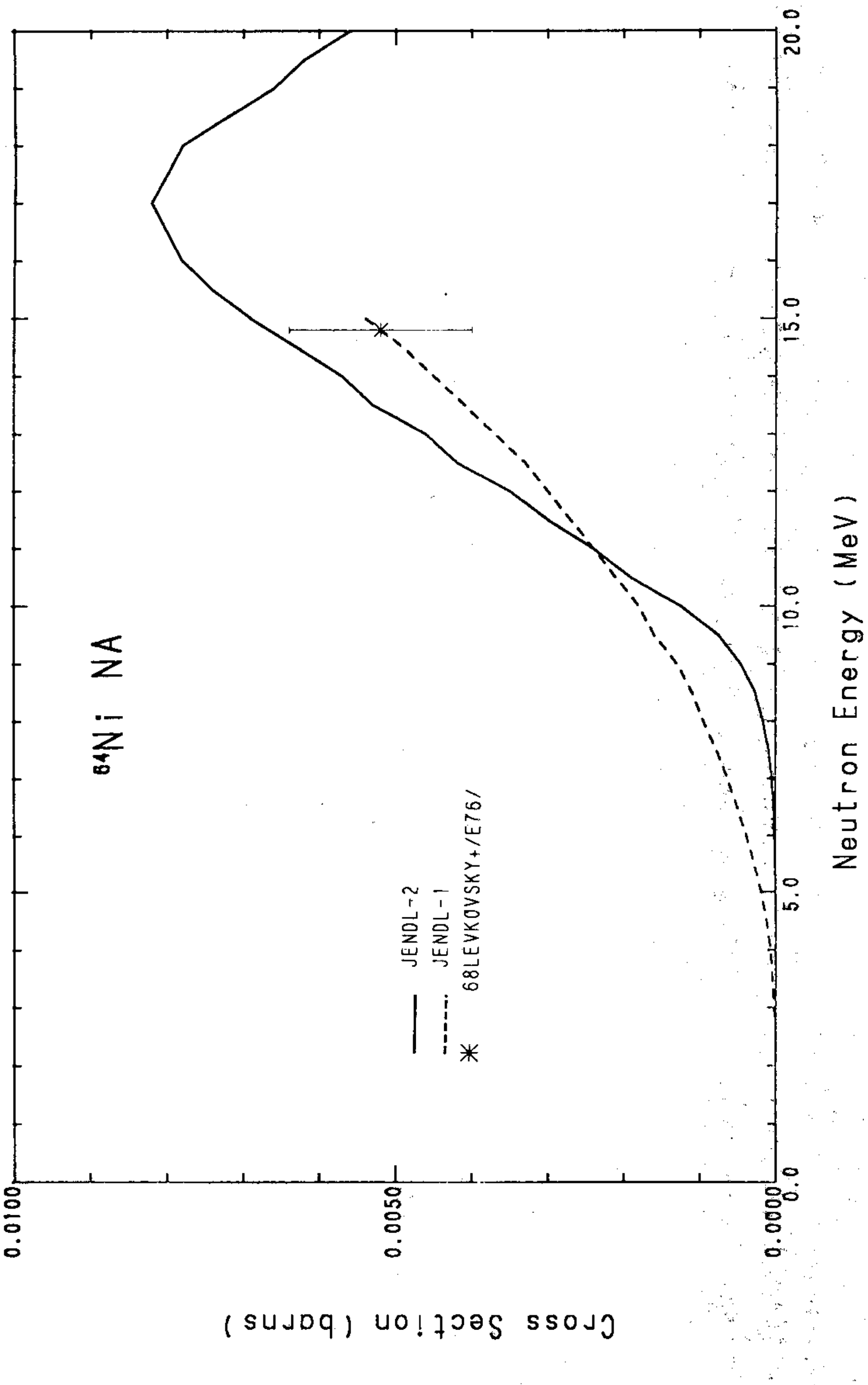


Fig. 32 (n,α) reaction cross section of ^{64}Ni.

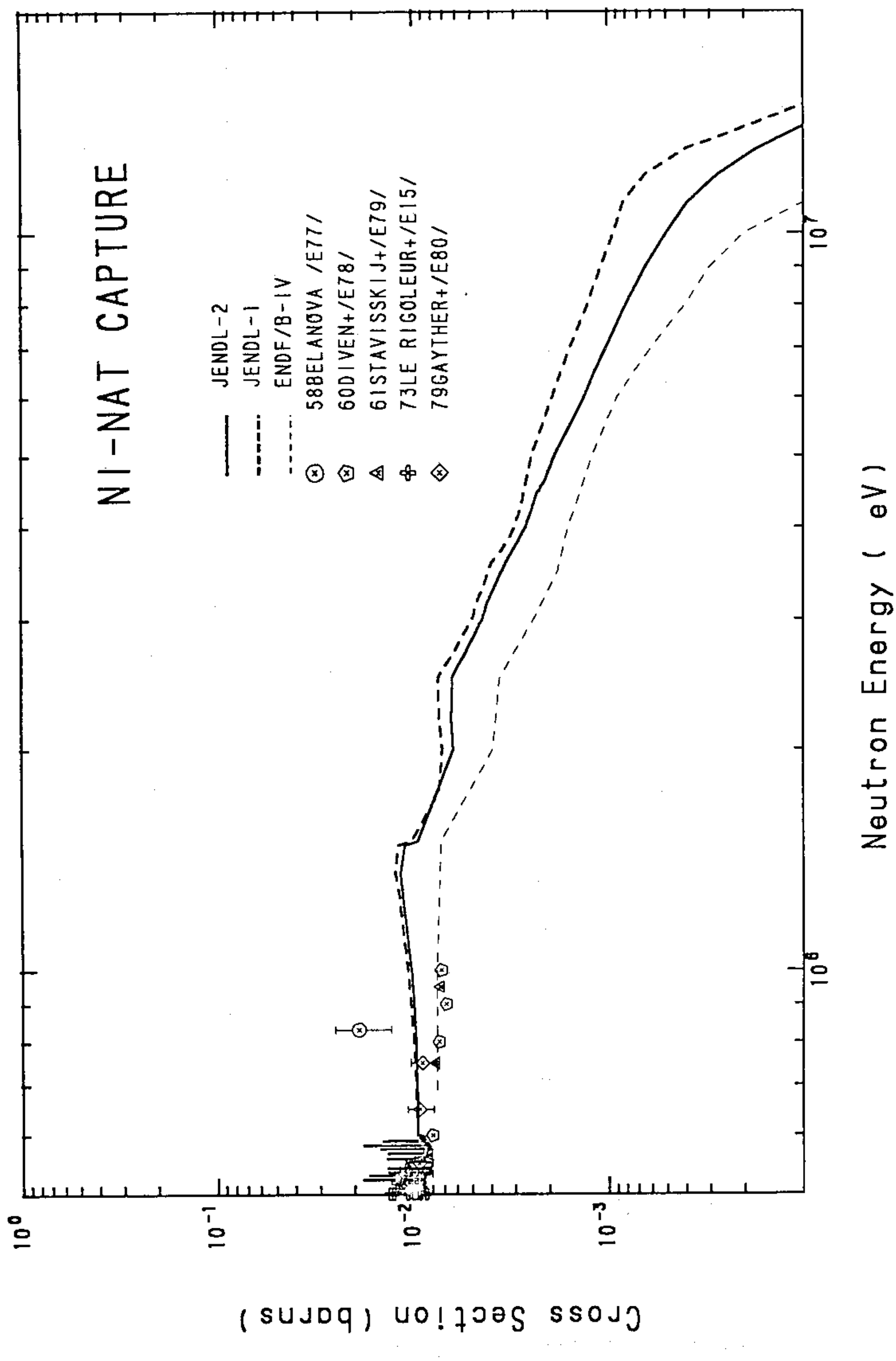


Fig. 33 Capture cross section of natural nickel.

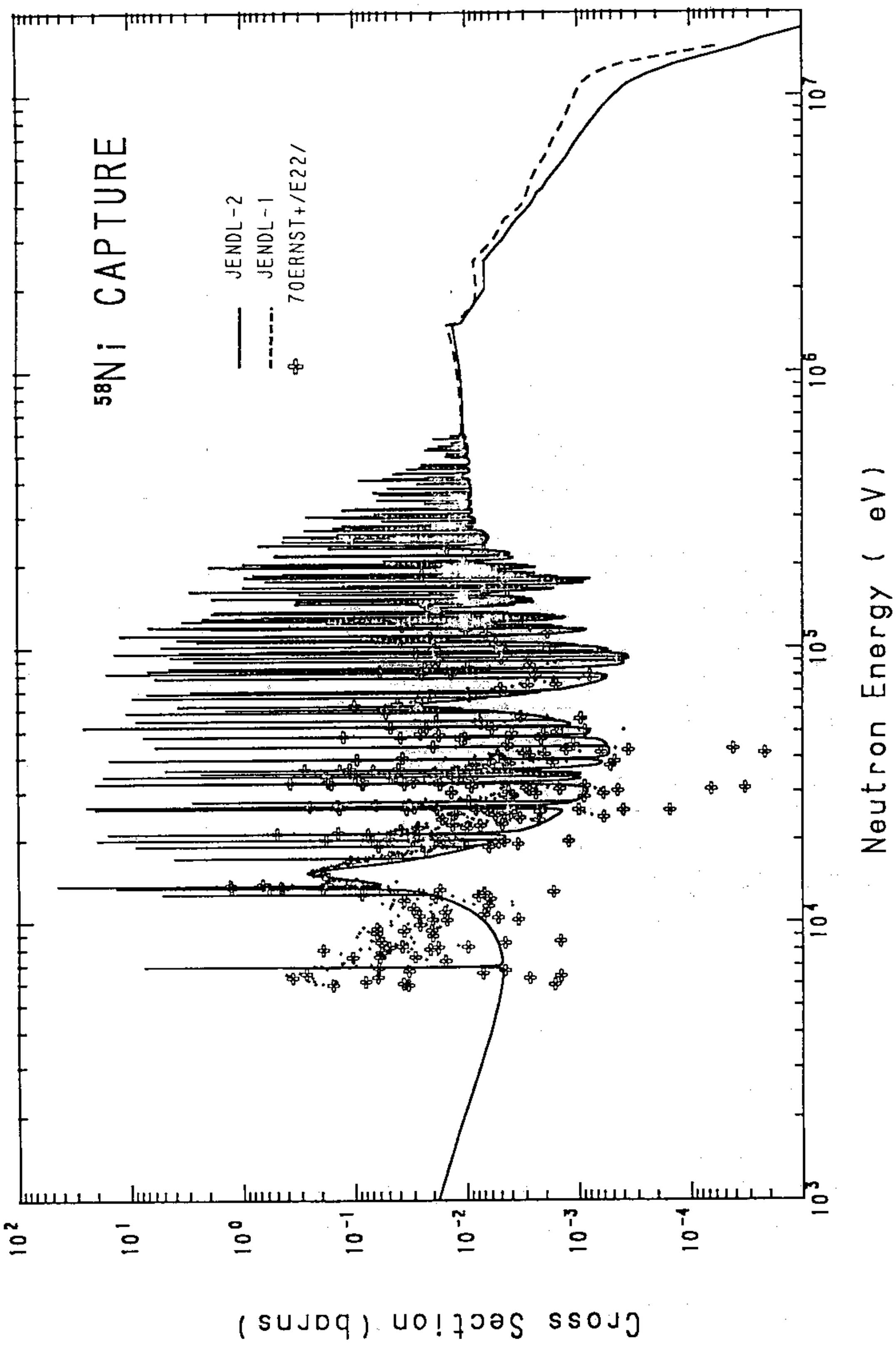


Fig. 34 Capture cross section of ^{58}Ni.

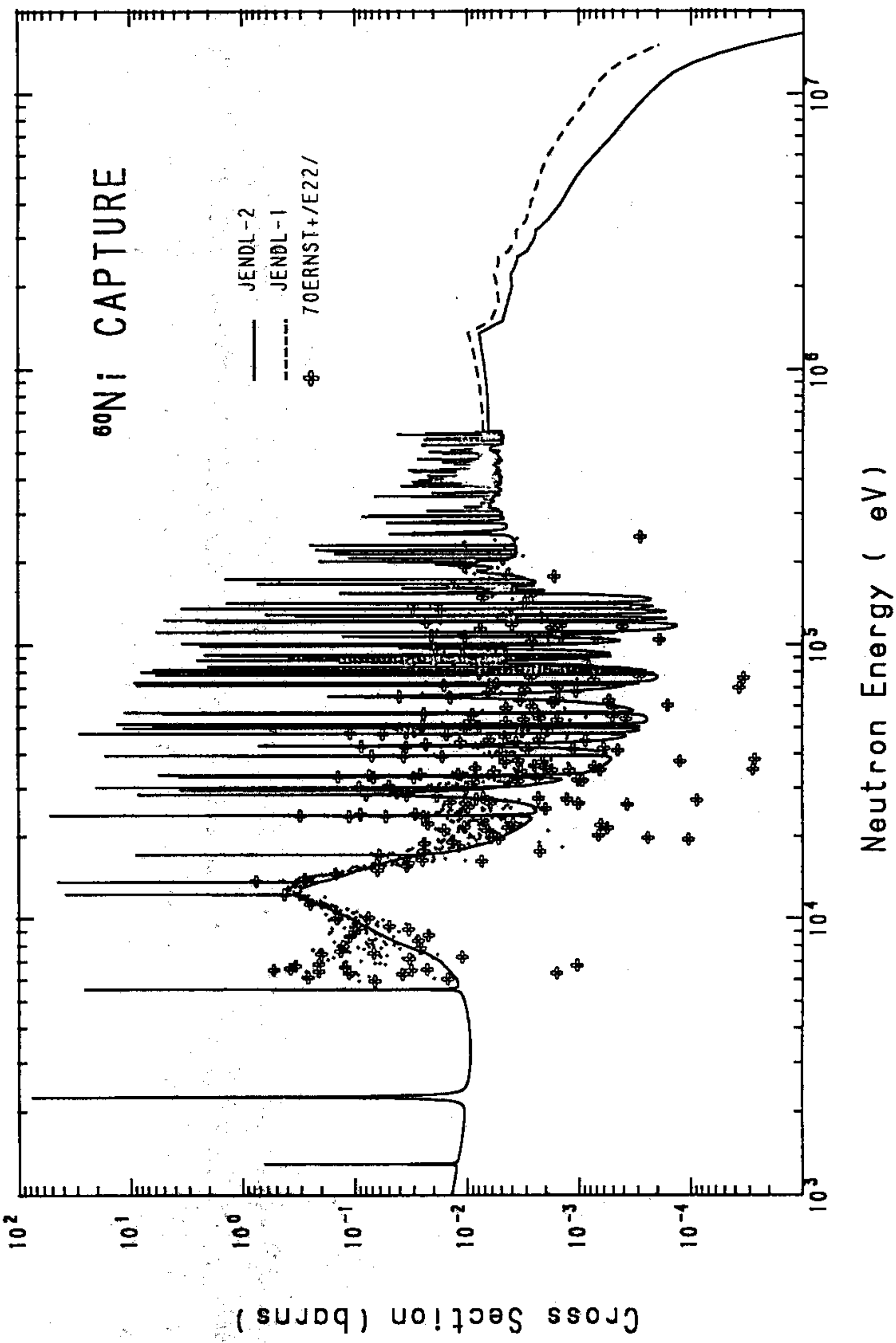


Fig. 35 Capture cross section of ^{60}Ni.

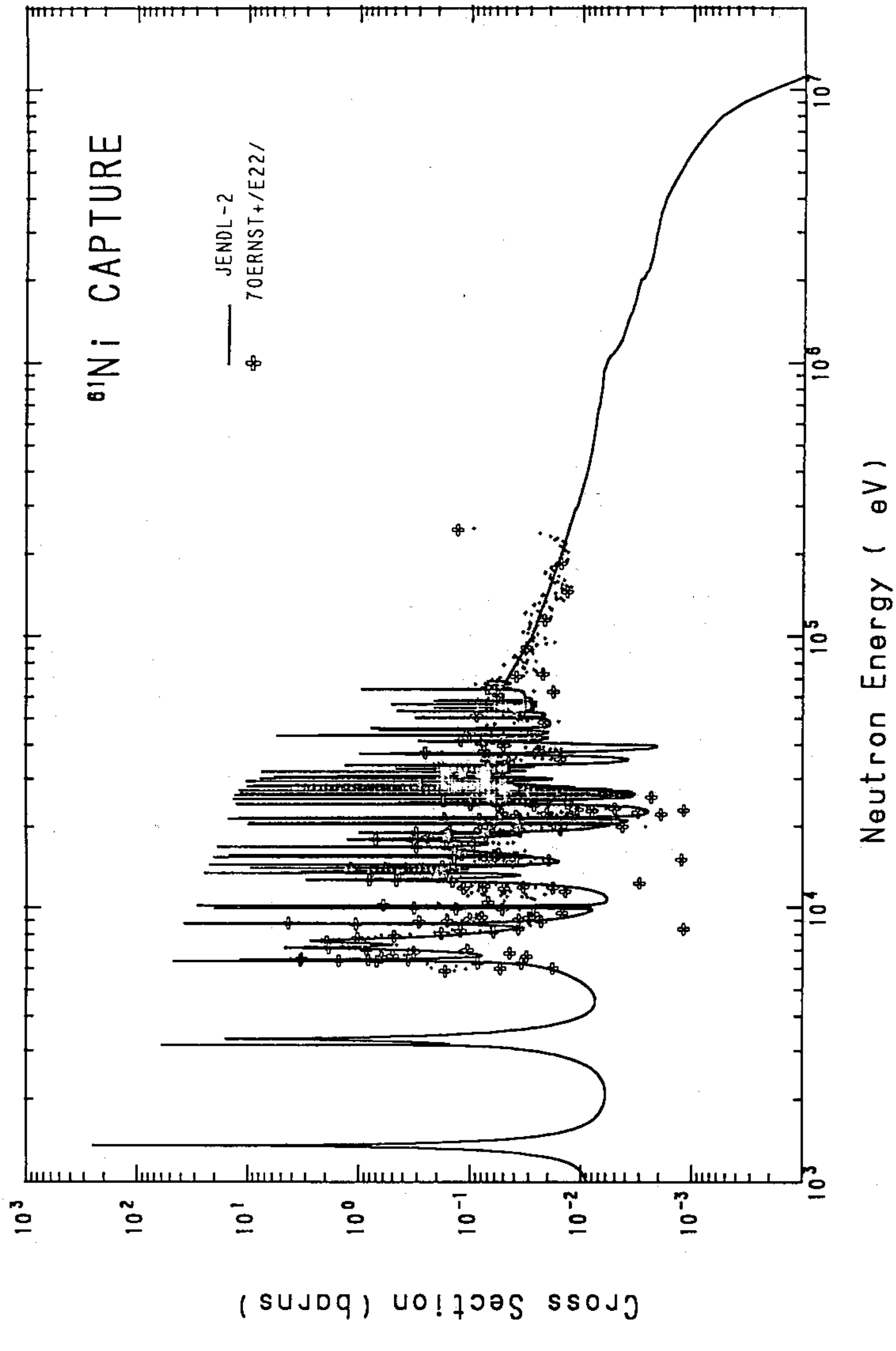


Fig. 36 Capture cross section of ^{61}Ni.

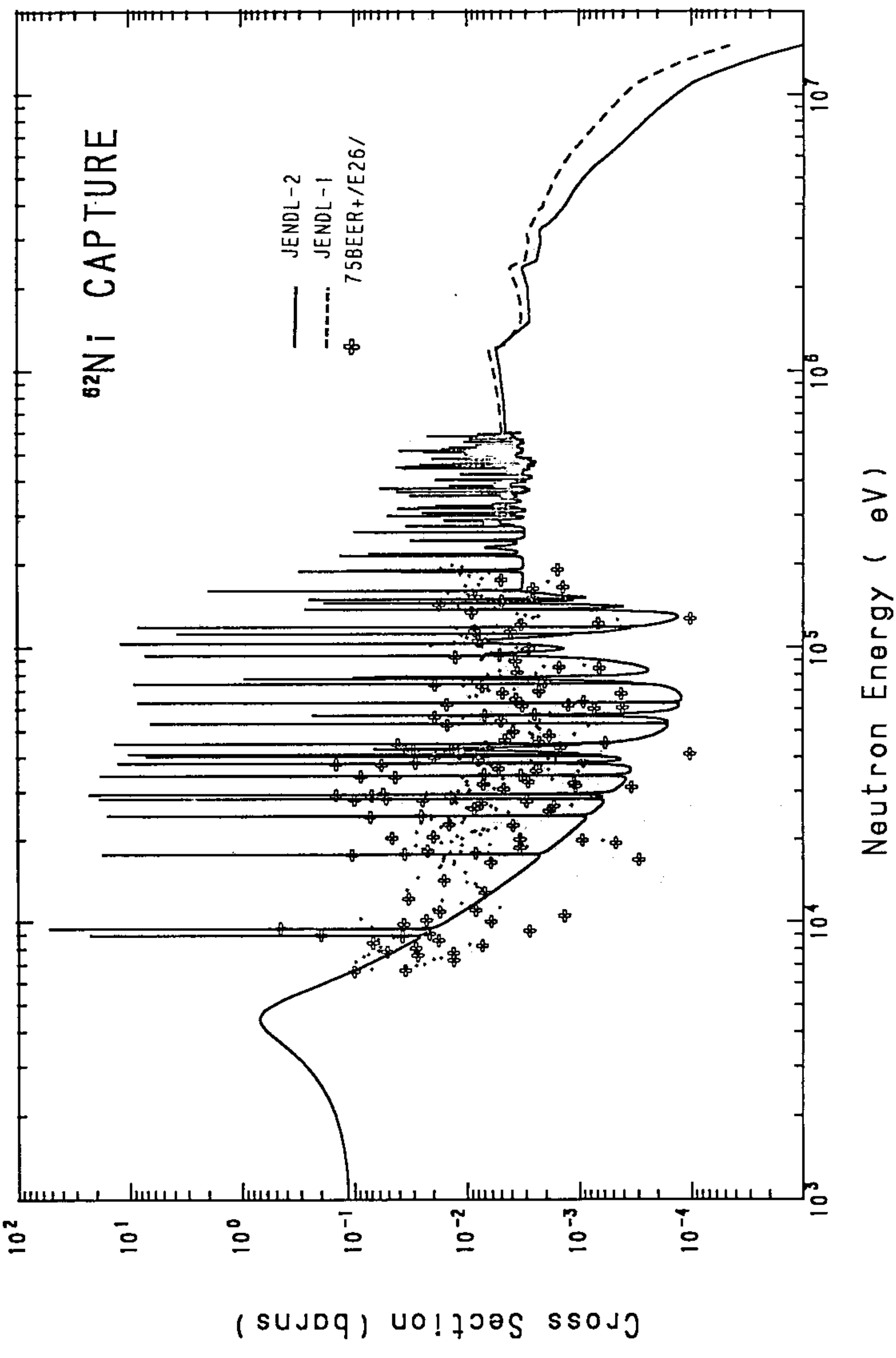


Fig. 37 Capture cross section of ^{62}Ni.

