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NEANDC(J)-58/L
INDC(JAP)-44/L
IND(JAP)-44

GRAPHS OF NEUTRON CROSS SECTION DATA FOR FUSION REACTOR DEVELOPMENT

March 1979

Working Group on Light- and Medium-Nuclide Nuclear Data,
Japanese Nuclear Data Committee
Editors: T. ASAMI and S. TANAKA

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

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(Received January 31, 1979)

Abstract: Graphs of neutron cross section data relevant to fusion reactor development are presented. Nuclides and reaction types in the present compilation are based on a WRENDA request list from Japan for fusion reactor development. The compilation contains various partial cross sections for 55 nuclides from ^{6}Li to ^{237}Np in the energy range up to 20 MeV.

Keywords: Fusion Reactor, Neutron Cross Section, Experimental Data, Evaluated Data, Data Compilation, Graphs, Energy Range up to 20 MeV.

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融合炉開発のための中性子断面積データのグラフ集

シグマ研究委員会　軽・中重核データ・ワーキンググループ*
浅見　哲夫・田中　茂也　編集

（1979年1月31日受理）

融合炉開発に必要な中性子核データのグラフが呈示されている。ここに集録されている核種と反応の種類は，日本からの融合炉開発のためのWRENDAリクエスト・リストに基くものである。この集録にはエネルギー領域20 MeVまでの，^{6}Liから^{237}Npまでの核種に対する種々の中性子断面積が含まれている。

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田中茂也（原研，グループリーダ）

FOREWORD

In 1975, Working Group on Nuclear Data for Fusion#, one of the working groups under Japanese Nuclear Data Committee (JNDC), received requests for nuclear data from Japanese researchers in the field of fusion reactor engineering. After screening work for these requests had been done by the working group, the requests were sent to CCDN (presently NEA Data Bank) at Saclay, and compiled in Request List for Fusion Reactor Development of WRENDA 76/77 [INDC(SEC)-55/URSF].

The plan of the nuclear data evaluation works in the working group has been based on the above requests. Since plotting of the available experimental data was requisite for any evaluation work, the working group decided to make a compilation which contains an overall plotting of the experimental data in the range of the above requests; and such a compilation was expected to be useful also for other researchers than in the working group. A preliminary compilation prepared by the end of 1976 was not satisfactory because of the large missing of the available data in the plotting, and the compilation work was resumed in July 1977. The work consisted of requesting for the most recent data in NEUDADA from NEA Data Bank at Saclay, surveying for and adding missing data in the compilation with reference to CINDA, correction

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#) The name was changed to "Working Group on Light- and Medium-Nuclide Nuclear Data" in April 1977.

of erroneous data in the NEUDADA file* and plotting graphs using a computer code, SPLINT$. To serve the convenience of users of the present compilation, two kinds of evaluated data, JENDL-1 and ENDF/B-IV are also plotted with the experimental data.

INTRODUCTION

Data Plotting

The experimental data plotted in the graphs have been taken mainly from NEUDADA (Neutron Data Direct Access) file, the data of which the authors received from NEA Data Bank at Saclay in July 1977 in the form of magnetic tapes. These data were stored in and retrieved from NESTOR (Neutron Data Storage and Retrival) System at JAERI Nuclear Data Center to be plotted by the computer code SPLINT. The NEUDADA data were checked with reference to CINDA 76/77 and CINDA 78 (Supplement 4 to CINDA 76/77), and the data lacking in NEUDADA were added in the data plotting. A few erroneous data in NEUDADA were corrected by referring to original papers.

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*) Erroneous data found in the course of the present work are to be informed to NEA Data Bank at Saclay.

$) SPLINT was improved in some parts for the present work. As for the original SPLINT, refer to T. Narita, T. Nakagawa, Y. Kanemori and H. Yamakoshi, JAERI-M 5769 (1974).

Symbols for reaction types, etc. used in the present graphs and NEUDADA are listed in the following:

	Present	NEUDADA
radiative capture	(n,γ)	NG
elastic scattering	(n,n)	SEL
inelastic scattering	(n,n')	SIN
level energy excited through inelastic scattering	E_x	L,Q
γ-ray emission from inelastic scatt.	(n,n'γ)	NNG
γ-ray production except for radiative capture	(n,xγ)	NEG
energy of γ-ray emitted	E_γ	X,L
(n,2n) reaction	(n,2n)	N2N
(n,p) reaction	(n,p)	NP
(n,d) reaction	(n,d)	ND
(n,n'd) reaction	(n,n'd)	NND
(n,t) reaction	(n,t)	NT
(n,n't) reaction	(n,n't)	NNT
(n,α) reaction	(n,α)	NA
(n,n'α) reaction	(n,n'α)	NNA
(n,n'3α) reaction	(n,n'3α)	NN3
fission	(n,f)	NF

Among the NEUDADA data, the data with STATUS=1 (preliminary) and 2 (superseded) are

omitted from the plotting, and some of the data with STATUS=3 (calculated) and 4 (normalization outdated) are added to the plotting after original papers being surveyed. The cross sections averaged over particular energy bands and over some neutron spectra such as fission spectra are removed from the plotting. The values averaged for thermal neutron spectra, however, are adopted, and they are plotted at E_n = 0.0253 eV.

Due to some differences in classifications between the reaction types in the original request list and those in NEUDADA, the following changes on the reaction types have been made (when a reaction type in quotation marks is requested, the data of reaction type(s) shown after arrow are plotted):

1) "Total photon production" ⟶ (n,γ) and (n,n'γ); the others being neglected.
2) "Absorption" ⟶ (n,γ), (n,p), (n,α), ...
3) "Spectrum" ⟶ omitted.
4) "Inelastic" ⟶ graphs are only given for the (n,n') reactions leading to a few final levels of excitation and for the (n,n'γ) reactions with a few transition gamma rays.

If there are only few data points for a given reaction, and if no relevant evaluated data are available, they were omitted from the graphic presentation. Moreover, to draw a boundary to the present compilation, the authors confined themselves only to integrated cross sections. Therefore, some quantities such as "angular distributions" are not filed, though a few angular distributions are contained in the original WRENDA request list.

In order to give a guide to the shapes of the experimental data and to make a comparison with them, the evaluated data in JENDL-1 and ENDF/B-IV are also plotted, if there are the corresponding data in these files.

The symbols used in the graphs are tagged by the first Author's Name, followed by Year, Month, Laboratory and Reference. This tagging is the same as that in the comment file of NEUDADA, except for Author's Name. In the case of plural authors, a symbol "+" follows the first Author's Name.

Graphs

The graphs are arranged in ascending order of atomic number Z and mass number A. Within each Z and A, they are presented in the order of increasing mass of the emitted particle in the reactions.

The graphic layout are in log-log scale for the (n,γ), (n,n) and (n,f) reactions, and in linear-linear scale for the threshold reactions. The data ranging from 10^{-2} eV to 20 MeV are considered as the subject of the present plotting. The energy range of the graphs is so selected that at least the experimental data may be contained in it, and is usually set to an extent wider than the region of the experimental data. This may enable us to see the trend of excitation curve more easily. In case where a set of data covers only a narrow energy region, a small energy range is taken in the graph to save the total volume of the graphs. The sizes of graphs are reduced to a half or a quarter of one page, when only a few data are plotted.

On the other hand, those with dense data points are plotted in two to four separate pages depending on their degree of crowdedness, in particular for the (n,γ) and (n,f) reactions. The data are usually plotted with error bars for the cross section and the neutron energy, when they are available. When it is hard to distinguish the individual data points, the error bars are omitted. Furthermore, in case where the data are densely presented, the symbols overlapping within the same reference are changed to small dots.

ACKNOWLEDGMENTS

The authors wish to express their appreciation to NEA Data Bank at Saclay for sending us the NEUDADA data. We wish to thank National Nuclear Data Center at Brookhaven National Laboratory for the use of the ENDF/B-IV data relevant to the present work. Thanks are also due to Mr. T. Narita for his cooperation in improving the computer code SPLINT so as to meet the needs of the present graphical plotting.

CONTENTS

Element or Nuclide	Qantity	Energy Range in Graph	page
^{12}C	(n,n'γ), E_γ=4.44 MeV	0 - 20 MeV	21
	(n,n'3α)	10 - 20 MeV	22
^{16}O	(n,p)	10 - 20 MeV	23
	(n,α)	0 - 20 MeV	24
^{19}F	(n,γ)	10^{-2} eV - 20 MeV	25
	(n,n')	0 - 5 MeV	26
	(n,n'), E_x=0.1099 MeV	0 - 5 MeV	27
	E_x=0.197 MeV	0 - 5 MeV	28
	(n,n'γ),E_γ=1.24,1.36 MeV	0 - 5 MeV	29
	(n,2n)		30-31
	(n,p)		32
	(n,α)		33
^{27}Al	(n,γ)	10^{-2} eV - 20 MeV	34-35
	(n,n')	0 - 20 MeV	36
	(n,n'), E_x=0.842 MeV	0 - 20 MeV	37
	E_x=1.013 MeV	0 - 20 MeV	38
	E_x=2.21 MeV	0 - 20 MeV	39
	E_x=2.73 MeV	0 - 20 MeV	40
	(n,n'γ),E_γ=0.842 MeV	0 - 15 MeV	41
	E_γ=1.013 MeV	0 - 15 MeV	42
	E_γ=1.72 MeV	0 - 15 MeV	43
	E_γ=2.21 MeV	0 - 15 MeV	44

Element or Nuclide	Qantity	Energy Range in Graph	page
^{27}Al	(n,2n)	10 - 20 MeV	45
	(n,p)	0 - 20 MeV	46-47
	(n,α)	0 - 20 MeV	48-49
^{20}Ca	(n,γ)	10^{-2} eV - 20 MeV	50
	(n,n)	0.5 - 20 MeV	51
	(n,n'), E_x=3.35,3.73,3.90 MeV	0 - 15 MeV	52
^{40}Ca	(n,γ)	10^{-2} eV - 20 MeV	53
	(n,n'), E_x=3.348 MeV	3 - 10 MeV	54
	(n,n'γ),E_γ=3.35,3.73,3.90 MeV	3 - 10 MeV	54
^{42}Ca	(n,γ)	10^{-2} eV - 20 MeV	55
^{43}Ca	(n,γ)	10^{-2} eV - 20 MeV	56
^{44}Ca	(n,γ)	10^{-2} eV - 20 MeV	57
^{22}Ti	(n,γ)	10^{-2} eV - 20 MeV	58
	(n,n')	0 - 15 MeV	59
	(n,n'), E_x=0.98 MeV	0 - 15 MeV	60
	E_x=0.89,2.89,3.38 MeV	0 - 15 MeV	61
	(n,n'γ),E_γ=0.99,1.38,1.56 MeV	0 - 5 MeV	61
	(n,2n)	10 - 20 MeV	62
^{46}Ti	(n,n'), E_x=0.89 MeV	0 - 5 MeV	63
	(n,2n)	0 - 20 MeV	64

Element or Nuclide	Qantity	Energy Range in Graph	page
^{46}Ti	(n,p)	0 - 20 MeV	65
^{47}Ti	(n,γ)	10^{-2} eV - 20 MeV	66
	(n,p)	0 - 20 MeV	67
^{48}Ti	(n,n'), E_x=0.98 MeV	0 - 5 MeV	68
	(n,p)	0 - 20 MeV	69
^{49}Ti	(n,p)	5 - 20 MeV	70
^{50}Ti	(n,γ)	10^{-2} eV - 20 MeV	71
	(n,p)	0 - 20 MeV	72
^{50}V	(n,γ)	10^{-2} eV - 20 MeV	73
^{51}V	(n,γ)	10^{-2} eV - 20 MeV	74-75
	(n,n'), E_x=0.3198 MeV	0 - 10 MeV	76
	E_x=0.930 MeV	0 - 10 MeV	77
	E_x=1.609 MeV	0 - 10 MeV	78
	E_x=1.81 MeV	0 - 10 MeV	79
	(n,2n)	8 - 20 MeV	80
	(n,p)	0 - 20 MeV	81
	(n,α)	5 - 20 MeV	82
	(n,n'α)	12 - 20 MeV	83
$_{24}Cr$	(n,γ)	10^{-2} eV - 20 MeV	84-85
	(n,n'), E_x=All Levels, 1.43,2.37,	0 - 20(10)MeV	86

Element or Nuclide	Qantity	Energy Range in Graph	page
^{54}Fe	(n,n'γ), E_γ=1.41 MeV	0 - 20 MeV	108
	(n,2n)	13 - 20 MeV	109
	(n,p)	0 - 20 MeV	110-111
	(n,α)	0 - 20 MeV	112
^{56}Fe	(n,γ)	1 keV - 20 MeV	113
	(n,n')	0 - 20 MeV	114
	(n,n'), E_x=0.845 MeV	0 - 15 MeV	115
	E_x=2.08 MeV	0 - 15 MeV	116
	E_x=2.65 MeV	0 - 15 MeV	117
	(n,n'γ),E_γ=0.845 MeV	0 - 20 MeV	118
	E_γ=1.24 MeV	0 - 20 MeV	119
	E_γ=1.81 MeV	0 - 20 MeV	120
	E_γ=2.085,2.27,2.60 MeV	0 - 20(10) MeV	121
	(n,2n)	10 - 20 MeV	124
	(n,p)	0 - 20 MeV	122-123
^{57}Fe	(n,γ)	1 keV - 20 MeV	125
^{58}Fe	(n,γ)	10^{-2} eV - 20 MeV	126
$_{28}Ni$	(n,γ)	10^{-2} eV - 20 MeV	127-129
	(n,n'),E_x=All Levels, 1.15,1.32 1.44,2.14 MeV	0 - 15 MeV	130-131

Element or Nuclide	Qantity	Energy Range in Graph	page
$_{28}Ni$	(n,n'γ), E_γ=0.86,1.00,1.17 MeV	0 - 10 MeV	131
	E_γ=1.332,1.45,1.795, 2.15 MeV	0 - 10 MeV	132
	(n,2n)	0 - 20 MeV	133
^{58}Ni	(n,γ)	1 keV - 20 MeV	134
	(n,n'), E_x=1.452 MeV	0 - 15 MeV	135
	(n,n'γ), E_γ=1.452 MeV	0 - 20 MeV	136
	(n,2n)	10 - 20 MeV	137
	(n,p)	0 - 20 MeV	138-139
^{60}Ni	(n,γ)	10^{-2} eV - 20 MeV	140
	(n,n'), E_x=1.333,2.16 MeV	0 - 15 MeV	141
	(n,n'γ), E_γ=1.332 MeV	0 - 20 MeV	141
	(n,p)	0 - 20 MeV	142
^{61}Ni	(n,γ)	10^{-2} eV - 20 MeV	143
	(n,p)	0 - 20 MeV	144
^{62}Ni	(n,γ)	10^{-2} eV - 20 MeV	145
	(n,n'), E_x=1.17 MeV	0 - 10 MeV	146
	(n,n'γ), E_γ=1.17 MeV	0 - 10 MeV	146
	(n,p)	10 - 20 MeV	146
^{64}Ni	(n,γ)	10^{-2} eV - 20 MeV	147
$_{29}Cu$	(n,γ)	10^{-2} eV - 20 MeV	148-149

Element or Nuclide	Qantity	Energy Range in Graph	page
$_{29}Cu$	(n,n')	0 - 20 MeV	150
	(n,n'), E_x=0.67,0.77,0.97,1.11 MeV	0 - 10 MeV	151
	(n,2n)	10 - 20 MeV	152
^{63}Cu	(n,γ)	10^{-2} eV - 20 MeV	153-154
	(n,n'), E_x=0.669,0.962 MeV	0 - 10 MeV	155
	(n,n'γ),E_γ=0.668,0.961,1.33 MeV	0 - 5 MeV	156
	(n,2n)	10 - 20 MeV	156-157
^{65}Cu	(n,γ)	10^{-2} eV - 20 MeV	158-159
	(n,n'), E_x=0.770,1.115 MeV	0 - 10 MeV	160
	(n,n'γ),E_γ=0.770,1.114 MeV	10 - 20 MeV	161
	(n,2n)	10 - 20 MeV	162-163
^{93}Nb	(n,γ)	10^{-2} eV - 20 MeV	164-165
	(n,n')	0 - 20 MeV	166
	(n,n'), E_x=0.74 MeV	0 - 10 MeV	167
	E_x=0.81 MeV	0 - 10 MeV	168
	E_x=0.96 MeV	0 - 10 MeV	169
	E_x=1.08 MeV	0 - 10 MeV	170
	(n,n'γ),E_γ=0.74,0.81,0.96,1.08 MeV	0 - 5 MeV	171
	(n,2n)	5 - 20 MeV	172
	(n,2n) ^{92m}Nb(10.16d)	5 - 20 MeV	173
	(n,α)	5 - 20 MeV	174
	(n,α) ^{90g}Y(64h), ^{90m}Y(3.1h)	10 - 20 MeV	175

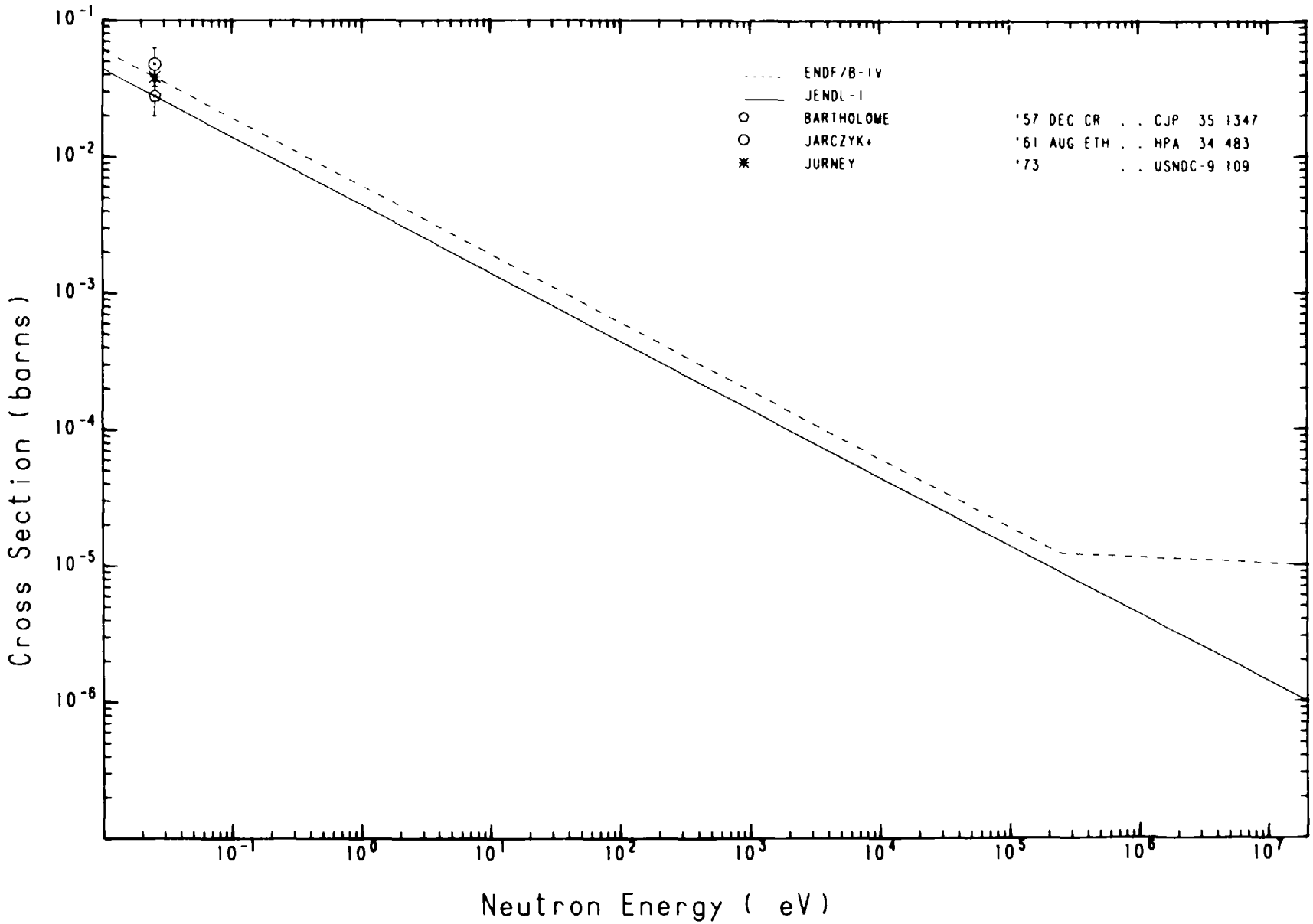
Element or Nuclide	Qantity	Energy Range in Graph	page
$_{42}Mo$	(n,γ)	10^{-2} eV - 20 MeV	176-177
	(n,n)	10 keV - 20 MeV	178
	(n,n')	0 - 20 MeV	179
	(n,n'), E_x=0.2,0.5,0.68,0.78, 0.87,1.045 MeV	0 - 5 MeV	180
	(n,n'), E_x=1.27,1.41,1.5,1.6 MeV	0 - 5 MeV	181
	(n,n'γ),E_γ=0.74,1.06 MeV	0 - 5(3) MeV	181
	(n,2n)	5 - 20 MeV	182
^{92}Mo	(n,γ)	1 keV - 20 MeV	183
	(n,n)	10 keV - 20 MeV	184
	(n,2n)	10 - 20 MeV	185
	(n,2n) ^{91g}Mo(15.5 m)	12 - 20 MeV	186
	^{91m}Mo(66 s)	12 - 20 MeV	187
	(n,p)	0 - 20 MeV	188
	(n,α) ^{89g}Zr(78.4 h), ^{89m}Zr(4.18 m)	12 - 17 MeV	189
^{94}Mo	(n,γ)	1 keV - 20 MeV	190
	(n,n)	10 keV - 20 MeV	191
	(n,n'), E_x=0.88 MeV	0 - 10 MeV	192
	(n,n'γ),E_γ=0.874 MeV	0 - 3 MeV	192
^{95}Mo	(n,γ)	10^{-2} eV - 20 MeV	193-194
^{96}Mo	(n,γ)	10^{-2} eV - 20 MeV	195

Element or Nuclide	Qantity	Energy Range in Graph	page
^{96}Mo	(n,n)	10 keV - 20 MeV	196
	(n,n'), E_x=0.78,1.15 MeV	0 - 5 MeV	197
	(n,p)	13 - 16 MeV	197
^{97}Mo	(n,γ)	10^{-2} eV - 20 MeV	198-199
	(n,p)	13 - 16 MeV	200
^{98}Mo	(n,γ)	10 keV - 20 MeV	201-202
	(n,n)	10 keV - 20 MeV	203
	(n,p),(n,α)	13 - 16 MeV	204
^{100}Mo	(n,γ)	10^{-2} eV - 20 MeV	205-206
	(n,n)	10 keV - 20 MeV	207
	(n,n'), E_x=0.5,0.7,1.07 MeV	0 - 5 MeV	208
	(n,2n),(n,α)	13 - 16 MeV	208
$_{82}$Pb	(n,γ)	10^{-2} eV - 20 MeV	209
	(n,n')	0 - 20 MeV	210
^{204}Pb	(n,γ)	10^{-2} eV - 20 MeV	211
	(n,n') ^{204m}Pb(66.9 m)	0 - 20 MeV	212
^{206}Pb	(n,γ)	10^{-2} eV - 20 MeV	213
	(n,n'), E_x=0.803,1.17 MeV	0 - 5 MeV	214
	E_x=1.34,1.47 MeV	0 - 5 MeV	215

Element or Nuclide	Qantity	Energy Range in Graph	page
^{206}Pb	(n,n'γ), E_γ=0.538,0.662 MeV	0 - 5 MeV	216
	E_γ=0.803,1.36 MeV	0 - 5 MeV	217
	E_γ=1.45,170,1.82 MeV	0 - 6 MeV	218
^{207}Pb	(n,γ)	10^{-2} eV - 20 MeV	219
	(n,n') ^{207m}Pb(0.80 s)	0 - 20 MeV	220
	(n,n'), E_x=0.570,0.898 MeV	0 - 5 MeV	221
^{208}Pb	(n,γ)	10^{-2} eV - 20 MeV	222
	(n,n'), E_x=2.61,3.20,3.48 MeV	0 - 5 MeV	223
^{237}Np	(n,f)	10^{-2} eV - 20 MeV	224-227

^{6}Li

(n,γ)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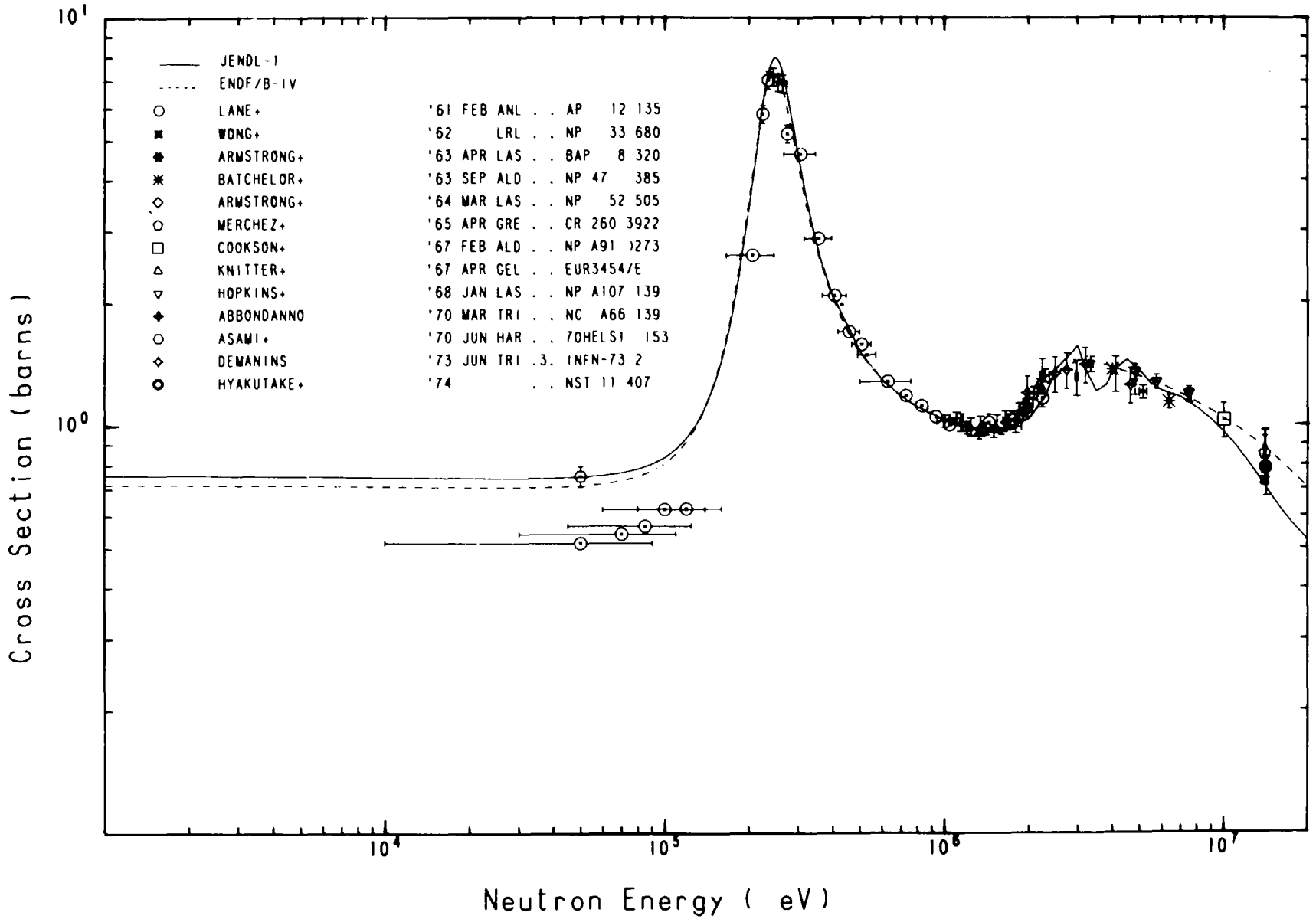
JARCZYK+ '61 AUG ETH . . HPA 34 483
JURNEY '73 . . USNDC-9 109
Cross Section (barns)
Neutron Energy (eV)

^{6}Li
(n,n)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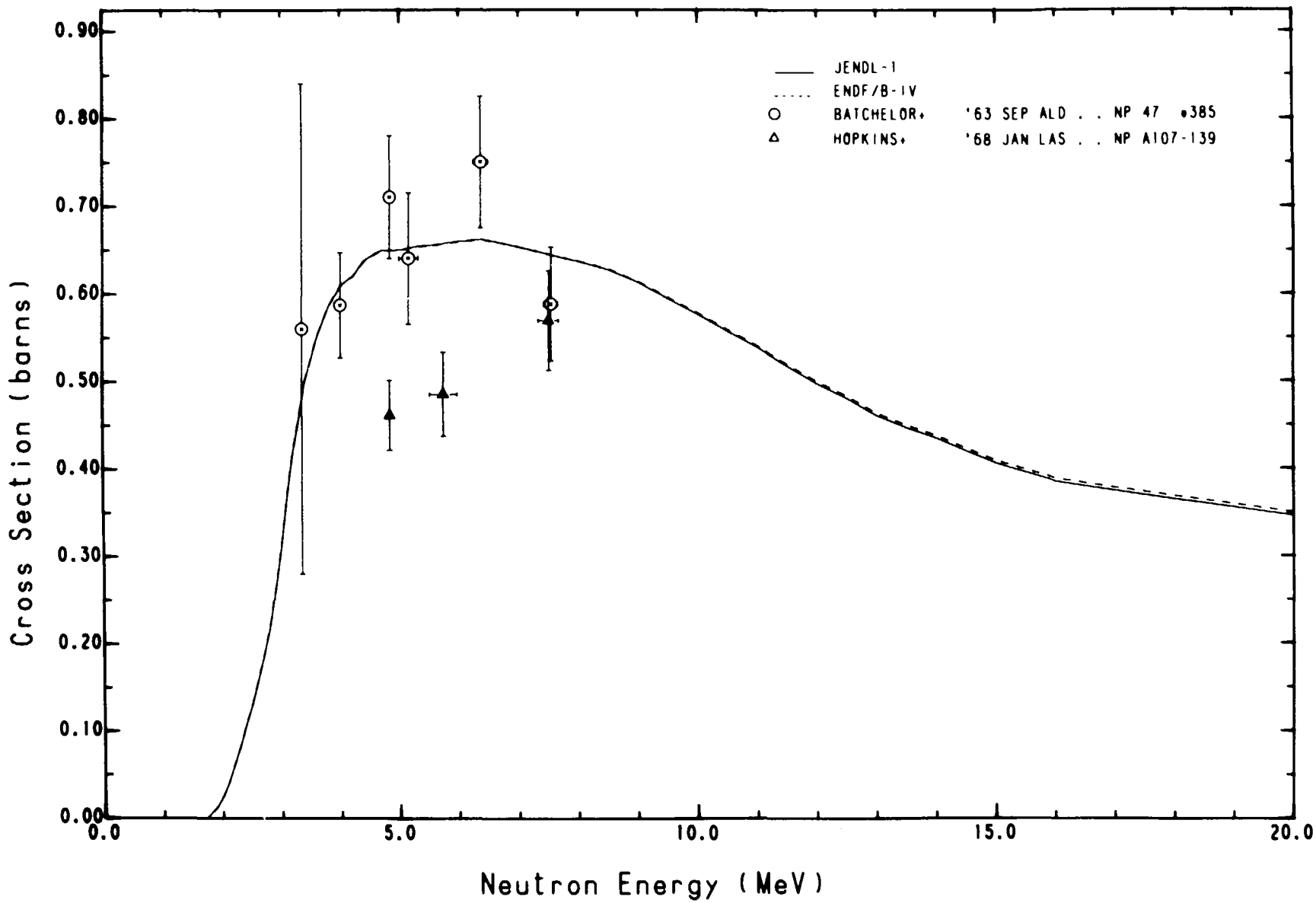
ENDF/B-IV
LANE+ '61 FEB ANL . . AP 12 135
WONG+ '62 LRL . . NP 33 680
ARMSTRONG+ '63 APR LAS . . BAP 8 320
BATCHELOR+ '63 SEP ALD . . NP 47 385
ARMSTRONG+ '64 MAR LAS . . NP 52 505
MERCHEZ+ '65 APR GRE . . CR 260 3922
COOKSON+ '67 FEB ALD . . NP A91)273
KNITTER+ '67 APR GEL . . EUR3454/E
HOPKINS+ '68 JAN LAS . . NP A107 139
ABBONDANNO '70 MAR TRI . . NC A66 139
ASAMI+ '70 JUN HAR . . 70HELSI 153
DEMANINS '73 JUN TRI .3. INFN-73 2
HYAKUTAKE+ '74 . . NST 11 407
Cross Section (barns)
Neutron Energy (eV)

^{6}Li
(n,n')


JENDL-1
ENDF/B-IV
BATCHELOR+ '63 SEP ALD . . NP 47 •385
HOPKINS+ '68 JAN LAS . . NP A107-139
Cross Section (barns)
Neutron Energy (MeV)
0.00
0.10
0.20
0.30
0.40
0.50
0.60
0.70
0.80
0.90
0.0
5.0
10.0
15.0
20.0

^{6}Li

(n,t)

——	JENDL-1							
-----	ENDF/B-IV							
●	BLAIR+	'50	SEP	ANL	. .	ANL4515	7	
◆	RIBE	'52			. .	PR 87	205	
●	FRYE JR	'54	MAR	LAS	. .	PR	93	1086
✦	WEDDELL+	'54	JUL	NWU	. .	PR	95	117
●	GORLOV+	'56		CCP	. .	DOK	111	791
■	RIBE	'56	JUN	LAS	. .	PR	103-741	
■	ELIPIDIN.+	'57			. .	AE S5	75	
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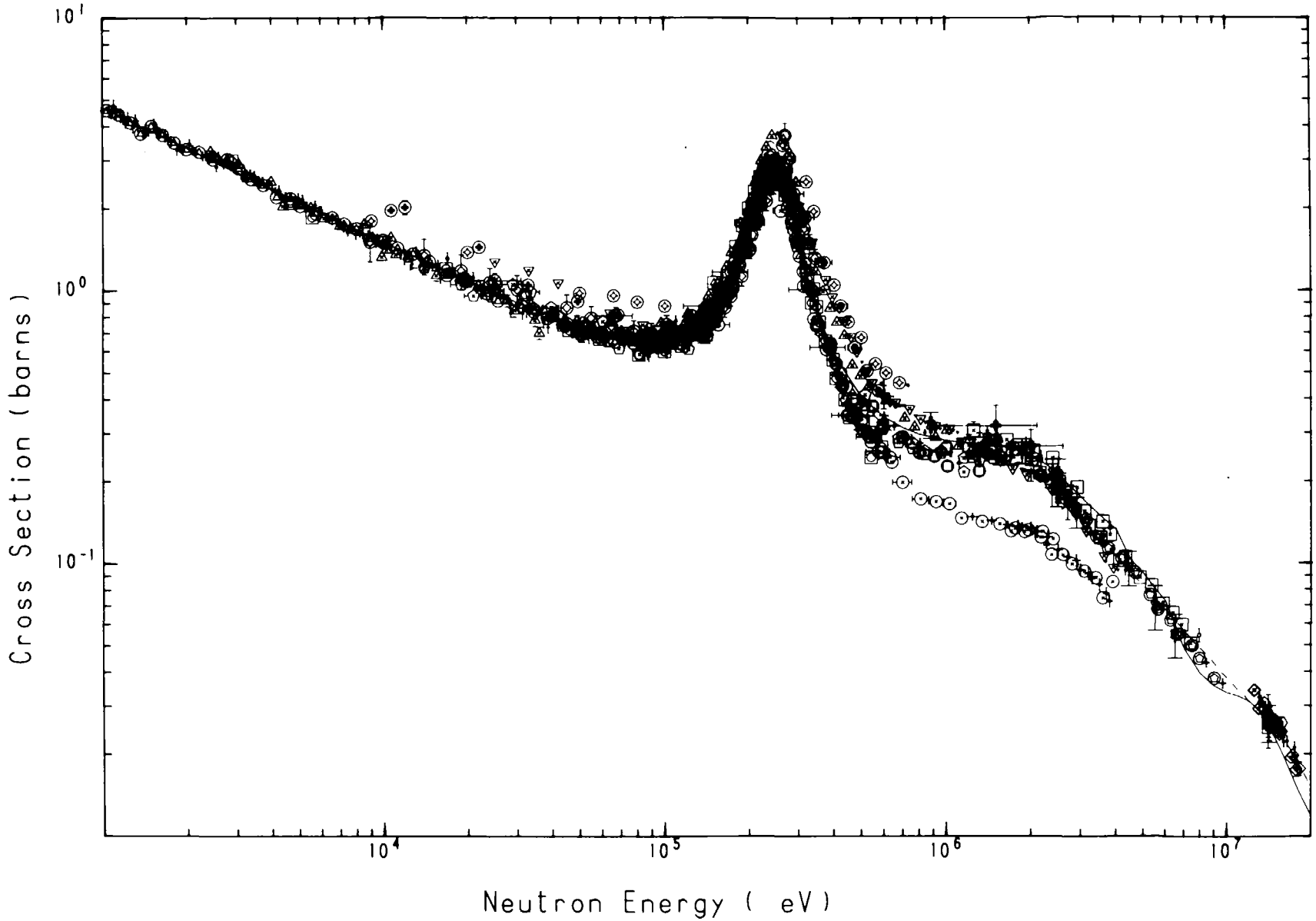
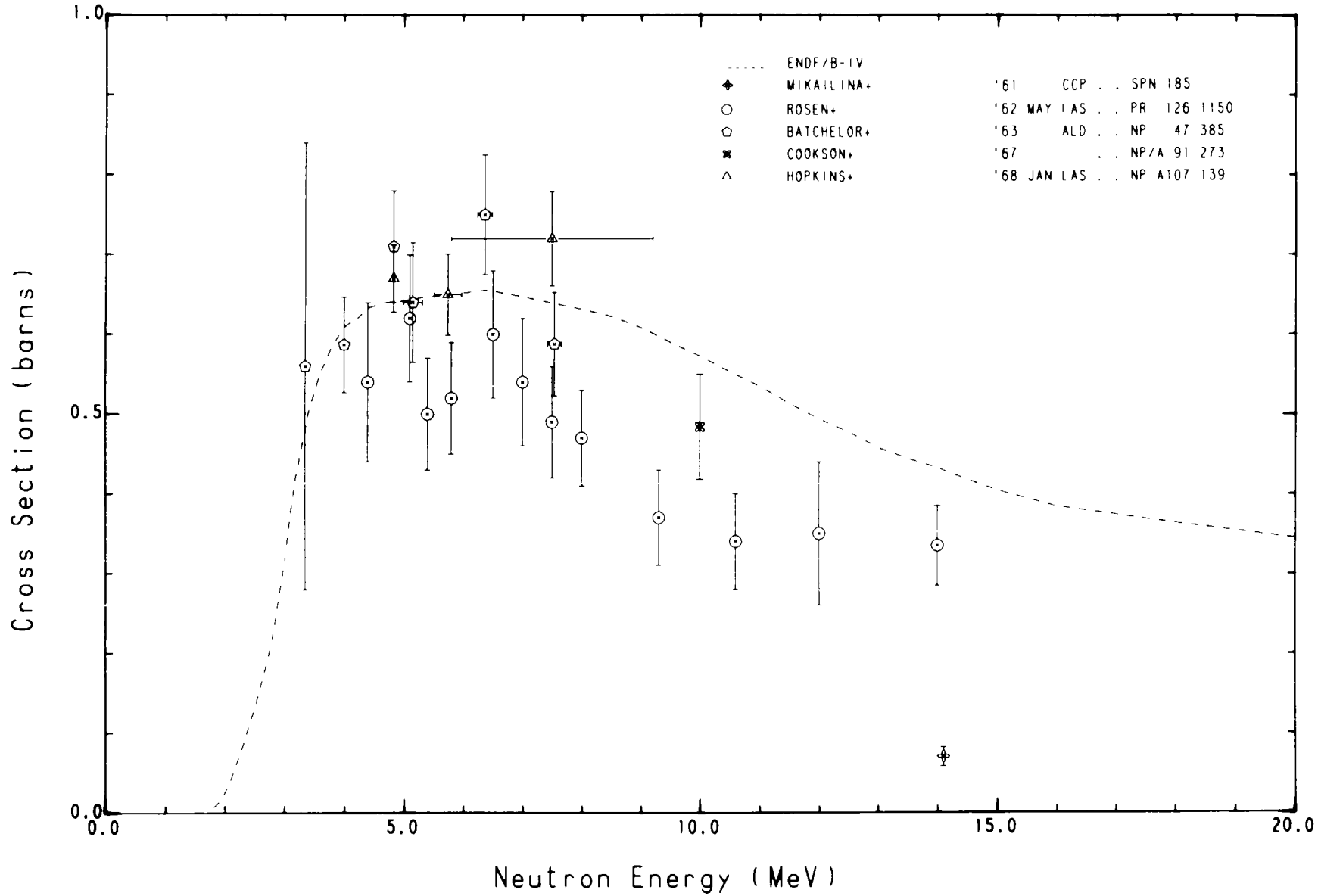
◇	KERN+	'58	NOV	NRD	. .	PR	112	926
●	PARDO+	'59		NWU	. .	BAP	4	218
▽	GABBARD+	'59	APR	RIC	. .	PR	114	201
□	MURRAY+	'59	APR	ORL	. .	PR	115	1707
●	BAME JR+	'59	JUN	LAS	. .	PR	114	1580
■	PERELYGIN+	'60			. .	AE 9	488	
■	BORMANN+	'60		HAM	. .	ZN	15A	200
●	MIKAILINA+	'61		CCP	. .	SPN	185	
■	SCHWARZ+	'65	MAR	FOA	. .	NP	63	593
■	CONDE+	'65	NOV	FOA	. .	AF	29	45
●	BARRY	'66	MAR	ALD	. .	66WASH	763	
■	FORT+	'66	OCT	CAD	. .	66PARIS	267	
●	COX+	'67	MAR	ALD	. .	JNE	21	271
✱	RENDIC+	'67	OCT	RBZ	. .	ROS2	143	
◇	FORT+	'70	JUN	CAD	. .	70HELSI	253	
●	MCPHERSON+	'71	MAR	KTY	. .	71KNOX2	611	
○	FORT+	'72	JAN	CAD	. .	EANDC E	148	
○	CLEMENT+	'72	JUL	HAR	. .	AERE-R	7075	
●	POENITZ	'74		ANL	. .	ZP	268	359
○	FRIESENHAH	'74	FEB	GRT	. .	INT7011	-001	
●	COATES+	'74	JUN	HAR	. .	COATES.	74F	
●	STEPHANY+	'75	FEB	WIS	. .	BAP	20	163

^{6}Li
(n,t)

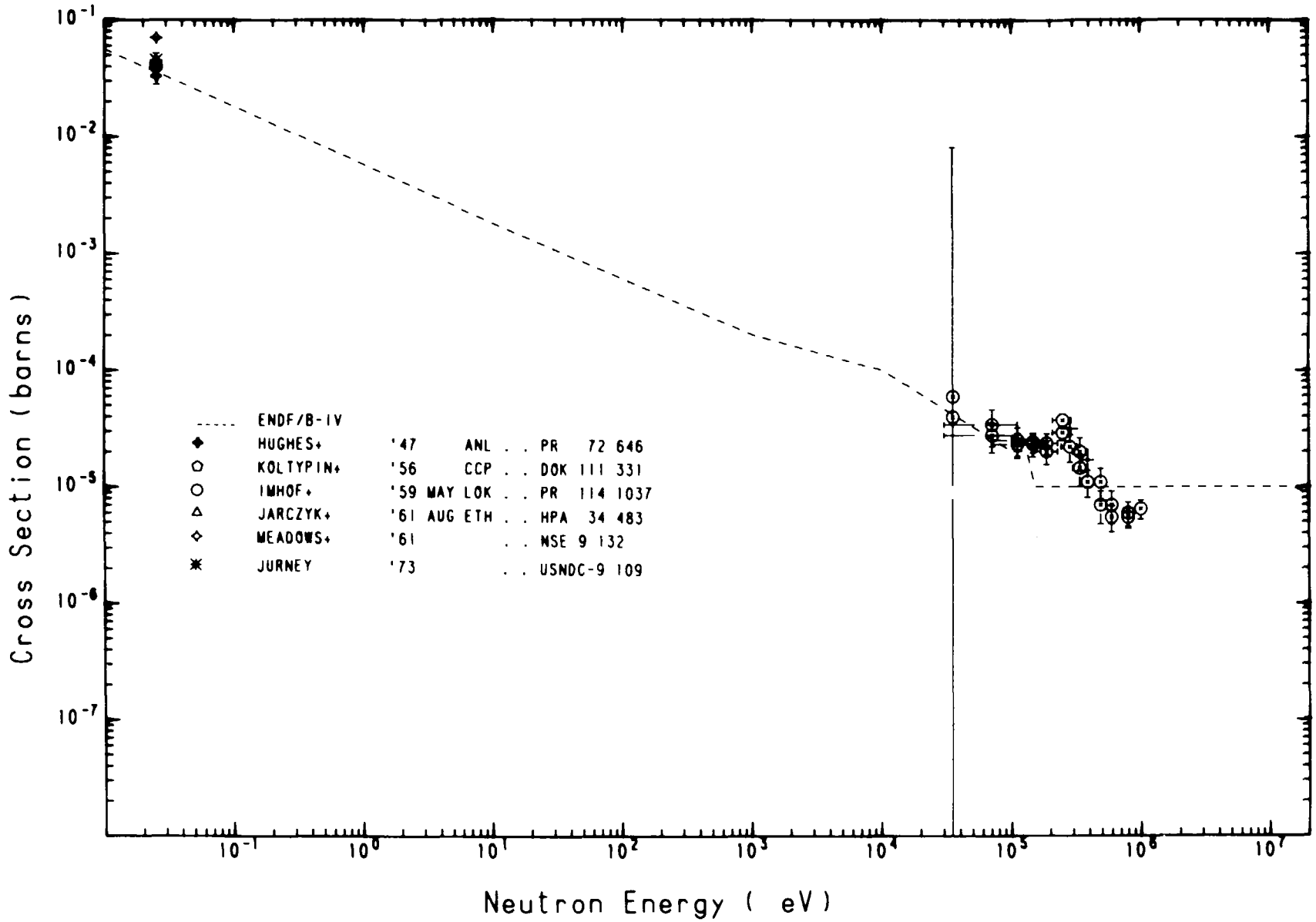

Cross Section (barns)
Neutron Energy (eV)
10^{1}
10^{0}
10^{-1}
10^{4}
10^{5}
10^{6}
10^{7}

^{6}Li

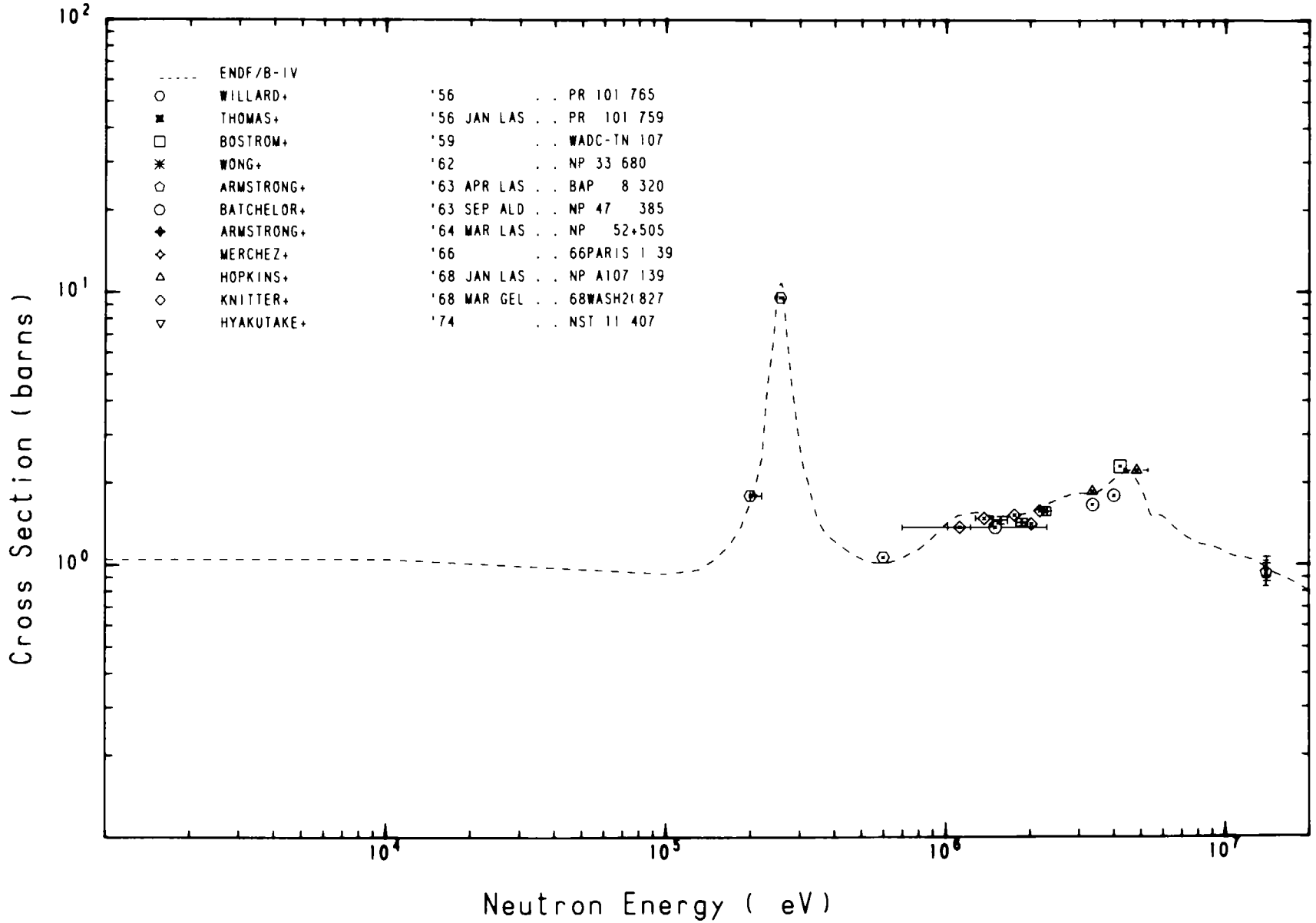
(n,n'd)


ENDF/B-IV
MIKAILINA+ '61 CCP . . SPN 185
ROSEN+ '62 MAY LAS . . PR 126 1150
BATCHELOR+ '63 ALD . . NP 47 385
COOKSON+ '67 . . NP/A 91 273
HOPKINS+ '68 JAN LAS . . NP A107 139
Cross Section (barns)
Neutron Energy (MeV)
0.0
0.5
1.0
5.0
10.0
15.0
20.0

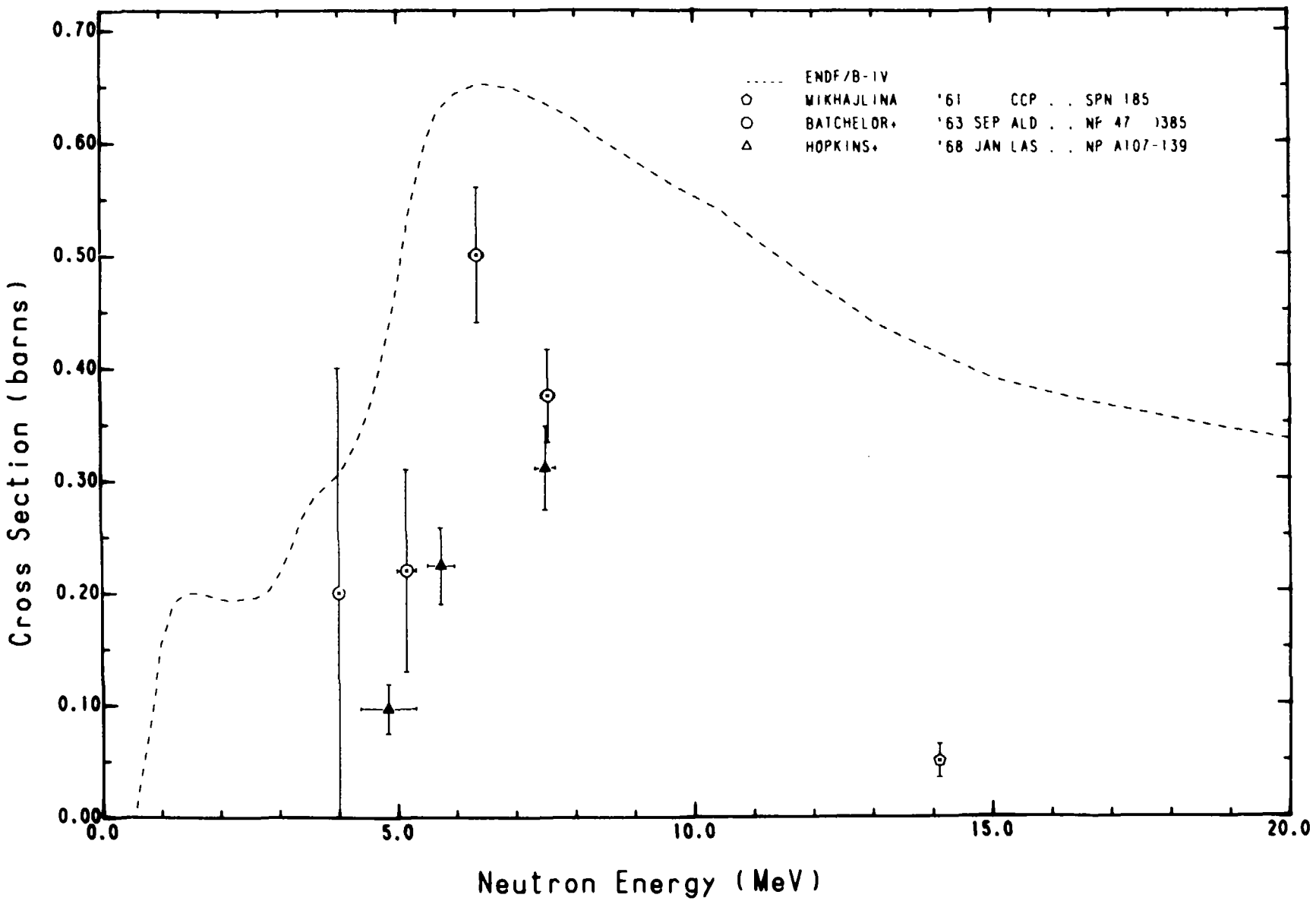
^{7}Li
(n,γ)


Cross Section (barns)
Neutron Energy (eV)
ENDF/B-IV
HUGHES+ '47 ANL . . PR 72 646
KOLTYPIN+ '56 CCP . . DOK 111 331
IMHOF+ '59 MAY LOK . . PR 114 1037
JARCZYK+ '61 AUG ETH . . HPA 34 483
MEADOWS+ '61 . . NSE 9 132
JURNEY '73 . . USNDC-9 109

^{7}Li
(n,n)

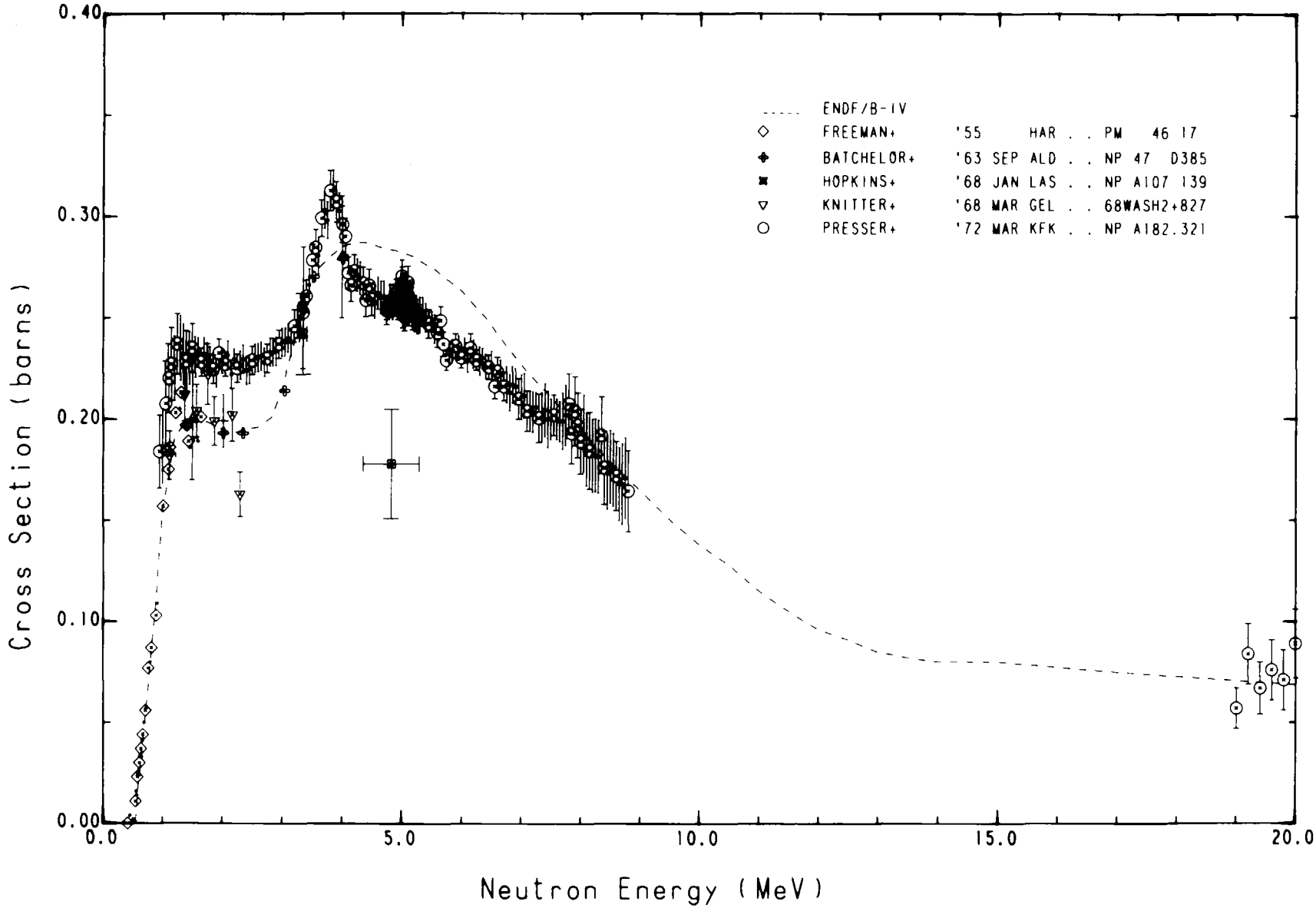

ENDF/B-IV
WILLARD+ '56 . . PR 101 765
THOMAS+ '56 JAN LAS . . PR 101 759
BOSTROM+ '59 . . WADC-TN 107
WONG+ '62 . . NP 33 680
ARMSTRONG+ '63 APR LAS . . BAP 8 320
BATCHELOR+ '63 SEP ALD . . NP 47 385
ARMSTRONG+ '64 MAR LAS . . NP 52+505
MERCHEZ+ '66 . . 66PARIS 1 39
HOPKINS+ '68 JAN LAS . . NP A107 139
KNITTER+ '68 MAR GEL . . 68WASH2 827
HYAKUTAKE+ '74 . . NST 11 407
Cross Section (barns)
Neutron Energy (eV)

^{7}Li
(n,n')


ENDF/B-IV
MIKHAJLINA '61 CCP . . SPN 185
BATCHELOR+ '63 SEP ALD . . NF 47 1385
HOPKINS+ '68 JAN LAS . . NP A107-139
Cross Section (barns)
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0.0
5.0
10.0
15.0
20.0
Neutron Energy (MeV)

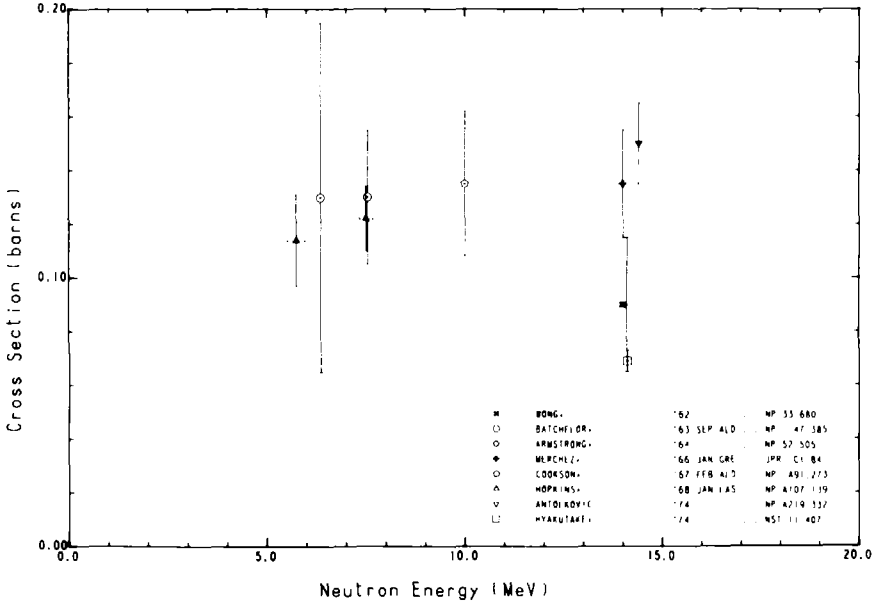
^{7}Li
(n,n')

Ex=0.478 MeV

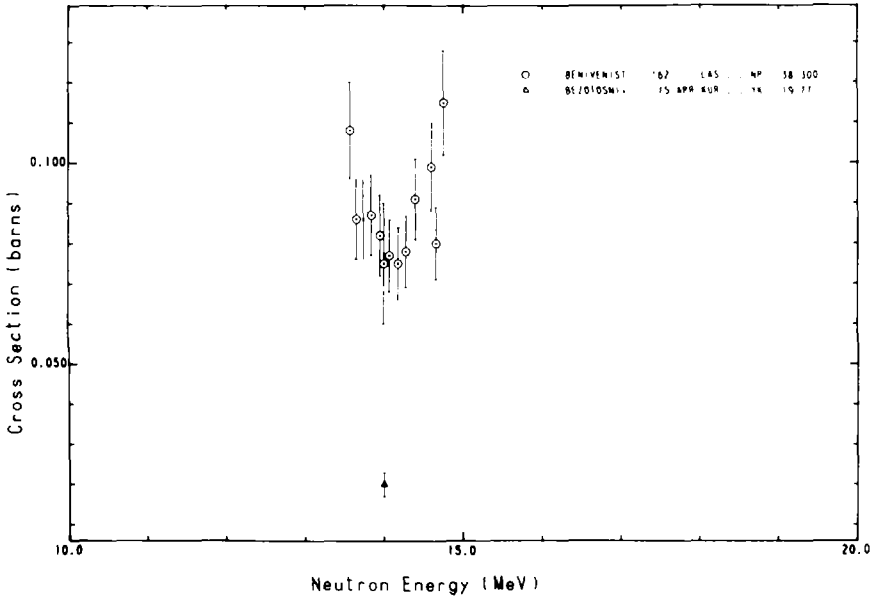


^{7}Li
(n,n')
(n,n'γ)

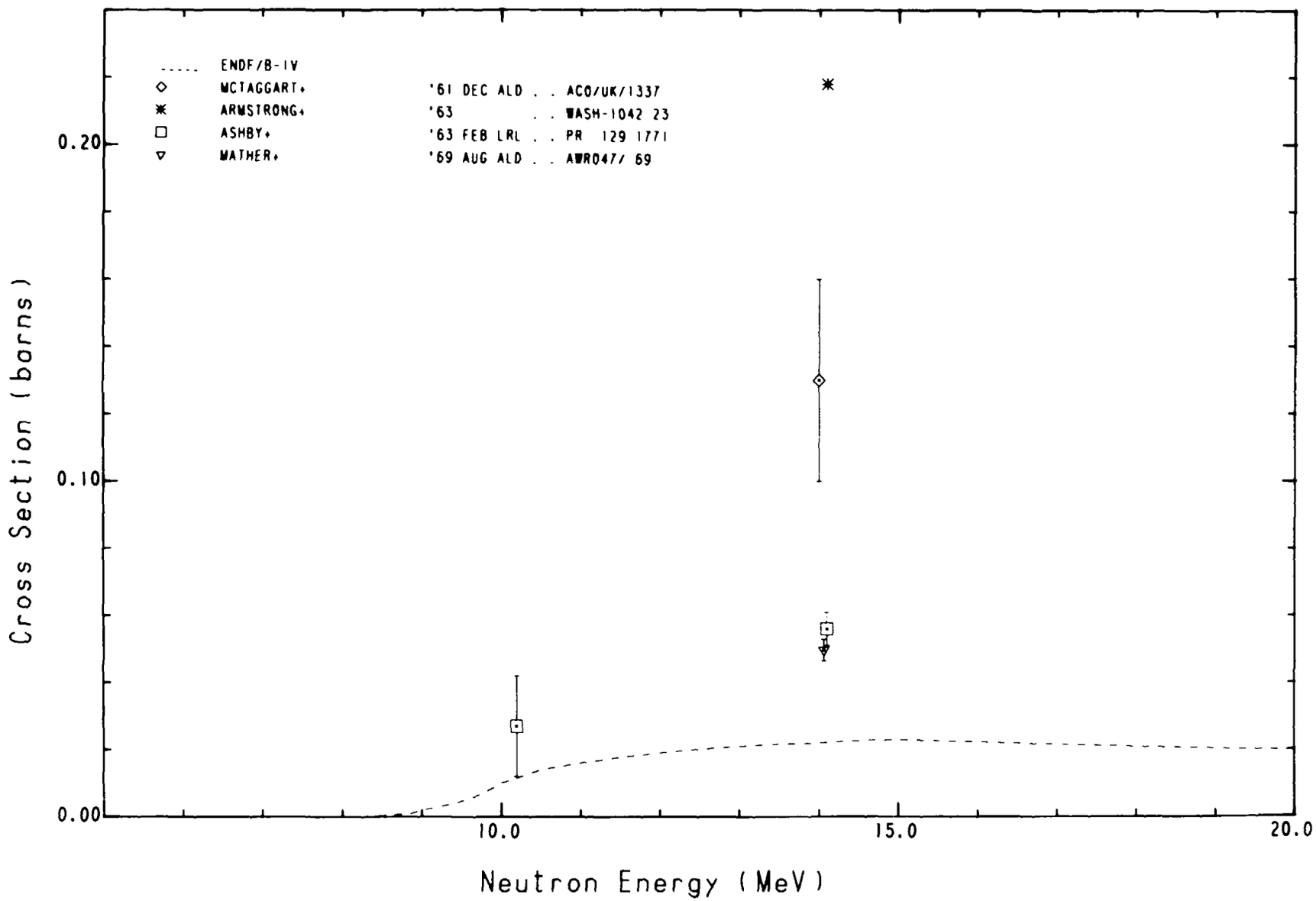
(n,n')
E_x=4.63 MeV



(n,n'γ)
E =0.478 MeV

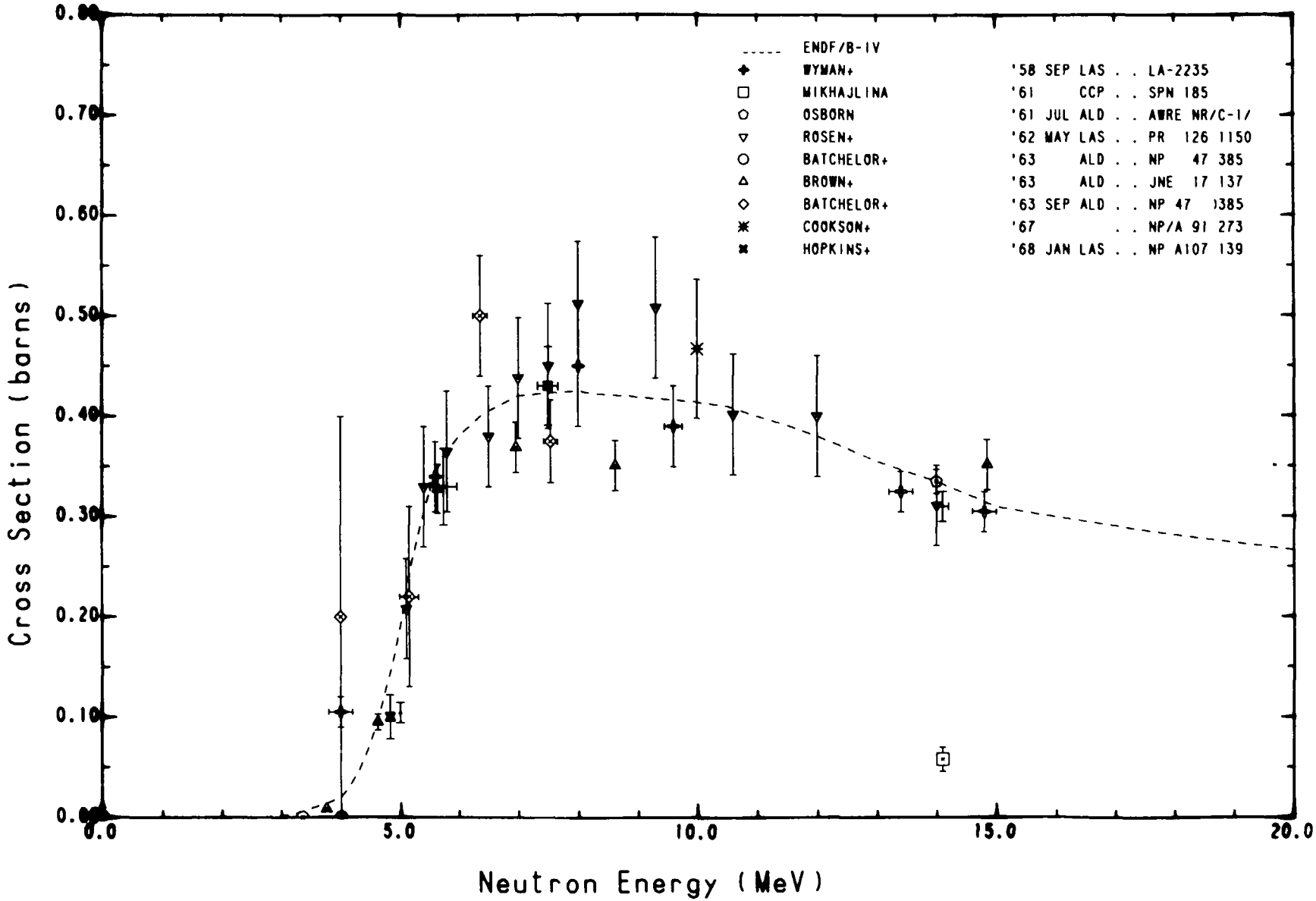


^{7}Li
(n,2n)

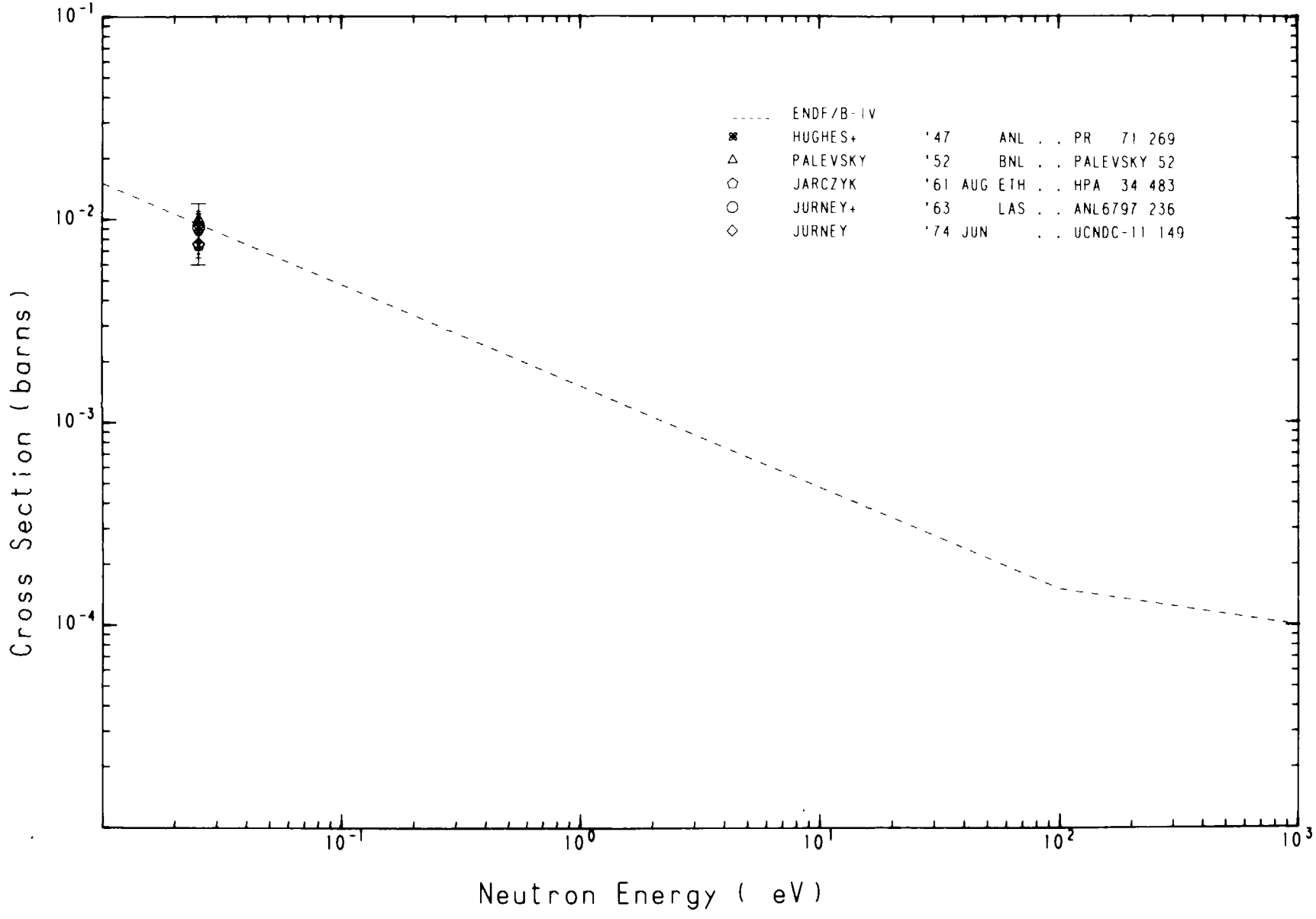

ENDF/B-IV
MCTAGGART+ '61 DEC ALD . . ACO/UK/1337
ARMSTRONG+ '63 . . WASH-1042 23
ASHBY+ '63 FEB LRL . . PR 129 1771
MATHER+ '69 AUG ALD . . AWRO47/ 69
0.20
0.10
0.00
10.0
15.0
20.0
Cross Section (barns)
Neutron Energy (MeV)

