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Evaluation of the $^{58}Ni(n,2n)^{57}Ni$ Cross Sections

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Abstract

The excitation function for the reaction $^{58}Ni(n,2n)^{57}Ni$ was evaluated in the neutron-energy range from the threshold (12.41 MeV) to 20 MeV. All available experimental data sets were critically reviewed and obviously erroneous data sets were disregarded. If necessary, the data were renormalized in order to take into account adjustments of the decay data of the product nucleus ^{57}Ni and of reference cross sections. Cross section values were evaluated for energy groups 0.2 MeV to 1.5 MeV wide, the width depending on the number of available data points. For each evaluated cross section value also an uncertainty, representing an equivalent standard deviation, was derived taking into account the errors given by the experimentalists (after a critical review) and the general consistency of the experimental data. In addition the covariance matrix and the correlation matrix of the evaluated cross section data were derived. In the energy range above 15 MeV the results of the evaluation are up to 30% higher than the values from the ENDF/B-V, caused by the inclusion of a number of recent experiments and by renormalizations applied according to adjustments in the decay scheme of ^{57}Ni.

CONTENTS

I. INTRODUCTION

In order to satisfy the increasing demand for neutron cross section evaluations also providing information on the uncertainties of the evaluated data and their correlations, procedures were developed at our institute for deriving values of the diagonal and, at least approximately, also of the off-diagonal elements of the covariance matrices of the evaluated cross sections /1, 4/. These procedures were applied to a number of neutron induced reactions chosen for their importance in fast neutron dosimetry /1, 2, 3/. In continuation of this evaluation programme the cross sections of the $^{58}Ni(n,2n)^{57}Ni$ reaction were evaluated using the general procedures described in Ref. /1/, section II.

The $^{58}Ni(n,2n)^{57}Ni$ reaction has a Q-value of - 12.20 MeV /5/, resulting in a reaction threshold of 12.41 MeV. Therefore this reaction has become important for activation-detector fast-neutron dosimetry applications, and a precise knowledge of the energy dependent cross section data is required. This reaction has been classified as a category-I reaction, but above 15 MeV the knowledge of the excitation function has been unsatisfactory. There are differences > 30% between the results of different authors (not taking into account the obviously wrong data of Jeronymo 63). The cross sections originally reported by the authors are shown in Fig. 1 for all experiments providing data points above 16 MeV neutron energy.

Previous evaluations /6-10/ resulted in excitation functions similar to the measurement of Paulsen 65. Recent experiments (Adamski 80, Hanlin 82, Pavlik 82), which were not considered in the previous evaluations, delivered cross sections up to 30% higher, in agreement with Bayhurst 75. To evaluate the cross sections of the $^{58}Ni(n,2n)^{57}Ni$ reaction all available experimental literature data were critically reviewed and renormalized, if necessary.

II. EXPERIMENTAL DATA BASE

To establish the data base, CINDA up to Supplement 81 (November 1981) and the compilation in Ref. /11/ were used as index to the existing literature. The most recent editions of some journals most likely to contain relevant publications have also been searched up to Nov. 1981. The experiment of Hanlin 82 (private communication) and the authors' own experiment (Pavlik 82) were also included in the data base.

The original papers had been looked up, whenever available. Simultaneously it was checked that references cited therein were already contained in the literature list. The most important information on the 37 papers found in this way is briefly summarized in Table 1. The authors used the activation method throughout. Columns 1 to 7 give the energy range of the experiment, the number of data points within this range, the accuracy of the measurements as estimated by the evaluators, the method used to determine the neutron fluence, the first author and date of the respective paper and a reference number used furtheron in the compilation. In several cases where measurements of the cross sections by different methods were reported in one paper, the paper was split up into two parts for further processing. Therefore two entries appear in Table 1 for the papers Prestwood 61, Csikai 65, Bayhurst 75 and Pavlik 82.

A number of papers was rejected because they had been superseeded by more recent papers of the same authors:

Rayburn 59 by Rayburn 61
Preiss 60 by Bramlitt 63
Cross 62 by Cross 63
Bormann 65 incorporated in Bormann 66
Adamski 77 and Marcinkowski 79 by Adamski 80.

Detailed analysis of the remaining experiments resulted in rejection of three further data sets for the following reasons:

Jeronymo 63, reference number 22:

The cross sections deviate by more than 3 standard deviations from the main body of the data in the energy range above 14 MeV.

Csikai 65, reference number 177:

The experimental results for the shape of the excitation function did not allow adequate renormalization as the shape strongly deviated from a preliminary evaluated excitation function based on experiments that provided absolute cross section values. (For the renormalization procedure of relative excitation functions see Ref. /1/, section II.)

Bormann 66, reference number 456:

The data deviate more than three standard deviations from the average. Due to the lack of information given in the relevant paper about the standards used, a (probably necessary) renormalization was not possible. Also the shape of the excitation function disagrees strongly with all other data.

The cross section values from all accepted data sets are summarized in Table 2. The table lists all cross section measurements in order of increasing neutron energy. For each data point the following quantities are given: the average neutron energy and the energy spread (half width at half maximum) of the neutrons employed for the measurement, the uncertainty of the average neutron energy, the cross section value and its uncertainty as reported by the author, an indication which renormalization procedures were applied to both cross section and uncertainty (see explanation of the correction codes at the end of Table 2), and finally the renormalized cross section value and its uncertainty. The uncertainties of the average neutron energies were not given in most papers and were estimated from the experimental conditions described in the papers.

The renormalized cross sections and uncertainties have reference to:

a) Decay scheme and half life of ^{57}Ni such as given in the Table of Isotopes, 7th edition /12/.

b) Cross sections for the reference reactions $^{56}Fe(n,p)^{56}Mn$, $^{65}Cu(n,2n)^{64}Cu$ and $^{238}U(n,f)$ such as in the ENDF/B-V file /6/. The uncertainties of these reference cross sections were taken from the corresponding covariance file and included in the final uncertainties of the renormalized cross sections.

c) The cross sections and their uncertainties for the reference reactions $^{27}Al(n,\alpha)^{24}Na$ and $^{63}Cu(n,2n)^{62}Cu$ such as given in the recently performed evaluations, Refs. /3/ and /1/, respectively.

In the following cases additional special corrections had to be applied:

Paulsen 65:

The neutron fluence was measured by means of a proton-recoil telescope. The data from Gammel /13/ had been used for the (n,p) scattering cross sections. To convert to the (n,p) scattering cross sections of Hopkins and Breit /14/ as reference, small renormalization factors (for the two runs of Paulsen's experiment 1.013 and 1.009, respectively) were applied.

Strain 65:

The goal of the original work was to derive γ-spectra from the decay of various radioactive nuclei. For some of the producing reactions cross sections had been deduced. As no uncertainty information is given by the author an uncertainty of $\pm$ 15% was assumed according to the "state of the art" in 1965 and taking into account the uncertainties of the reference cross sections.

The most important adjustment was the renormalization according to the decay scheme in the most cases. In Table 1, column 4, the type of radiation is indicated, which had been used to measure the induced activity. If the β^+ or the 0.511 MeV annihilation radiation had been measured, cross section values were multiplied by 1.15 to 1.17 (depending on the decay scheme data used by the experimentalists) to relate the measurements to the reference decay scheme. A renormalization factor of 1.03 to 1.11 was applied, if the 1.37 MeV γ radiation of the ^{57}Ni decay had been measured.

The renormalized and corrected cross section data of all accepted measurements are shown in Figs. 2 and 3. The renormalized cross sections from the various authors agree quite well in the whole energy range. The renormalized values from Paulsen 65 (0.511 MeV annihilation radiation measured) are now in agreement as well with

the data from Adamski 80 (1.37 MeV γ radiation detected) as with the data from Bayhurst 75 and Pavlik 82. Bayhurst 75 used a NaI(Tl) well-type detector for the calibration of the proportional counter employed. Pavlik 82 measured the induced activity directly by means of a NaI(Tl) well-type detector. Activity measurements with NaI(Tl) well-type detectors are rather independent of the decay scheme data used (see e.g. /15/). For instance, the variation of the calculated detection efficiency of the 12.7 x 12.7 cm NaI(Tl) well-type detector at our institute was found to be less than 1% using the various versions of the decay scheme for ^{57}Ni from the literature /12, 16, 17/.

By application of the appropriate renormalization factor due to the decay scheme agreement amongst experiments employing different methods of activity measurement was achieved. This shows that discrepancies in the original data were essentially effected by inconsistent decay scheme data used by different authors.

III. EVALUATION AND RESULTS

III.1. Evaluation of group cross sections

The whole energy range was divided into 16 energy bins. In the energy range from 13.5 to 14.7 MeV the bin width was chosen to be 200 keV, considering the energy resolution of the most experiments and to get a sufficient number of data points within each bin. Outside this range the bin width depended on the number of available data points. It was chosen in such a way that at least one data point of each experiment covering the respective energy range was inside each bin.