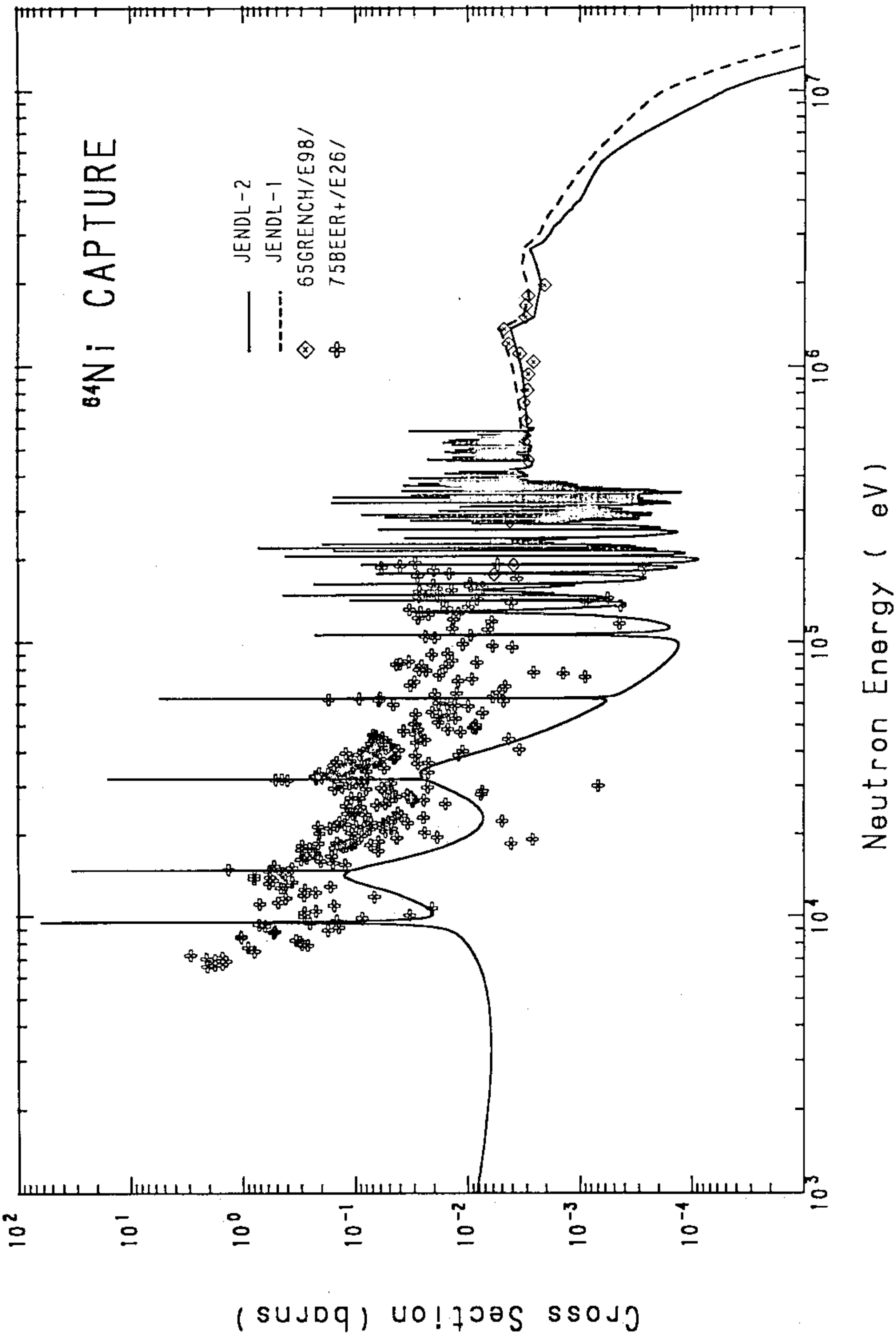


Fig. 38 Capture cross section of ^{64}Ni.

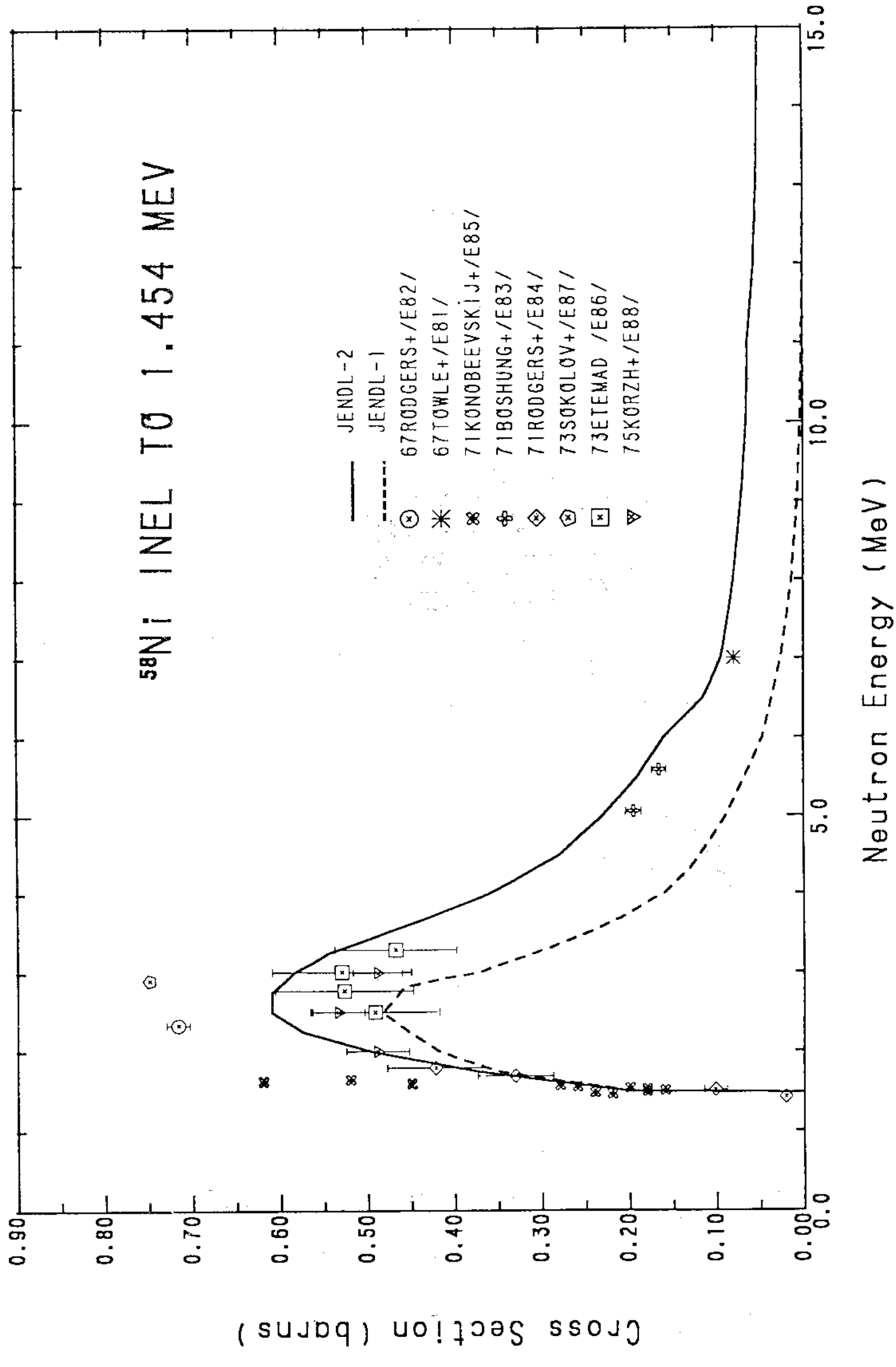


Fig. 39 Inelastic scattering cross section to the first 1.455 - MeV level of ^{58}Ni.

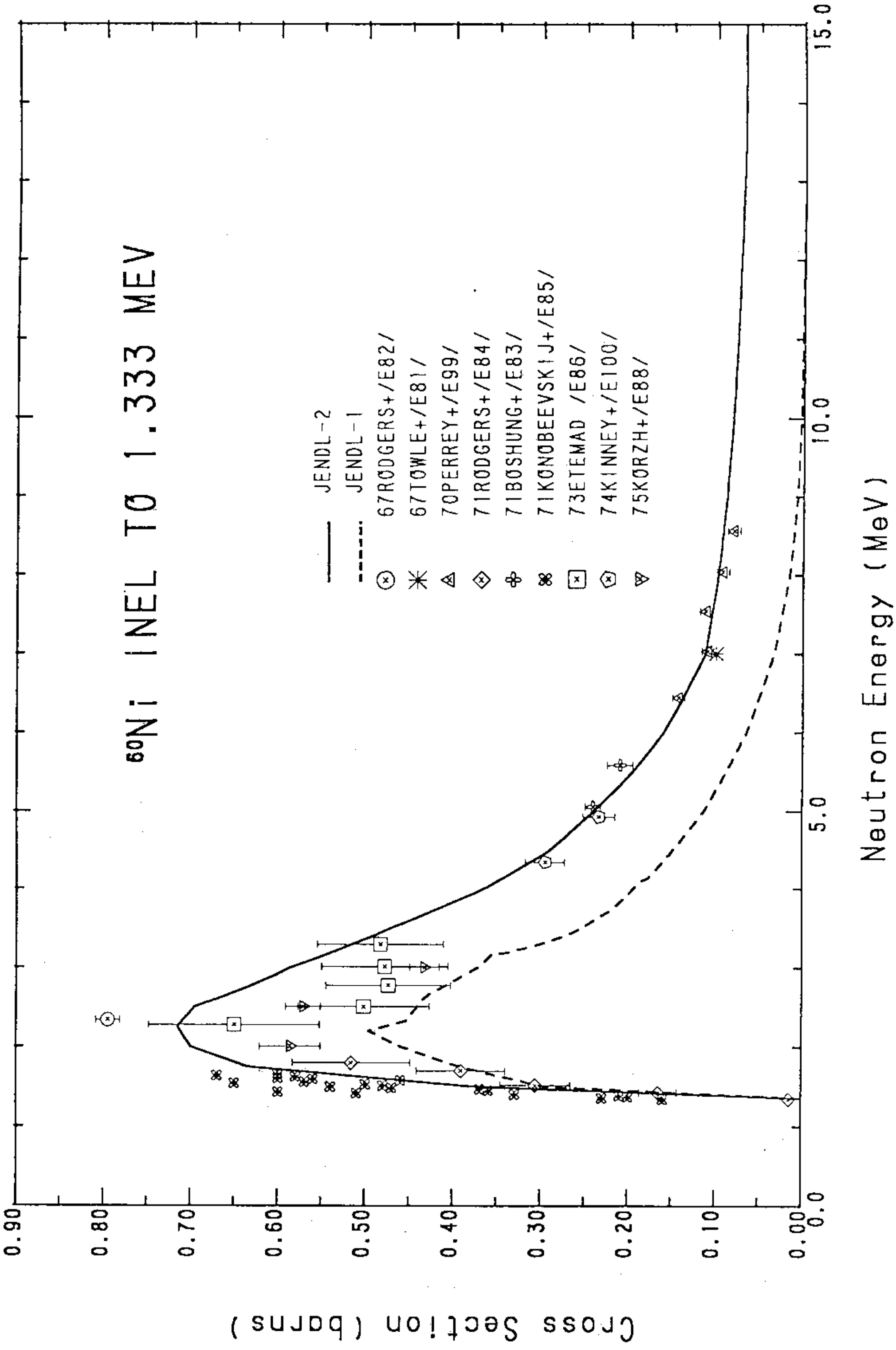


Fig. 40 Inelastic scattering cross section to the first 1.333-MeV level of ^{60}Ni.

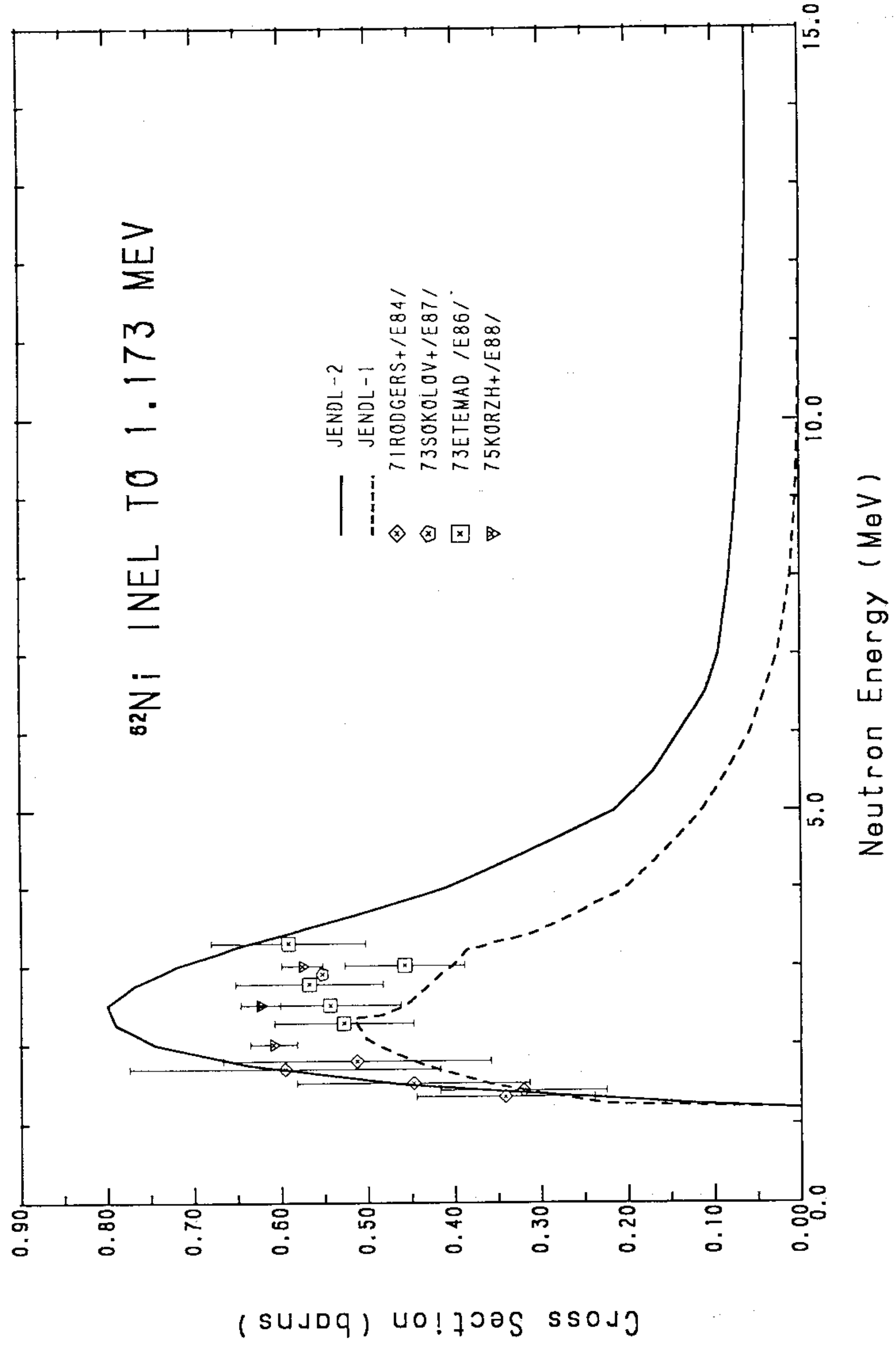


Fig. 41 Inelastic scattering cross section to the first 1.173-MeV level of ^{62}Ni.

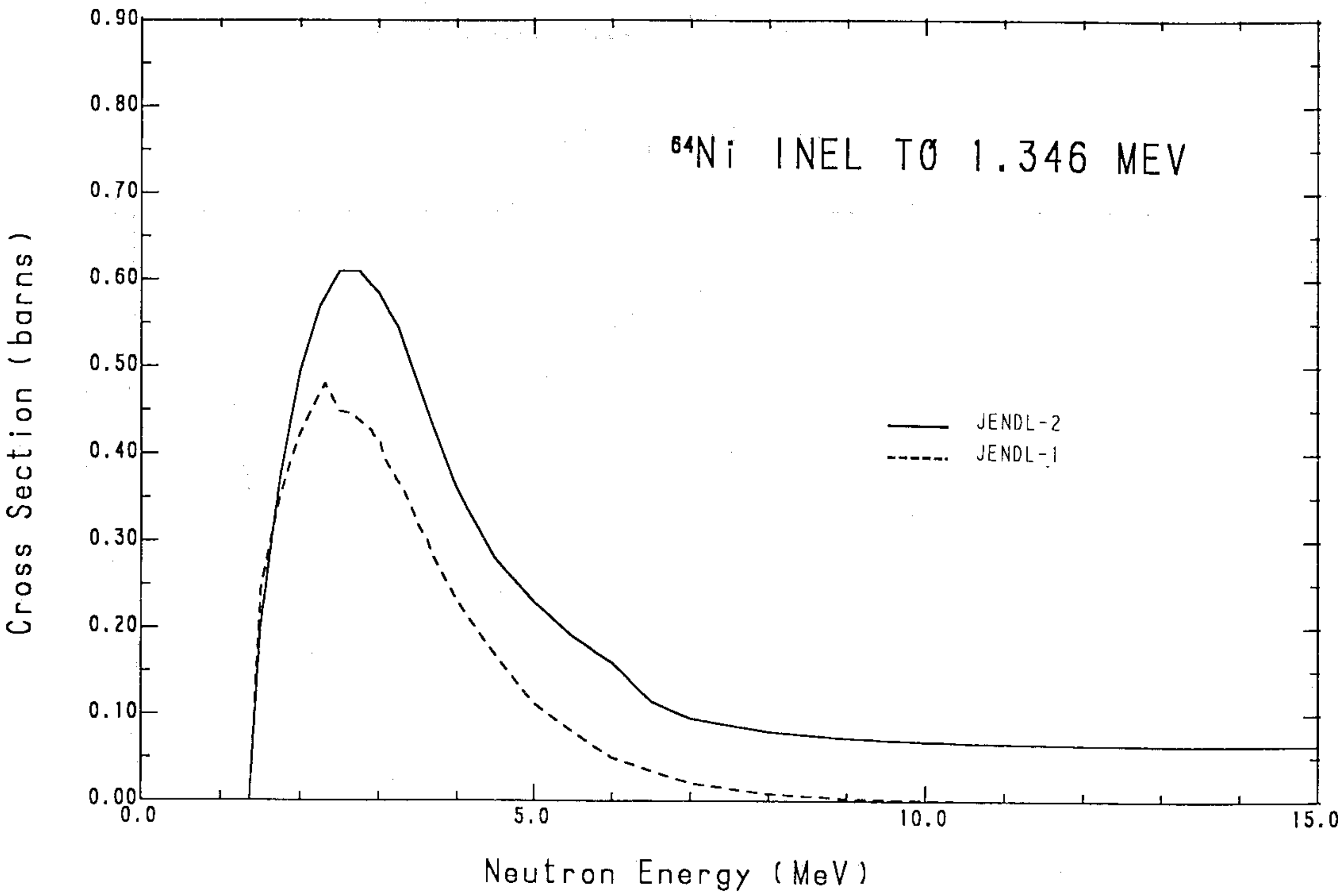


Fig. 42 Inelastic scattering cross section to the first 1.346 - MeV level of ^{64}Ni.

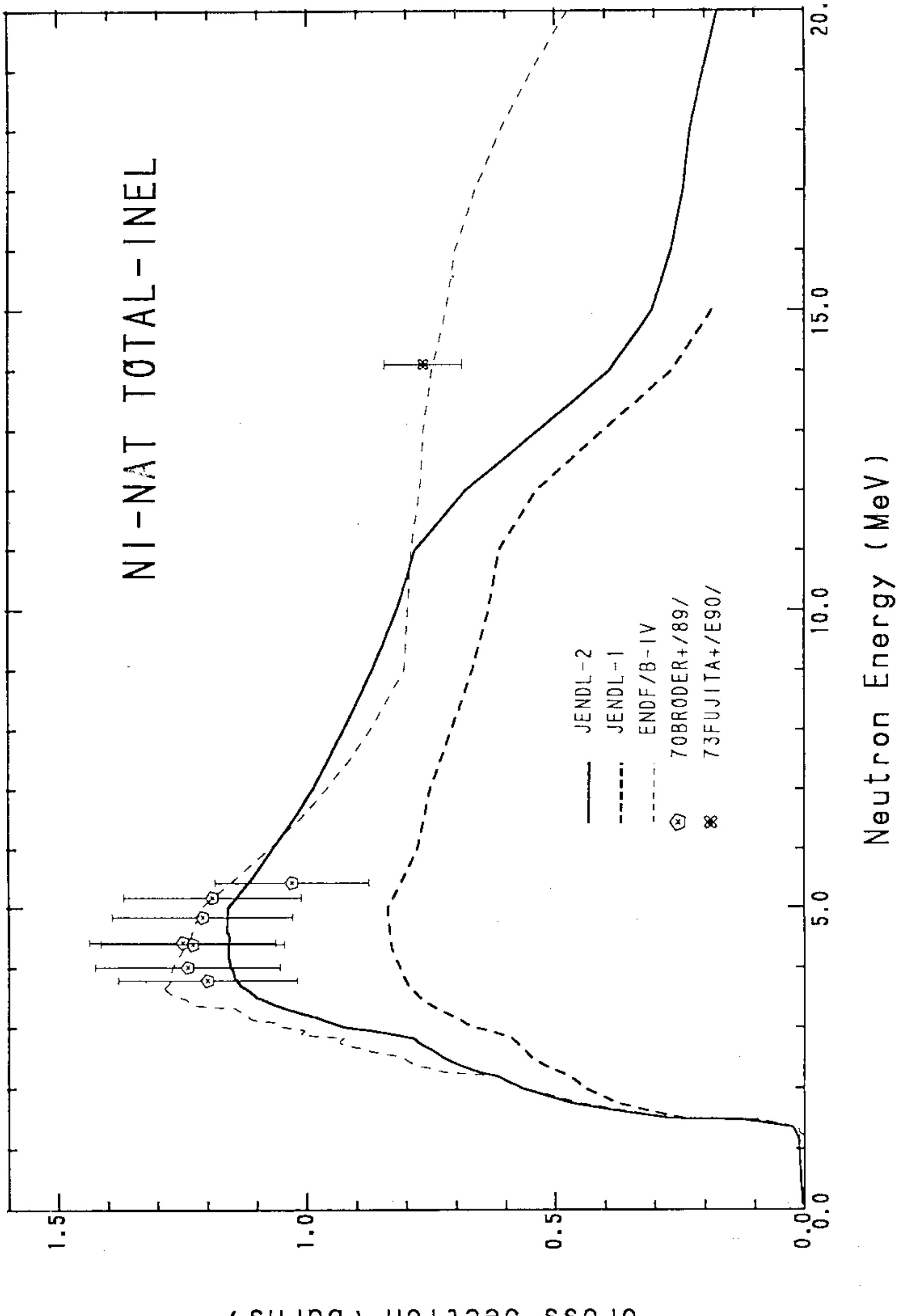


Fig. 43 Total inelastic scattering of natural nickel.