^{7}Li

(n,n't)


ENDF/B-IV
WYMAN+ '58 SEP LAS . . LA-2235
MIKHAJLINA '61 CCP . . SPN 185
OSBORN '61 JUL ALD . . AWRE NR/C-17
ROSEN+ '62 MAY LAS . . PR 126 1150
BATCHELOR+ '63 ALD . . NP 47 385
BROWN+ '63 ALD . . JNE 17 137
BATCHELOR+ '63 SEP ALD . . NP 47 385
COOKSON+ '67 . . NP/A 91 273
HOPKINS+ '68 JAN LAS . . NP A107 139
Cross Section (barns)
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0.0
5.0
10.0
15.0
20.0
Neutron Energy (MeV)

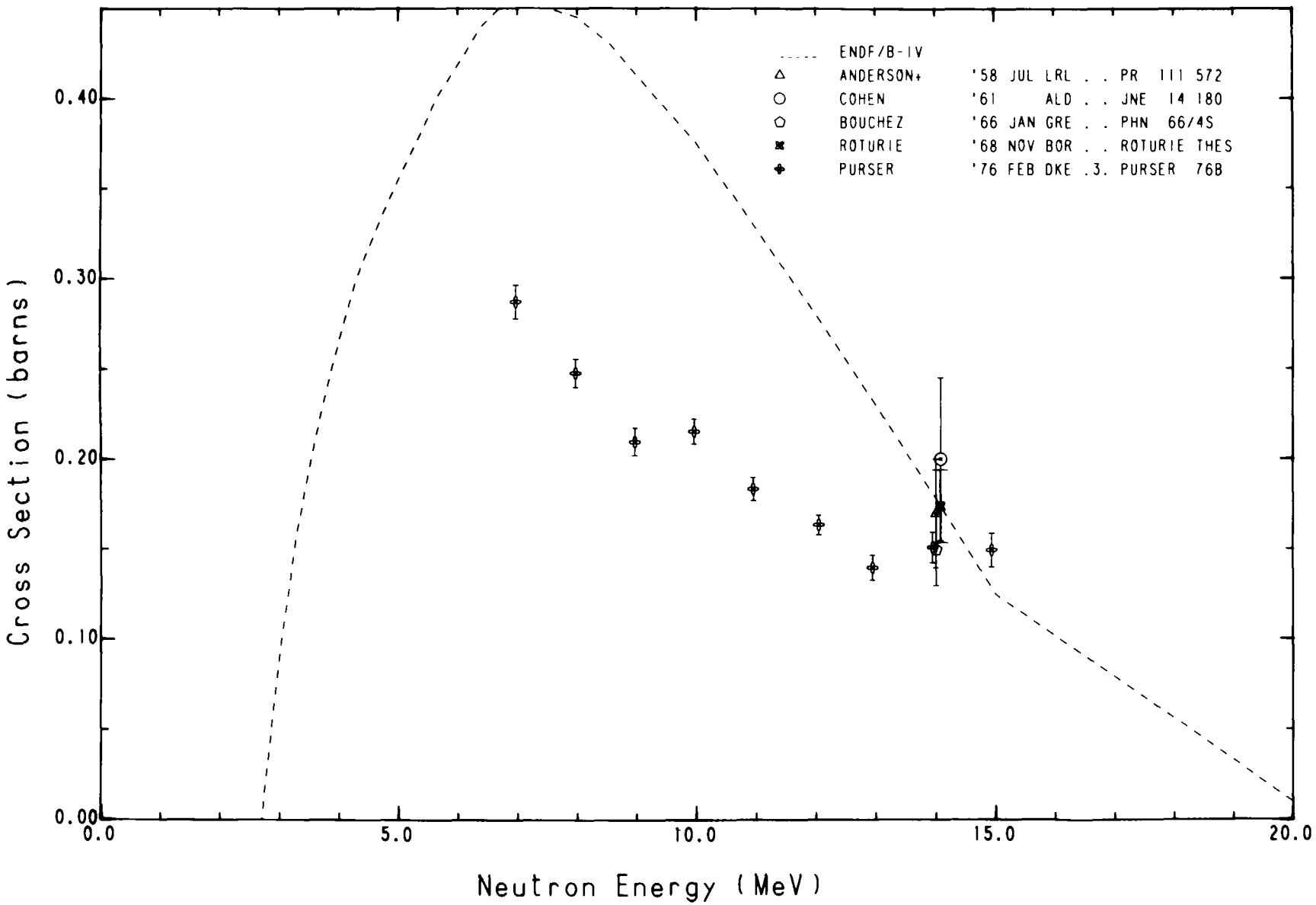
^{9}Be
(n,γ)


ENDF/B-IV
HUGHES+ '47 ANL . . PR 71 269
PALEVSKY '52 BNL . . PALEVSKY 52
JARCZYK '61 AUG ETH . . HPA 34 483
JURNEY+ '63 LAS . . ANL6797 236
JURNEY '74 JUN . . UCNDC-11 149
Cross Section (barns)
Neutron Energy (eV)
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-1}
10^{0}
10^{1}
10^{2}
10^{3}

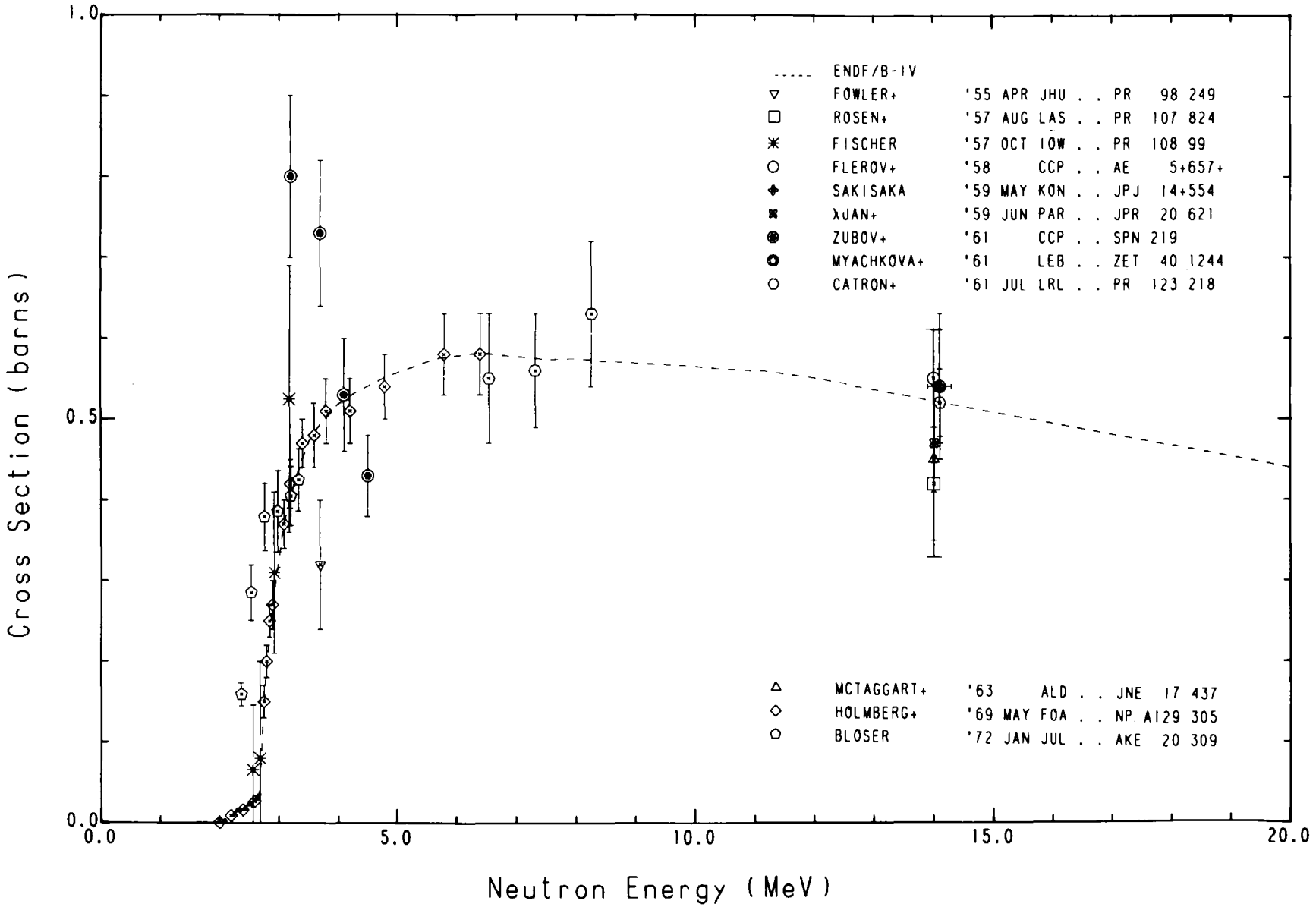
^{9}Be

(n,n')

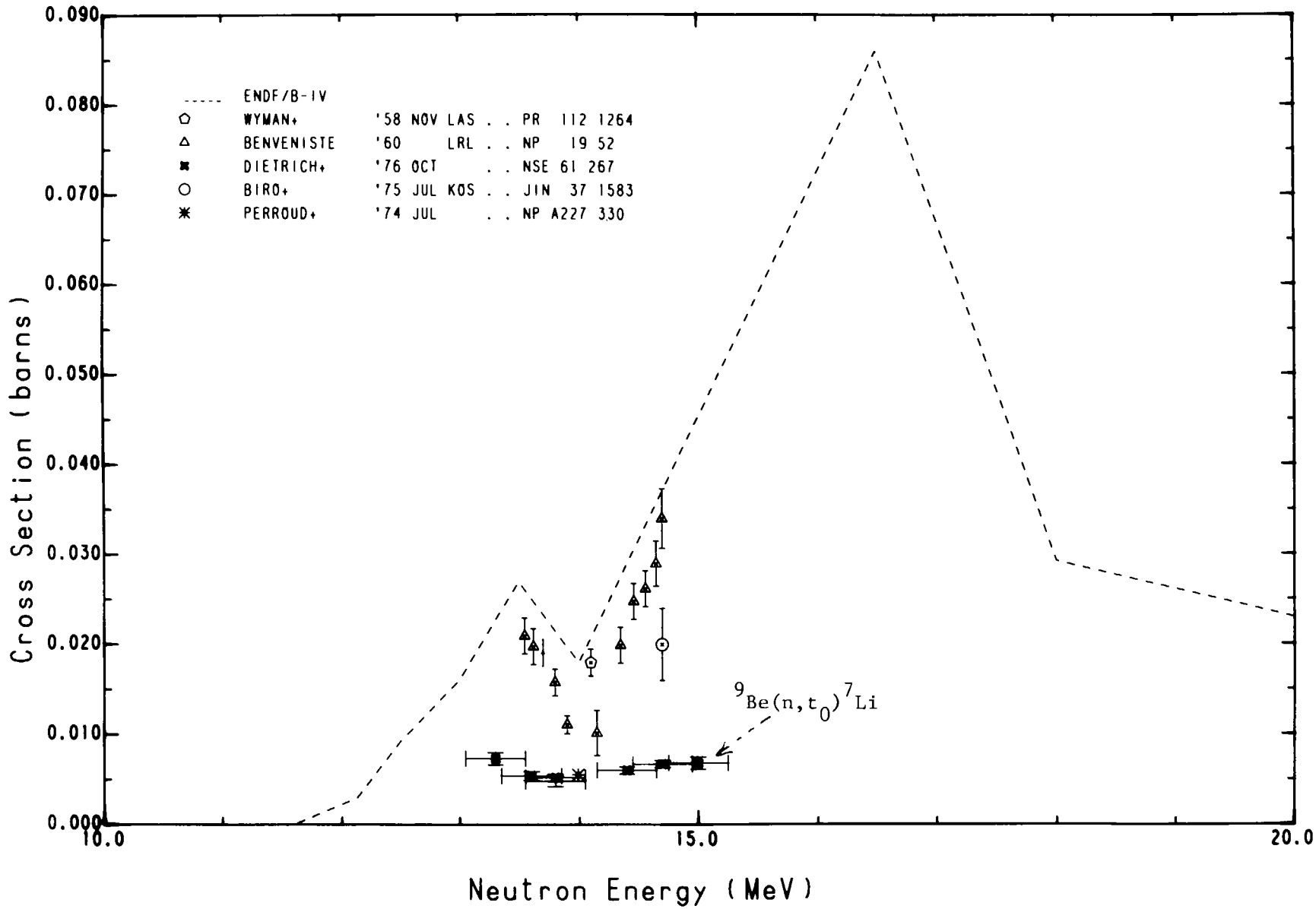
E_x=2.43 MeV



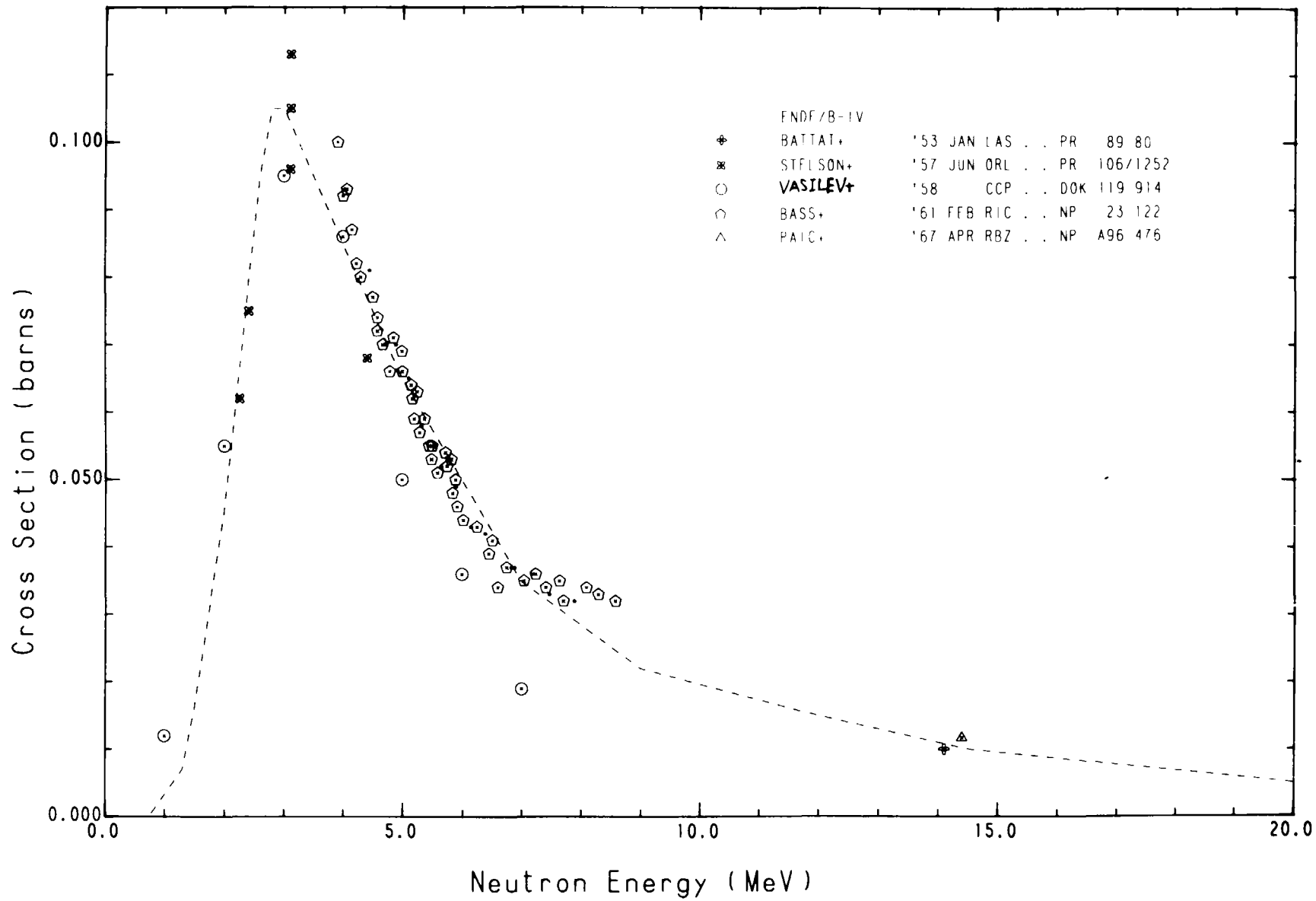
^{9}Be
(n,2n)


ENDF/B-IV
FOWLER+ '55 APR JHU . . PR 98 249
ROSEN+ '57 AUG LAS . . PR 107 824
FISCHER '57 OCT IOW . . PR 108 99
FLEROV+ '58 CCP . . AE 5+657+
SAKISAKA '59 MAY KON . . JPJ 14+554
XUAN+ '59 JUN PAR . . JPR 20 621
ZUBOV+ '61 CCP . . SPN 219
MYACHKOVA+ '61 LEB . . ZET 40 1244
CATRON+ '61 JUL LRL . . PR 123 218
MCTAGGART+ '63 ALD . . JNE 17 437
HOLMBERG+ '69 MAY FOA . . NP A129 305
BLOSER '72 JAN JUL . . AKE 20 309
Cross Section (barns)
Neutron Energy (MeV)
0.0
0.5
1.0
5.0
10.0
15.0
20.0

^{9}Be
(n,t)


ENDF/B-IV
WYMAN+ '58 NOV LAS . . PR 112 1264
BENVENISTE '60 LRL . . NP 19 52
DIETRICH+ '76 OCT . . NSE 61 267
BIRO+ '75 JUL KOS . . JIN 37 1583
PERROUD+ '74 JUL . . NP A227 330
^{9}Be(n,t$_0$)^{7}Li
Cross Section (barns)
Neutron Energy (MeV)
0.090
0.080
0.070
0.060
0.050
0.040
0.030
0.020
0.010
0.000
10.0
15.0
20.0

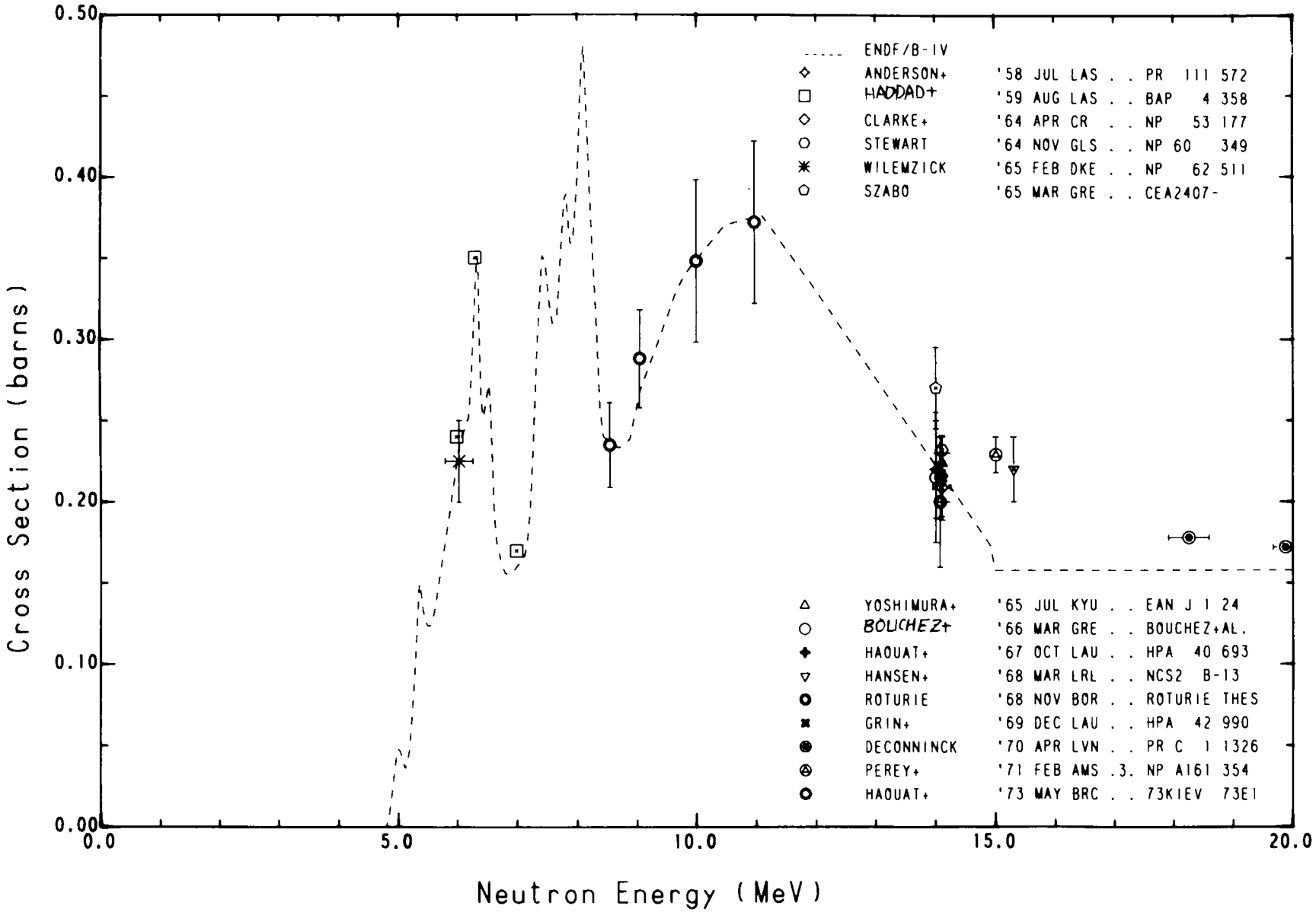
^{9}Be
(n,α)


ENDF/B-IV
BATTAT+ '53 JAN LAS . . PR 89 80
STELSON+ '57 JUN ORL . . PR 106/1252
VASILEV+ '58 CCP . . DOK 119 914
BASS+ '61 FEB RIC . . NP 23 122
PAIC+ '67 APR RBZ . . NP A96 476
0.100
0.050
0.000
0.0
5.0
10.0
15.0
20.0
Cross Section (barns)
Neutron Energy (MeV)

^{12}C

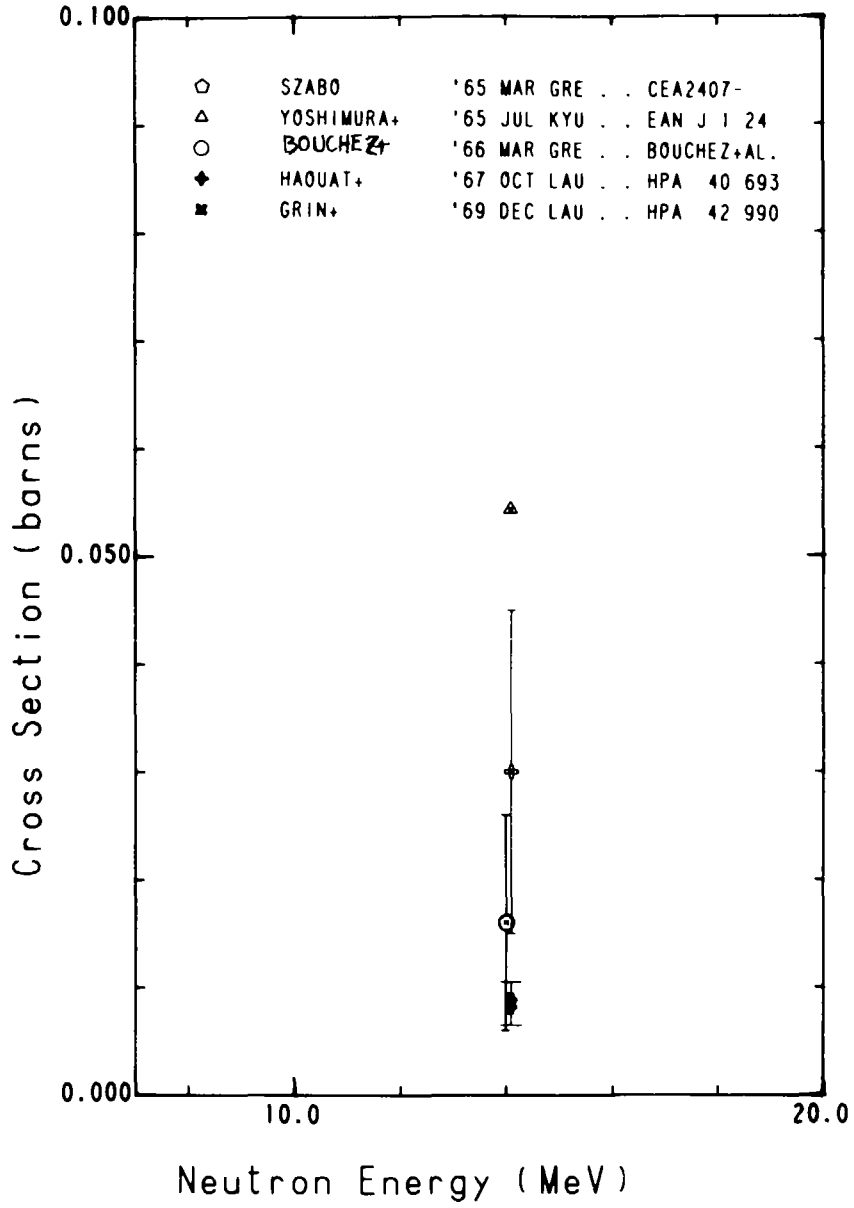
(n,n')

E_x=4.44 MeV

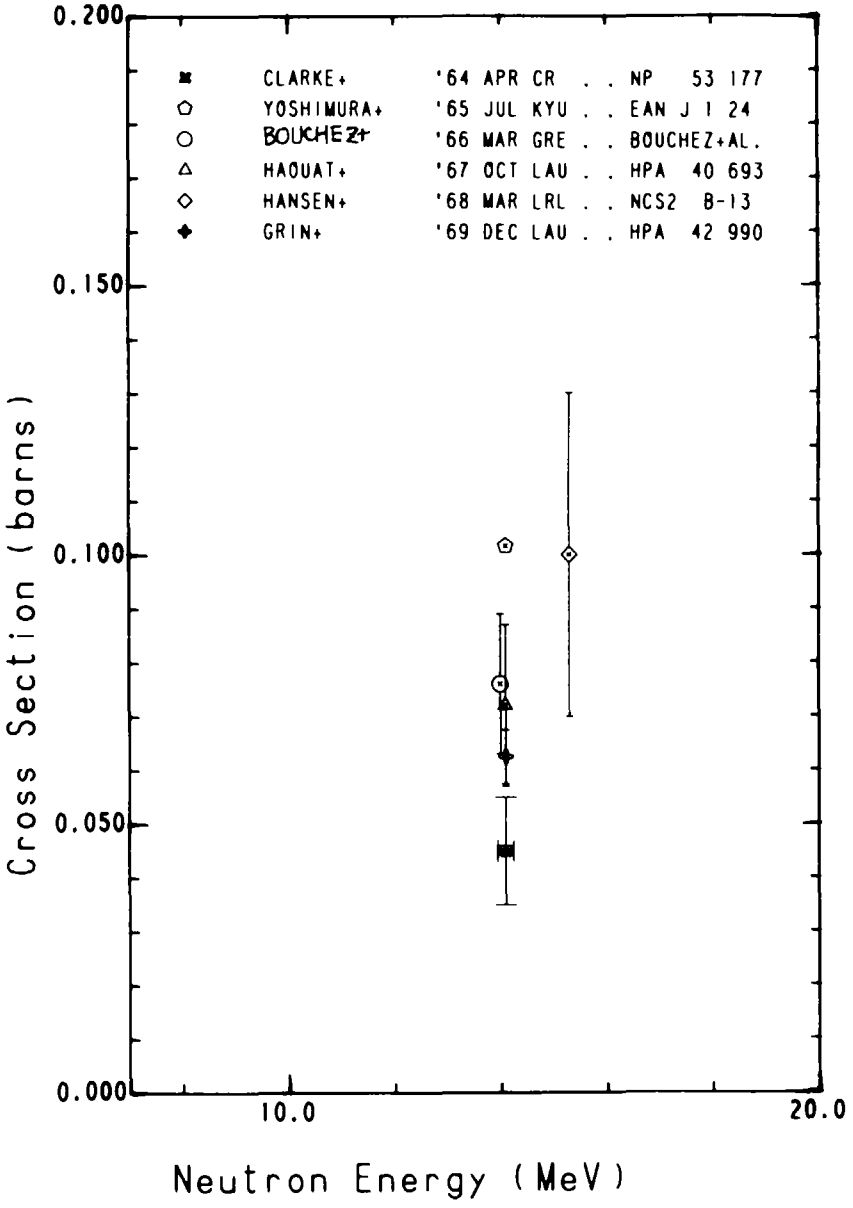


^{12}C
(n,n')

E_x=7.65 MeV

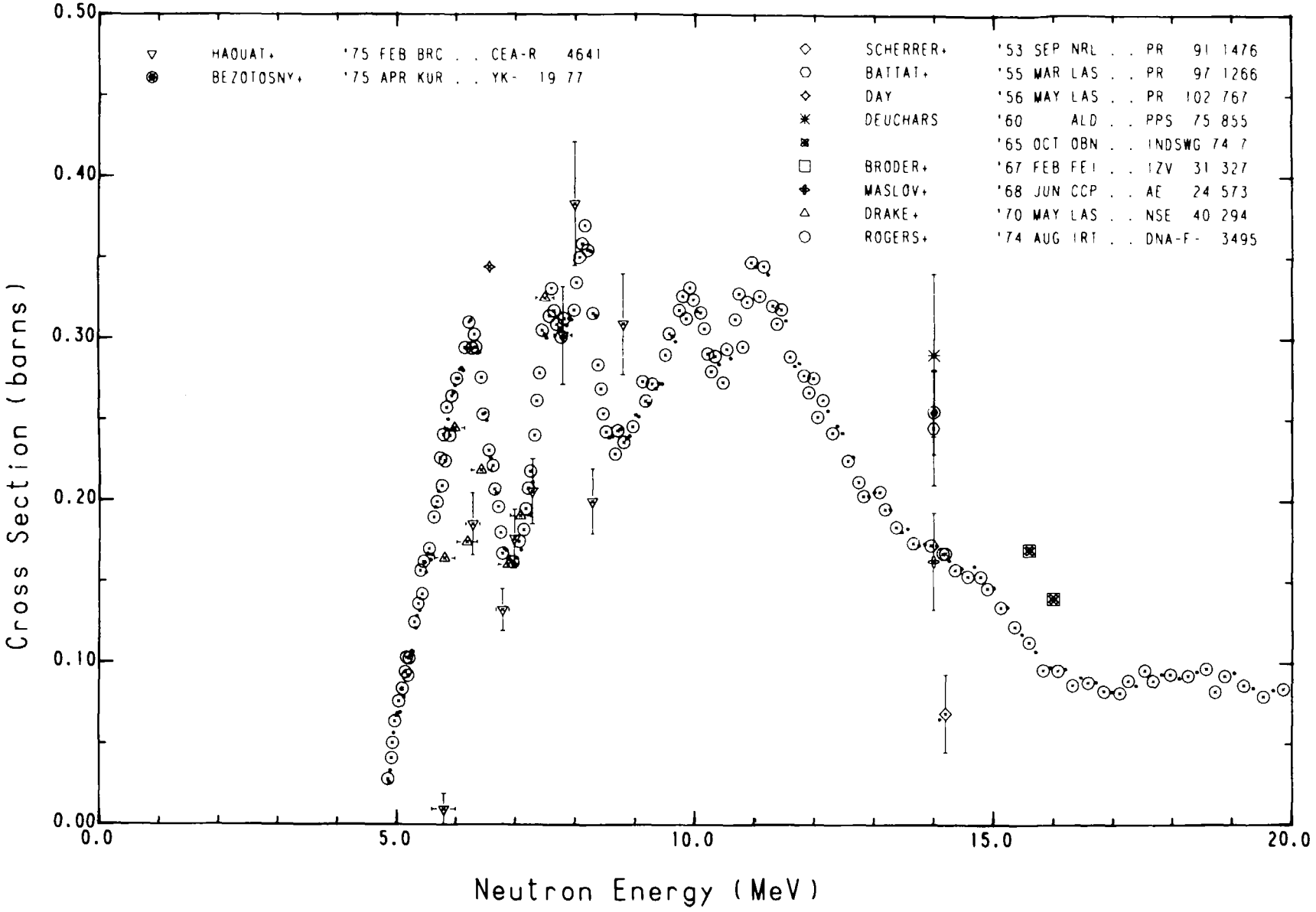


E_x=9.64 MeV

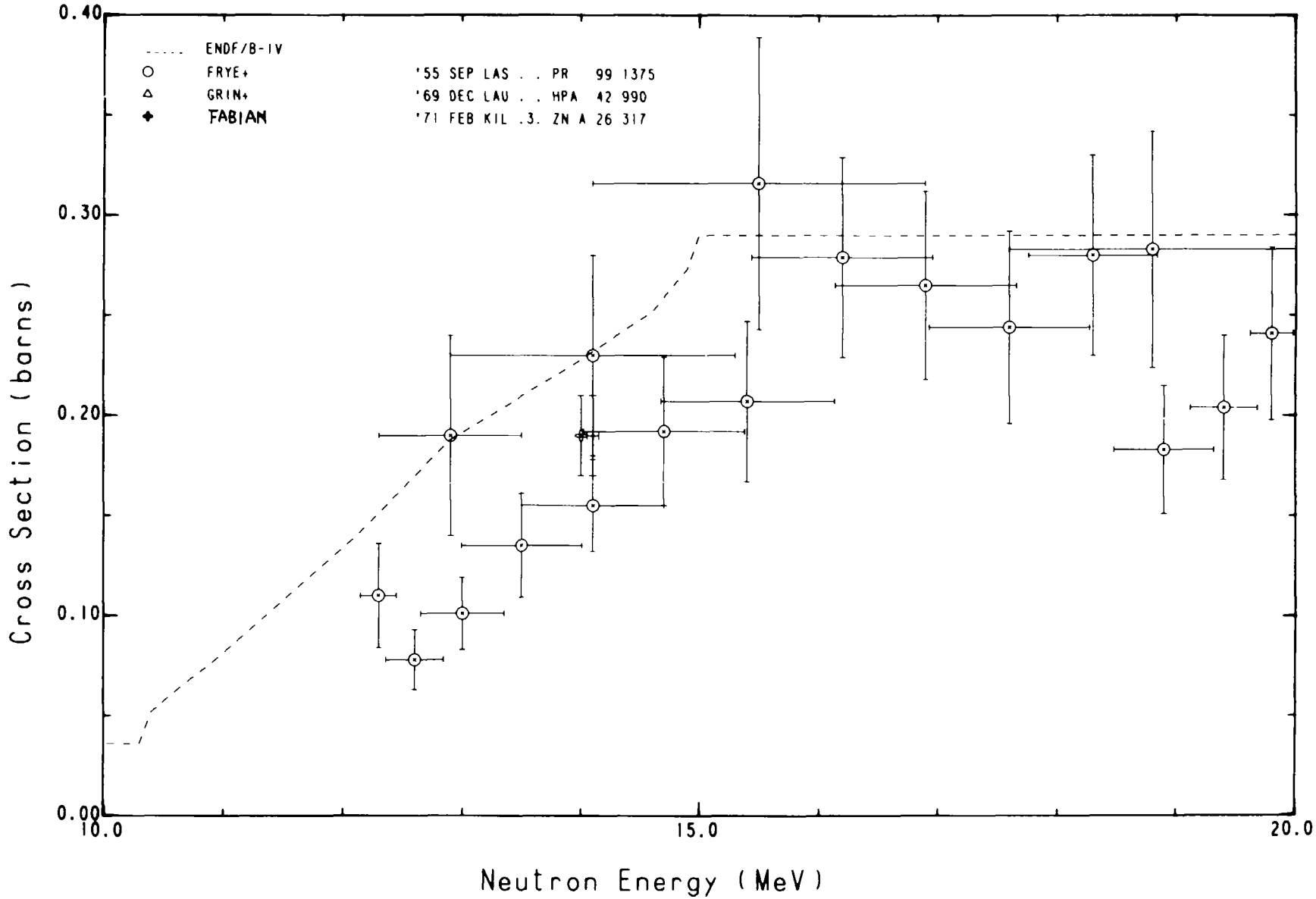


^{12}C (n,n'γ)

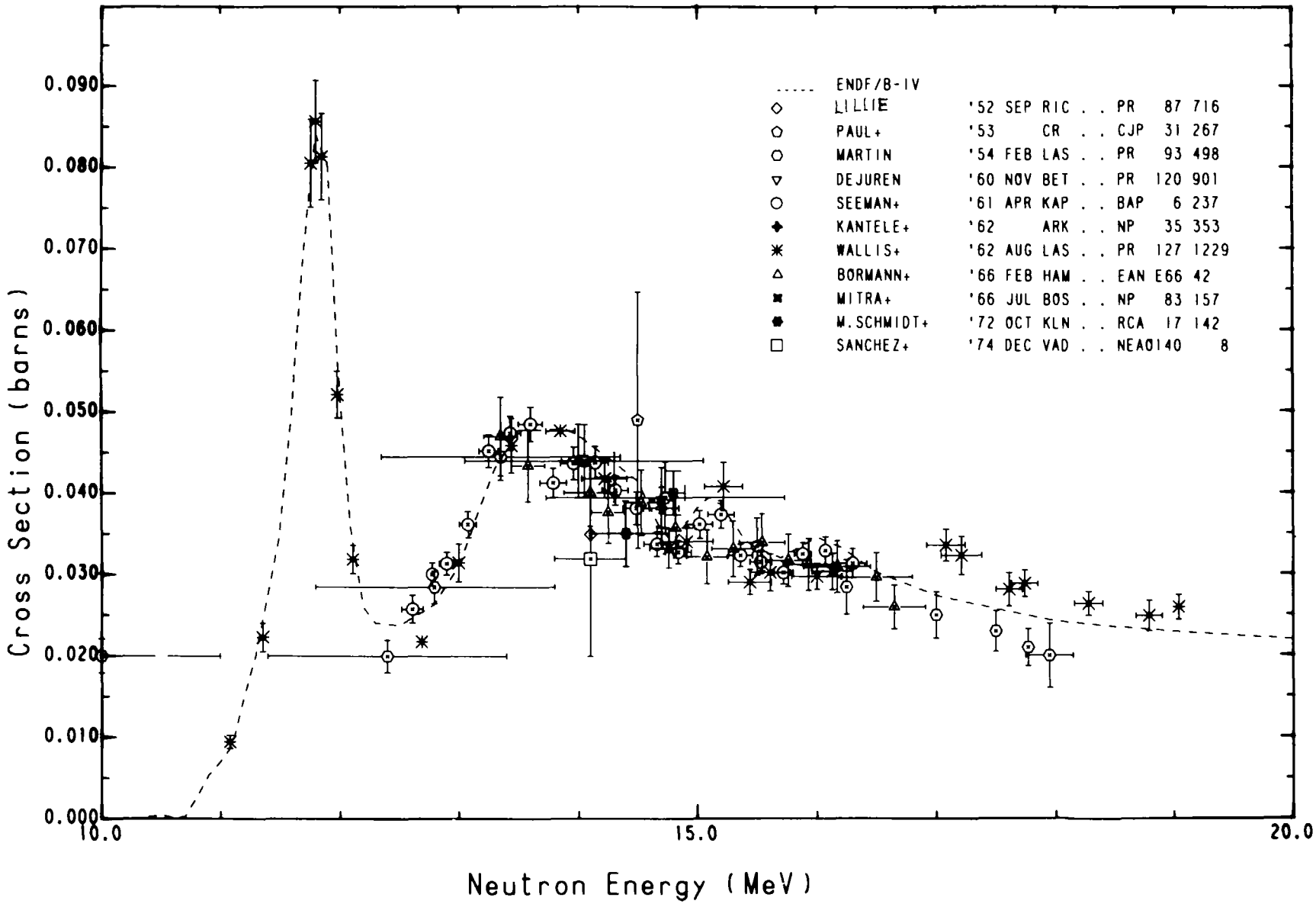
E_γ=4.44 MeV



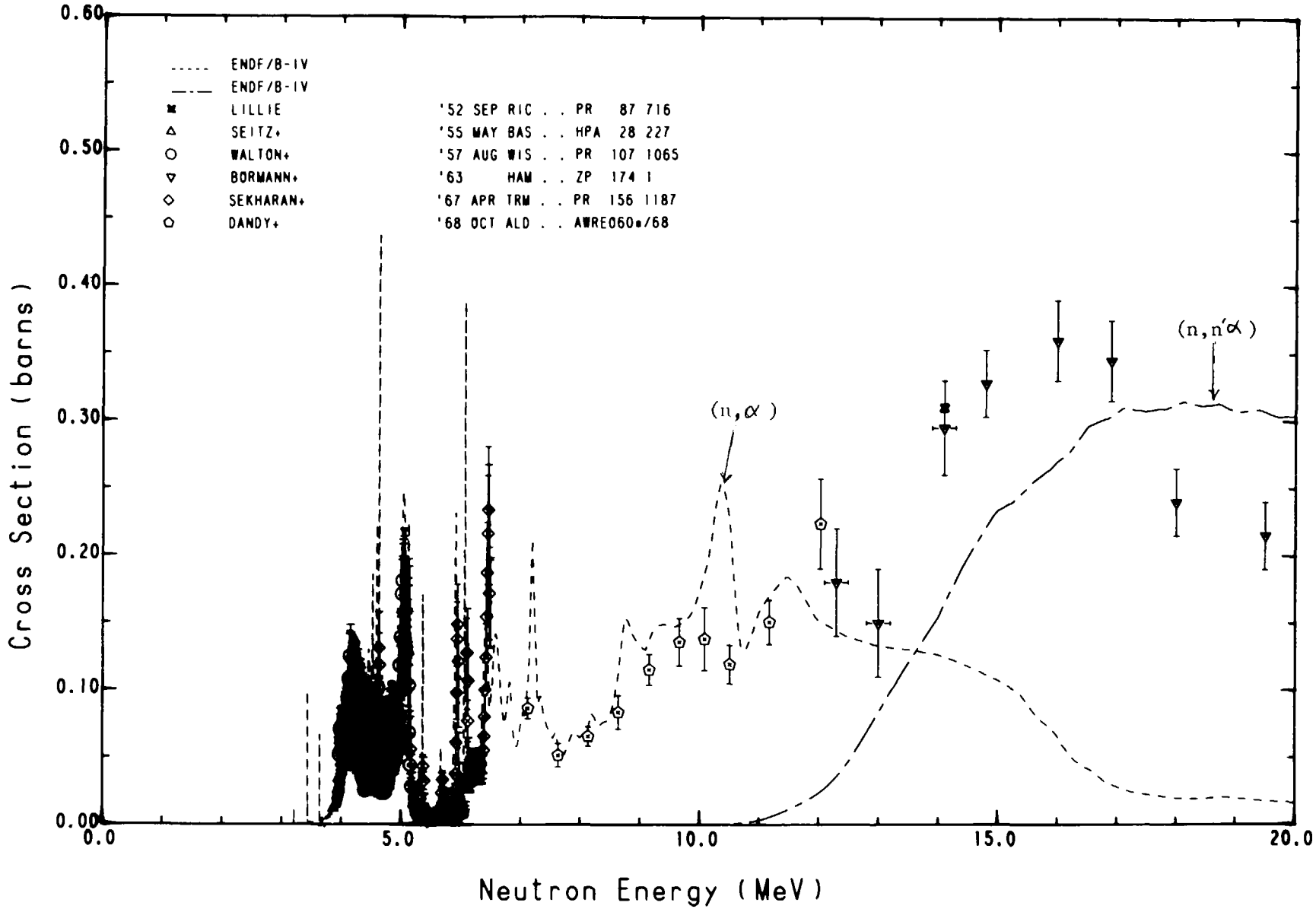
^{12}C
(n,n'3α)


ENDF/B-IV
FRYE+
GRIN+
FABIAN
'55 SEP LAS . . PR 99 1375
'69 DEC LAU . . HPA 42 990
'71 FEB KIL .3. ZN A 26 317
0.40
0.30
0.20
0.10
0.00
10.0
15.0
20.0
Cross Section (barns)
Neutron Energy (MeV)

^{16}O (n,p)

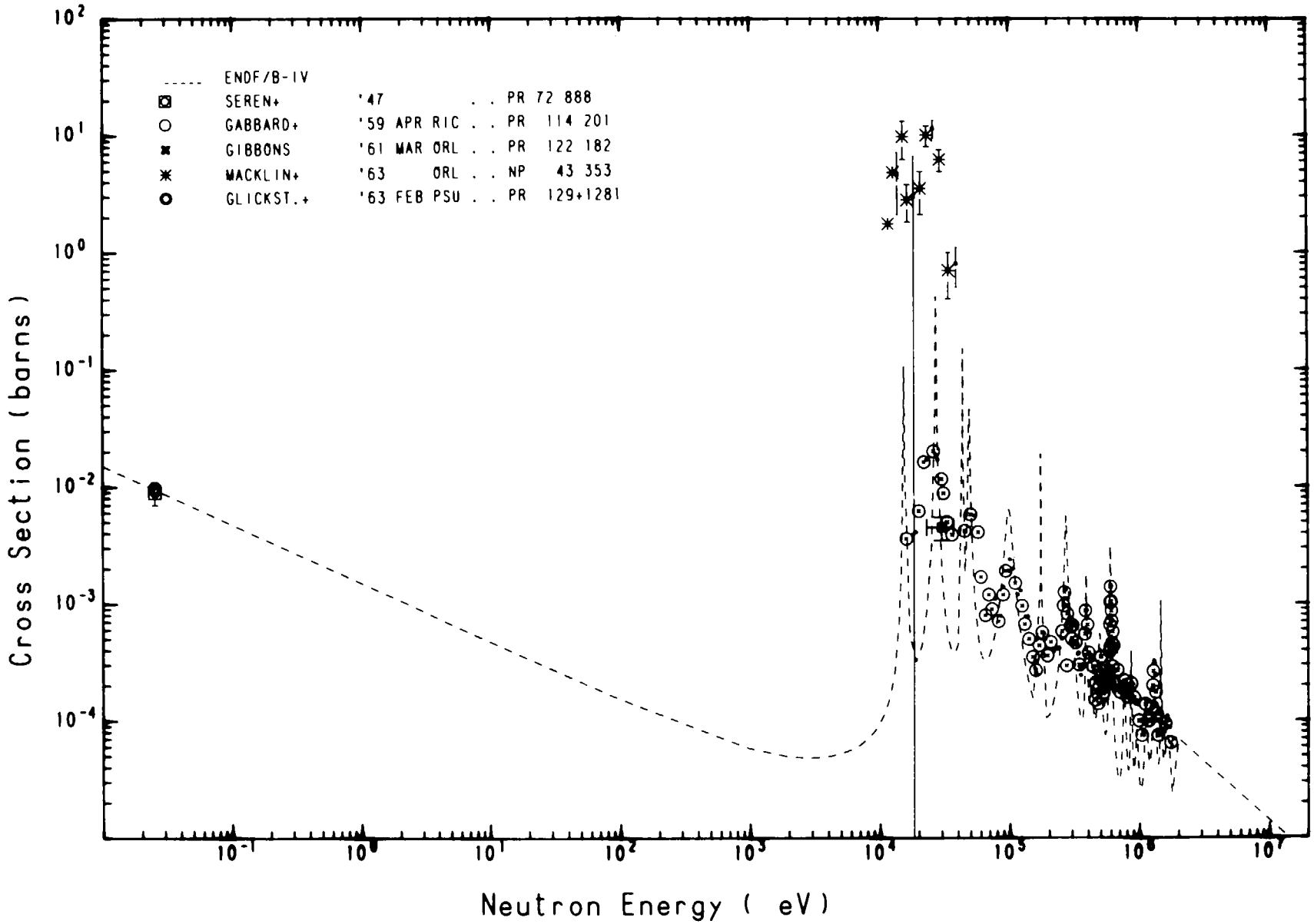

ENDF/B-IV
LILLIE '52 SEP RIC . . PR 87 716
PAUL+ '53 CR . . CJP 31 267
MARTIN '54 FEB LAS . . PR 93 498
DEJUREN '60 NOV BET . . PR 120 901
SEEMAN+ '61 APR KAP . . BAP 6 237
KANTELE+ '62 ARK . . NP 35 353
WALLIS+ '62 AUG LAS . . PR 127 1229
BORMANN+ '66 FEB HAM . . EAN E66 42
MITRA+ '66 JUL BOS . . NP 83 157
M.SCHMIDT+ '72 OCT KLN . . RCA 17 142
SANCHEZ+ '74 DEC VAD . . NEA0140 8
Cross Section (barns)
0.090
0.080
0.070
0.060
0.050
0.040
0.030
0.020
0.010
0.000
10.0
15.0
20.0
Neutron Energy (MeV)

^{16}O
(n,α)


ENDF/B-IV
ENDF/B-IV
LILLIE '52 SEP RIC . . PR 87 716
SEITZ+ '55 MAY BAS . . HPA 28 227
WALTON+ '57 AUG WIS . . PR 107 1065
BORMANN+ '63 HAM . . ZP 174 1
SEKHARAN+ '67 APR TRM . . PR 156 1187
DANDY+ '68 OCT ALD . . AWRE060*/68
(n,α)
(n,n'α)
Cross Section (barns)
Neutron Energy (MeV)
0.00
0.10
0.20
0.30
0.40
0.50
0.60
0.0
5.0
10.0
15.0
20.0

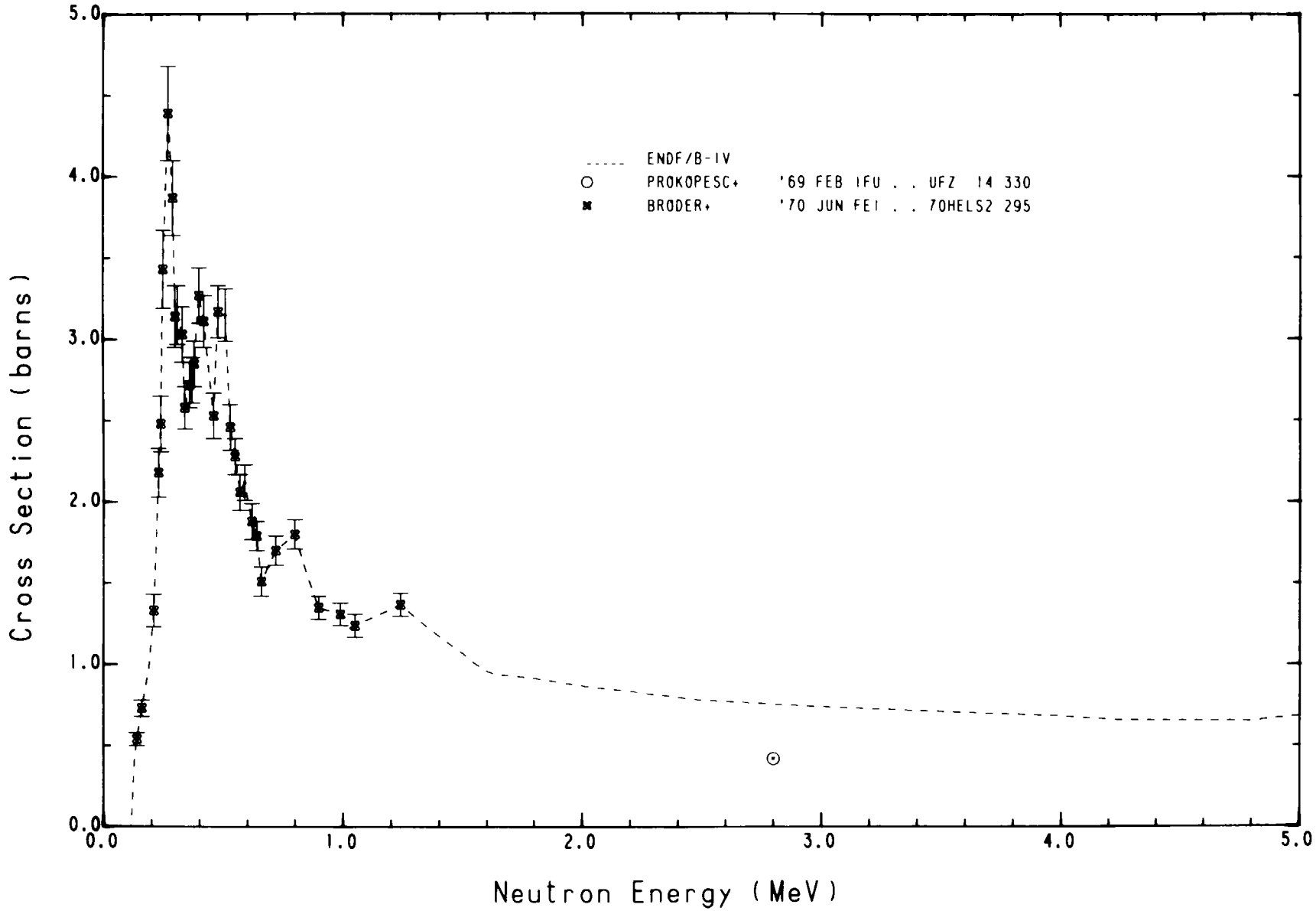
^{19}F

(n, γ)


ENDF/B-IV
SEREN+ '47 . . PR 72 888
GABBARD+ '59 APR RIC . . PR 114 201
GIBBONS '61 MAR ORL . . PR 122 182
MACKLIN+ '63 ORL . . NP 43 353
GLICKST.+ '63 FEB PSU . . PR 129+1281
Cross Section (barns)
Neutron Energy (eV)

^{19}F

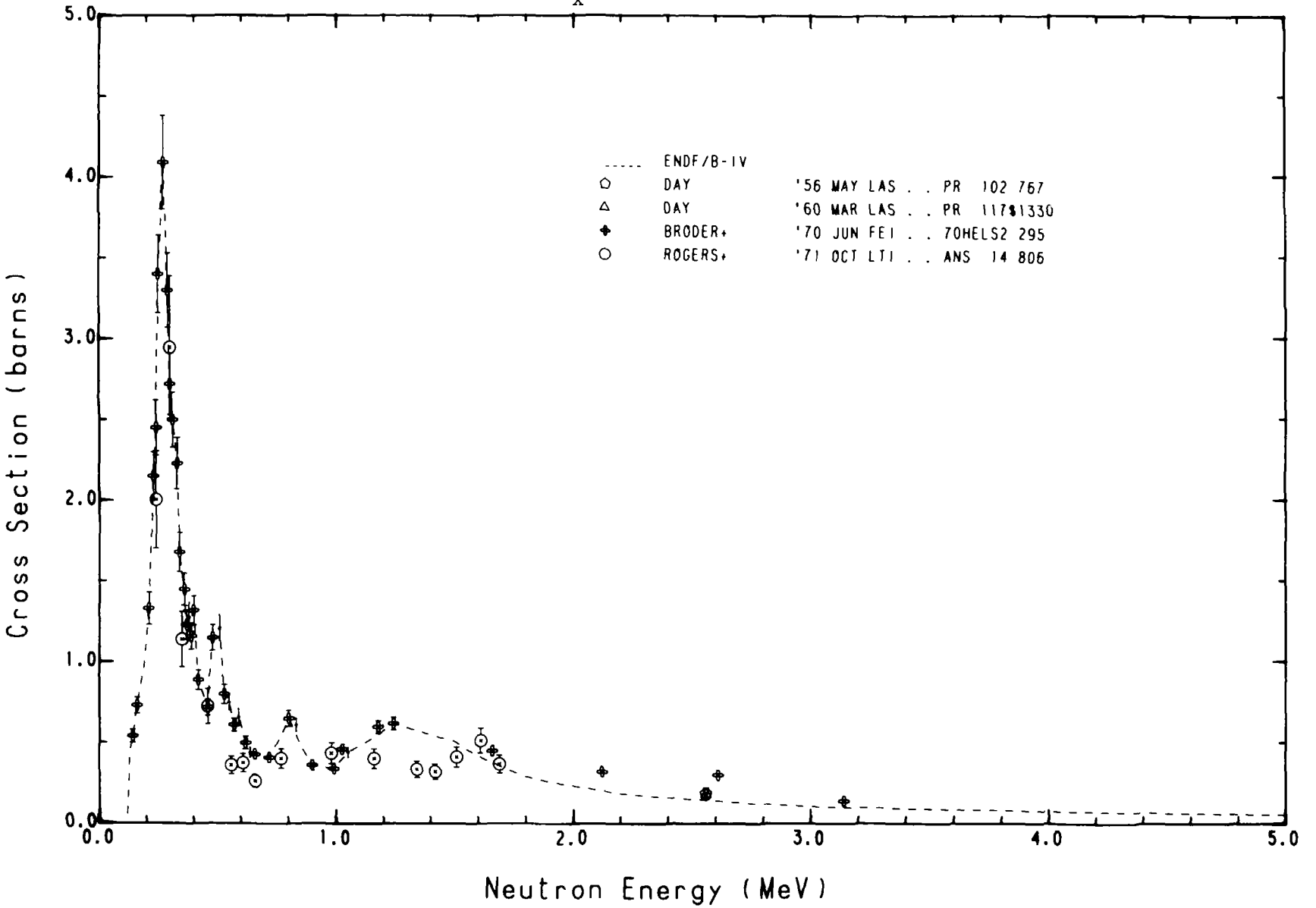
(n,n')


ENDF/B-IV
PROKOPESC+ '69 FEB IFU . . UFZ 14 330
BRODER+ '70 JUN FEI . . 70HELS2 295
Cross Section (barns)
Neutron Energy (MeV)
0.0
1.0
2.0
3.0
4.0
5.0

^{19}F

(n,n')

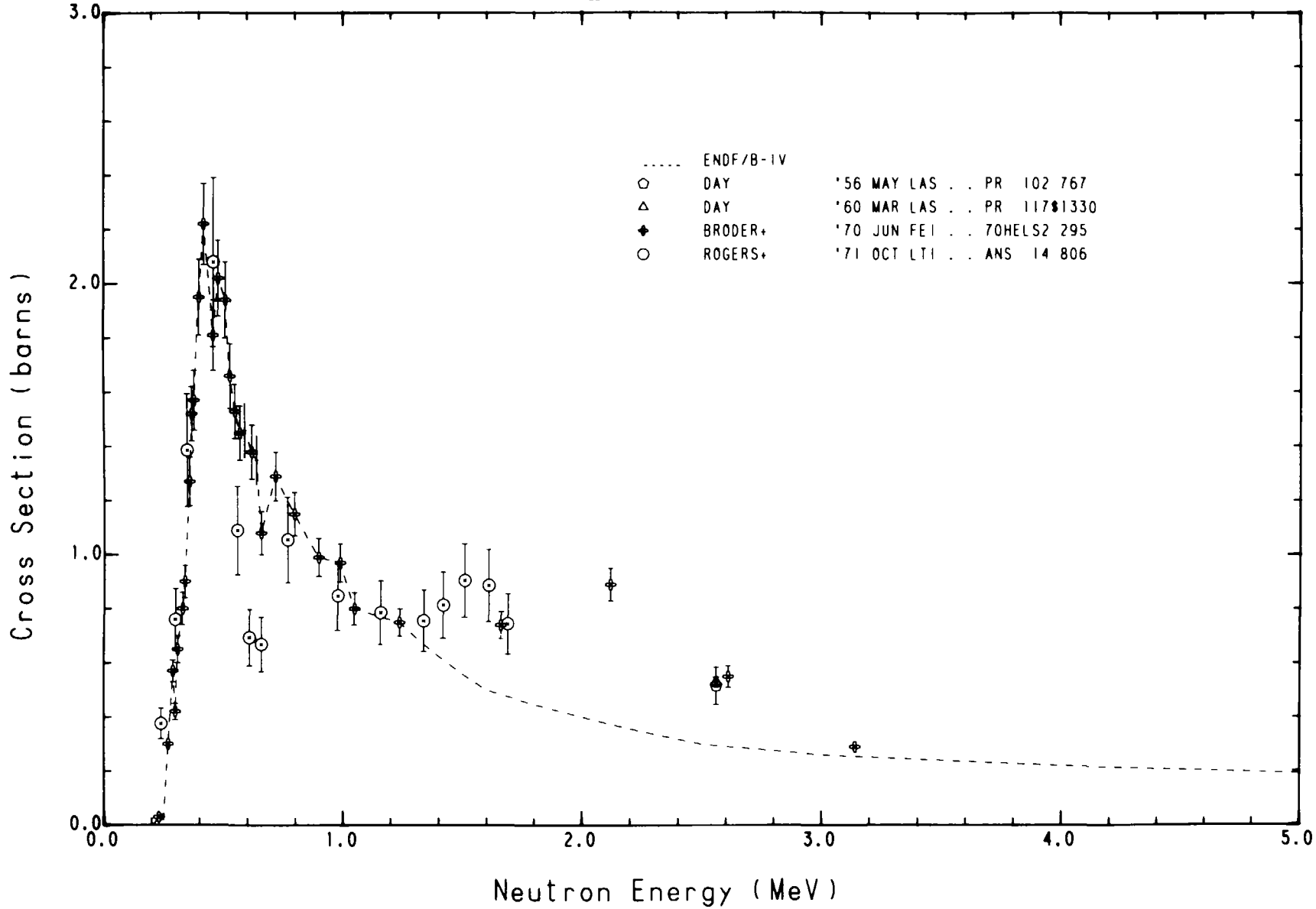
E_x=0.1099 MeV



^{19}F

(n,n')

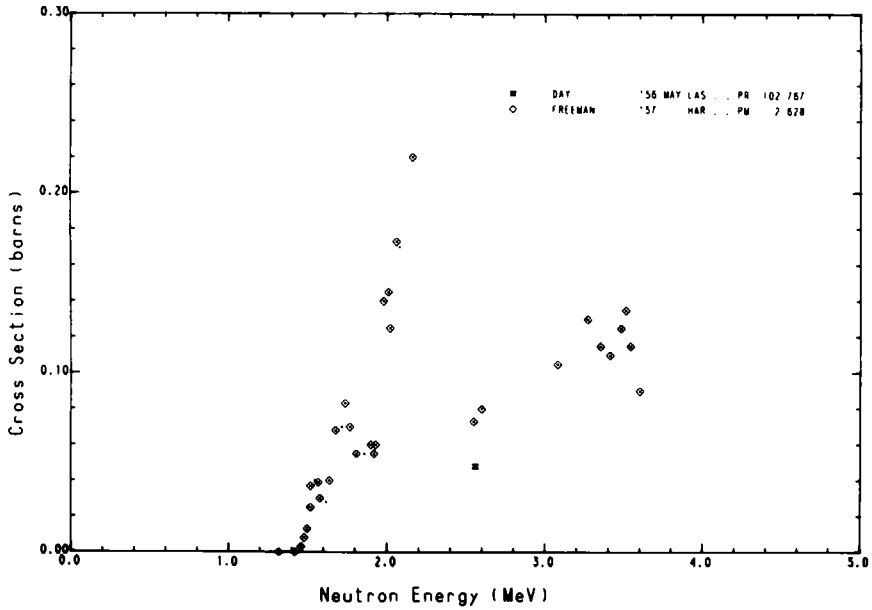
E_x=0.197 MeV



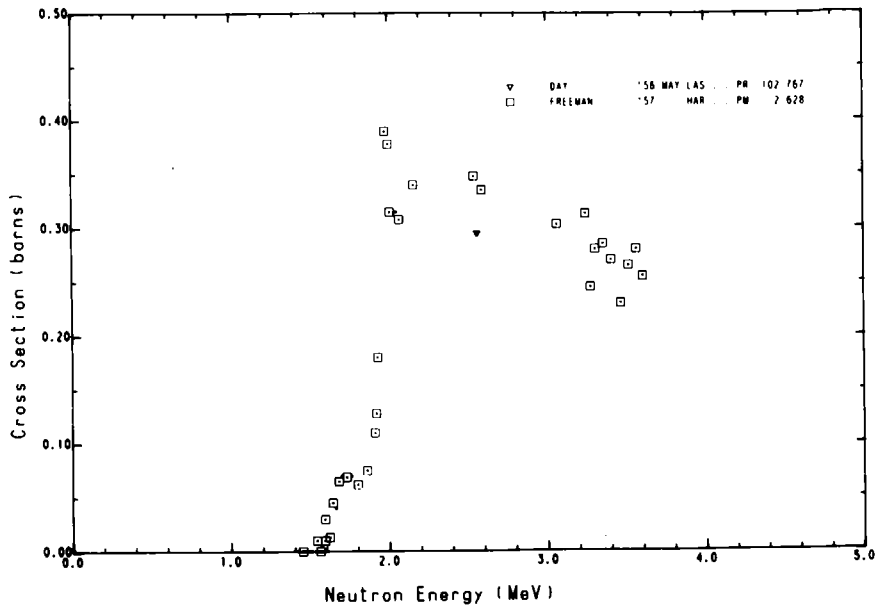
^{19}F

(n,n',γ)

Eγ=1.24 MeV



Eγ=1.36 MeV



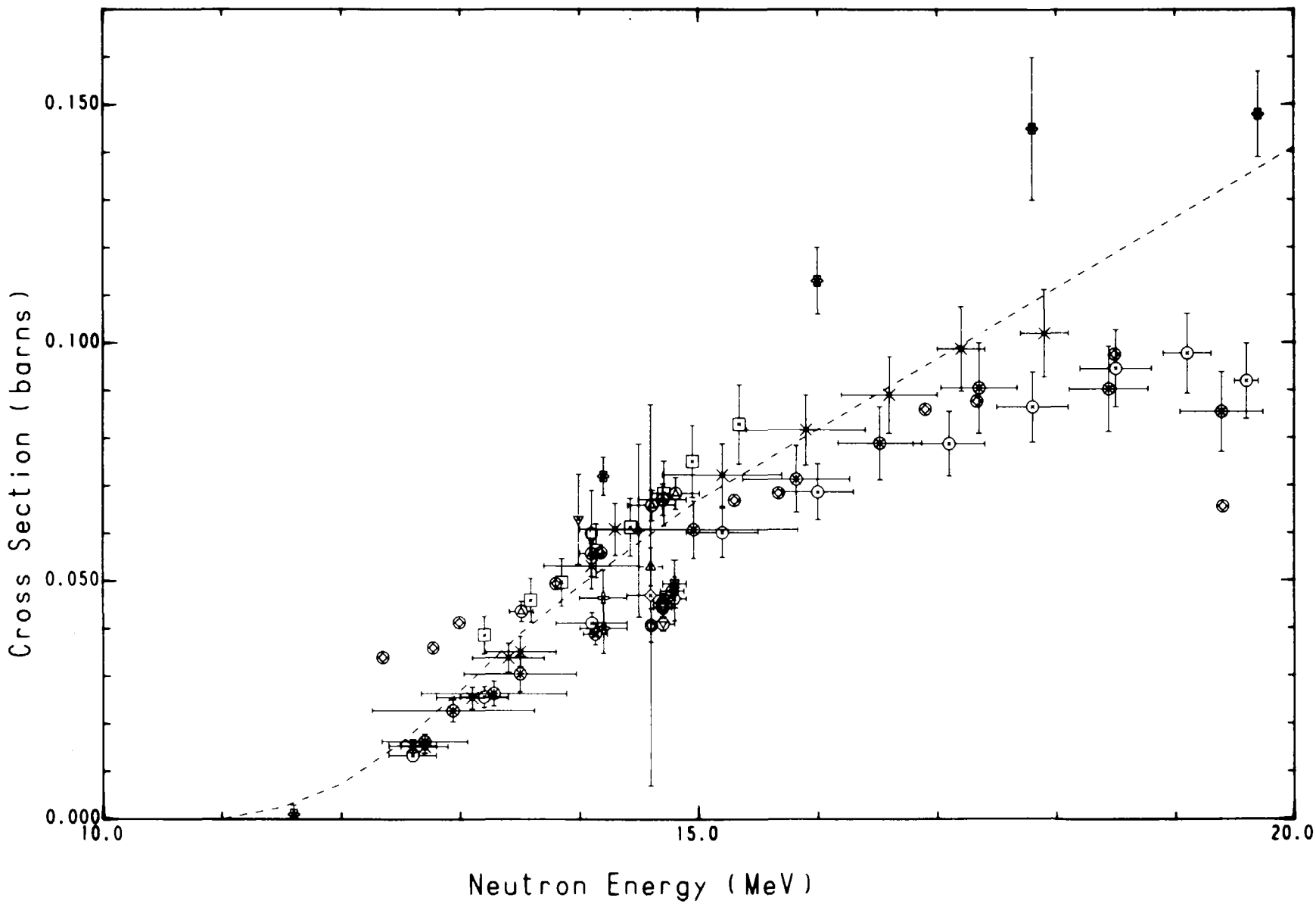
^{19}F

(n, 2n)

-----	ENDF/B-IV								
◇	PAUL+	'53		CR	.	.	CJP	31	267
O	ASHBY+	'58	JUL	LRL	.	.	PR	111+	616
□	MCCRARY+	'60	APR	TNC	.	.	BAP	5	246
●	BRILL	'61		CCP	.	.	DOK	136	55
✳	RAYBURN	'62	APR	GEO	.	.	BAP	7	335
●	CEVOLANI+	'62	DEC	BOL	.	.	NC	26	1328
○	BORMANN+	'65	MAR	HAM	.	.	NP	63	438
◉	PICARD+	'65	APR	SAC	.	.	NP	63	673
△	CSIKAI	'65	JUL	DEB	.	.	65ANTW2		102A
■	CHATTERJEE	'66	AUG	BOS	.	.	AEET276		59
✦	NAGEL	'66	DEC	AMS	.	.	NAGEL.		(66L
⊛	PASQUARELL	'67	MAR	TUR	.	.	NP	A93	218
▽	CSIKA'+	'67	MAY	DEB	.	.	AHP	23	87
○	CHATTERJEE	'67	OCT	BOS	.	.	BARC305		30
●	MENLOVE+	'67	NOV	LOK	.	.	PR	163	1308
⊛	SHIOKAWA+	'68	JAN	TOH	.	.	JIN	30	1
O	VONACH+	'68	FEB	MUN	.	.	EAN	E89/	37
O	VONACH+	'68	MAR	MUN	.	.	WASHCON		•E31
◇	BARRALL+	'69	MAR	STF	.	.	AFWL-68		134
O	ARAMINOWIC	'73	MAY	LOU	.	.	INR1464		14
⊕	ROBERTSON+	'73	AUG	NPL	.	.	JNE	27	531