The intermediate and final evaluation results are given in Table 3. Column 1 shows the lower limit of the energy bin, columns 2 to 4 show the neutron energy, renormalized cross section and uncertainty of each data point, in column 5 the cross section value related to the center of the energy bin is listed. In order to adjust the cross section to the bin center the shape of a preliminary evaluated excitation function was used. The group cross sections of the preliminary excitation function were calculated as weighted average of the cross section values in each bin. Column 6 contains the reference number.

The final group cross section, i.e. the weighted average of the cross sections related to the center of each bin, is given in column 7 at the end of each group. The internal and external errors of the group cross sections are given in the columns 8 and 9. If one energy bin contained two or more data points of the same experiment, these data were pre-averaged assuming full correlation within that bin. This avoids the weight of a data set to become higher only due to a larger number of data points.

In order to take into account the uncertainty of the average neutron energy, corresponding uncertainties $(d\sigma/dE)\Delta E$ were added quadratically to the standard deviations of the cross sections. The inverse squares of these uncertainties were used as weights to calculate the weighted average. The internal or the external error, in any case the larger

one, was assigned as equivalent standard deviation of the evaluated group cross section.

III.2. Evaluation results

The results of the evaluation are given in Table 4. The cross section averages (group cross sections) may as a good approximation also be considered as cross sections at the centers of the corresponding energy bins, since the curvature of the excitation functions is sufficiently small within each energy bin.

Thus we recommend to use the evaluated group cross sections also as point cross sections at the group centers and to calculate the cross sections at other energies by linear interpolation. The evaluated cross section are given in Table 5 according to the ENDF/B format.

Except for the first energy bin the average uncertainty of the evaluated cross section is 3.6% and in the energy range above 15 MeV the average uncertainty is 4.3% which is sufficient for most applications in fast neutron dosimetry.

The evaluation results and a comparison with previous evaluations /6, 7/ are shown in Fig. 4. Above 15 MeV the results of the new evaluation are up to 30% higher than the ENDF/B-V values. Since the data base has been improved by a number of precise measurements, there is a significant decrease of the uncertainties in the whole energy range compared to previous evaluations.

III.3. Derivation of the covariance matrix

Covariances and correlation coefficients between all evaluated cross sections were calculated approximately according to the procedures described in Ref. /1/, section II. These procedures use an average correlation coefficient B_{nnk} within each data set and neglect correlations between different data sets. The B_{nnk} values for the data sets containing more than one data point were estimated from the error analysis given in the papers, and are summarized in Table 6. A number of papers was split into two experiments,

assumed to be independent, if the correlation between the two data sets was small (< 10%) and different B_{nnk} values had to be assigned to each data set (see section II).

The correlation matrix for the evaluated group cross sections is given in Table 7, the corresponding fractional covariance matrix with matrix elements cov $(x_i,x_j)/(x_i x_j)$, is given in Table 8.

III.4. Comparison with integral data

Using the presently evaluated cross sections for the reaction $^{58}Ni(n,2n)^{57}Ni$, the spectrum-averaged cross section $\langle\sigma\rangle$ for the ^{252}Cf spontaneous-fission neutron field was calculated taking spectra parameters from Grundl and Eisenhauer /18/. This resulted in:

$\langle\sigma\rangle_{calc} = 0.00856 \pm 0.00040$ mb for a Maxwellian spectrum, ($\langle E\rangle$ = 2.13 MeV) and segment corrections,

$\langle\sigma\rangle_{calc} = 0.0113 \pm 0.0003$ mb for a Maxwellian spectrum with the same average energy and no segment corrections.

The uncertainties of the calculated $\langle\sigma\rangle$ values stem from the uncertainties of the evaluated cross sections considering the full covariance matrix, but do not take into account the uncertainty of the ^{252}Cf spectrum representation. The calculated averaged cross sections can be compared with the most recent experimental value from Mannhart /19/:

$\langle\sigma\rangle_{exp} = 0.00894 \pm 0.00028$ mb.

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TABLE 1 EXPERIMENTS SUMMARY FOR THE REACTION 58 NI (N,2N)

ENERGY-RANGE [MEV]		NR.OF DATA POINTS	AVERAGE ACCUR %	METHOD	FLUX, REF X-SECTION	REF	NR.
14.50	14.50	1	35	ACT, PROP C, BETA+	LONG CTR CALIB BY ASS ALPHA PART	PAUL 53	12
14.10	14.10	1	27	ACT, SCINT C, .511 MEV GAM	ASSOC ALPHA PART	PURSER 59	451
14.40	14.40	1		ACT, NAI, .511 MEV GAM COINC	63CU(N,2N)	RAYBURN 59	470
14.80	14.80	1		ACT	27AL(N,A), 63CU(N,2N), 65CU(N,2N)	PREISS 60	61
16.50	19.76	3	8.7	ACT, PROP C, BETA+	238U(N,F)	PRESTWOOD 61	100
13.52	14.81	6	6	ACT, PROP C, BETA+	ASSOC PART, 27AL(N,A) REL EXC FCTN	PRESTWOOD 61	111
14.40	14.40	1	22	ACT, NAI, .511 MEV GAM COINC	63CU(N,2N) 503 MB	RAYBURN 61	112
14.50	14.50	1		ACT, GAM	27AL(N,A) 115 MB	CROSS 62	471
13.86	14.88	9	8	ACT, NAI, .511 MEV GAM COINC	ASSOC PART, 65CU(N,2N) REL EXC FCTN	GLOVER 62	55
14.70	14.70	1	12	ACT, NAI, 1.37 MEV GAM	27AL(N,A) 114 MB	BRAMLITT 63	101
14.50	14.50	1	13	ACT, GAM	27AL(N,A) 115 MB	CROSS 63	452
12.55	21.00	8		ACT, NAI WELL, GAM	PLASTIC SZINT RECOIL SPECT	JERONYMO 63	22
14.10	14.10	1		ACT, NAI, GAM	STILBENE C	BORMANN 65	472
13.30	15.50	7	17	ACT, NAI, .511 MEV GAM COINC	65CU(N,2N) AT 14.2MEV,56FE(N,P) REL	CHOJNACKI 65	453
14.60	14.60	1	8	ACT, NAI WELL, GAM	63CU(N,2N) 541 MB	CSIKAI 65	454
13.56	14.71	24	5	ACT, NAI WELL, GAM	RELATIVE EXCIT FCTN	CSIKAI 65	177
12.98	19.58	25	7 - 10	ACT, NAI, .511 MEV GAM	PROTON-RECOIL TELESCOPE	PAULSEN 65	455
14.70	14.70	1	15	ACT, NAI, GAM	27AL(N,A), 63CU(N,2N), 28SI(N,P)	STRAIN 65	14
12.95	19.60	10	7	ACT, NAI, GAM	STILBENE C AT 14.1 MEV	BORMANN 66	456
15.40	15.40	1	15	ACT, NAI, .511 MEV GAM	63CU(N,2N) 488 MB AT 14.1 MEV	CSIKAI 67	176
13.72	14.79	6	10	ACT, NAI, .511 MEV GAM	ASSOC ALPHA PART	TEMPERLEY 68	457
14.60	14.60	1	3	ACT, NAI, 1.37 MEV GAM	27AL(N,A) 120.7 MB	BARRALL 69A	13
14.50	14.50	1	6.3	ACT	27AL(N,A) 121.0 MB	BARRALL 69B	175
14.80	14.80	1	4.3	ACT, NAI, 1.37 MEV GAM	PROTON-RECOIL TELESCOPE	BARRALL 69C	407
14.40	14.40	1	13	ACT, GE(LI), GAM	56FE(N,P) 100 MB	FINK 70	458
14.60	14.60	1	10	ACT, NAI, .511 MEV GAM	63CU(N,2N) 538 MB	ARAMINOWICZ 73	123
14.70	14.70	1	4.6	ACT, NAI, 57CO GAM	56FE(N,P) 97.8 MB	HEMINGWAY 73	459
17.23	19.99	3	7	ACT, PROP,BETA+,CAL BY NAI-W	27AL(N,A) EXCIT FCTN	BAYHURST 75	106
16.21	28.05	7	5	ACT, PROP,BETA+,CAL BY NAI-W	PROTON-RECOIL TELESCOPE	BAYHURST 75	460

TABLE 1 EXPERIMENTS SUMMARY FOR THE REACTION 58 NI (N,2N)