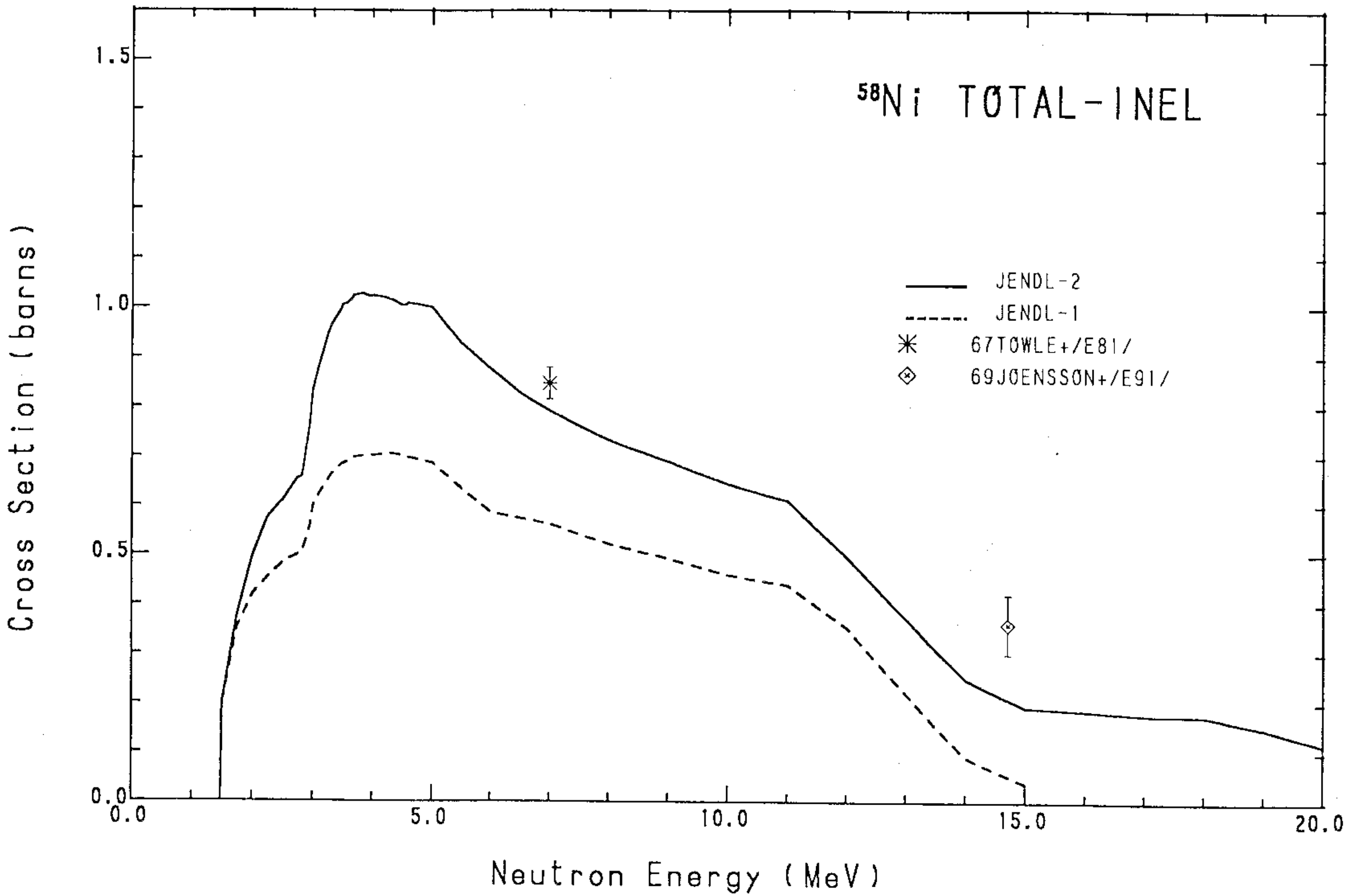


Fig. 44 Total inelastic scattering of ^{58}Ni.

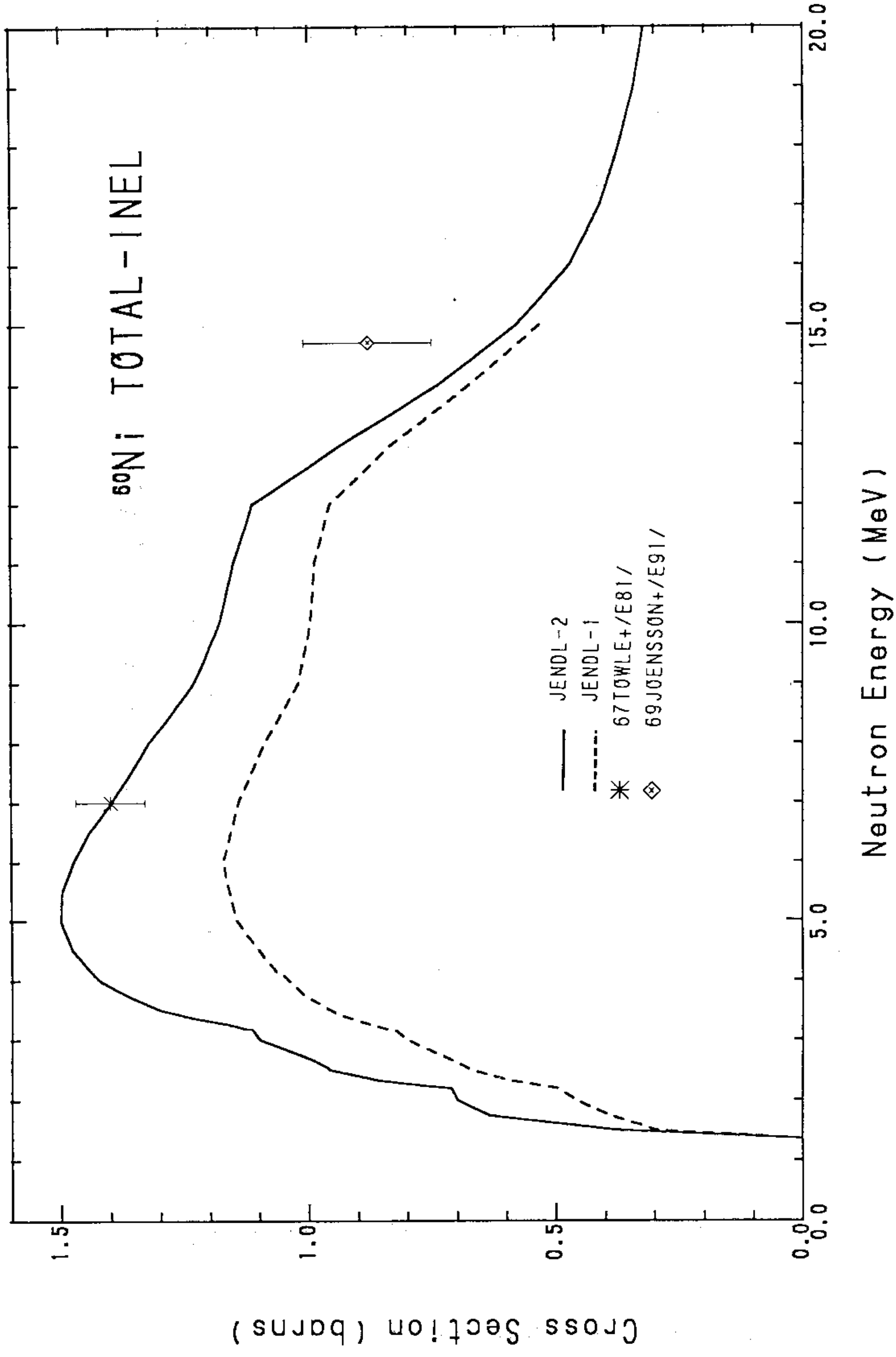


Fig. 45 Total inelastic scattering of ^{60}Ni.

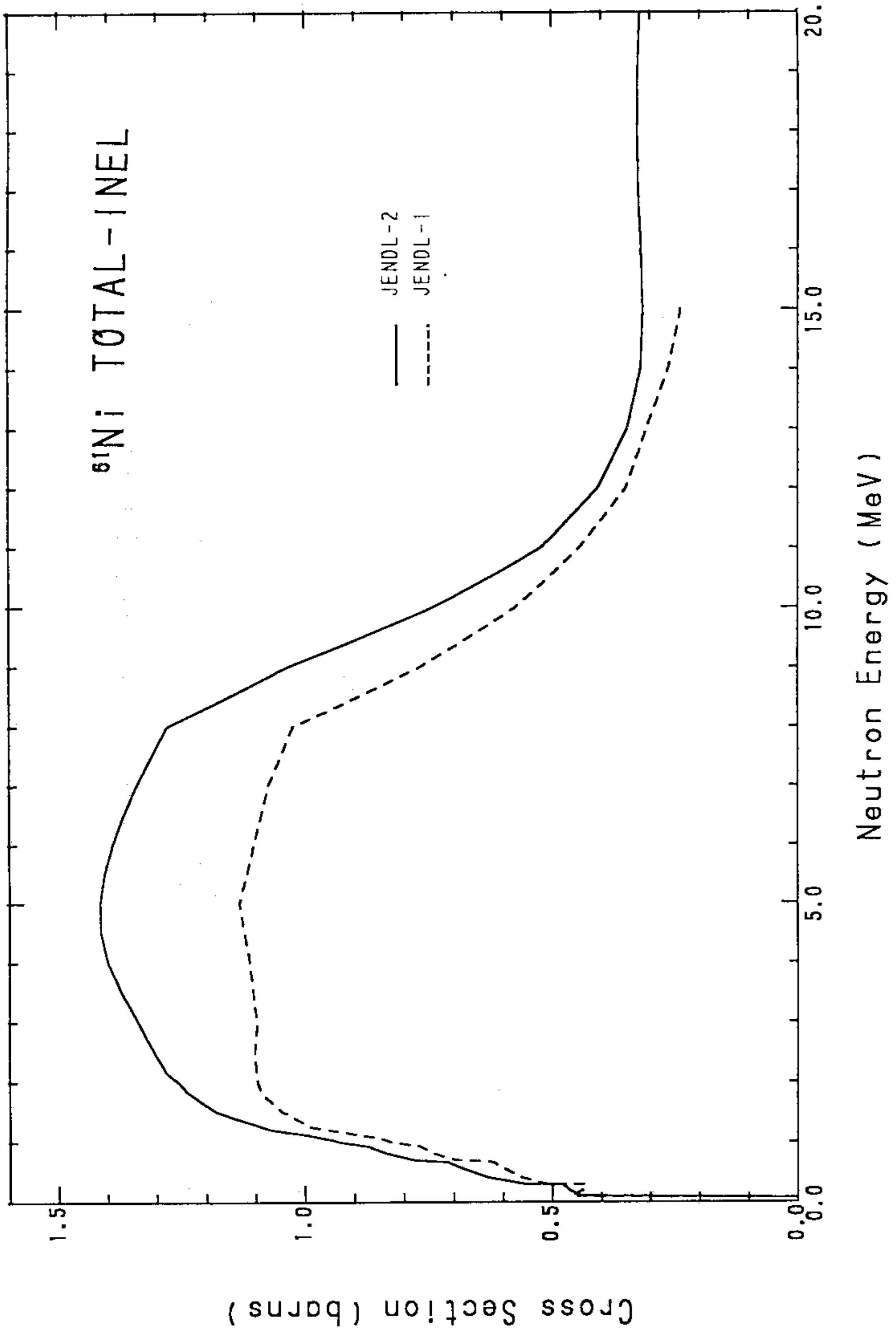


Fig. 46 Total inelastic scattering of ^{61}Ni.

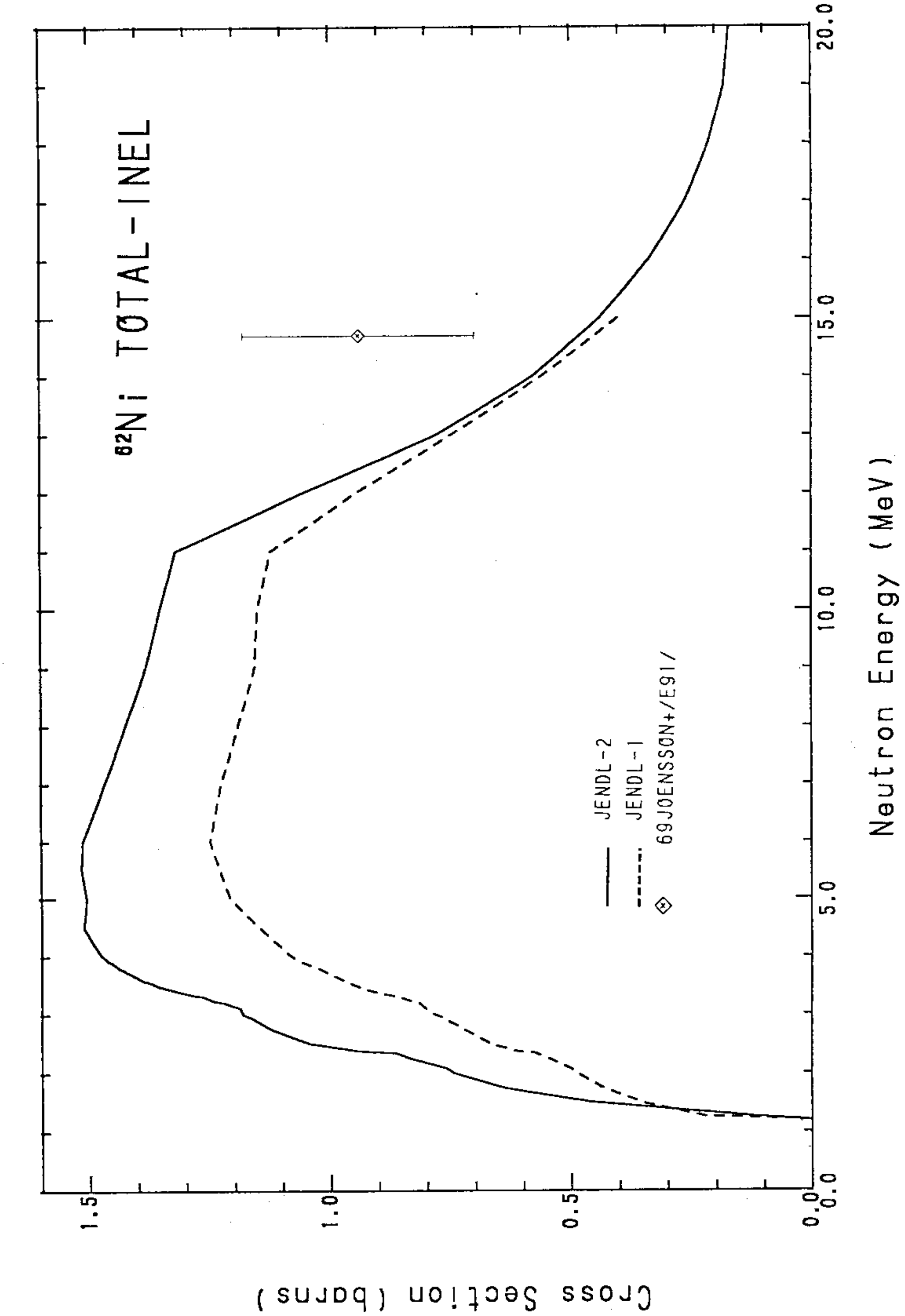


Fig. 47 Total inelastic scattering of ^{62}Ni.

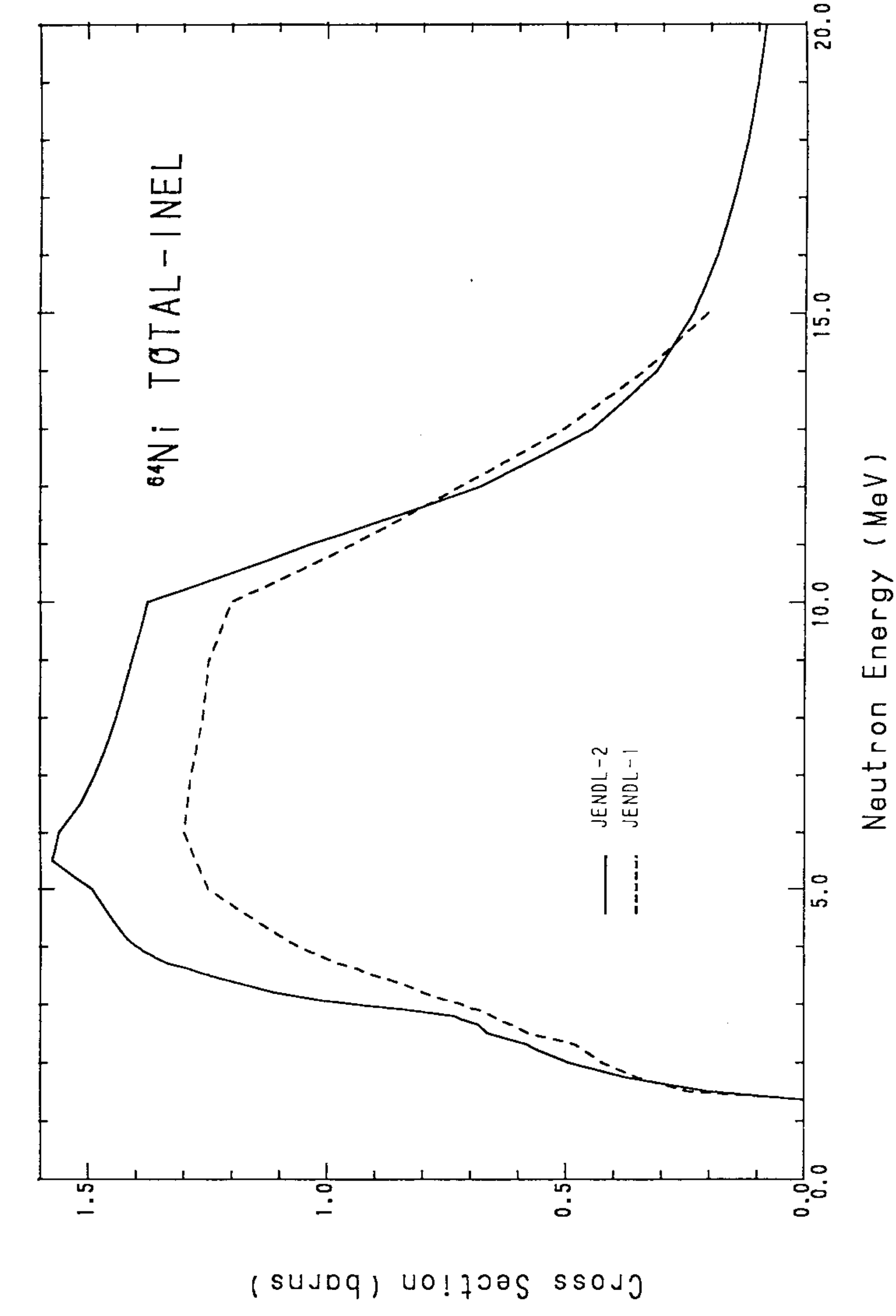


Fig. 48 Total inelastic scattering of ^{64}Ni.