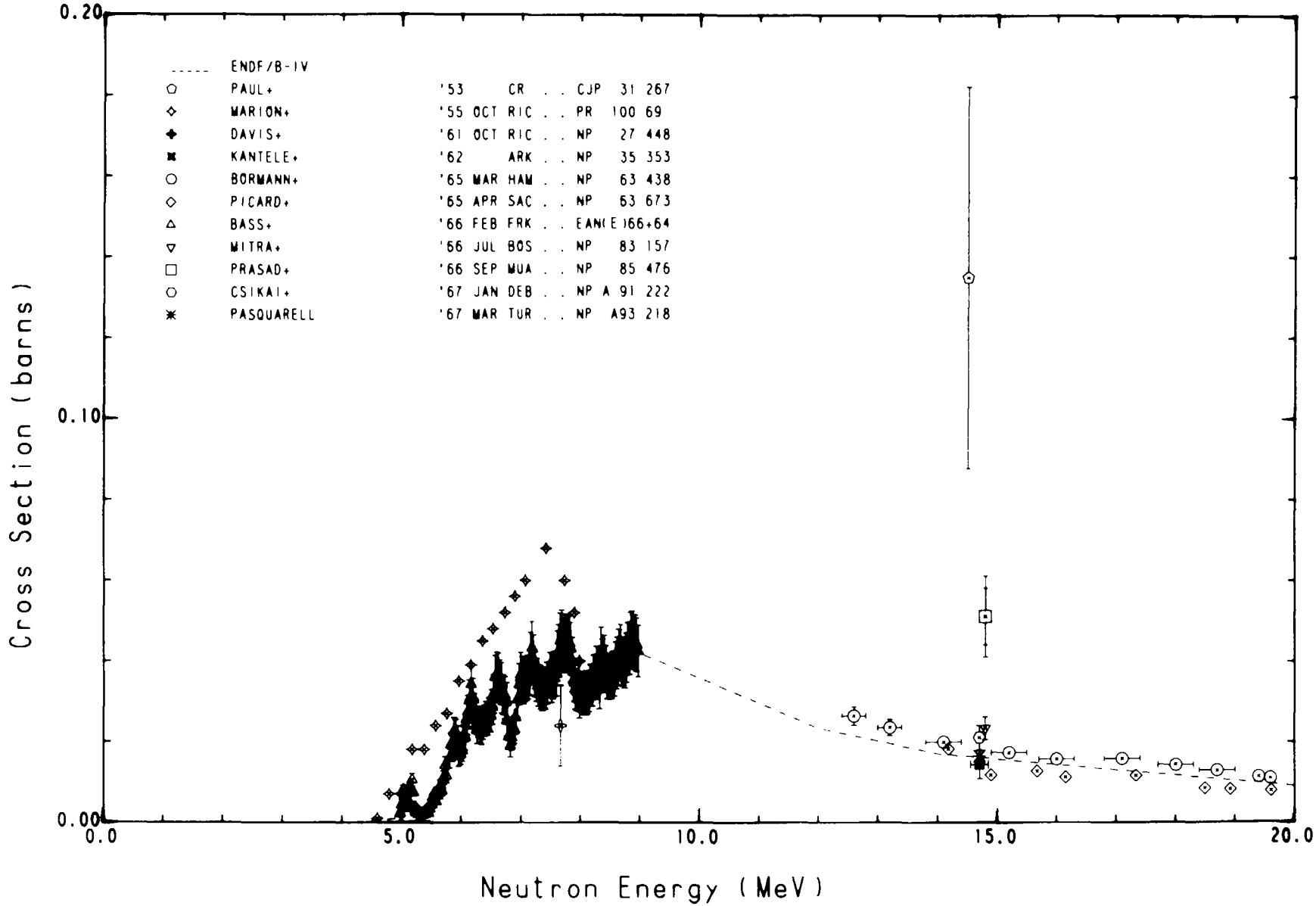
^{19}F

(n, 2n)


0.150
0.100
0.050
0.000
Cross Section (barns)
10.0
15.0
20.0
Neutron Energy (MeV)

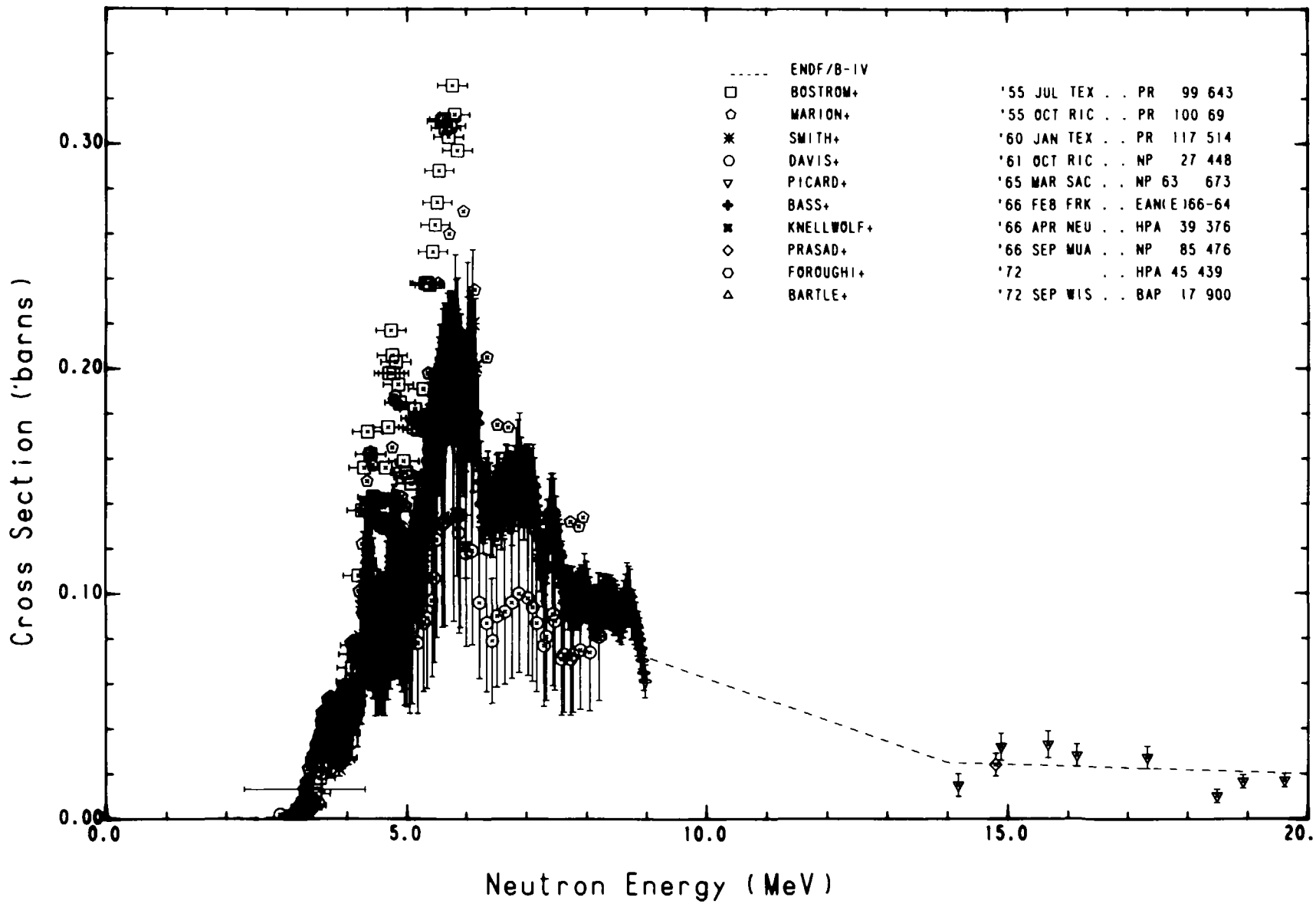
^{19}F

(n,p)


ENDF/B-IV
PAUL+ '53 CR . . CJP 31 267
MARION+ '55 OCT RIC . . PR 100 69
DAVIS+ '61 OCT RIC . . NP 27 448
KANTELE+ '62 ARK . . NP 35 353
BORMANN+ '65 MAR HAM . . NP 63 438
PICARD+ '65 APR SAC . . NP 63 673
BASS+ '66 FEB FRK . . EANDC(E)66+64
MITRA+ '66 JUL BOS . . NP 83 157
PRASAD+ '66 SEP MUA . . NP 85 476
CSIKAI+ '67 JAN DEB . . NP A 91 222
PASQUARELL '67 MAR TUR . . NP A93 218
0.20
0.10
0.00
0.0
5.0
10.0
15.0
20.0
Cross Section (barns)
Neutron Energy (MeV)

^{19}F

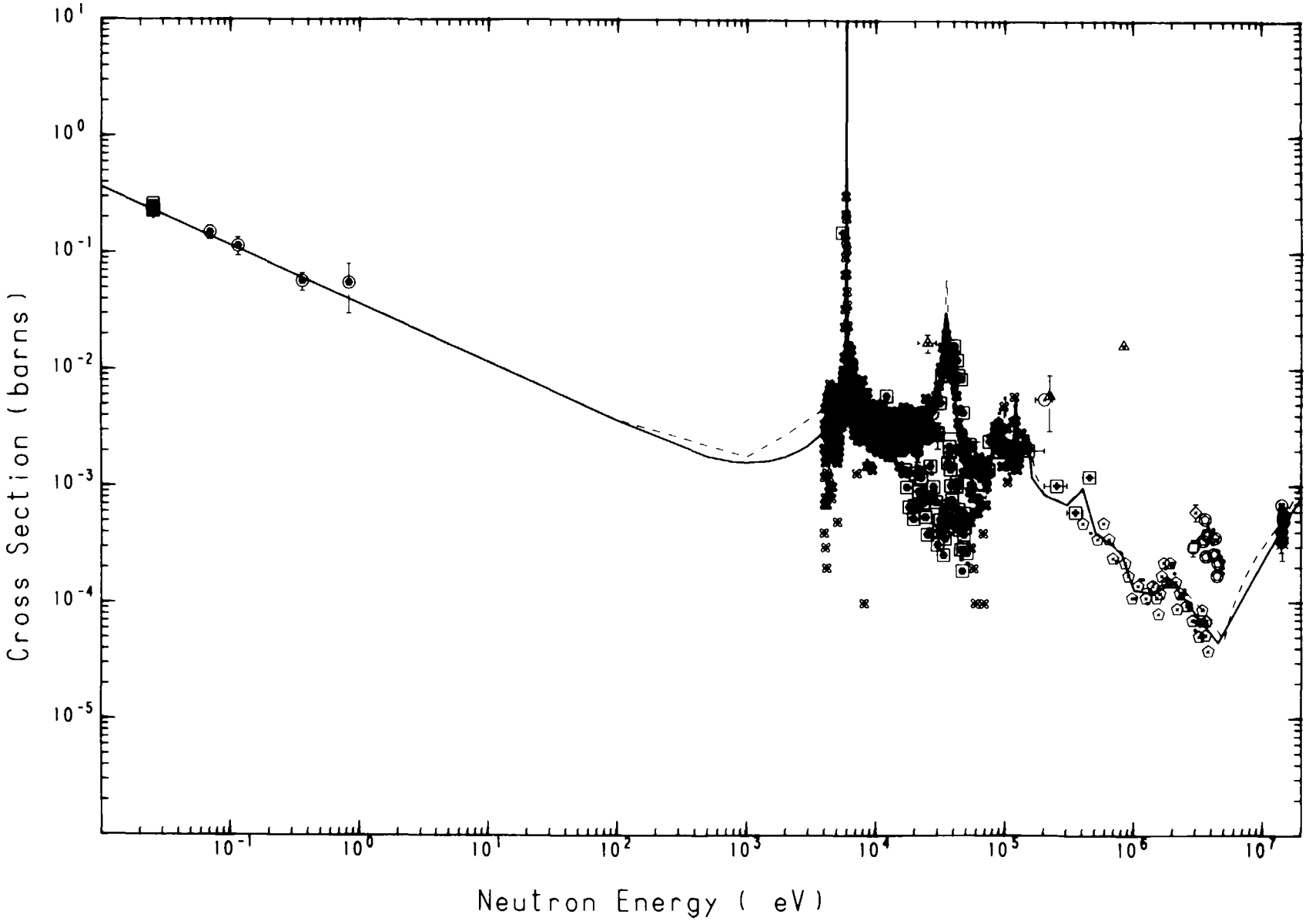
(n, α)


ENDF/B-IV
BOSTROM+ '55 JUL TEX . . PR 99 643
MARION+ '55 OCT RIC . . PR 100 69
SMITH+ '60 JAN TEX . . PR 117 514
DAVIS+ '61 OCT RIC . . NP 27 448
PICARD+ '65 MAR SAC . . NP 63 673
BASS+ '66 FEB FRK . . EANDC(E)66-64
KNELLWOLF+ '66 APR NEU . . HPA 39 376
PRASAD+ '66 SEP MUA . . NP 85 476
FOROUGHI+ '72 . . HPA 45 439
BARTLE+ '72 SEP WIS . . BAP 17 900
Cross Section (barns)
0.00
0.10
0.20
0.30
0.0
5.0
10.0
15.0
20.0
Neutron Energy (MeV)

^{27}Al
(n,γ)

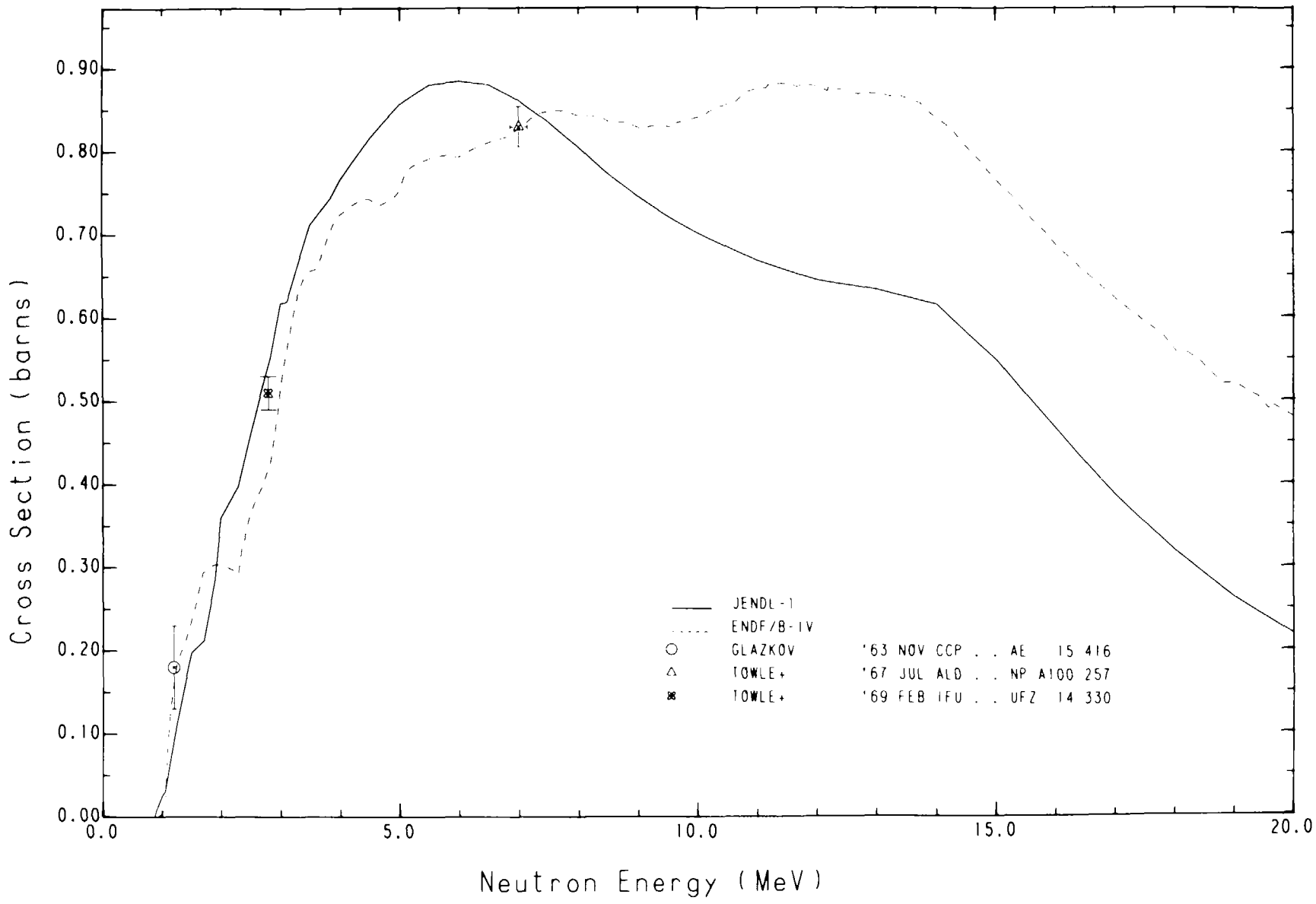
——	JENDL-1								
-----	ENDF/B-IV								
⊗	HUGHES+	'49	JUN	ANL	. .	PR	75	1781
◉	HENKEL+	'50	OCT	WIS	. .	PR	80+	145
⬠	HENKEL	'53	JAN	LAS	. .	HENKEL	+53	
▽	GRIMELAND	'56		KJL	. .	GRIMLND	56	
●	PERKIN+	'58		ALD	. .	PPS	72	505
✦	KONONOV+	'58		CCP	. .	AE	5	564
○	LEIPUNSKIJ	'58		CCP	. .	GEN2	15	50
△	BELANOVA	'58	MAR	CCP	. .	ZET	34	574
●	VERVIER	'59	JAN	LVN	. .	NP	9	569
⊡	STEFANESCU	'61		BUC	. .	61BUCAR		553
⊡	GIBBONS+	'61			. .	PR	122	182
⊡	SHER	'62		BNL	. .	SHER	62	
⊙	CALVI+	'62	DEC	CAT	. .	NP	39	621
▣	MACKLIN+	'63			. .	PR	129	2695
⊛	CSIKAI+	'63		DEB	. .	NP	46	141
⊛	CVELBAR+	'63	FEB	NJS	. .	PL	3	364
✧	CVELBAR+	'66	OCT	NJS	. .	NIM	44	292
⊕	CSIKAI+	'67	MAR	DEB	. .	NP A	95	229
◇	PEIO+	'67	OCT	DEB	. .	JNE	21	797
⊗	DINTER	'68	MAR	UEN	. .	NP A	111	360
⊠	BLOCK	'68	MAY	RPI	. .	BLOCK	68	
●	COLDITZ+	'68	JUN	IRK	. .	OSA	105	236
⬡	HASAN+	'68	DEC	MUA	. .	NC B	58	402
⊗	CVELBAR+	'69	JUN	NJS	. .	NP A	130	401
⊗	MALIK+	'70		BNL	. .	NIM	86	83
□	RYVES+	'70	NOV	NPL	. .	JNE	24	419
⊡	CRANSTON+	'71			. .	NP A	169	95
✳	HOLUB+	'72		RBZ	. .	LNS-4-	72	
⊡	STEYERL+	'72	FEB	MUN	. .	ZP	250	166
⊛	RIGAUD+	'74	SEP	BOR	. .	NSE	55	17
⊕	ALLEN+	'75			. .	75WASH	360	

^{27}Al
(n,γ)


Cross Section (barns)
Neutron Energy (eV)
10^1
10^0
10^-1
10^-2
10^-3
10^-4
10^-5
10^-1
10^0
10^1
10^2
10^3
10^4
10^5
10^6
10^7

^{27}Al

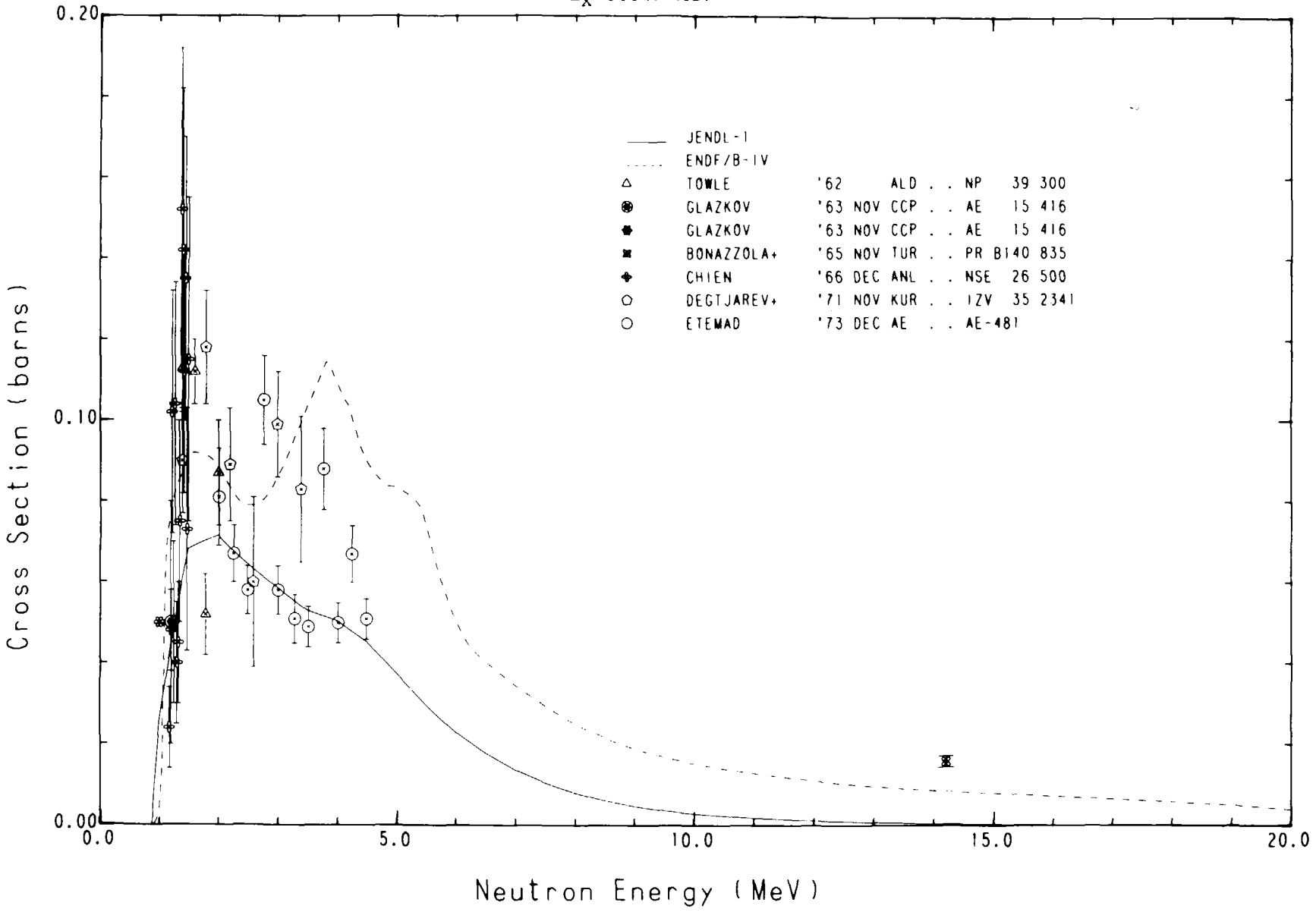
(n,n')


0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Cross Section (barns)
0.0
5.0
10.0
15.0
20.0
Neutron Energy (MeV)
JENDL-1
ENDF/B-IV
GLAZKOV '63 NOV CCP . . AE 15 416
TOWLE+ '67 JUL ALD . . NP A100 257
TOWLE+ '69 FEB IFU . . UFZ 14 330

^{27}Al

(n,n')

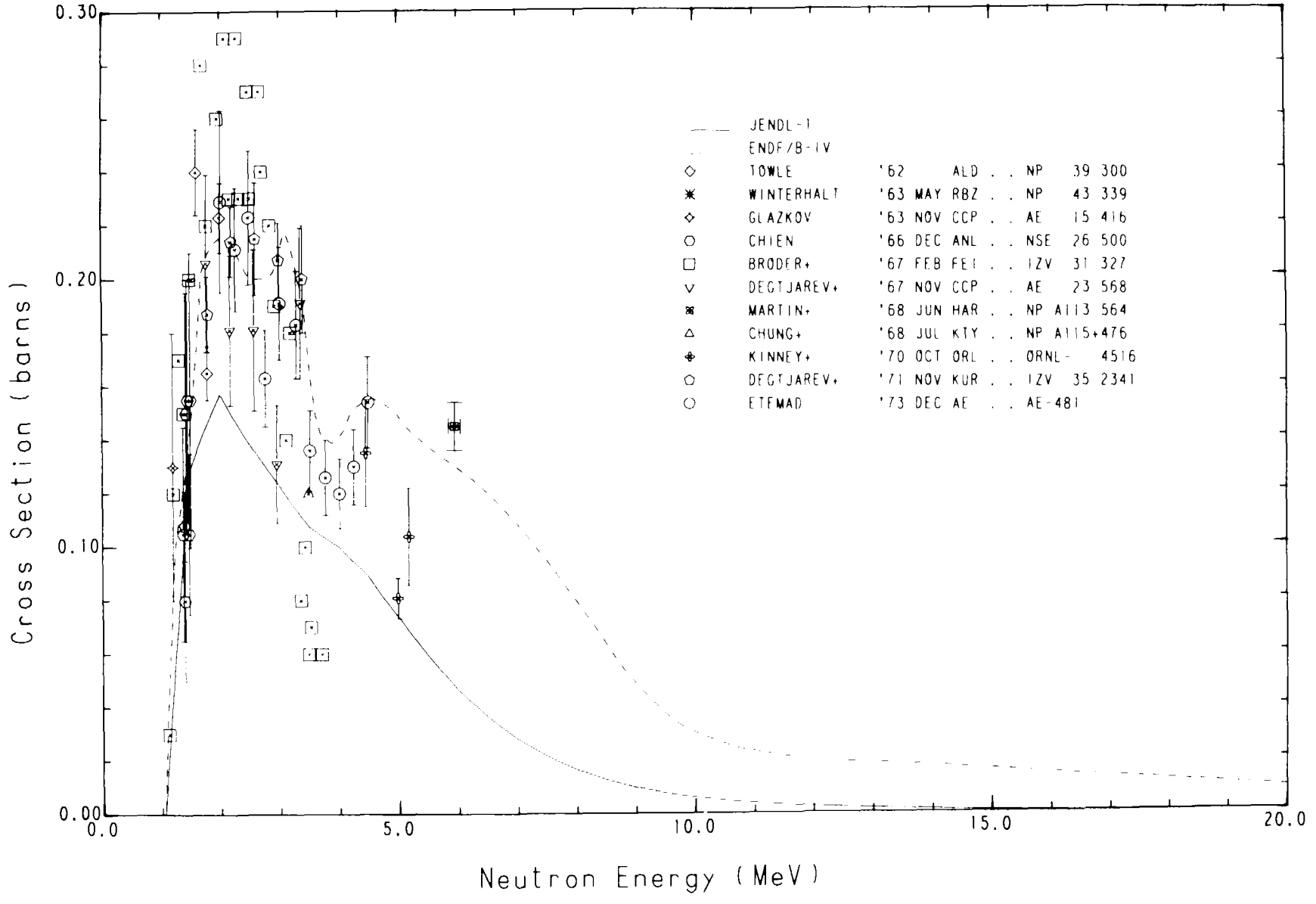
E_x=0.842 MeV



^{27}Al

(n,n')

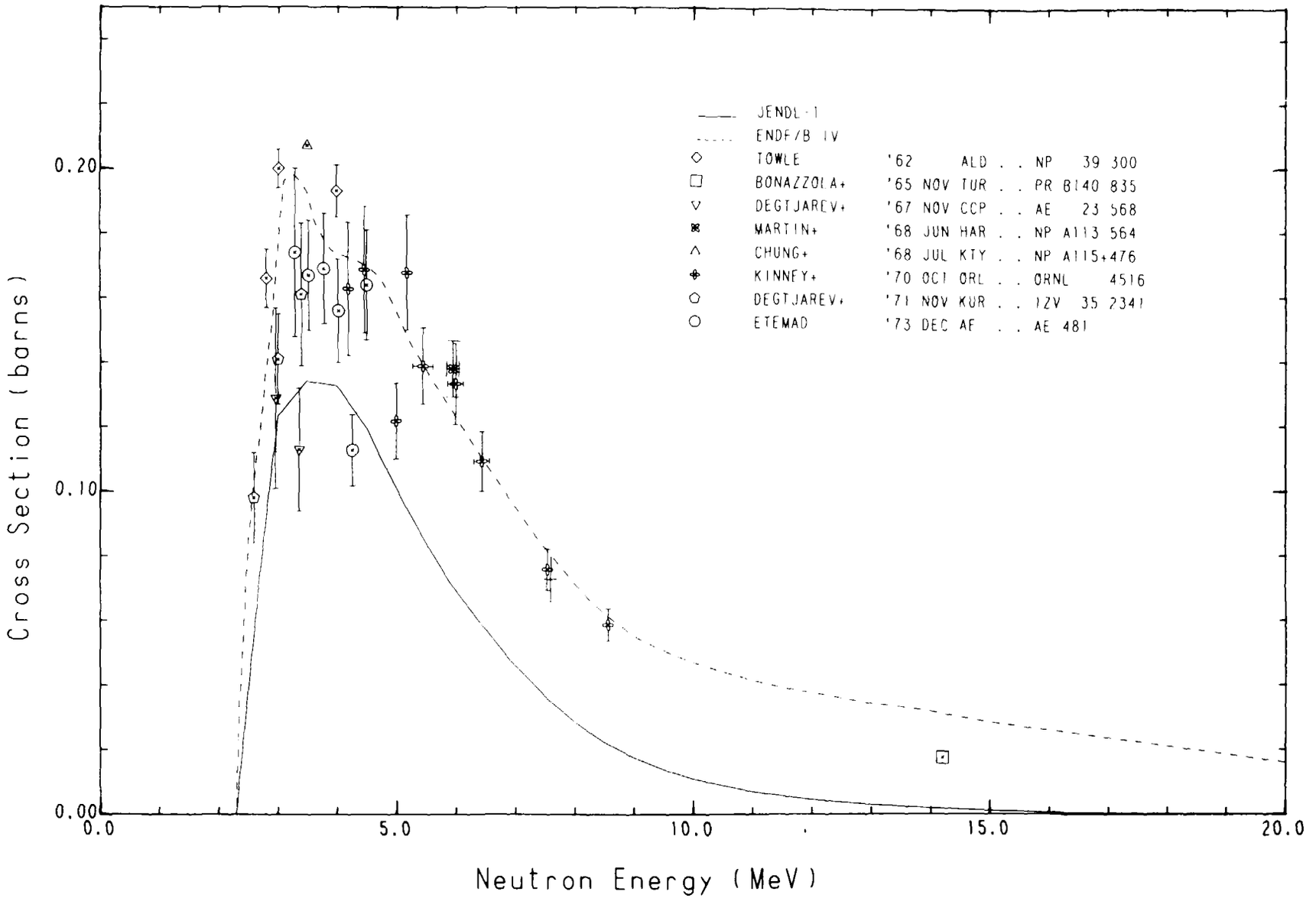
E_x=1.013 MeV



^{27}Al

(n,n')

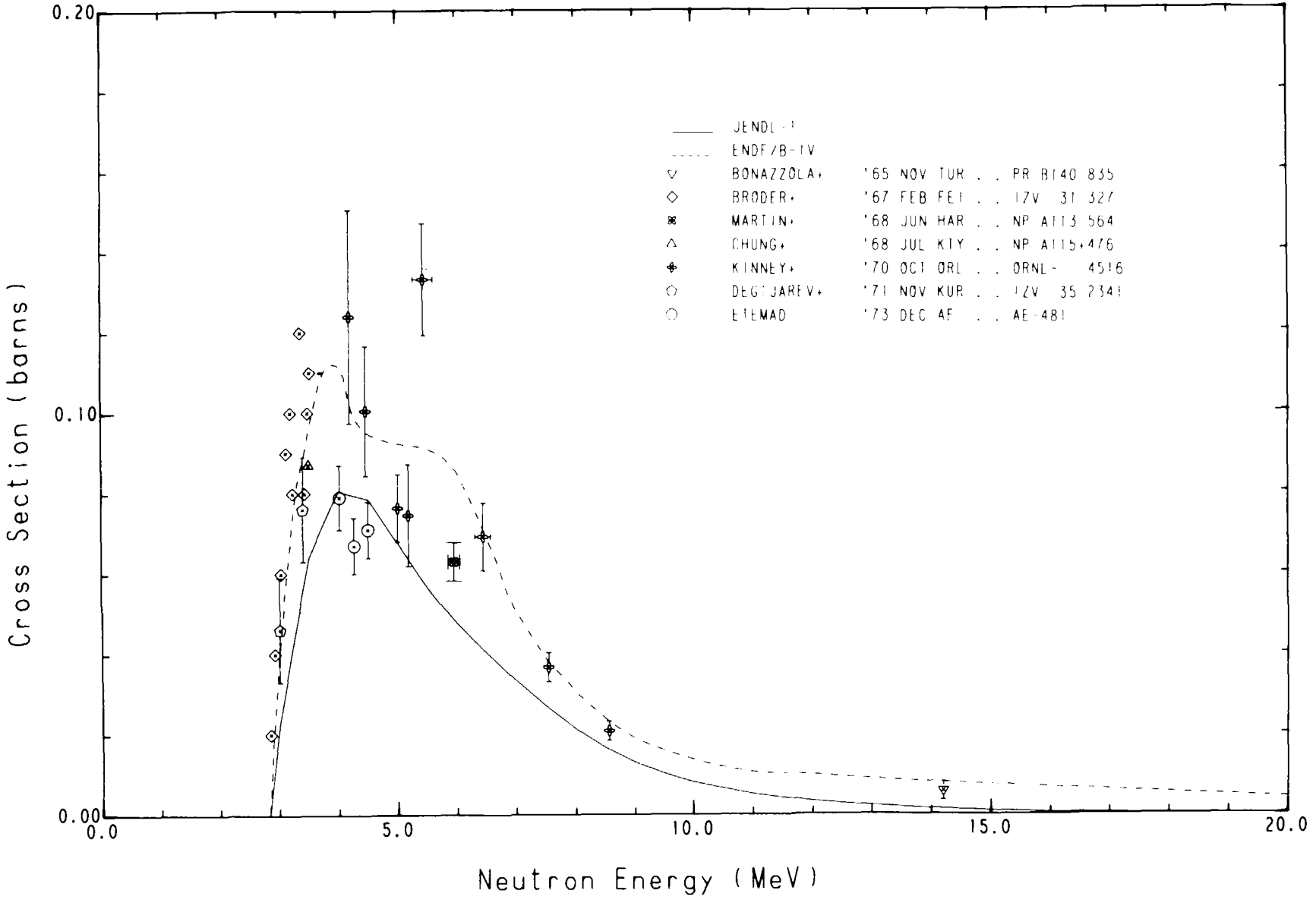
E_x=2.21 MeV



^{27}Al

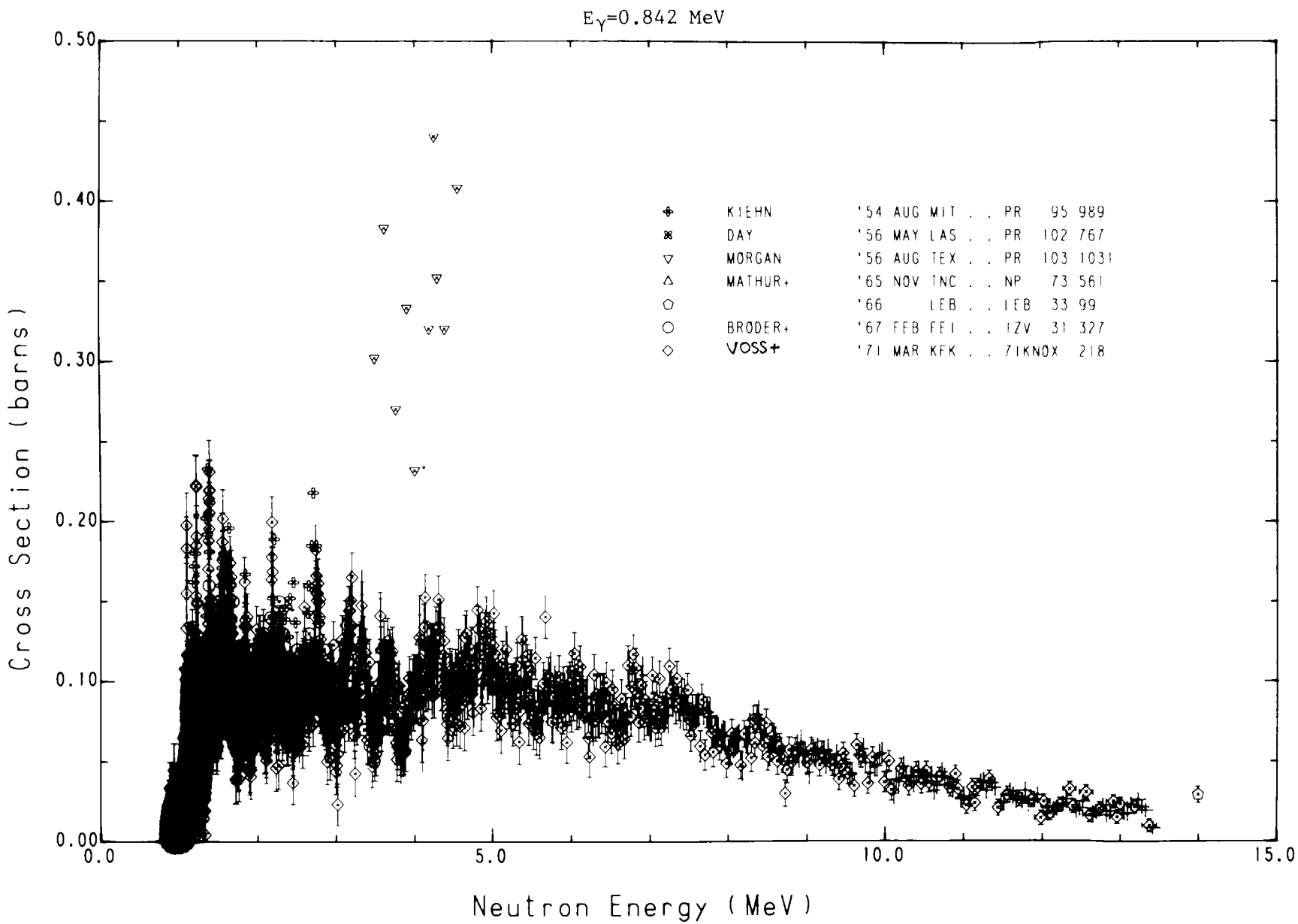
(n,n')

E_x=2.73 MeV



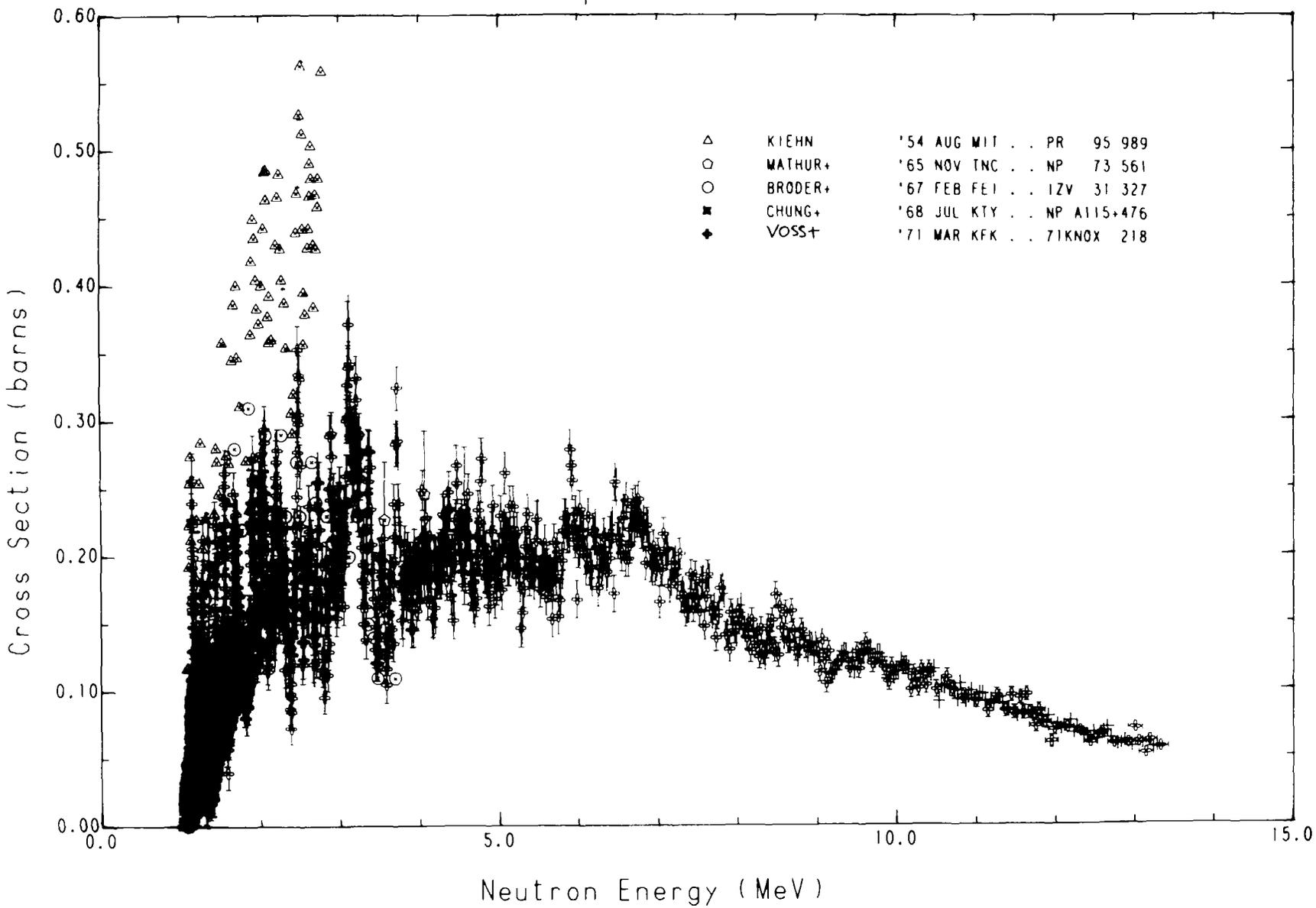
^{27}Al

(n,n'γ)


Eγ=0.842 MeV
KIEHN '54 AUG MIT . . PR 95 989
DAY '56 MAY LAS . . PR 102 767
MORGAN '56 AUG TEX . . PR 103 1031
MATHUR+ '65 NOV TNC . . NP 73 561
'66 LEB . . LEB 33 99
BRODER+ '67 FEB FEI . . IZV 31 327
VOSS+ '71 MAR KFK . . 71KNOX 218
Cross Section (barns)
0.50
0.40
0.30
0.20
0.10
0.00
0.0
5.0
10.0
15.0
Neutron Energy (MeV)

^{27}Al
(n,n'γ)

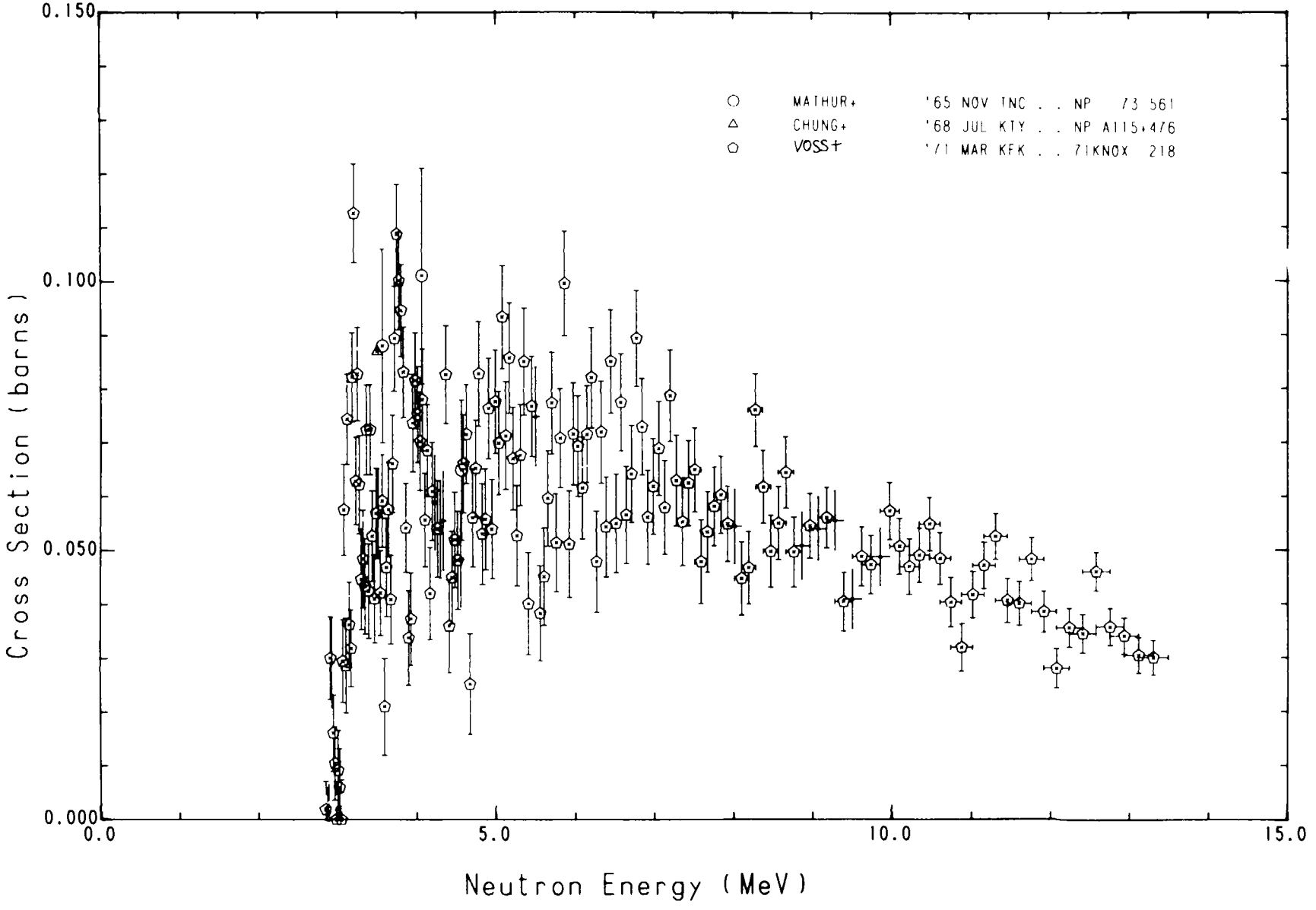
E_γ=1.013 MeV



^{27}Al

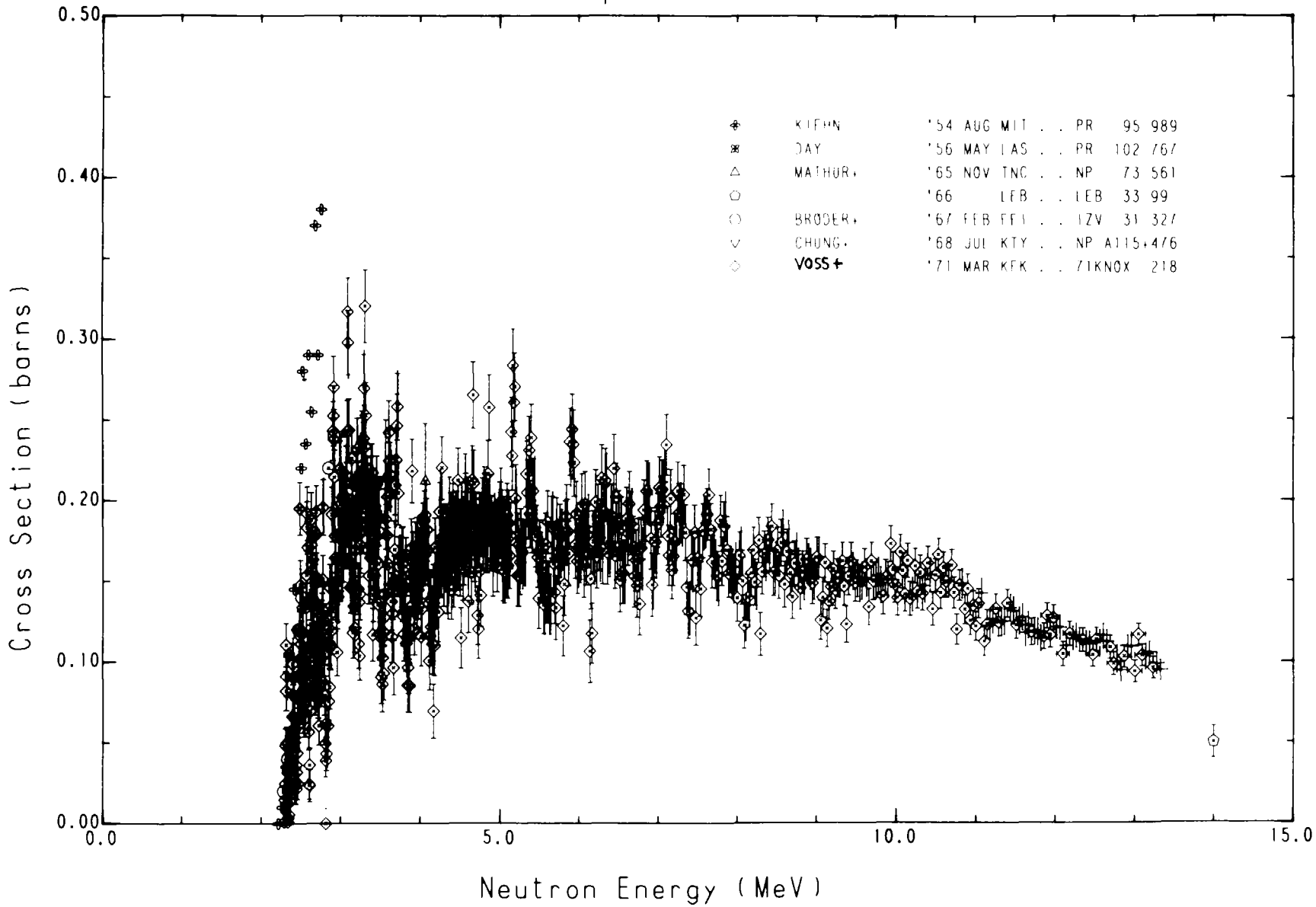
(n,n'γ)

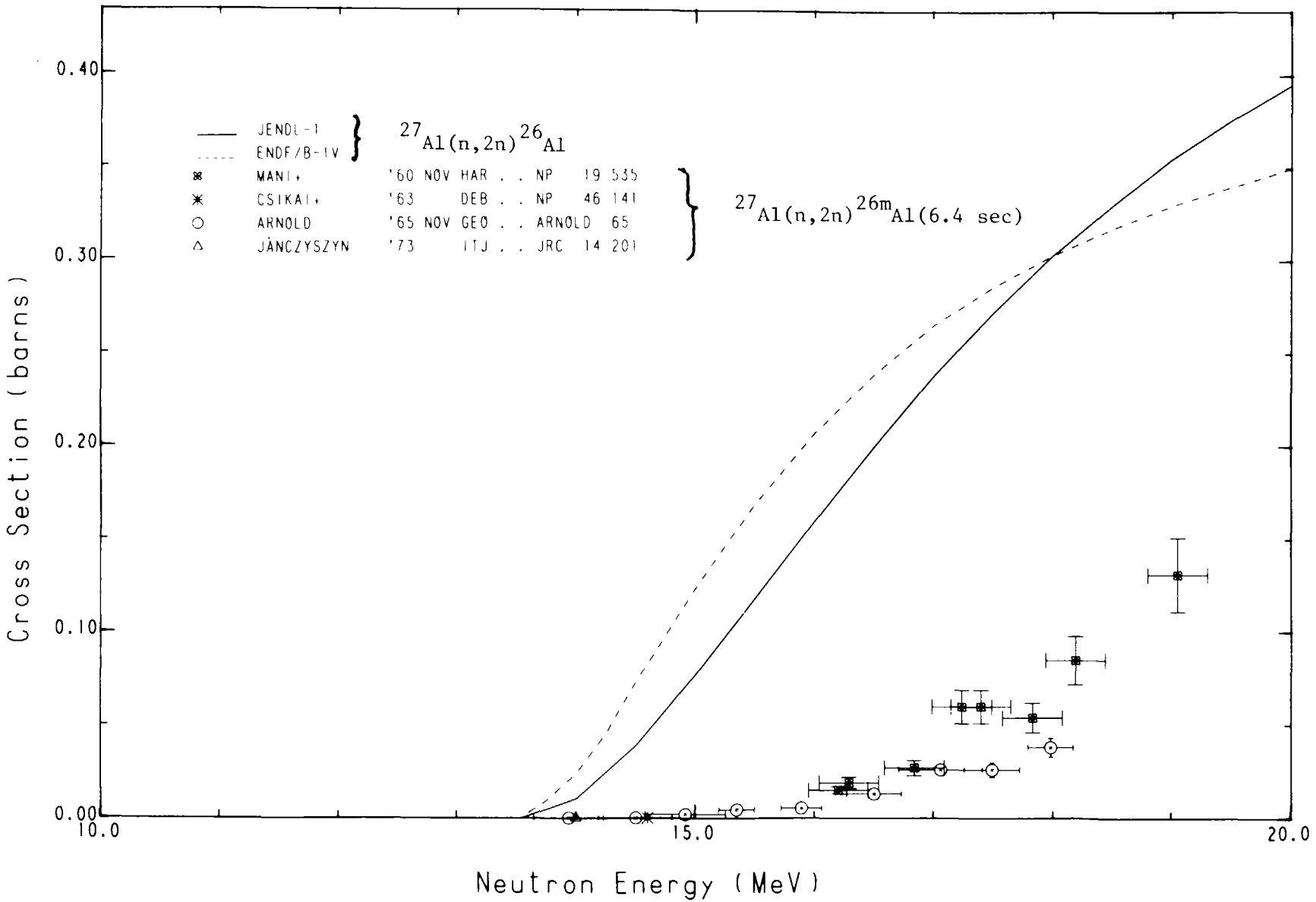
E_γ=1.72 MeV



^{27}Al
(n,n'γ)

E_γ=2.21 MeV




JENDL-1
ENDF/B-IV
^{27}Al(n,2n)^{26}Al
MANI+ '60 NOV HAR . . NP 19 535
CSIKAI+ '63 DEB . . NP 46 141
ARNOLD '65 NOV GEO . . ARNOLD 65
JÀNCZYSZYN '73 ITJ . . JRC 14 201
^{27}Al(n,2n)^{26m}Al(6.4 sec)
0.40
0.30
0.20
0.10
0.00
10.0
15.0
20.0
Cross Section (barns)
Neutron Energy (MeV)

^{27}Al

(n,p)

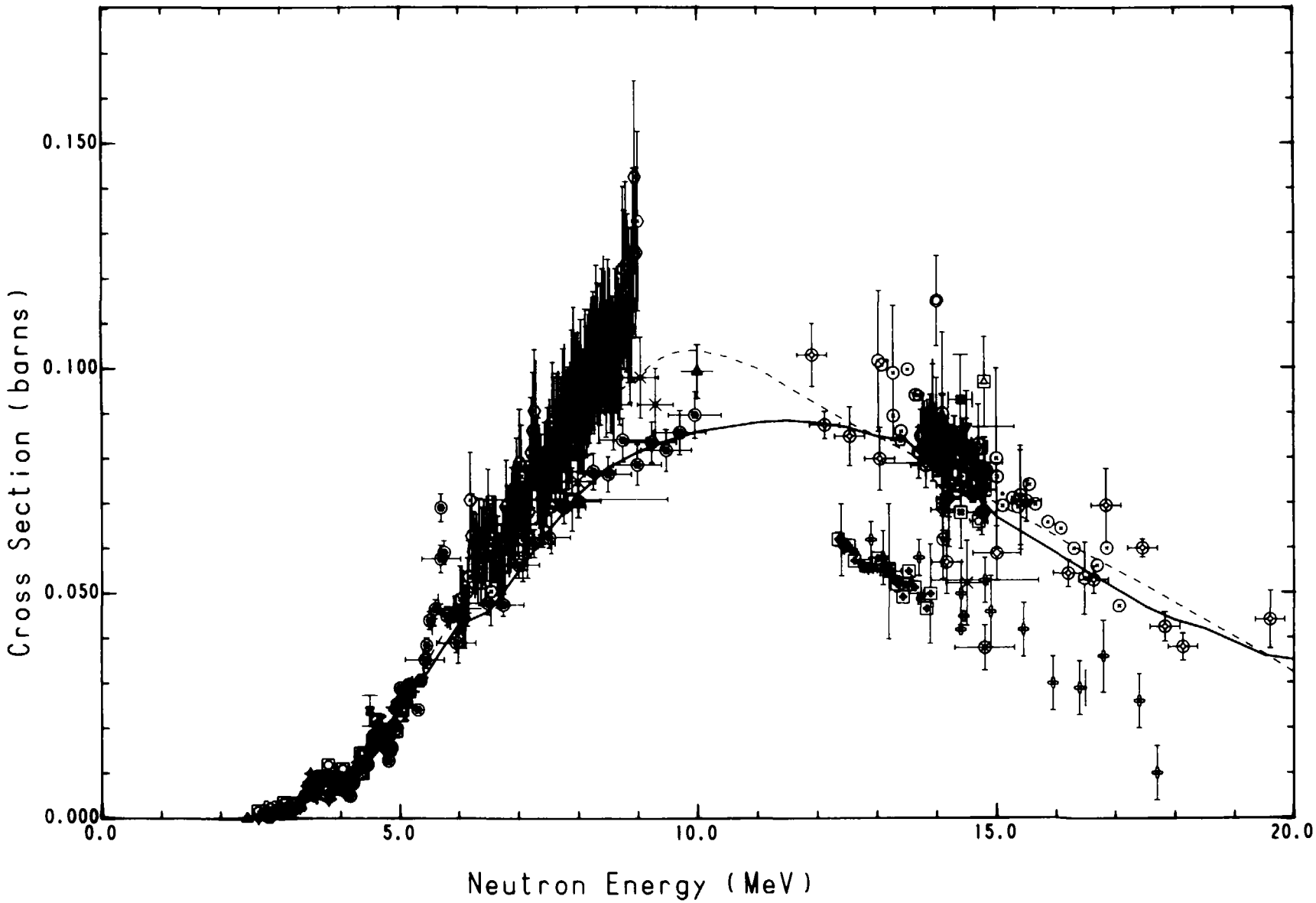
—— JENDL-I

----- ENDF/B-IV

⬠	FORBES	'52	DEC	LAS	. .	PR	88	1309
✳	PAUL+	'53		CRC	. .	CJP	31	267
◇	HENKEL	'54		LAS	. .	HENKEL		54
⊡	BROWN+	'57		GLS	. .	PM	2	785
⊞	ALLAN	'57	MAR	HAR	. .	PPS	70	195
⊕	YASUMI	'57	MAY	KON	. .	JPJ	12	443
△	HALING+	'57	JUN	BRN	. .	PR	106	971
⊙	KHURANA+	'59		MUA	. .	NP	13	88
○	HUDSON+	'59	MAR	TNC	. .	BAP	4	97
✦	POULARIKAS	'59	AUG	ARK	. .	PR	115	989
○	STOREY+	'60		GLS	. .	PPS	75	526
⊙	DEPRAZ+	'60	MAY	LYO	. .	JPR	21	377
⊛	MANI+	'60	NOV	HAR	. .	NP	19-	535
●	MUKHERJEE+	'61		SAH	. .	PPS	77	508
○	POLLEHN+	'61	FEB	HAM	. .	ZN	16A	227
⊞	ALLAN	'61	APR	HAR	. .	NP	24	274
▽	KANTELE	'61	APR	ARK	. .	BAP	6	252
⊛	SAKISAKA+	'61	OCT	KON	. .	JPJ	16	1869
✖	HASSLER+	'62	FEB	BRN	. .	PR	125	1011
⬠	KANTELE+	'62	JUN	ARK	. .	NP	35-	353
⊛	LANGMANN	'62	SEP	HAM	. .	LANGMANN		62
✦	GABBARD+	'62	NOV	KTY	. .	PR	128	1276
⊡	CALVI+	'62	DEC	CAT	. .	NP	39	621
●	CSIKAI+	'63		DEB	. .	NP	46	141
⊙	CHURSIN+	'63	AUG	CCP	. .	JET	17	321
⊡	BONAZZOLA+	'64	FEB	TUR	. .	NP	51	337
■	STRAIN+	'65	JAN	ORL	. .	ORNL		3672
○	BASS+	'66	FEB	FRK	. .	EANDE	66	64
⊠	MITRA+	'66	JUL	BOS	. .	NP	83	157
◇	TIWARI+	'66	OCT	TRM	. .	66PARSI		216
⊞	FERGUSON+	'67	MAY	NRD	. .	NP	A98	65
⊡	DEBERTIN+	'67	SEP	FRK	. .	NP	A101+	473
△	GRUNDL	'67	OCT	LAS	. .	NSE	30	39
◇	TIWARI+	'68	MAR	TAT	. .	PR	167	1091
⊙	CUZZOCREA+	'68	MAR	CAT	. .	NC	B54	53
⊠	RANAKUMAR+	'68	DEC	GIT	. .	NP	A122	679
□	BARRALL+	'69	APR	LRL	. .	WASH		1127
⊞	PRASAD+	'69	NOV	AUW	. .	NP	A138	85
▽	HUSAIN+	'70	APR	ARK	. .	PR C	1	1233
□	BARI	'71		ARK	. .	BARI		71
●	PRASAD+	'71	JUN	MUA	. .	NC A	3	467
⊠	SALAITA	'71	JUL	SMU	. .	NP	A170	193
✳	MASLOV+	'72		RI	. .	YK-	9	53
◇	MOGHARRAB+	'72	APR	HAM	. .	AKE	19	107
✖	PETO+	'73		KOS	. .	AHP	33	363
⊙	DRESLER+	'73	MAY	LOU	. .	INRI	464	12
⊛	ROBERTSON+	'73	AUG	NPL	. .	JNE	27	531
●	D.SMITH+	'75	NOV	ANL	.4.	NSE	58.	314

^{27}Al

(n,p)


0.150
0.100
0.050
0.000
Cross Section (barns)
0.0
5.0
10.0
15.0
20.0
Neutron Energy (MeV)

^{27}Al

(n,α)

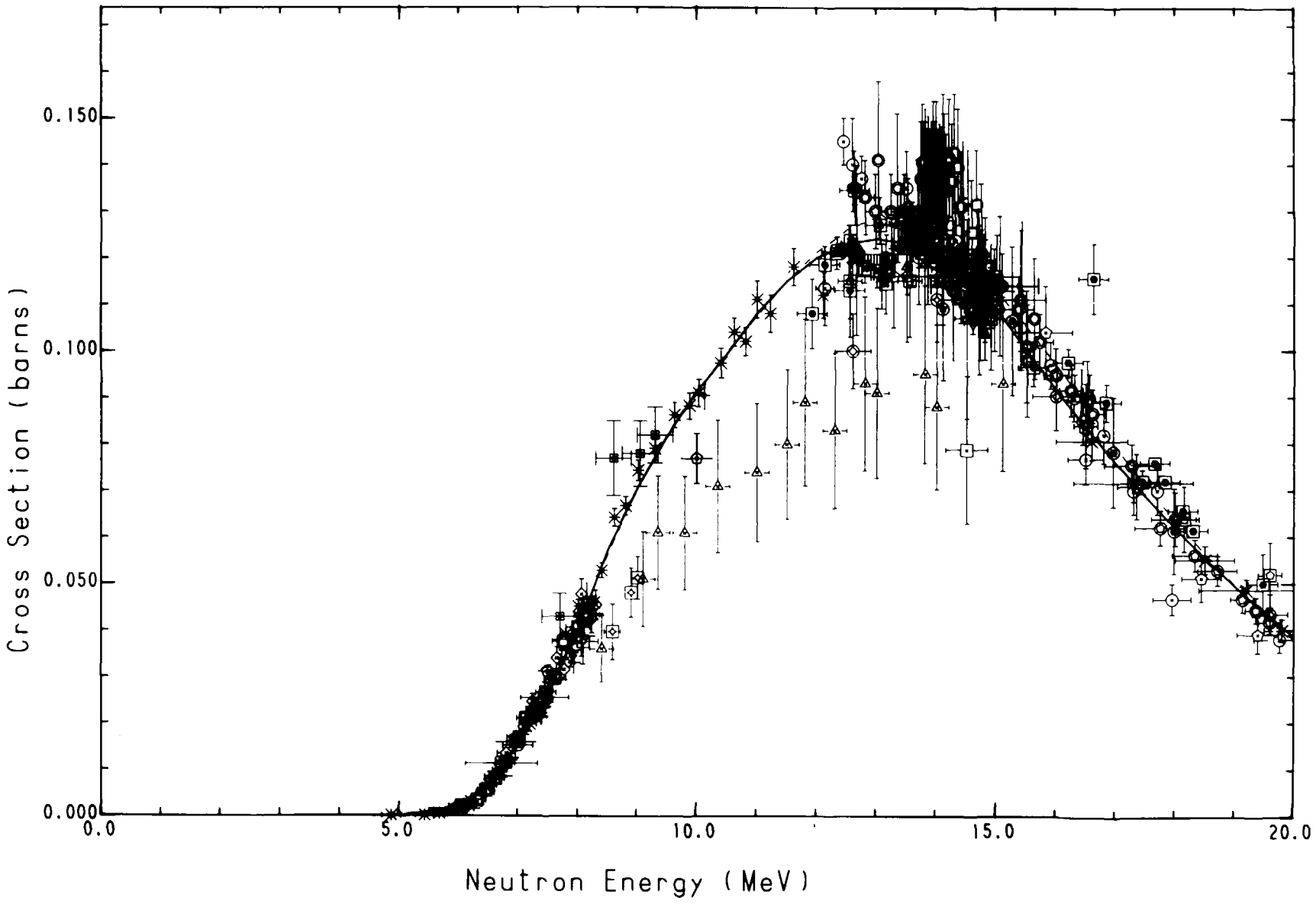
—— JENDL-1

..... ENDF/B-IV

◎	FORBES	'52	DEC	LAS	. .	PR	88	1309
□	PAUL+	'53		CRC	. .	CJP	31	267
⊕	YASUMI	'57	MAY	KON	. .	JPJ	12	443
⊠	GRUNDL+	'58	JAN	LAS	. .	PR	109	425
○	KERN+	'59	MAR	NRD	. .	NP	10	226
●	POULARIKAS	'59	AUG	ARK	. .	PR	115	989
⊗	KHURANA+	'59	OCT	MUA	. .	NP	13	88
⊛	IMHOF	'60		LOK	. .	IMHOF		60
⊛	DEPRAZ+	'60	MAY	LYO	. .	JPR	21	377
△	TEWES	'60	JUN	LRL	. .	UCRL	6028	
⊡	MANI+	'60	NOV	HAR	. .	NP	19+	535
◇	SCHMITT+	'61	FEB	ORL	. .	PR	121	827
◎	BORMANN+	'61	OCT	HAM	. .	JPR	22	602
◎	STROHAL+	'62	FEB	RBZ	. .	NP	30	49
○	BAYHURST+	'62	APR	LAS	. .	JIN	23	173
⊛	LANGMANN	'62	SEP	HAM	. .	LANGMANN		
○	GABBARD+	'62	NOV	KTY	. .	PR	128	1276
✦	CSIKAI+	'63		DEB	. .	NP	46	141
✳	BUTLER+	'63		CRC	. .	CJP	41	372
◎	JERONYMO+	'63	AUG	SAC	. .	NP	47	157
○	BORMANN+	'63	OCT	HAM	. .	EAN/E	49	4
⊡	BONAZZOLA+	'64	FEB	TUR	. .	NP	51	337
▽	ARON+	'64	APR	CCP	. .	AE	16	370
⊠	STRAIN+	'65	JAN	ORL	. .	ORNL		3672
⊕	SEEBECK+	'65	JUN	HAM	. .	NP	68+	387
○	PAULSEN+	'65	NOV	GEL	. .	JNE	19	907
□	LISKIEN+	'66		GEL	. .	NUK	8	315
△	HEMINGWAY+	'66	MAY	DUR	. .	PRSA	292	180
◇	MINETTI	'67	JAN	TUR	. .	ZP	199	275
▣	FERGUSON+	'67	MAY	NRD	. .	NP	A98	65
⬠	GRUNDL	'67	OCT	LAS	. .	NSE	30	39
⬟	MENLOVE+	'67	NOV	LOK	. .	PR	163	1308
○	CUZZOCREA+	'68	MAR	CAT	. .	NC	B54	53
✧	BOSCHUNGZ+	'68	APR	BAS	. .	HPA	42	252
○	CRUMPTON+	'69	JAN	BIA	. .	JIN	31	1
◎	BARRALL+	'69	DEC	LRL	. .	NP	A138	387
⊛	LEBOWITZ+	'70	FEB	BLN	. .	NC A	65	675
✖	VONACH+	'70	SEP	IRK	. .	ZP	237	155
⊠	SALAITA	'71	JUL	SMU	. .	NP	A170.	193
✖	NEMILOV+	'72		RI	. .	YK-	9	53
⊗	ROBERTSON+	'73	MAR	NPL	. .	JNE	27	139

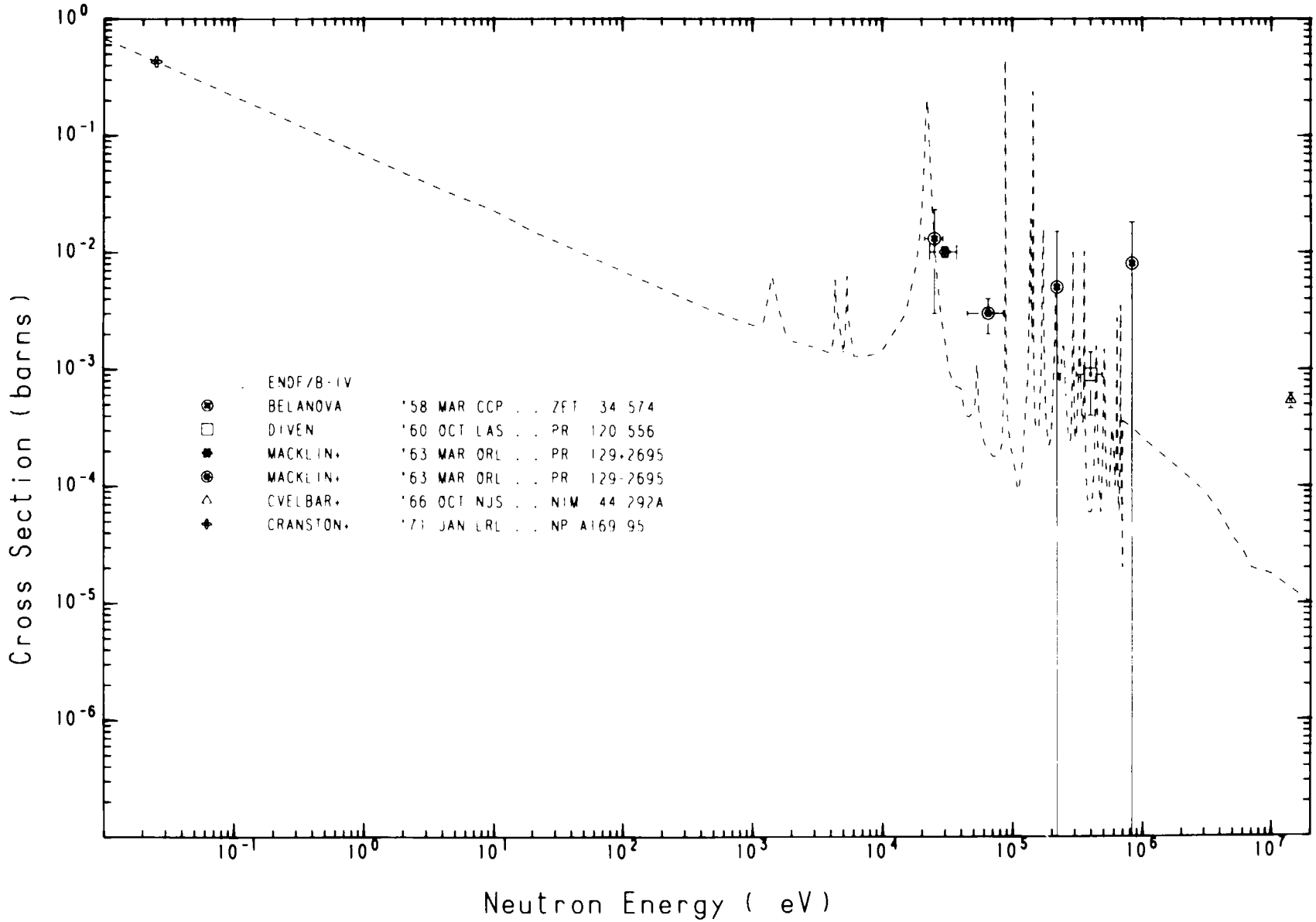
^{27}Al

(n, α)


0.150
0.100
0.050
0.000
Cross Section (barns)
0.0
5.0
10.0
15.0
20.0
Neutron Energy (MeV)