ENERGY-RANGE [MEV]		NR.OF DATA POINTS	AVERAGE ACCUR %	METHOD	FLUX, REF X-SECTION	REF	NR.
14.10	14.10	1	13	ACT, NAI, .511 MEV GAM	27AL(N,A) 115 MB	SPANGLER 75	60
14.70	14.70	1	8.5	ACT, GE(LI), 1.37 MEV GAM	27AL(N,A) 121 MB	GAIM 76	462
14.60	14.60	1	8.5	ACT, GE(LI), GAM	27AL(N,A) 114.2 MB	SIGG 76	461
14.00	17.90	6	10	ACT, GE(LI), 1.37 MEV GAM	2AL(N,A), 56FE(N,P)	ADAMSKI 77	473
13.30	17.10	5	9	ACT, GE(LI) 1.37 MEV GAM	27AL(N,A) EXCIT FCTN	HUDSON 78	463
14.00	17.90	4	10	ACT, GE(LI), 1.37 MEV GAM	27AL(N,A), 56FE(N,P)	MARCINKOWSKI 79	474
14.00	17.90	6	10	ACT, GE(LI), 1.37 MEV GAM	27AL(N,A), 56FE(N,P)	ADAMSKI 80	464
13.55	14.71	6	8	ACT, GE(LI), 1.37 MEV GAM	27AL(N,A) EXCIT FCTN	NOOC 80	465
13.52	14.80	5	4	ACT, GE(LI), 1.37 MEV, .127	27AL(N,A) EXCIT FCTN	RAICS 81	467
12.79	18.26	13	4 - 10	ACT, NAI, 1.37 MEV GAM	27AL(N,A)AT 14.6 MEV	HAN LIN 82	466
13.47	14.83	18	2	ACT, NAI-WELL, GAM	27AL(N,A) EXCIT FCTN	PAVLIK 82	128
13.31	19.57	11	4.5	ACT, NAI-WELL, GAM	PROTON-RECOIL TELESCOPE AT 0 DEG	PAVLIK 82	127

TABLE 2 CROSS-SECTION DATA FOR THE REACTION 58 NI (N,2N)

NR.	E-NEUTR [MEV]	WIDTH [MEV]	ERR.CENTR [MEV]	X-SECT(ORIG) [MB]	ERR(ORIG) [MB]	CORR.APPL.	X-SECT(FIN) [MB]	ERR(FIN) [MB]	REF
1	12.79	0.290	0.030	3.500	0.500	1)9)	3.800	0.500	HAN LIN 82
2	12.86	0.210	0.030	3.600	0.400	1)9)	3.900	0.400	HAN LIN 82
3	12.98	0.170	0.020	3.200	0.300	1)6)	3.800	0.400	PAULSEN 65
4	13.10	0.180	0.020	4.600	0.400	1)6)	5.500	0.500	PAULSEN 65
5	13.30	0.300	0.030	21.000	4.000	1)3)	23.000	4.000	CHOJNACKI 65
6	13.30	0.140	0.015	11.000	1.000	1)9)	12.100	1.100	HUDSON 78
7	13.31	0.115	0.025	9.060	3.330	NONE	9.060	3.330	PAVLIK 82
8	13.38	0.210	0.020	10.100	0.700	1)6)	12.100	0.800	PAULSEN 65
9	13.47	0.160	0.015	11.240	0.330	NONE	11.240	0.330	PAVLIK 82
10	13.50	0.200	0.020	19.000	4.000	1)3)	22.000	4.000	CHOJNACKI 65
11	13.52	0.150	0.015	13.900	0.700	1)9)	15.700	0.900	PRESTWOOD 61
12	13.52	0.120	0.015	12.000	0.500	1)9)	12.400	0.500	RAICS 81
13	13.54	0.220	0.030	11.900	0.800	1)6)	14.200	1.000	PAULSEN 65
14	13.55	0.120	0.015	11.900	1.100	1)9)	13.000	1.200	NGOC 80
15	13.57	0.130	0.015	12.980	0.400	NONE	12.980	0.400	PAVLIK 82
16	13.62	0.120	0.010	14.200	0.360	NONE	14.200	0.360	PAVLIK 82
17	13.64	0.310	0.030	16.400	1.300	1)9)	17.700	1.400	HAN LIN 82
18	13.68	0.350	0.040	18.700	0.900	1)9)	20.200	1.000	HAN LIN 82
19	13.68	0.110	0.010	15.080	0.400	NONE	15.080	0.400	PAVLIK 82
20	13.72	0.200	0.020	19.000	1.900	1)	21.700	2.200	TEMPERLEY 68
21	13.75	0.100	0.010	16.300	0.600	1)9)	16.900	0.600	RAICS 81
22	13.77	0.120	0.015	15.900	1.200	1)9)	17.300	1.300	NGOC 80
23	13.82	0.090	0.010	18.450	0.360	NONE	18.450	0.360	PAVLIK 82
24	13.86	0.100	0.015	18.700	1.500	1)3)	21.200	1.700	GLOVER 62
25	13.88	0.100	0.015	21.400	1.100	1)9)	24.300	1.500	PRESTWOOD 61
26	13.88	0.240	0.030	19.600	1.400	1)6)	23.400	1.700	PAULSEN 65
27	13.95	0.200	0.020	24.400	2.400	1)	27.800	2.800	TEMPERLEY 68
28	13.96	0.130	0.030	21.430	3.000	NONE	21.430	3.000	PAVLIK 82
29	13.96	0.080	0.010	21.370	0.430	NONE	21.370	0.430	PAVLIK 82
30	14.00	0.800	0.030	19.900	2.300	1)3)	21.800	2.500	ADAMSKI 80
31	14.04	0.080	0.010	23.410	0.460	NONE	23.410	0.460	PAVLIK 82
32	14.05	0.250	0.030	22.000	1.500	1)6)	26.300	1.800	PAULSEN 65
33	14.08	0.110	0.010	20.800	1.800	1)9)	22.900	2.000	NGOC 80
34	14.09	0.100	0.015	23.500	1.200	1)9)	27.100	1.600	PRESTWOOD 61
35	14.10	0.300	0.030	38.000	8.000	1)	44.500	12.000	PURSER 59
36	14.10	0.250	0.025	24.000	3.000	1)9)	27.600	3.500	SPANGLER 75
37	14.10	0.220	0.020	22.000	2.000	1)9)	23.800	2.200	HUDSON 78
38	14.11	0.100	0.015	22.900	1.800	1)3)	25.900	2.100	GLOVER 62
39	14.12	0.090	0.010	24.770	0.350	NONE	24.770	0.350	PAVLIK 82
40	14.12	0.080	0.010	22.700	0.700	1)9)	23.800	0.700	RAICS 81
41	14.20	0.100	0.020	30.000	7.000	1)3)	34.000	6.000	CHOJNACKI 65
42	14.20	0.250	0.020	25.500	2.600	1)	29.100	2.900	TEMPERLEY 68
43	14.24	0.100	0.015	27.200	2.200	1)3)	30.300	2.400	GLOVER 62
44	14.27	0.110	0.010	28.780	0.590	NONE	28.780	0.590	PAVLIK 82
45	14.31	0.130	0.015	31.100	1.600	1)9)	35.900	2.200	PRESTWOOD 61
46	14.31	0.310	0.020	28.100	2.800	1)	32.100	3.200	TEMPERLEY 68
47	14.37	0.150	0.015	29.300	2.300	1)3)	32.600	2.600	GLOVER 62
48	14.40	0.300	0.030	34.200	7.500	1)9)	32.600	7.200	RAYBURN 61
49	14.40	0.300	0.030	38.000	5.000	1)3)	40.700	5.300	FINK 70
50	14.40	0.130	0.010	27.000	2.100	1)9)	29.300	2.300	NGOC 80
51	14.42	0.150	0.010	31.470	0.560	NONE	31.470	0.560	PAVLIK 82
52	14.42	0.260	0.030	29.400	2.100	1)6)	35.100	2.500	PAULSEN 65
53	14.45	0.120	0.015	29.600	1.000	1)9)	30.800	1.000	RAICS 81
54	14.48	0.170	0.015	33.240	0.490	NONE	33.240	0.490	PAVLIK 82
55	14.49	0.200	0.020	31.700	2.500	1)3)	35.600	2.900	GLOVER 62
56	14.50	0.350	0.100	40.600	12.200	1)	47.500	16.600	PAUL 53
57	14.50	0.200	0.020	34.300	1.700	1)9)	39.000	2.300	PRESTWOOD 61
58	14.50	0.300	0.030	35.000	4.000	1)9)	38.800	5.000	CROSS 63
59	14.50	0.200	0.040	31.500	2.000	1)9)	34.900	2.200	BARRALL 69B

TABLE 2 CROSS-SECTION DATA FOR THE REACTION 58 NI (N,2N)