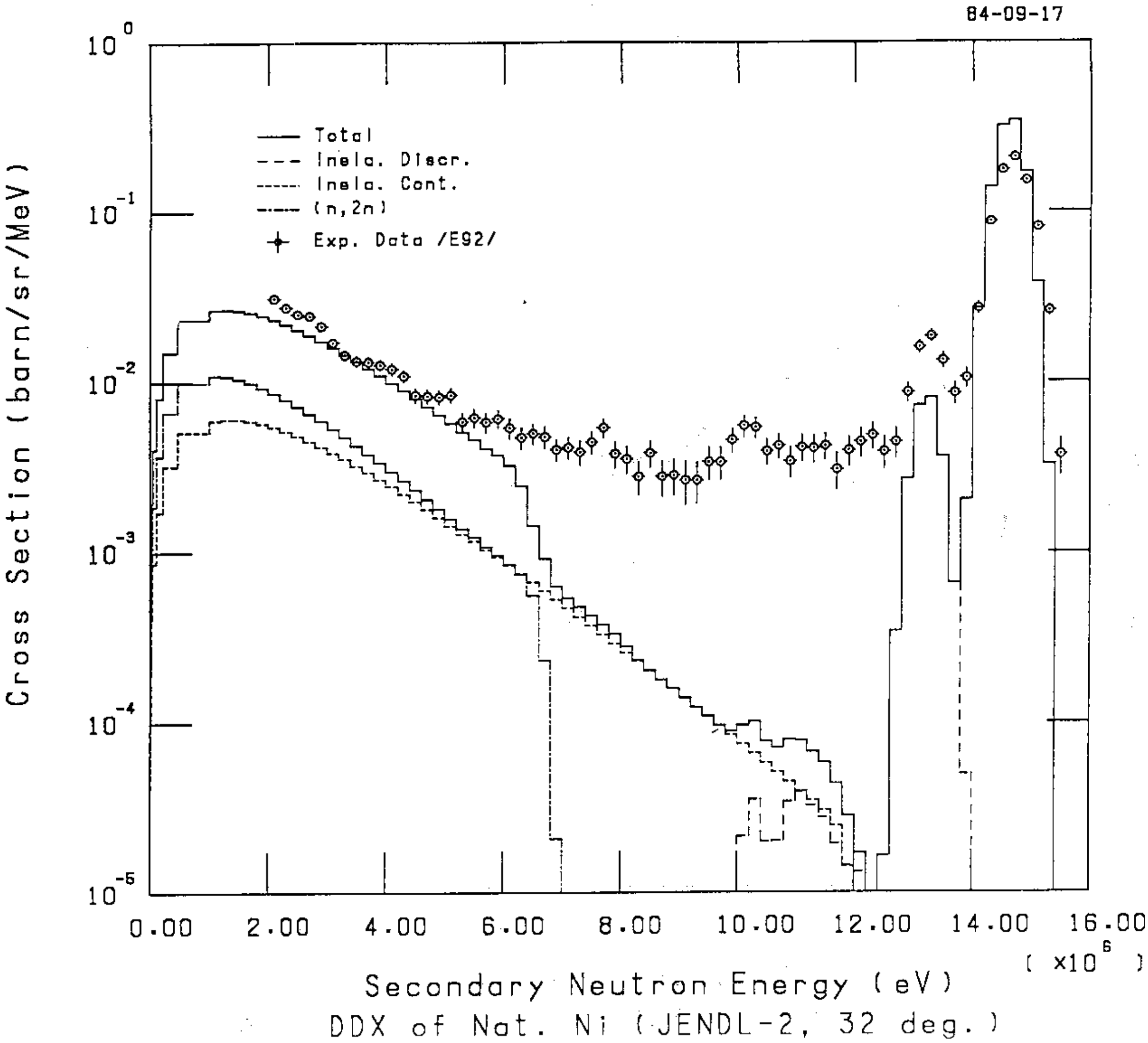


Fig. 49(a) Energy-angle double differential cross section of natural nickel at 32°

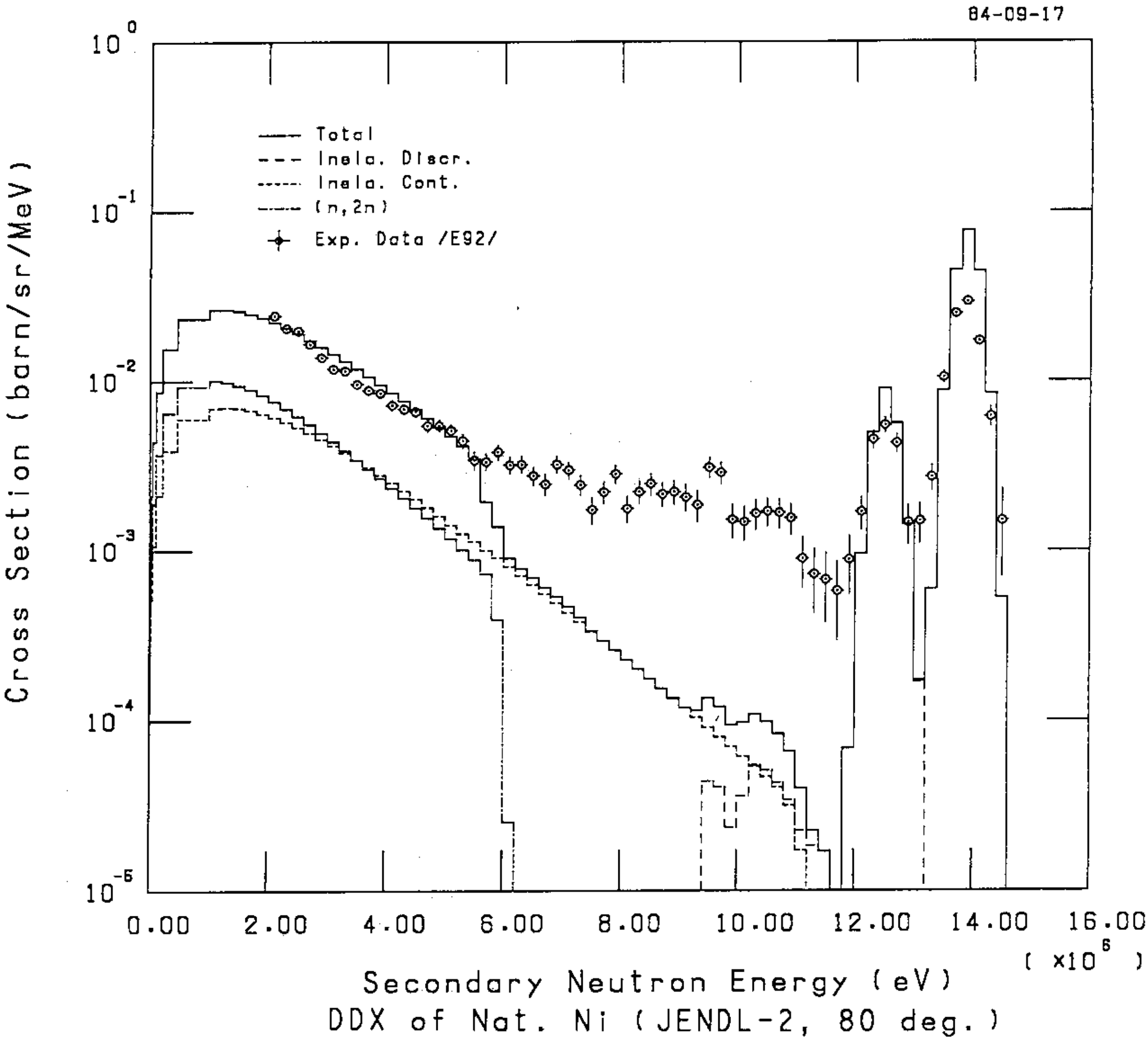


Fig. 49(b) Energy-angle double differential cross section of natural nickel at 80°

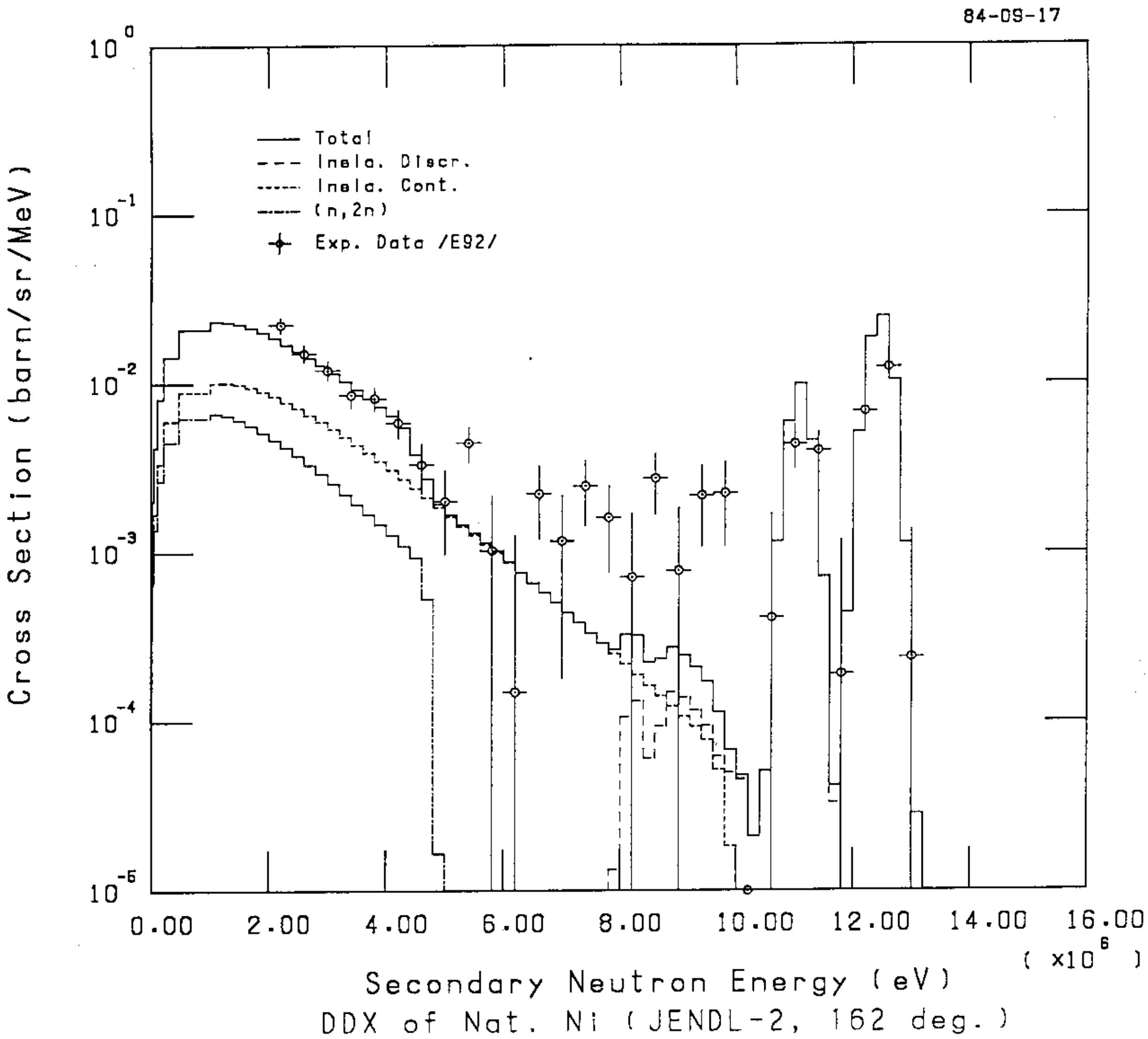


Fig. 49(c) Energy-angle double differential cross section of natural nickel at 162°

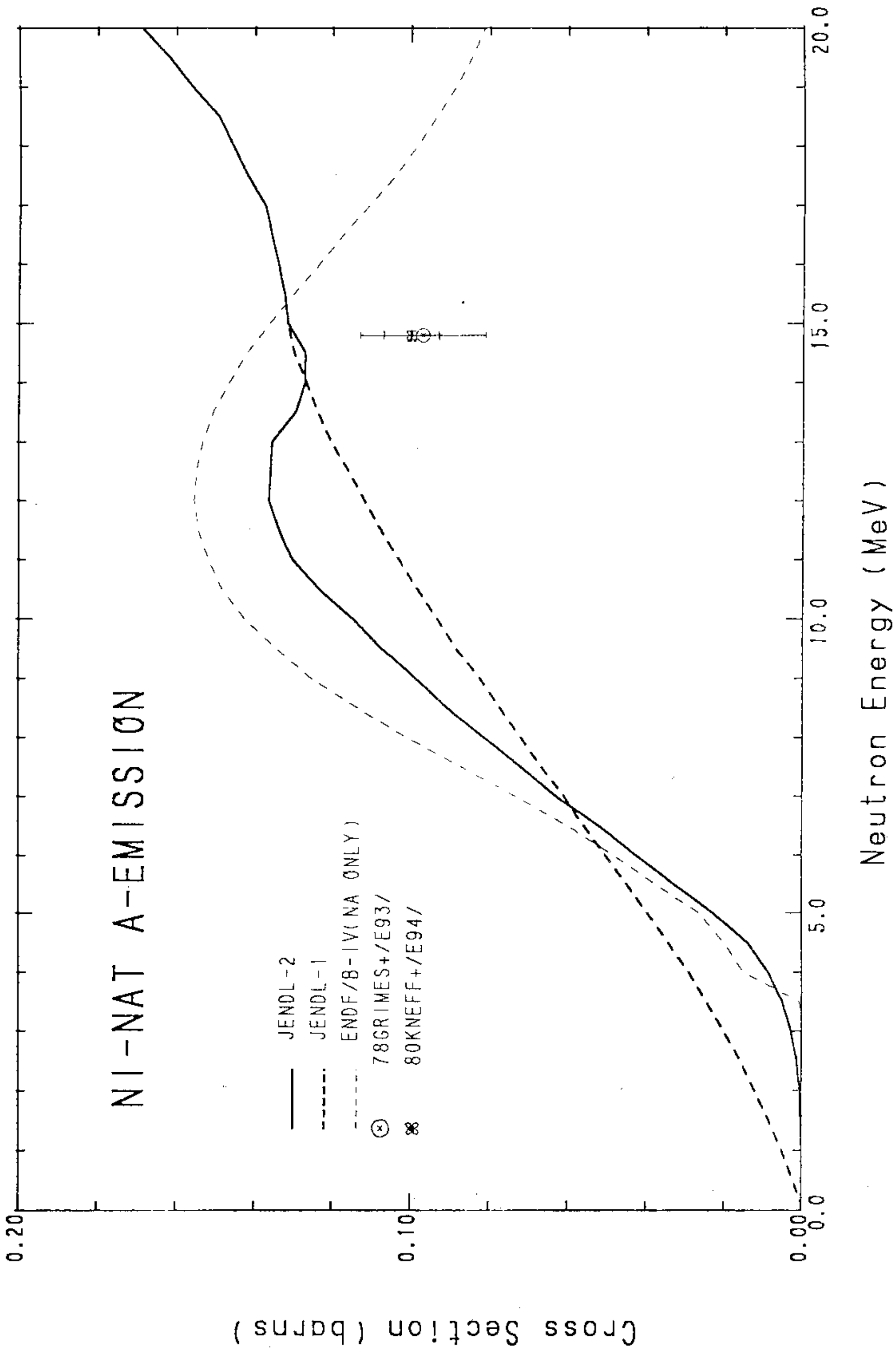


Fig. 50 α-emission cross section of natural nickel.

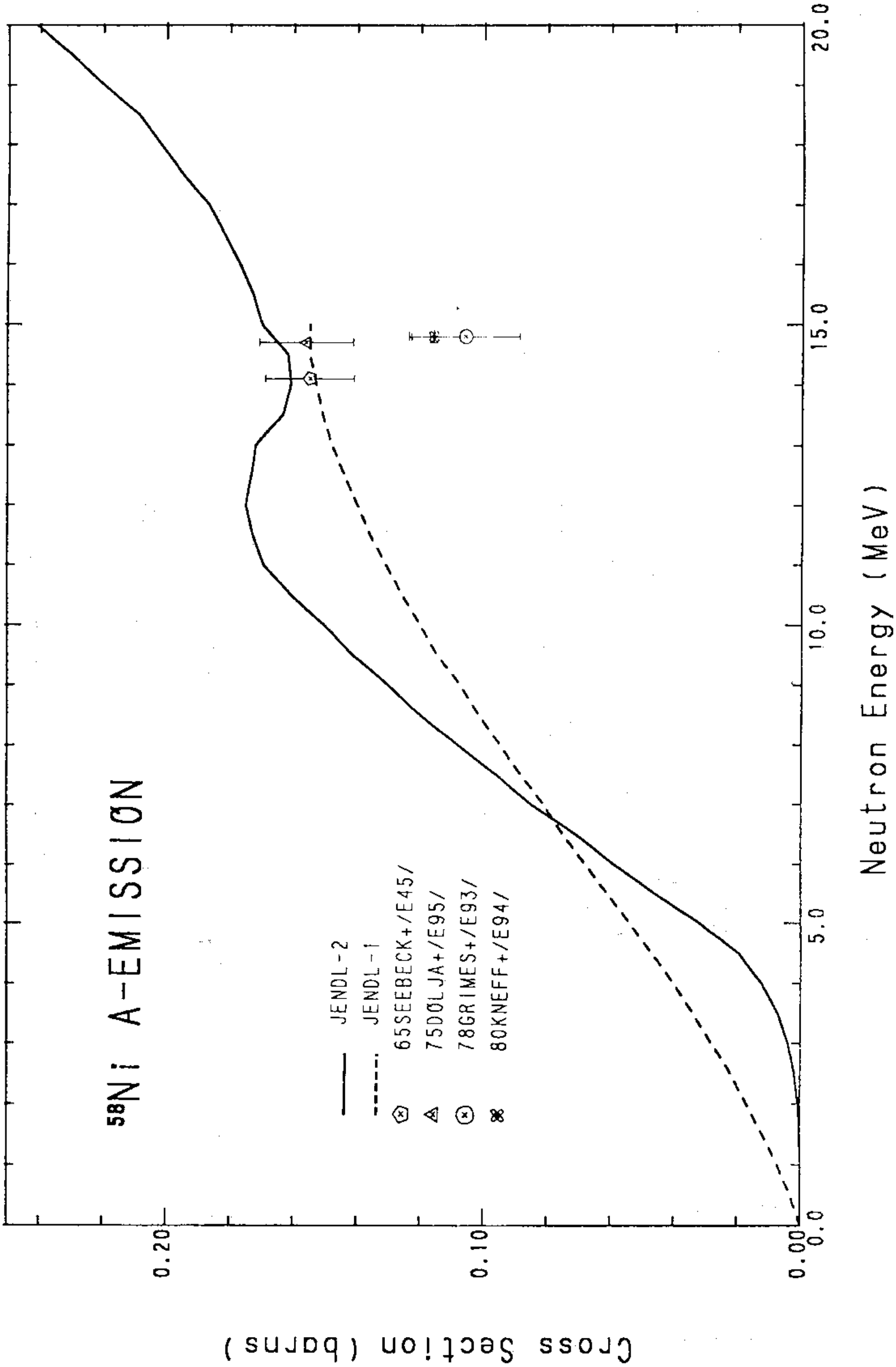


Fig. 51 α-emission cross section of ^{58}Ni.

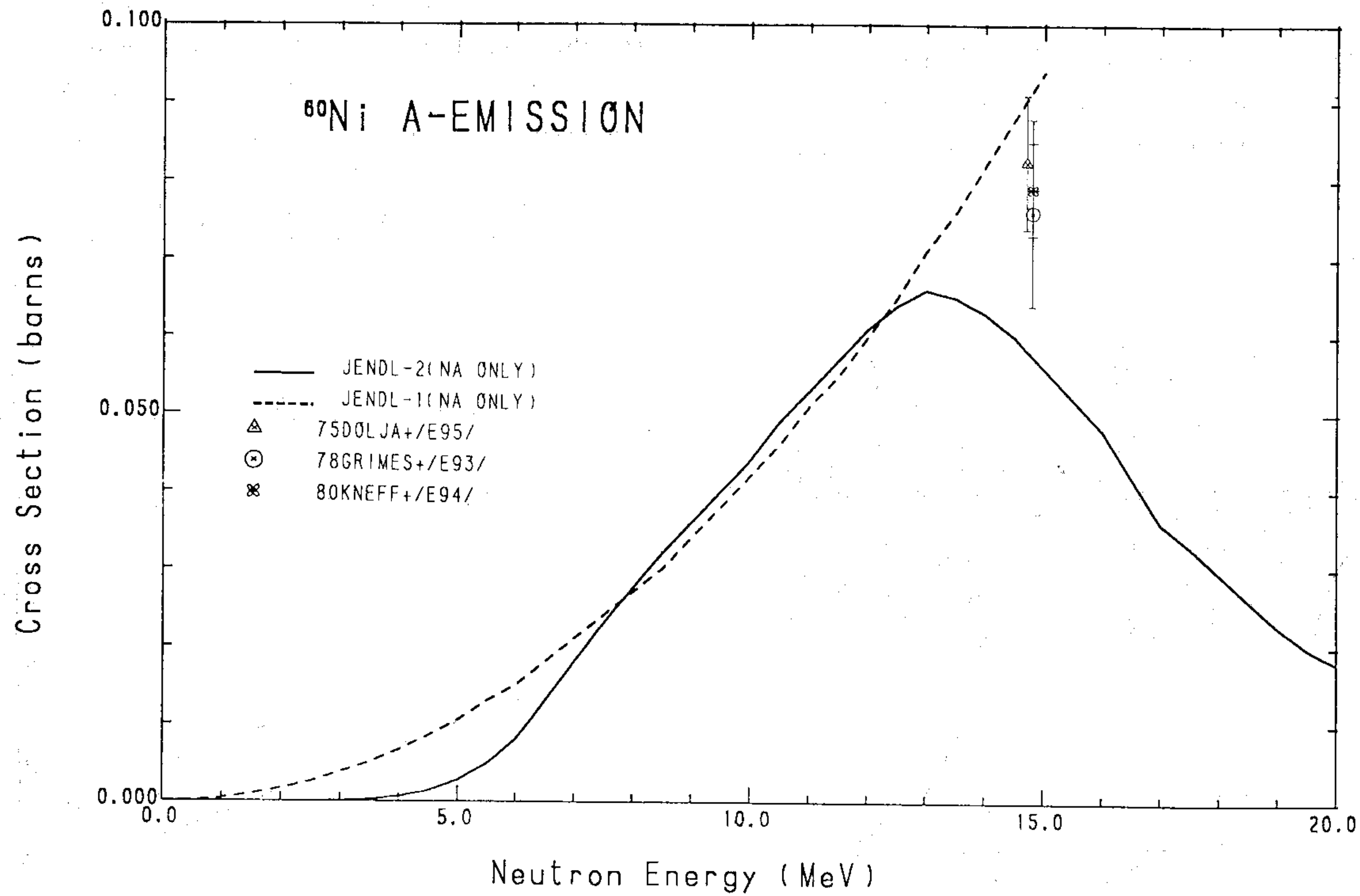


Fig. 52 α-emission cross section of ^{60}Ni.