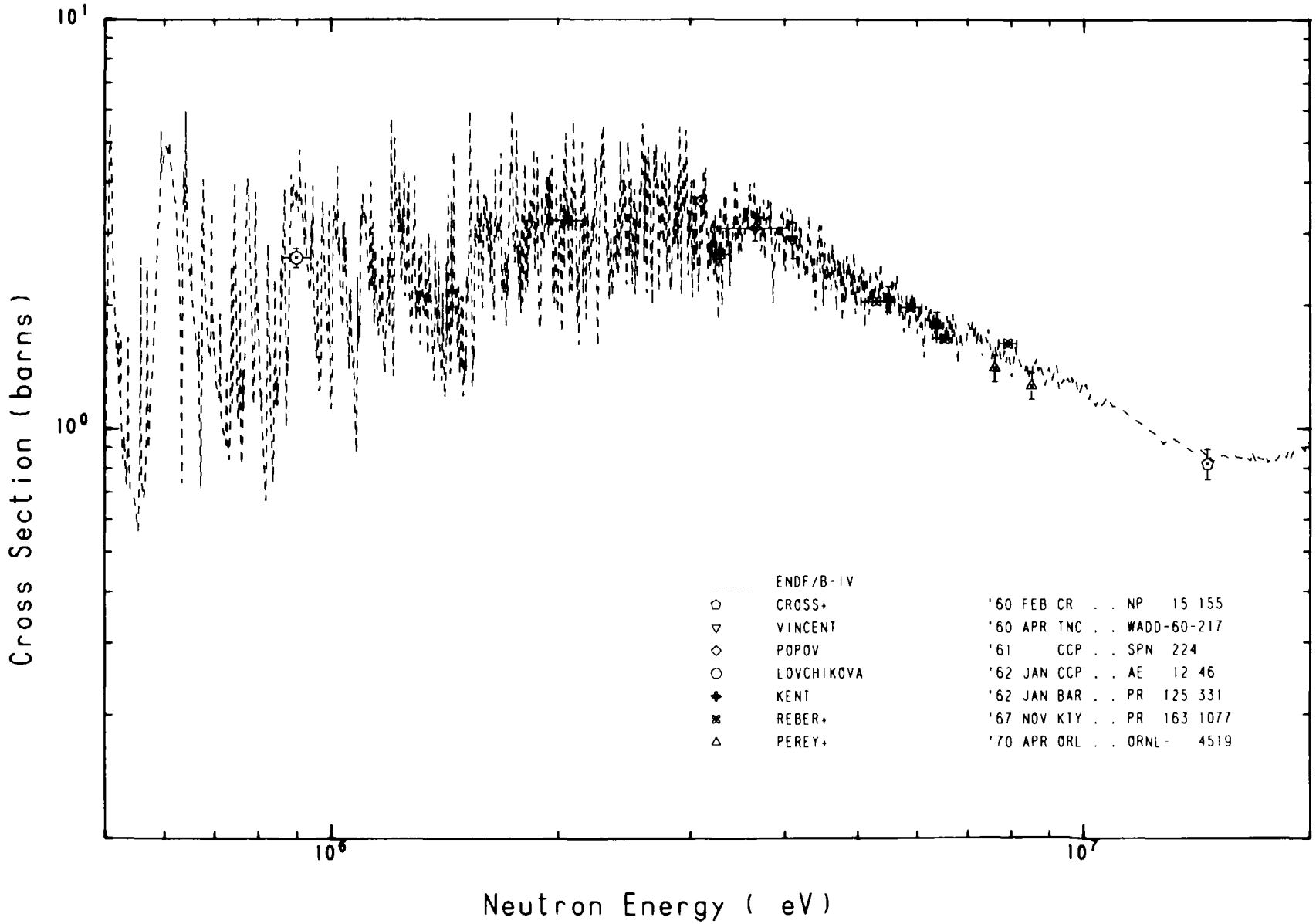
$_{20}$Ca

(n,γ)


ENDF/B-IV
BELANOVA '58 MAR CCP . . ZET 34 574
DIVEN '60 OCT LAS . . PR 120 556
MACKLIN+ '63 MAR ORL . . PR 129-2695
MACKLIN+ '63 MAR ORL . . PR 129-2695
CVELBAR+ '66 OCT NJS . . NIM 44 292A
CRANSTON+ '71 JAN LRL . . NP A169 95
Cross Section (barns)
Neutron Energy (eV)

$_{20}Ca$

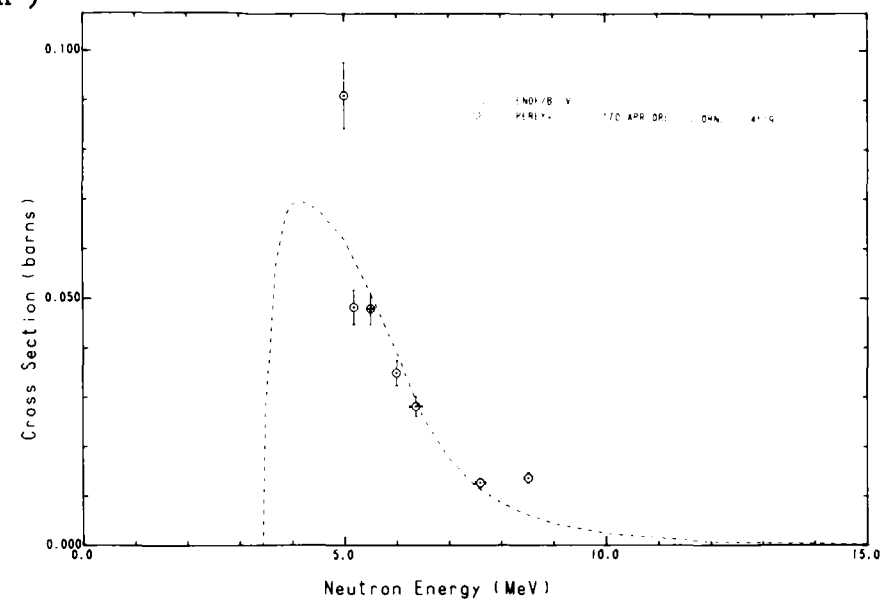
(n,n)


Cross Section (barns)
Neutron Energy (eV)
ENDF/B-IV
CROSS+ '60 FEB CR . . NP 15 155
VINCENT '60 APR TNC . . WADD-60-217
POPOV '61 CCP . . SPN 224
LOVCHIKOVA '62 JAN CCP . . AE 12 46
KENT '62 JAN BAR . . PR 125 331
REBER+ '67 NOV KTY . . PR 163 1077
PEREY+ '70 APR ORL . . ORNL- 4519

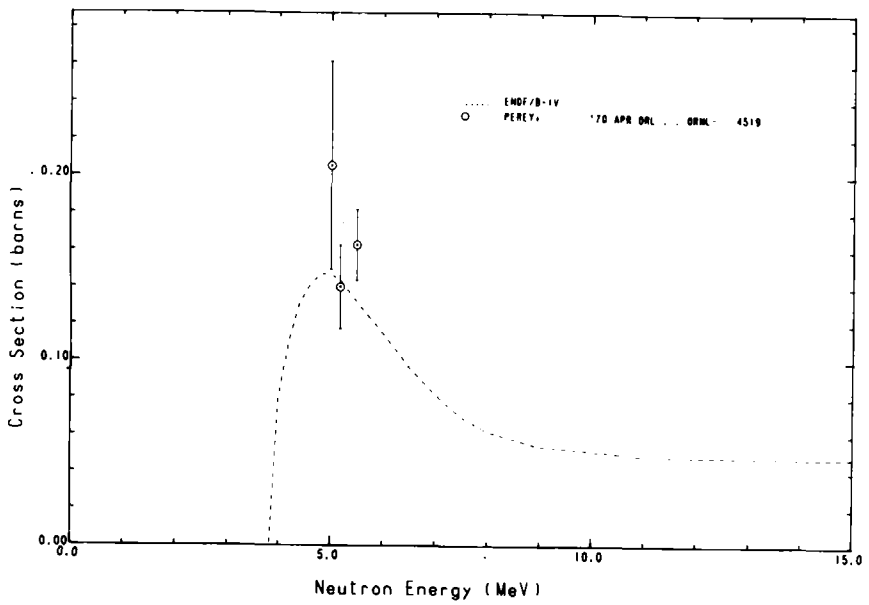
$_{20}$Ca

(n,n')

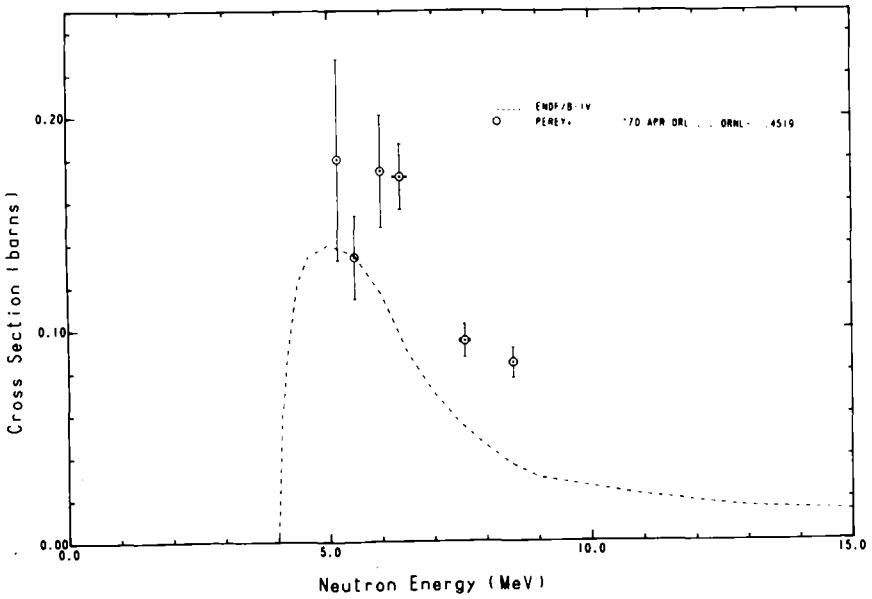
E_x=3.35 MeV



E_x=3.73 MeV

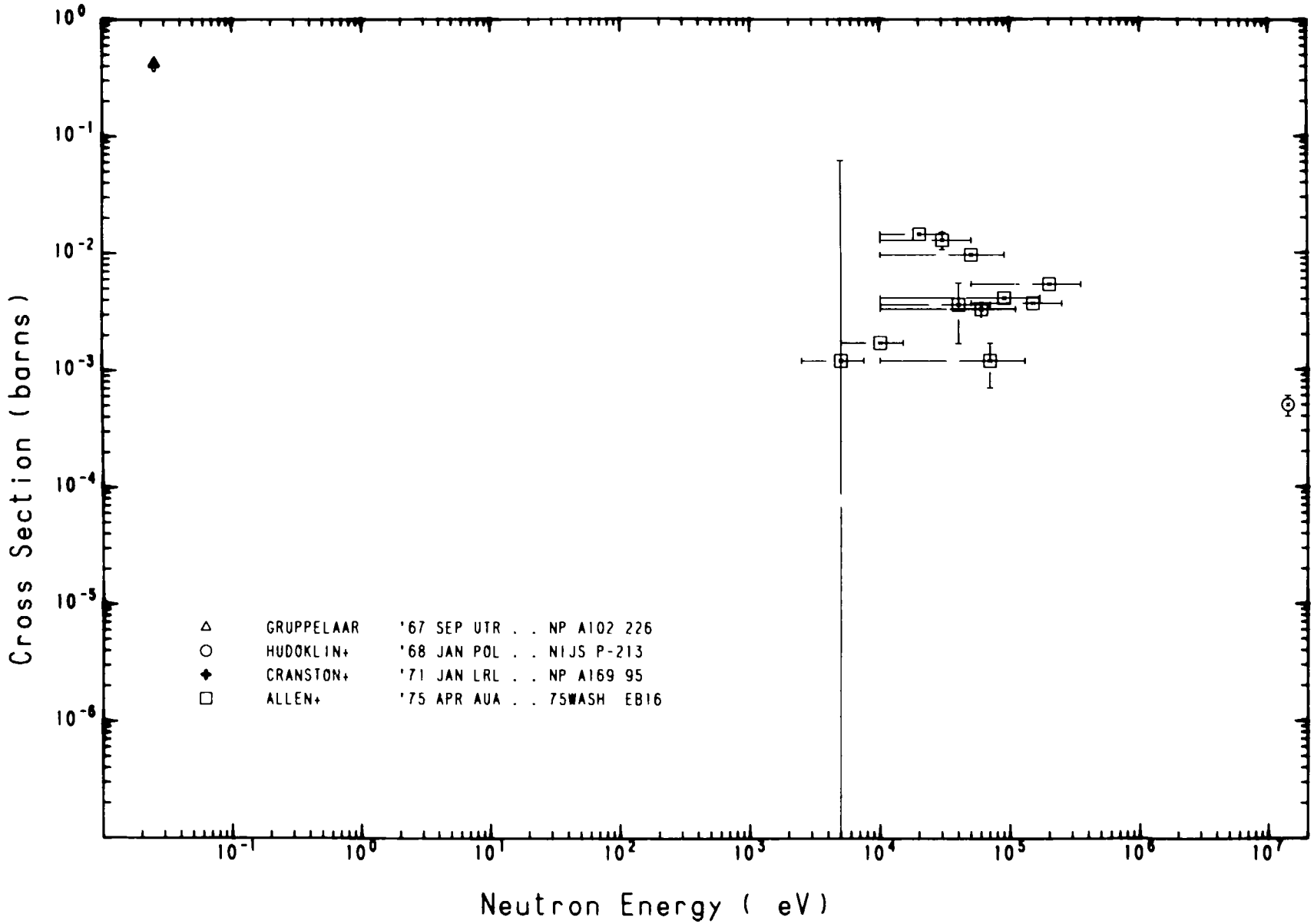


E_x=3.90 MeV



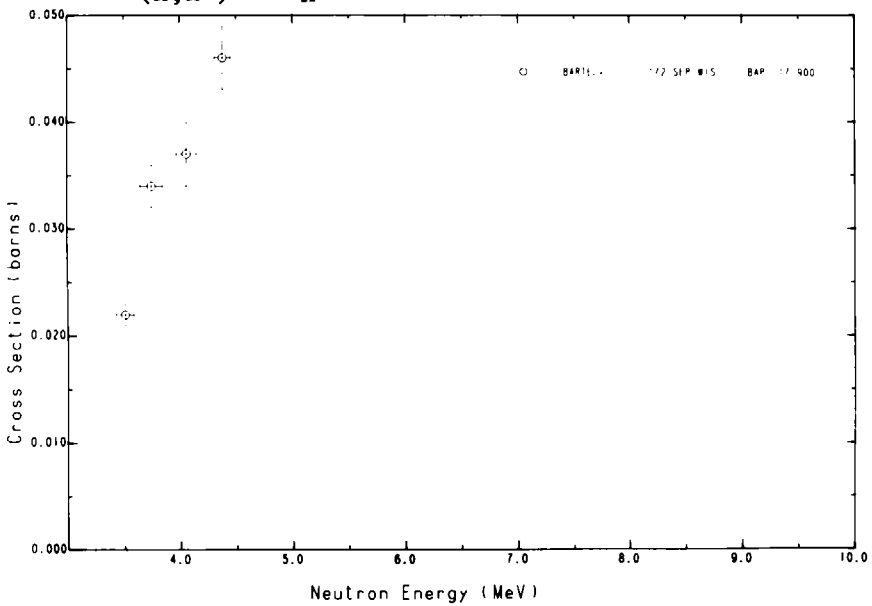
^{40}Ca

(n,γ)

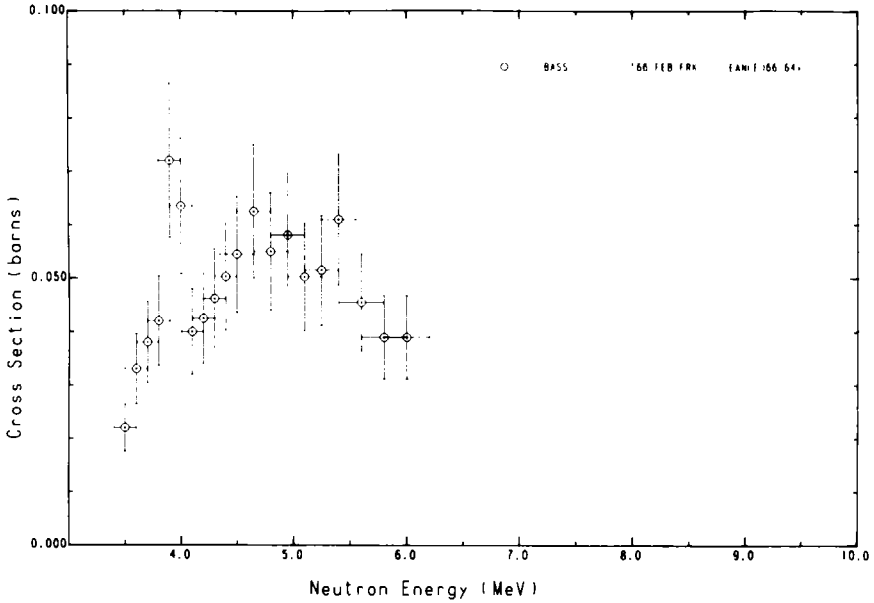

Cross Section (barns)
Neutron Energy (eV)
GRUPPELAAR '67 SEP UTR . . NP A102 226
HUDOKLIN+ '68 JAN POL . . NIJS P-213
CRANSTON+ '71 JAN LRL . . NP A169 95
ALLEN+ '75 APR AUA . . 75WASH EB16

^{40}Ca (n,n') (n,n'γ)

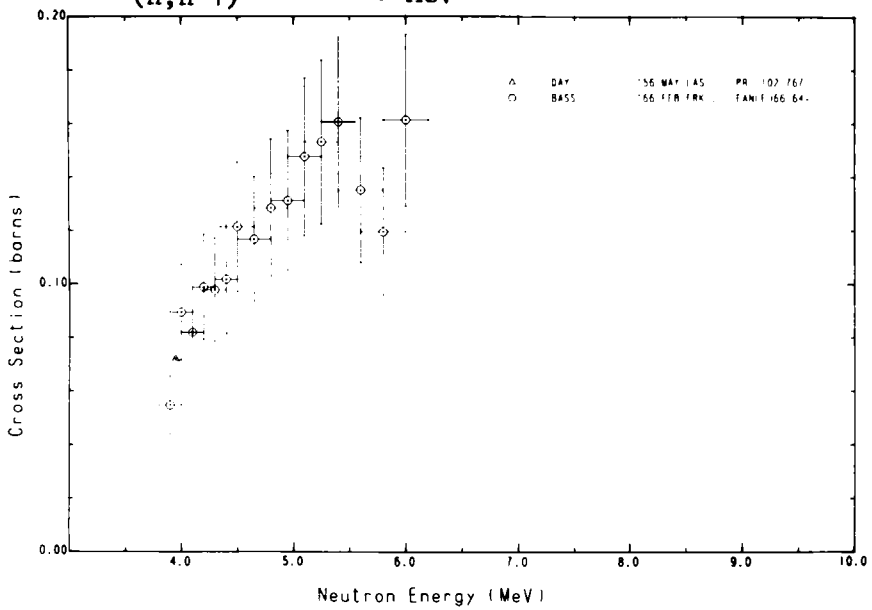
(n,n') E_x=3.348 MeV



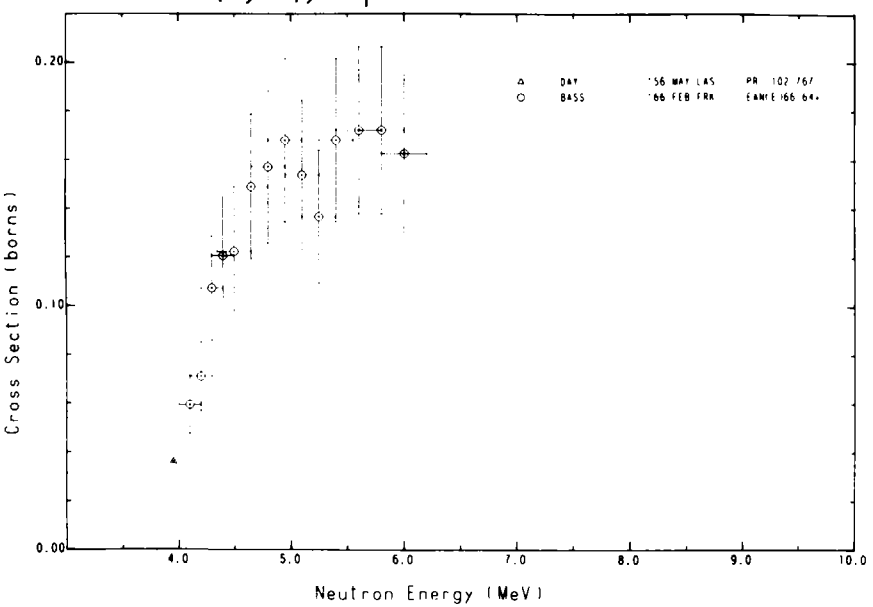
(n,n'γ) E_x=3.35 MeV



(n,n'γ) E =3.73 MeV

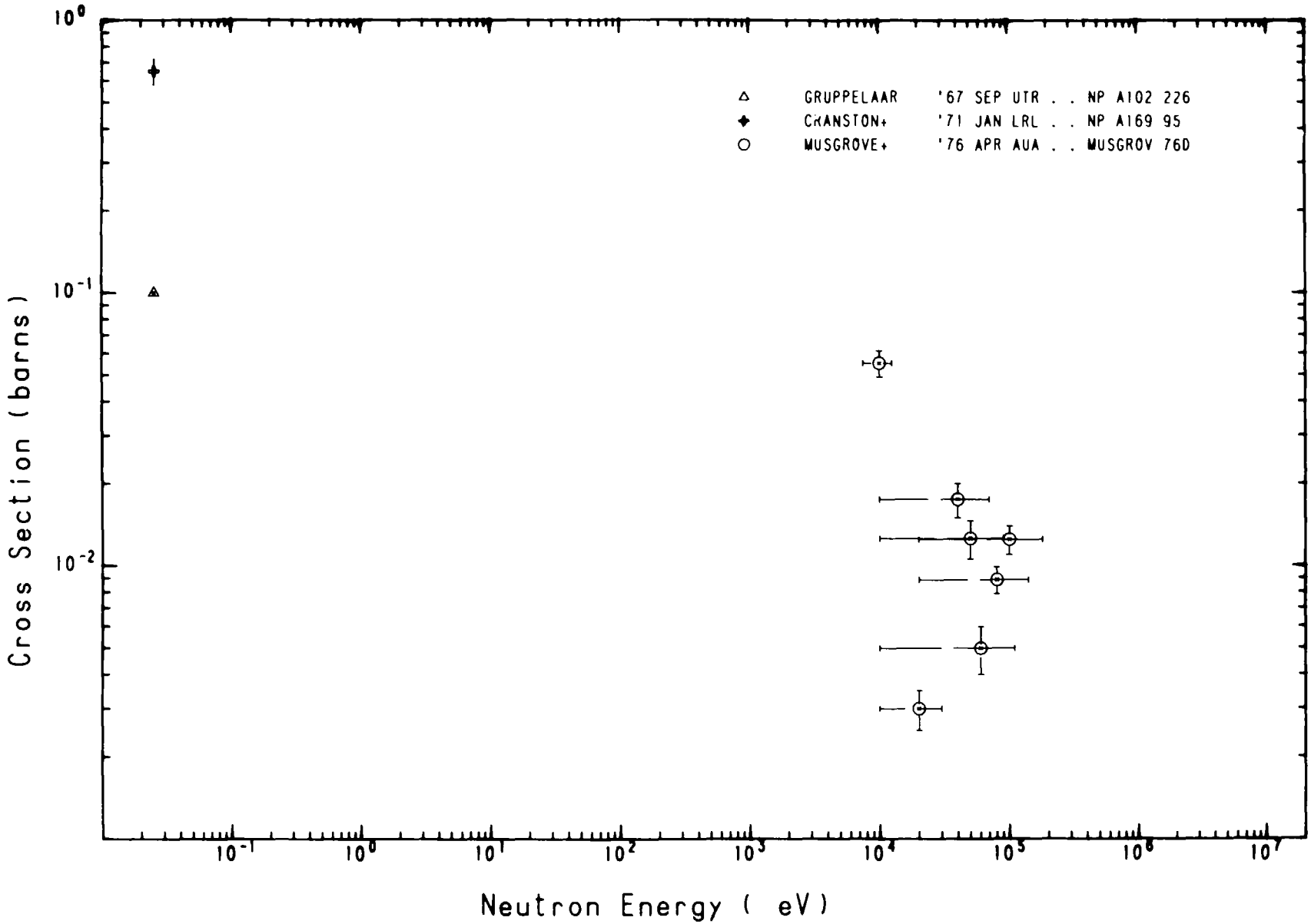


(n,n'γ) E_γ=3.90 MeV



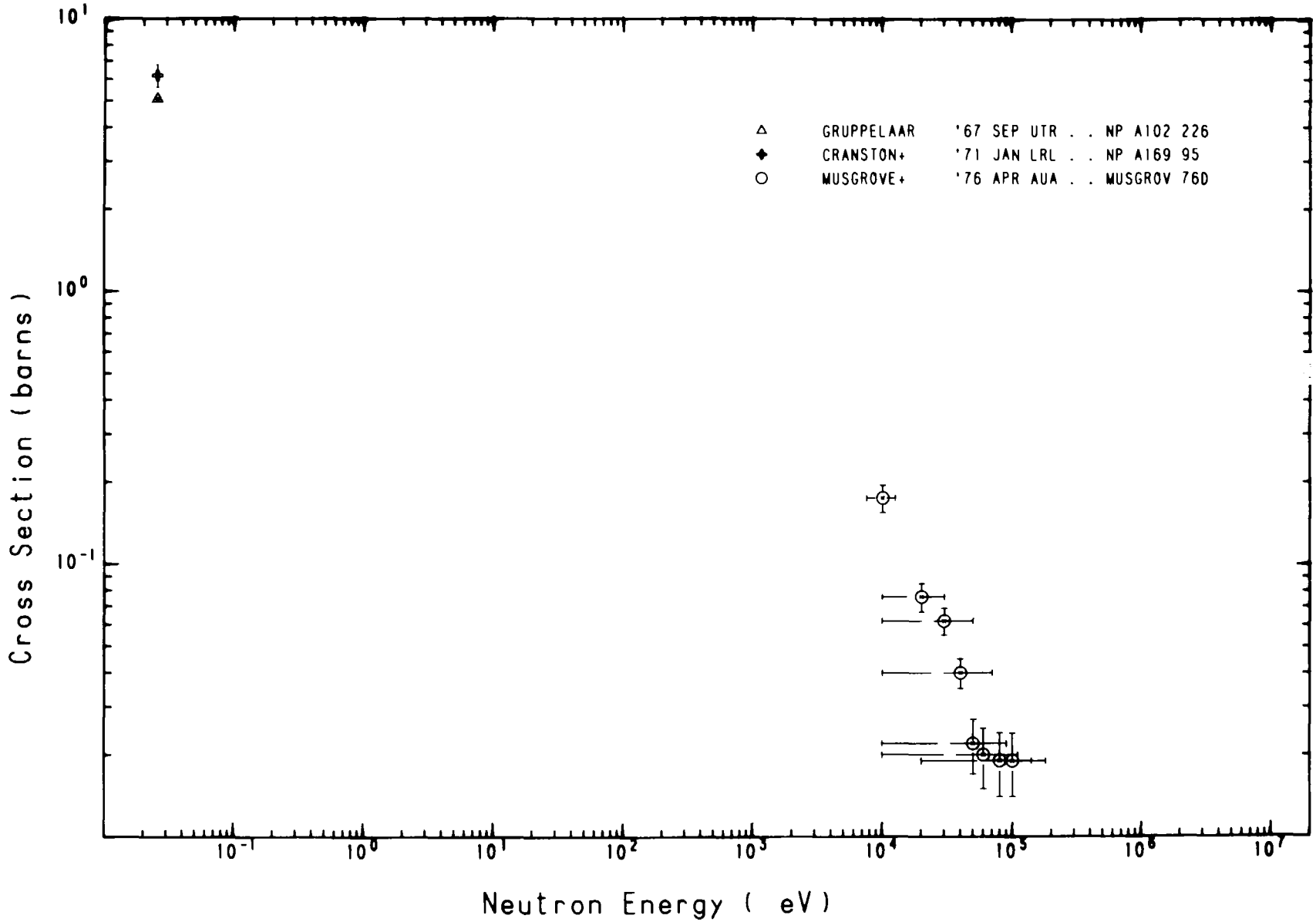
^{42}Ca

(n,γ)


GRUPPELAAR '67 SEP UTR . . NP A102 226
CRANSTON+ '71 JAN LRL . . NP A169 95
MUSGROVE+ '76 APR AUA . . MUSGROV 76D
Cross Section (barns)
Neutron Energy (eV)
10^0
10^{-1}
10^{-2}
10^{-1}
10^0
10^1
10^2
10^3
10^4
10^5
10^6
10^7

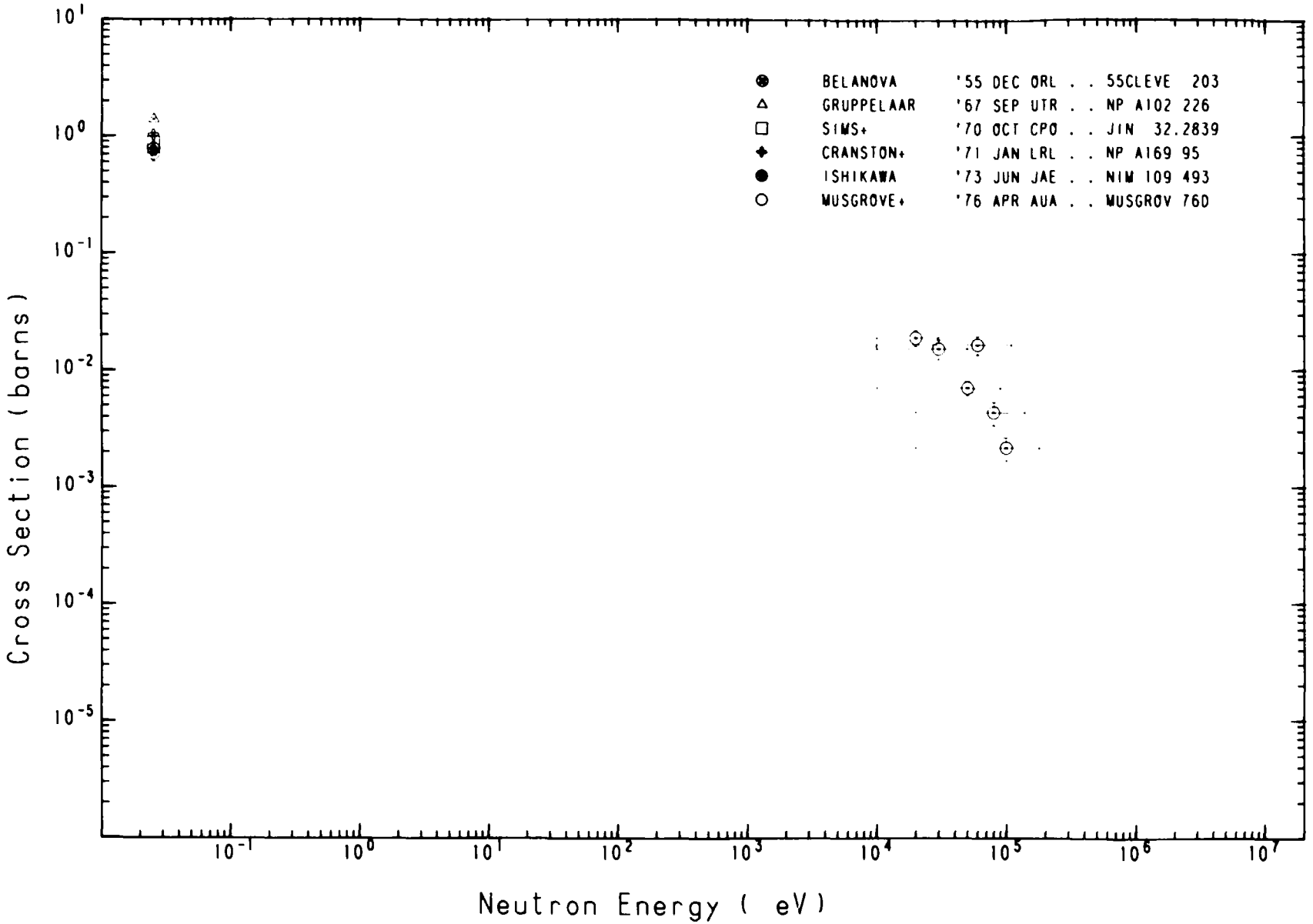
^{43}Ca

(n, γ)

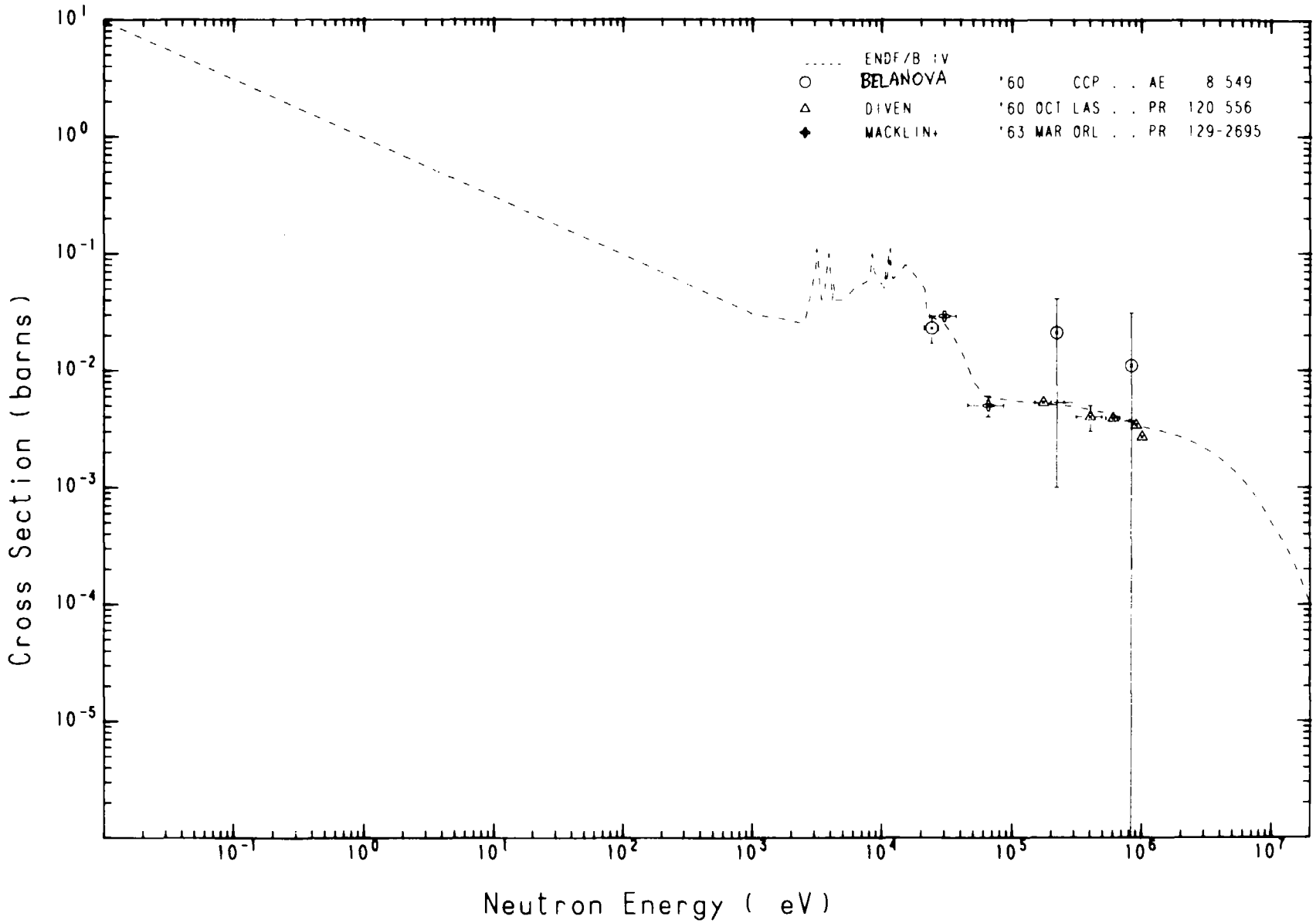

GRUPPELAAR '67 SEP UTR . . NP A102 226
CRANSTON+ '71 JAN LRL . . NP A169 95
MUSGROVE+ '76 APR AUA . . MUSGROV 76D
Cross Section (barns)
Neutron Energy (eV)
10^{1}
10^{0}
10^{-1}
10^{-1}
10^{0}
10^{1}
10^{2}
10^{3}
10^{4}
10^{5}
10^{6}
10^{7}

^{44}Ca

(n,γ)

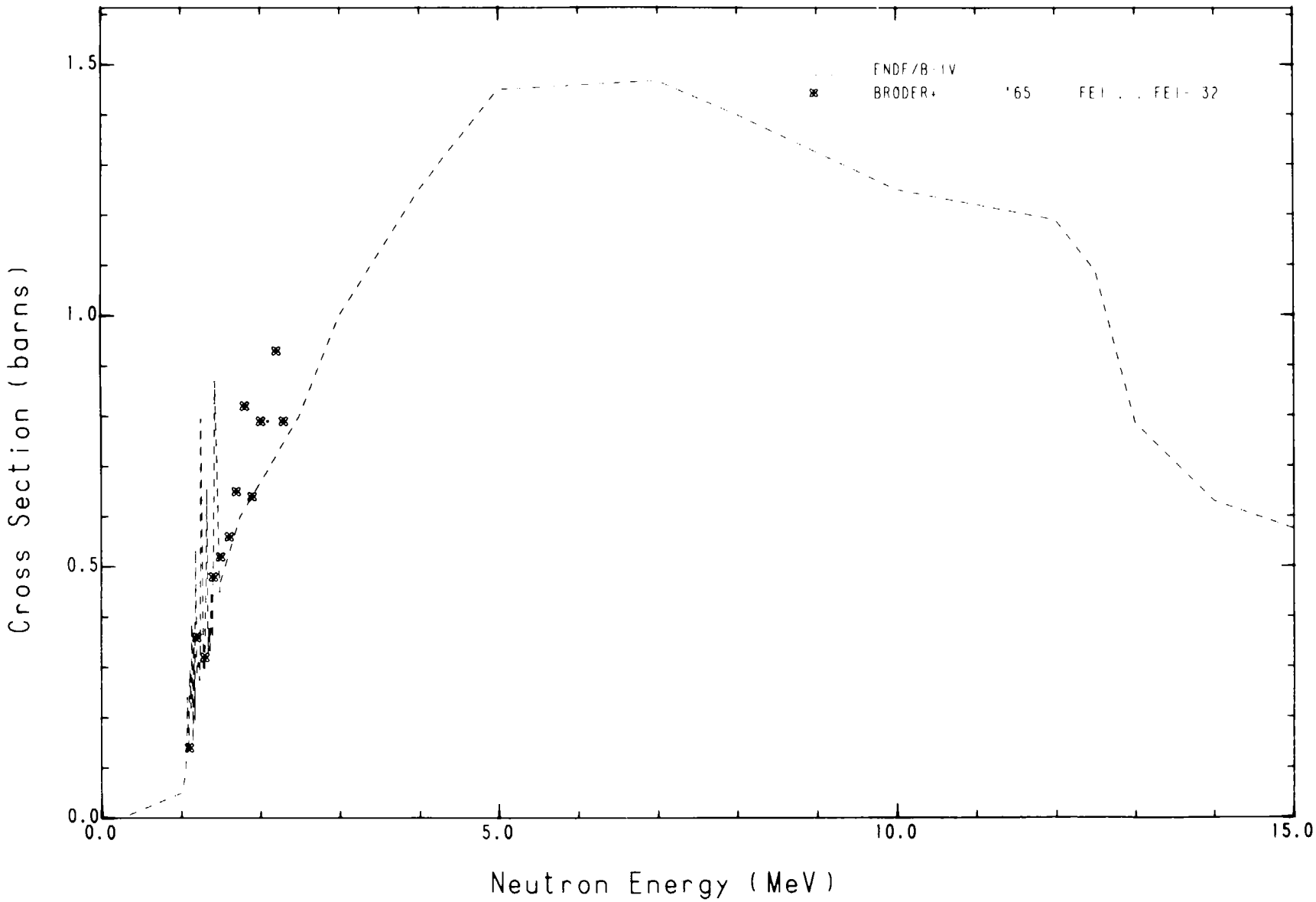

BELANOVA '55 DEC ORL . . 55CLEVE 203
GRUPPELAAR '67 SEP UTR . . NP A102 226
SIMS+ '70 OCT CPO . . JIN 32.2839
CRANSTON+ '71 JAN LRL . . NP A169 95
ISHIKAWA '73 JUN JAE . . NIM 109 493
MUSGROVE+ '76 APR AUA . . MUSGROV 760
Cross Section (barns)
Neutron Energy (eV)

$_{22}Ti$
(n, γ)


ENDF/B IV
BELANOVA '60 CCP . . AE 8 549
DIVEN '60 OCT LAS . . PR 120 556
MACKLIN+ '63 MAR ORL . . PR 129-2695
Cross Section (barns)
Neutron Energy (eV)

$_{22}$Ti

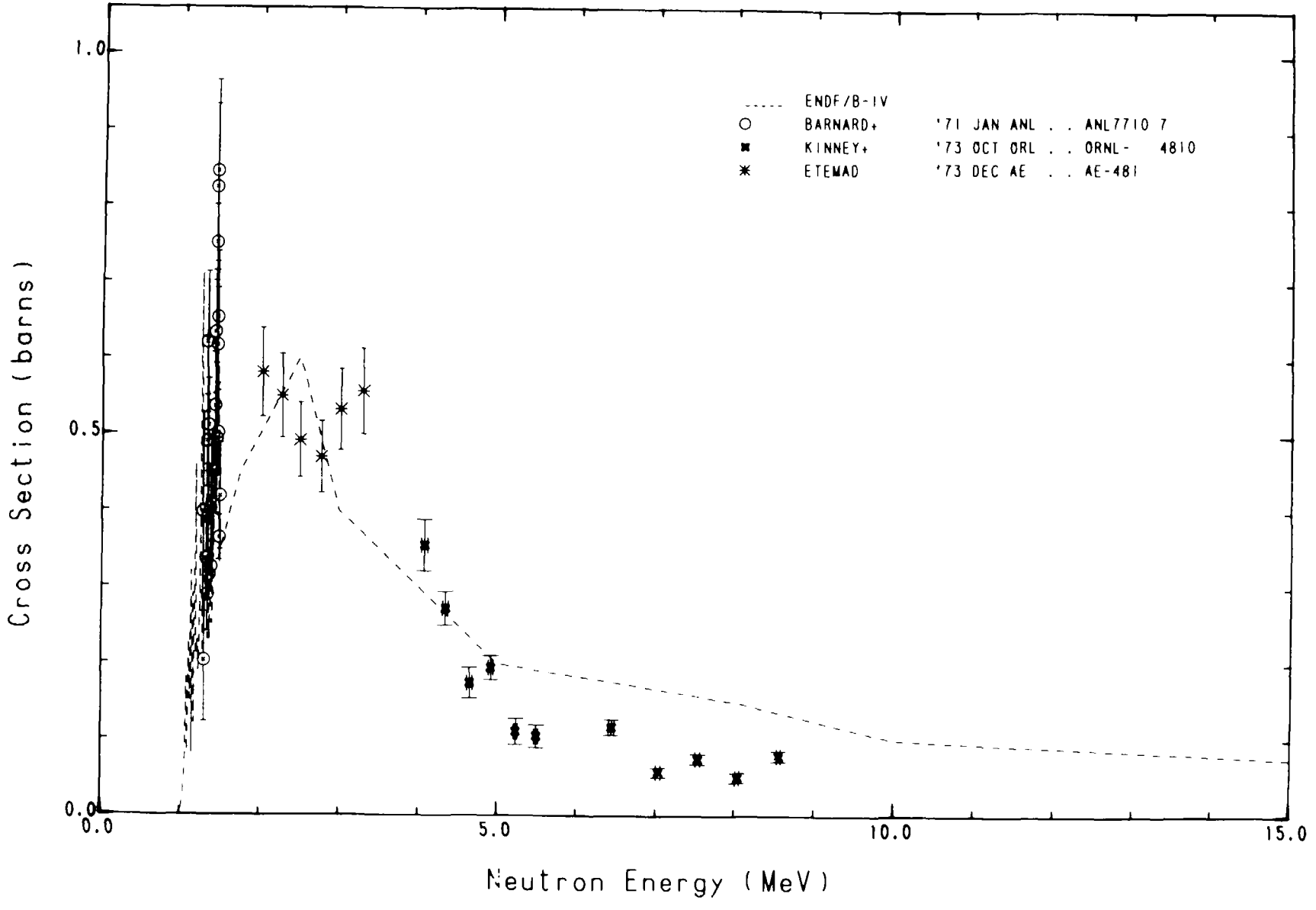
(n,n')


ENDF/B-IV
BRODER+ '65 FEI . . FEI- 32
Cross Section (barns)
Neutron Energy (MeV)
0.0
0.5
1.0
1.5
0.0
5.0
10.0
15.0

$_{22}Ti$

(n,n')

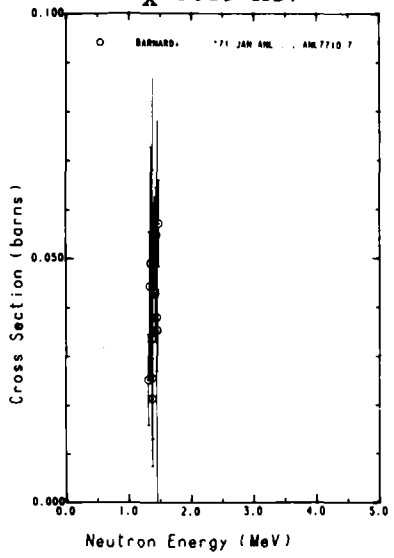
E_x=0.98 MeV



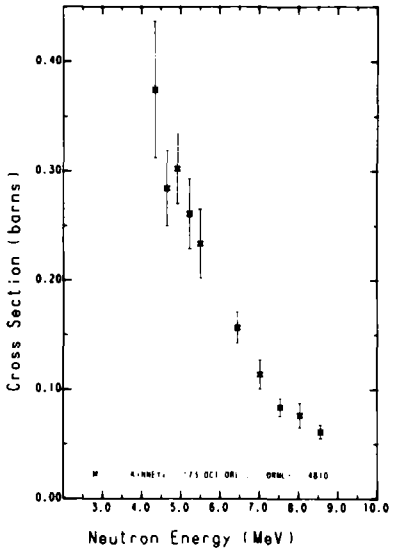
$_{22}$Ti
(n,n')
(n,n'γ)

(n,n')

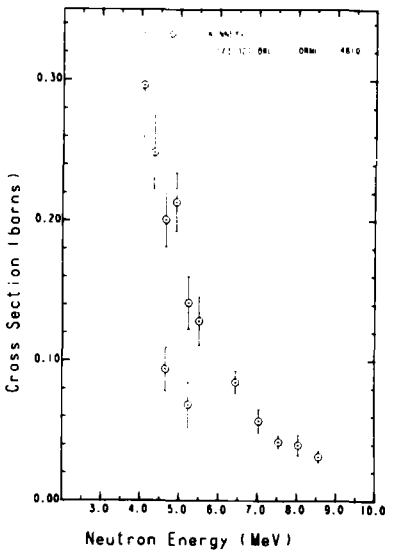
E_x=0.89 MeV



E_x=2.89 MeV

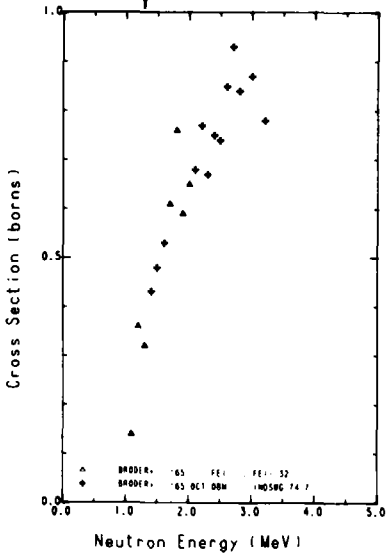


E_x=3.38 MeV

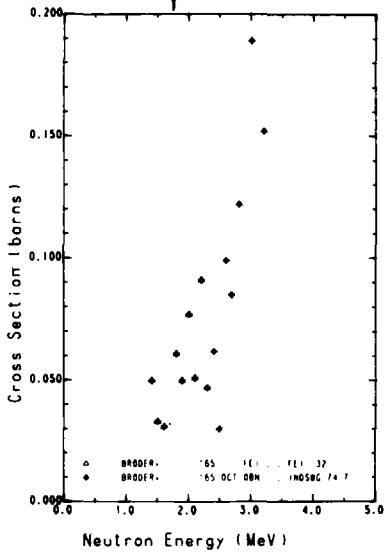


(n,n'γ)

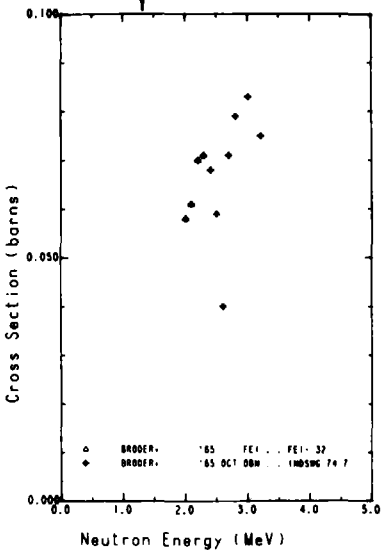
E_γ=0.98 MeV



E_γ=1.38 MeV

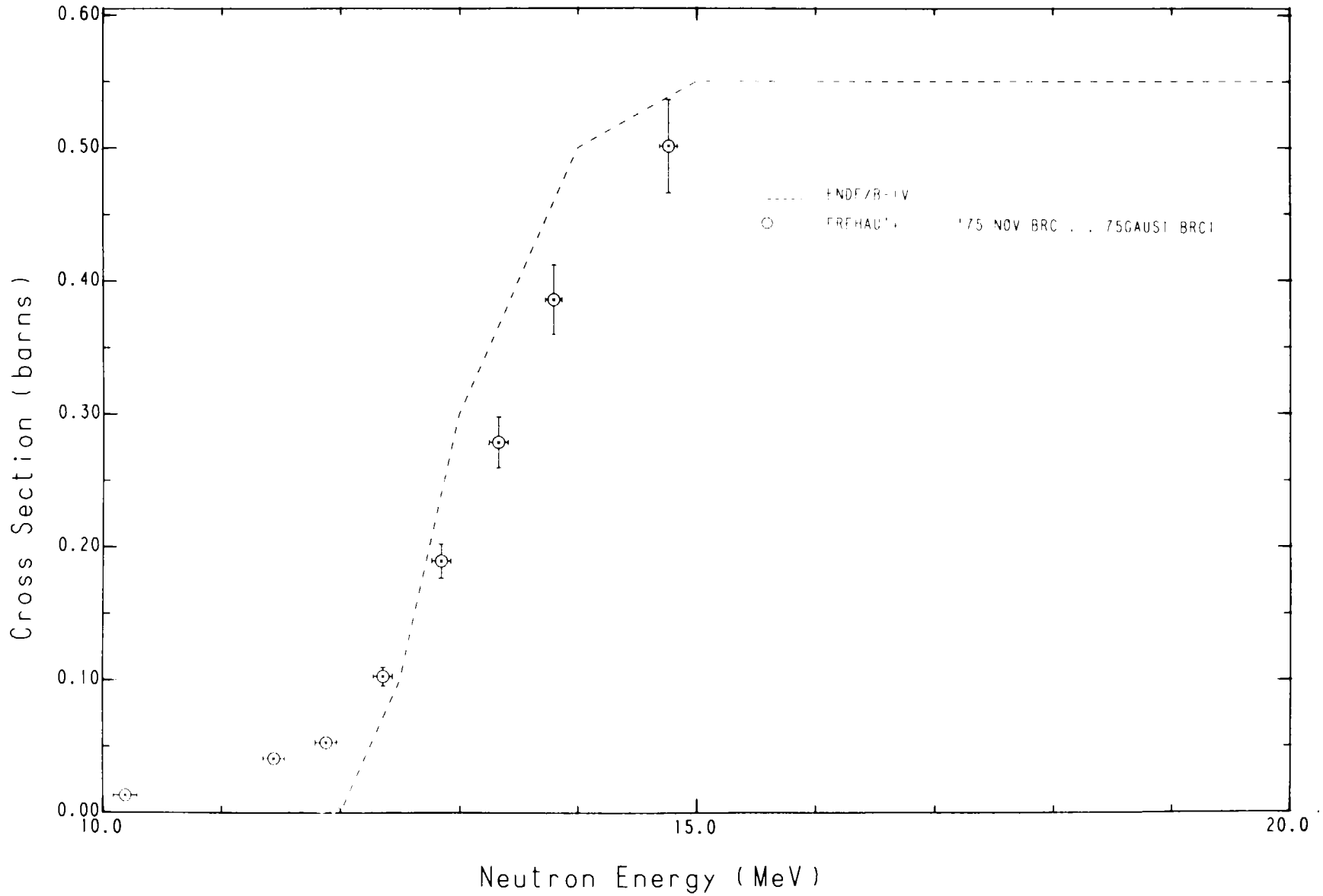


E_γ=1.56 MeV



$_{22}Ti$

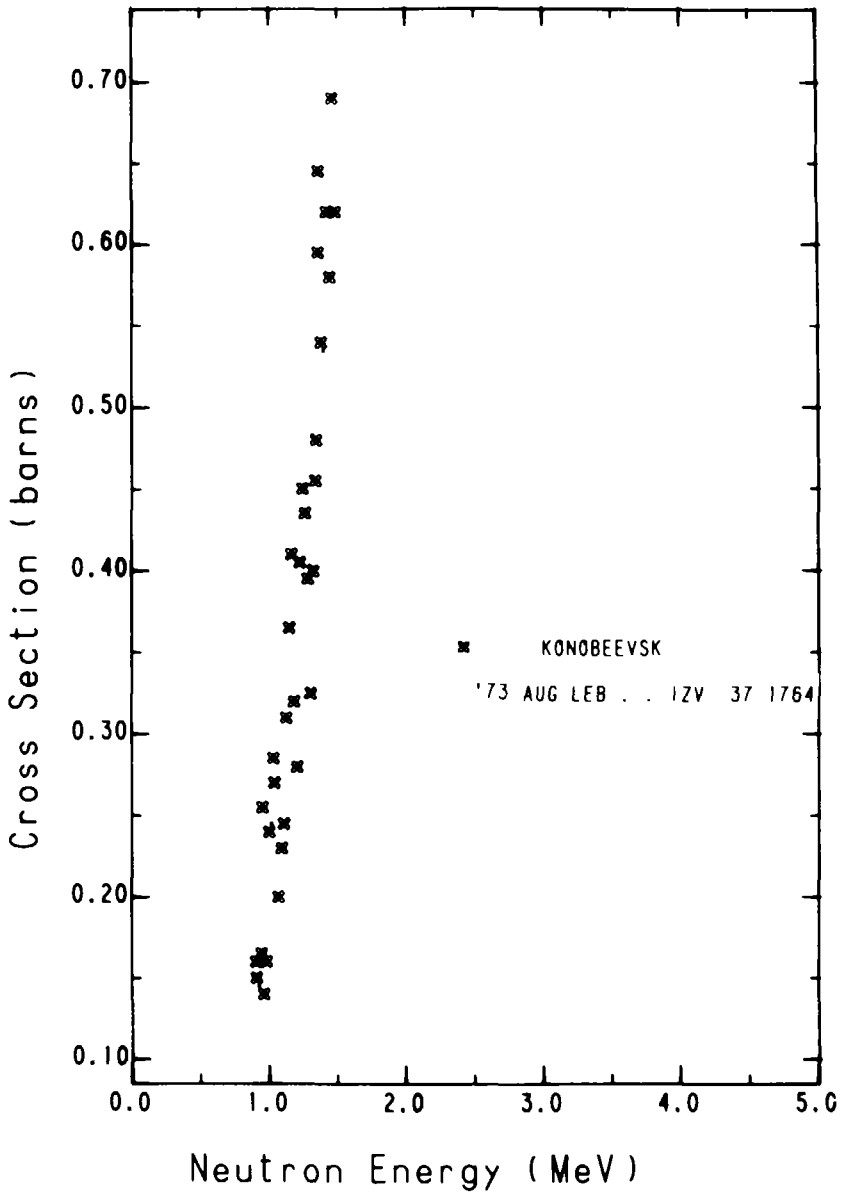
(n, 2n)


0.60
0.50
0.40
0.30
0.20
0.10
0.00
10.0
15.0
20.0
Cross Section (barns)
Neutron Energy (MeV)
ENDF/B-IV
'75 NOV BRC . . 75GAUSI BRC1

^{46}Ti

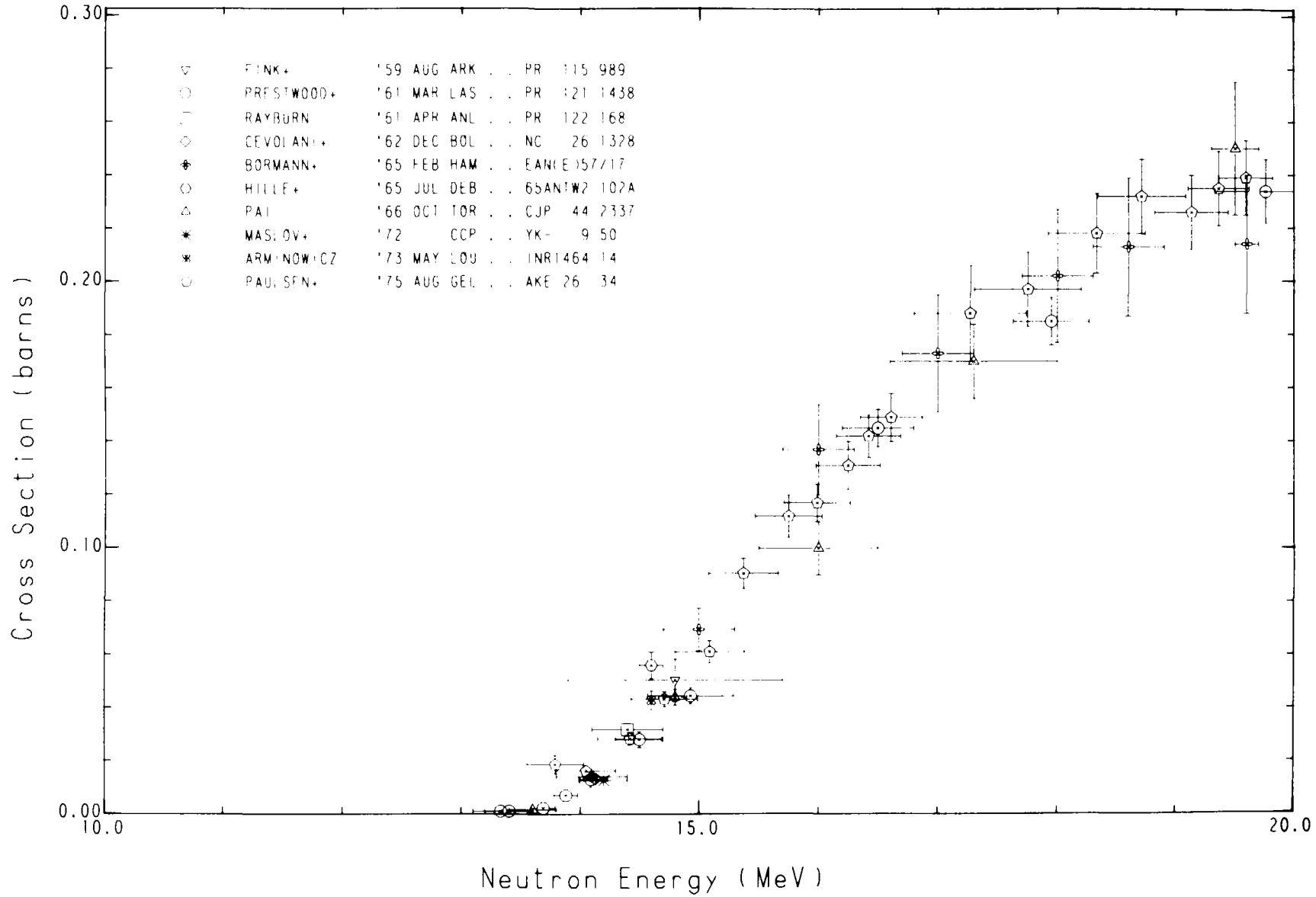
(n,n')

E_x=0.89 MeV



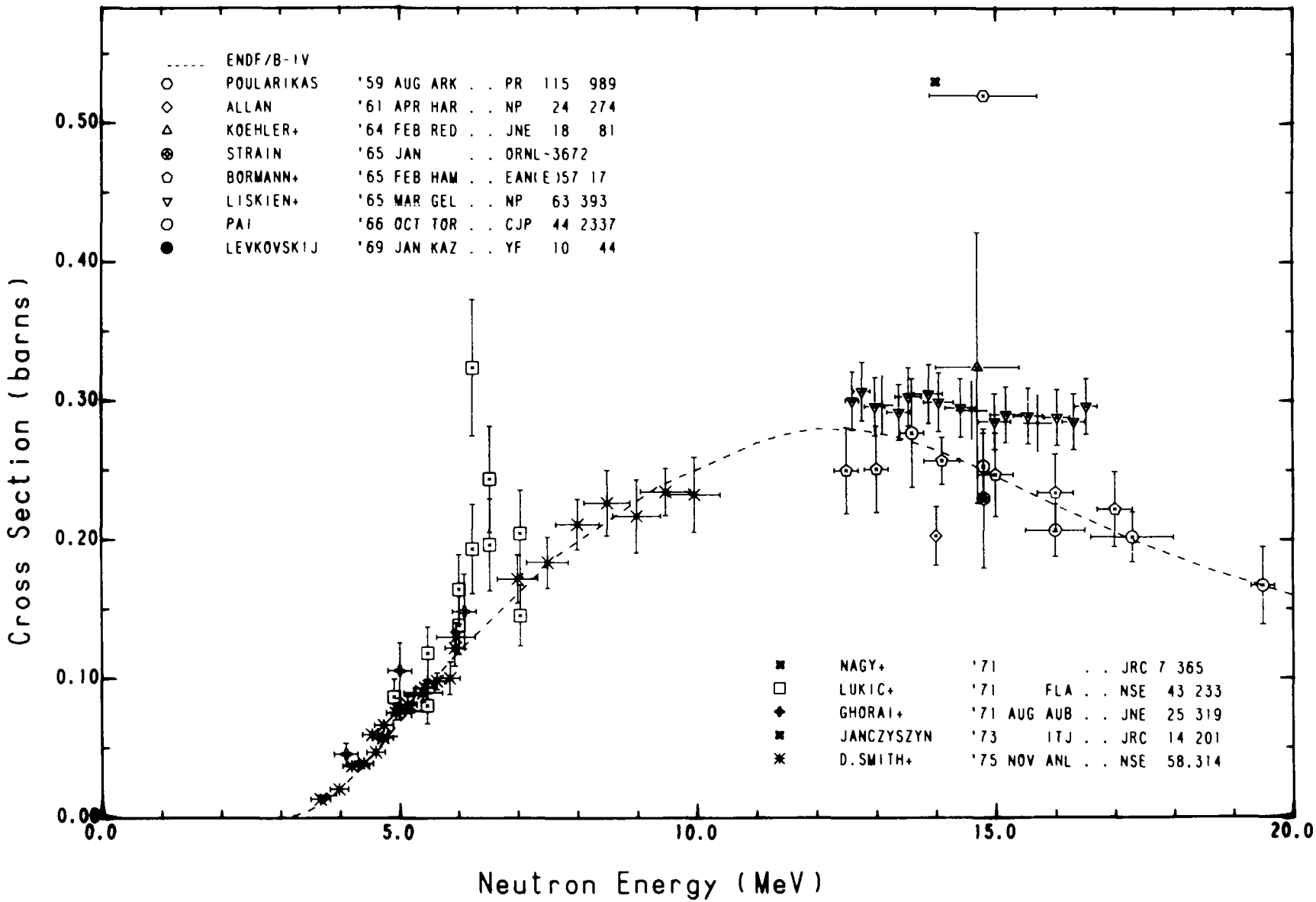
^{46}Ti

(n,2n)

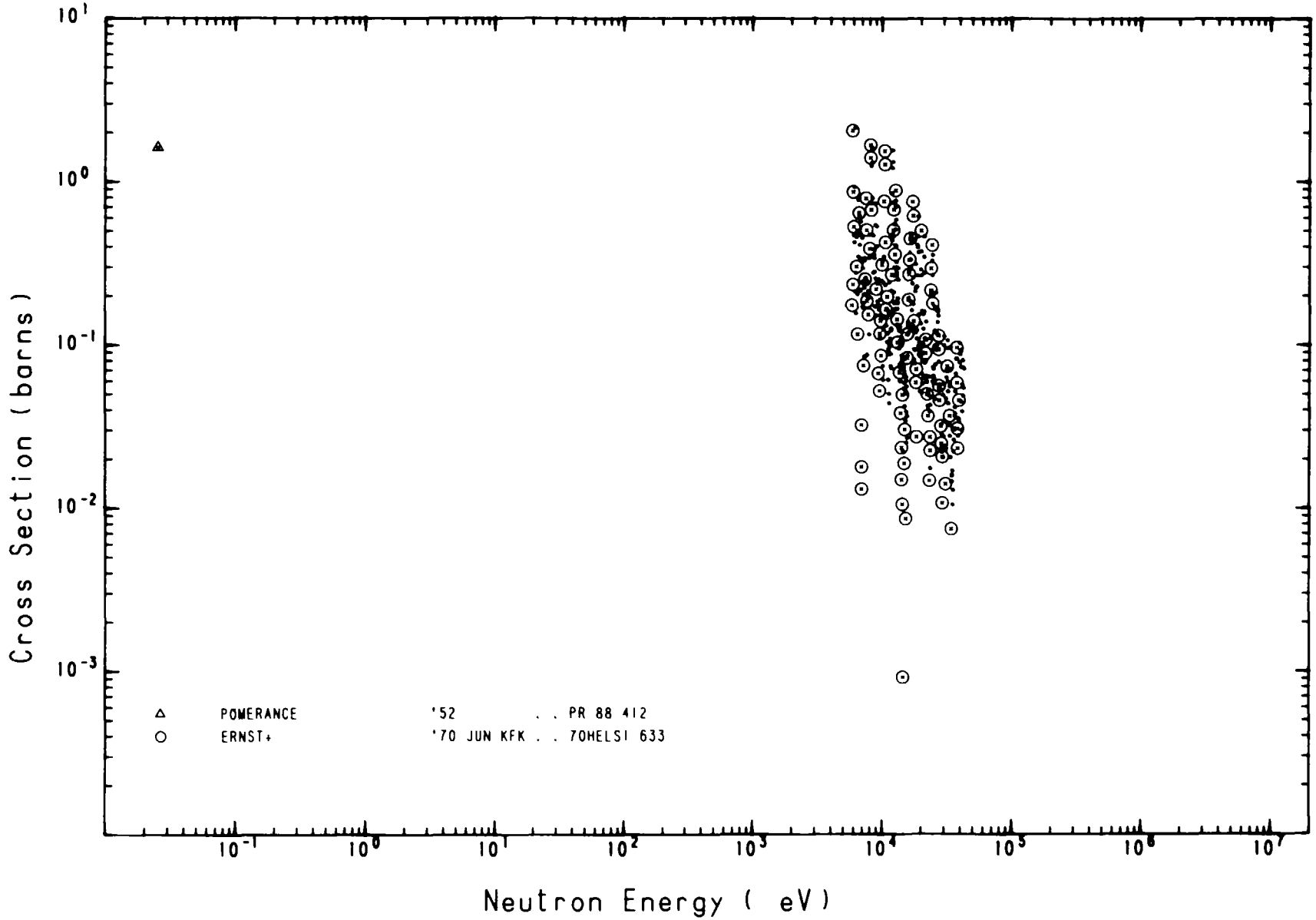

FINK+ '59 AUG ARK . . PR 115 989
PRESTWOOD+ '61 MAR LAS . . PR 121 1438
RAYBURN '61 APR ANL . . PR 122 168
CEVOLANI+ '62 DEC BOL . . NC 26 1328
BORMANN+ '65 FEB HAM . . EANDC(E)57/17
HILLE+ '65 JUL DEB . . 65ANTW2 102A
PAI '66 OCT TOR . . CJP 44 2337
MASLOV+ '72 CCP . . YK- 9 50
ARMONOWICZ '73 MAY LOU . . INR1464 14
PAULSEN+ '75 AUG GEL . . AKE 26 34
0.30
0.20
0.10
0.00
10.0
15.0
20.0
Cross Section (barns)
Neutron Energy (MeV)

^{46}Ti

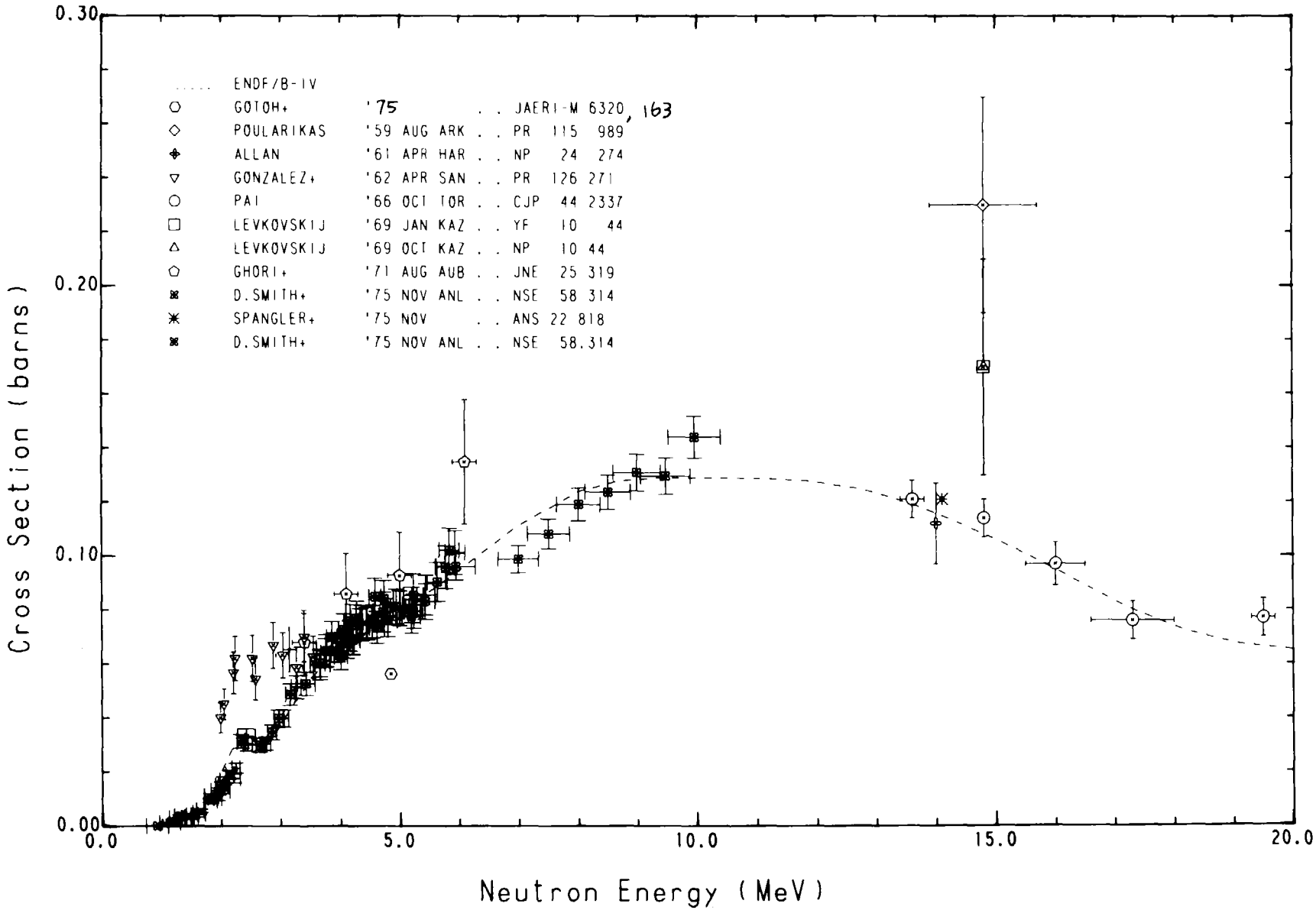
(n,p)


ENDF/B-IV
POULARIKAS '59 AUG ARK . . PR 115 989
ALLAN '61 APR HAR . . NP 24 274
KOEHLER+ '64 FEB RED . . JNE 18 81
STRAIN '65 JAN . . ORNL-3672
BORMANN+ '65 FEB HAM . . EANDC 57 17
LISKIEN+ '65 MAR GEL . . NP 63 393
PAI '66 OCT TOR . . CJP 44 2337
LEVKOVSKIJ '69 JAN KAZ . . YF 10 44
NAGY+ '71 . . JRC 7 365
LUKIC+ '71 FLA . . NSE 43 233
GHORAI+ '71 AUG AUB . . JNE 25 319
JANCZYSZYN '73 ITJ . . JRC 14 201
D.SMITH+ '75 NOV ANL . . NSE 58.314
Cross Section (barns)
0.00
0.10
0.20
0.30
0.40
0.50
0.0
5.0
10.0
15.0
20.0
Neutron Energy (MeV)

^{47}Ti
(n,γ)