NR.	E-NEUTR [MEV]	WIDTH [MEV]	ERR.CENTR [MEV]	X-SECT(ORIG) [MB]	ERR(ORIG) [MB]	CORR.APPL.	X-SECT(FIN) [MB]	ERR(FIN) [MB]	REF
60	14.53	0.320	0.020	27.300	2.700	1)	31.100	3.100	TEMPERLEY,68
61	14.55	0.180	0.015	34.840	0.670	NONE	34.840	0.670	PAVLIK 82
62	14.59	0.200	0.020	33.500	2.700	1)3)	37.900	3.000	GLOVER 62
63	14.60	0.100	0.010	37.000	3.000	1)9)	34.800	2.900	CSIKAI 65
64	14.60	0.200	0.020	33.400	0.020	1)2)9)	35.100	1.100	BARRALL 69A
65	14.60	0.380	0.040	37.900	3.800	1)9)	37.000	3.700	ARAMINOWICZ 73
66	14.60	0.200	0.020	34.700	2.700	1)9)	38.900	3.300	SIGG 76
67	14.61	0.260	0.030	33.400	2.300	1)6)	39.900	2.700	PAULSEN 65
68	14.61	0.300	0.020	36.900	1.300	1)9)	39.900	1.400	HAN LIN 82
69	14.62	0.140	0.015	30.100	2.400	1)9)	32.800	2.600	NGOC 80
70	14.66	0.210	0.015	36.620	0.470	NONE	36.620	0.470	PAVLIK 82
71	14.69	0.250	0.025	35.900	2.900	1)3)	40.400	3.200	GLOVER 62
72	14.69	0.150	0.030	38.060	3.080	NONE	38.060	3.080	PAVLIK 82
73	14.69	0.150	0.030	37.650	2.820	NONE	37.650	2.820	PAVLIK 82
74	14.70	0.200	0.040	31.000	4.000	1)9)	29.700	3.800	BRAMLITT 63
75	14.70	0.300	0.100	35.000	0.000	1)6)9)	37.700	5.700	STRAIN 65
76	14.70	0.200	0.015	32.600	2.700	3)	34.300	1.600	HEMINGWAY 73
77	14.70	0.300	0.030	35.000	3.000	1)9)	36.300	3.100	QAIM 76
78	14.71	0.140	0.015	31.200	2.300	1)9)	34.400	2.500	NGOC 80
79	14.75	0.230	0.015	39.050	0.620	NONE	39.050	0.620	PAVLIK 82
80	14.77	0.250	0.025	36.200	2.900	1)3)	40.900	3.300	GLOVER 62
81	14.78	0.240	0.015	39.630	0.520	NONE	39.630	0.520	PAVLIK 82
82	14.79	0.300	0.020	29.100	2.900	1)	33.200	3.300	TEMPERLEY 68
83	14.80	0.200	0.040	36.000	3.000	1)5)	39.900	1.700	BARRALL 69C
84	14.80	0.170	0.015	35.300	1.400	1)9)	37.600	1.400	RAICS 81
85	14.81	0.310	0.030	39.300	2.000	1)9)	44.800	2.700	PRESTWOOD 61
86	14.81	0.250	0.015	40.010	0.650	NONE	40.010	0.650	PAVLIK 82
87	14.83	0.270	0.015	40.550	0.540	NONE	40.550	0.540	PAVLIK 82
88	14.88	0.300	0.030	39.500	3.200	1)3)	44.700	3.600	GLOVER 62
89	14.90	0.300	0.030	43.000	10.000	1)3)	48.000	8.000	CHOJNACKI 65
90	14.99	0.270	0.030	38.000	2.700	1)6)	45.400	3.200	PAULSEN 65
91	15.18	0.260	0.030	39.500	2.800	1)6)	47.200	3.300	PAULSEN 65
92	15.20	0.240	0.020	35.000	3.000	1)9)	36.000	3.100	HUDSON 78
93	15.20	0.400	0.030	47.000	12.000	1)3)	53.000	9.000	CHOJNACKI 65
94	15.40	0.300	0.030	52.000	13.000	1)3)	58.000	10.000	CHOJNACKI 65
95	15.40	0.100	0.015	45.000	6.800	1)9)	49.200	7.400	CSIKAI 67
96	15.49	0.160	0.035	51.920	4.600	NONE	51.920	4.600	PAVLIK 82
97	15.50	0.300	0.030	71.000	16.000	1)3)	80.000	14.000	CHOJNACKI 65
98	15.55	0.240	0.030	43.000	3.000	1)6)	51.400	3.600	PAULSEN 65
99	15.68	0.360	0.040	56.300	3.000	1)9)	60.800	3.200	HAN LIN 82
100	15.71	0.230	0.020	44.500	3.100	1)6)	53.200	3.700	PAULSEN 65
101	16.00	0.150	0.015	46.000	5.000	1)9)	50.500	5.500	HUDSON 78
102	16.03	0.210	0.020	46.100	3.200	1)6)	55.100	3.800	PAULSEN 65
103	16.05	0.430	0.040	59.800	3.200	1)9)	64.600	3.500	HAN LIN 82
104	16.21	0.110	0.020	63.000	3.000	1)	64.300	3.100	BAYHURST 75
105	16.24	0.200	0.020	47.100	3.300	1)6)	56.300	3.900	PAULSEN 65
106	16.31	0.165	0.040	58.580	3.090	NONE	58.580	3.090	PAVLIK 82
107	16.50	0.300	0.030	53.300	4.300	1)3)	57.000	5.000	PRESTWOOD 61
108	16.59	0.190	0.020	50.400	3.500	1)6)	60.200	4.200	PAULSEN 65
109	16.63	0.330	0.040	64.800	2.400	1)9)	70.000	2.600	HAN LIN 82
110	16.90	0.700	0.030	53.400	4.500	1)3)	59.700	5.000	ADAMSKI 80
111	16.93	0.470	0.040	49.900	3.500	1)6)	59.400	4.200	PAULSEN 65
112	17.10	0.100	0.015	54.000	5.000	1)9)	55.800	5.200	HUDSON 78
113	17.12	0.170	0.040	65.410	2.900	NONE	65.410	2.900	PAVLIK 82
114	17.18	0.380	0.040	68.300	2.500	1)9)	73.800	2.700	HAN LIN 82
115	17.23	0.170	0.020	70.000	5.000	1)9)	69.500	5.000	BAYHURST 75
116	17.27	0.460	0.040	51.200	3.600	1)6)	60.900	4.300	PAULSEN 65
117	17.30	0.260	0.030	69.700	2.600	1)9)	75.300	2.800	HAN LIN 82
118	17.40	0.400	0.020	60.600	6.200	1)9)	63.500	6.500	ADAMSKI 80

TABLE 2 CROSS-SECTION DATA FOR THE REACTION 58 NI (N,2N)

NR.	E-NEUTR [MEV]	WIDTH [MEV]	ERR.CENTR [MEV]	X-SECT(ORIG) [MB]	ERR(ORIG) [MB]	CORR.APPL.	X-SECT(FIN) [MB]	ERR(FIN) [MB]	REF
119	17.40	0.400	0.020	63.300	6.900	1)3)	72.800	7.700	ADAMSKI 80
120	17.54	0.220	0.030	72.800	2.700	1)9)	78.600	2.900	HAN LIN 82
121	17.59	0.440	0.040	55.100	3.900	1)6)	65.600	4.600	PAULSEN 65
122	17.88	0.170	0.035	69.230	2.970	NONE	69.230	2.970	PAVLIK 82
123	17.90	0.420	0.040	55.000	3.900	1)6)	65.400	4.600	PAULSEN 65
124	17.90	0.100	0.020	64.000	6.500	1)9)	67.400	6.800	ADAMSKI 80
125	17.90	0.100	0.020	69.100	7.100	1)3)	77.000	7.900	ADAMSKI 80
126	17.95	0.320	0.032	67.600	3.400	1)3)	73.200	6.400	PRESTWOOD 61
127	17.97	0.270	0.030	71.000	2.700	1)9)	76.700	2.900	HAN LIN 82
128	18.19	0.390	0.030	56.400	4.000	1)6)	67.100	4.800	PAULSEN 65
129	18.24	0.090	0.020	76.000	5.000	1)9)	78.600	5.200	BAYHURST 75
130	18.26	0.210	0.030	75.800	2.900	1)9)	81.900	3.100	HAN LIN 82
131	18.47	0.360	0.030	58.500	4.100	1)6)	69.600	4.900	PAULSEN 65
132	18.54	0.175	0.030	72.160	3.010	NONE	72.160	3.010	PAVLIK 82
133	18.71	0.330	0.030	60.400	4.200	1)6)	71.900	5.000	PAULSEN 65
134	18.94	0.290	0.020	60.500	4.200	1)6)	72.000	5.000	PAULSEN 65
135	19.07	0.205	0.025	75.700	3.160	NONE	75.700	3.160	PAVLIK 82
136	19.29	0.200	0.020	63.800	4.500	1)6)	75.900	5.400	PAULSEN 65
137	19.42	0.220	0.025	78.700	3.340	NONE	78.700	3.340	PAVLIK 82
138	19.57	0.225	0.020	79.250	3.420	NONE	79.250	3.420	PAVLIK 82
139	19.58	0.190	0.020	65.500	4.700	1)6)	77.900	5.600	PAULSEN 65
140	19.76	0.430	0.043	77.400	3.900	1)3)	91.000	7.900	PRESTWOOD 61
141	19.99	0.110	0.020	92.000	6.000	1)9)	92.400	6.100	BAYHURST 75