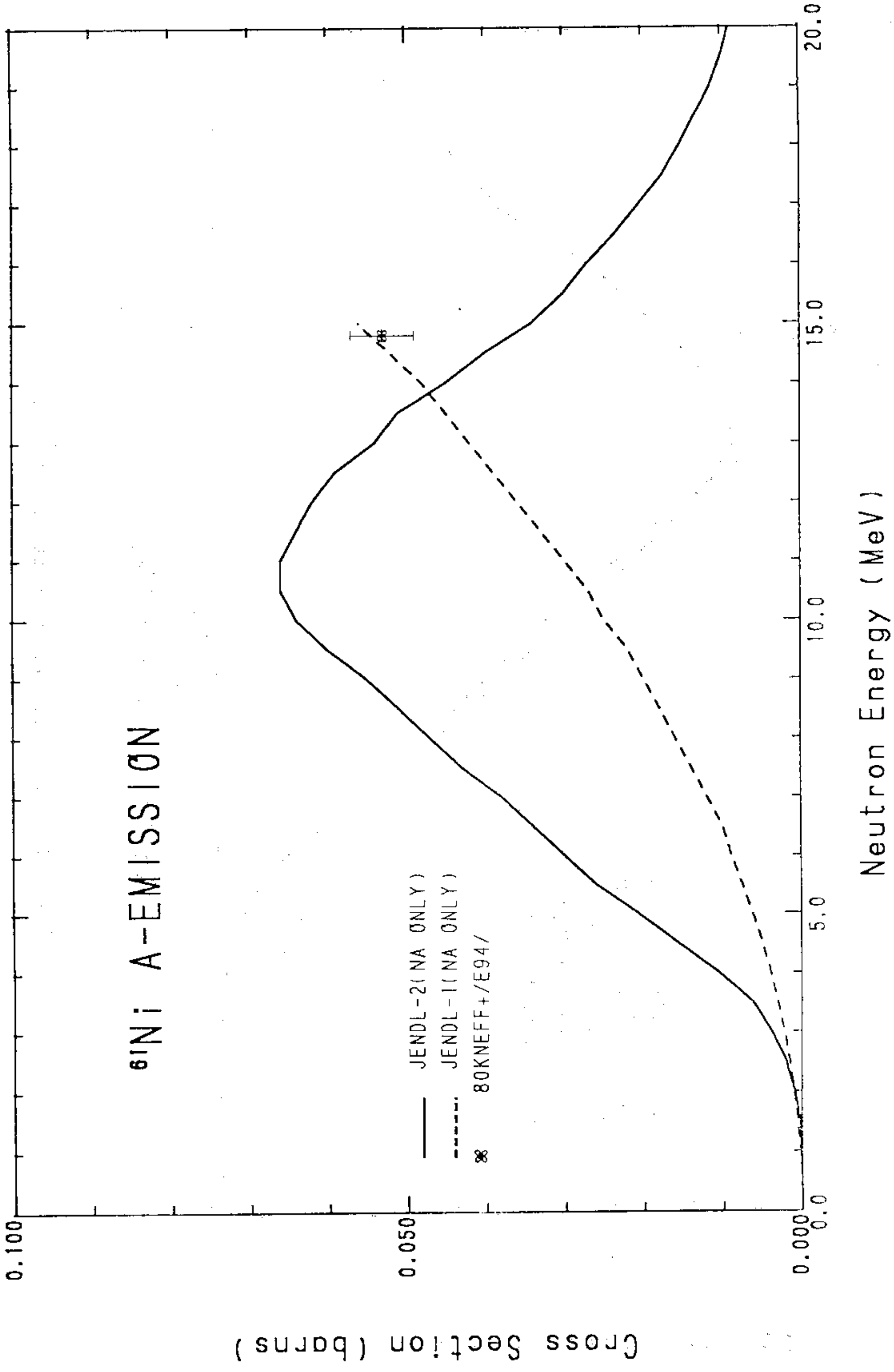


Fig. 53 α-emission cross section of ^{61}Ni.

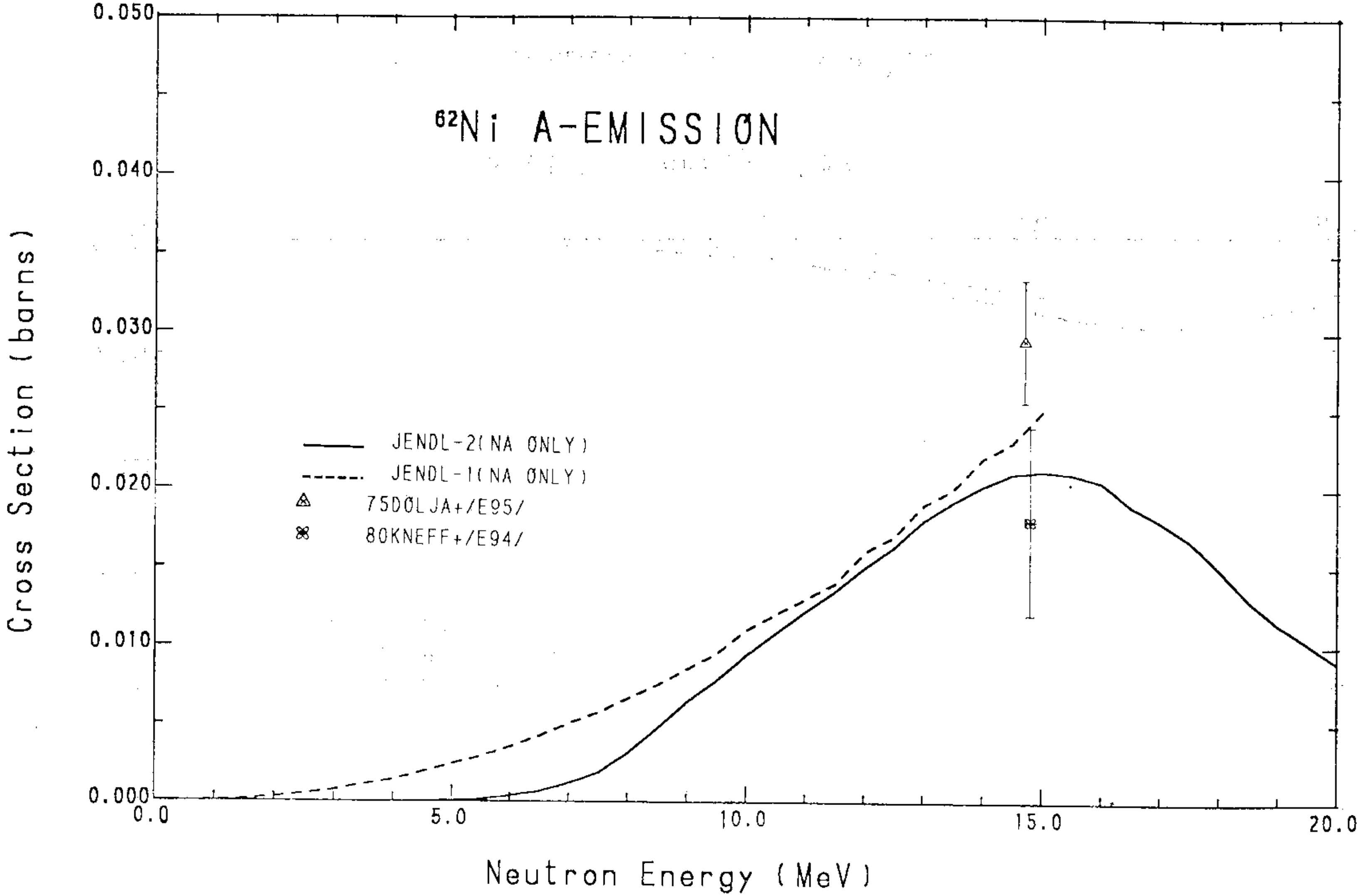


Fig. 54 α-emission cross section of ^{62}Ni.

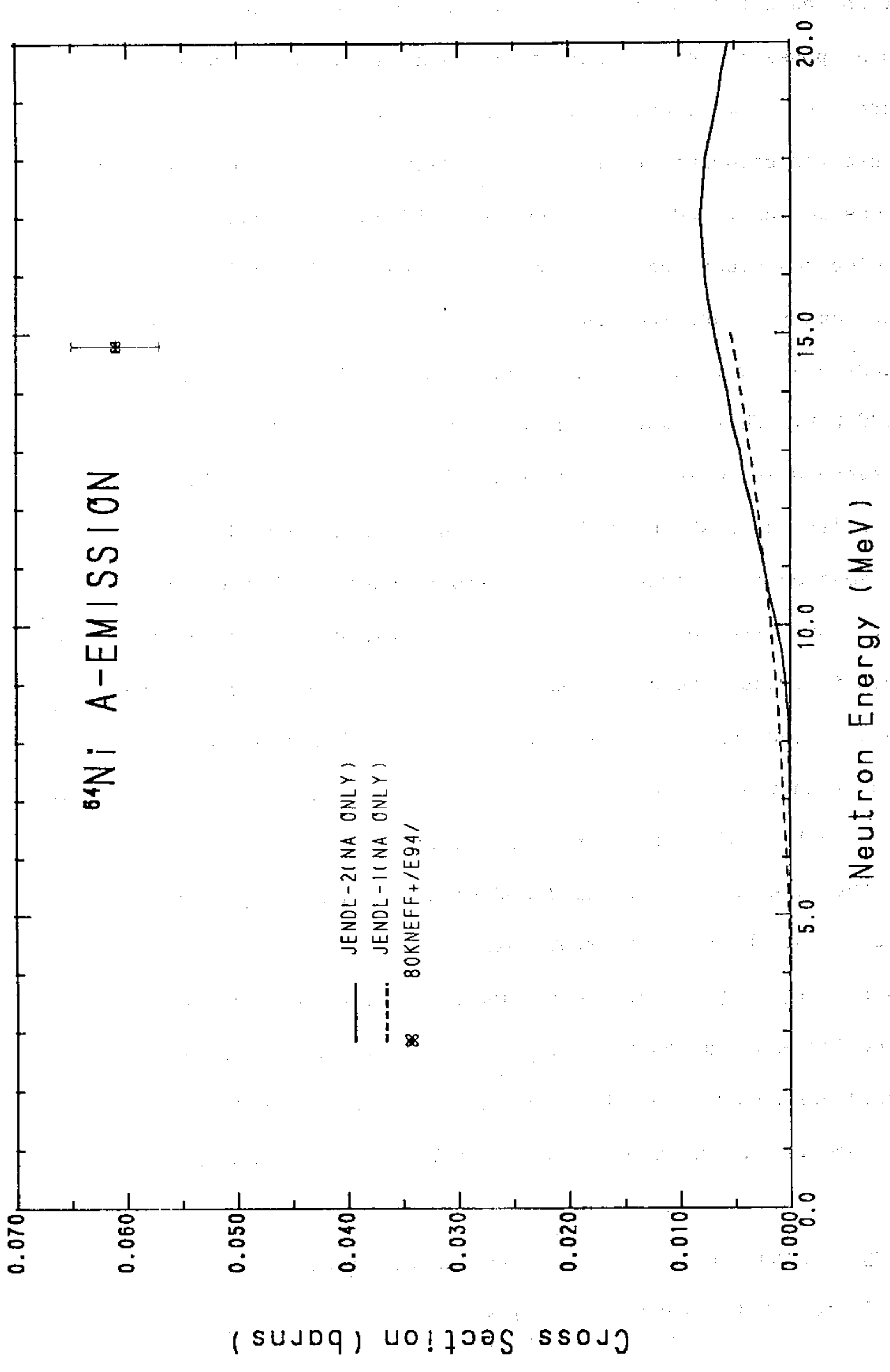


Fig. 55 α-emission cross section of ^{64}Ni.

Appendix Background Cross Sections

It is desirable to give the resonance parameters up to the energy as high as possible for the structural materials, since the resonance structure has an important role in the self-shielding effects even in the unresolved resonance region up to a few MeV. Hence the resonance region was set up to 600 keV except for ^{61}Ni in the present evaluation. Such a wide resonance region, however, causes the following problems.

The capture cross sections calculated from these resonance parameters are lower than the measured data in the energy range above about 200 keV. This underestimation comes from the level missing of the p-wave resonances, which is obvious in the staircase plotting of resonance levels as shown in Figs. A1 $\sim$ A5. We corrected this underestimation by applying a slight smooth positive background cross section. Some disagreement between the calculated and the experimental cross sections was also corrected by the background cross section instead of adjusting the resonance parameters. The capture cross sections of natural nickel with and without the background cross section are shown in Fig. A6 with the measured data.

On the other hand, the total and elastic scattering cross sections calculated from the present parameters are underestimated slightly in the lower energy region and overestimated considerably in the higher energy region above a few tens of keV. Hence we have investigated why this anomalous behavior of the total and elastic scattering cross sections occurs, and we have found the following two reasons:

A) Energy Dependence of Effective Scattering Radius

In the ENDF/B format, the effective scattering radius R is required to be constant through the resolved resonance region. For a wide energy range such as up to 600 keV, however, the effective scattering radius is not constant but energy dependent. The optical model calculation shows that the radius of Ni isotopes decreases considerably with increase of the neutron energy as shown in Figs. A7 ∿ A11. The radius decreases often down to a factor of 0.7 at 600 keV. It is therefore evident that the constant radius approximation causes considerable overestimation in the higher energy region. However, this effect is not sufficient to explain the overestimate in the higher energy region.

B) Truncation Effect of Finite Resonances

The resonance shape of the elastic scattering cross section is asymmetric as shown in Fig. A12 because of the interference between the resonance and potential scattering. Hence its contribution is positive in the higher off-resonance energy region and negative in the lower energy region. Consider an energy point. If there are many resonances both in higher and lower energy region as in the case of actual nuclei, the positive and negative contributions cancel out at this energy point.

In the evaluated data file, however, we take a finite number of resonances. Hence all the contributions of distant resonance levels are positive near the upper boundary of the resonance region, and are negative near the lower boundary. This situation is schematically shown in Fig. A12.

In order to know how much this effect is, the cross section of ^{58}Ni was calculated by removing the resonance levels below 400 keV. The results are compared with those without removal of levels in

Fig. A13. The cross section value is reduced more than 20% in the off-resonance energy region. It is found that the truncation effect is as much as the effect of the energy dependence of the effective scattering radius described above.

It is revealed from the present study that the overestimation of the total and elastic scattering cross sections in the higher energy region is inevitable if we use the constant scattering radius. How should this overestimation be corrected? Applying the background cross section is a common way. In the present case, however, the background correction is very difficult particularly for the isotopes from the following reason: The overestimation becomes more than 3 barns at the off-resonance regions above 400 keV. On the other hand, the cross section minimum due to the interference often becomes as low as 0.5 barns. Therefore a smooth negative background correction causes negative cross section values at the energies of the cross section minima.

Consequently the background cross section must have strong energy dependence. It is a hard job to determine such an energy dependent background cross section, as so many resonance levels exist in the energy region considered.

To avoid this difficulty, we adopted the energy dependent effective scattering radius by modifying the ENDF/B format for internal use. We found that the overestimation could disappear with the following energy dependent radius:

$$R\ (\mathrm{fm}) = 8.11 - 5.9 \times E_n\ (\mathrm{MeV}) \quad \text{for } {}^{58}\mathrm{Ni},$$
$$= 7.0 - 5.0 \times E_n\ (\mathrm{MeV}) \quad \text{for } {}^{60}\mathrm{Ni},$$
$$= 6.4 - 8.3 \times E_n\ (\mathrm{MeV}) \quad \text{for } {}^{61}\mathrm{Ni},$$
$$= 7.66 - 4.29 \times E_n\ (\mathrm{MeV}) \quad \text{for } {}^{62}\mathrm{Ni},$$
$$= 7.37 - 3.7 \times E_n\ (\mathrm{MeV}) \quad \text{for } {}^{64}\mathrm{Ni}.$$

The present radius is also shown in Figs. A7 ∿ A11. The solid line in Fig. A13 shows the cross section calculated with the energy dependent radius.

The energy dependent radius is not allowed, however, in the current ENDF/B format. We made a proposal[A1] to modify the ENDF/B format so as to accept the energy dependent effective scattering radius. At present we took the difference between the energy-dependent and constant radius calculations as the background cross section. Consequently, the background cross section has a resonance-like structure. Such a strongly energy-dependent background cross section, however, might distor the Doppler broadened cross section, if it is calculated directly from the resonance parameters and the background cross section. As to the natural nickel, the background cross section was produced by the eye-guide method before the present study. The eye-guide method was possible, because the cross section minimums are not so low as those of the isotopes.

Figures A14-A19 show the background cross section of natural nickel and the isotopes.

References

A1) Kikuchi Y.: "Nuclear Data for Structural Materials", Proc. IAEA Consultants' Meeting, Vienna, 2-4 Nov. 1983, p.169, INDC(NDS)-152/L (1984).

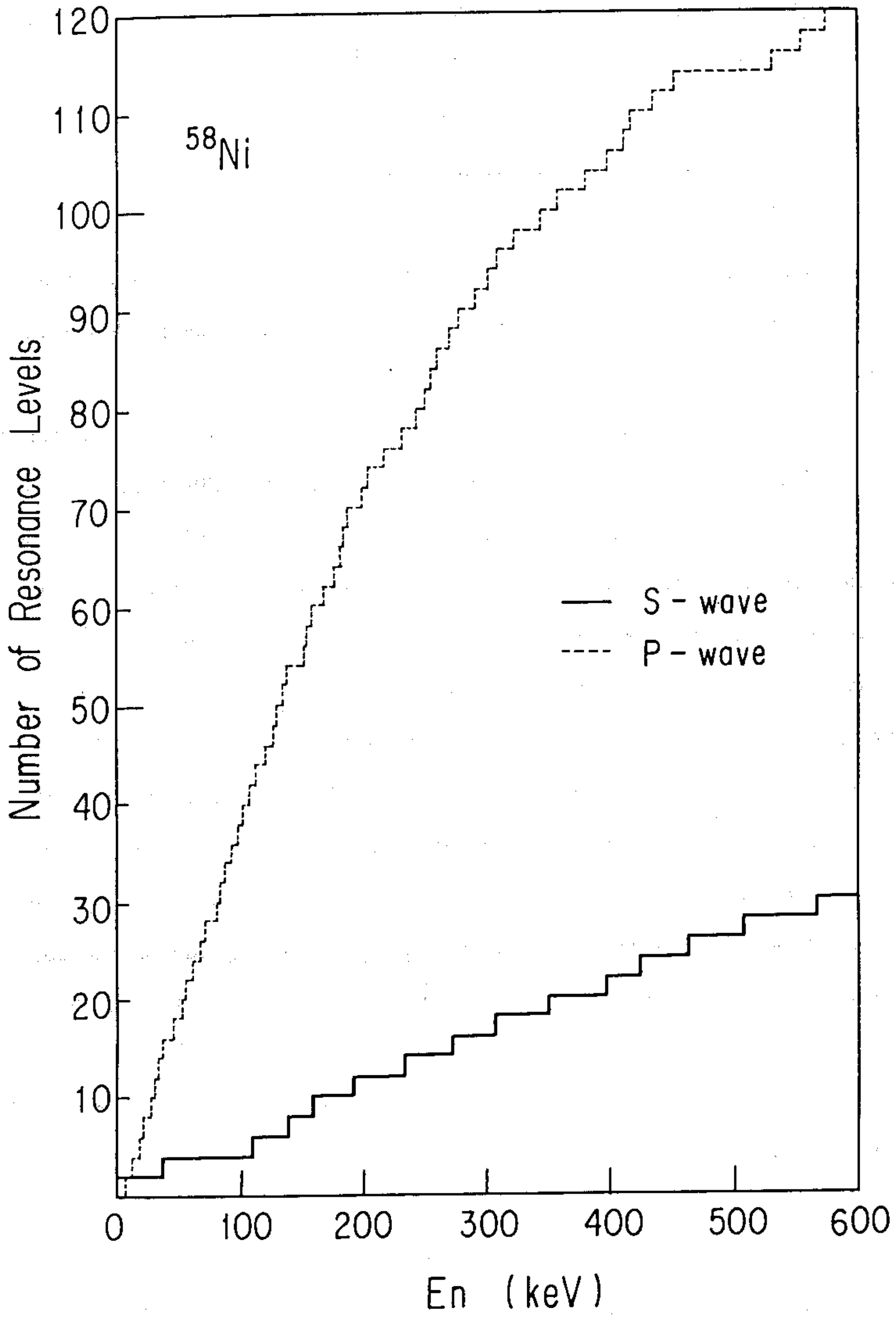


Fig.A.1 Staircase plotting of resonance levels of ^{58}Ni.

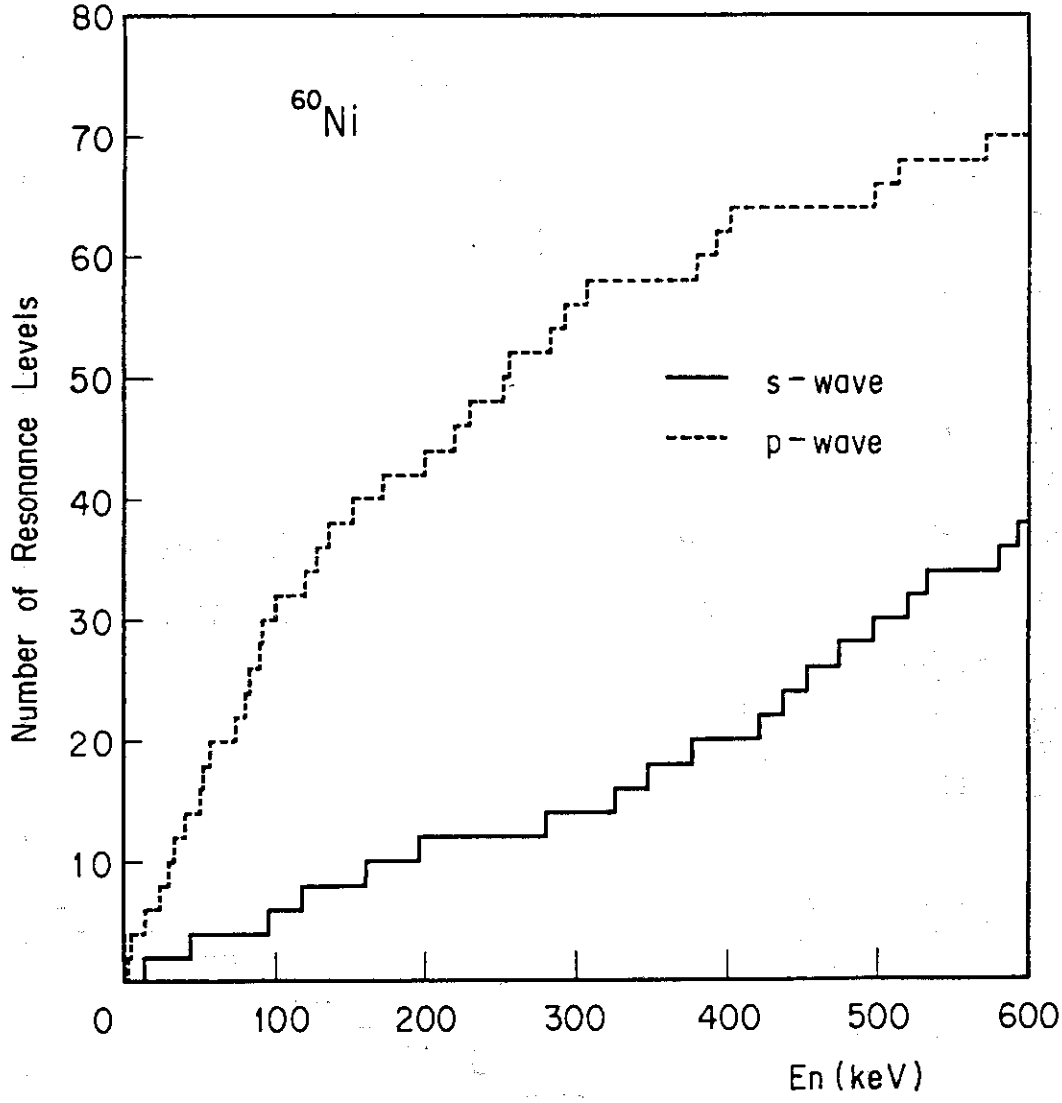


Fig.A.2 Staircase plotting of resonance levels of ^{60}Ni.