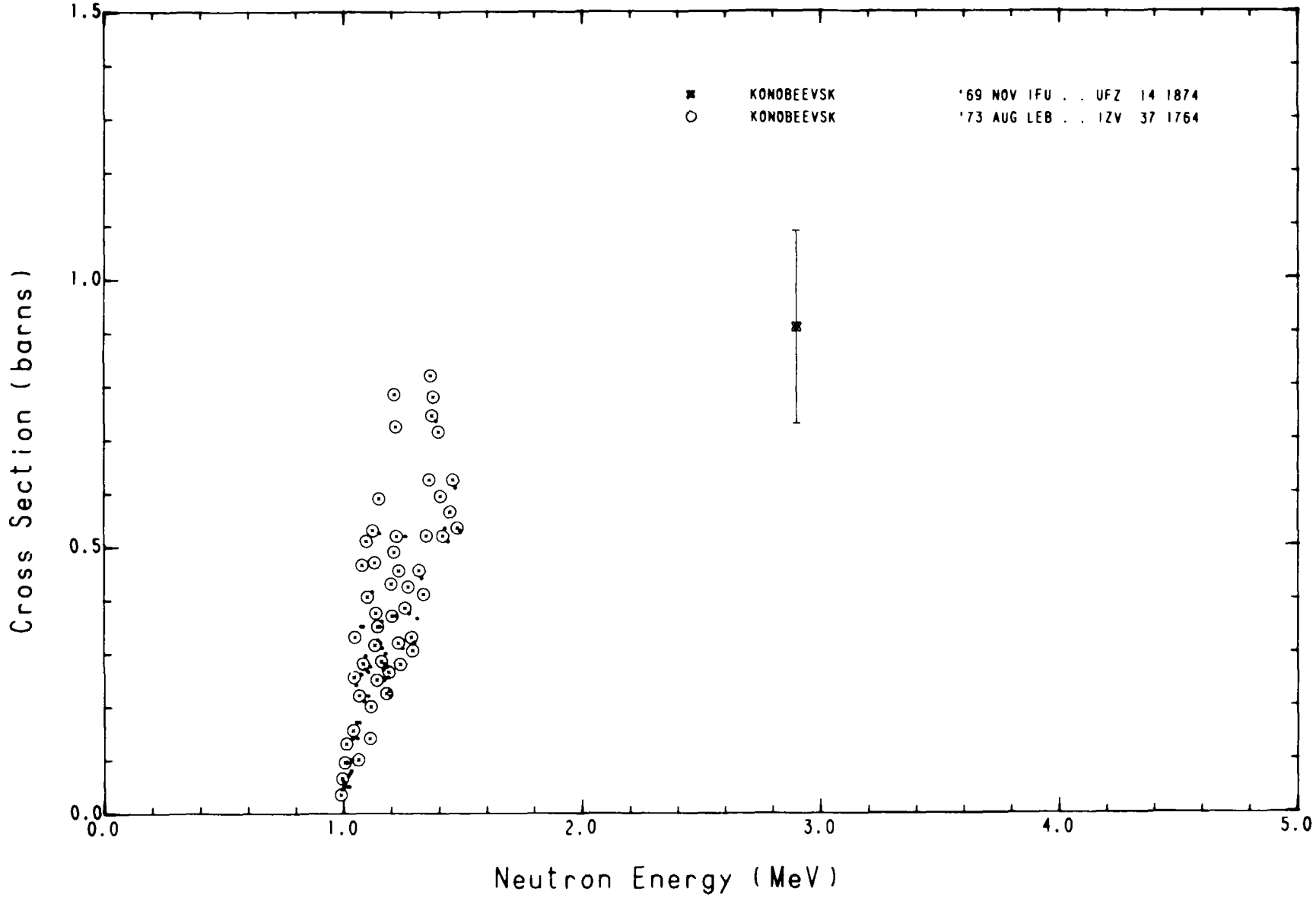

Cross Section (barns)
Neutron Energy (eV)
POMERANCE '52 . . PR 88 412
ERNST+ '70 JUN KFK . . 70HELSI 633

^{47}Ti
(n,p)


ENDF/B-IV
GOTOH+ '75 . . JAERI-M 6320, 163
POULARIKAS '59 AUG ARK . . PR 115 989
ALLAN '61 APR HAR . . NP 24 274
GONZALEZ+ '62 APR SAN . . PR 126 271
PAI '66 OCT TOR . . CJP 44 2337
LEVKOVSKIJ '69 JAN KAZ . . YF 10 44
LEVKOVSKIJ '69 OCT KAZ . . NP 10 44
GHORI+ '71 AUG AUB . . JNE 25 319
D.SMITH+ '75 NOV ANL . . NSE 58 314
SPANGLER+ '75 NOV . . ANS 22 818
D.SMITH+ '75 NOV ANL . . NSE 58.314
0.30
0.20
0.10
0.00
0.0
5.0
10.0
15.0
20.0
Cross Section (barns)
Neutron Energy (MeV)

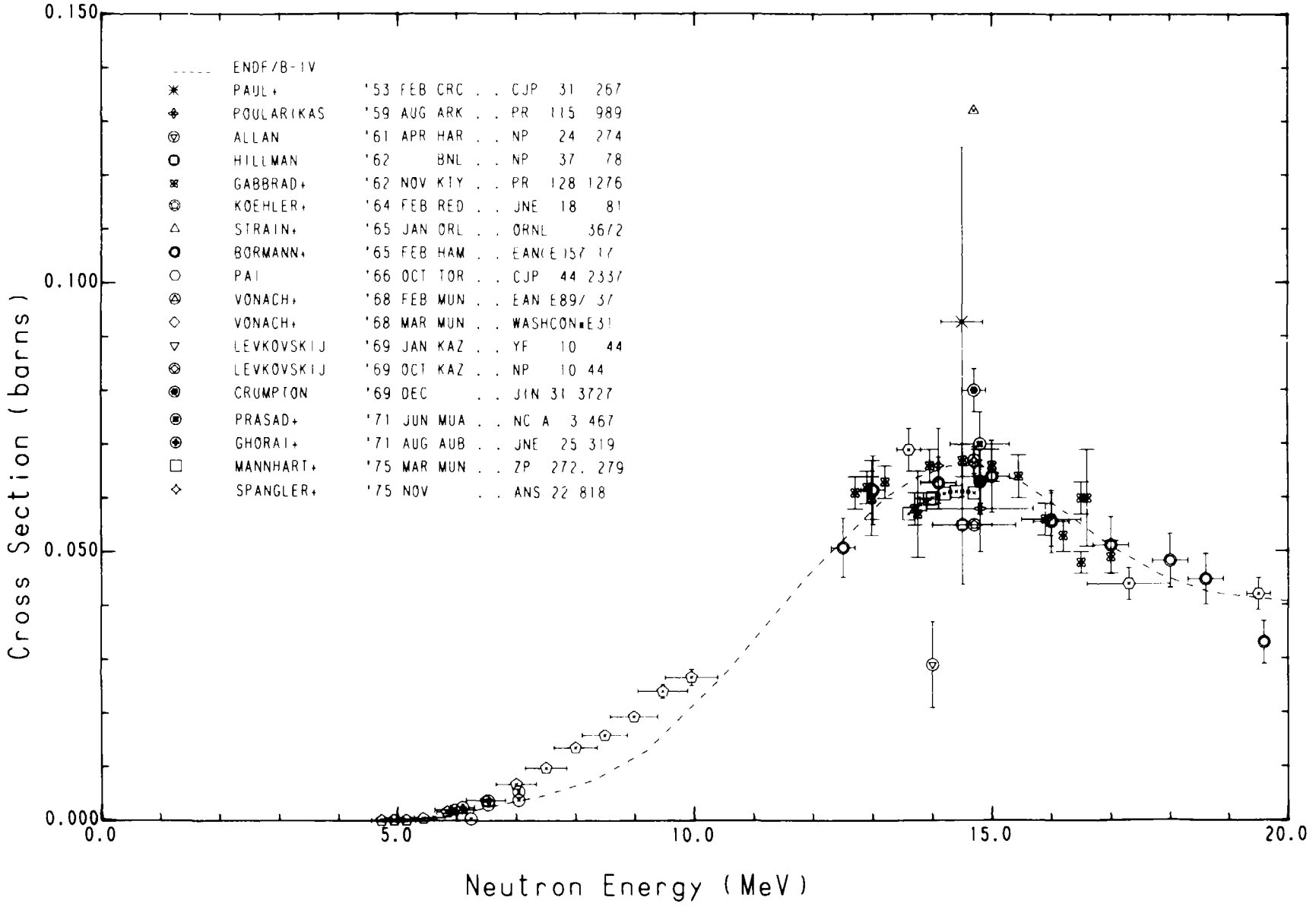
^{48}Ti
(n,n')

E_x=0.98 MeV

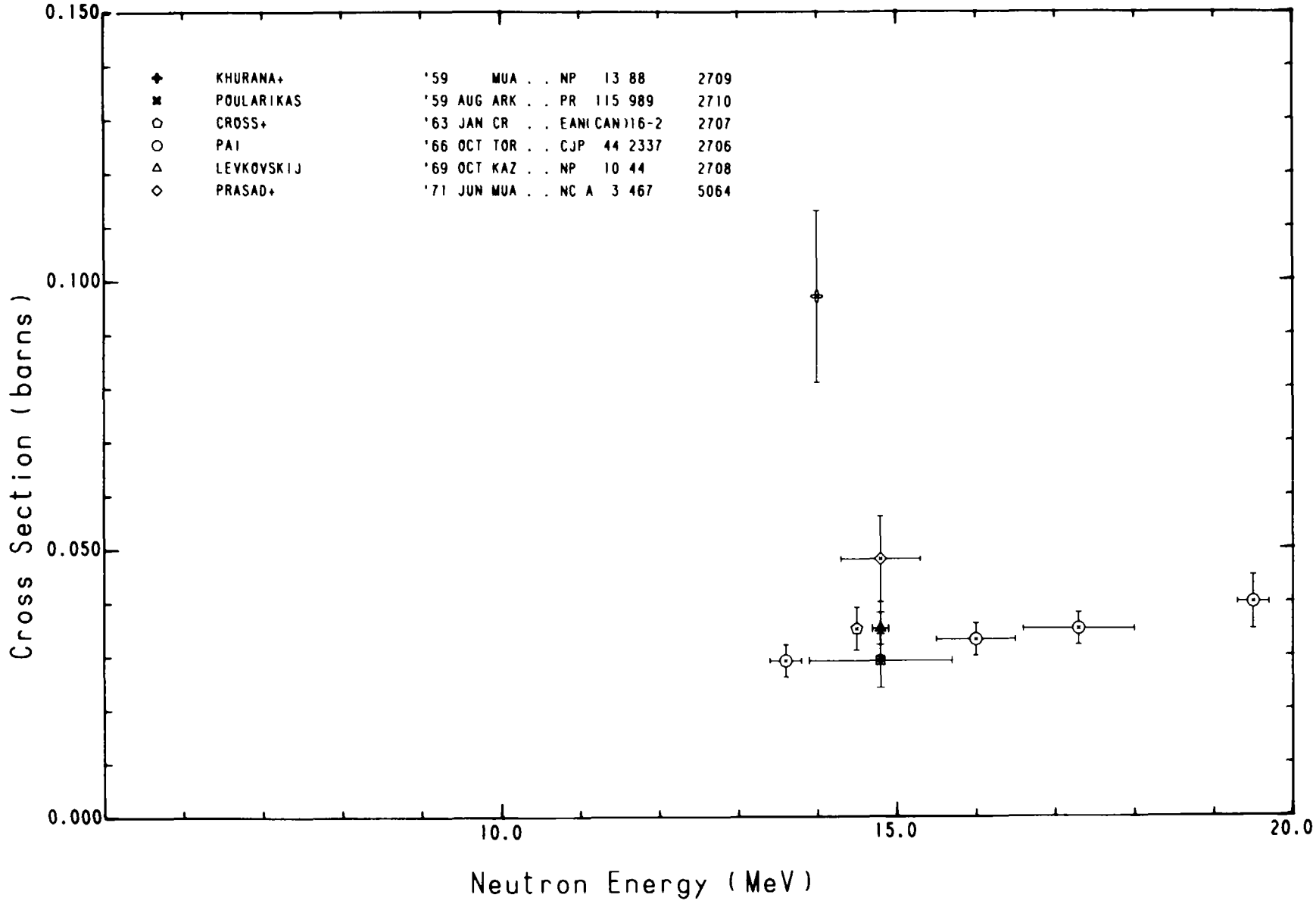


^{48}Ti

(n,p)

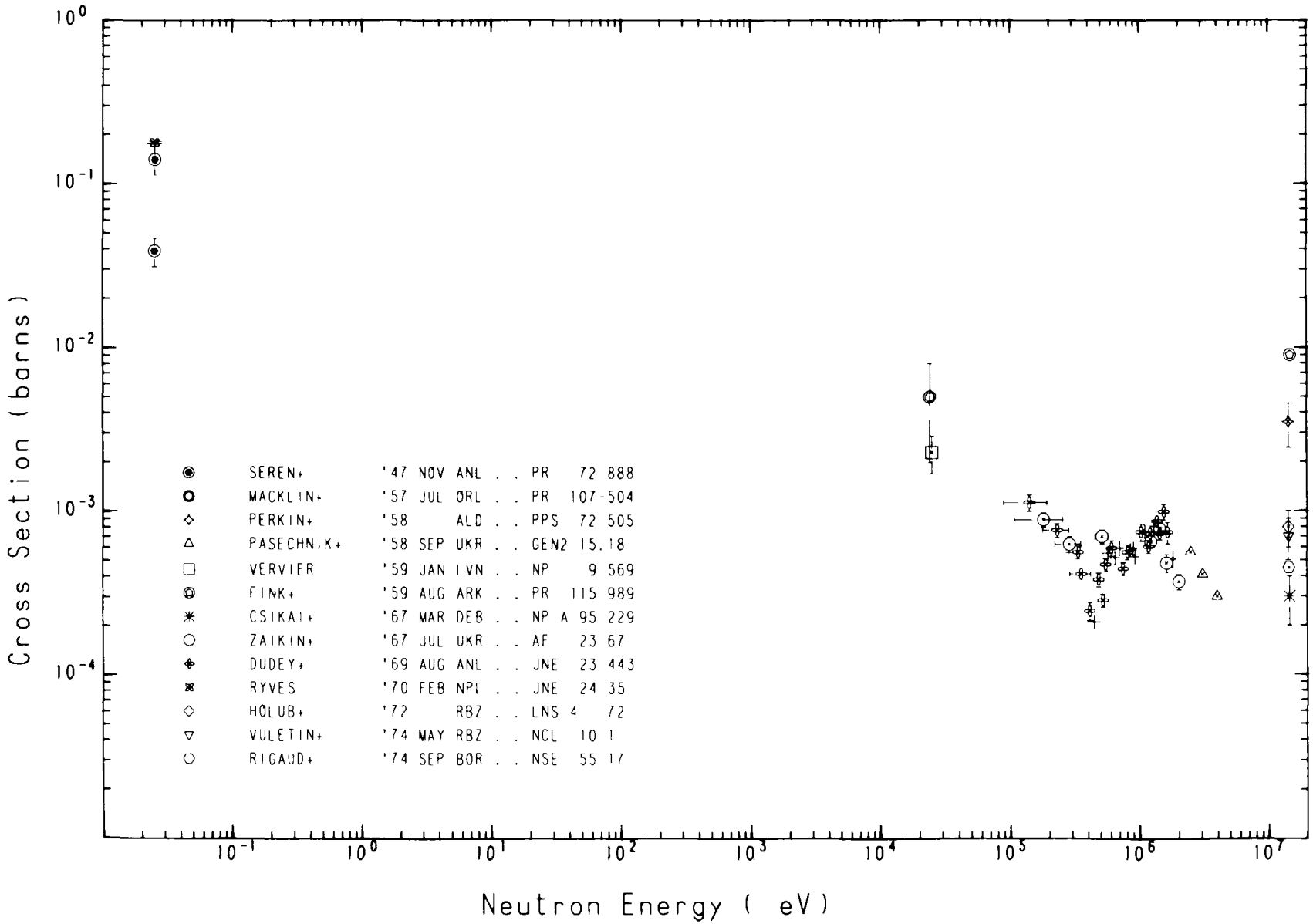

ENDF/B-IV
PAUL+ '53 FEB CRC . . CJP 31 267
POULARIKAS '59 AUG ARK . . PR 115 989
ALLAN '61 APR HAR . . NP 24 274
HILLMAN '62 BNL . . NP 37 78
GABBRAD+ '62 NOV KIY . . PR 128 1276
KOEHLER+ '64 FEB RED . . JNE 18 81
STRAIN+ '65 JAN ORL . . ORNL 3672
BORMANN+ '65 FEB HAM . . EAN(E)57 17
PAI '66 OCT TOR . . CJP 44 2337
VONACH+ '68 FEB MUN . . EAN E897 37
VONACH+ '68 MAR MUN . . WASHCON*E31
LEVKOVSKIJ '69 JAN KAZ . . YF 10 44
LEVKOVSKIJ '69 OCT KAZ . . NP 10 44
CRUMPTON '69 DEC . . JIN 31 3727
PRASAD+ '71 JUN MUA . . NC A 3 467
GHORAI+ '71 AUG AUB . . JNE 25 319
MANNHART+ '75 MAR MUN . . ZP 272. 279
SPANGLER+ '75 NOV . . ANS 22 818
Cross Section (barns)
0.150
0.100
0.050
0.000
0.0
5.0
10.0
15.0
20.0
Neutron Energy (MeV)

^{49}Ti
(n,p)


KHURANA+ '59 MUA . . NP 13 88 2709
POULARIKAS '59 AUG ARK . . PR 115 989 2710
CROSS+ '63 JAN CR . . EANI CAN 116-2 2707
PAI '66 OCT TOR . . CJP 44 2337 2706
LEVKOVSKIJ '69 OCT KAZ . . NP 10 44 2708
PRASAD+ '71 JUN MUA . . NC A 3 467 5064
0.150
0.100
0.050
0.000
10.0
15.0
20.0
Cross Section (barns)
Neutron Energy (MeV)

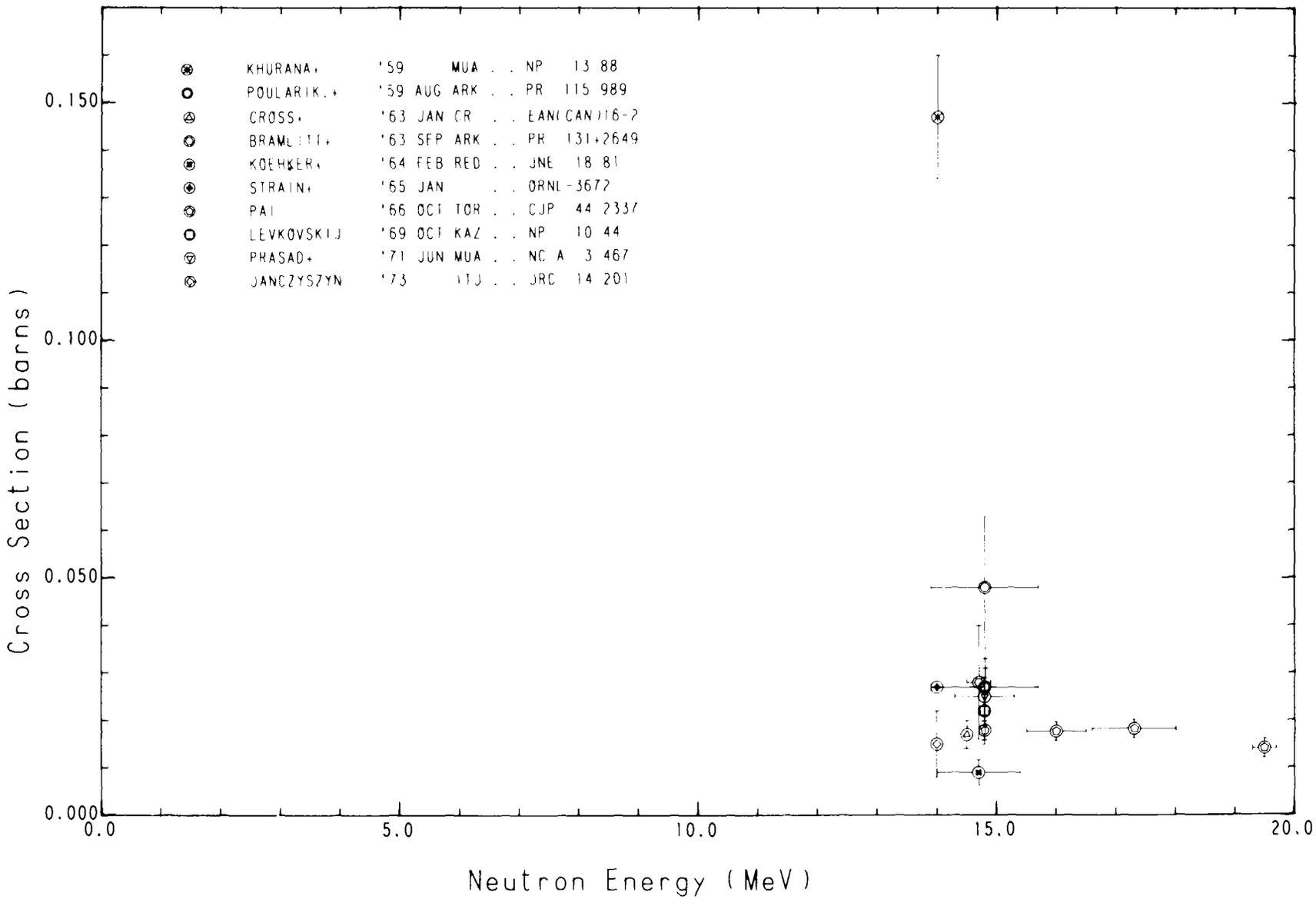
^{50}Ti

(n, γ)


Cross Section (barns)
Neutron Energy (eV)
SEREN+ '47 NOV ANL . . PR 72 888
MACKLIN+ '57 JUL ORL . . PR 107-504
PERKIN+ '58 ALD . . PPS 72 505
PASECHNIK+ '58 SEP UKR . . GEN2 15.18
VERVIER '59 JAN LVN . . NP 9 569
FINK+ '59 AUG ARK . . PR 115 989
CSIKAI+ '67 MAR DEB . . NP A 95 229
ZAIKIN+ '67 JUL UKR . . AE 23 67
DUDEY+ '69 AUG ANL . . JNE 23 443
RYVES '70 FEB NPL . . JNE 24 35
HOLUB+ '72 RBZ . . LNS 4 72
VULETIN+ '74 MAY RBZ . . NCL 10 1
RIGAUD+ '74 SEP BOR . . NSE 55 17

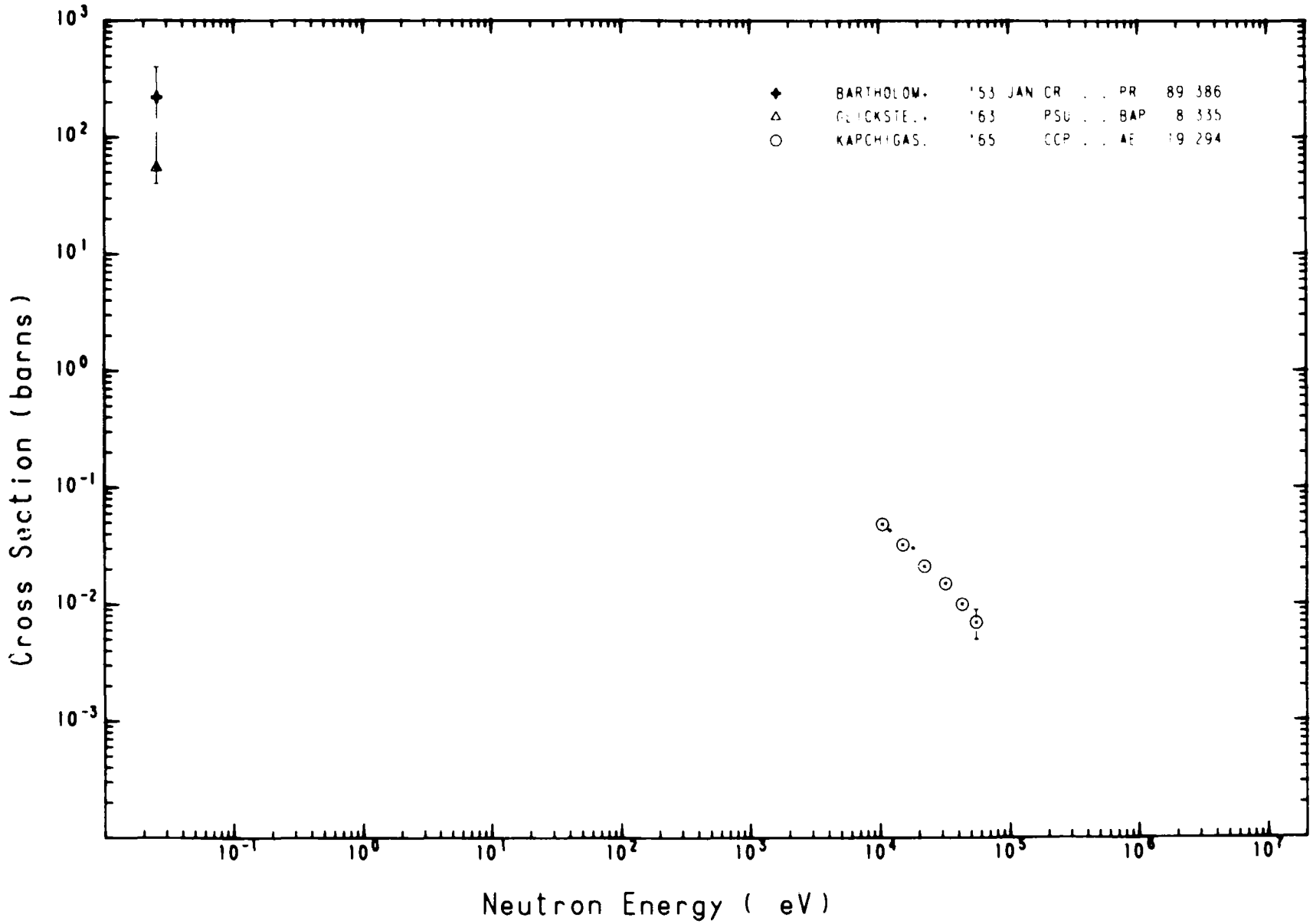
^{50}Ti

(n,p)


KHURANA+ '59 MUA . . NP 13 88
POULARIK.+ '59 AUG ARK . . PR 115 989
CROSS+ '63 JAN CR . . EANDCAN116-2
BRAMLITT+ '63 SEP ARK . . PR 131+2649
KOEHLER+ '64 FEB RED . . JNE 18 81
STRAIN+ '65 JAN . . ORNL-3672
PAI '66 OCT TOR . . CJP 44 2337
LEVKOVSKIJ '69 OCT KAZ . . NP 10 44
PRASAD+ '71 JUN MUA . . NC A 3 467
JANCZYSZYN '73 ITJ . . JRC 14 201
0.150
0.100
0.050
0.000
0.0
5.0
10.0
15.0
20.0
Cross Section (barns)
Neutron Energy (MeV)

^{50}V

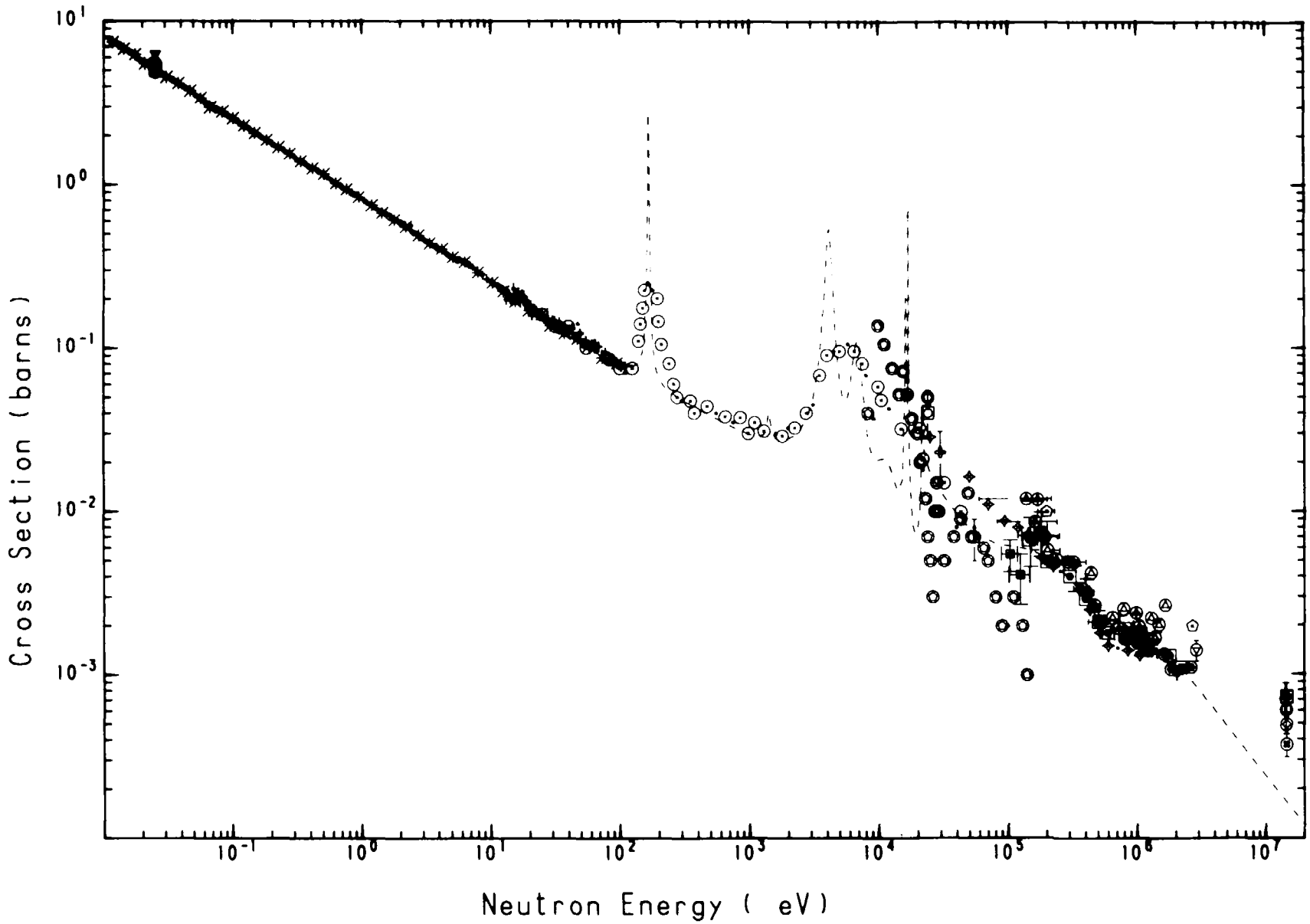
(n,γ)


BARTHOLOM. '53 JAN CR . . PR 89 386
GLICKSTE.. '63 PSU . . BAP 8 335
KAPCHIGAS. '65 CCP . . AE 19 294
Cross Section (barns)
Neutron Energy (eV)

.....	ENDF/B-IV							
●	HUGHES+	'49	JUN	ANL	. .	PR	75	1781
O	MACKLIN+	'57	JUL	ORL	. .	PR	107	-504
⬠	LEIPUNSKI+	'58		CCP	. .	GEN2	15/50	
○	KONONOV+	'58		CCP	. .	AE	5	564
⬠	LEIPUNSKI+	'58		CCP	. .	GEN2	15	-50
⊛	LYON+	'59	JUN	ORL	. .	PR	114	1619
▣	BARSCHALL+	'59	NOV	WIS	. .	PR	116	-927
✧	STAVISSKI+	'60	NOV	CCP	. .	AE	9	-401
▽	STEFANESC+	'61		BUC	. .	61BUCAR	553	
O	GIBBONS	'61		ORL	. .	GIBBONS	61	
O	GLICKSTEIN	'63		PSU	. .	BAP	8/335	
✦	MACKLIN+	'63	MAR	ORL	. .	PR	129	+2695
○	KAPCHIGASH	'65		CCP	. .	AE	19	294
△	CVELBAR+	'66	OCT	NJS	. .	NIM	44	292
⊡	CHAUBEY+	'66	DEC	MUA	. .	PR	152	1055
⊗	CSIKAI+	'67	MAR	DEB	. .	NP A	95	229
✖	MACKLIN+	'67	JUL	ORL	. .	PR	159	1007
●	ZAIKIN+	'67	JUL	UKR	. .	AE	23	67
⊜	COLDITZ+	'68	JUN	IRK	. .	OSA	105	236
⊡	CVELBAR+	'69			. .	NP A	130	401
⊛	DUDEY+	'69	AUG	ANL	. .	JNE	23	443
□	CEULMANS+	'70	JUN	MOL	. .	70HELSI	461	
⊕	RYVES+	'70	NOV	NPL	. .	JNE	24	419
O	KANTELE+	'72	MAY	JYV	. .	PL	B39	625
✳	WIDDER	'72	JUN	WUR	. .	EIR-217		
◇	DILG+	'74	FEB	MUN	. .	ZP	266	157
⊙	RIGAUD+	'74	SEP	BOR	. .	NSE	55	17
⊠	SCHERER+	'76			. .	NP A	264	105

^{51}V

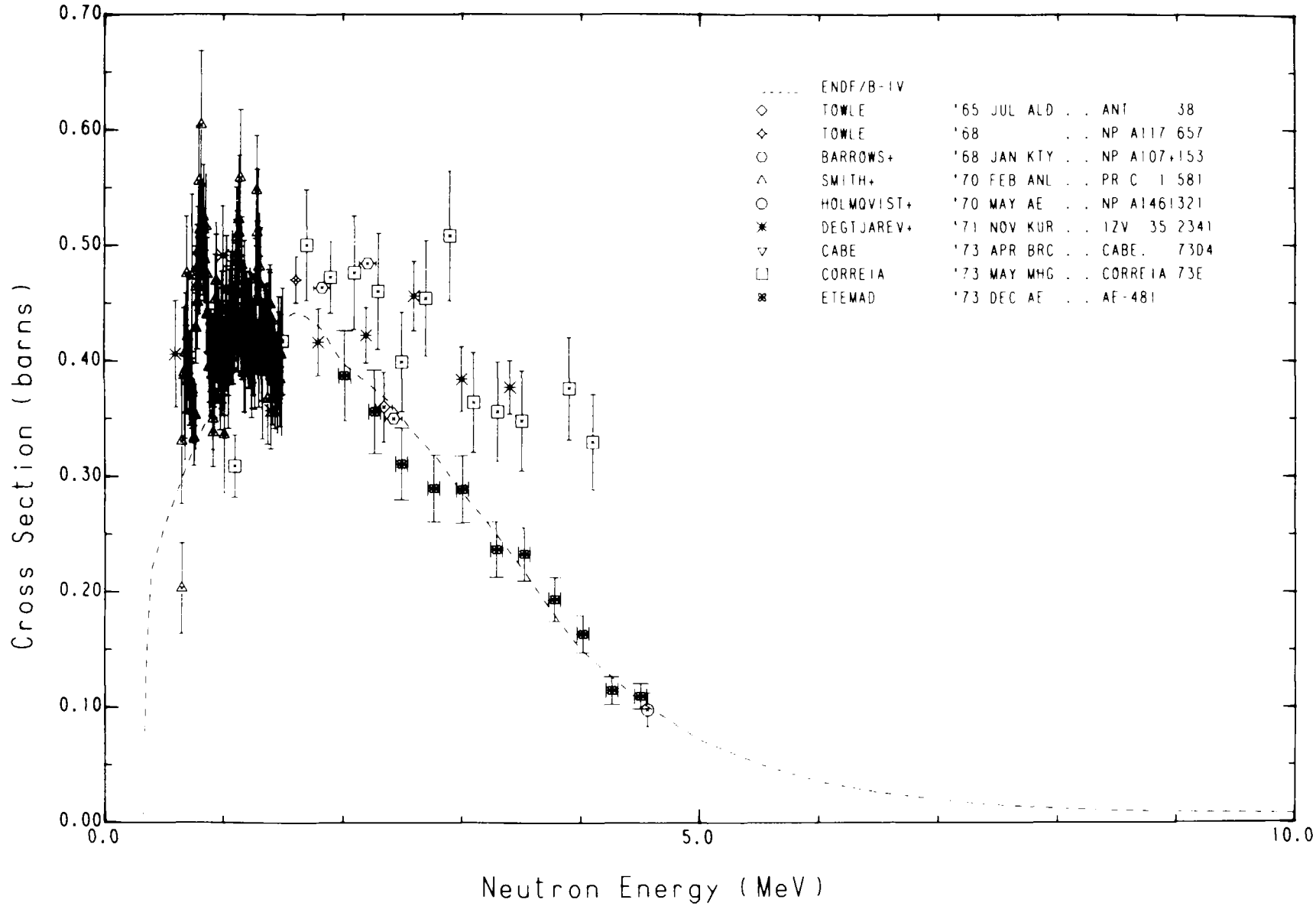
(n, γ)


Cross Section (barns)
Neutron Energy (eV)
10^{1}
10^{0}
10^{-1}
10^{-2}
10^{-3}
10^{-1}
10^{0}
10^{1}
10^{2}
10^{3}
10^{4}
10^{5}
10^{6}
10^{7}

^{51}V

(n,n')

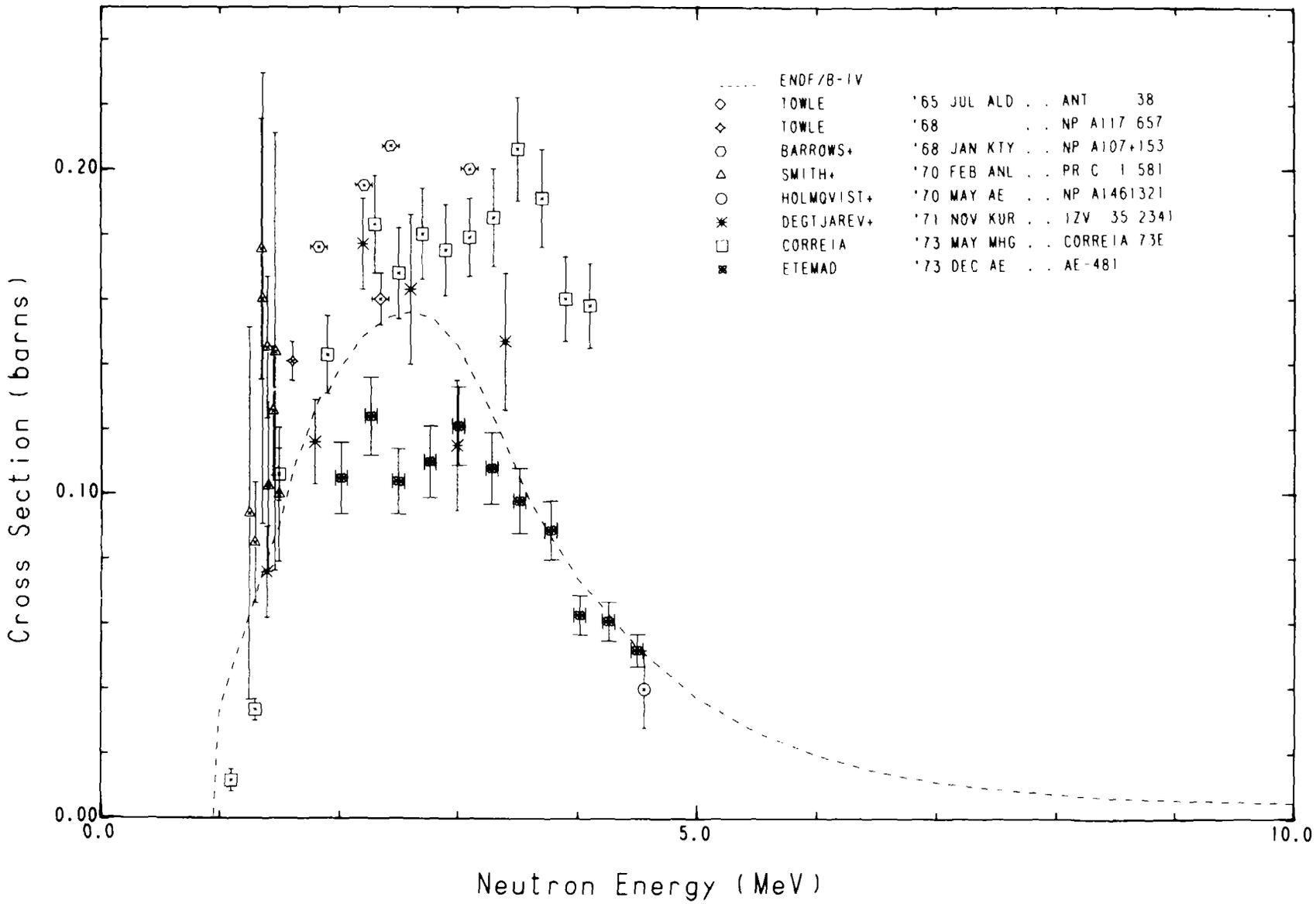
E_x=0.3198 MeV



^{51}V

(n,n')

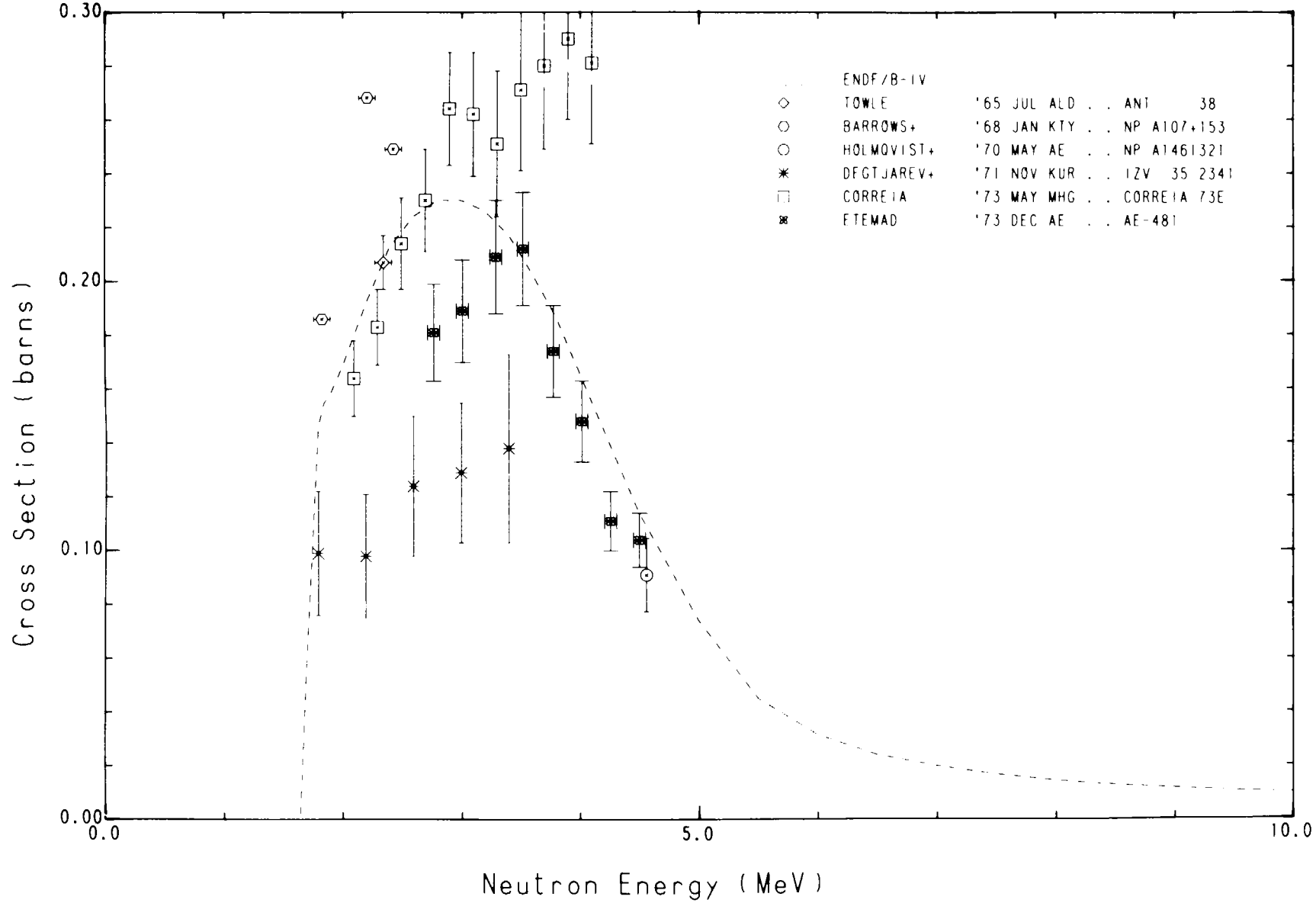
E_x=0.930 MeV



^{51}V

(n,n')

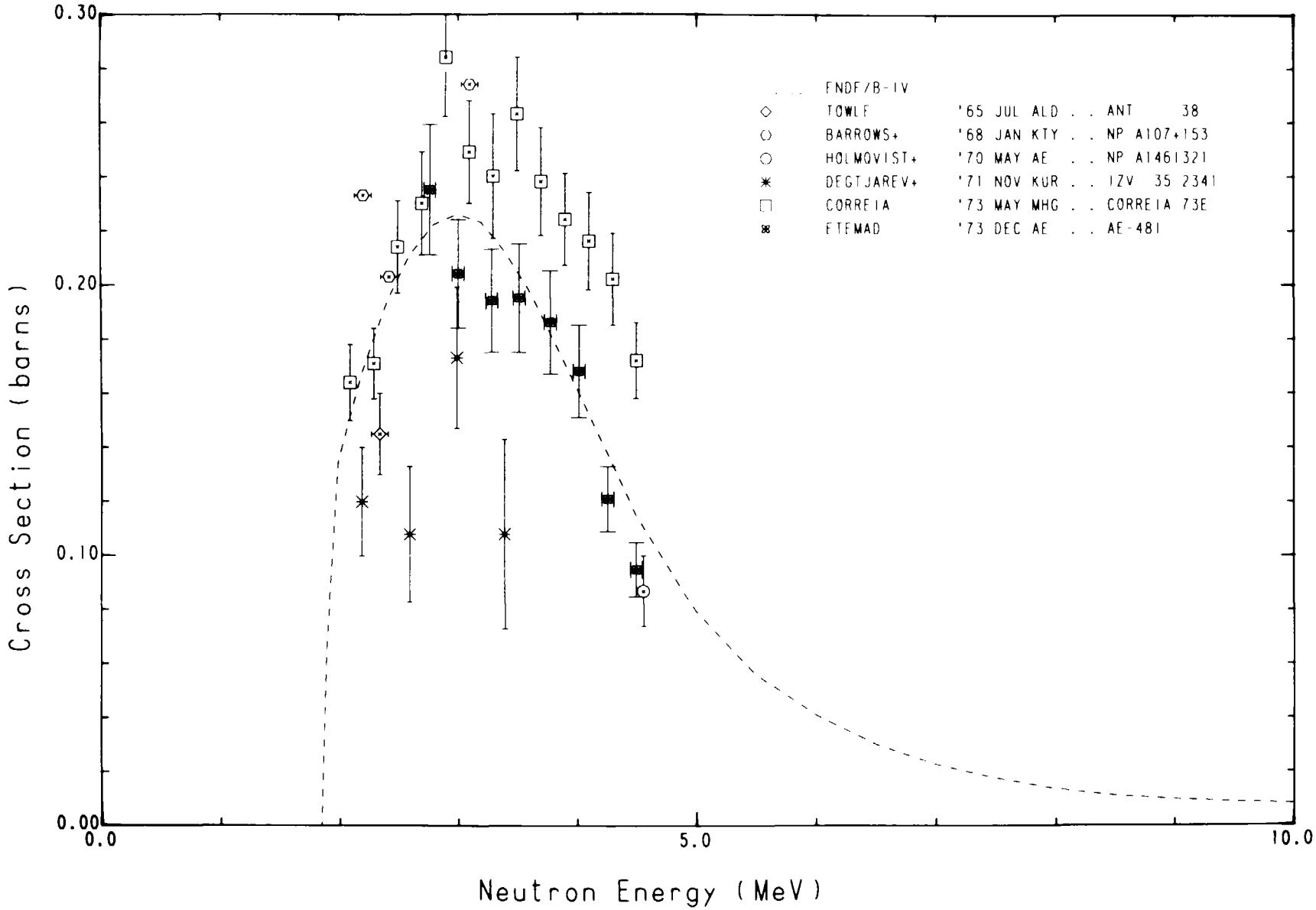
E_x=1.609 MeV



^{51}V

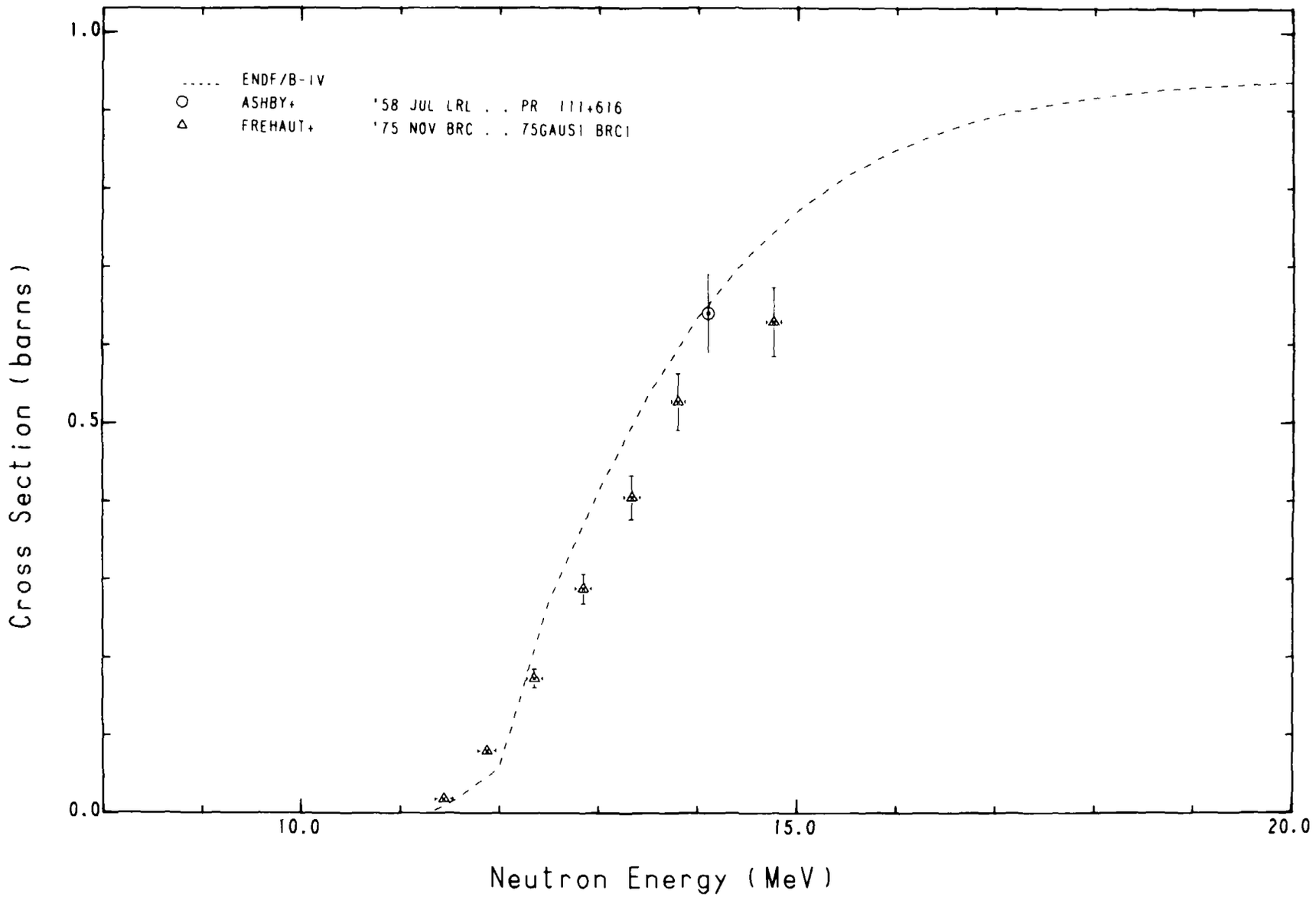
(n,n')

E_x=1.81 MeV



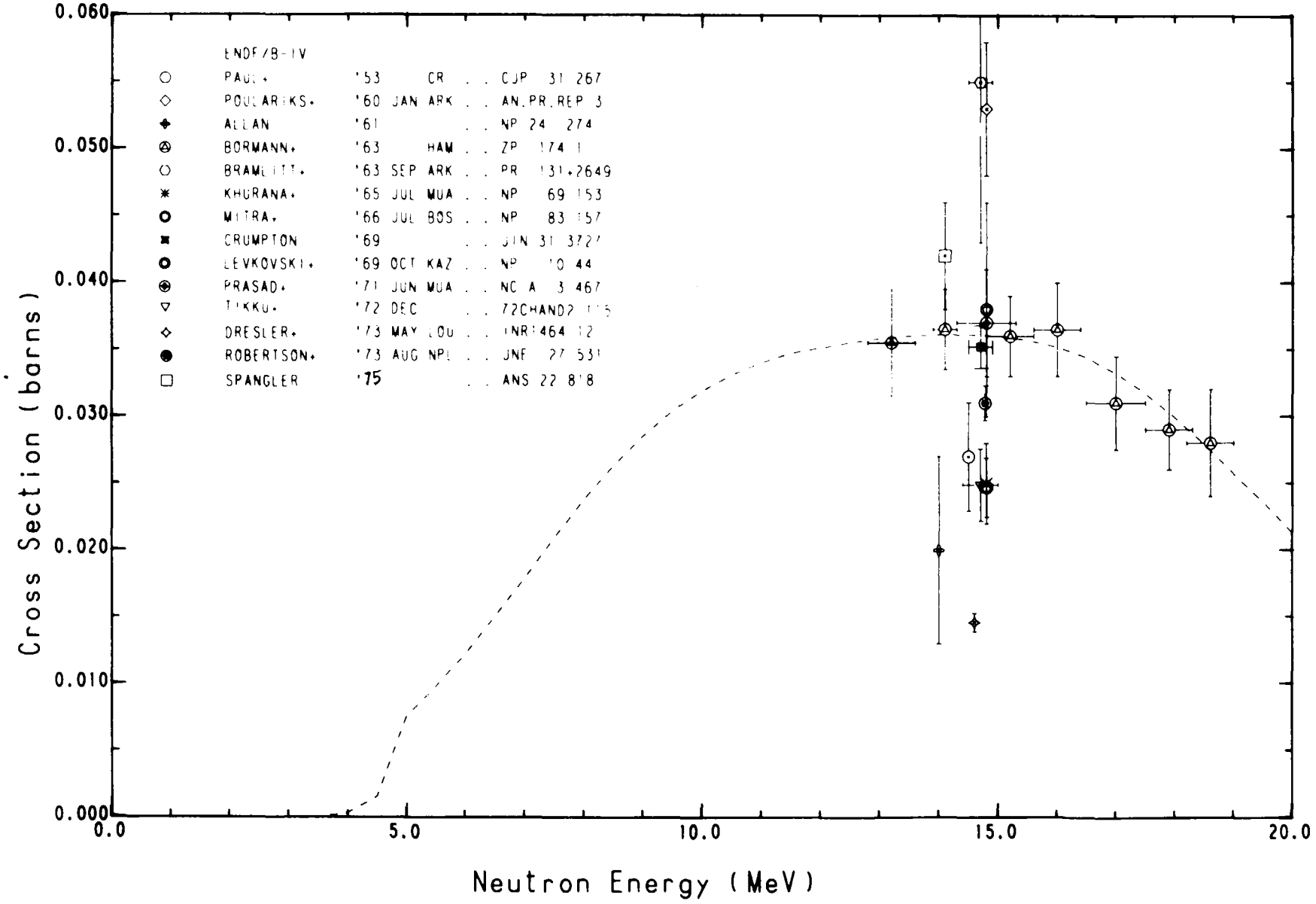
^{51}V

(n,2n)

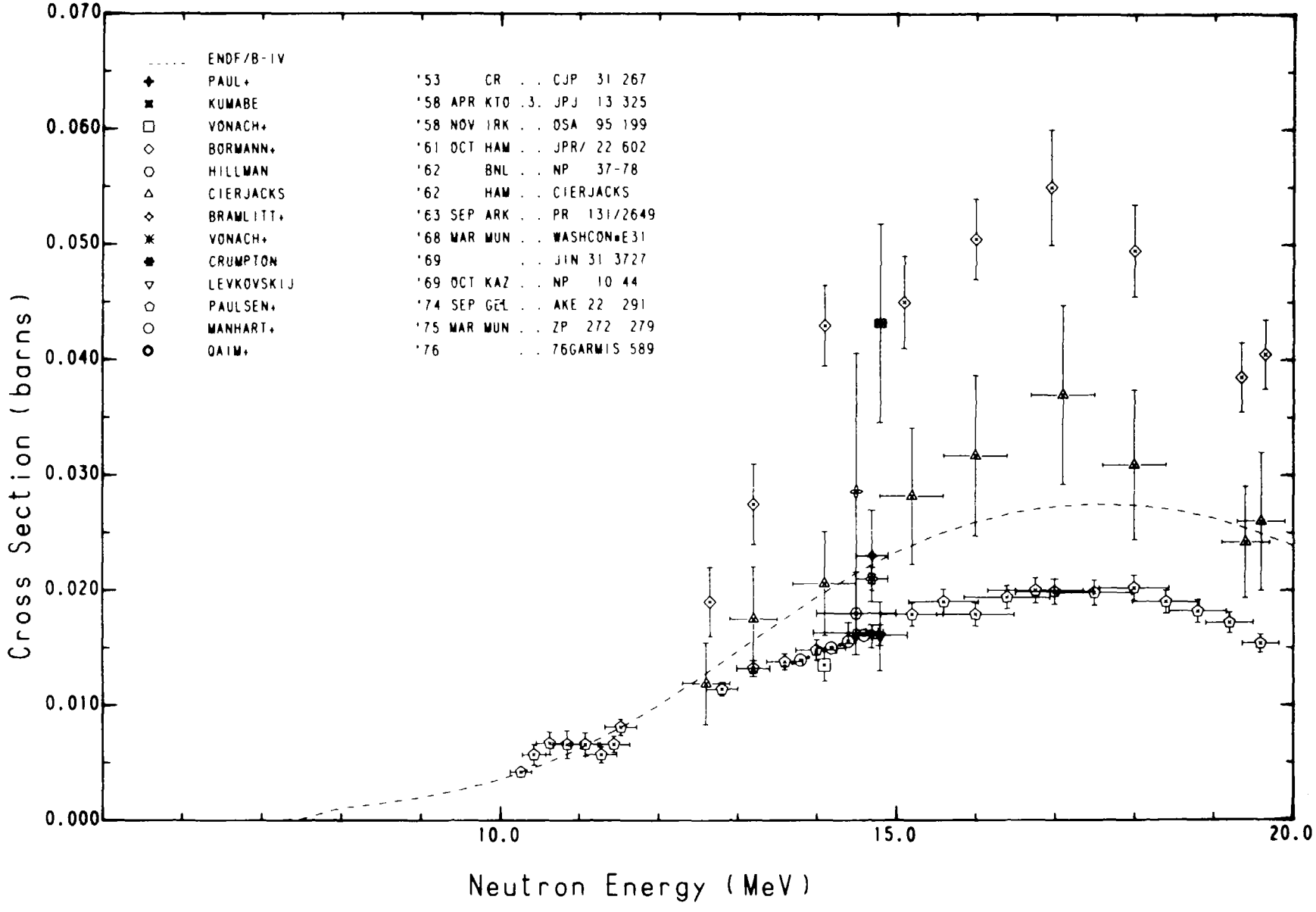

ENDF/B-IV
ASHBY+ '58 JUL LRL . . PR 111+616
FREHAUT+ '75 NOV BRC . . 75GAUSI BRCI
1.0
0.5
0.0
10.0
15.0
20.0
Cross Section (barns)
Neutron Energy (MeV)

^{51}V

(n,p)

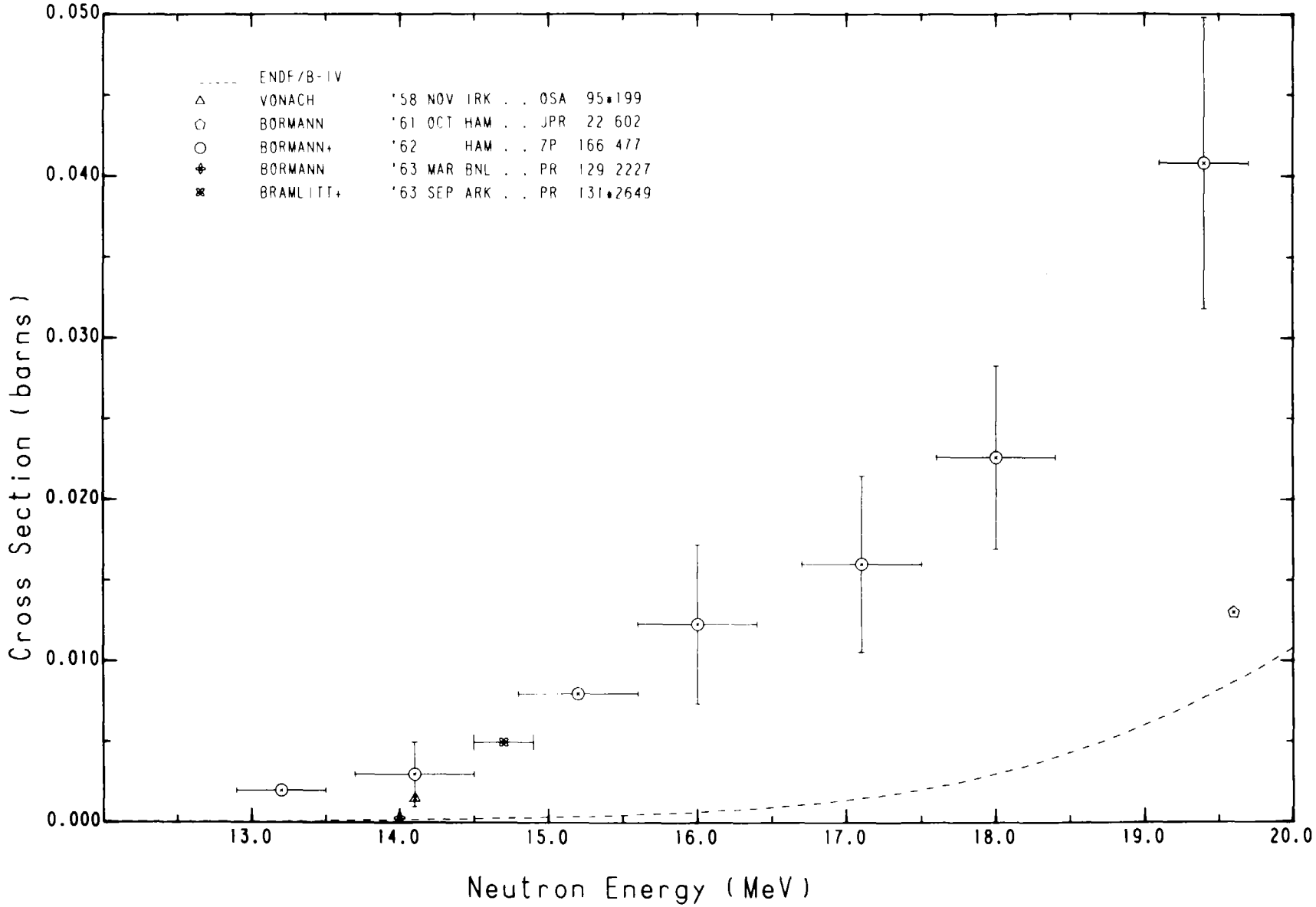

ENDF/B-IV
PAUL+ '53 CR . . CJP 31 267
POULARIKS+ '60 JAN ARK . . AN.PR.REP 3
ALLAN '61 . . NP 24 274
BORMANN+ '63 HAM . . ZP 174 1
BRAMLITT+ '63 SEP ARK . . PR 131+2649
KHURANA+ '65 JUL MUA . . NP 69 153
MITRA+ '66 JUL BOS . . NP 83 157
CRUMPTON '69 . . JIN 31 3727
LEVKOVSKI+ '69 OCT KAZ . . NP 10 44
PRASAD+ '71 JUN MUA . . NC A 3 467
TIKKU+ '72 DEC . . 72CHAND2 115
DRESLER+ '73 MAY LOU . . INR 464 12
ROBERTSON+ '73 AUG NPL . . JNE 27 531
SPANGLER '75 . . ANS 22 818
Cross Section (barns)
0.000
0.010
0.020
0.030
0.040
0.050
0.060
0.0
5.0
10.0
15.0
20.0
Neutron Energy (MeV)

^{51}V
(n,α)

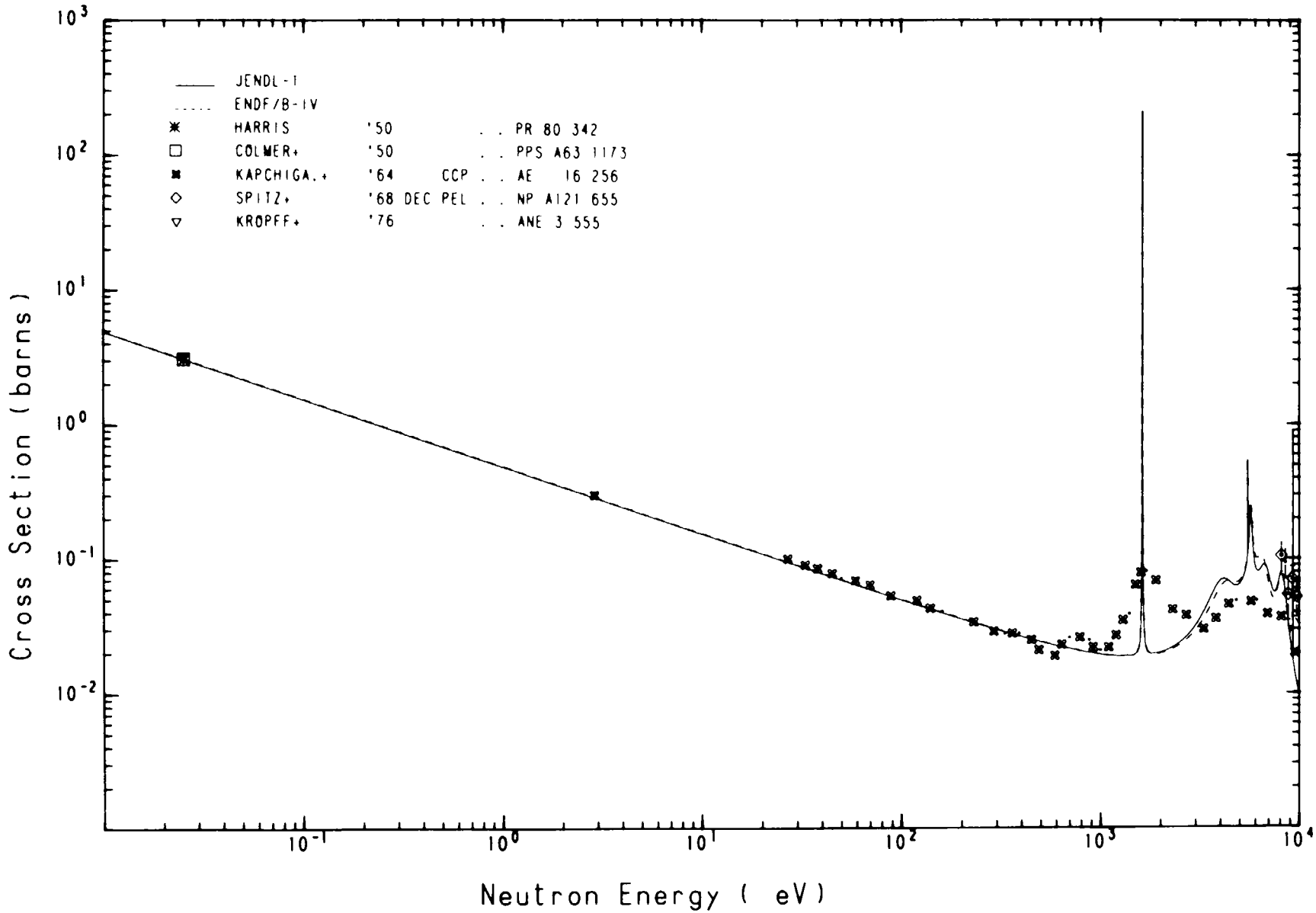

ENDF/B-IV
PAUL+ '53 CR . . CJP 31 267
KUMABE '58 APR KTO .3. JPJ 13 325
VONACH+ '58 NOV IRK . . OSA 95 199
BORMANN+ '61 OCT HAM . . JPR/ 22 602
HILLMAN '62 BNL . . NP 37-78
CIERJACKS '62 HAM . . CIERJACKS
BRAMLITT+ '63 SEP ARK . . PR 131/2649
VONACH+ '68 MAR MUN . . WASHCON•E31
CRUMPTON '69 . . JIN 31 3727
LEVKOVSKIJ '69 OCT KAZ . . NP 10 44
PAULSEN+ '74 SEP GEL . . AKE 22 291
MANHART+ '75 MAR MUN . . ZP 272 279
QAIM+ '76 . . 76GARMIS 589
Cross Section (barns)
0.000
0.010
0.020
0.030
0.040
0.050
0.060
0.070
10.0
15.0
20.0
Neutron Energy (MeV)

^{51}V

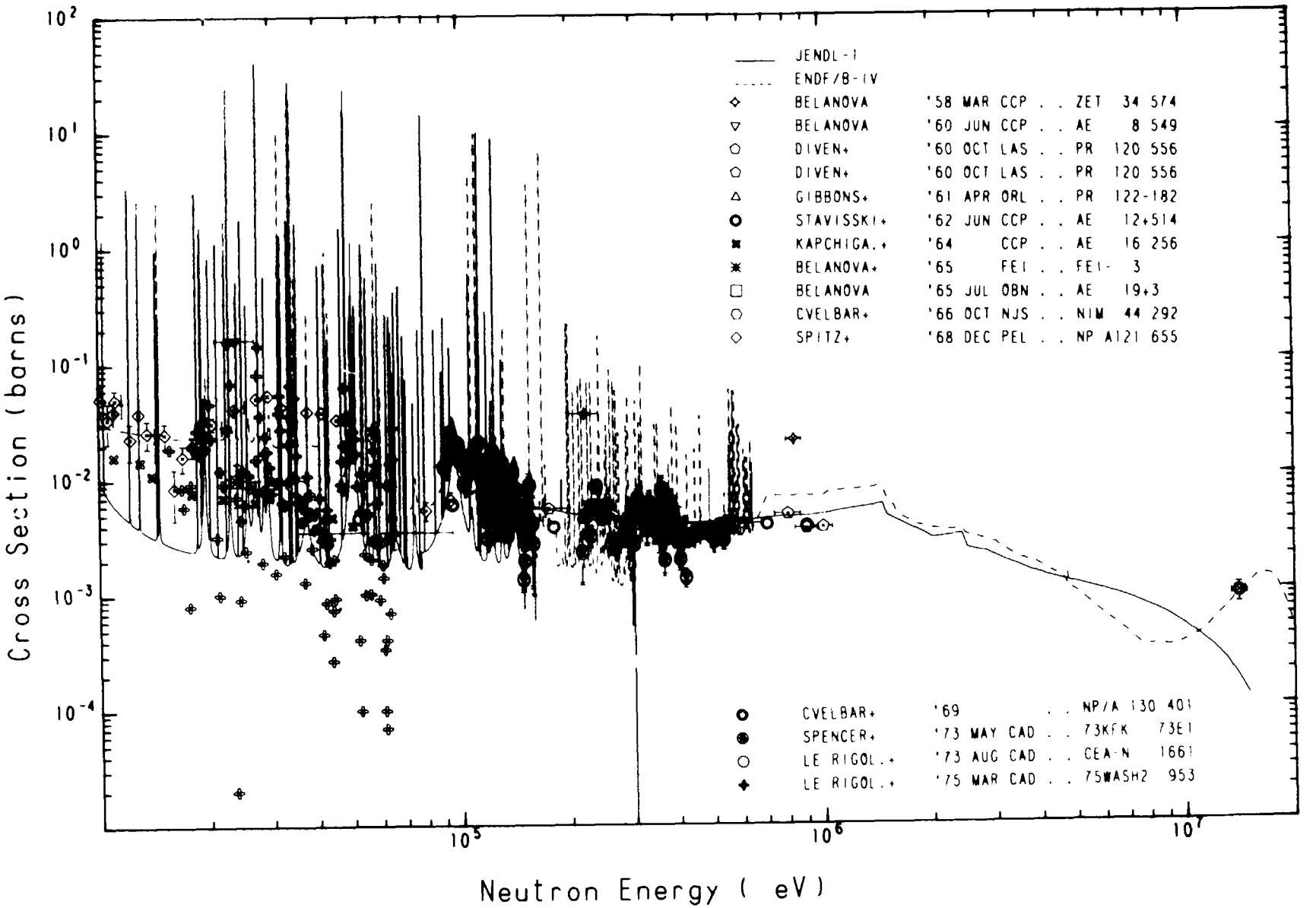
(n,n'α)