CORRECTION CODES:
1) CROSS-SECTION RENORMALIZED TO PRESENT DECAY DATA (HALF-LIFE, BRANCHING RATIOS ETC.)
2) ERROR GIVEN IN PUBLICATION DID NOT INCLUDE ERROR OF REFERENCE CROSS-SECTION.
3) CROSS-SECTION RENORMALIZED TO ENDF/B-V VALUES OF REFERENCE CROSS-SECTION USED IN MEASUREMENT. ERRORS TAKEN FROM THE ASSOCIATED FILE 33 INCLUDED IN FINAL ERROR.
4) CROSS-SECTION RENORMALIZED TO ANGULAR DISTRIBUTION OF SOURCE NEUTRONS OF LISKIEN AND PAULSEN.
5) ERROR HAS BEEN REDUCED BY A FACTOR TWO OR THREE IN ORDER TO REPRESENT 1 STANDARD DEVIATION.
6) SPECIAL CORRECTION. SEE TEXT FOR DETAILS.
7) CROSS-SECTION FROM MEASURED RELATIVE EXCIT. FN., NORMALIZED TO PRESENT EVALUATION.
8) CROSS-SECTION FROM THEORETICAL CALCULATION, NORMALIZED TO PRESENT EVALUATION.
9) RENORMALIZATION USING REF.X-SECTION EVALUATED AT IRK, SEE PHYSICS DATA 13-1, 13-2, 13-3.

TABLE 3 58 NI (N,2N) INTERMEDIATE AND FINAL EVALUATION RESULTS

GRP ENERGY [MEV]	E-NEUTR [MEV]	X-SECT(EXP) [MB]	ERR(EXP) [MB]	X-SECT(M.E) [MB]	REF	X-SECT(AVG) [MB]	EXT.ERR [MB]	INT.ERR [MB]
12.75								
	12.79	3.800	0.500	6.294	466			
	12.86	3.900	0.400	5.455	466			
	12.98	3.800	0.400	4.129	455			
	13.10	5.500	0.500	3.934	455			
						4.541	0.800	0.431
13.25								
	13.30	23.000	4.000	26.022	453			
	13.30	12.100	1.100	13.490	463			
	13.31	9.060	3.330	10.158	127			
	13.38	12.100	0.800	12.041	455			
	13.47	11.240	0.330	10.281	128			
						10.777	0.692	0.303
13.50								
	13.50	22.000	4.000	24.052	453			
	13.52	15.700	0.900	16.869	111			
	13.52	12.400	0.500	13.324	467			
	13.54	14.200	1.000	15.000	455			
	13.55	13.000	1.200	13.617	465			
	13.57	12.980	0.400	13.427	128			
	13.62	14.200	0.360	13.777	128			
	13.64	17.700	1.400	16.676	466			
	13.68	20.200	1.000	17.990	466			
	13.68	15.080	0.400	13.430	128			
						14.120	0.581	0.291
13.70								
	13.72	21.700	2.200	23.951	457			
	13.75	16.900	0.600	17.955	467			
	13.77	17.300	1.300	17.932	465			
	13.82	18.450	0.360	18.162	128			
	13.86	21.200	1.700	19.939	55			
	13.88	24.300	1.500	22.410	111			
	13.88	23.400	1.700	21.580	455			
						18.594	0.544	0.312
13.90								
	13.95	27.800	2.800	29.064	457			
	13.96	21.430	3.000	22.303	127			
	13.96	21.370	0.430	22.140	128			
	14.00	21.800	2.500	21.800	464			
	14.04	23.410	0.460	22.735	128			
	14.05	26.300	1.800	25.252	455			
	14.08	22.900	2.000	21.499	465			
	14.09	27.100	1.600	25.255	111			
						22.881	0.546	0.420
14.10								
	14.10	44.500	12.000	48.491	451			
	14.10	27.600	3.500	30.075	60			
	14.10	23.800	2.200	25.934	463			
	14.11	25.900	2.100	28.018	55			
	14.12	24.770	0.350	26.699	128			
	14.12	23.800	0.700	25.541	467			
	14.20	34.000	6.000	34.000	453			
	14.20	29.100	2.900	29.100	457			
	14.24	30.300	2.400	29.022	55			
	14.27	28.780	0.590	26.858	128			
						26.588	0.451	0.410
14.30								
	14.31	35.900	2.200	39.073	111			
	14.31	32.100	3.200	34.937	457			

GRP ENERGY [MEV]	E-NEUTR [MEV]	X-SECT(EXP) [MB]	ERR(EXP) [MB]	X-SECT(N,E) [MB]	REF	X-SECT(AVG) [MB]	EXT.ERR [MB]	INT.ERR [MB]
	14.37	32.600	2.600	33.507	55			
	14.40	32.600	7.200	32.600	112			
	14.40	40.700	5.300	40.700	458			
	14.40	29.300	2.300	29.300	465			
	14.42	31.470	0.560	31.116	128			
	14.42	35.100	2.500	34.587	455			
	14.45	30.800	1.000	29.742	467			
	14.48	33.240	0.490	31.468	128			
	14.49	35.600	2.900	33.483	55			
						31.486	0.719	0.460
14.50								
	14.50	47.500	16.600	50.535	12			
	14.50	39.000	2.300	41.492	111			
	14.50	38.800	5.000	41.279	452			
	14.50	34.900	2.200	37.130	175			
	14.53	31.100	3.100	32.458	457			
	14.55	34.840	0.670	35.906	128			
	14.59	37.900	3.000	38.106	55			
	14.60	34.800	2.900	34.800	454			
	14.60	35.100	1.100	35.100	13			
	14.60	37.000	3.700	37.000	123			
	14.60	38.900	3.300	38.900	461			
	14.61	39.900	2.700	39.761	455			
	14.61	39.900	1.400	39.761	466			
	14.62	32.800	2.600	32.572	465			
	14.66	36.620	0.470	35.867	128			
	14.69	40.400	3.200	39.167	55			
	14.69	38.060	3.080	36.898	127			
	14.69	37.650	2.820	36.501	128			
						36.858	0.661	0.571
14.70								
	14.70	29.700	3.800	31.392	101			
	14.70	37.700	5.700	39.848	14			
	14.70	34.500	1.600	36.466	459			
	14.70	36.300	3.100	38.368	462			
	14.71	34.400	2.500	36.238	465			
	14.75	39.050	0.620	40.589	128			
	14.77	40.900	3.300	42.231	55			
	14.78	39.630	0.520	40.785	128			
	14.79	33.200	3.300	34.028	457			
	14.80	39.900	1.700	40.726	407			
	14.80	37.600	1.400	38.378	467			
	14.81	44.800	2.700	45.539	111			
	14.81	40.010	0.650	40.670	128			
	14.83	40.550	0.540	40.882	128			
	14.88	44.700	3.600	44.163	55			
	14.90	48.000	8.000	47.046	453			
	14.99	45.400	3.200	42.961	455			
						39.936	0.673	0.481
15.00								
	15.18	47.200	3.300	52.554	455			
	15.20	36.000	3.100	39.799	463			
	15.20	53.000	9.000	58.592	453			
	15.40	58.000	10.000	59.868	453			
	15.40	49.200	7.400	50.785	176			
	15.49	51.920	4.600	52.142	127			
	15.50	80.000	14.000	80.000	453			
	15.55	51.400	3.600	50.616	455			
	15.68	60.800	3.200	57.590	466			