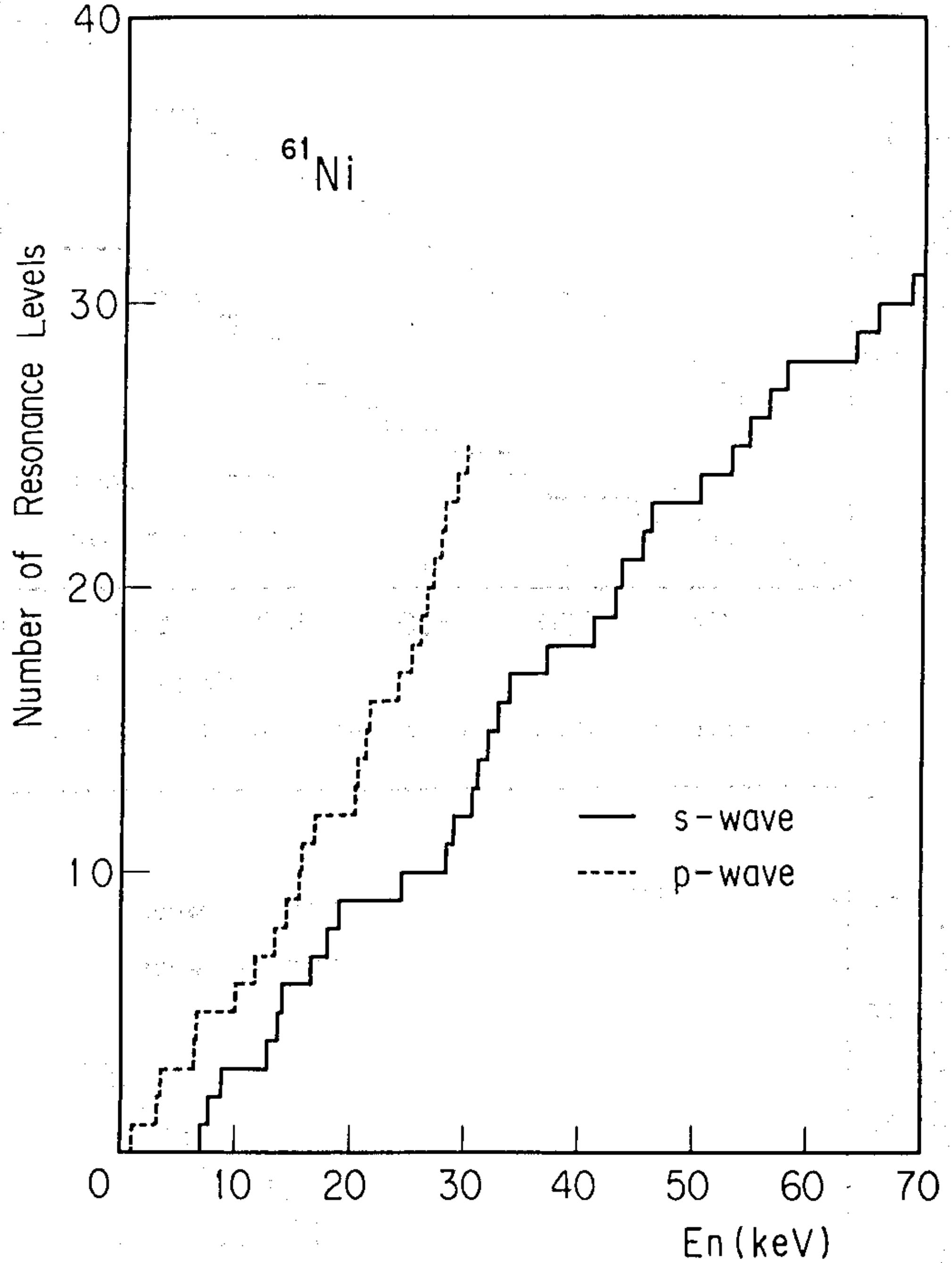


Fig.A.3 Staircase plotting of resonance levels of ^{61}Ni.

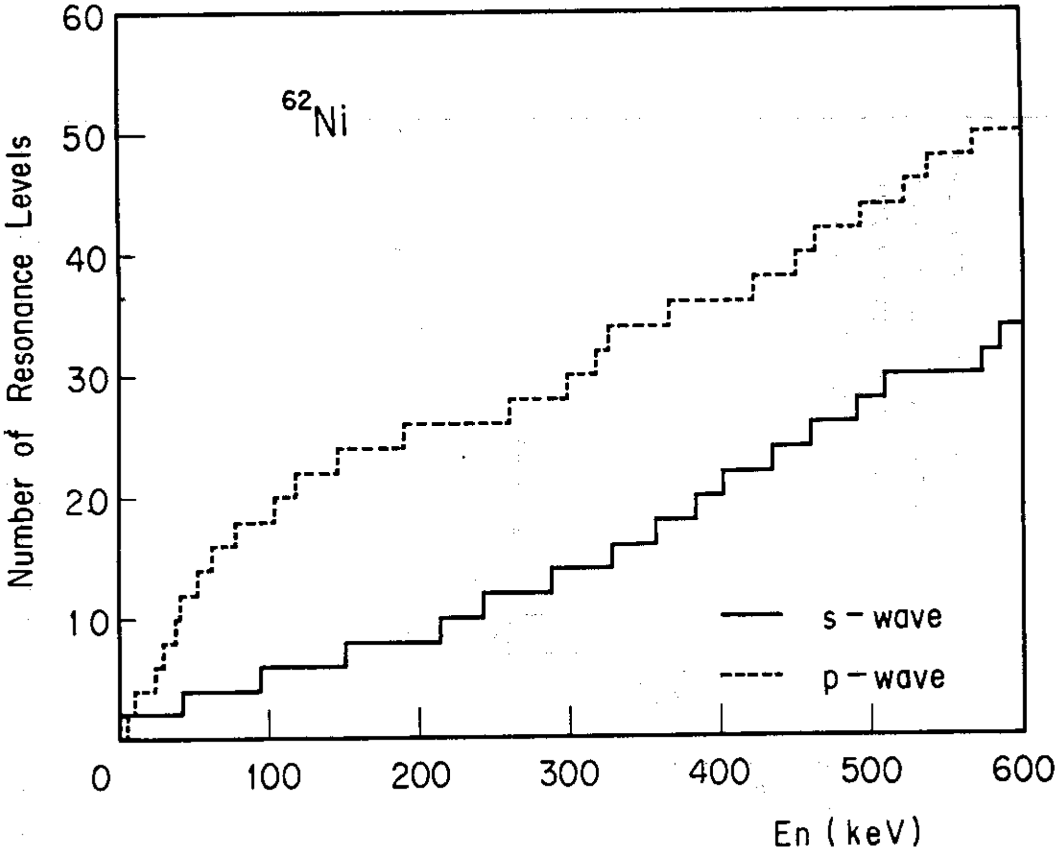


Fig.A.4 Staircase plotting of resonance levels of ^{62}Ni.

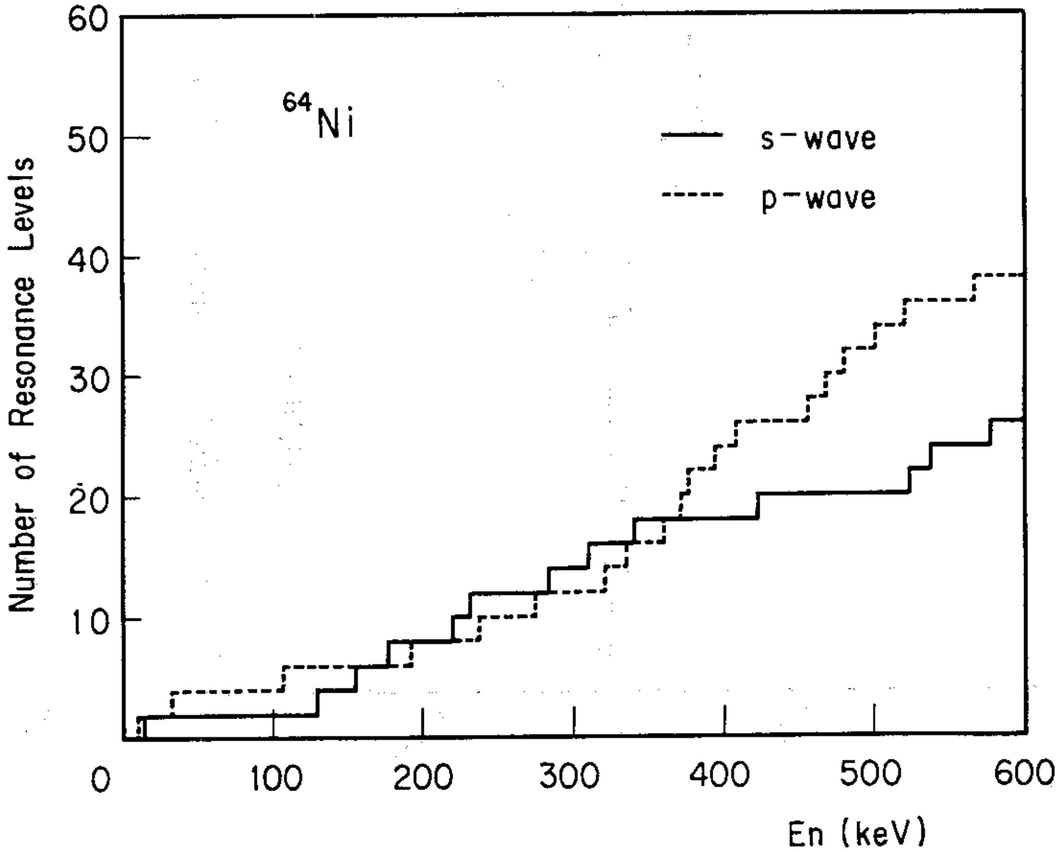


Fig.A.5 Staircase plotting of resonance levels of ^{64}Ni.

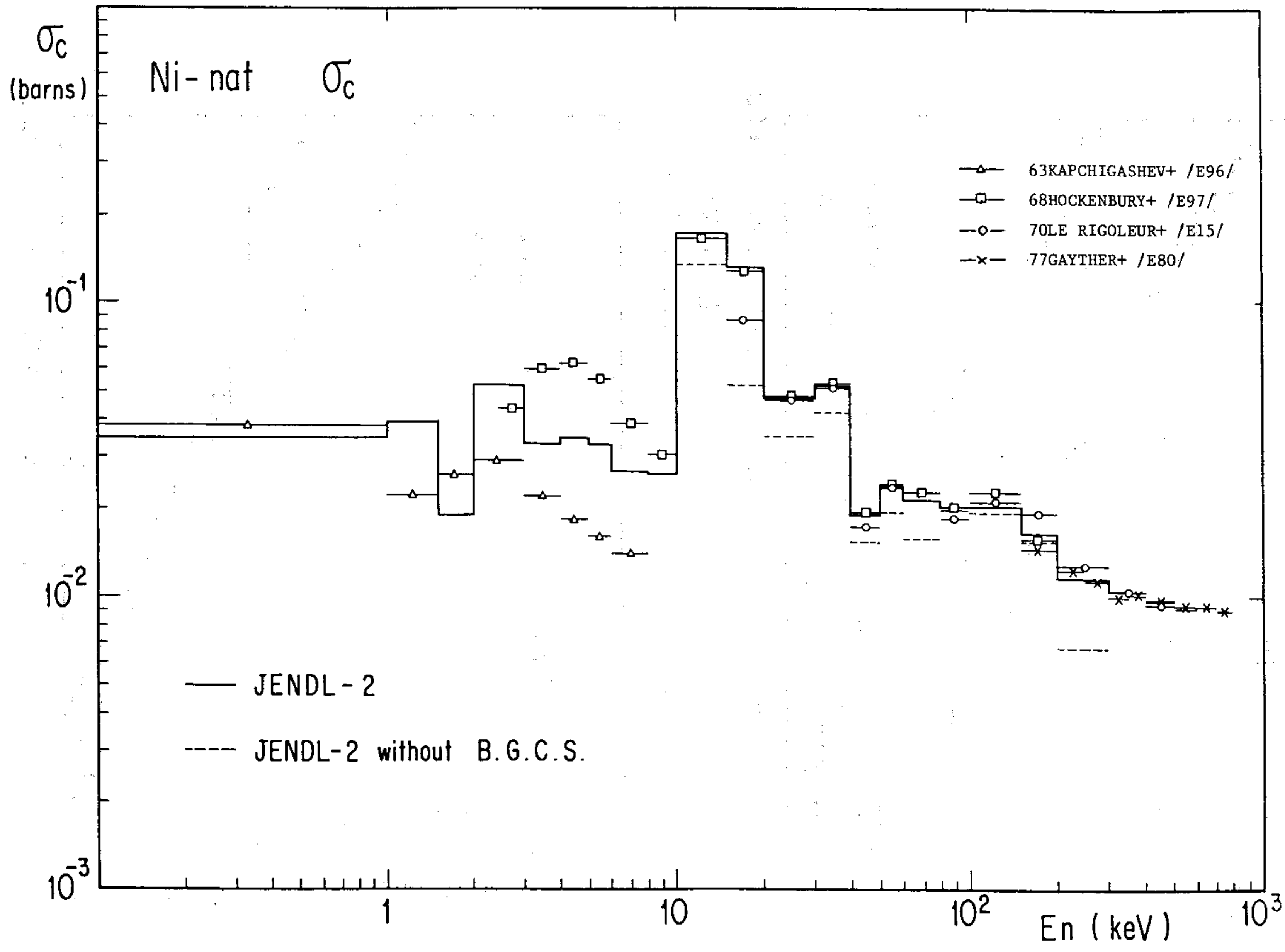


Fig.A.6 Average capture cross sections of natural nickel with and without background cross section.

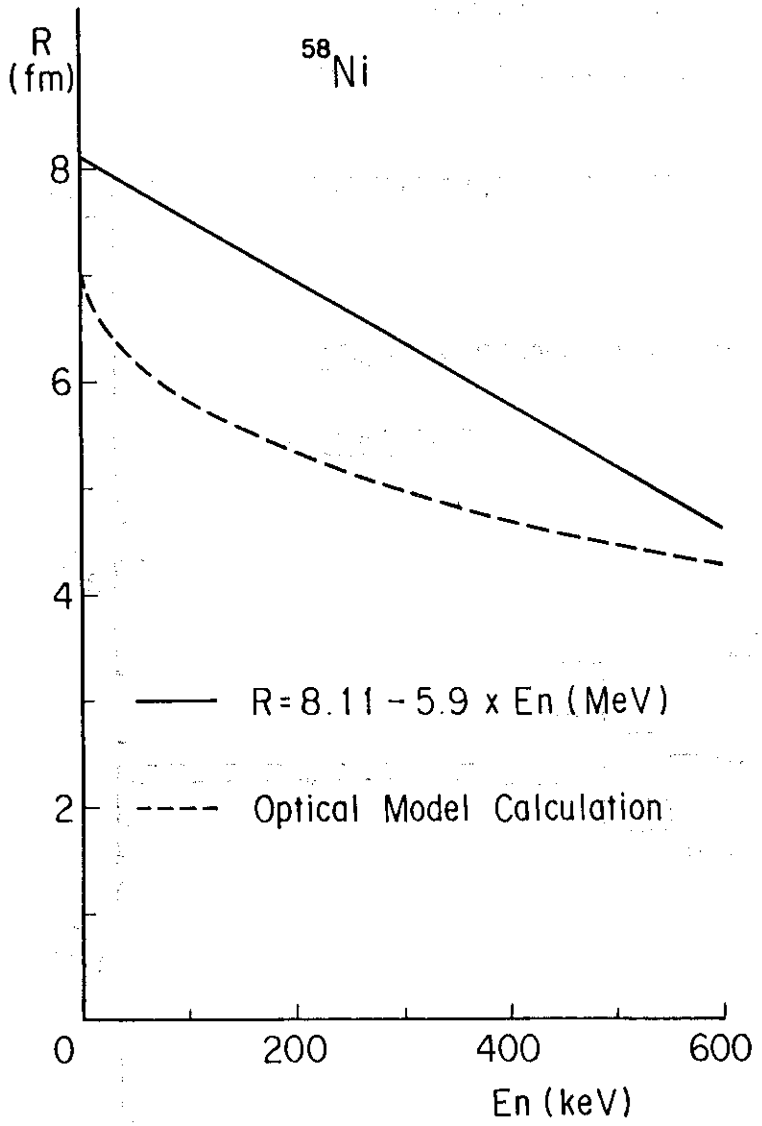


Fig.A.7 Energy dependence of the effective scattering radius of ^{58}Ni. The solid line is the adopted value in JENDL-2. The dashed line is calculated with the optical model.

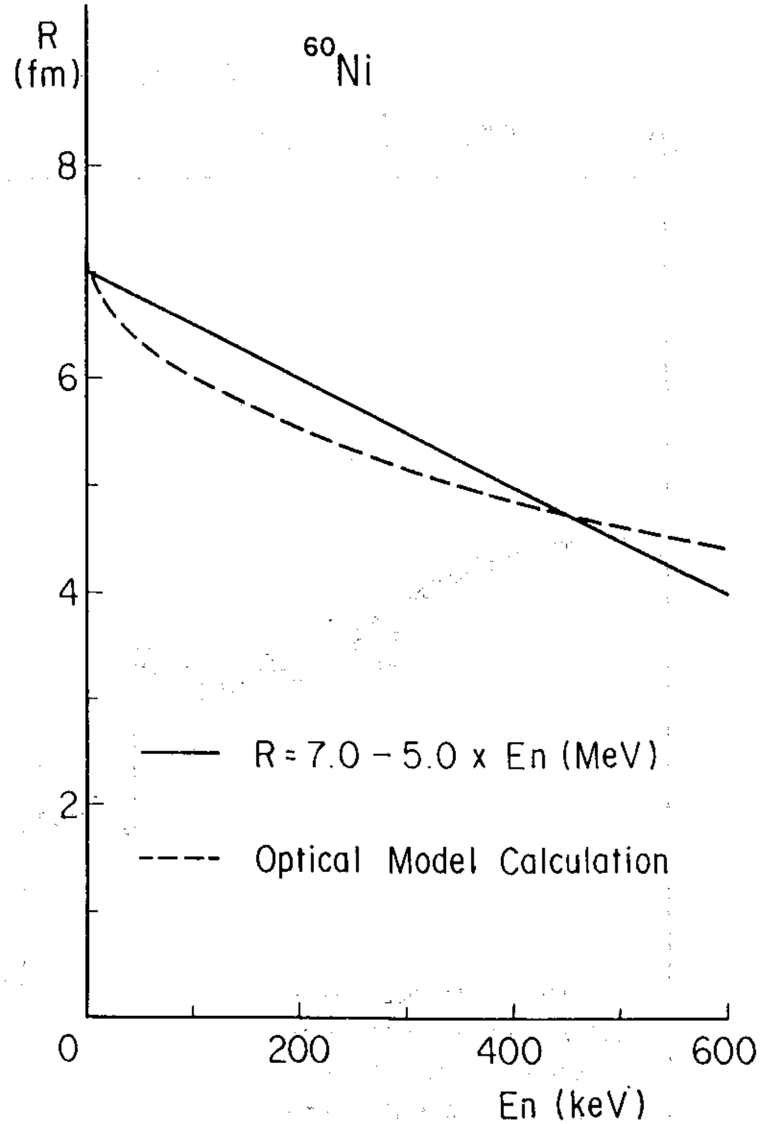


Fig.A.8 Energy dependence of the effective scattering radius of ^{60}Ni. The solid line is the adopted value in JENDL-2. The dashed line is calculated with the optical model.