ENDF/B-IV
VONACH '58 NOV IRK . . OSA 95•199
BORMANN '61 OCT HAM . . JPR 22 602
BORMANN+ '62 HAM . . ZP 166 477
BORMANN '63 MAR BNL . . PR 129 2227
BRAMLITT+ '63 SEP ARK . . PR 131•2649
0.050
0.040
0.030
0.020
0.010
0.000
Cross Section (barns)
13.0
14.0
15.0
16.0
17.0
18.0
19.0
20.0
Neutron Energy (MeV)

$_{24}$Cr
(n,γ)
(1)

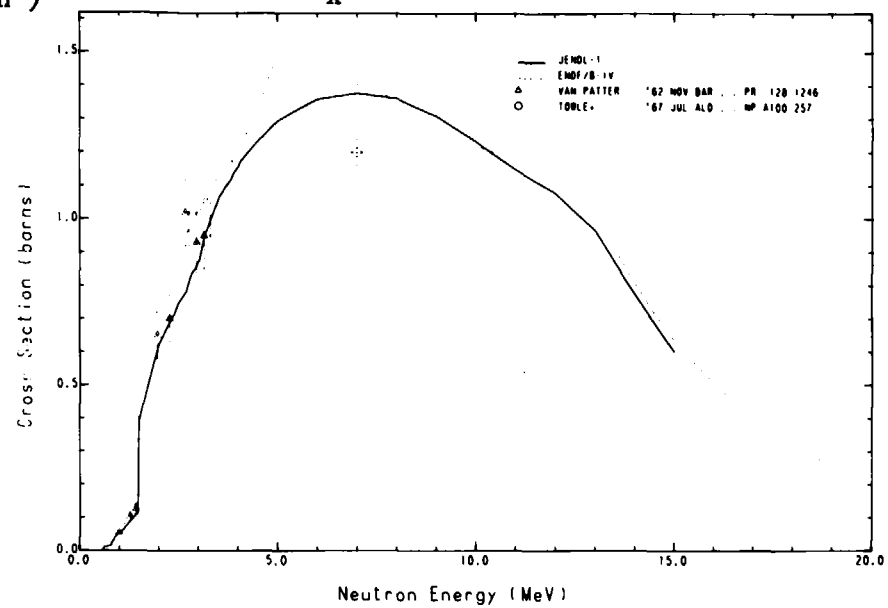

JENDL-1
ENDF/B-IV
HARRIS '50 . . PR 80 342
COLMER+ '50 . . PPS A63 1173
KAPCHIGA.+ '64 CCP . . AE 16 256
SPITZ+ '68 DEC PEL . . NP A121 655
KROPFF+ '76 . . ANE 3 555
Cross Section (barns)
Neutron Energy (eV)
10^3
10^2
10^1
10^0
10^{-1}
10^{-2}
10^{-1}
10^0
10^1
10^2
10^3
10^4

$_{24}$Cr
(n,γ)
(2)

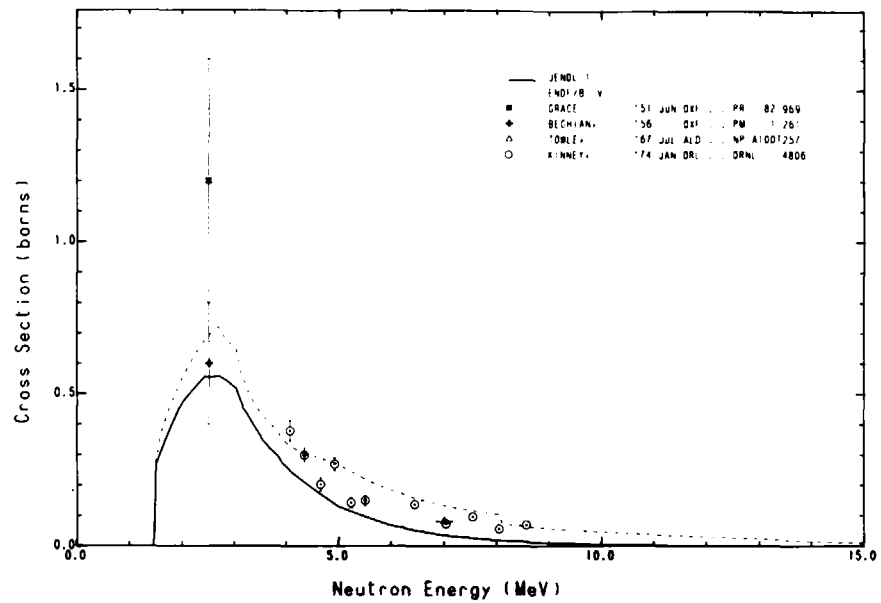

JENDL-I
ENDF/B-IV
BELANOVA '58 MAR CCP . . ZET 34 574
BELANOVA '60 JUN CCP . . AE 8 549
DIVEN+ '60 OCT LAS . . PR 120 556
DIVEN+ '60 OCT LAS . . PR 120 556
GIBBONS+ '61 APR ORL . . PR 122-182
STAVISSKI+ '62 JUN CCP . . AE 12+514
KAPCHIGA.+ '64 CCP . . AE 16 256
BELANOVA+ '65 FEI . . FEI- 3
BELANOVA '65 JUL OBN . . AE 19+3
CVELBAR+ '66 OCT NJS . . NIM 44 292
SPITZ+ '68 DEC PEL . . NP A121 655
CVELBAR+ '69 . . NP/A 130 401
SPENCER+ '73 MAY CAD . . 73KFK 73E1
LE RIGOL.+ '73 AUG CAD . . CEA-N 1661
LE RIGOL.+ '75 MAR CAD . . 75WASH2 953
Cross Section (barns)
Neutron Energy (eV)

$_{24}$Cr (n,n')

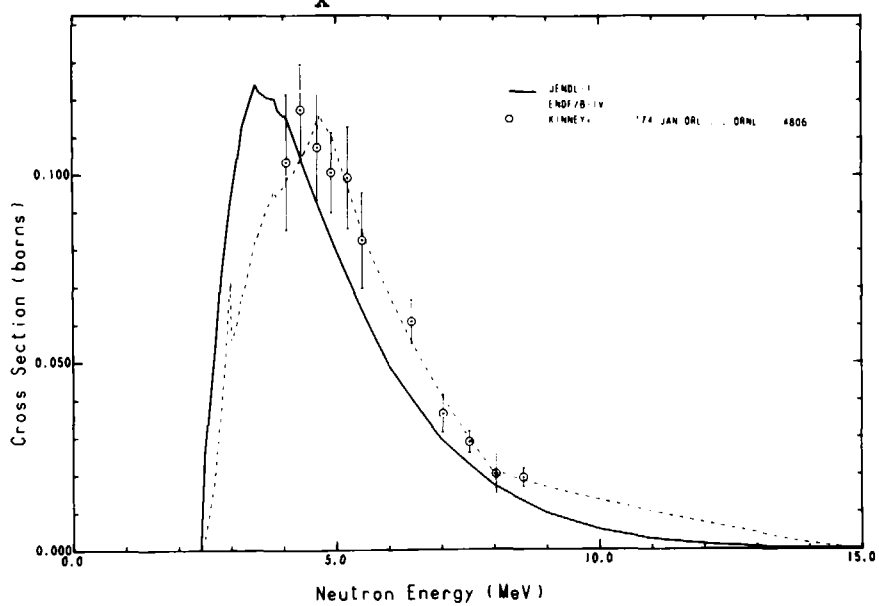
E_x=all levels



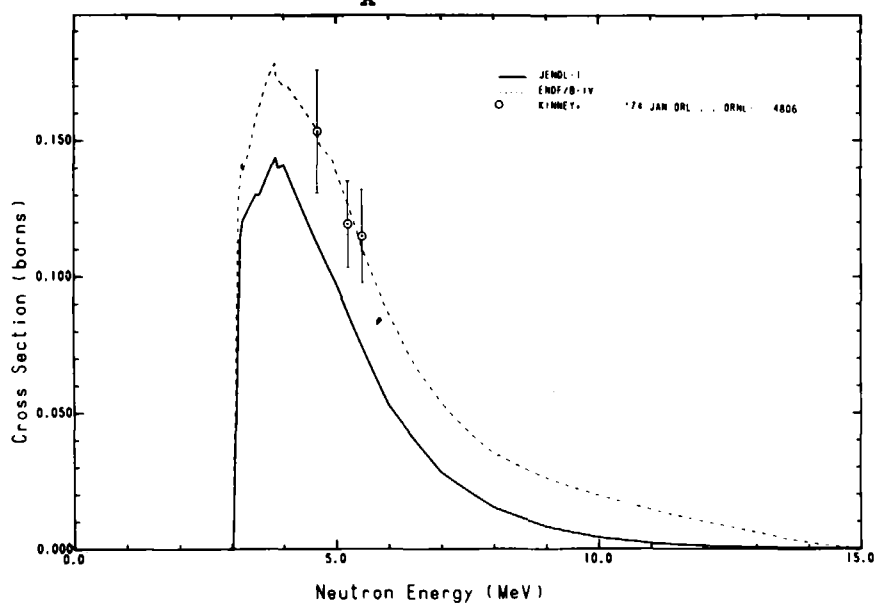
E_x=1.43 MeV



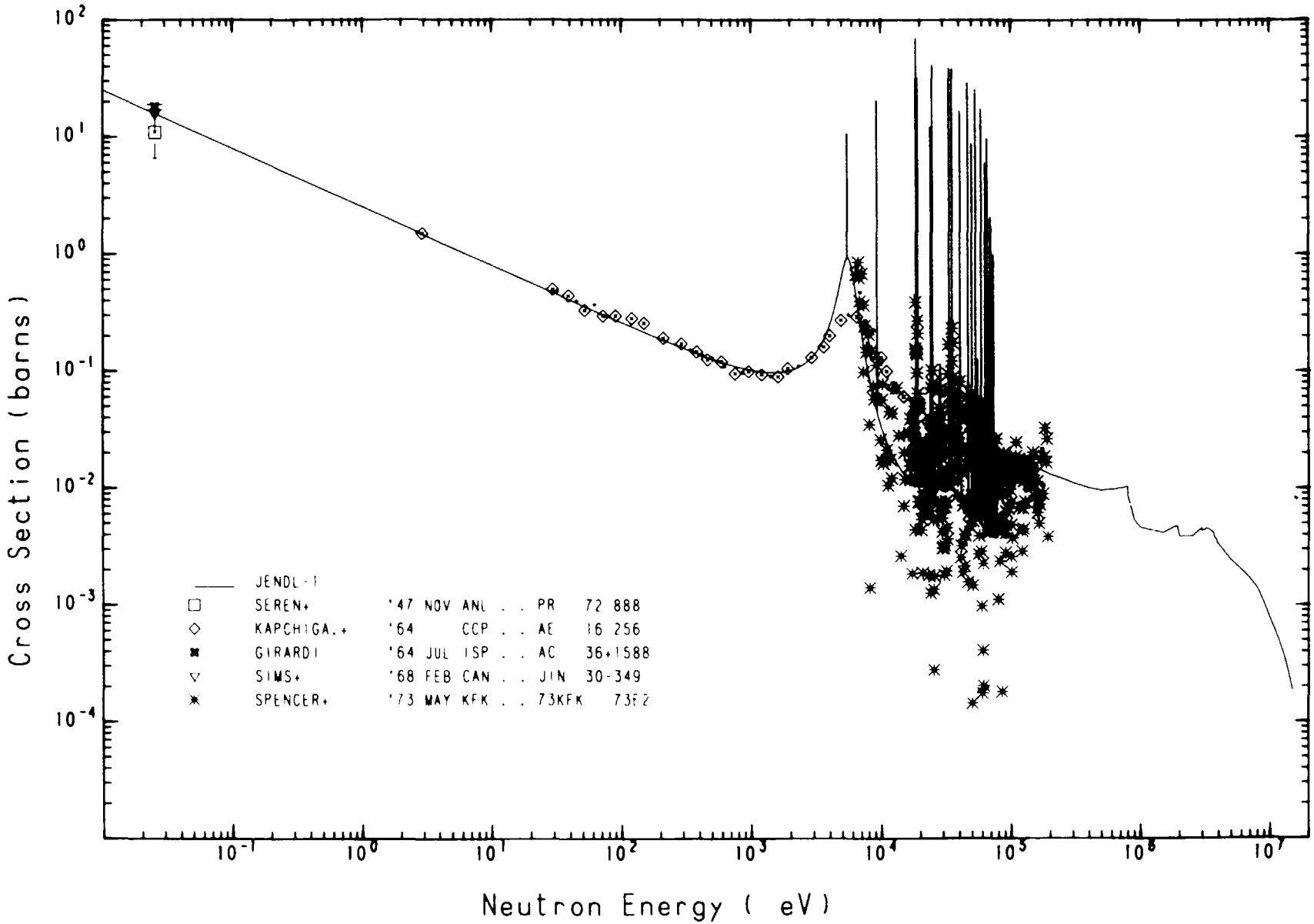
E_x=2.37 MeV



E_x=2.97 MeV

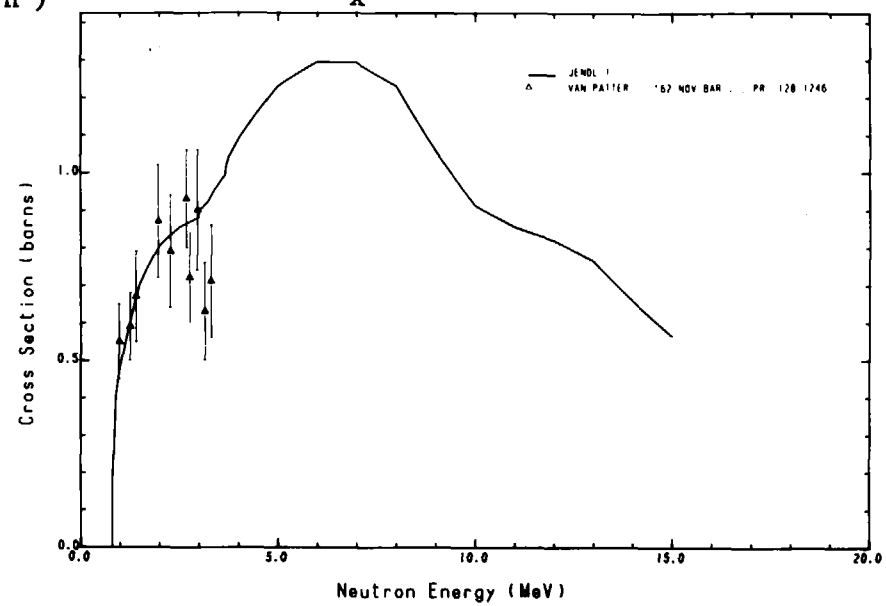


^{50}Cr
(n,γ)

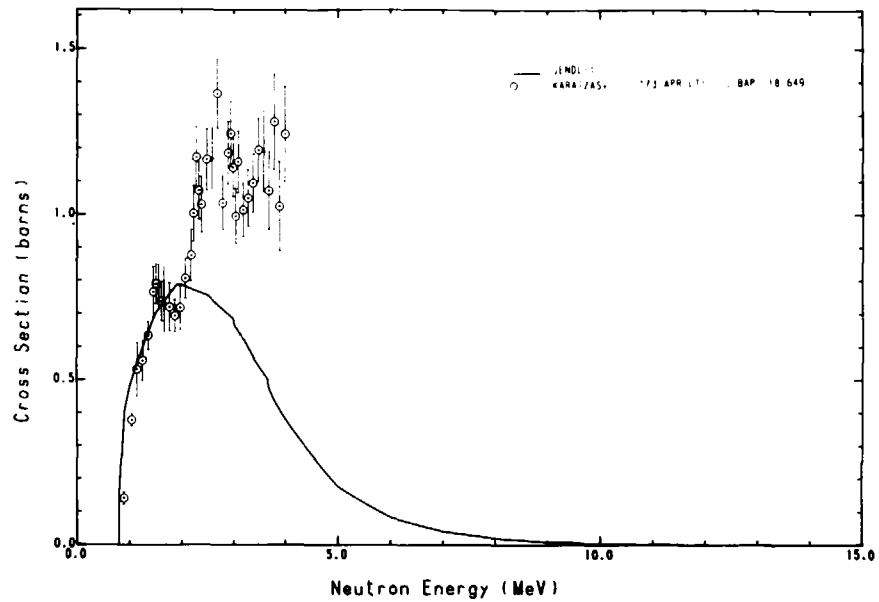

Cross Section (barns)
Neutron Energy (eV)
JENDL-1
SEREN+ '47 NOV ANL . . PR 72 888
KAPCHIGA.+ '64 CCP . . AE 16 256
GIRARDI '64 JUL ISP . . AC 36+1588
SIMS+ '68 FEB CAN . . JIN 30-349
SPENCER+ '73 MAY KFK . . 73KFK 73F2

^{50}Cr (n,n')

E_x=all levels

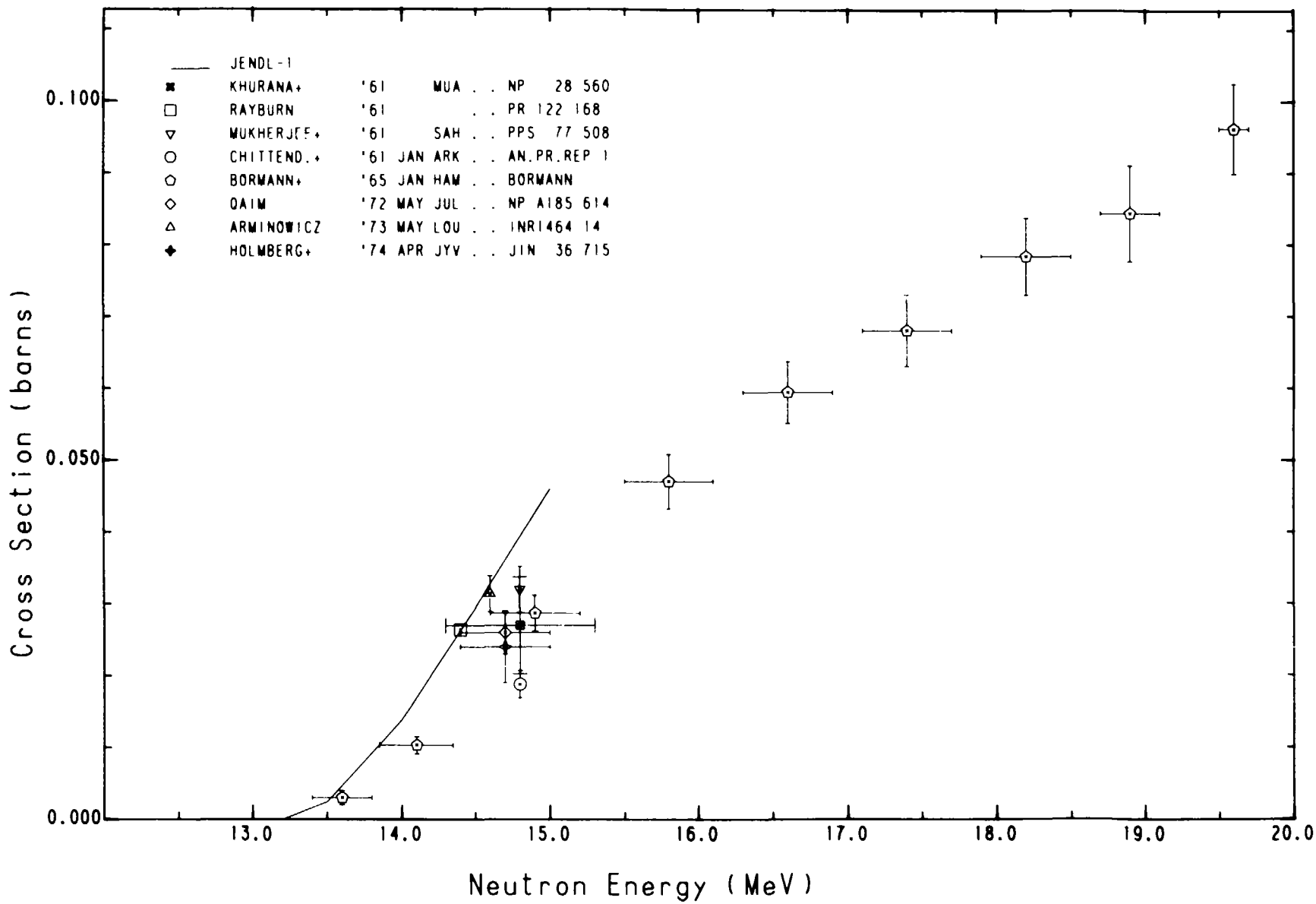


E_x=0.783 MeV

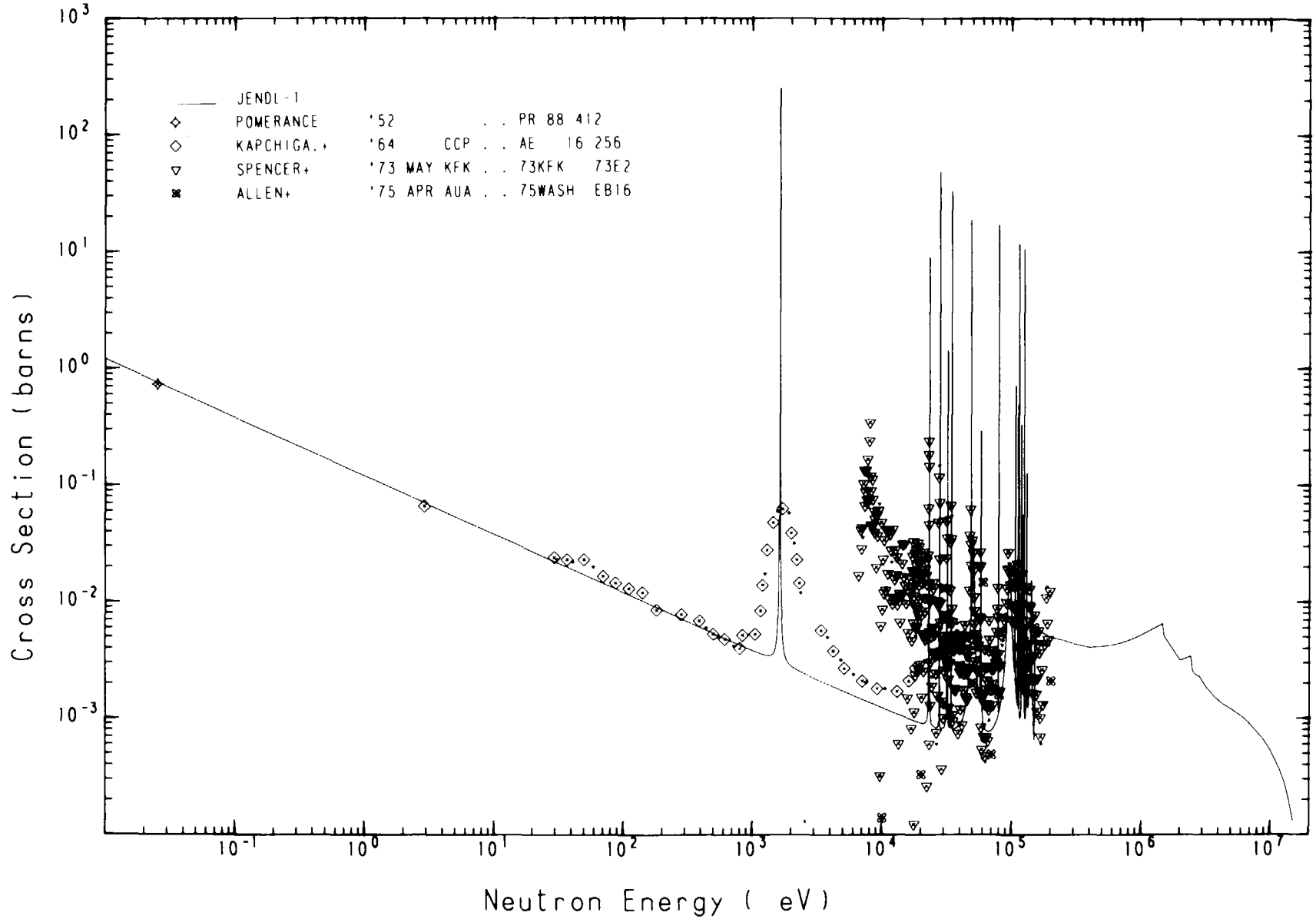


^{50}Cr

(n,2n)

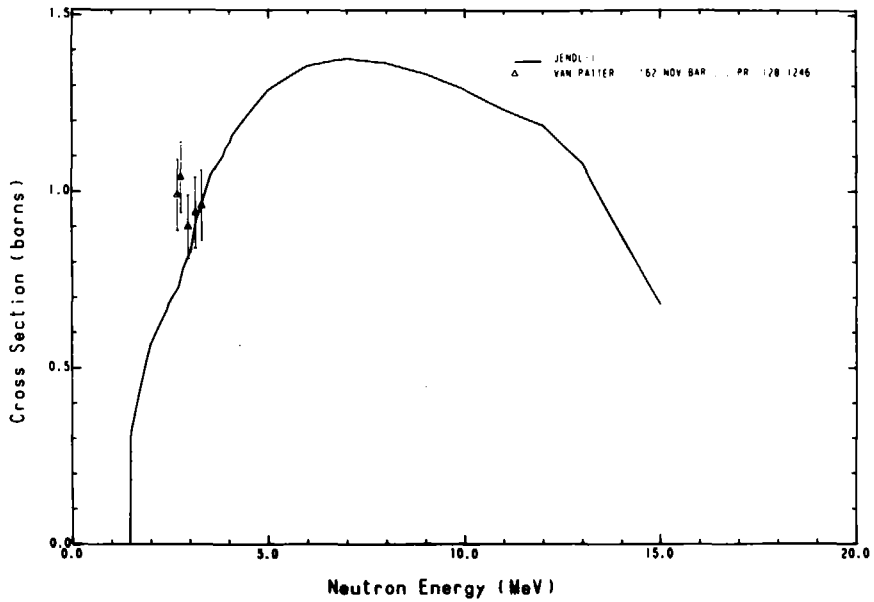

JENDL-1
KHURANA+ '61 MUA . . NP 28 560
RAYBURN '61 . . PR 122 168
MUKHERJEE+ '61 SAH . . PPS 77 508
CHITTEND.+ '61 JAN ARK . . AN.PR.REP 1
BORMANN+ '65 JAN HAM . . BORMANN
OAIM '72 MAY JUL . . NP A185 614
ARMINOWICZ '73 MAY LOU . . INR1464 14
HOLMBERG+ '74 APR JYV . . JIN 36 715
0.100
0.050
0.000
13.0
14.0
15.0
16.0
17.0
18.0
19.0
20.0
Cross Section (barns)
Neutron Energy (MeV)

^{52}Cr
(n,γ)

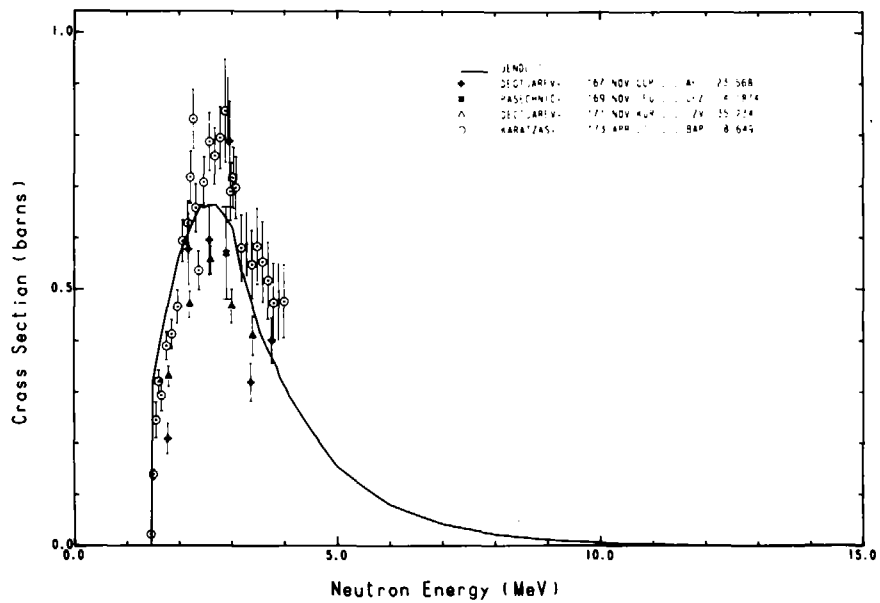

JENDL-1
POMERANCE '52 . . PR 88 412
KAPCHIGA.+ '64 CCP . . AE 16 256
SPENCER+ '73 MAY KFK . . 73KFK 73E2
ALLEN+ '75 APR AUA . . 75WASH EB16
Cross Section (barns)
Neutron Energy (eV)

^{52}Cr
(n,n')
(1)

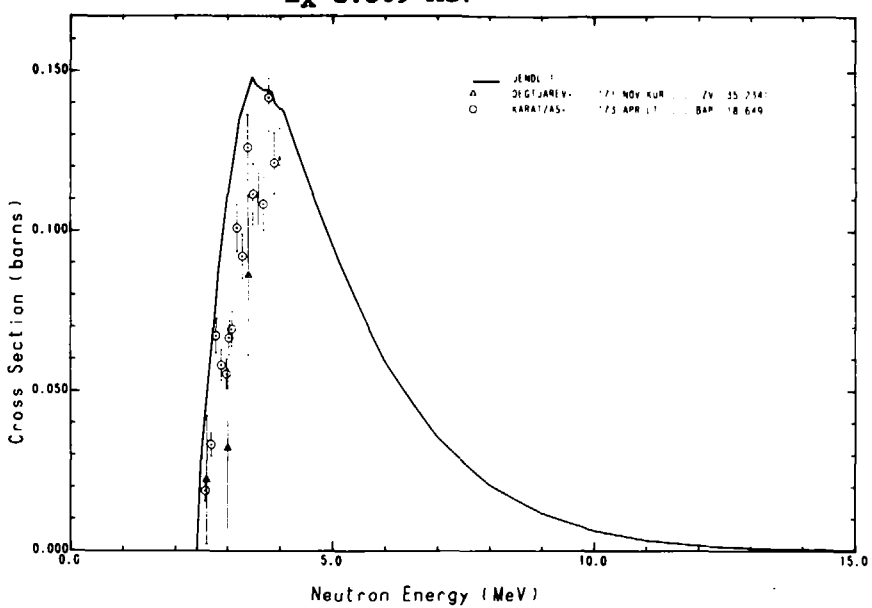
E_x=all levels



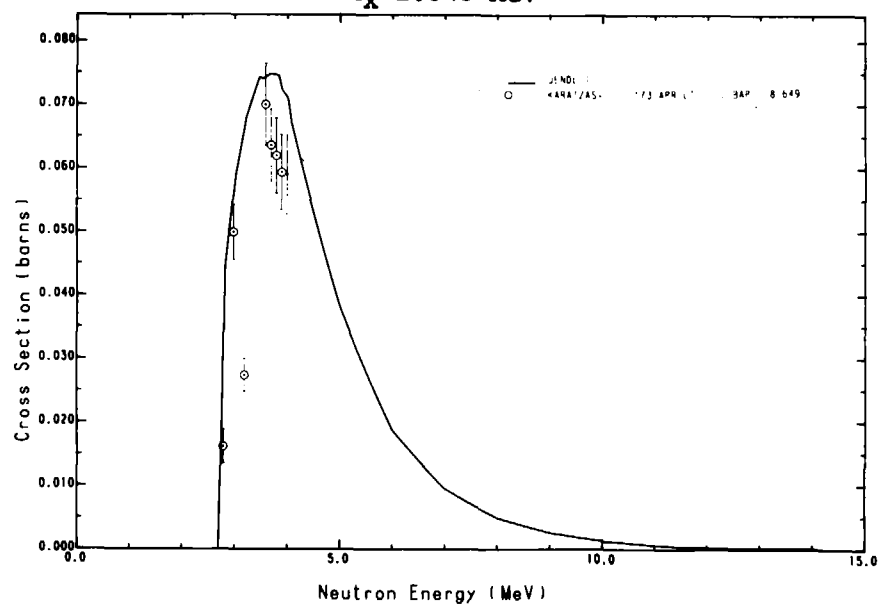
E_x=1.434 MeV



E_x=2.369 MeV

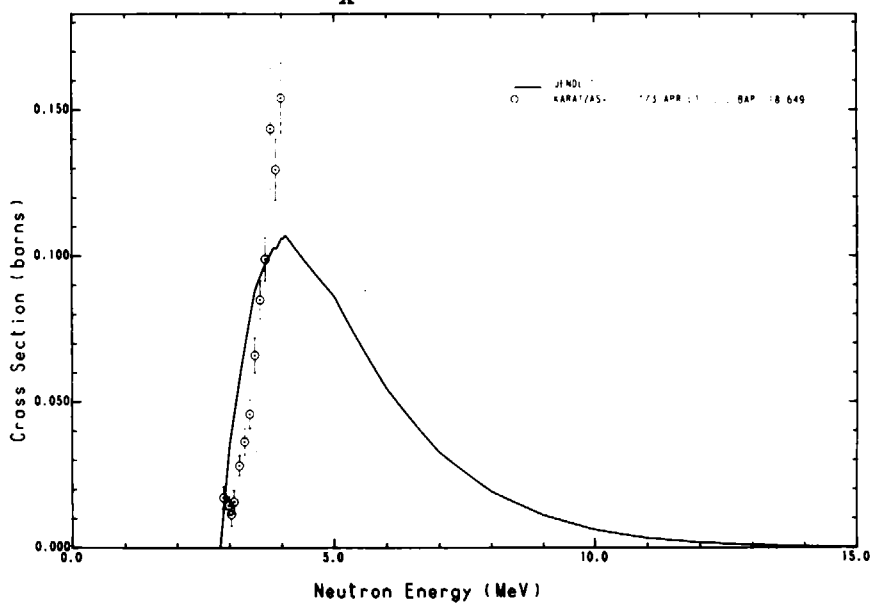


E_x=2.648 MeV

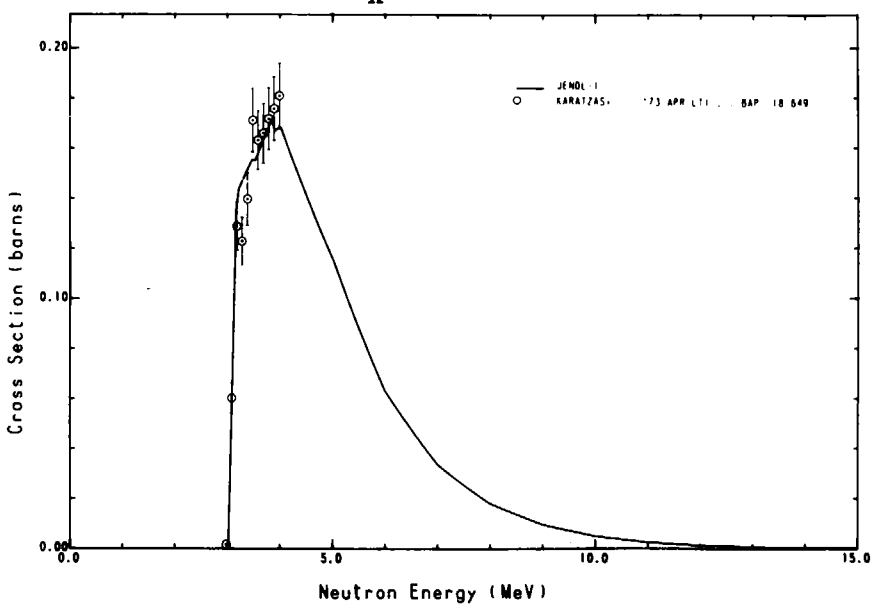


^{52}Cr
(n,n')
(2)

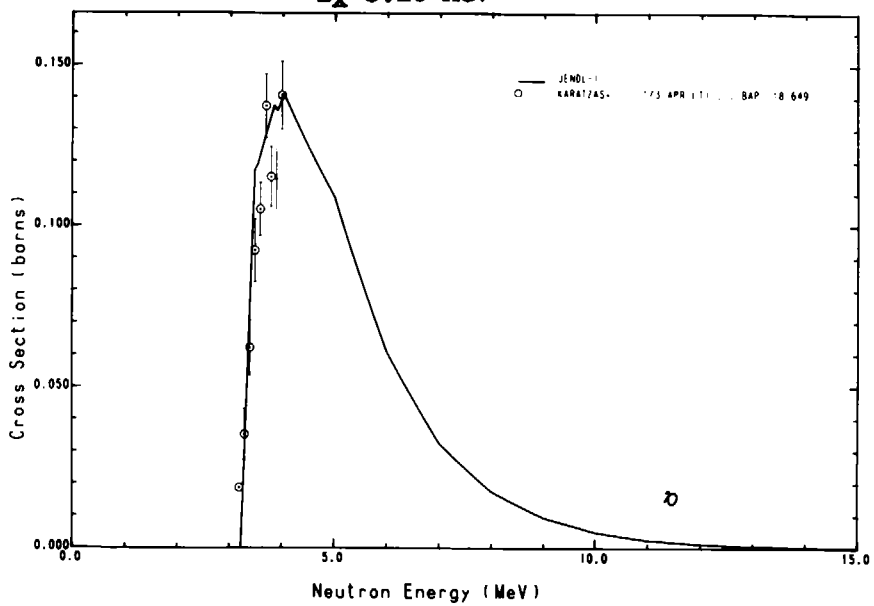
E_x=2.766 MeV



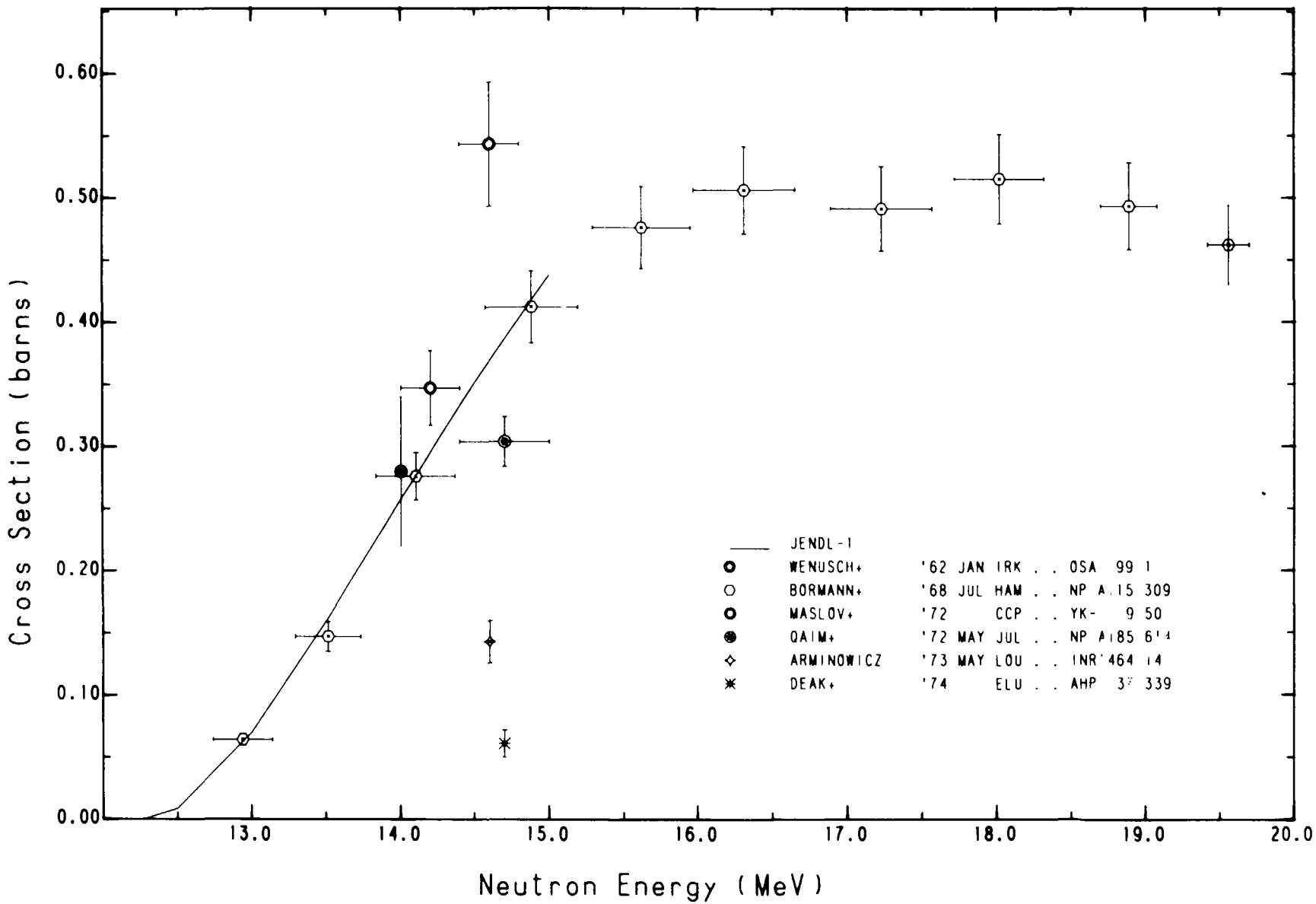
E_x=2.965 MeV



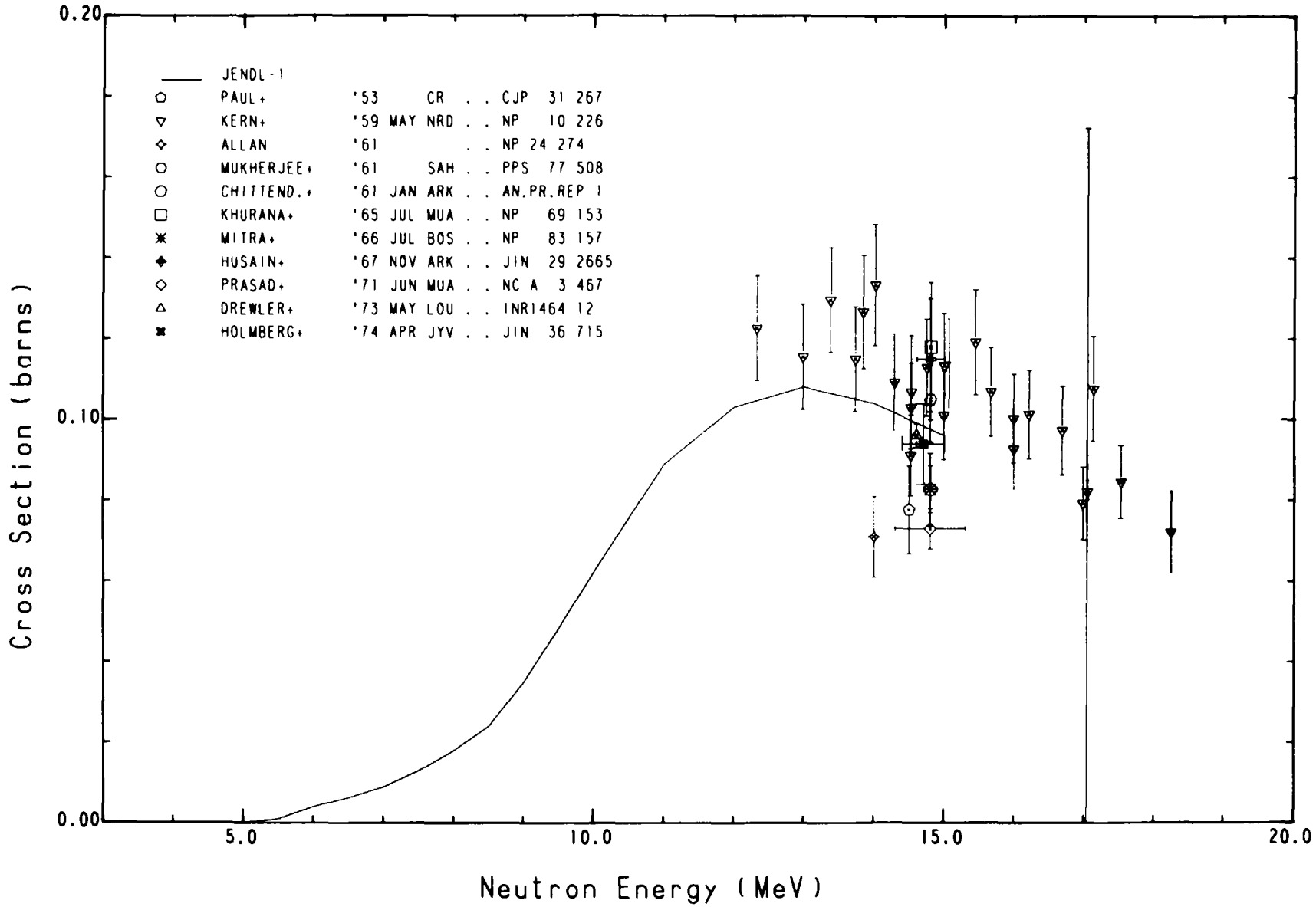
E_x=3.16 MeV



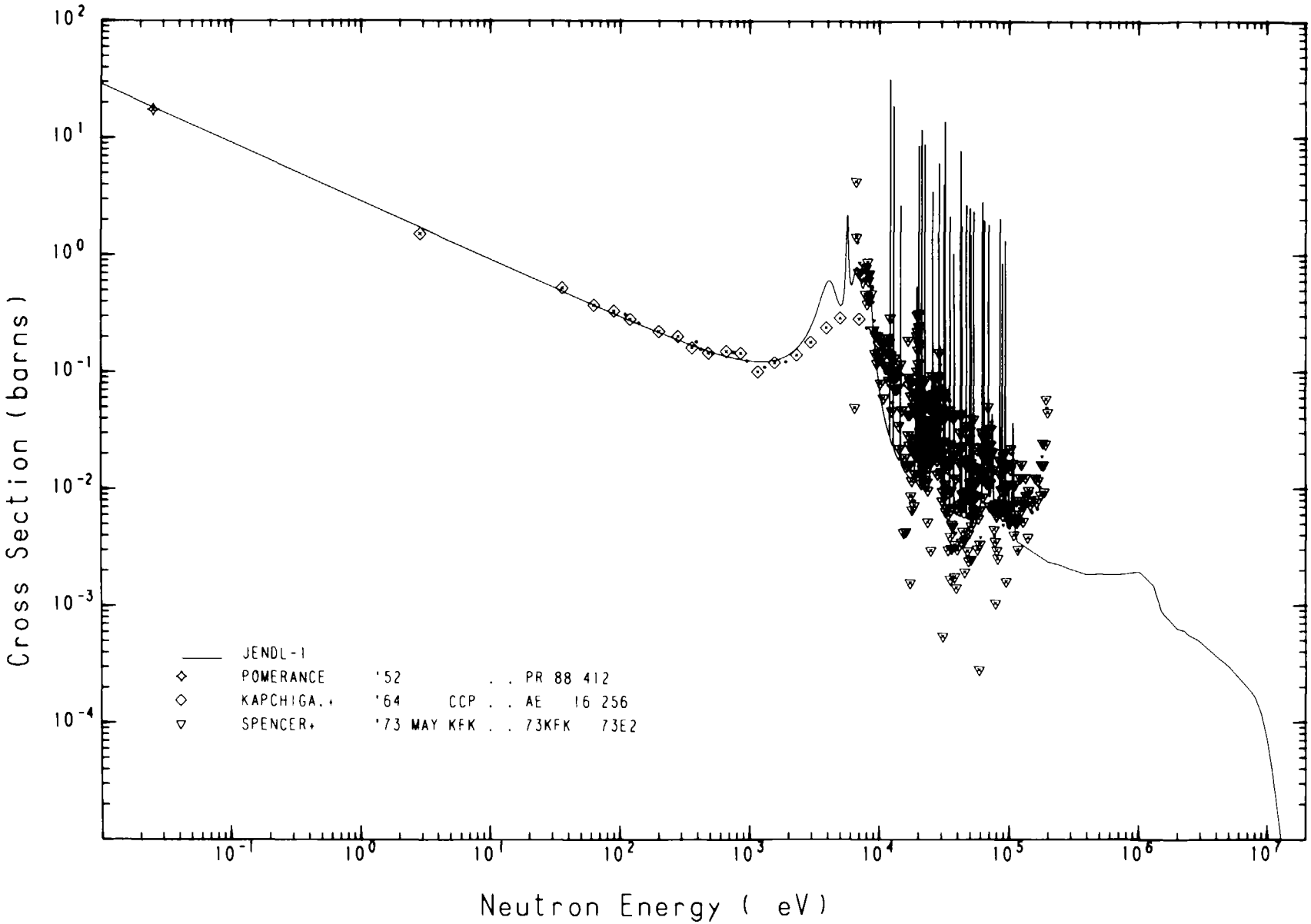
^{52}Cr
(n,2n)


0.60
0.50
0.40
0.30
0.20
0.10
0.00
Cross Section (barns)
13.0
14.0
15.0
16.0
17.0
18.0
19.0
20.0
Neutron Energy (MeV)
JENDL-1
WENUSCH+ '62 JAN IRK . . OSA 99 1
BORMANN+ '68 JUL HAM . . NP A 15 309
MASLOV+ '72 CCP . . YK- 9 50
QAIM+ '72 MAY JUL . . NP A 185 614
ARMINOWICZ '73 MAY LOU . . INR 464 14
DEAK+ '74 ELU . . AHP 37 339

^{52}Cr
(n,P)

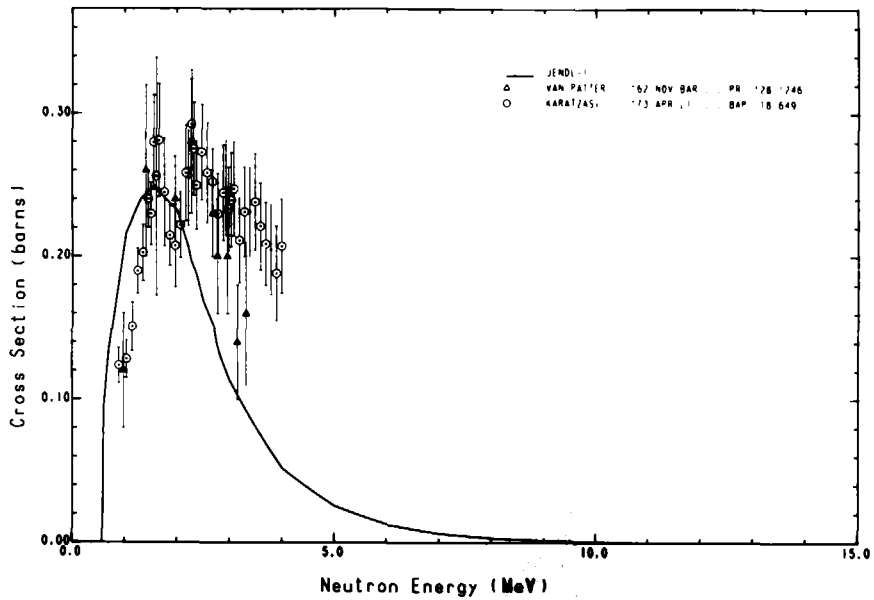

JENDL-1
PAUL+ '53 CR . . CJP 31 267
KERN+ '59 MAY NRD . . NP 10 226
ALLAN '61 . . NP 24 274
MUKHERJEE+ '61 SAH . . PPS 77 508
CHITTEND.+ '61 JAN ARK . . AN.PR.REP 1
KHURANA+ '65 JUL MUA . . NP 69 153
MITRA+ '66 JUL BOS . . NP 83 157
HUSAIN+ '67 NOV ARK . . JIN 29 2665
PRASAD+ '71 JUN MUA . . NC A 3 467
DREWLER+ '73 MAY LOU . . INR1464 12
HOLMBERG+ '74 APR JYV . . JIN 36 715
0.20
0.10
0.00
5.0
10.0
15.0
20.0
Cross Section (barns)
Neutron Energy (MeV)

^{53}Cr
(n, γ)

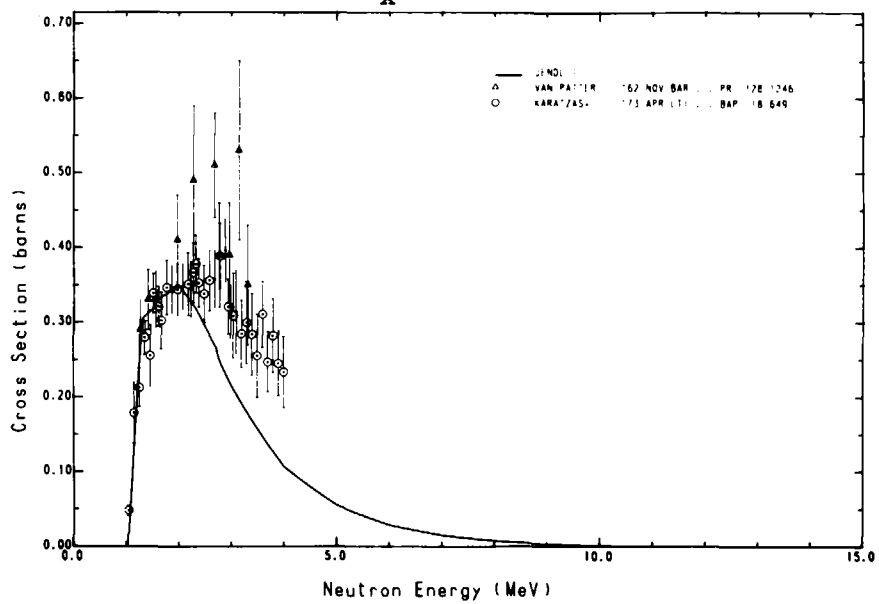

Cross Section (barns)
Neutron Energy (eV)
JENDL-1
POMERANCE '52 . . PR 88 412
KAPCHIGA.+ '64 CCP . . AE 16 256
SPENCER+ '73 MAY KFK . . 73KFK 73E2

^{53}Cr
(n,n')
(1)

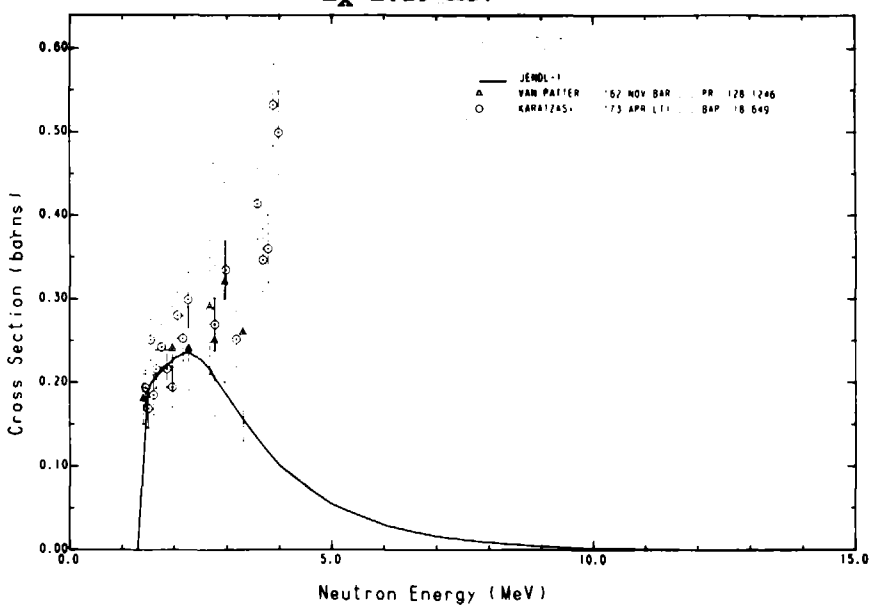
E_x=0.563 MeV



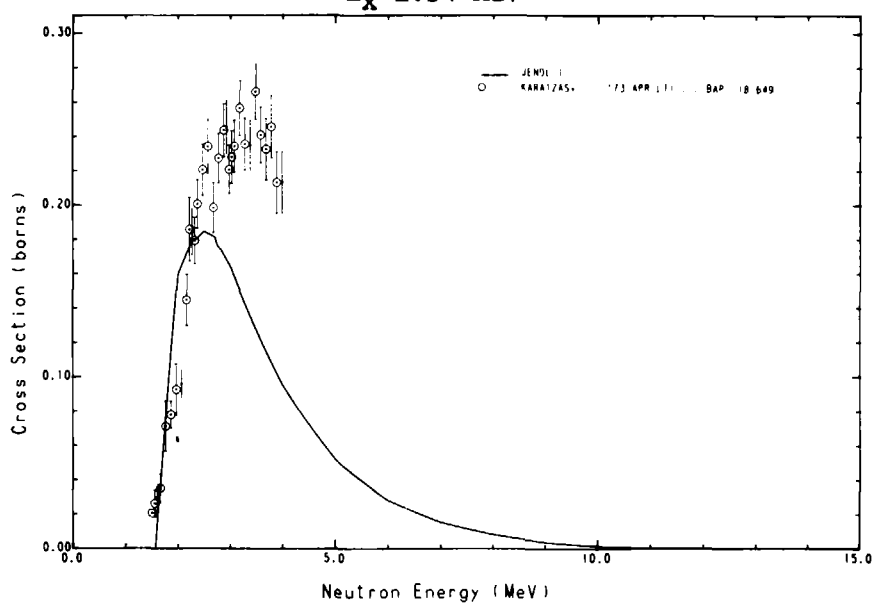
E_x=1.01 MeV



E_x=1.29 MeV

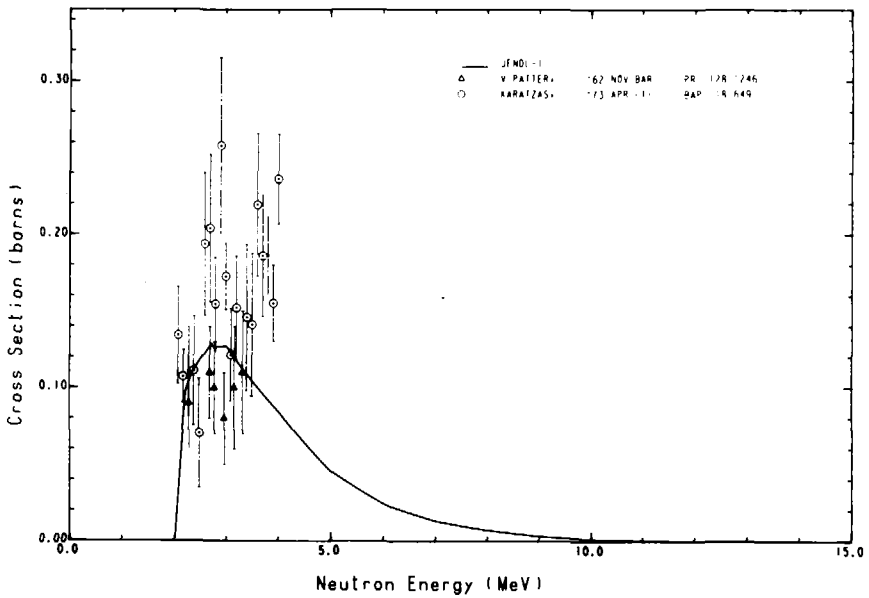


E_x=1.54 MeV

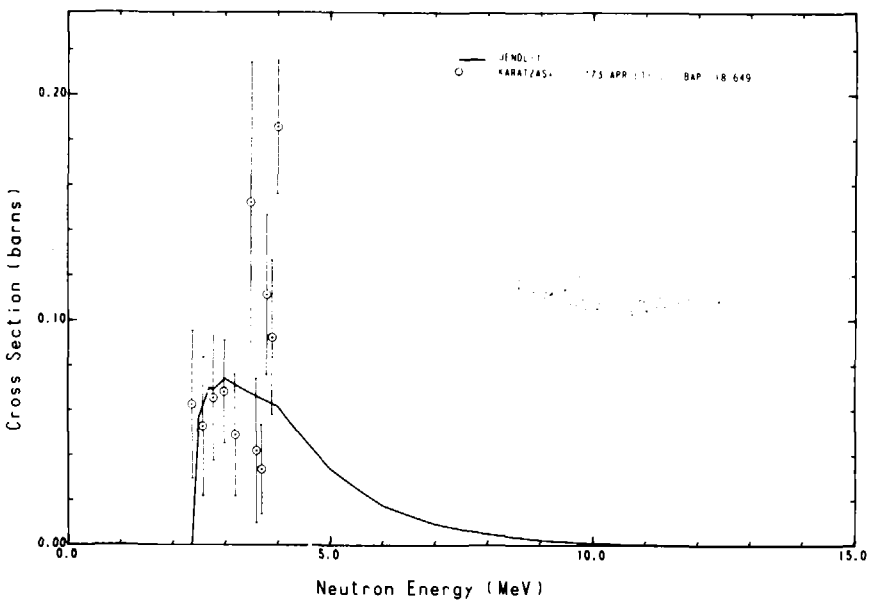


^{53}Cr (n,n') (2)

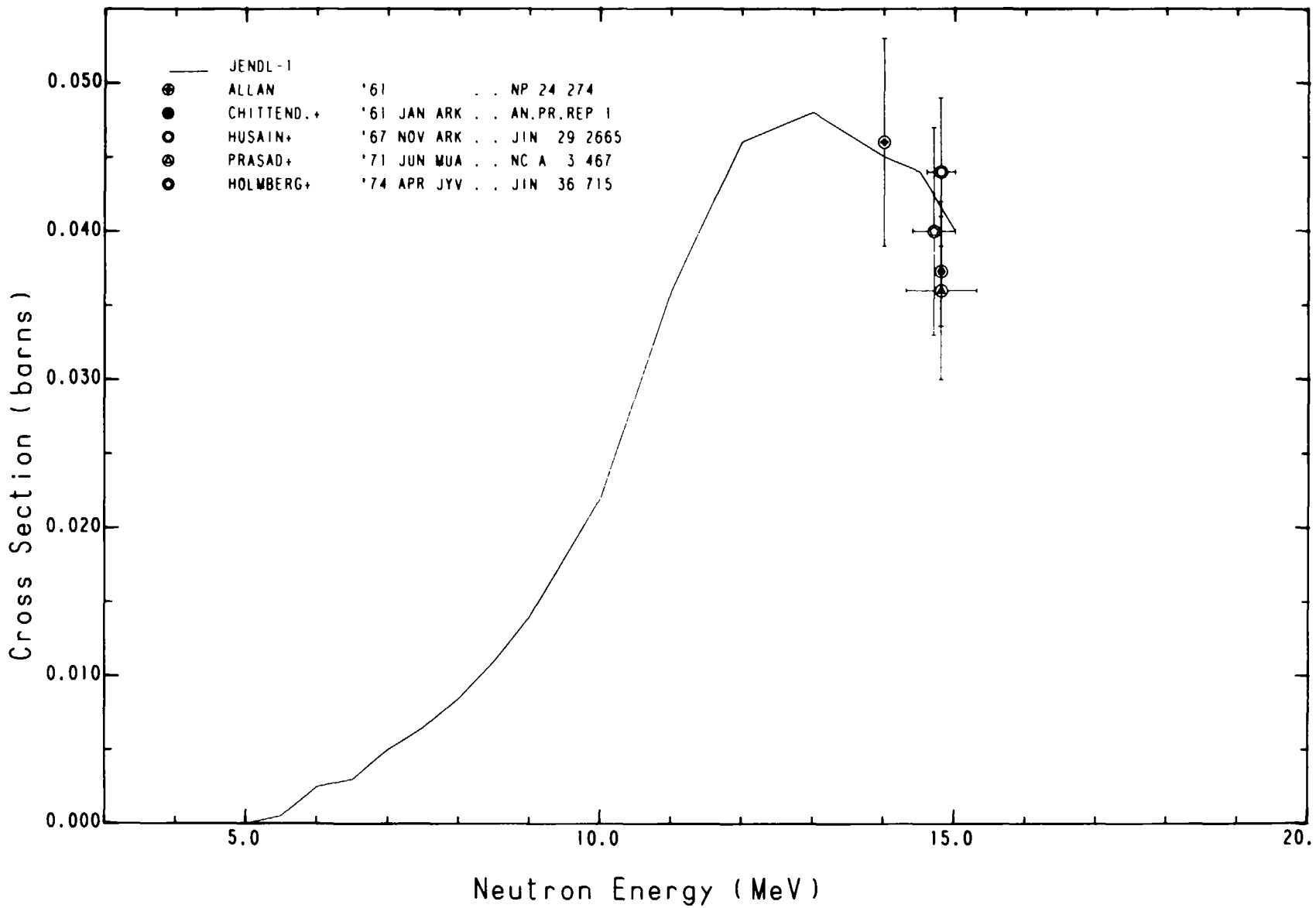
E_x=1.97 MeV



E_x=2.32 MeV

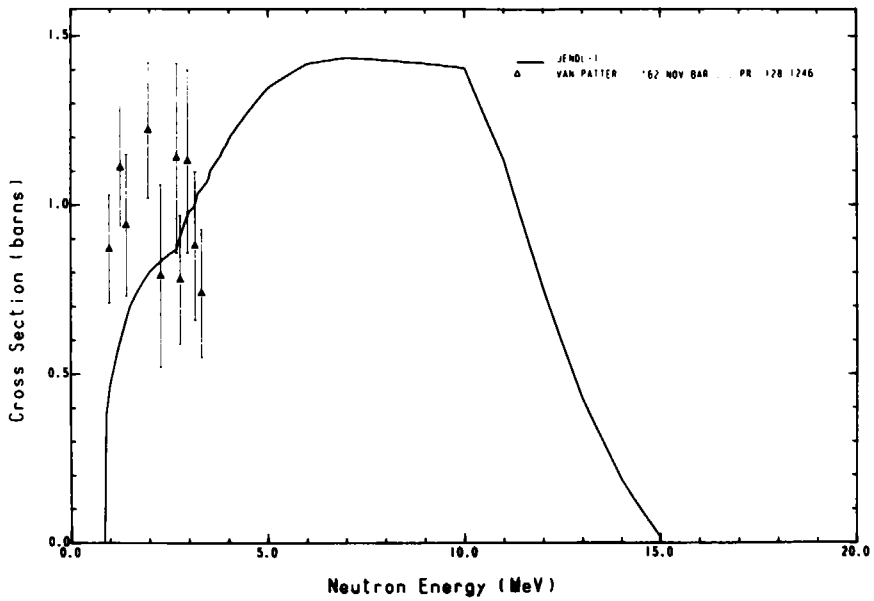


^{53}Cr
(n,p)

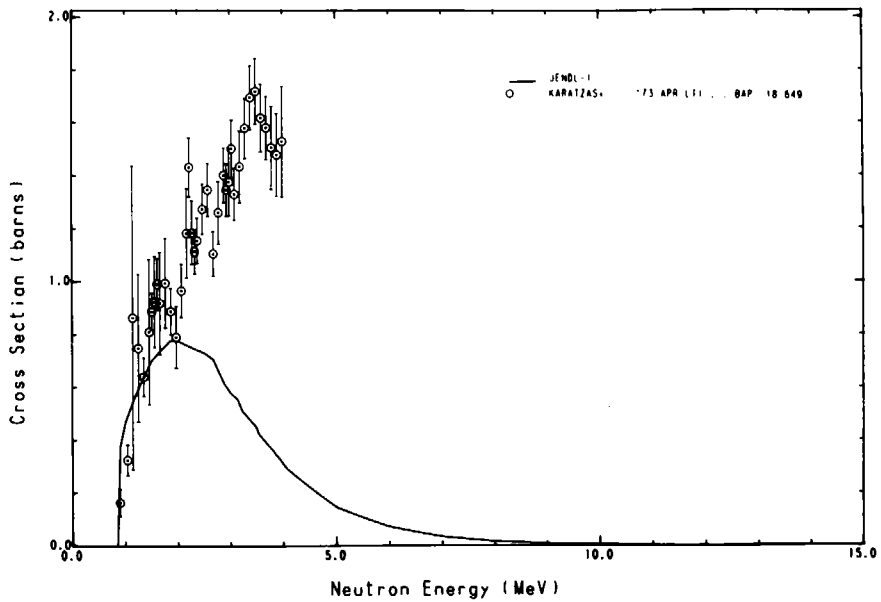

JENDL-1
ALLAN '61 . . NP 24 274
CHITTEND.+ '61 JAN ARK . . AN.PR.REP 1
HUSAIN+ '67 NOV ARK . . JIN 29 2665
PRASAD+ '71 JUN MUA . . NC A 3 467
HOLMBERG+ '74 APR JYV . . JIN 36 715
0.050
0.040
0.030
0.020
0.010
0.000
5.0
10.0
15.0
20.0
Cross Section (barns)
Neutron Energy (MeV)

^{54}Cr
(n,n')