TABLE 3 58 NI (N,2N) INTERMEDIATE AND FINAL EVALUATION RESULTS

BRF ENERGY [MEV]	E-NEUTR [MEV]	X-SECT(EXP) [MB]	ERR(EXP) [MB]	X-SECT(M,E) [MB]	REF	X-SECT(AVG) [MB]	EXT.ERR [MB]	INT.ERR [MB]
	15.71	53.200	3.700	49.951	455			
						50.635	3.099	1.724
16.00								
	16.00	50.500	5.500	52.945	463			
	16.03	55.100	3.800	57.307	455			
	16.05	64.600	3.500	66.832	466			
	16.21	64.300	3.100	64.638	460			
	16.24	56.300	3.900	56.374	455			
	16.31	58.580	3.090	58.161	127			
						60.988	2.275	1.630
16.50								
	16.50	57.000	5.000	58.570	100			
	16.59	60.200	4.200	61.160	455			
	16.63	70.000	2.600	70.762	466			
	16.90	59.700	5.000	59.058	464			
	16.93	59.400	4.200	58.635	455			
						65.166	3.327	1.898
17.00								
	17.10	55.800	5.200	56.396	463			
	17.12	65.410	2.900	66.016	127			
	17.18	73.800	2.700	74.169	466			
	17.23	69.500	5.000	69.603	106			
	17.27	60.900	4.300	60.757	455			
	17.30	75.300	2.800	74.859	466			
	17.40	63.500	6.500	62.398	464			
	17.40	72.800	7.700	71.537	464			
						67.600	2.636	1.584
17.50								
	17.54	78.600	2.900	80.479	466			
	17.59	65.600	4.600	66.788	455			
	17.88	69.230	2.970	68.293	127			
	17.90	65.400	4.600	64.409	455			
	17.90	67.400	6.800	66.378	464			
	17.90	77.000	7.900	75.833	164			
	17.95	73.200	6.400	71.794	100			
	17.97	76.700	2.900	75.103	466			
						70.638	2.189	1.902
18.00								
	18.19	67.100	4.800	68.780	455			
	18.24	76.600	5.200	80.243	102			
	18.26	81.900	3.100	83.478	466			
	18.47	69.600	4.900	69.765	455			
	18.54	72.160	3.010	71.964	127			
	18.71	71.900	5.000	70.990	455			
	18.94	72.000	5.000	69.983	455			
						76.680	3.311	1.865
19.00								
	19.07	75.700	3.160	77.773	127			
	19.29	75.900	5.400	76.889	455			
	19.42	78.700	3.340	79.112	127			
	19.57	79.250	3.420	79.115	127			
	19.58	77.900	5.600	77.767	455			
	19.76	91.000	7.900	90.845	100			
	19.99	92.400	6.100	92.242	106			
						81.785	3.421	2.459

TABLE 4

EVALUATED GROUP CROSS SECTIONS
FOR THE REACTION 58 NI (N,2N) 57 NI

GROUP-ENERGY [MEV]	TO [MEV]	X-SECTION [MB]	ERROR [MB]	ERROR [%]
12.75	13.25	4.541	0.800	17.6
13.25	13.50	10.777	0.692	6.4
13.50	13.70	14.120	0.581	4.1
13.70	13.90	18.594	0.544	2.9
13.90	14.10	22.881	0.546	2.4
14.10	14.30	26.588	0.451	1.7
14.30	14.50	31.486	0.719	2.3
14.50	14.70	36.858	0.661	1.8
14.70	15.00	39.936	0.673	1.7
15.00	16.00	50.635	3.099	6.1
16.00	16.50	60.988	2.275	3.7
16.50	17.00	65.166	3.327	5.1
17.00	17.50	67.600	2.636	3.9
17.50	18.00	70.638	2.189	3.1
18.00	19.00	76.680	3.311	4.3
19.00	20.00	81.785	3.421	4.2

TABLE 5

EVALUATED CROSS SECTIONS ACCORDING TO THE
ENDF/B FORMAT

MATERIAL: 58NI REACTION TYPE: (N,2N)

NUMBER OF DATA POINTS: 17
INTERPOLATION LAW: LIN-LIN

REACTION Q VALUE: -1.220E+07 EV

N	E [EV]	SIGMA(E) [BARN]
1	1.2410E+07	0.0000E+00
2	1.3000E+07	4.5412E-03
3	1.3375E+07	1.0777E-02
4	1.3600E+07	1.4120E-02
5	1.3800E+07	1.8594E-02
6	1.4000E+07	2.2881E-02
7	1.4200E+07	2.6588E-02
8	1.4400E+07	3.1486E-02
9	1.4600E+07	3.6858E-02
10	1.4850E+07	3.9936E-02
11	1.5500E+07	5.0635E-02
12	1.6250E+07	6.0988E-02
13	1.6750E+07	6.5166E-02
14	1.7250E+07	6.7600E-02
15	1.7750E+07	7.0638E-02
16	1.8500E+07	7.6680E-02
17	1.9500E+07	8.1785E-02

Table 6

Average correlation coefficients for data sets with more than one data point

Ref.	Ref. Nr.	B_{nnk}
Prestwood 61	100	0.80
Prestwood 61	111	0.50
Glover 62	55	0.80
Chojnacki 65	453	0.50
Paulsen 65	455	0.70
Temperley 68	457	0.80
Bayhurst 75	106	0.50
Bayhurst 75	460	-- ::)
Hudson 78	463	0.80
Adamski 80	464	0.80
Ngoc 80	465	0.40
Raics 81	467	0.70
Hanlin 82	466	0.60
Pavlik 82	128	0.20
Pavlik 82	127	0.50

::) From this data set only one point below 20 MeV was used in the evaluation

TABLE 7

CORRELATION MATRIX FOR THE EVALUATED 58 NI (N,2N) 57 NI GROUP CROSS SECTIONS. CORRELATIONS ARE GIVEN IN %

GROUP NUMBER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	GROUP ENERGY [MEV] - [MEV]
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00 - 12.75
2		100	21	23	11	14	0	10	26	9	47	39	50	41	41	42	26	12.75 - 13.25
3			100	19	19	22	18	19	14	18	24	18	12	17	13	12	14	13.25 - 13.50
4				100	36	22	30	35	20	30	17	13	18	14	14	15	8	13.50 - 13.70
5					100	23	33	37	18	32	6	5	6	5	5	5	6	13.70 - 13.90
6						100	15	23	19	21	10	10	12	13	14	10	12	13.90 - 14.10
7							100	33	11	28	7	4	0	4	0	0	0	14.10 - 14.30
8								100	18	31	6	5	6	5	5	5	6	14.30 - 14.50
9									100	16	24	22	24	24	24	26	14	14.50 - 14.70
10										100	6	5	5	4	5	4	5	14.70 - 15.00
11											100	50	39	54	43	44	29	15.00 - 16.00
12												100	32	47	42	43	32	16.00 - 16.50
13													100	43	52	37	23	16.50 - 17.00
14														100	50	52	38	17.00 - 17.50
15															100	49	44	17.50 - 18.00
16																100	42	18.00 - 19.00
17																	100	19.00 - 20.00

TABLE 8

FRACTIONAL COVARIANCE MATRIX ELEMENTS FOR THE EVALUATED 58 NI (N,2N) 57 NI GROUP CROSS SECTIONS
ACCORDING TO THE ENDF/B FORMAT. (LINES AND COLUMNS ARE HEADED BY THE LOWER LIMIT OF EACH ENERGY GROUP).

ENERGY [EV]	1.000E-05	1.275E+07	1.325E+07	1.350E+07	1.370E+07	1.390E+07	1.410E+07	1.430E+07	1.450E+07	1.470E+07
1.000E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1.275E+07		3.11E-02	2.41E-03	1.63E-03	5.64E-04	5.70E-04	0.00E+00	4.22E-04	8.12E-04	2.71E-04
1.325E+07			4.12E-03	5.08E-04	3.51E-04	3.38E-04	1.91E-04	2.76E-04	1.58E-04	1.92E-04
1.350E+07				1.69E-03	4.33E-04	2.20E-04	2.10E-04	3.29E-04	1.51E-04	2.05E-04
1.370E+07					8.56E-04	1.61E-04	1.66E-04	2.47E-04	9.70E-05	1.56E-04
1.390E+07						5.70E-04	6.19E-05	1.23E-04	8.23E-05	8.57E-05
1.410E+07							2.87E-04	1.28E-04	3.43E-05	7.98E-05
1.430E+07								5.21E-04	7.22E-05	1.19E-04
1.450E+07									3.22E-04	4.94E-05
1.470E+07										2.84E-04