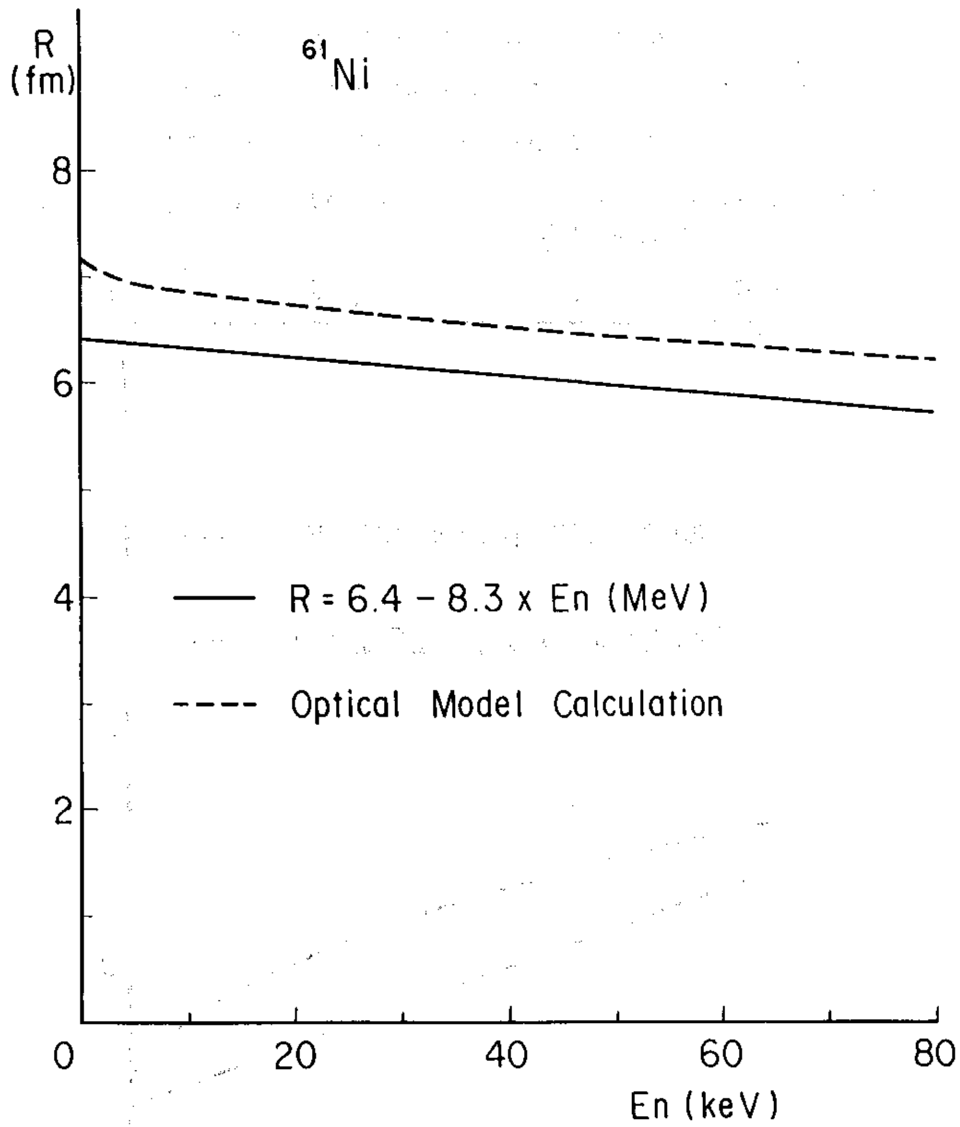


Fig.A.9 Energy dependence of the effective scattering radius of ^{61}Ni. The solid line is the adopted value in JENDL-2. The dashed line is calculated with the optical model.

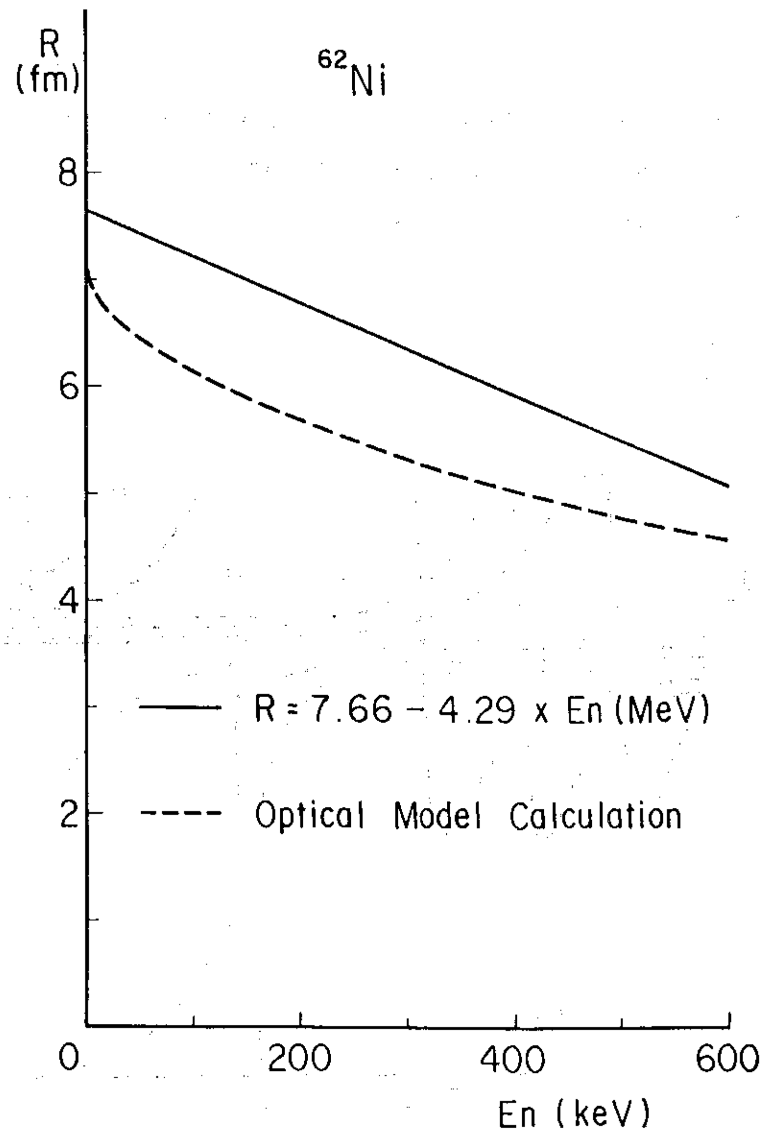


Fig.A.10 Energy dependence of the effective scattering radius of ^{62}Ni. The solid line is the adopted value in JENDL-2. The dashed line is calculated with the optical model.

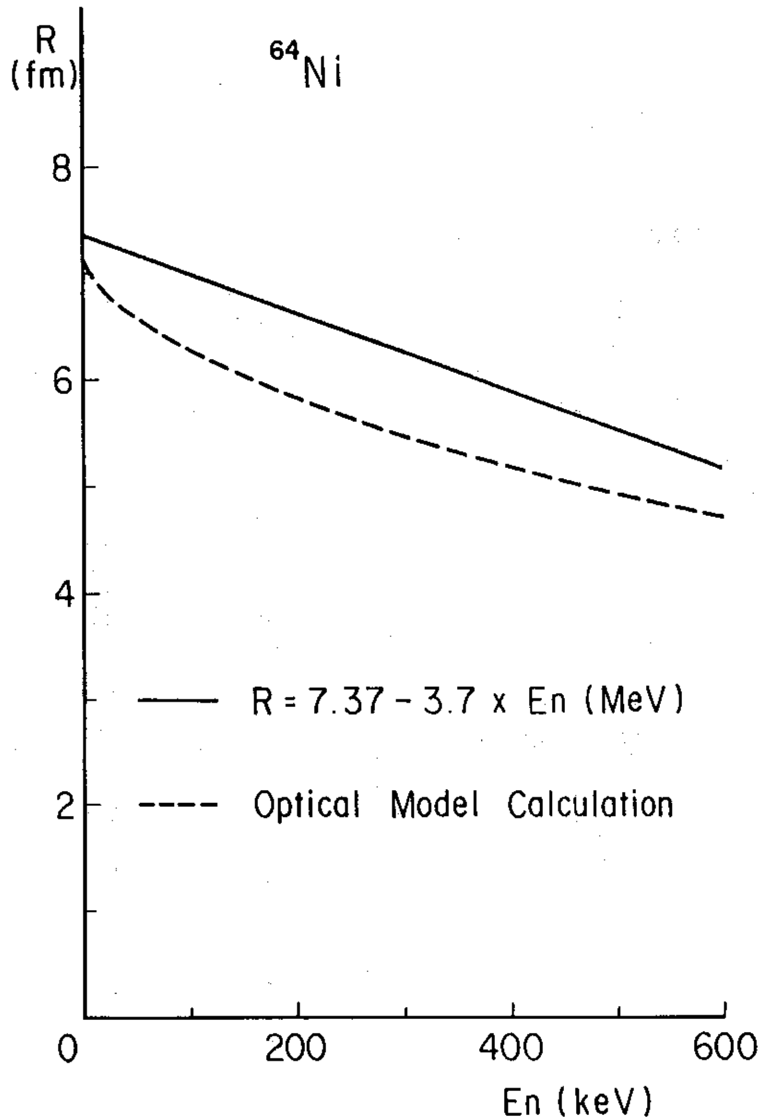


Fig.A.11 Energy dependence of the effective scattering radius of ^{64}Ni. The solid line is the adopted value in JENDL-2. The dashed line was calculated with the optical model.

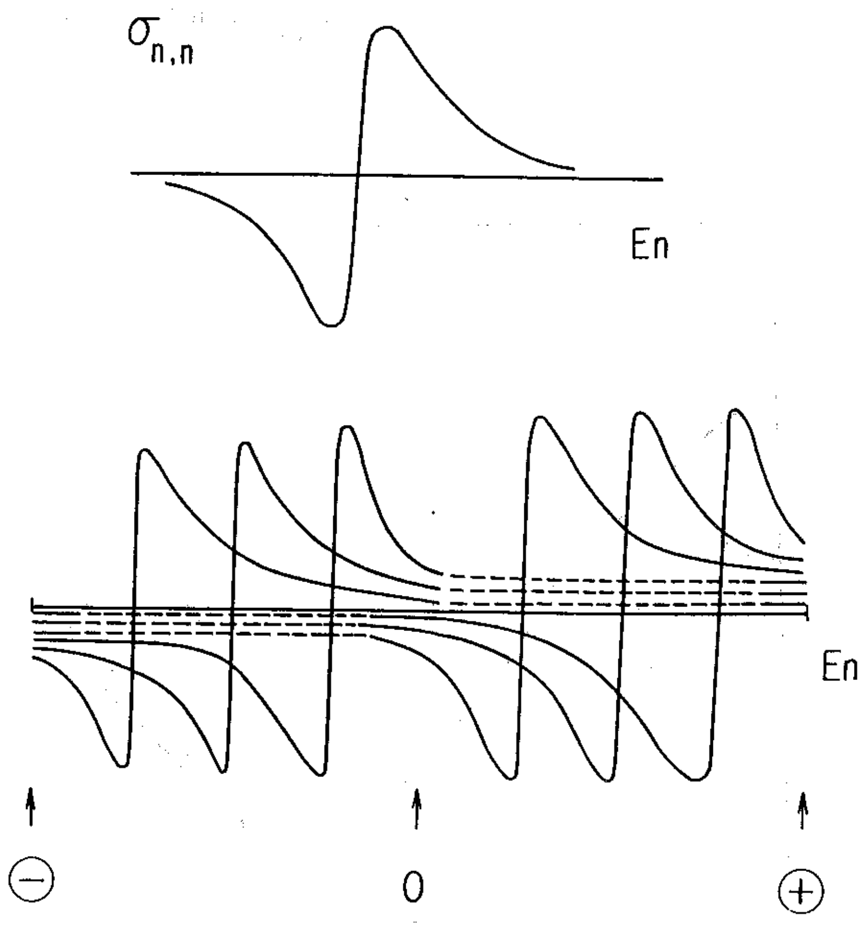


Fig.A.12 Shape of elastic scattering cross section (upper) and schematic view of the contribution from distant levels (lower).

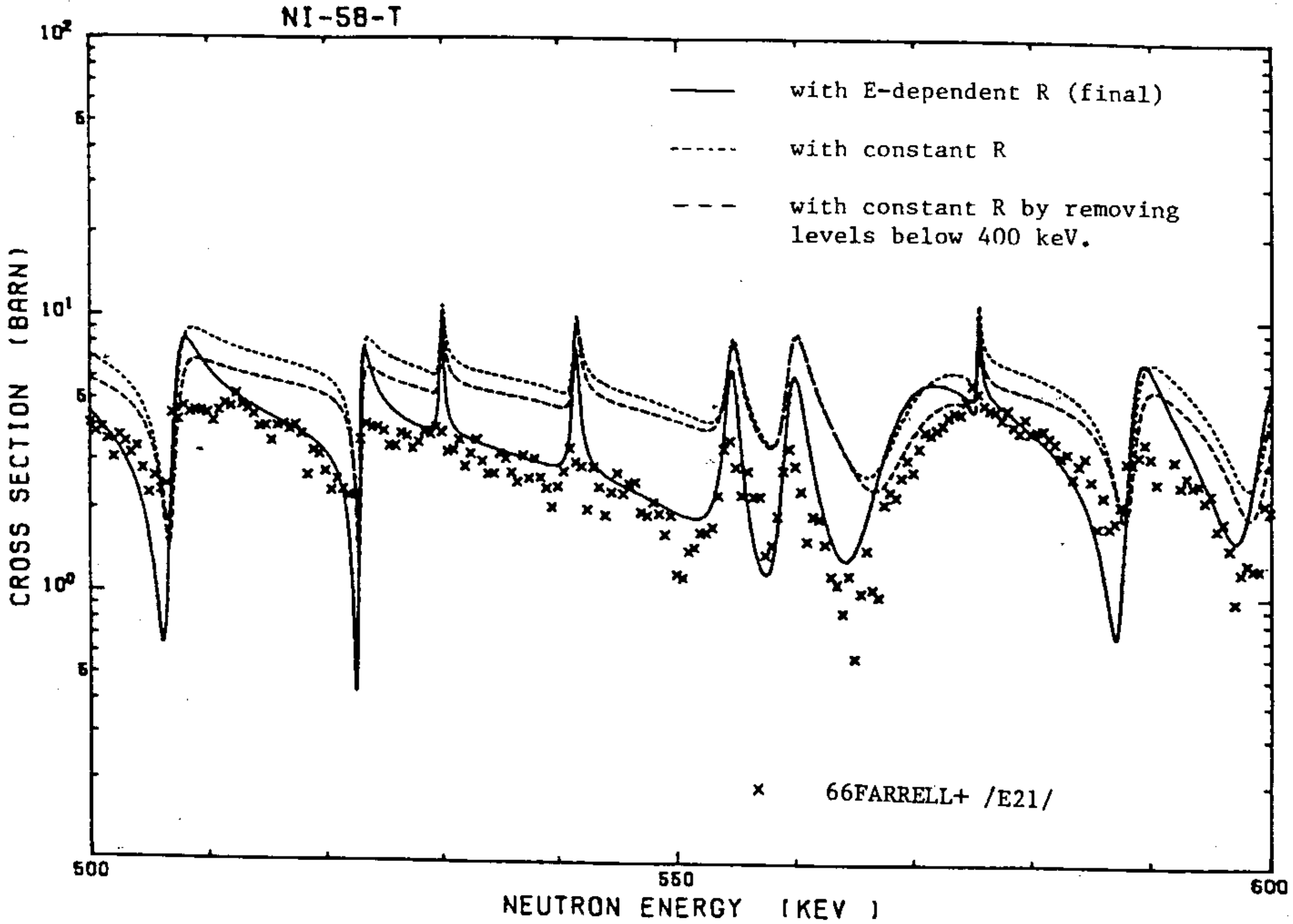
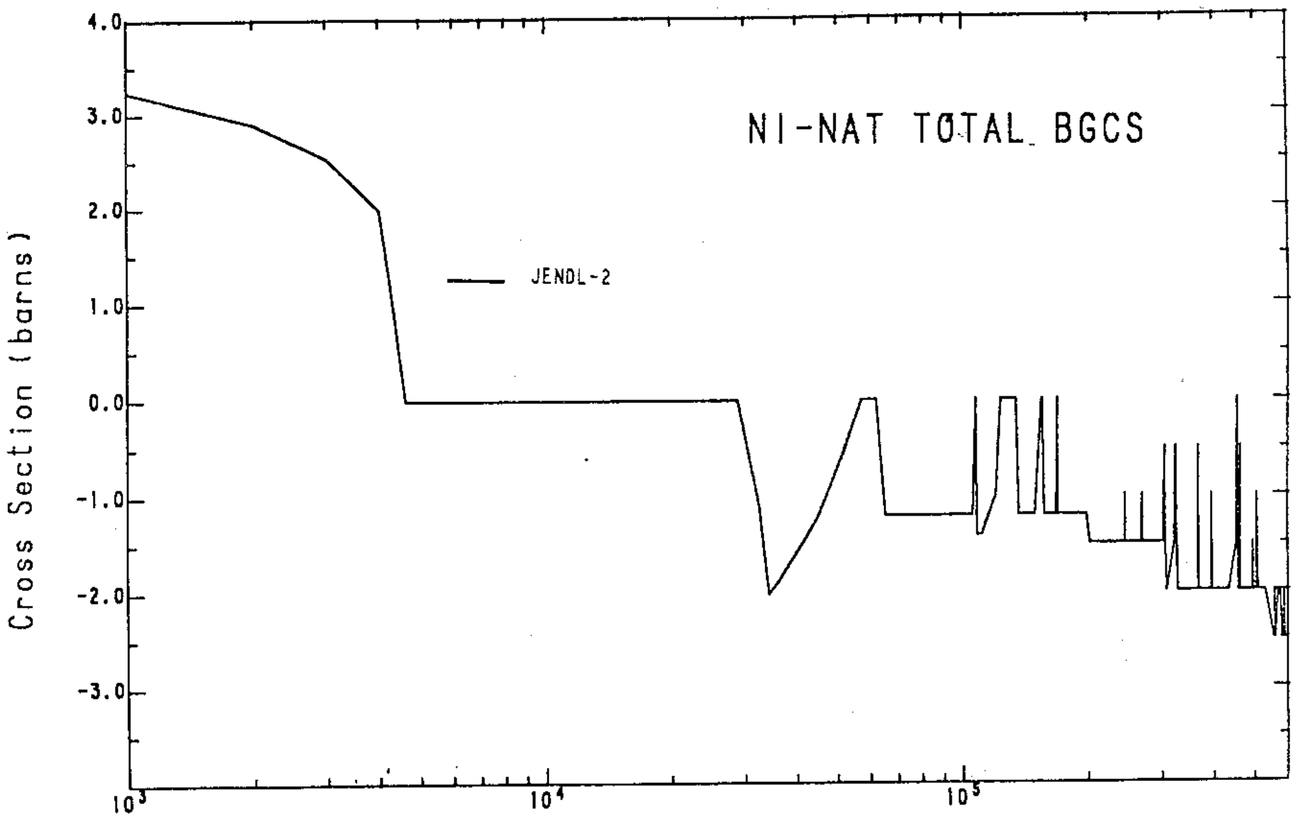


Fig.A.13 Total cross sections of ^{58}Ni. The solid line is calculated with the finally adopted energy dependent effective scattering radius and the dotted line with the constant radius. The dashed line is calculated with the constant radius by removing the resonances below 400 keV in order to know the truncation effect.



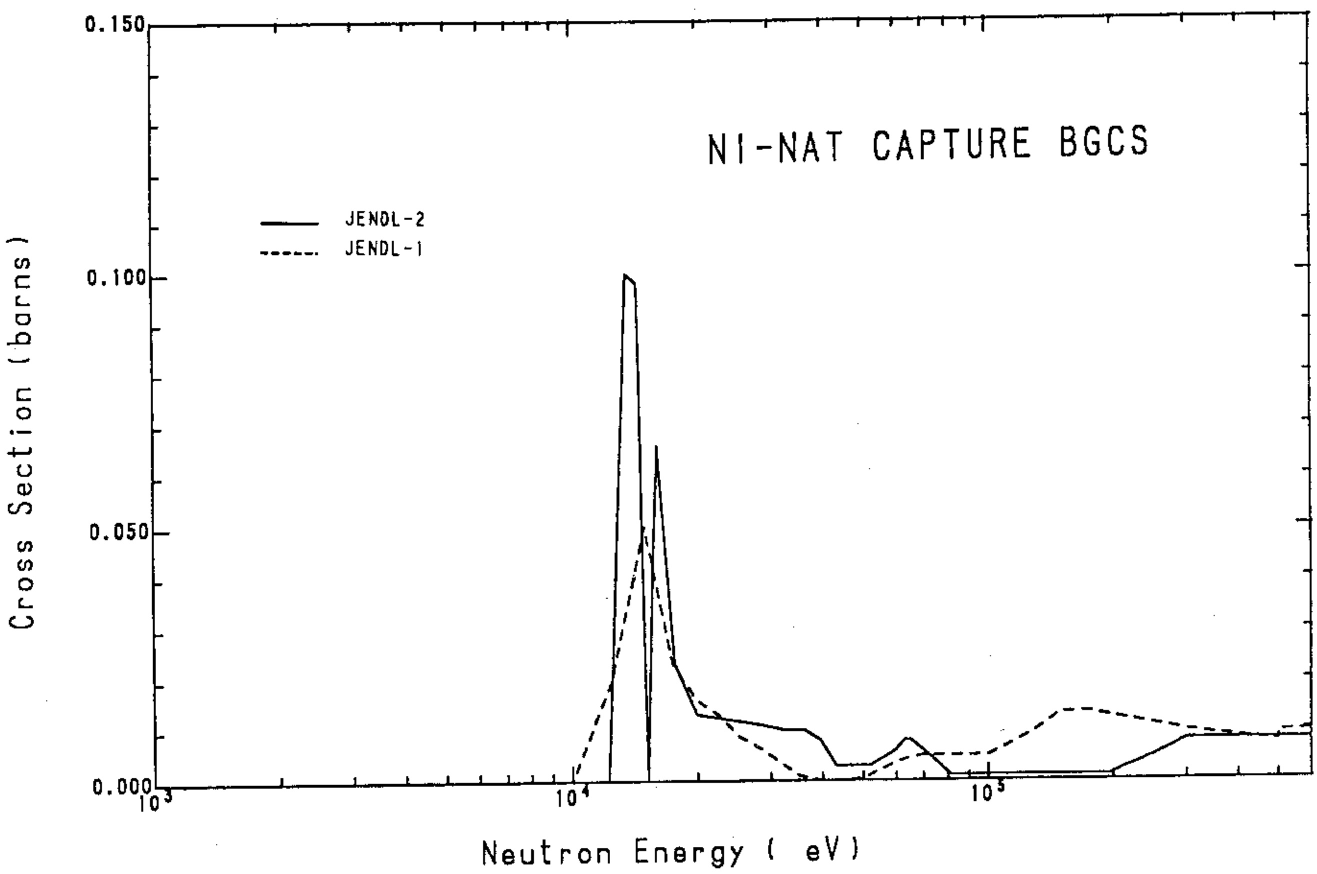


Fig.A.14 The total and capture background cross sections of natural nickel.