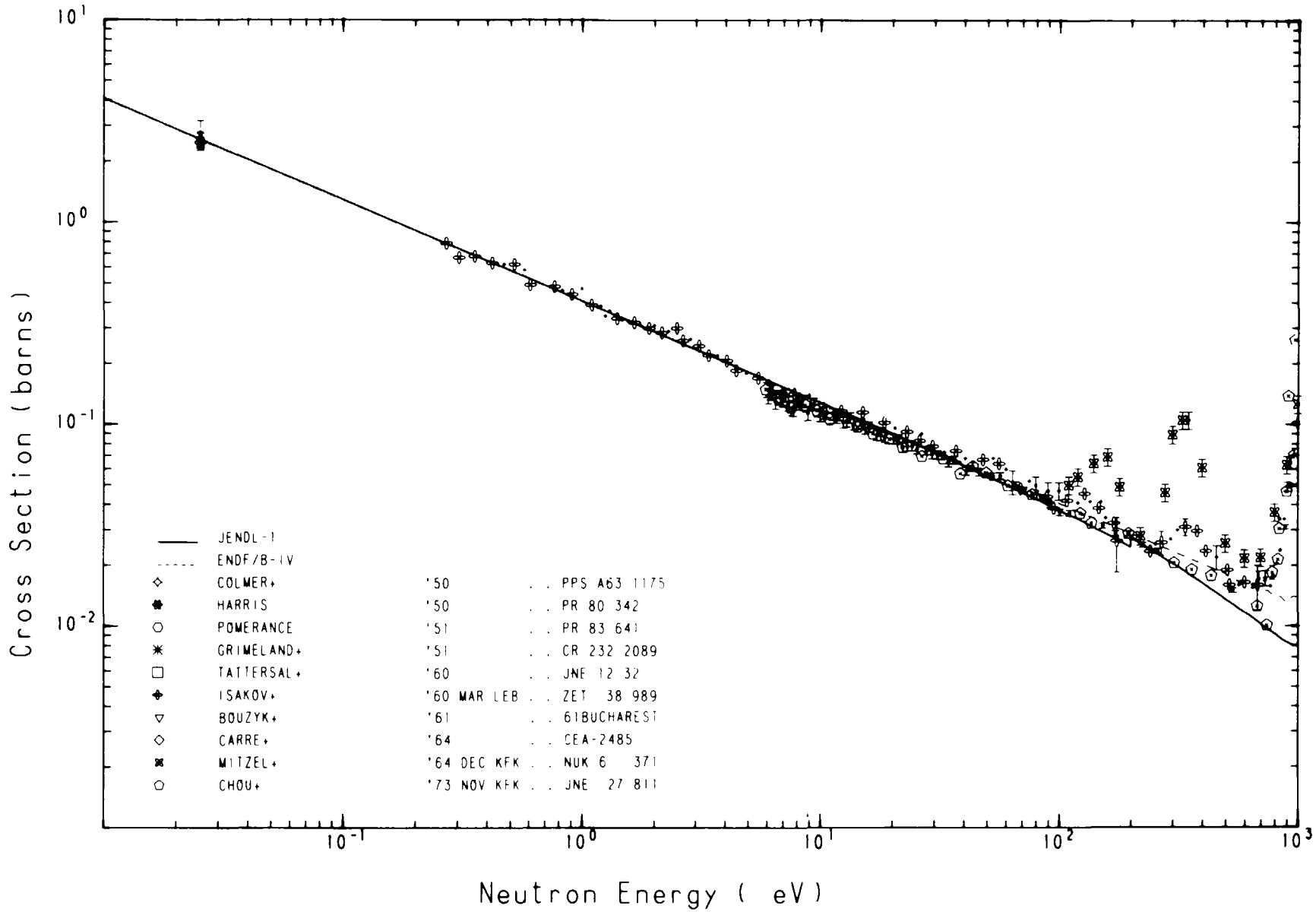
E_x=all levels



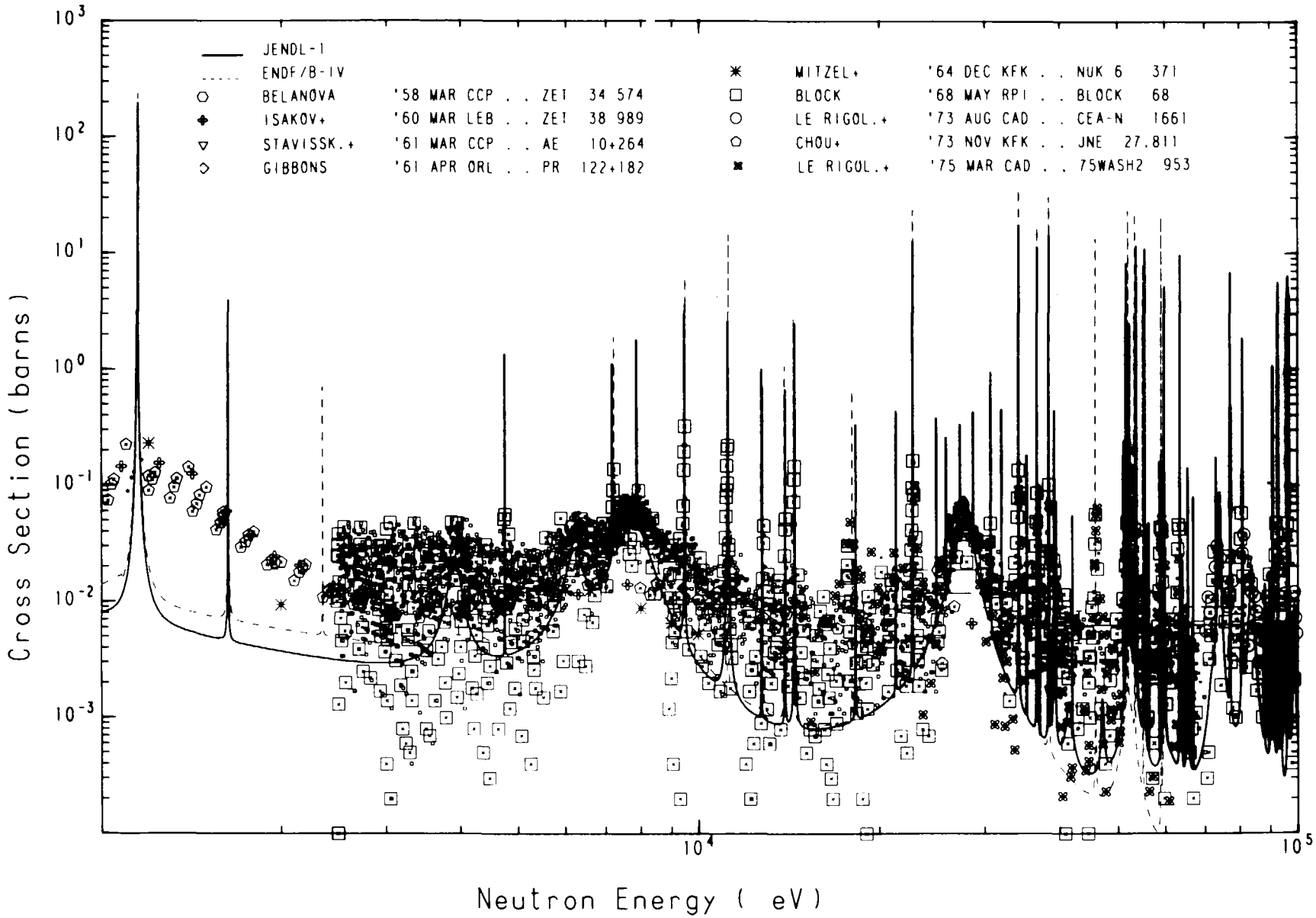
E_x=0.835 MeV



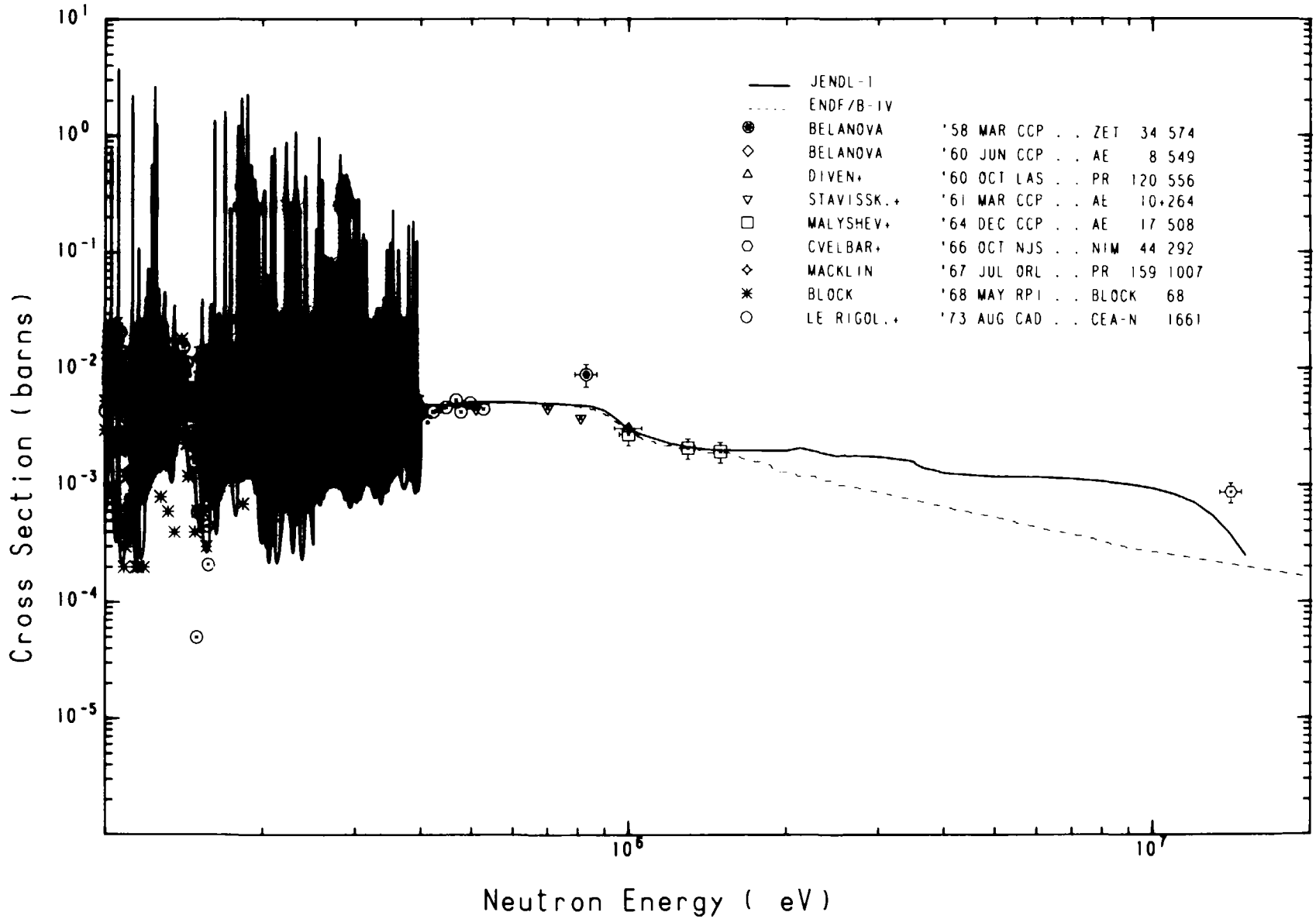
$_{26}$Fe
(n, γ)
(1)


Cross Section (barns)
Neutron Energy (eV)
JENDL-1
ENDF/B-IV
COLMER+ '50 . . PPS A63 1175
HARRIS '50 . . PR 80 342
POMERANCE '51 . . PR 83 641
GRIMELAND+ '51 . . CR 232 2089
TATTERSAL+ '60 . . JNE 12 32
ISAKOV+ '60 MAR LEB . . ZET 38 989
BOUZYK+ '61 . . 61BUCHAREST
CARRE+ '64 . . CEA-2485
MITZEL+ '64 DEC KFK . . NUK 6 371
CHOU+ '73 NOV KFK . . JNE 27 811

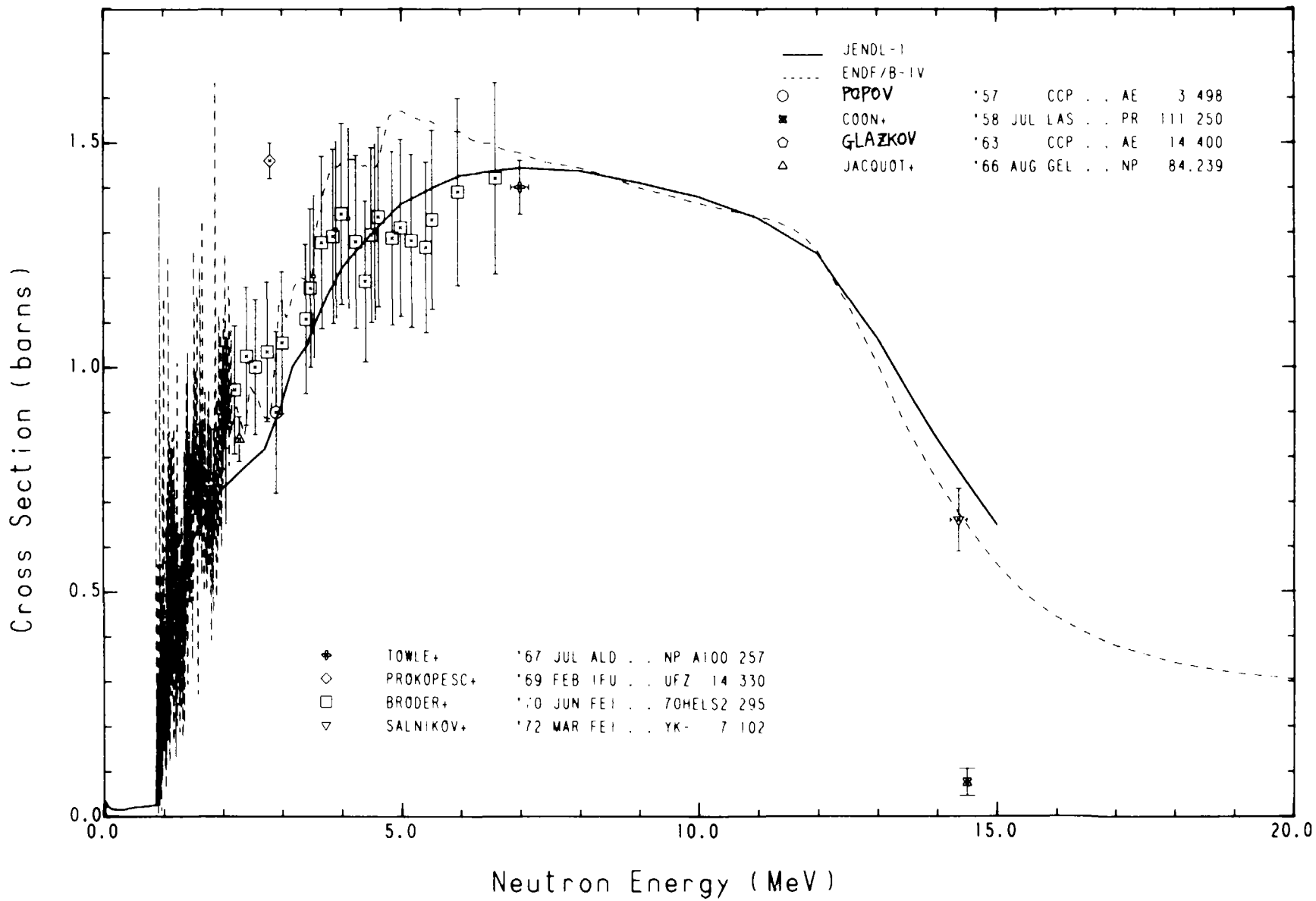
$_{26}Fe$
(n,γ)
(2)


JENDL-1
ENDF/B-IV
BELANOVA '58 MAR CCP . . ZET 34 574
ISAKOV+ '60 MAR LEB . . ZET 38 989
STAVISSK.+ '61 MAR CCP . . AE 10+264
GIBBONS '61 APR ORL . . PR 122+182
MITZEL+ '64 DEC KFK . . NUK 6 371
BLOCK '68 MAY RPI . . BLOCK 68
LE RIGOL.+ '73 AUG CAD . . CEA-N 1661
CHOU+ '73 NOV KFK . . JNE 27.811
LE RIGOL.+ '75 MAR CAD . . 75WASH2 953
Cross Section (barns)
Neutron Energy (eV)
10^3
10^2
10^1
10^0
10^{-1}
10^{-2}
10^{-3}
10^4
10^5

$_{26}Fe$
(n,γ)
(3)


JENDL-1
ENDF/B-IV
BELANOVA '58 MAR CCP . . ZET 34 574
BELANOVA '60 JUN CCP . . AE 8 549
DIVEN+ '60 OCT LAS . . PR 120 556
STAVISSK.+ '61 MAR CCP . . AE 10+264
MALYSHEV+ '64 DEC CCP . . AE 17 508
CVELBAR+ '66 OCT NJS . . NIM 44 292
MACKLIN '67 JUL ORL . . PR 159 1007
BLOCK '68 MAY RPI . . BLOCK 68
LE RIGOL.+ '73 AUG CAD . . CEA-N 1661
Cross Section (barns)
Neutron Energy (eV)
10^1
10^0
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-5}
10^6
10^7

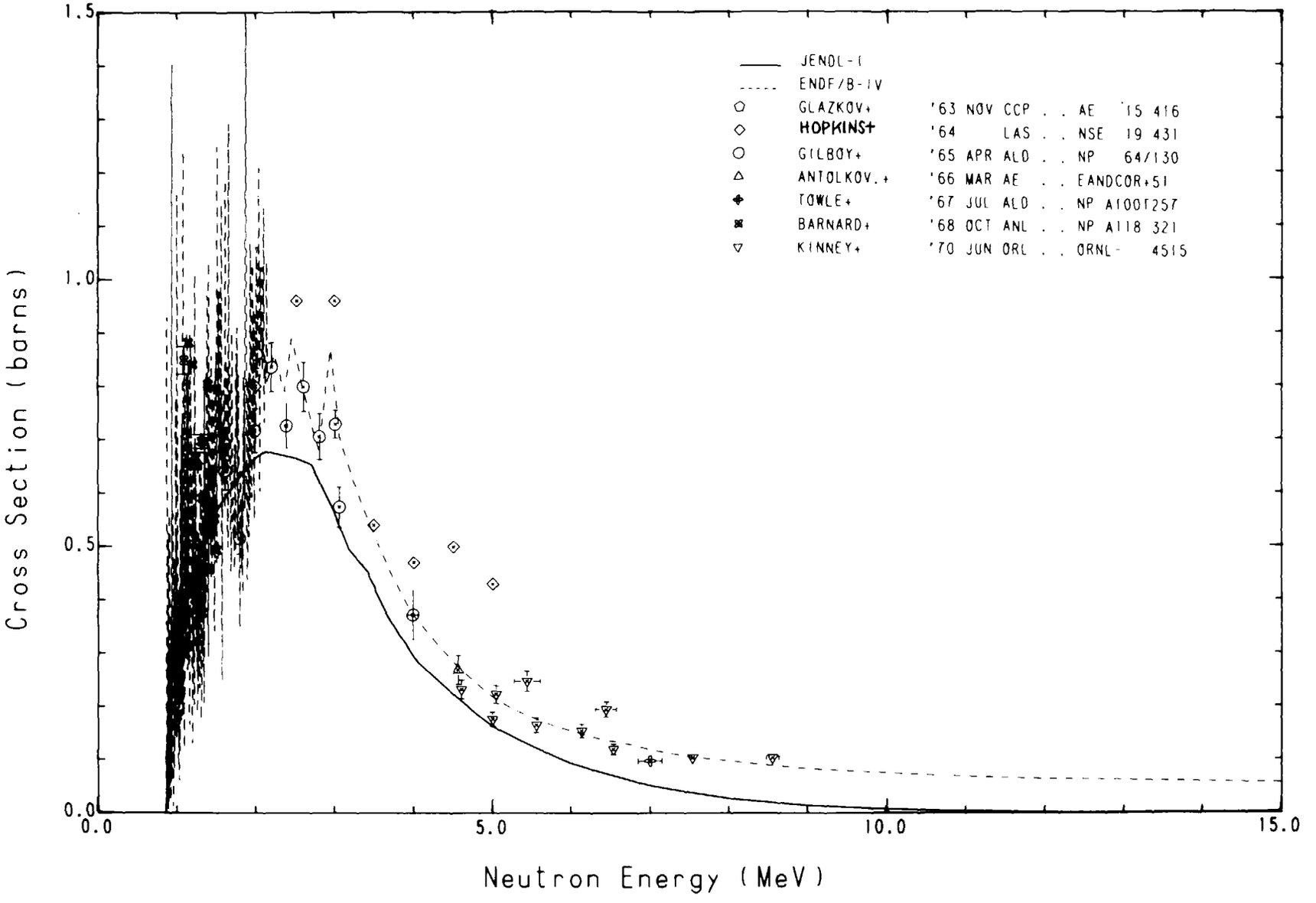
$_{26}Fe$
(n,n')


JENDL-1
ENDF/B-IV
POPOV '57 CCP . . AE 3 498
COON+ '58 JUL LAS . . PR 111 250
GLAZKOV '63 CCP . . AE 14 400
JACQUOT+ '66 AUG GEL . . NP 84.239
TOWLE+ '67 JUL ALD . . NP A100 257
PROKOPESC+ '69 FEB IFU . . UFZ 14 330
BRODER+ '70 JUN FEI . . 70HELS2 295
SALNIKOV+ '72 MAR FEI . . YK- 7 102
Cross Section (barns)
Neutron Energy (MeV)
0.0
0.5
1.0
1.5
5.0
10.0
15.0
20.0

$_{26}Fe$

(n,n')

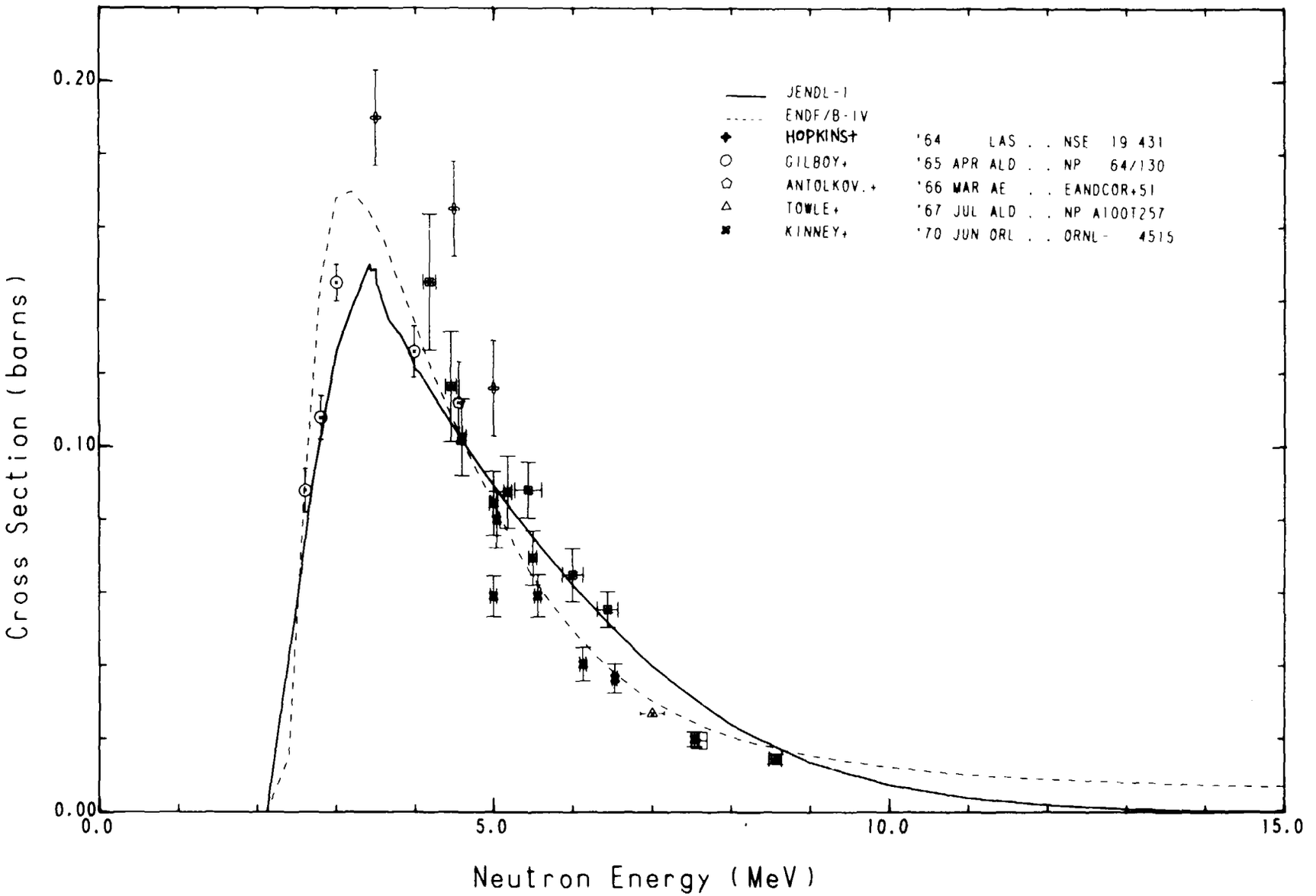
E_x=0.845 MeV



$_{26}Fe$

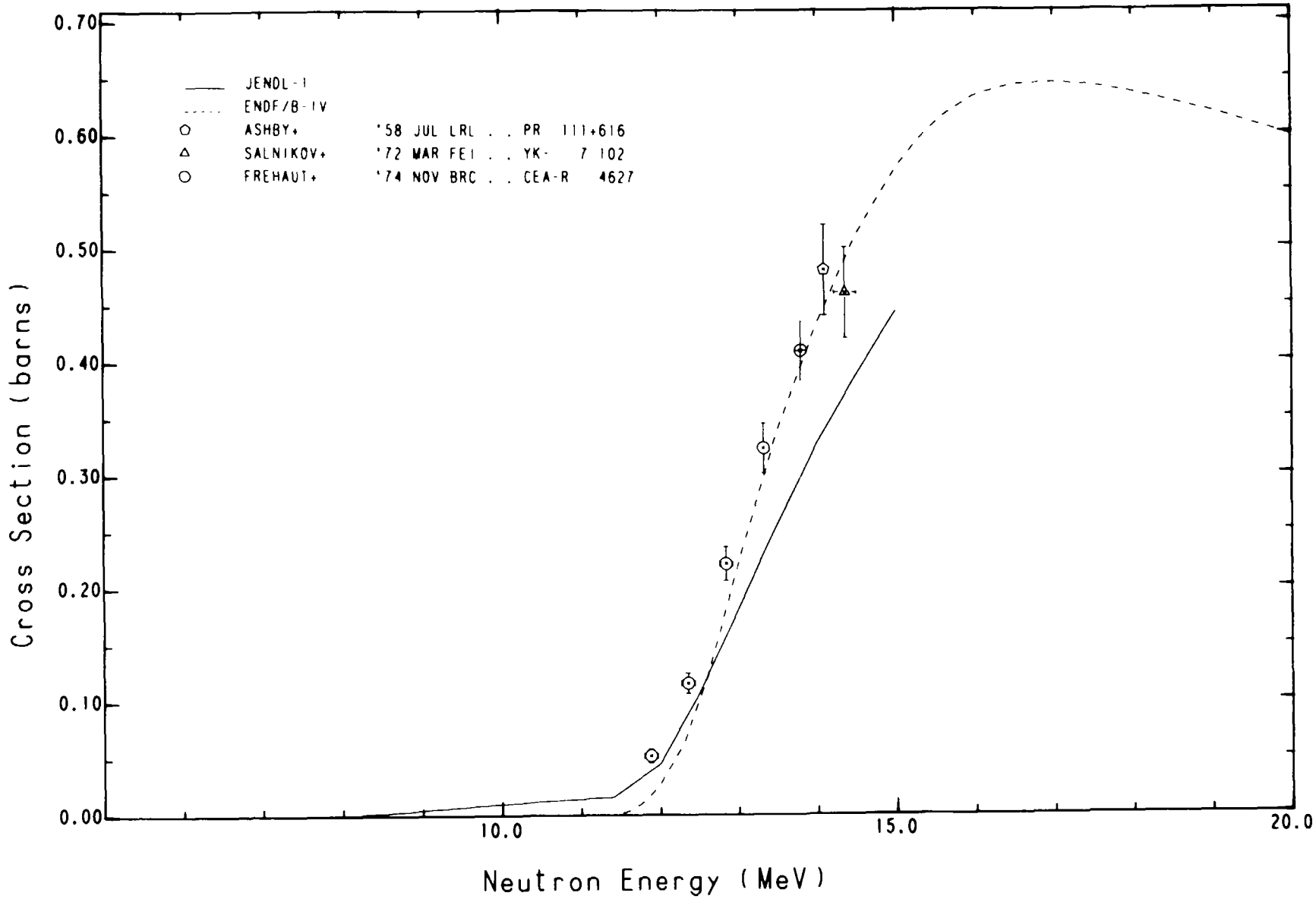
(n,n')

E_x=2.08 MeV

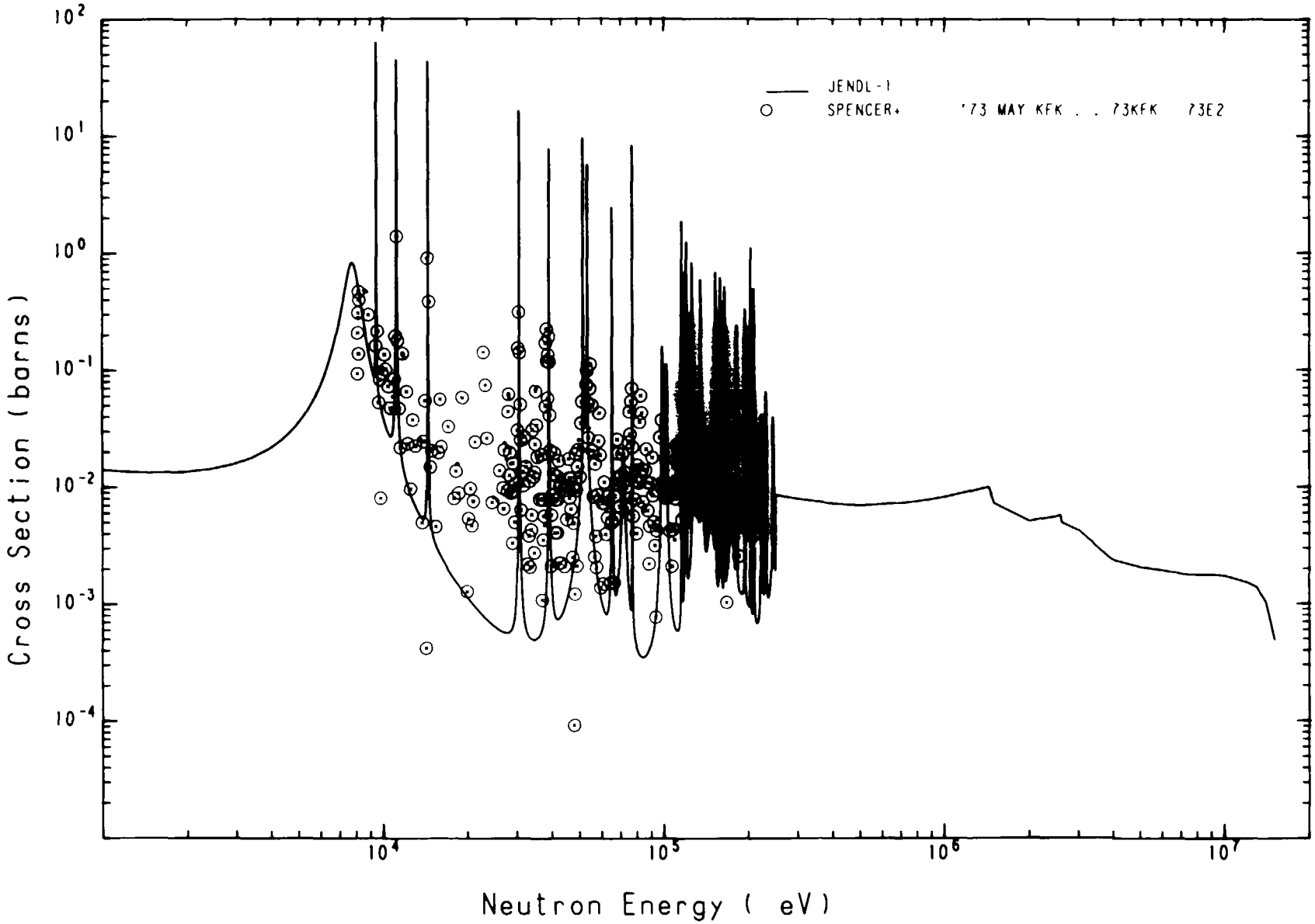


$_{26}Fe$

(n, 2n)


JENDL-1
ENDF/B-IV
ASHBY+ '58 JUL LRL . . PR 111+616
SALNIKOV+ '72 MAR FEI . . YK- 7 102
FREHAUT+ '74 NOV BRC . . CEA-R 4627
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
10.0
15.0
20.0
Cross Section (barns)
Neutron Energy (MeV)

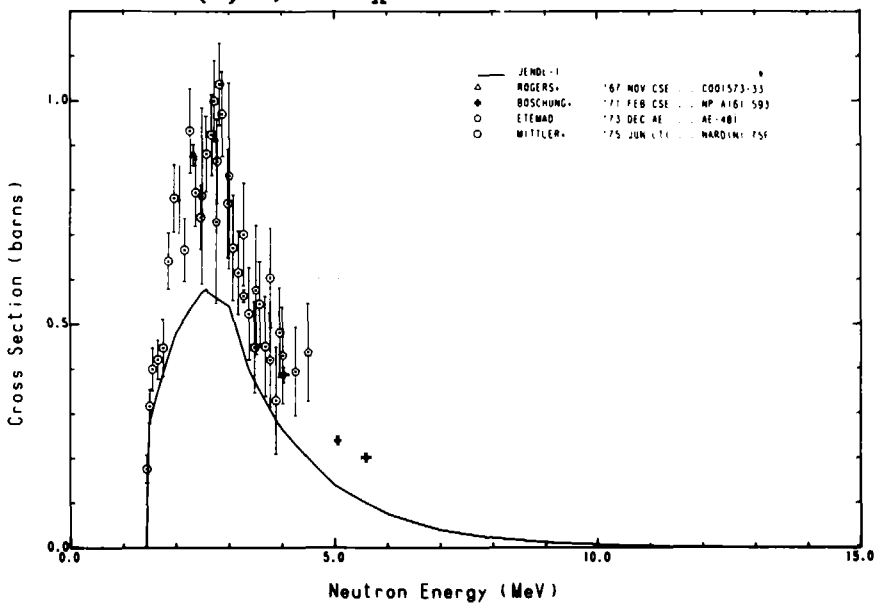
^{54}Fe
(n, γ)


JENDL-1
SPENCER+ '73 MAY KFK . . 73KFK 73E2
Cross Section (barns)
Neutron Energy (eV)
10^2
10^1
10^0
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^4
10^5
10^6
10^7

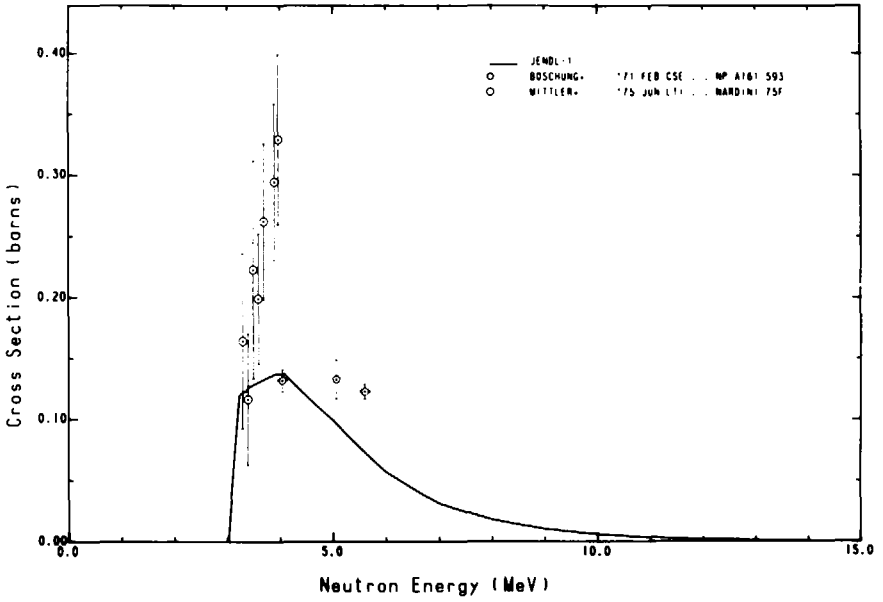
^{54}Fe

(n,n')
(n,n'γ)

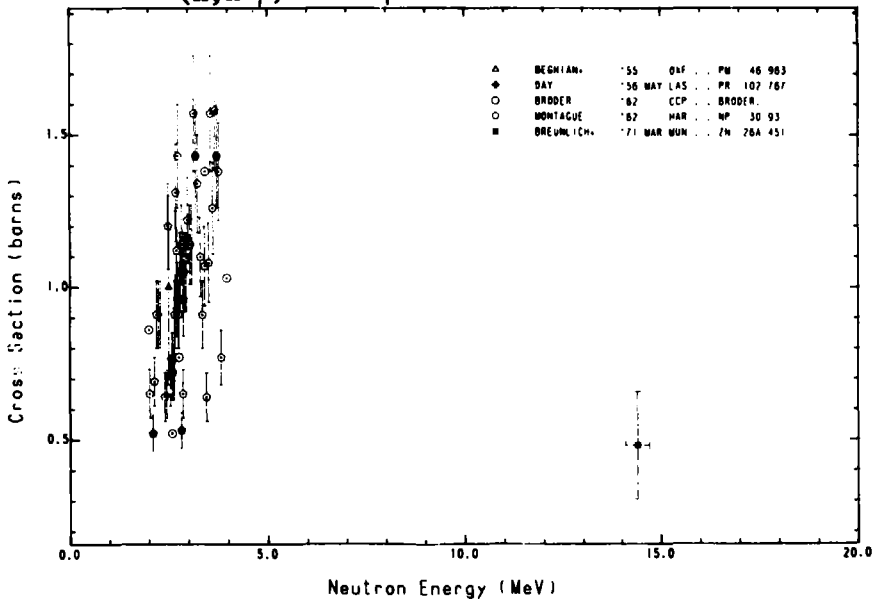
(n,n') E_x=1.41 MeV



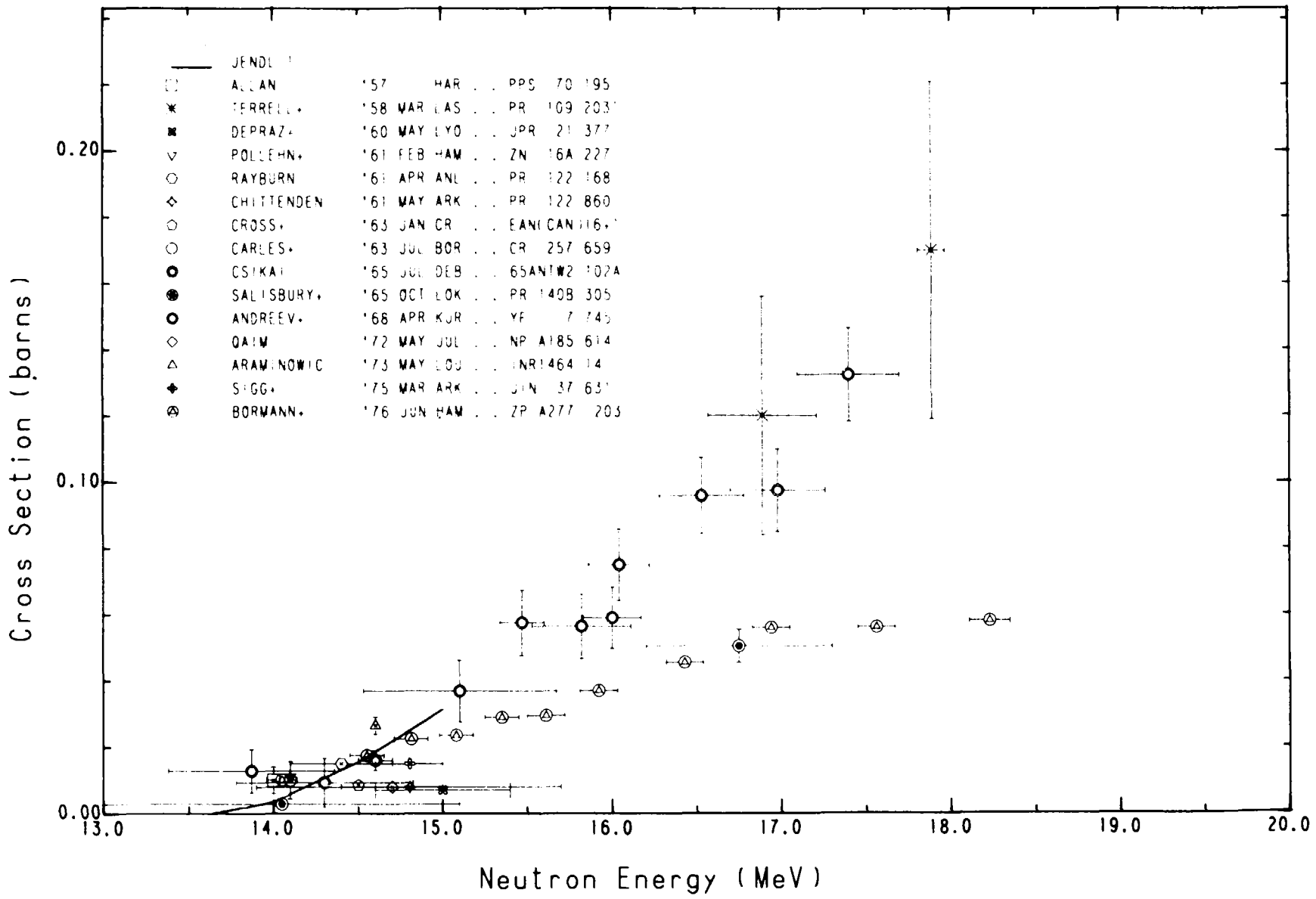
(n,n') E_x=2.96 MeV



(n,n'γ) E_γ=1.41 MeV



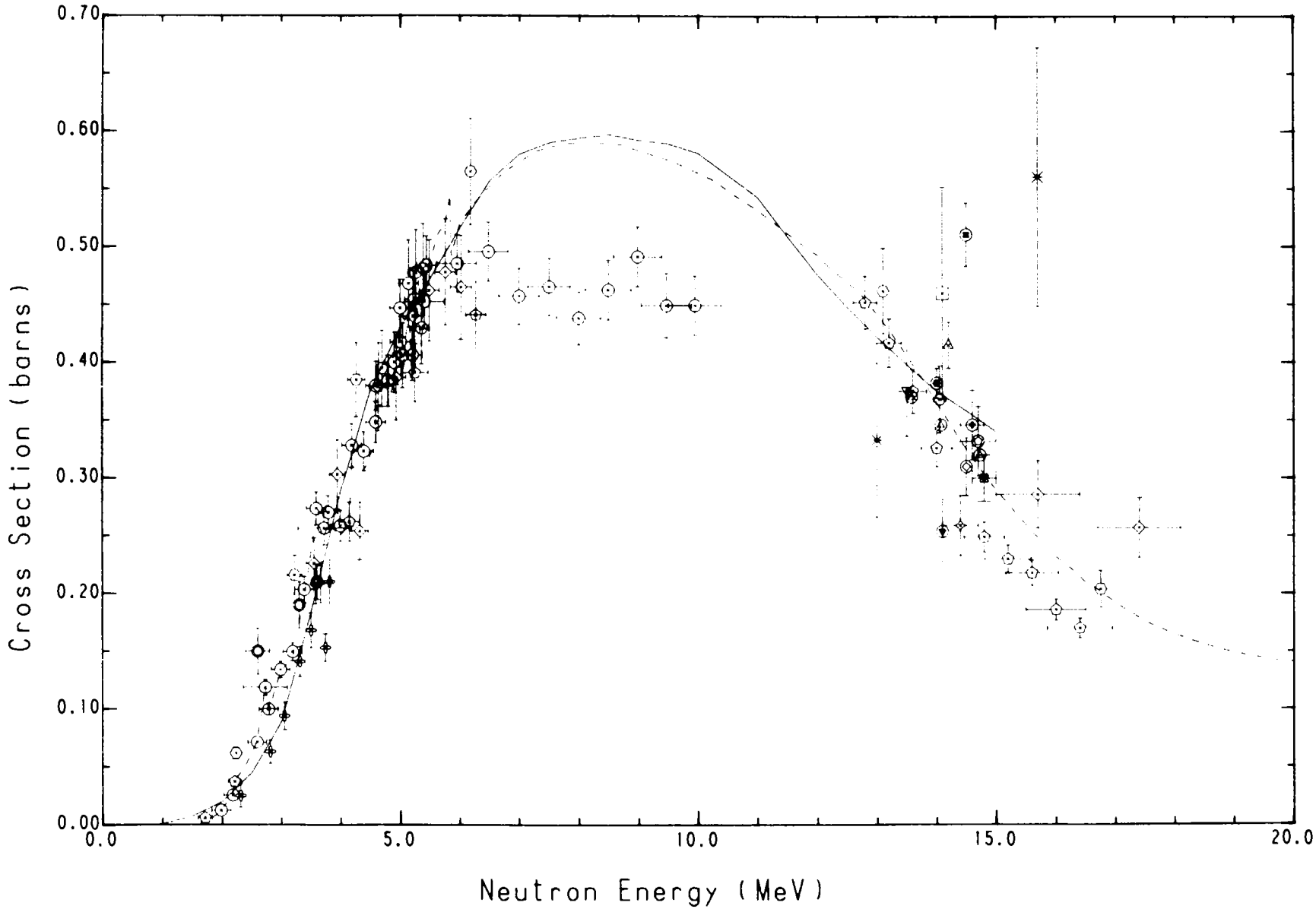
^{54}Fe
(n,2n)


JENDL
ALLAN '57 HAR . . PPS 70 195
FERRELL+ '58 MAR LAS . . PR 109 2031
DEPRAZ+ '60 MAY LYO . . JPR 21 377
POLLEHN+ '61 FEB HAM . . ZN 16A 227
RAYBURN '61 APR ANL . . PR 122 168
CHITTENDEN '61 MAY ARK . . PR 122 860
CROSS+ '63 JAN CR . . EANDCAN 116+
CARLES+ '63 JUL BOR . . CR 257 659
CSIKAI '65 JUL DEB . . 65ANTW2 102A
SALISBURY+ '65 OCT LOK . . PR 140B 305
ANDREEV+ '68 APR KUR . . YF 7 745
QAIM '72 MAY JUL . . NP A185 614
ARAMBASIC '73 MAY LOU . . INR1464 14
SIGG+ '75 MAR ARK . . JIN 37 631
BORMANN+ '76 JUN HAM . . ZP A277 203
0.20
0.10
0.00
13.0
14.0
15.0
16.0
17.0
18.0
19.0
20.0
Cross Section (barns)
Neutron Energy (MeV)

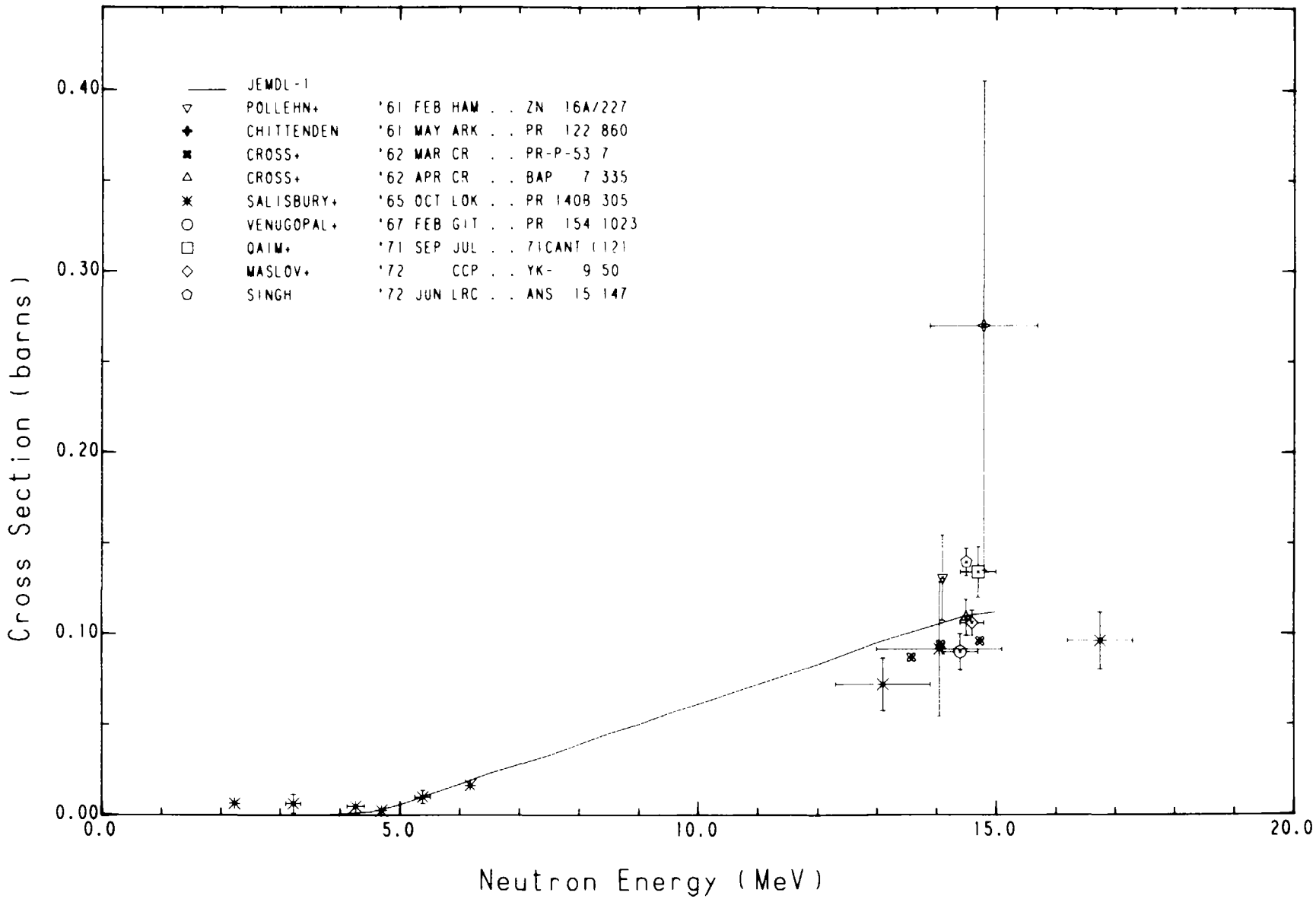
^{54}Fe
(n,p)

—·—	JENDL-1								
······	ENDF/B-IV								
□	ALLAN	'57	MAR	HAR	.	.	PPS	70	195
▽	MARCH+	'58	FEB	GLS	.	.	PM	3	143
△	ALLAN	'59	APR	HAR	.	.	NP	10	348
✱	STOREY+	'60		GLS	.	.	PPS75		526
⊽	POLLEHN+	'61	FEB	HAM	.	.	ZN	16A	227
●	ALLAN	'61	APR	HAR	.	.	NP	24	274
O	VAN LOEF	'61	APR	SAN	.	.	NP	24	340
⊛	CROSS+	'62		CRC	.	.	AFCL		542
⊗	CROSS+	'62	APR	CRC	.	.	BAP	7	355
◇	CARROLL	'65	AUG	BET	.	.	NSE	22	4[illegible]
○	SALISBURY+	'65	OCT	LOK	.	.	PR	140	3058
✦	LAUBER+	'65	NOV	AE	.	.	NP	73	234
◇	VENUGOPALA	'67	FEB	GIT	.	.	PR	154	1023
⊛	BARRALL+	'69	MAR	STF	.	.	AFWL	68	134
✱	BARRALL+	'69	DEC	LRC	.	.	NP A138		387
⊛	SINGH	'70	JUN	LRC	.	.	ANS	15	147
⊛	QAIM	'71	SEP	JUL	.	.	71CAN	[illegible]	
⊛	PAULSEN+	'71	SEP	GEL	.	.	71CAN	[illegible]	
○	D.SMITH+	'75	NOV	ANL	.	.	NSE	58	[illegible]

^{54}Fe
(n,p)

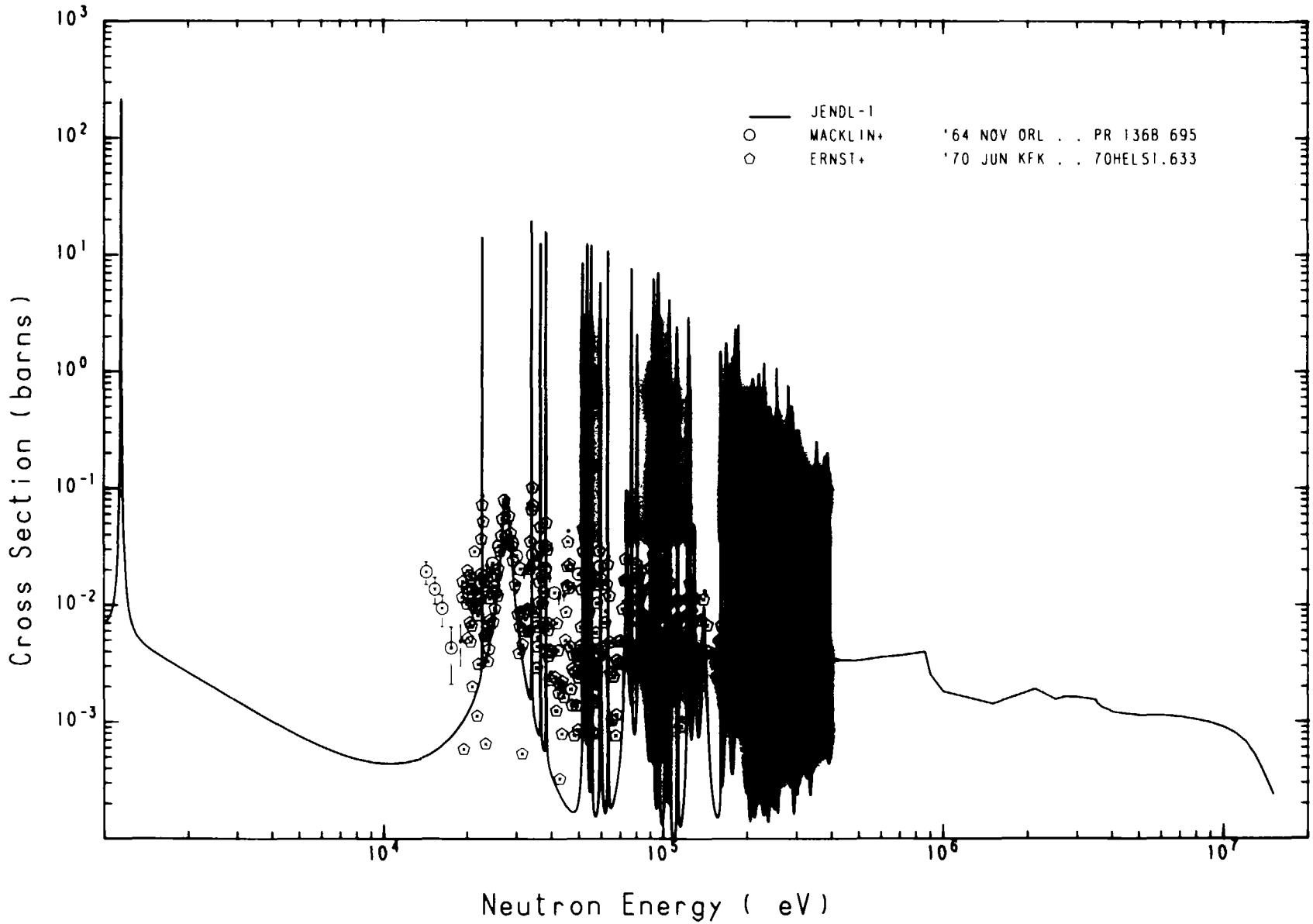

0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Cross Section (barns)
0.0
5.0
10.0
15.0
20.0
Neutron Energy (MeV)

^{54}Fe
(n,α)

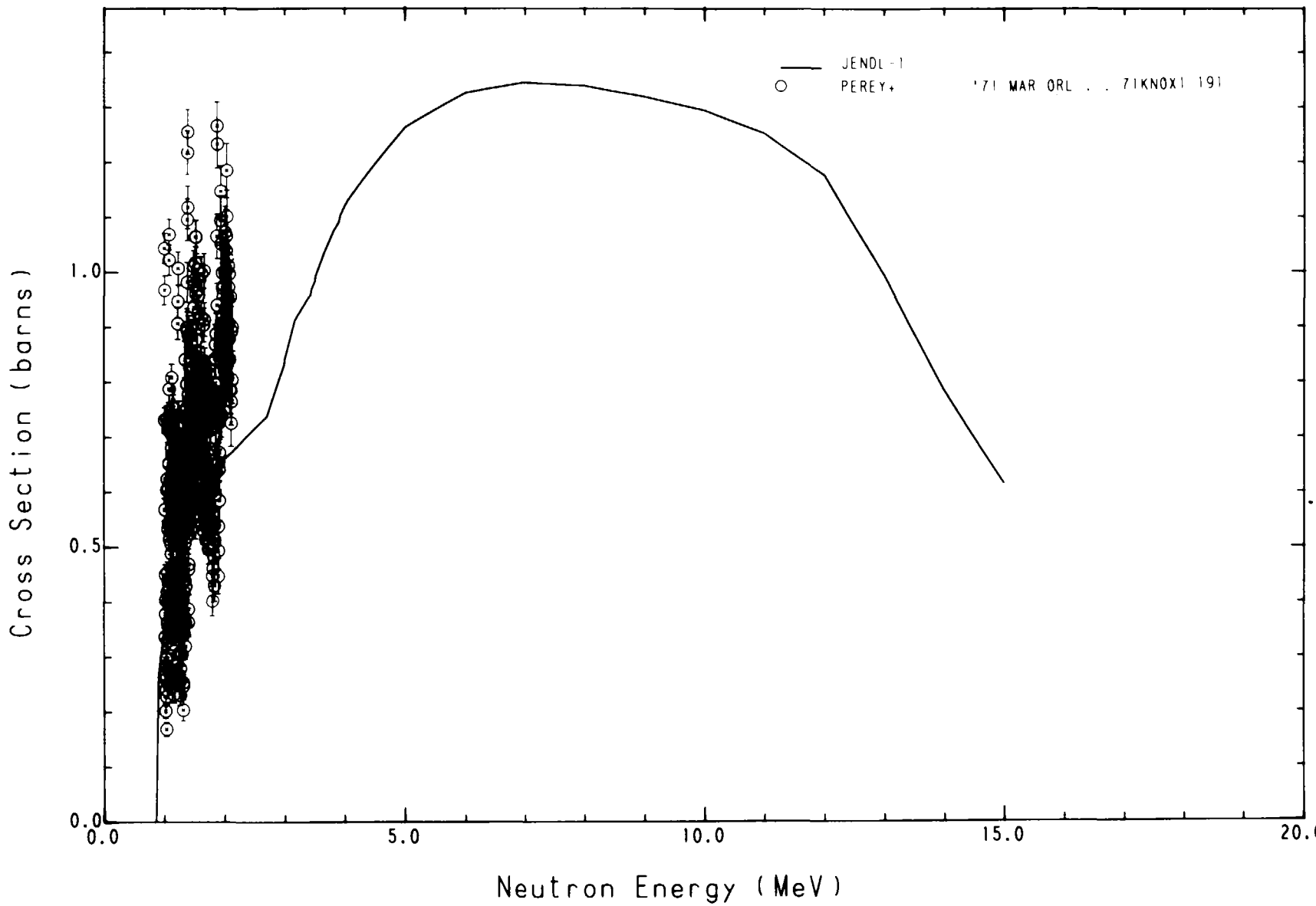

JEMDL-1
POLLEHN+ '61 FEB HAM . . ZN 16A/227
CHITTENDEN '61 MAY ARK . . PR 122 860
CROSS+ '62 MAR CR . . PR-P-53 7
CROSS+ '62 APR CR . . BAP 7 335
SALISBURY+ '65 OCT LOK . . PR 140B 305
VENUGOPAL+ '67 FEB GIT . . PR 154 1023
OAIM+ '71 SEP JUL . . 71CANT (121
MASLOV+ '72 CCP . . YK- 9 50
SINGH '72 JUN LRC . . ANS 15 147
Cross Section (barns)
0.00
0.10
0.20
0.30
0.40
0.0
5.0
10.0
15.0
20.0
Neutron Energy (MeV)

^{56}Fe

(n,γ)

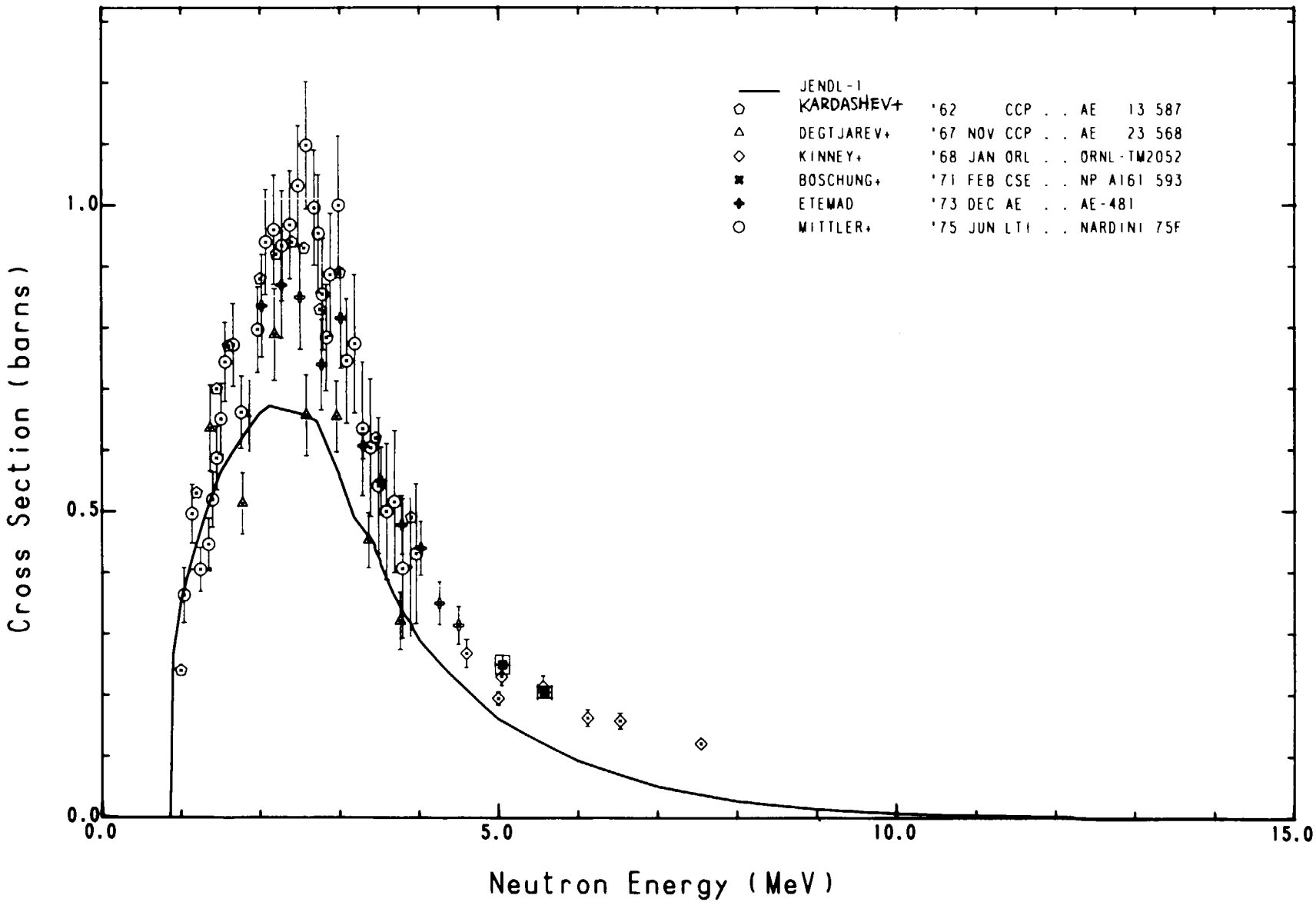

JENDL-1
MACKLIN+ '64 NOV ORL . . PR 136B 695
ERNST+ '70 JUN KFK . . 70HELS1.633
Cross Section (barns)
Neutron Energy (eV)
10^3
10^2
10^1
10^0
10^-1
10^-2
10^-3
10^4
10^5
10^6
10^7

^{56}Fe
(n,n')


JENDL-1
PEREY+
'71 MAR ORL . . 71KNOX1 191
Cross Section (barns)
1.0
0.5
0.0
0.0
5.0
10.0
15.0
20.0
Neutron Energy (MeV)

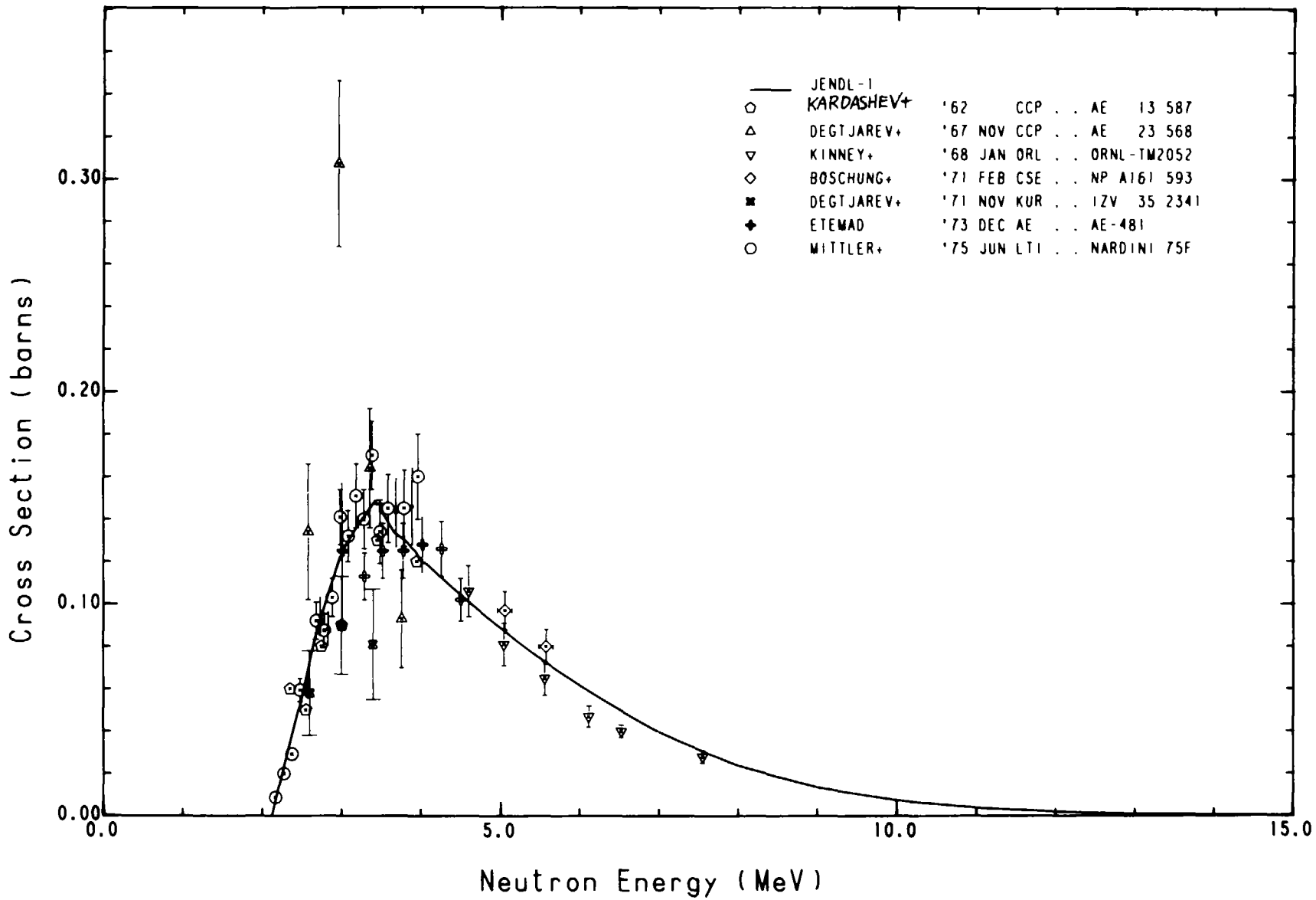
^{56}Fe
(n,n')

E_x=0.845 MeV



^{56}Fe
(n,n')

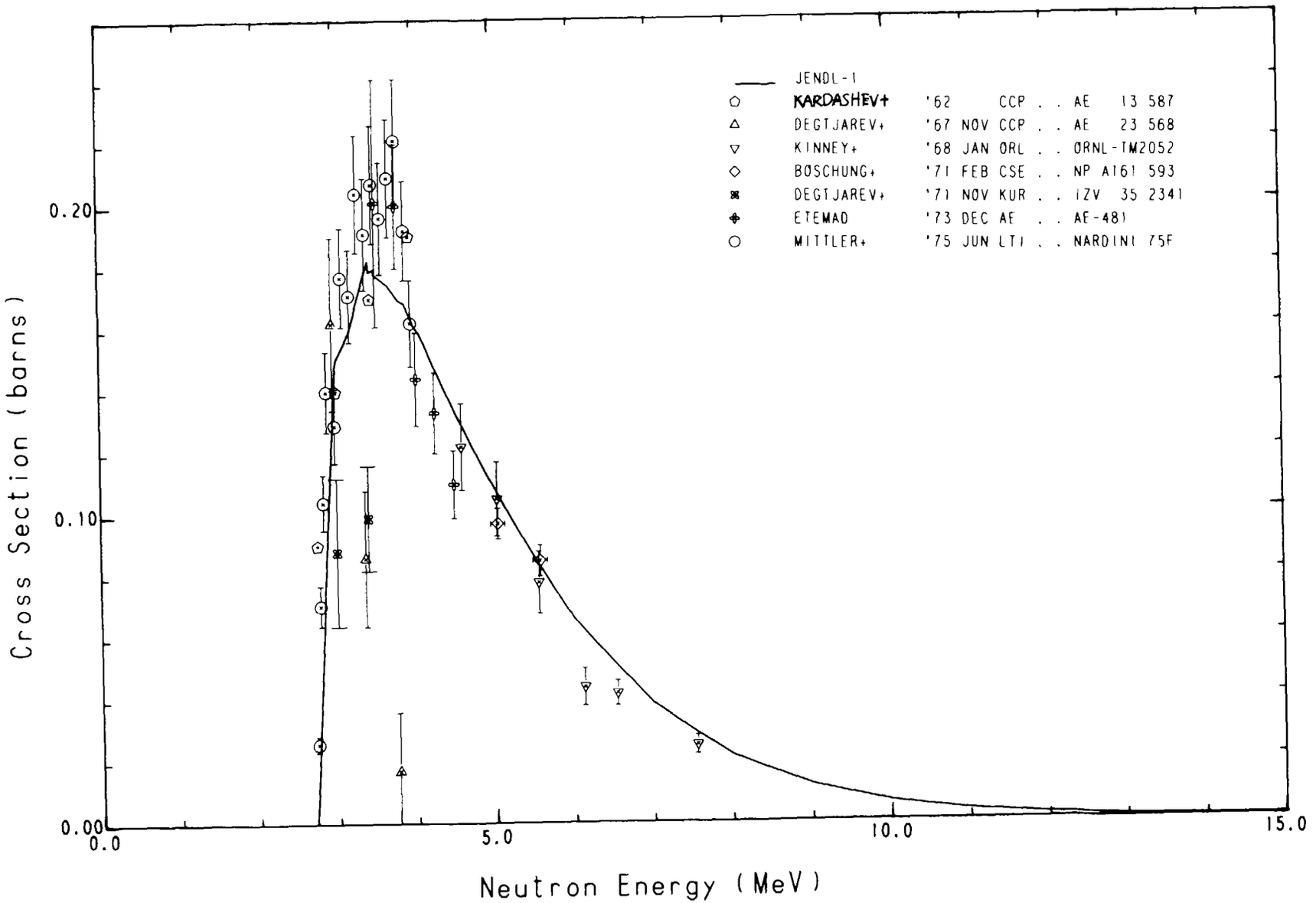
E_x=2.08 MeV



^{56}Fe

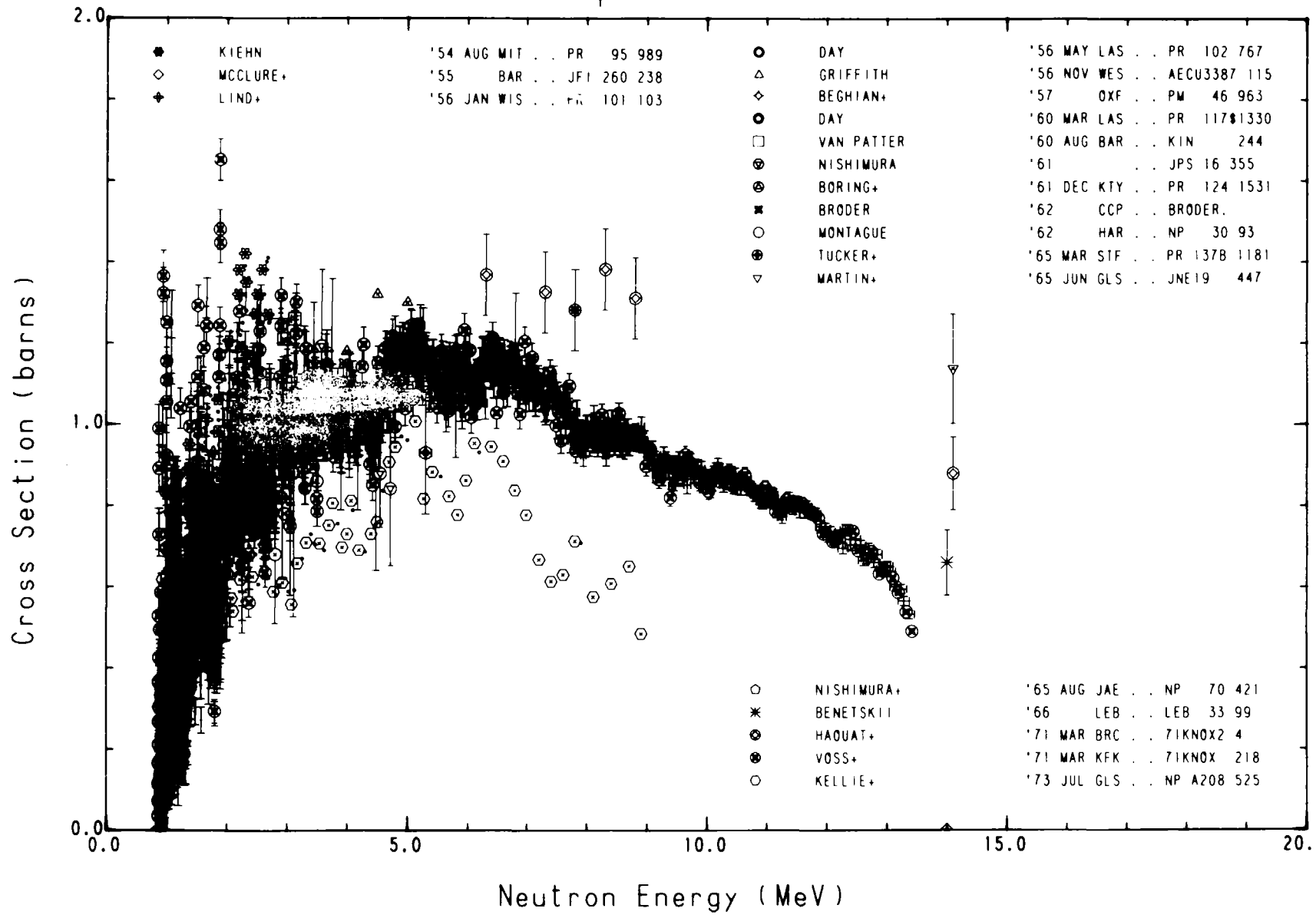
(n,n')

E_x=2.65 MeV



^{56}Fe
(n,n'γ)