ENERGY [EV]	1.500E+07	1.600E+07	1.650E+07	1.700E+07	1.750E+07	1.800E+07	1.900E+07	2.000E+07
1.000E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
1.275E+07	5.02E-03	2.56E-03	4.51E-03	2.79E-03	2.22E-03	3.18E-03	1.91E-03	
1.325E+07	9.33E-04	4.33E-04	3.79E-04	4.34E-04	2.62E-04	3.39E-04	3.86E-04	
1.350E+07	4.18E-04	2.06E-04	3.72E-04	2.30E-04	1.80E-04	2.62E-04	1.40E-04	
1.370E+07	1.13E-04	5.95E-05	8.87E-05	5.54E-05	4.92E-05	6.33E-05	7.17E-05	
1.390E+07	1.50E-04	9.13E-05	1.51E-04	1.17E-04	1.07E-04	1.04E-04	1.21E-04	
1.410E+07	7.50E-05	2.41E-05	0.00E+00	2.69E-05	0.00E+00	0.00E+00	0.00E+00	
1.430E+07	8.47E-05	4.45E-05	6.63E-05	4.14E-05	3.68E-05	4.73E-05	5.36E-05	
1.450E+07	2.64E-04	1.46E-04	2.19E-04	1.71E-04	1.35E-04	1.99E-04	1.02E-04	
1.470E+07	5.88E-05	2.86E-05	4.27E-05	2.66E-05	2.37E-05	3.04E-05	3.45E-05	
1.500E+07	3.75E-03	1.14E-03	1.22E-03	1.28E-03	8.08E-04	1.16E-03	7.32E-04	
1.600E+07		1.39E-03	6.12E-04	6.84E-04	4.89E-04	6.94E-04	5.05E-04	
1.650E+07			2.61E-03	8.62E-04	8.15E-04	8.23E-04	4.96E-04	
1.700E+07				1.52E-03	6.05E-04	8.83E-04	6.15E-04	
1.750E+07					9.60E-04	6.52E-04	5.73E-04	
1.800E+07						1.86E-03	7.54E-04	
1.900E+07							1.75E-03	

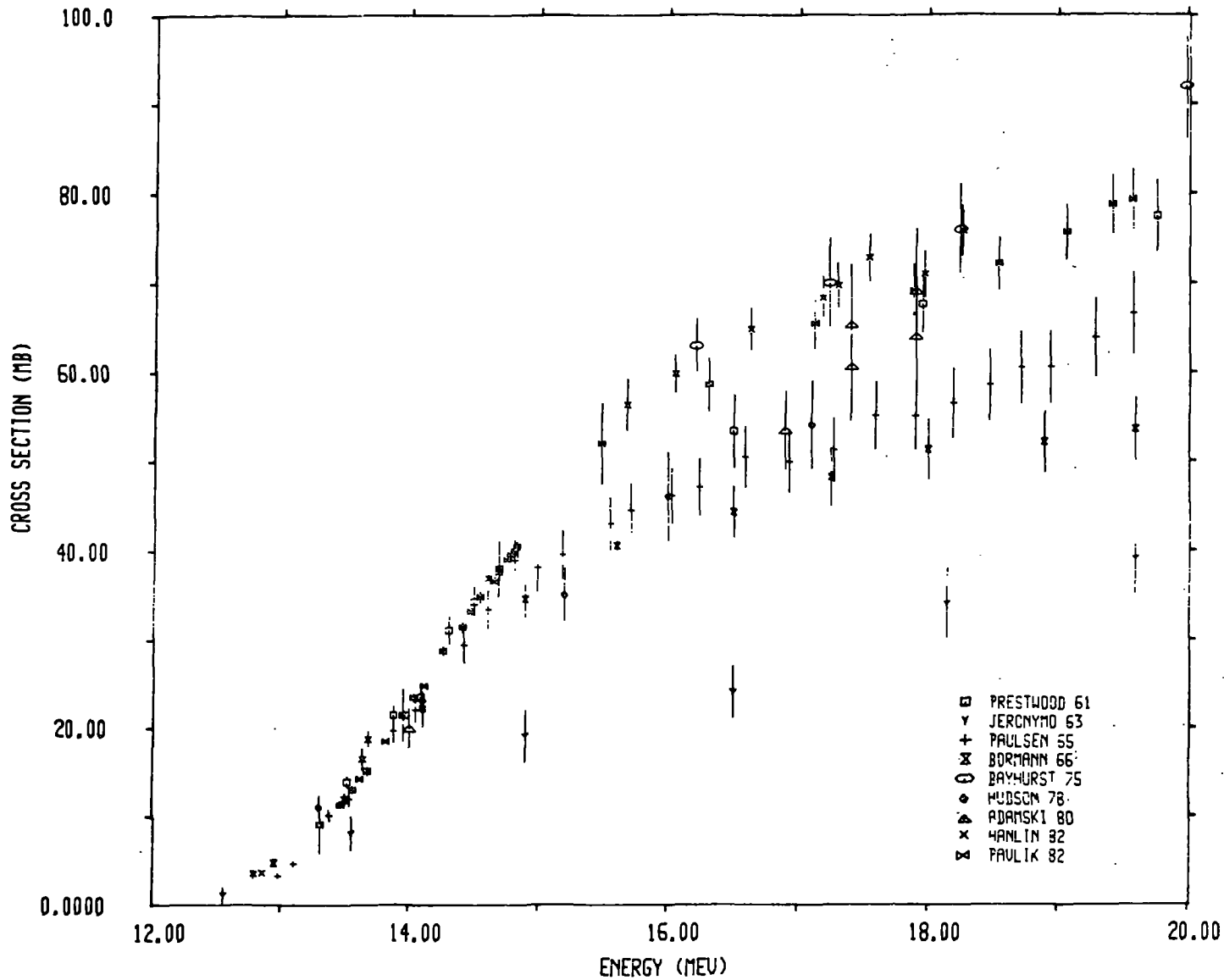
FIGURE CAPTIONS

Fig. 1. Cross sections for the $^{58}Ni(n,2n)^{57}Ni$ reaction as originally reported in the literature (Only data sets are shown which provide values above 16 MeV neutron energy)

Fig. 2. Renormalized and corrected cross section data for the reaction $^{58}Ni(n,2n)^{57}Ni$ from the threshold to 20 MeV

Fig. 3. Renormalized and corrected cross section data for the reaction $^{58}Ni(n,2n)^{57}Ni$ in the energy range 13 MeV to 15 MeV

Fig. 4. The final evaluated $^{58}Ni(n,2n)^{57}Ni$ cross sections compared with previous evaluations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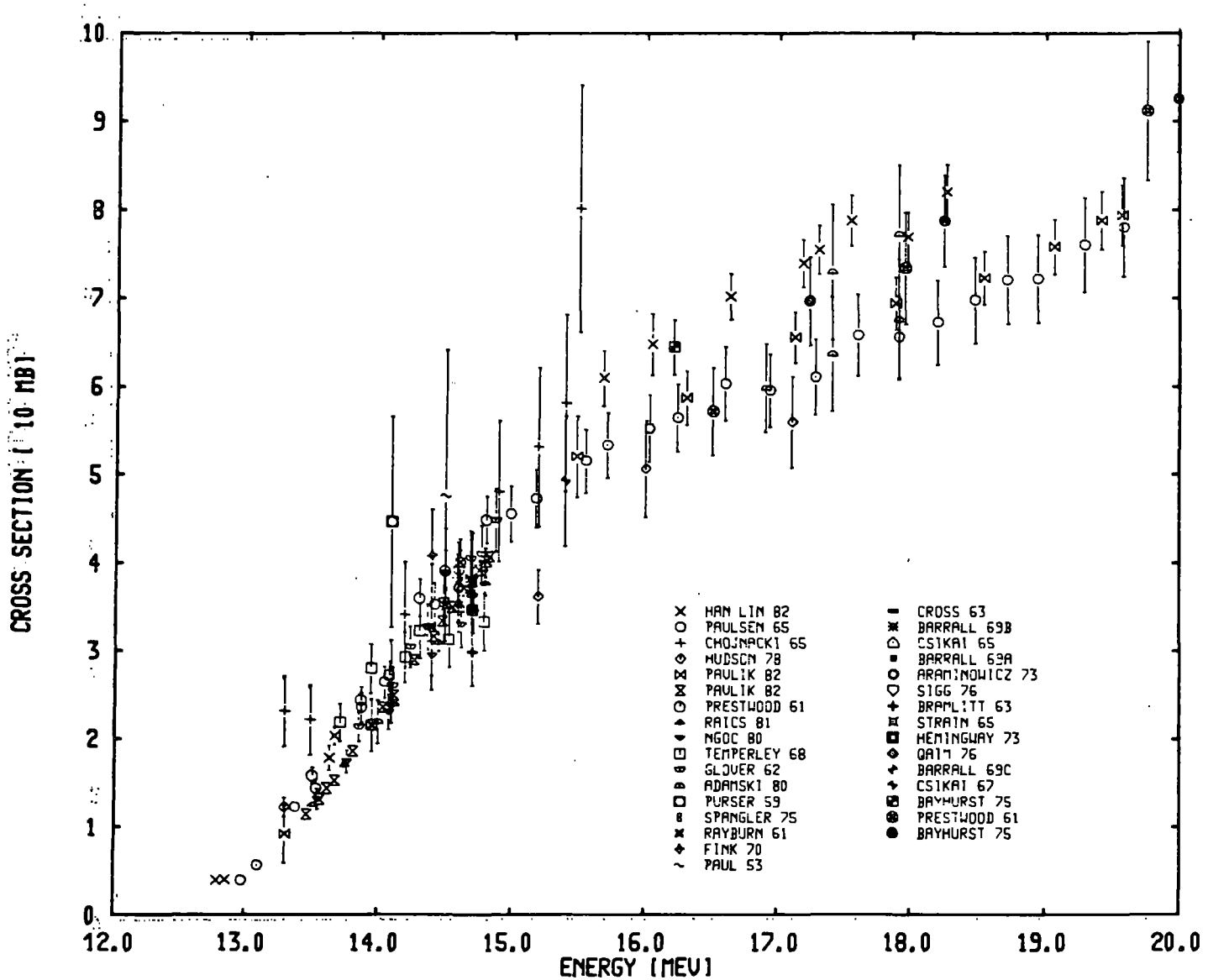
HUDSON 78
ADAMSKI 80
HANLIN 82
PAULIK 82

Fig. 1.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NGOC 80
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Fig. 2.