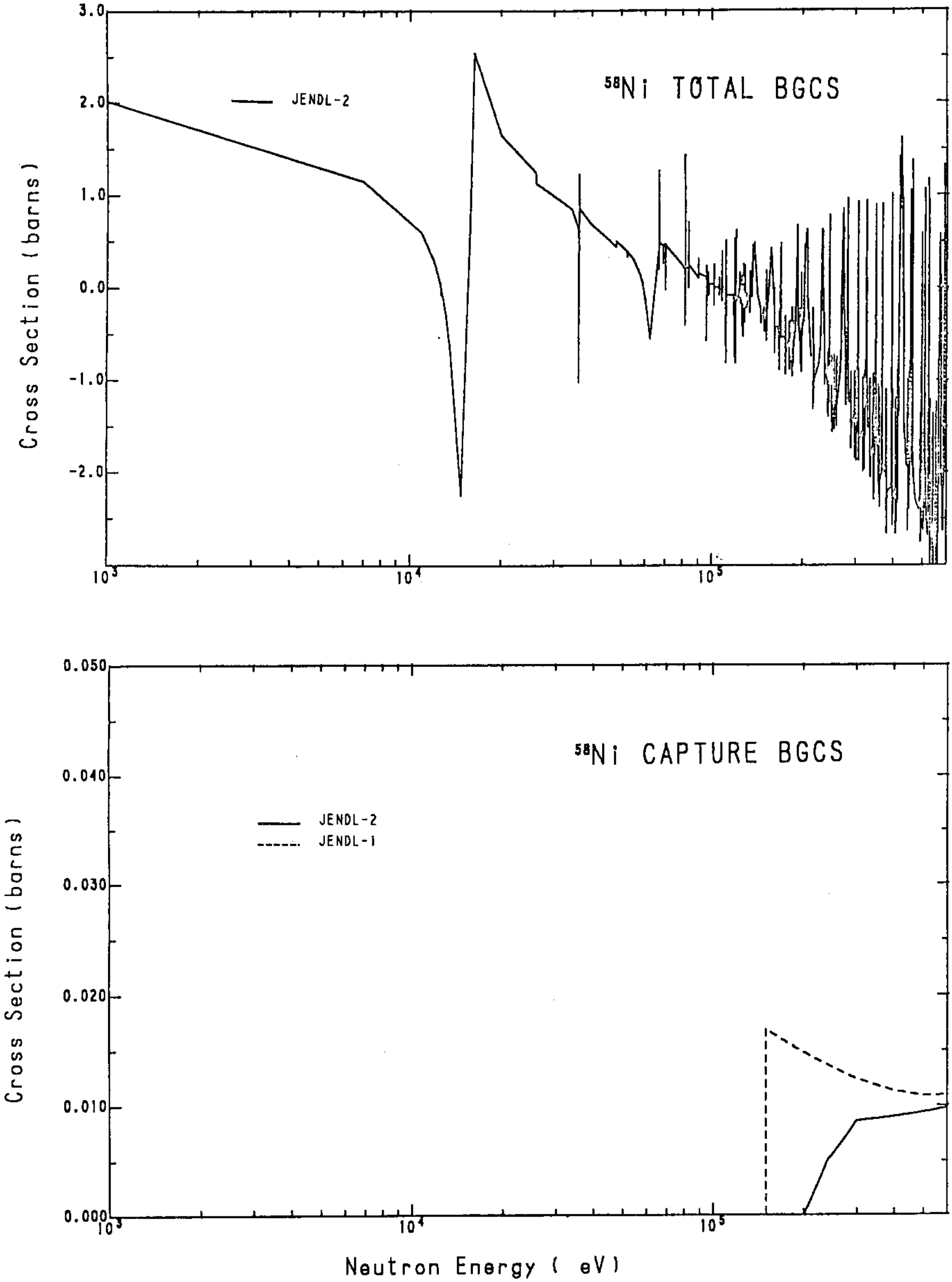


Fig.A.15 The total and capture background cross sections of ^{58}Ni.

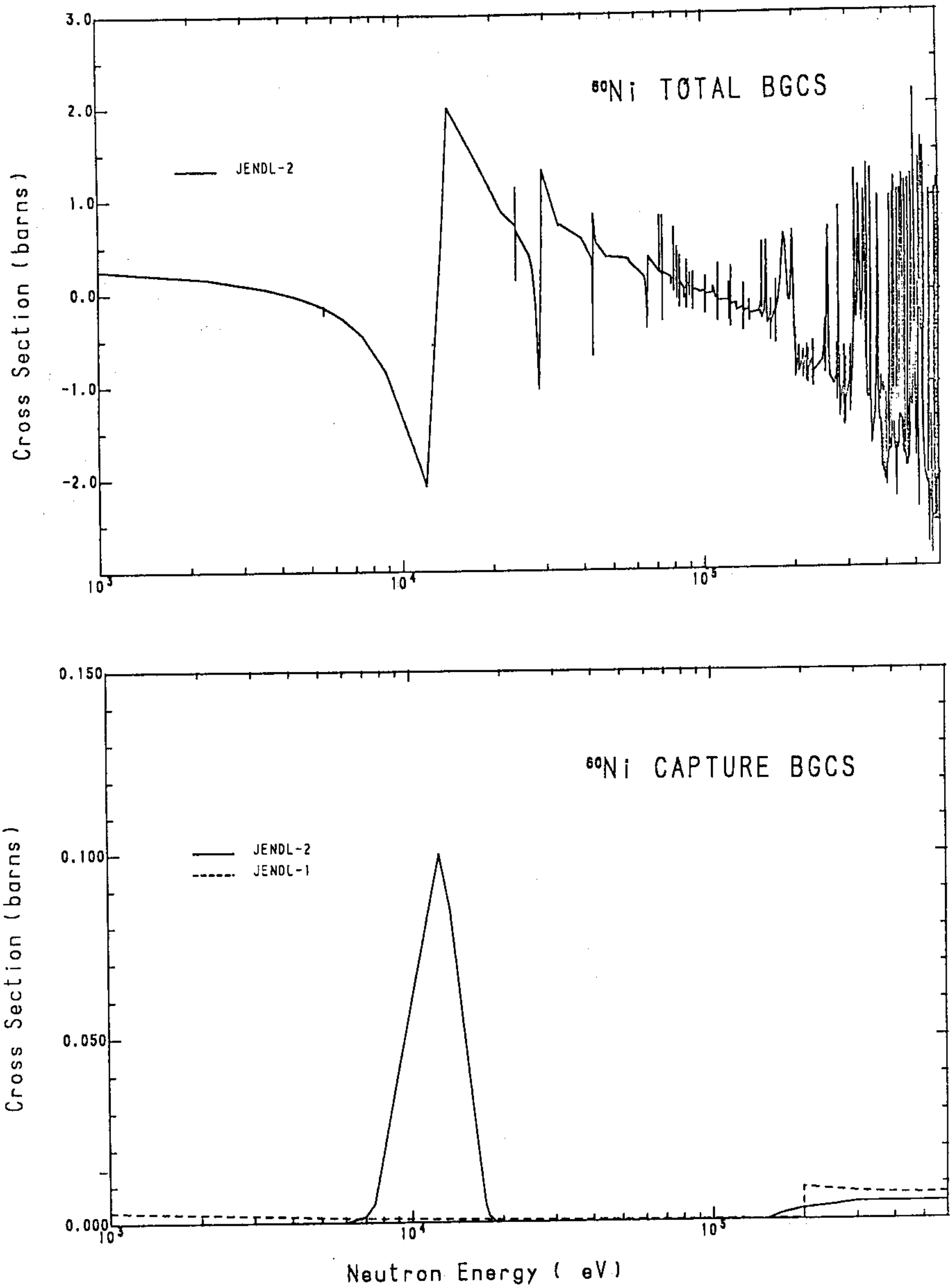
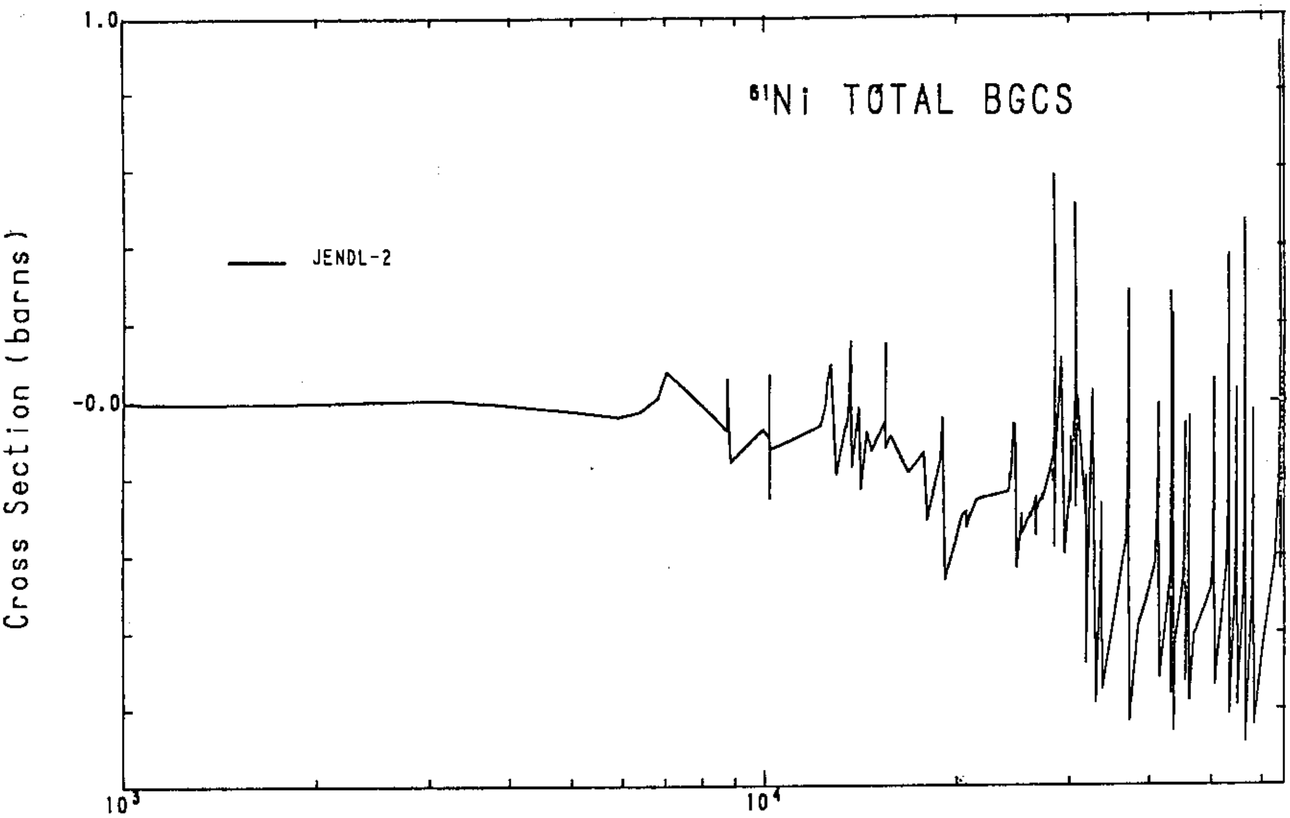


Fig.A.16 The total and capture background cross sections of ^{60}Ni.



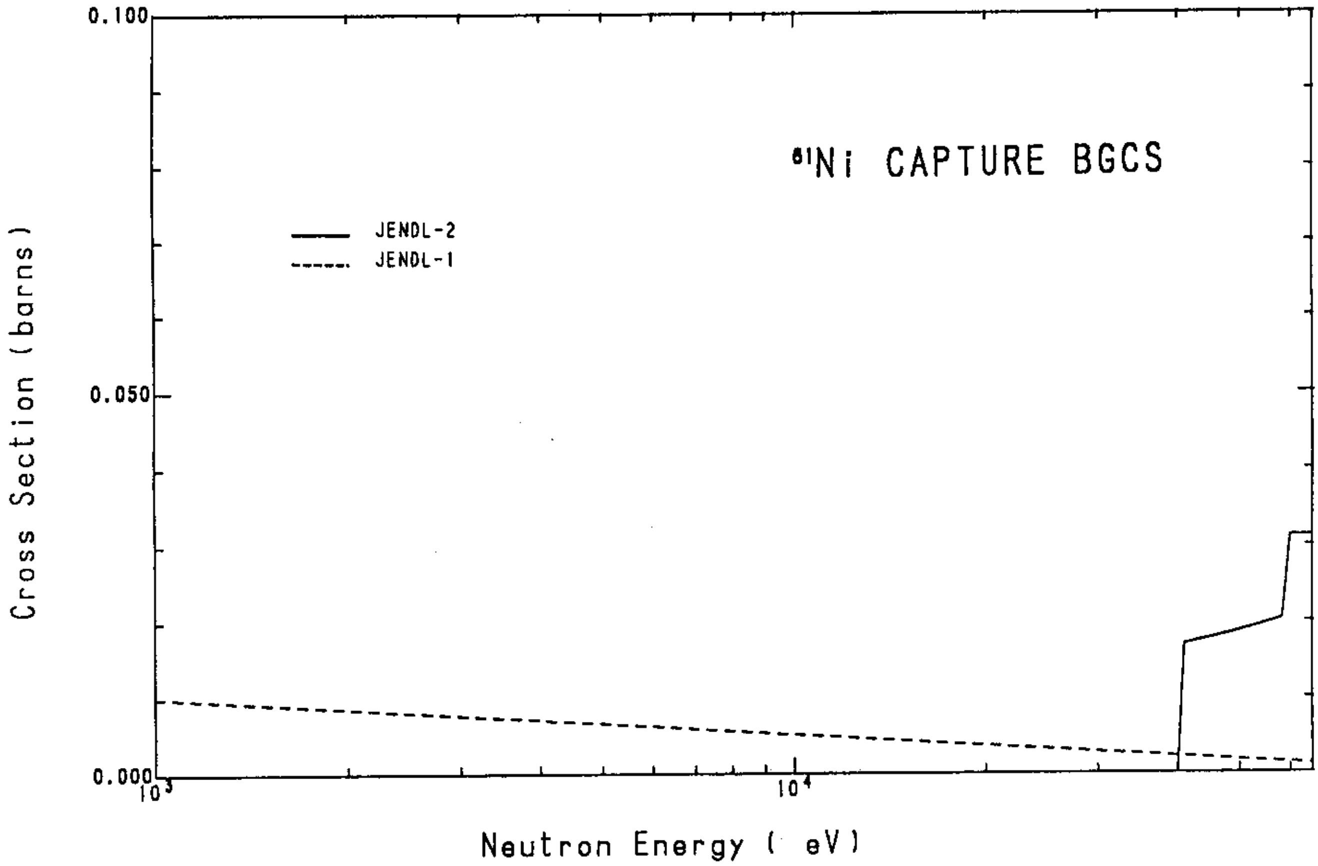


Fig.A.17 The total and capture background cross sections of ^{61}Ni.

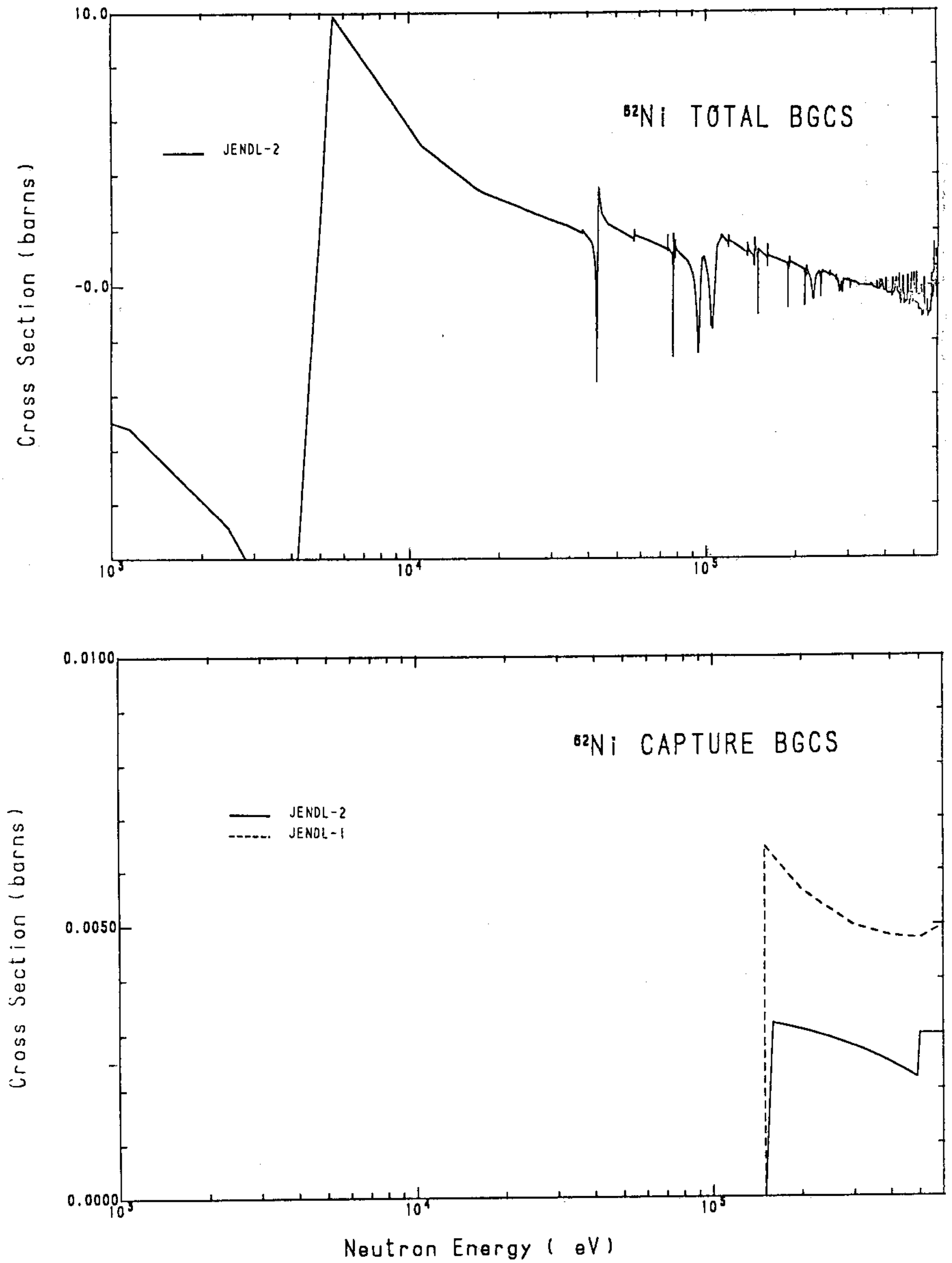


Fig.A.18 The total and capture background cross sections of ^{62}Ni.

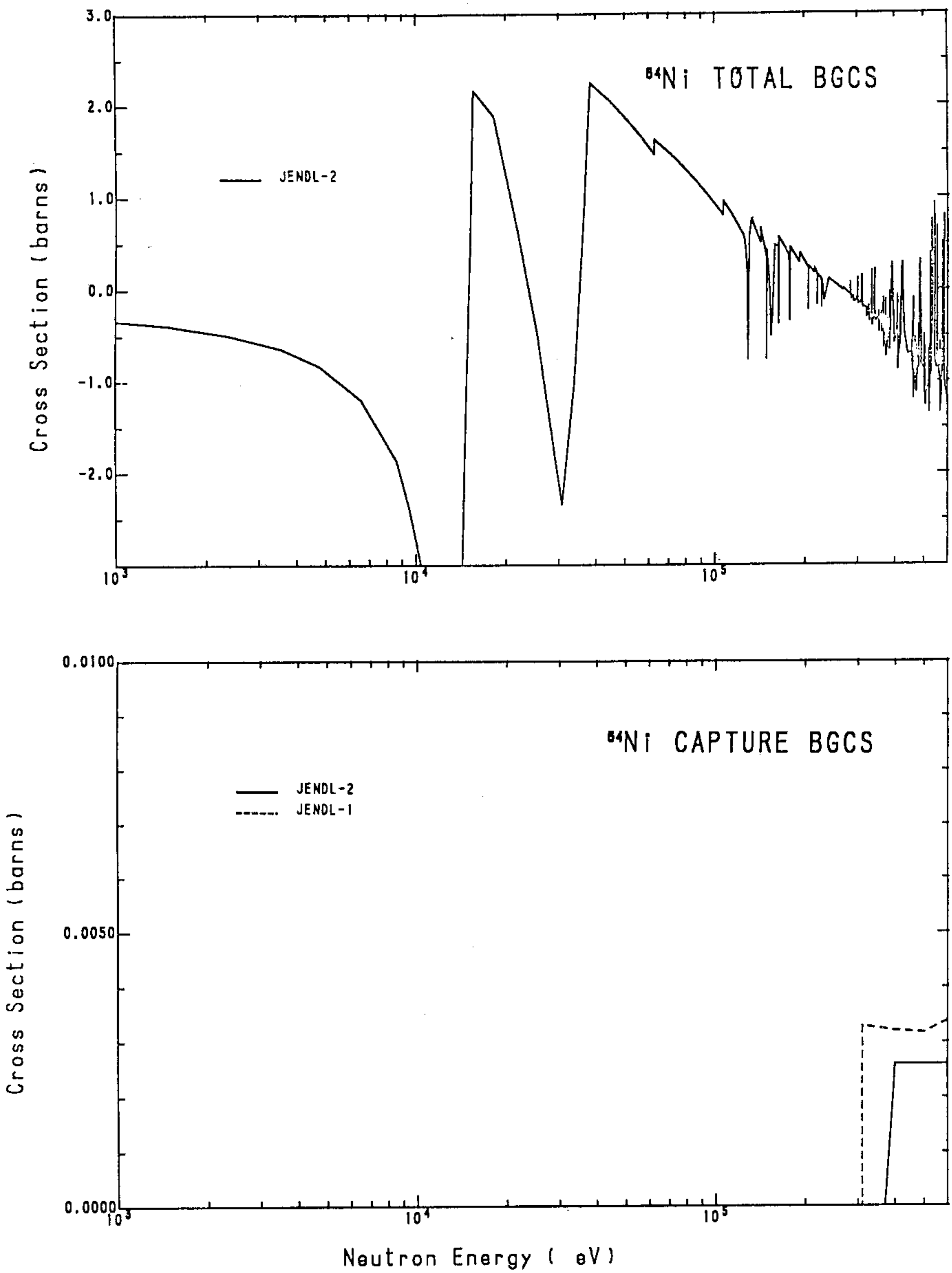


Fig.A.19 The total and capture background cross sections of ^{64}Ni.