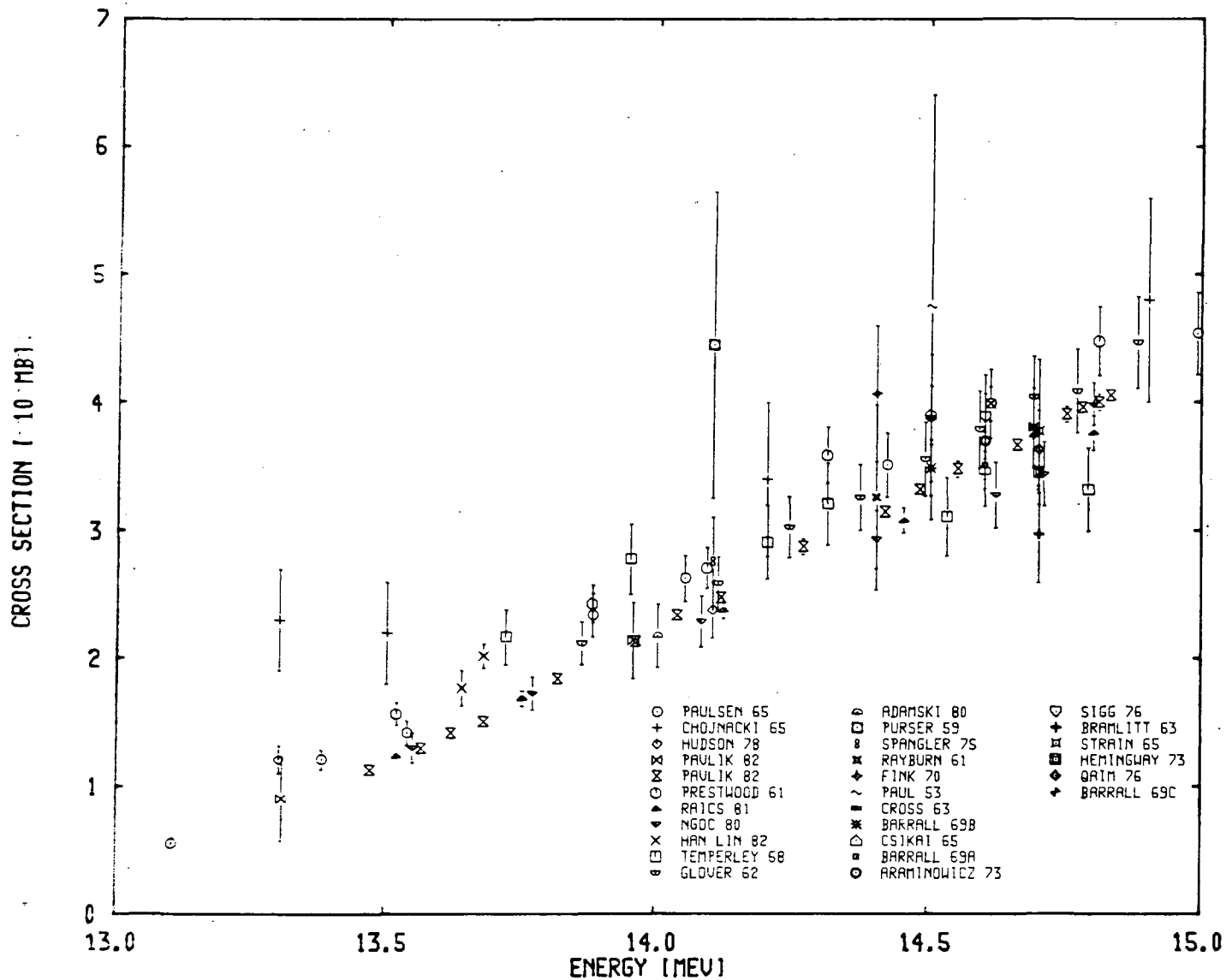
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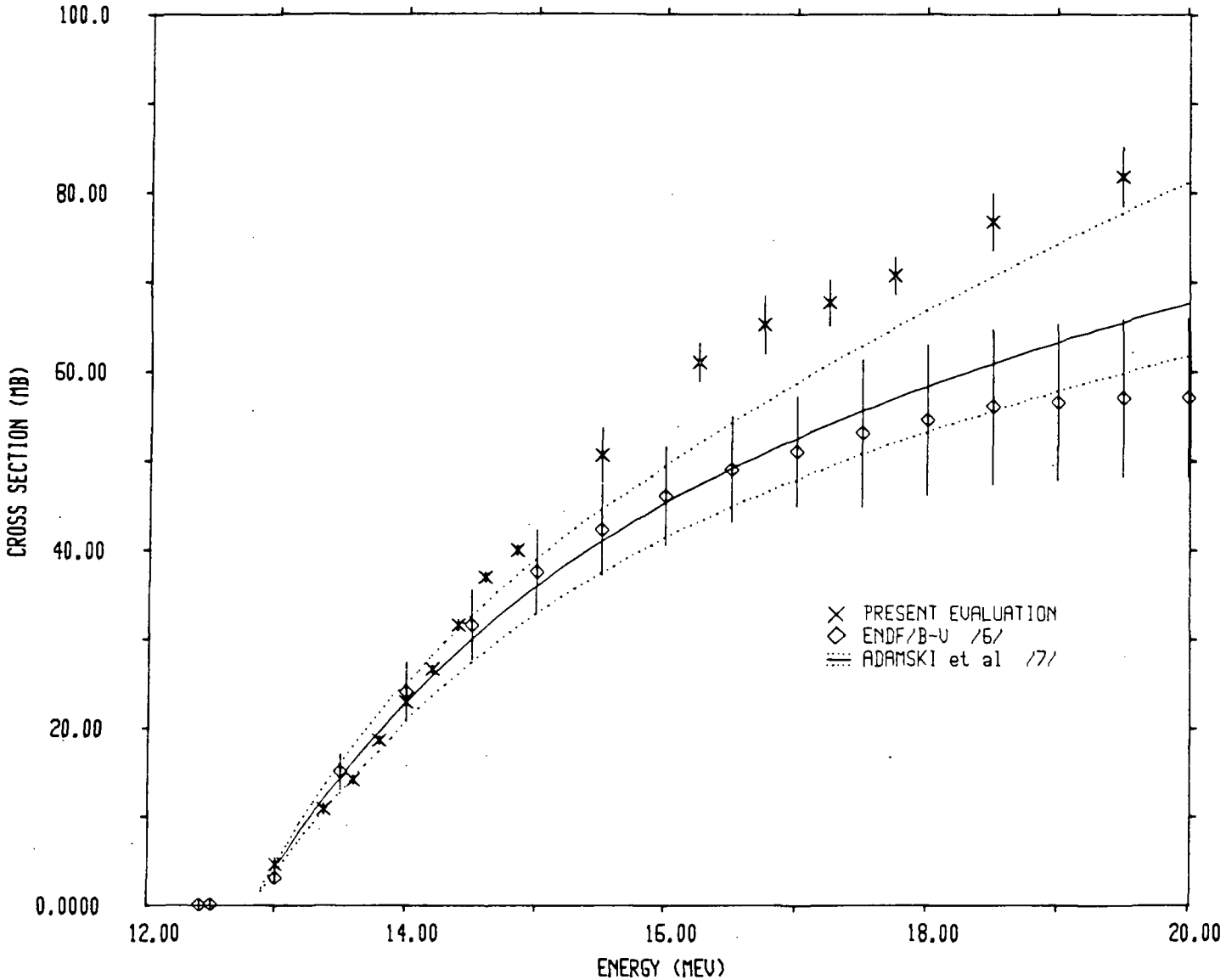
Fig. 3.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16.00
18.00
20.00
ENERGY (MEV)
PRESENT EVALUATION
ENDF/B-V /6/
ADAMSKI et al /7/

Fig. 4.

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