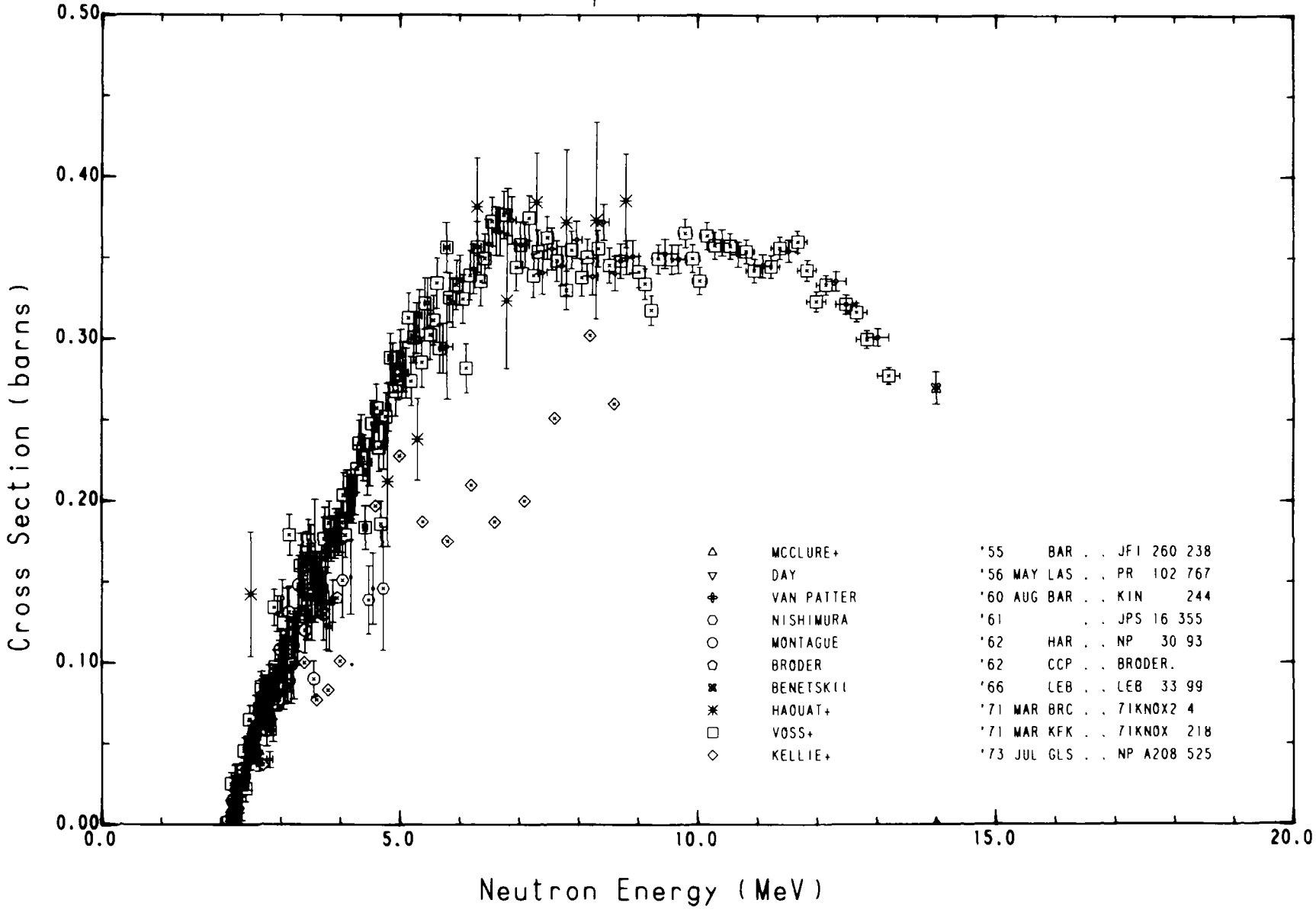
E_γ=0.845 MeV



^{56}Fe

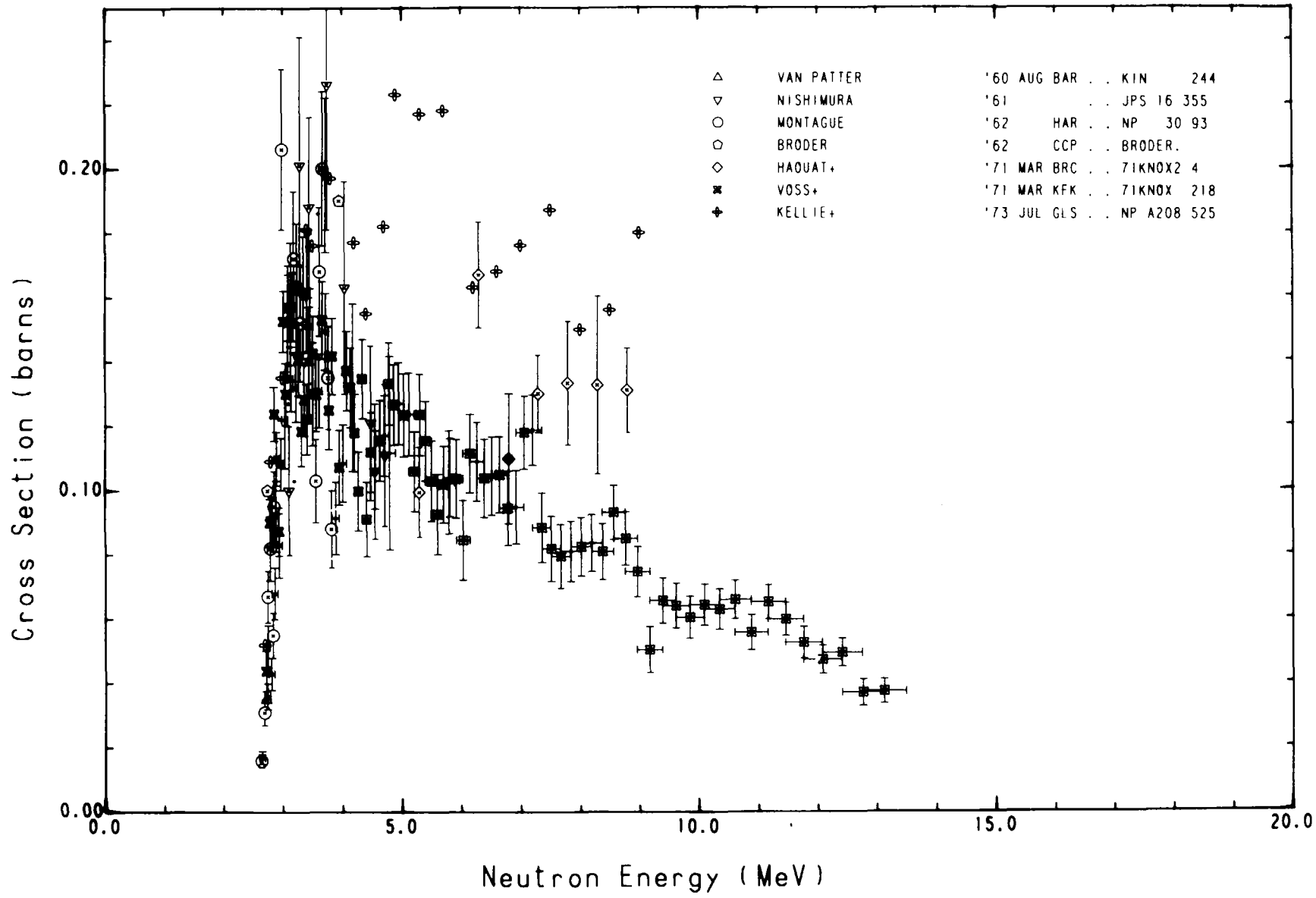
(n,n'γ)

E_γ=1.24 MeV



^{56}Fe
(n,n'γ)

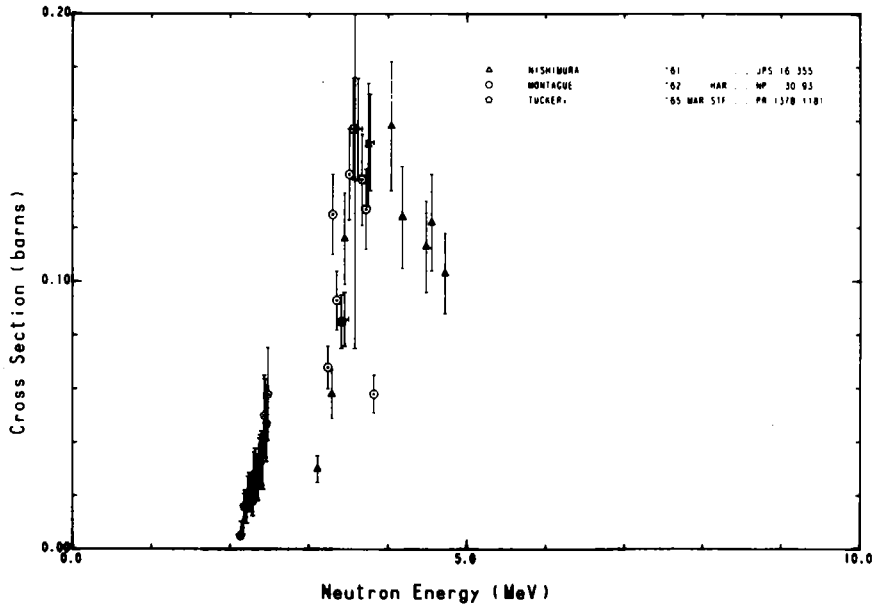
E_γ=1.81 MeV



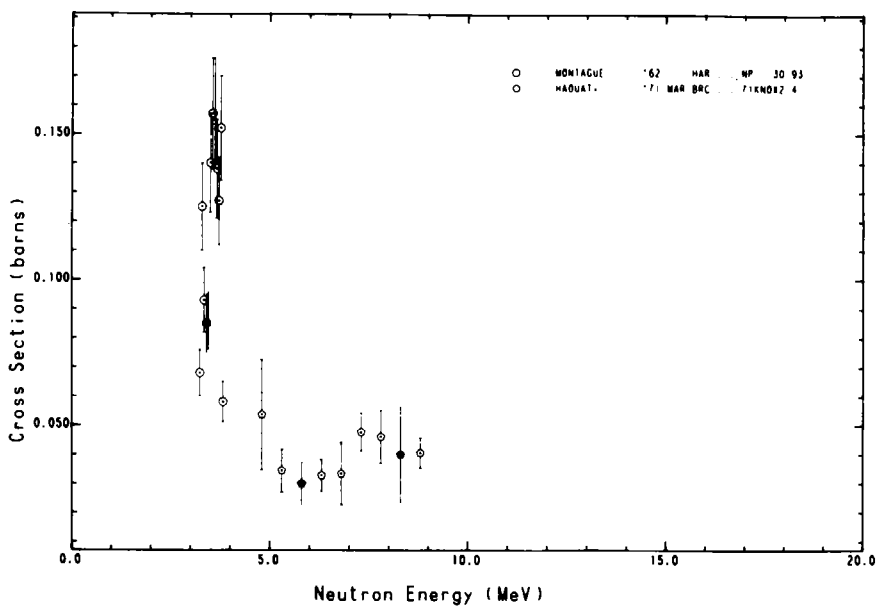
^{56}Fe

(n,n'γ)

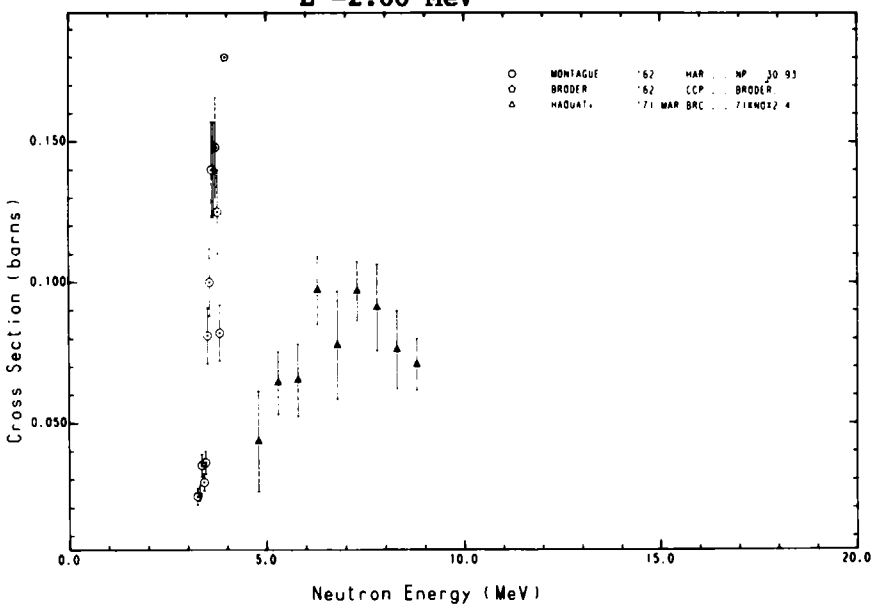
E =2.085 MeV



E =2.27 MeV



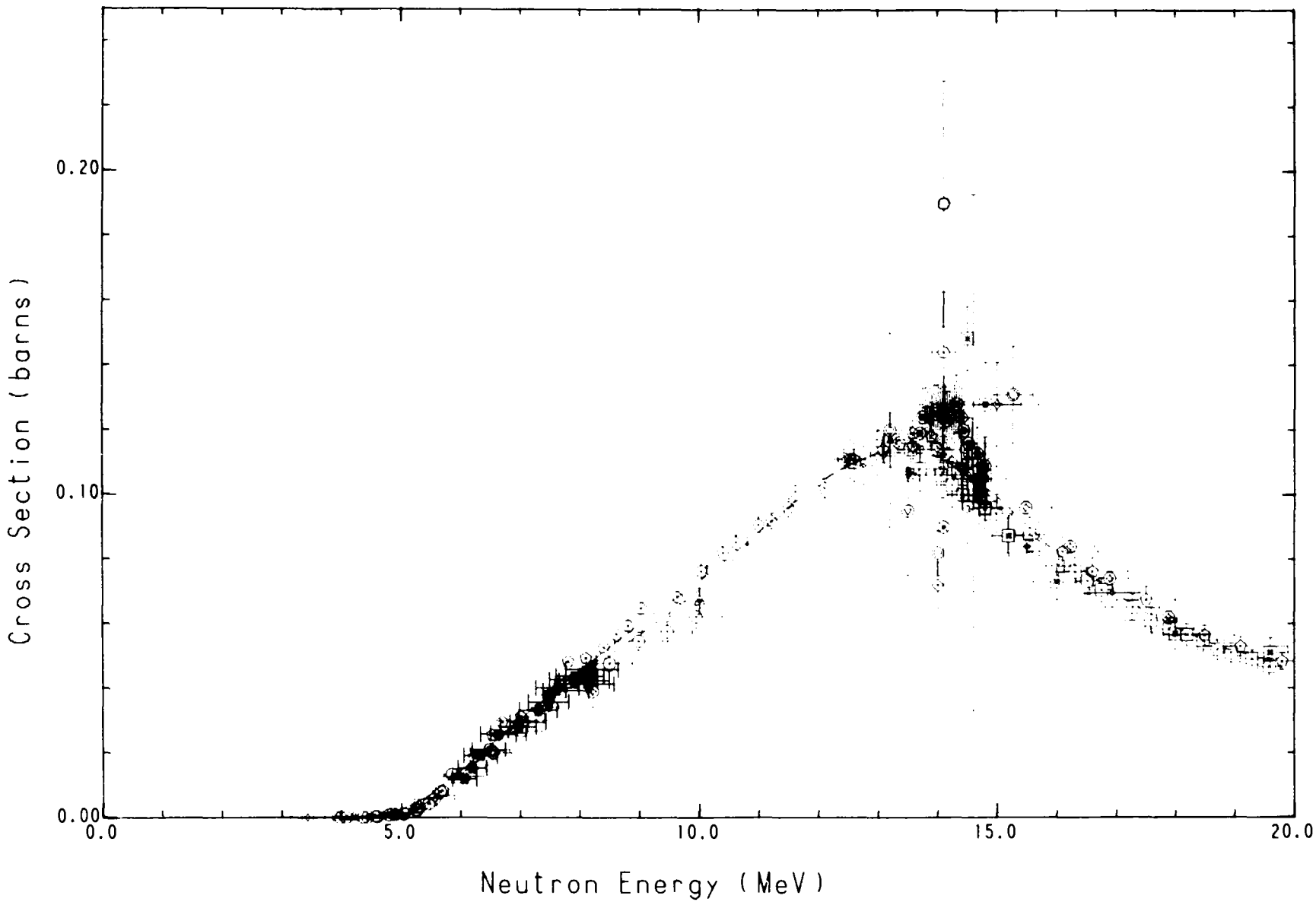
E =2.60 MeV



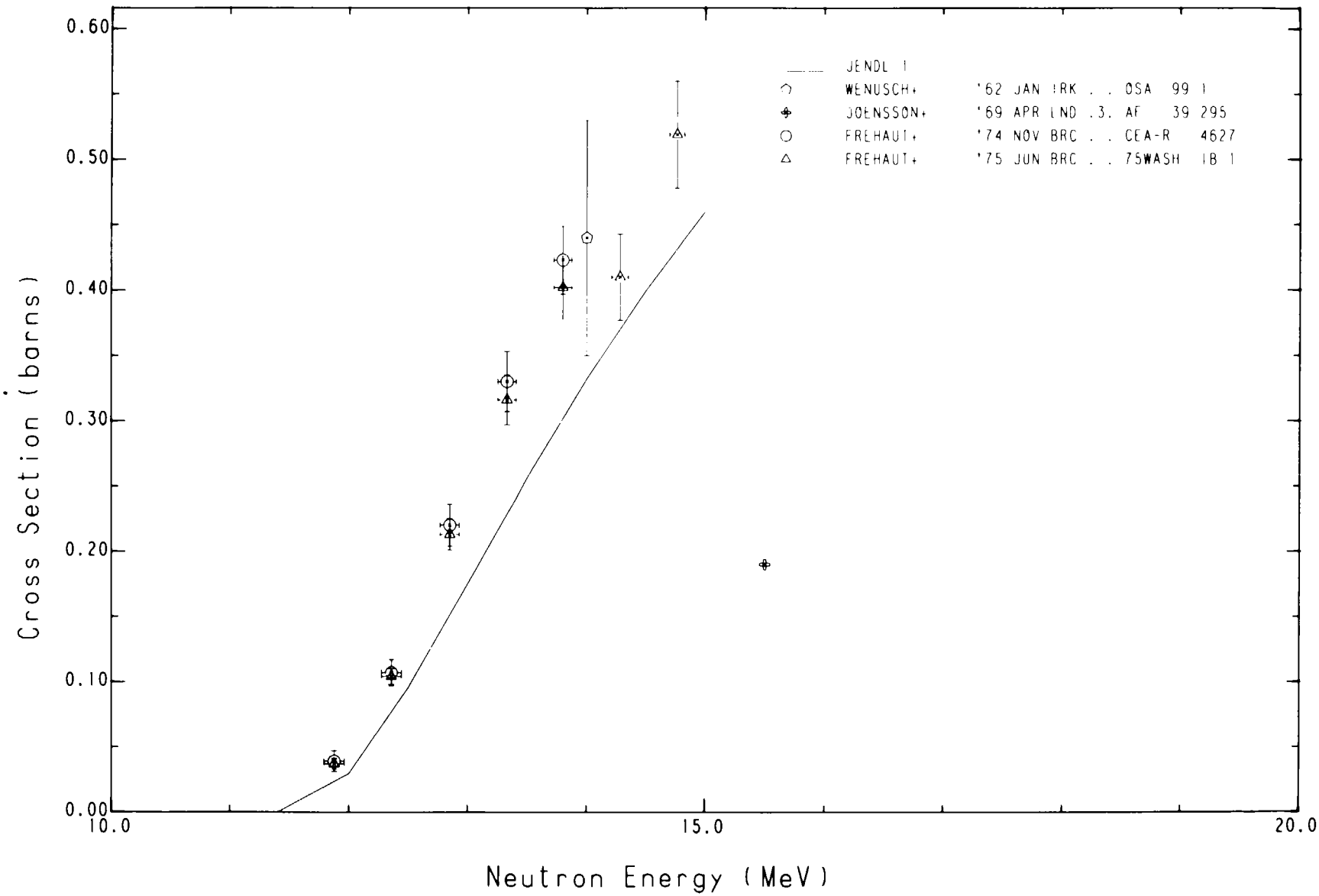
^{56}Fe
(n,p)

———	JENDL-1									
.....	ENDF/B-IV									
○	FORBES	'52	DEC	LAS	. .	PR	88	1309		
○	PAUL+	'53			. .	CJP	31	267		
○	ALLAN	'53	MAR	HAR	. .	PPS	70	195		
◇	MCCLURE+	'55		BAR	. .	JFI	260	238		
⊗	BROWN+	'57		GLS	. .	PM	2	785		
○	YASUMI	'57	MAY	KON	. .	JPJ	12	443		
⊗	MARCH+	'58	FEB	GLS	. .	PM	3	143		
⊗	TERRELL+	'58	MAR	LAS	. .	PR	109	2031		
○	KERN+	'59	MAY	NRD	. .	NP	10	226		
⊗	STOREY+	'60		GLS	. .	PPS/5		526		
◇	DEPRAZ+	'60	MAY	LYO	. .	JPR	21	377		
⊕	POLLEHN+	'61	FEB	HAM	. .	ZN	16A	227		
○	ALLAN	'61	APR	HAR	. .	NP	24	274		
⊡	CHITTENDEN	'61	MAY	ARK	. .	PR	122	860		
⊡	BORMANN	'62		HAM	. .	ZP	166	477		
⊡	CROSS+	'62		CRC	. .	AECL		1542		
⊡	CROSS+	'62	APR	CRC	. .	BAP	7	335		
⊡	GABBARD+	'62	NOV	KTY	. .	PR	128	1276		
⊕	BONAZZOLA+	'64	FEB	TUR	. .	NP	51	337		
⬠	SANTRY+	'64	JUN	CRC	. .	CJP	42	1030		
⊗	STRAIN+	'65	JAN	ORL	. .	ORNL		3672		
□	LISKIEN+	'65	MAR	GEL	. .	JNE	19	73		
●	LISKIEN+	'66		GEL	. .	NUK	8	315		
✦	HEMINGWAY+	'66	MAY	DUR	. .	PRSA	292	180		
△	GRUNDL	'67	OCT	LAS	. .	NSE	30	39		
✖	VONACH+	'68	FEB	MUN	. .	EAN	E89/	37		
●	CUZZOCREA+	'68	MAR	CAT	. .	NC	B54	53		
⊡	VONACH+	'68	MAR	MUN	. .	WASHCON		E31		
⊡	LEVKOVSKIJ	'69	JAN	KAZ	. .	YF	8	7		
⊡	BARRALL+	'69	MAR	STF	. .	AFWL	-68	134		
⊡	JOENSSON+	'69	APR	LND	. .	AF	39	295		
⊕	BARRALL+	'69	DEC	LRL	. .	NP	A138	387		
⊡	SINGH	'70	JUN	LRC	. .	ANS	15	147		
⊡	QAIM+	'71	SEP	JUL	. .	71CANT		<121		
▽	DYER+	'72	APR	VBT	. .	JIN	34	1119		
✱	ROBERTSON+	'73	MAR	NPL	. .	JNE	27	139		
○	D.SMITH+	'75	NOV	ANL	. .	NSE	58	314		

^{56}Fe
(n,p)

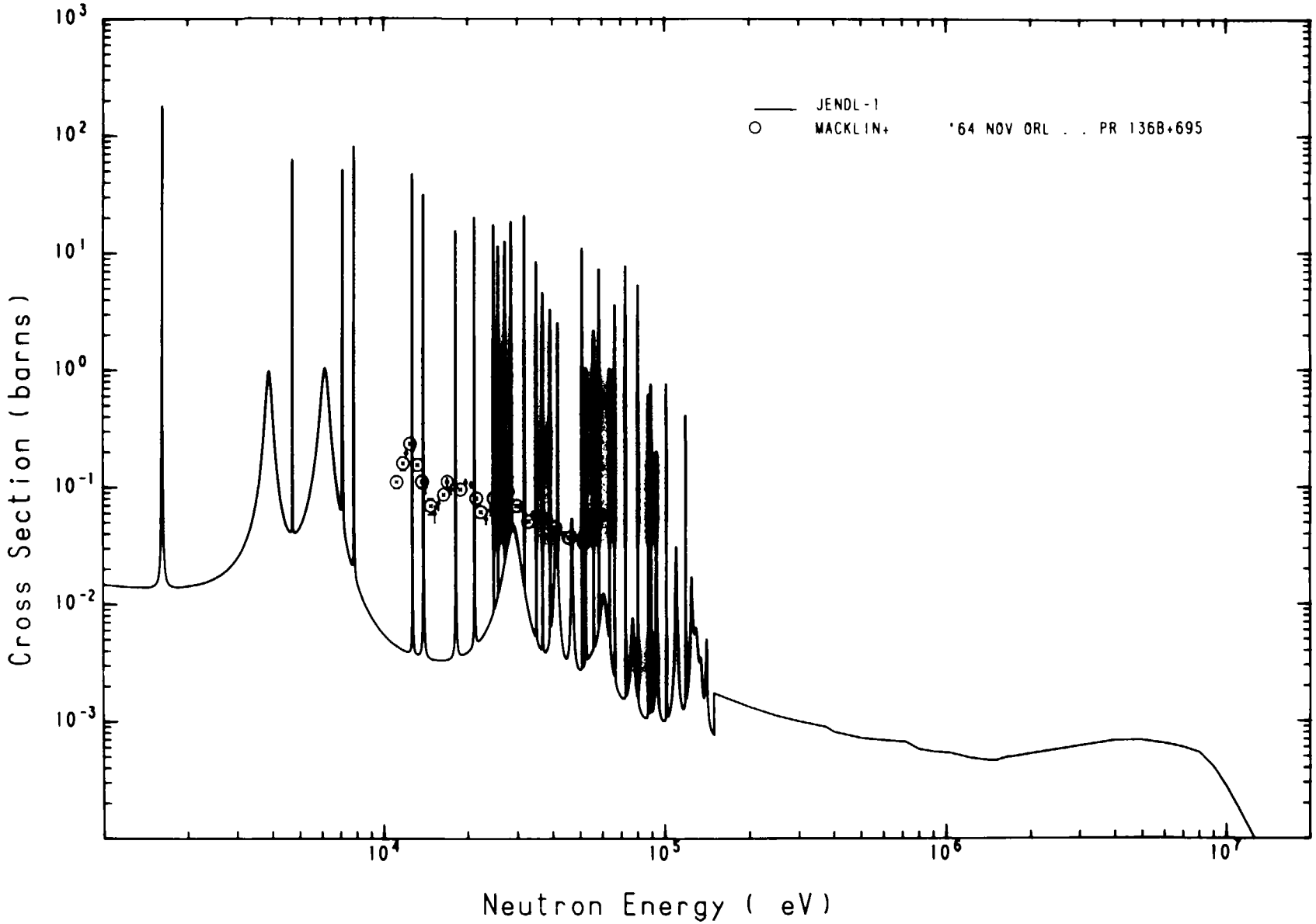

0.20
0.10
0.00
Cross Section (barns)
0.0
5.0
10.0
15.0
20.0
Neutron Energy (MeV)

^{56}Fe
(n,2n)


JENDL 1
WENUSCH+ '62 JAN IRK . . OSA 99 1
JOENSSON+ '69 APR LND .3. AF 39 295
FREHAUT+ '74 NOV BRC . . CEA-R 4627
FREHAUT+ '75 JUN BRC . . 75WASH IB 1
0.60
0.50
0.40
0.30
0.20
0.10
0.00
10.0
15.0
20.0
Cross Section (barns)
Neutron Energy (MeV)

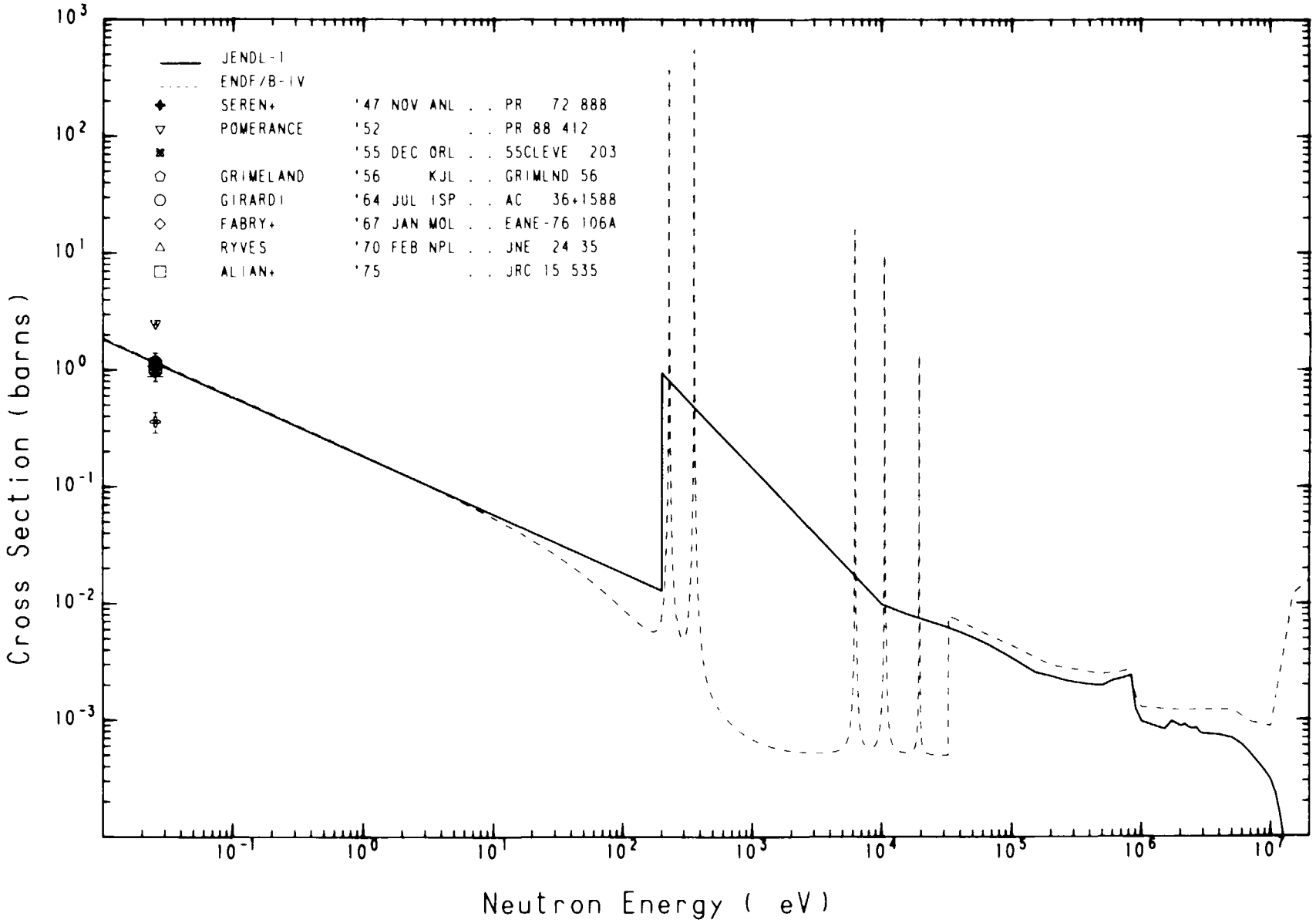
^{57}Fe

(n,γ)

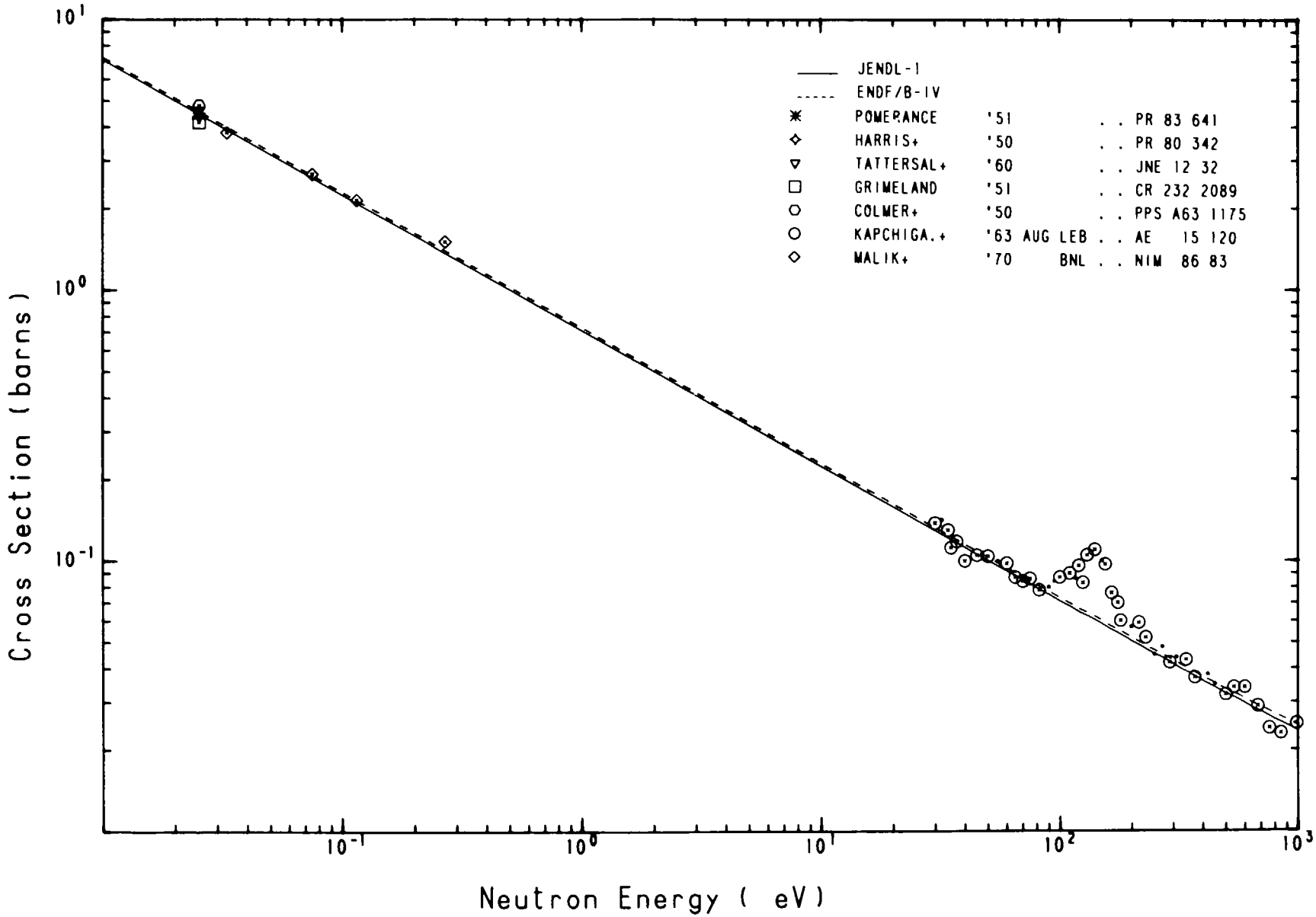

JENDL-1
MACKLIN+ '64 NOV ORL . . PR 136B+695
Cross Section (barns)
Neutron Energy (eV)
10^3
10^2
10^1
10^0
10^-1
10^-2
10^-3
10^4
10^5
10^6
10^7

^{58}Fe

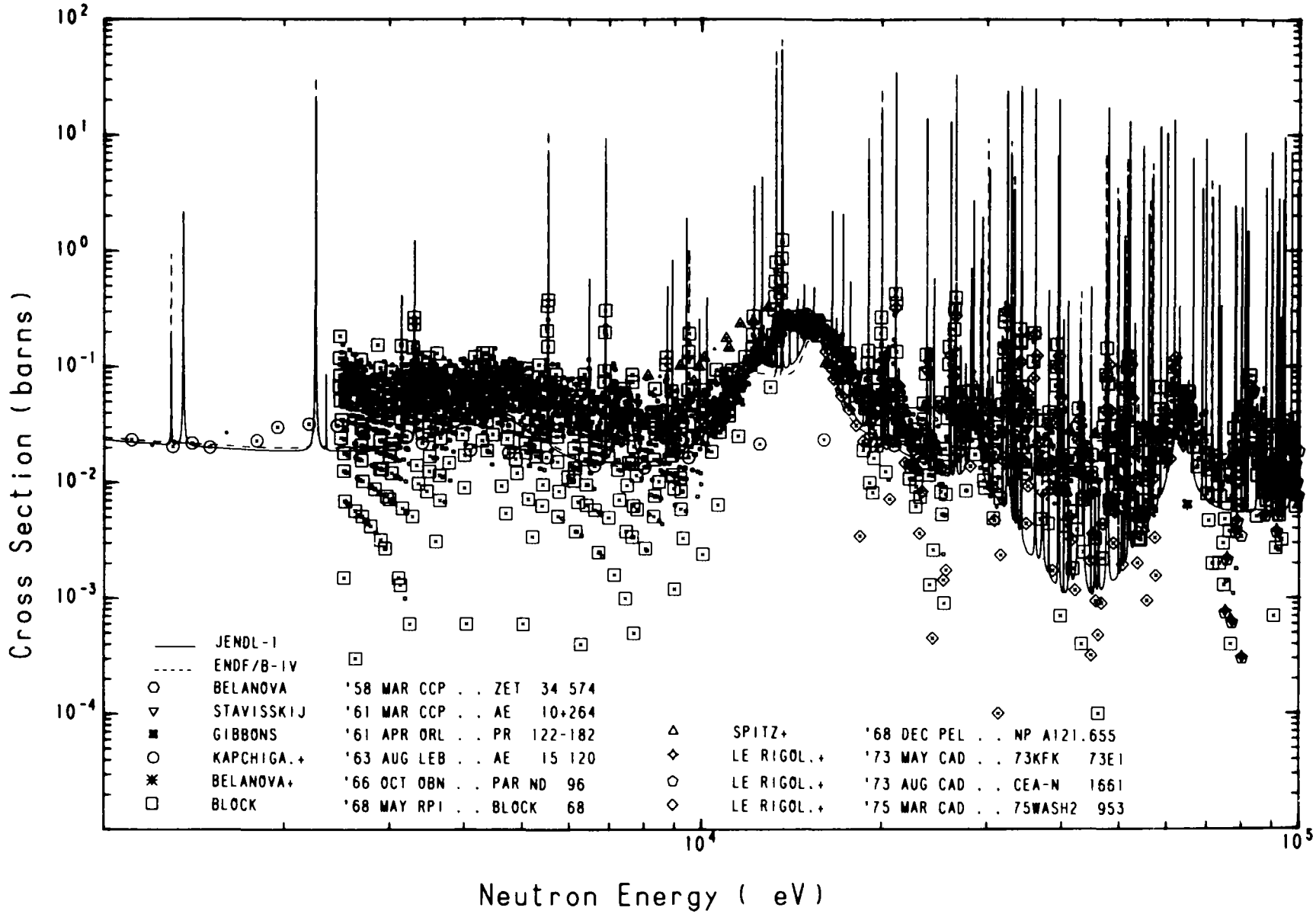
(n,γ)


JENDL-1
ENDF/B-IV
SEREN+ '47 NOV ANL . . PR 72 888
POMERANCE '52 . . PR 88 412
'55 DEC ORL . . 55CLEVE 203
GRIMELAND '56 KJL . . GRIMLND 56
GIRARDI '64 JUL ISP . . AC 36+1588
FABRY+ '67 JAN MOL . . EANE-76 106A
RYVES '70 FEB NPL . . JNE 24 35
ALIAN+ '75 . . JRC 15 535
Cross Section (barns)
Neutron Energy (eV)

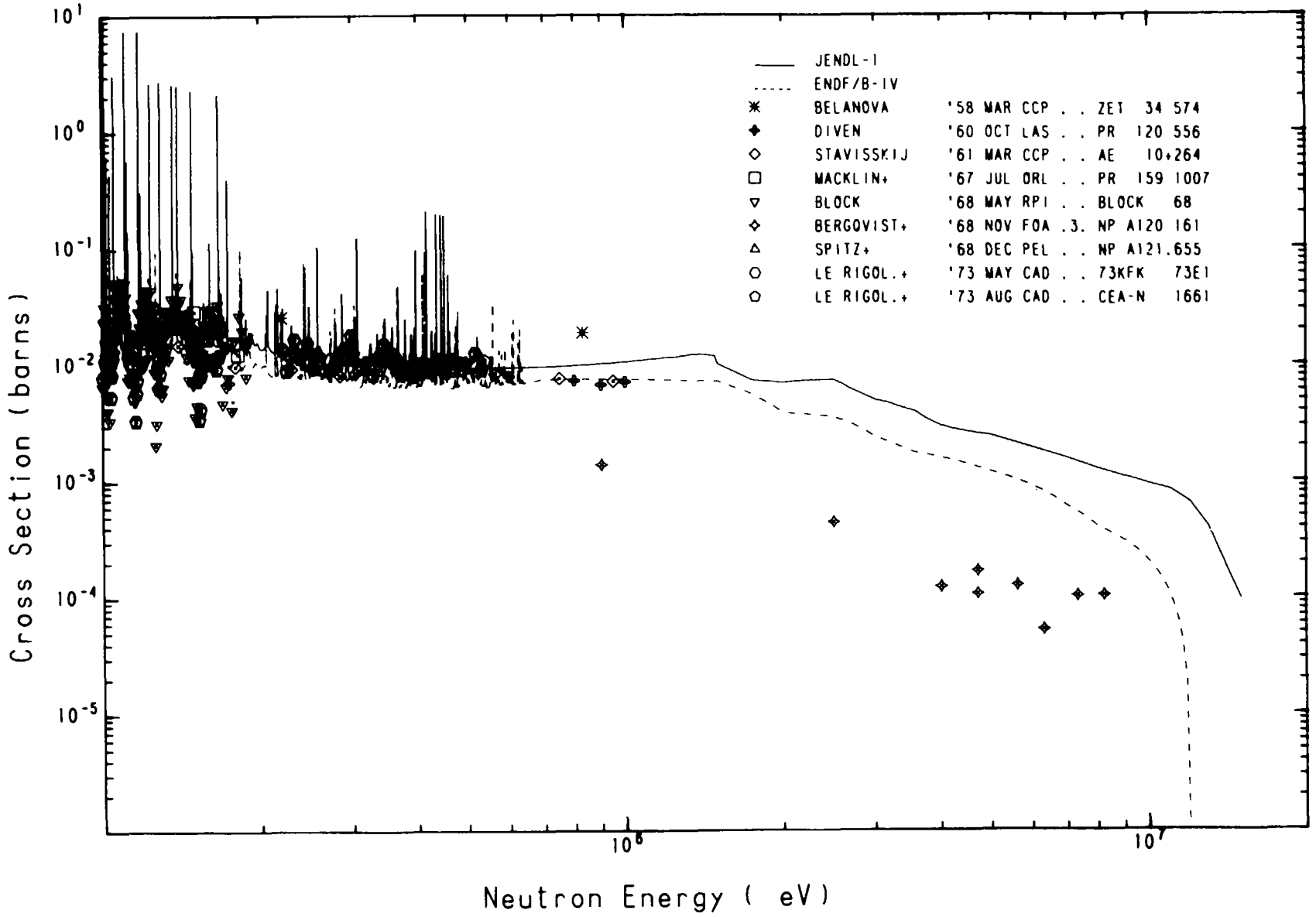
$_{28}$Ni
(n,γ)
(1)


JENDL-1
ENDF/B-IV
POMERANCE '51 . . PR 83 641
HARRIS+ '50 . . PR 80 342
TATTERSAL+ '60 . . JNE 12 32
GRIMELAND '51 . . CR 232 2089
COLMER+ '50 . . PPS A63 1175
KAPCHIGA.+ '63 AUG LEB . . AE 15 120
MALIK+ '70 BNL . . NIM 86 83
Cross Section (barns)
Neutron Energy (eV)
10^1
10^0
10^{-1}
10^{-1}
10^0
10^1
10^2
10^3

$_{28}$Ni
(n,γ)
(2)


Cross Section (barns)
Neutron Energy (eV)
JENDL-I
ENDF/B-IV
BELANOVA '58 MAR CCP . . ZET 34 574
STAVISSKIJ '61 MAR CCP . . AE 10+264
GIBBONS '61 APR ORL . . PR 122-182
KAPCHIGA.+ '63 AUG LEB . . AE 15 120
BELANOVA+ '66 OCT OBN . . PAR ND 96
BLOCK '68 MAY RPI . . BLOCK 68
SPITZ+ '68 DEC PEL . . NP A121.655
LE RIGOL.+ '73 MAY CAD . . 73KFK 73E1
LE RIGOL.+ '73 AUG CAD . . CEA-N 1661
LE RIGOL.+ '75 MAR CAD . . 75WASH2 953

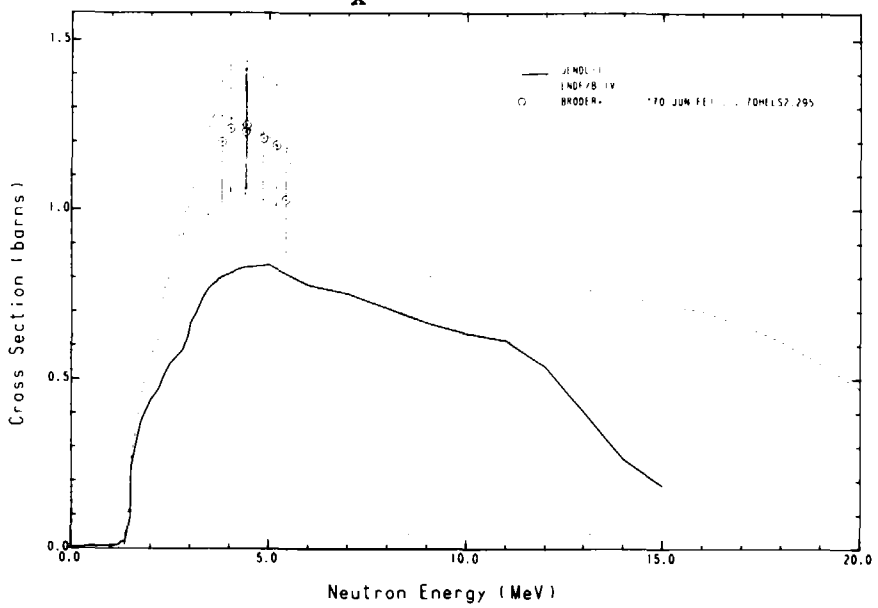
$_{28}$Ni
(n,γ)
(3)


JENDL-I
ENDF/B-IV
BELANOVA '58 MAR CCP . . ZET 34 574
DIVEN '60 OCT LAS . . PR 120 556
STAVISSKIJ '61 MAR CCP . . AE 10+264
MACKLIN+ '67 JUL ORL . . PR 159 1007
BLOCK '68 MAY RPI . . BLOCK 68
BERGQVIST+ '68 NOV FOA .3. NP A120 161
SPITZ+ '68 DEC PEL . . NP A121.655
LE RIGOL.+ '73 MAY CAD . . 73KFK 73E1
LE RIGOL.+ '73 AUG CAD . . CEA-N 1661
Cross Section (barns)
Neutron Energy (eV)

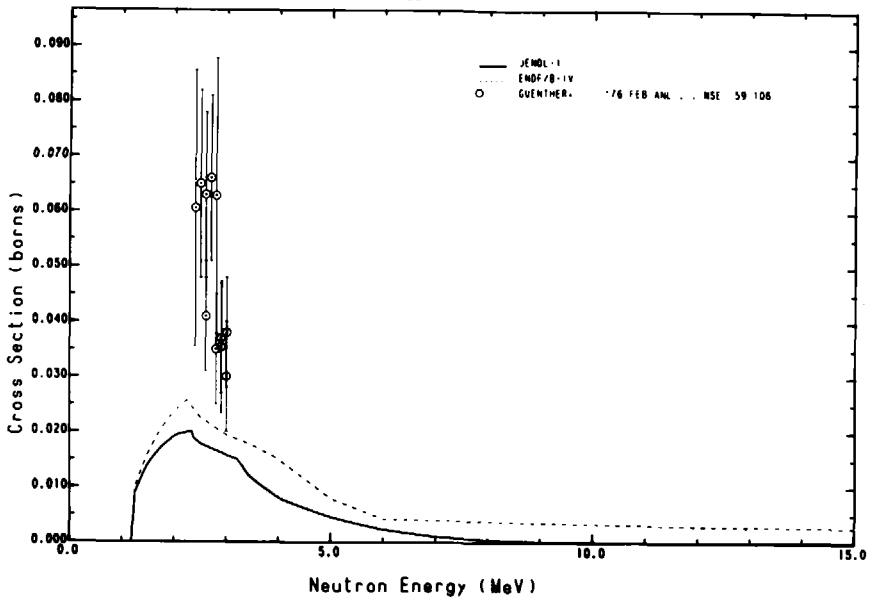
^{28}Ni

(n,n')

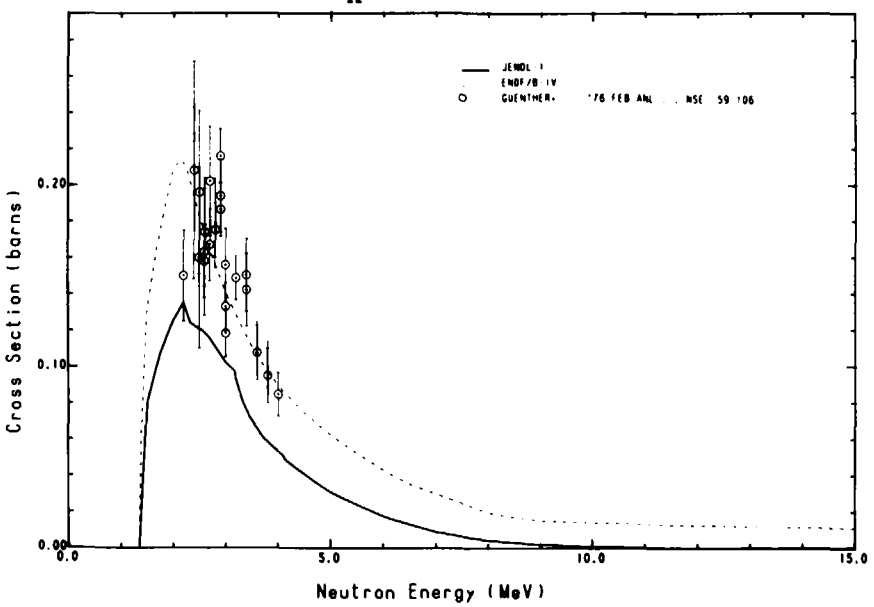
E_x=all levels



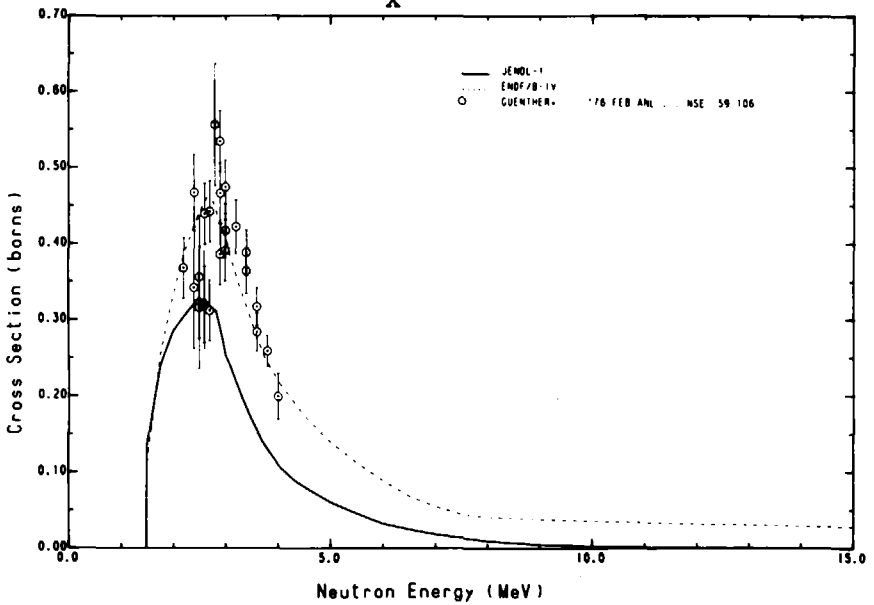
E_x=1.15 MeV



E_x=1.32 MeV



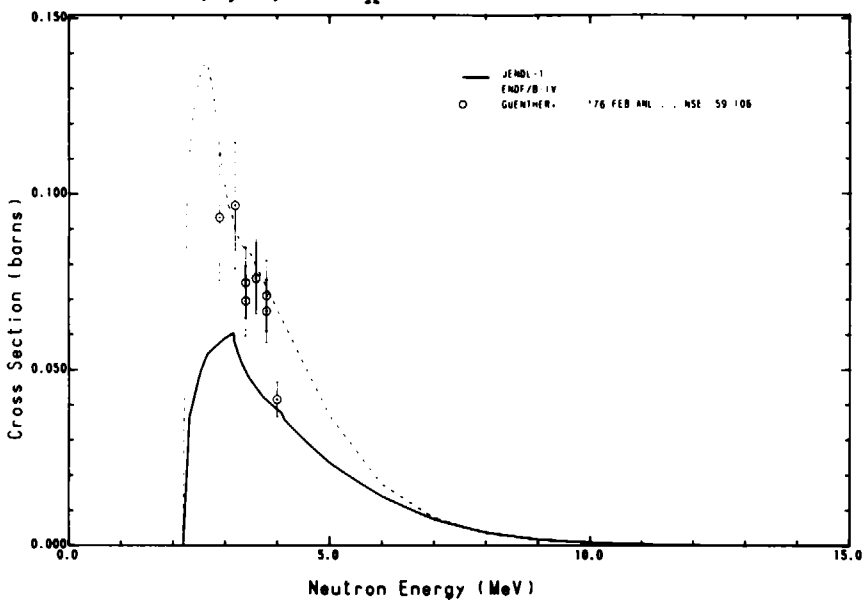
E_x=1.44 MeV



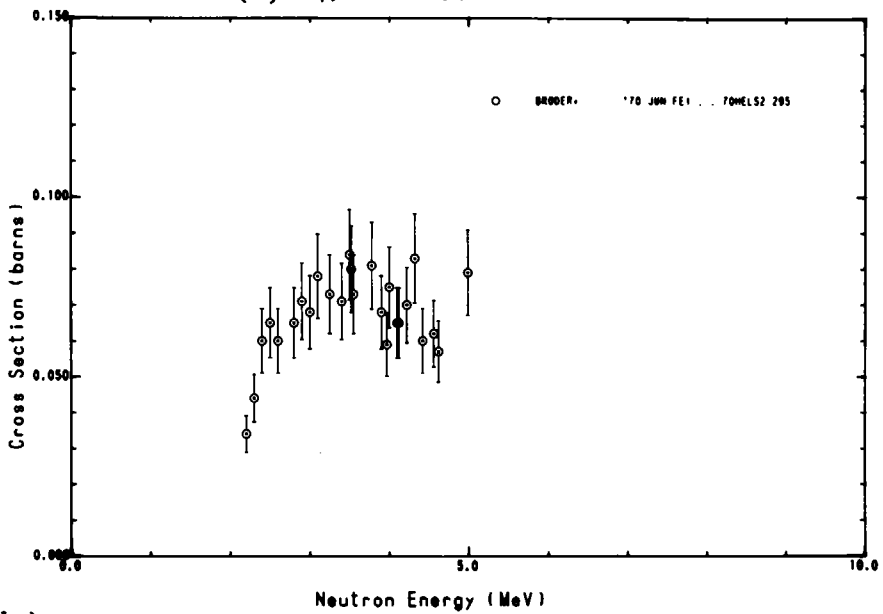
$_{28}$Ni

(n,n')
(n,n'γ)

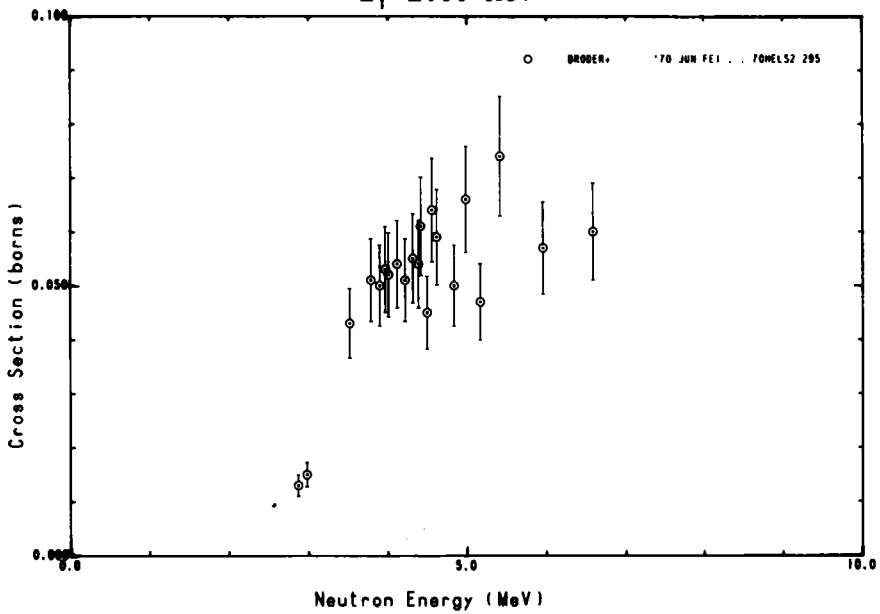
(n,n') E_x=2.14 MeV



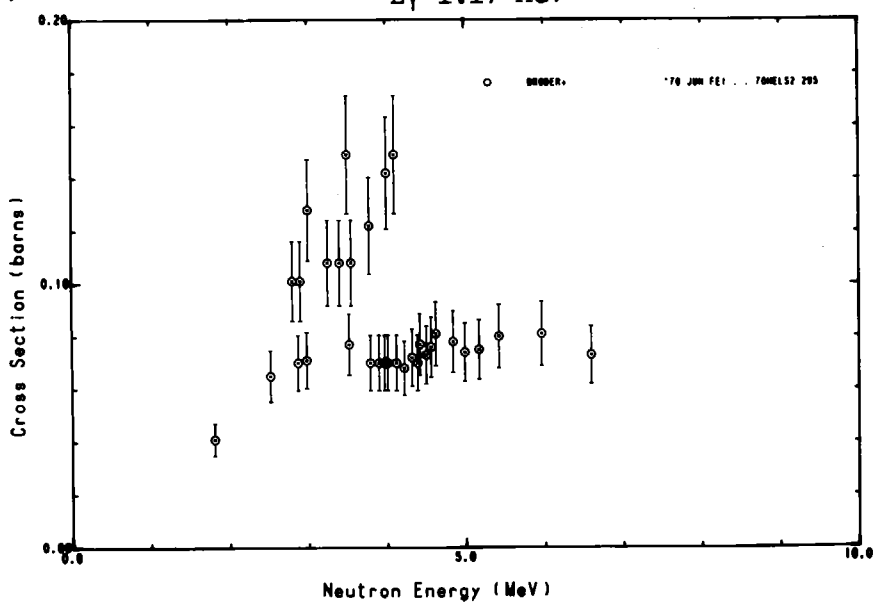
(n,n'γ) E =0.86 MeV



(n,n'γ) Eγ=1.00 MeV



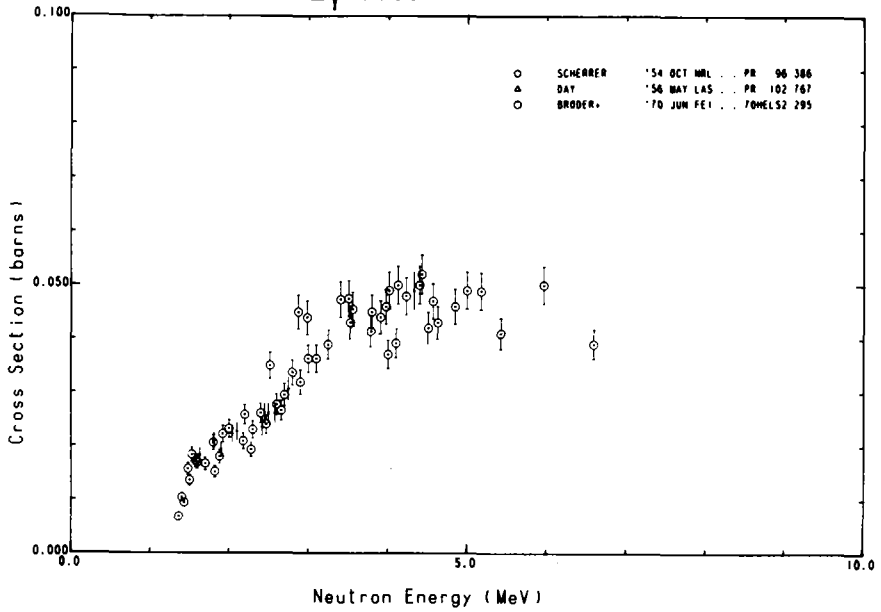
(n,n'γ) Eγ=1.17 MeV



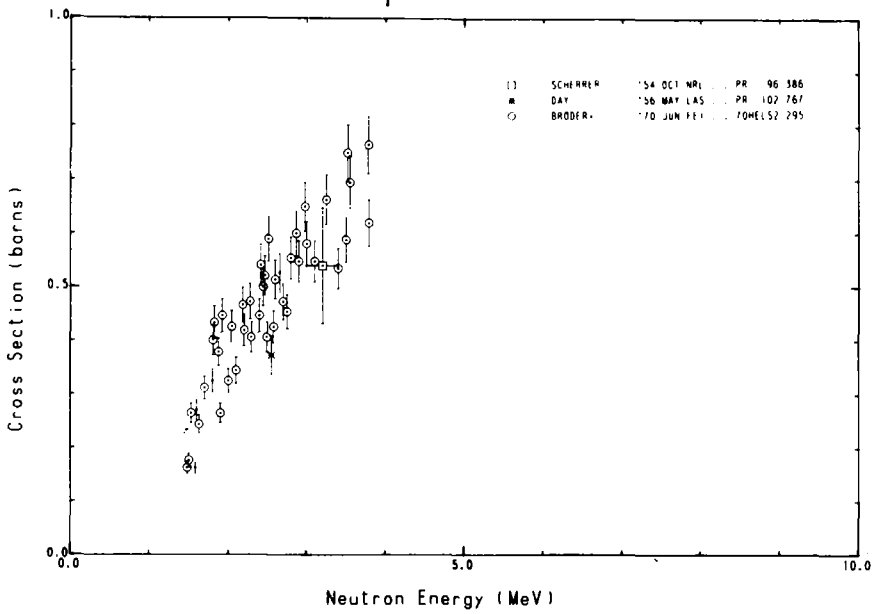
$_{28}$Ni

(n,n'γ)

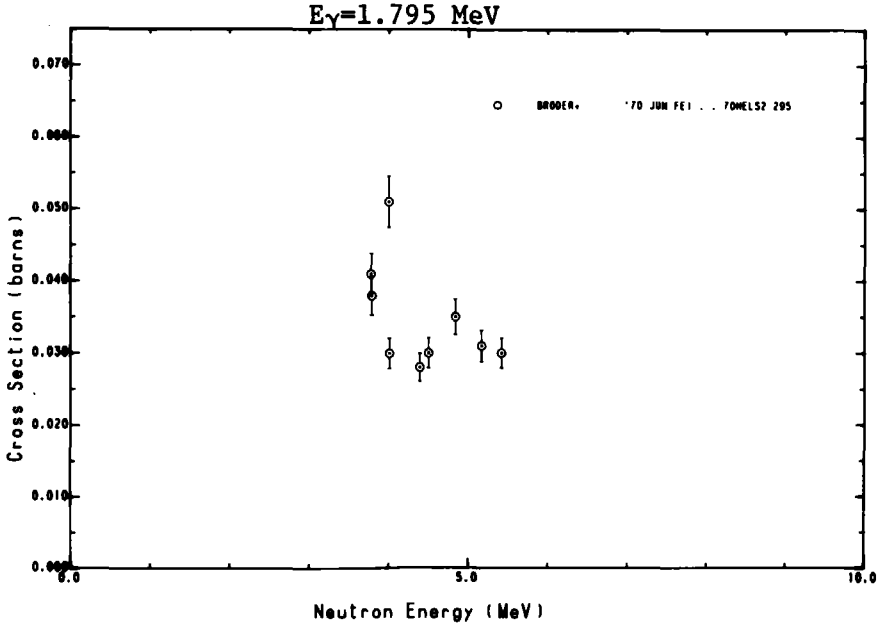
Eγ=1.332 MeV



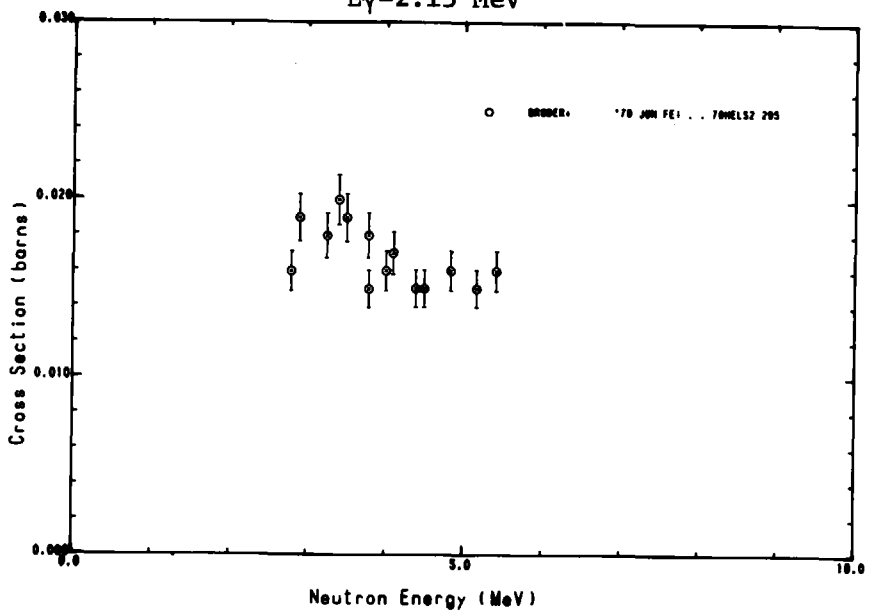
Eγ=1.45 MeV



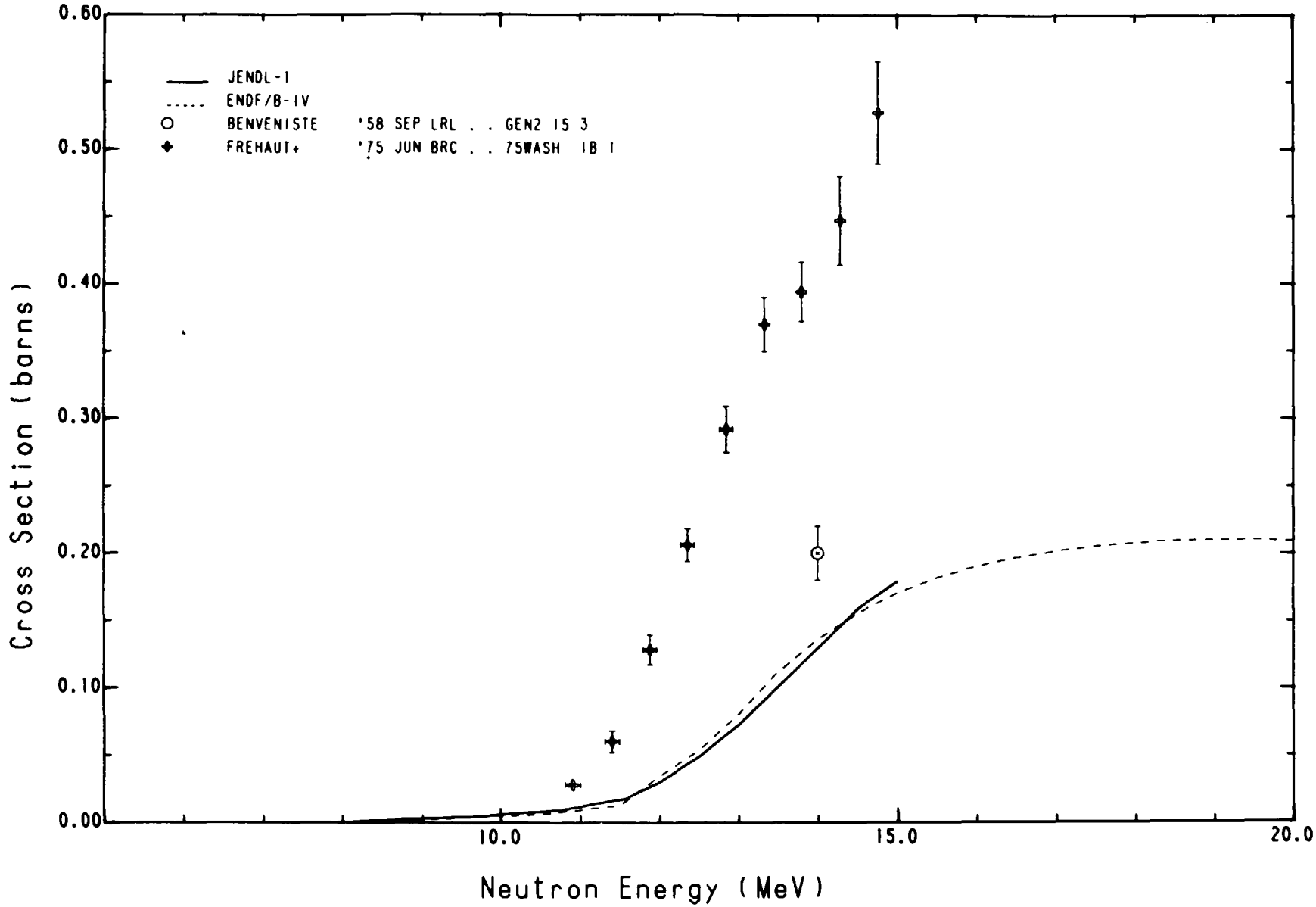
Eγ=1.795 MeV



Eγ=2.15 MeV

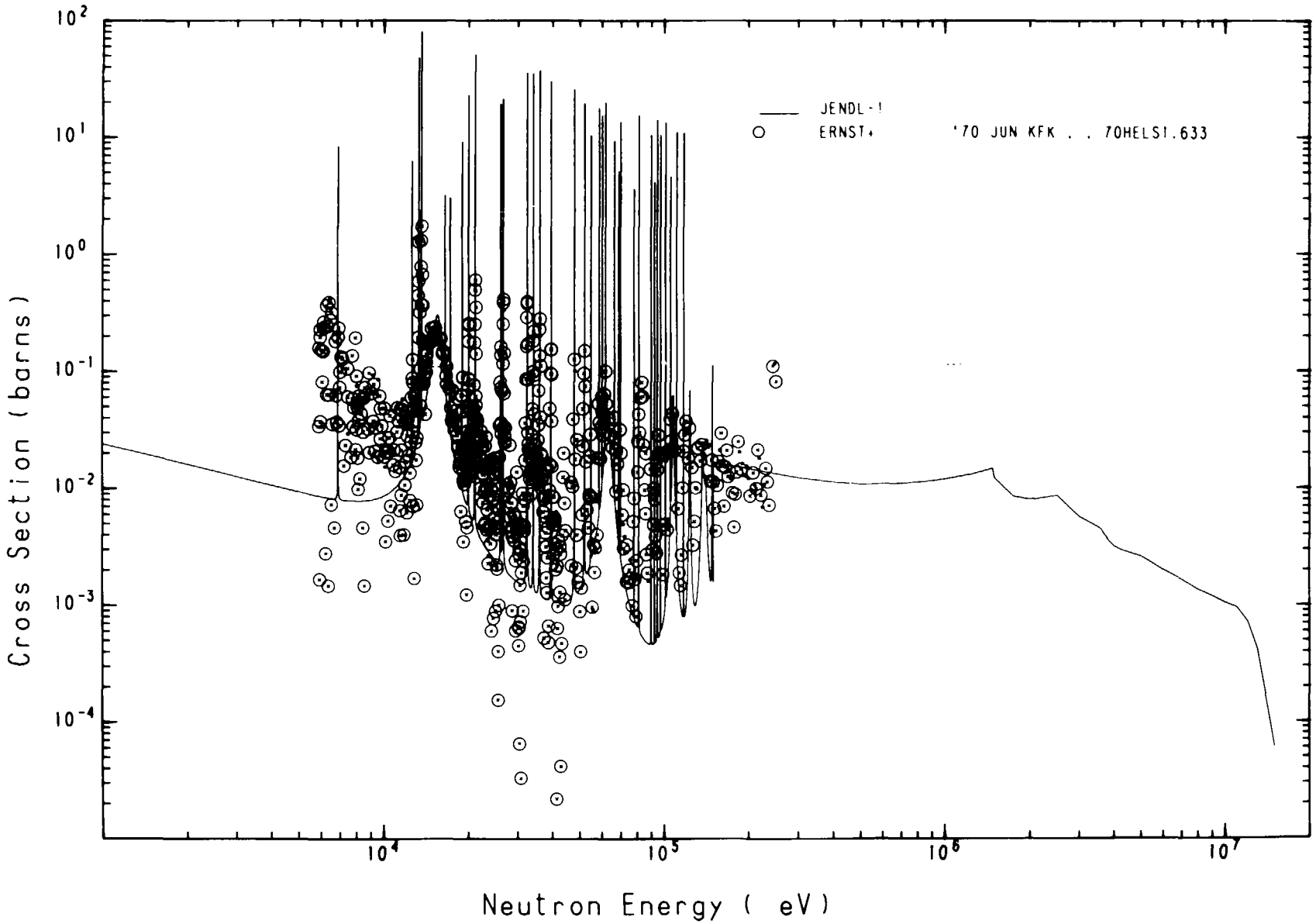


$_{28}$Ni
(n,2n)


JENDL-1
ENDF/B-IV
BENVENISTE '58 SEP LRL . . GEN2 15 3
FREHAUT+ '75 JUN BRC . . 75WASH 1B 1
Cross Section (barns)
0.60
0.50
0.40
0.30
0.20
0.10
0.00
10.0
15.0
20.0
Neutron Energy (MeV)

^{58}Ni

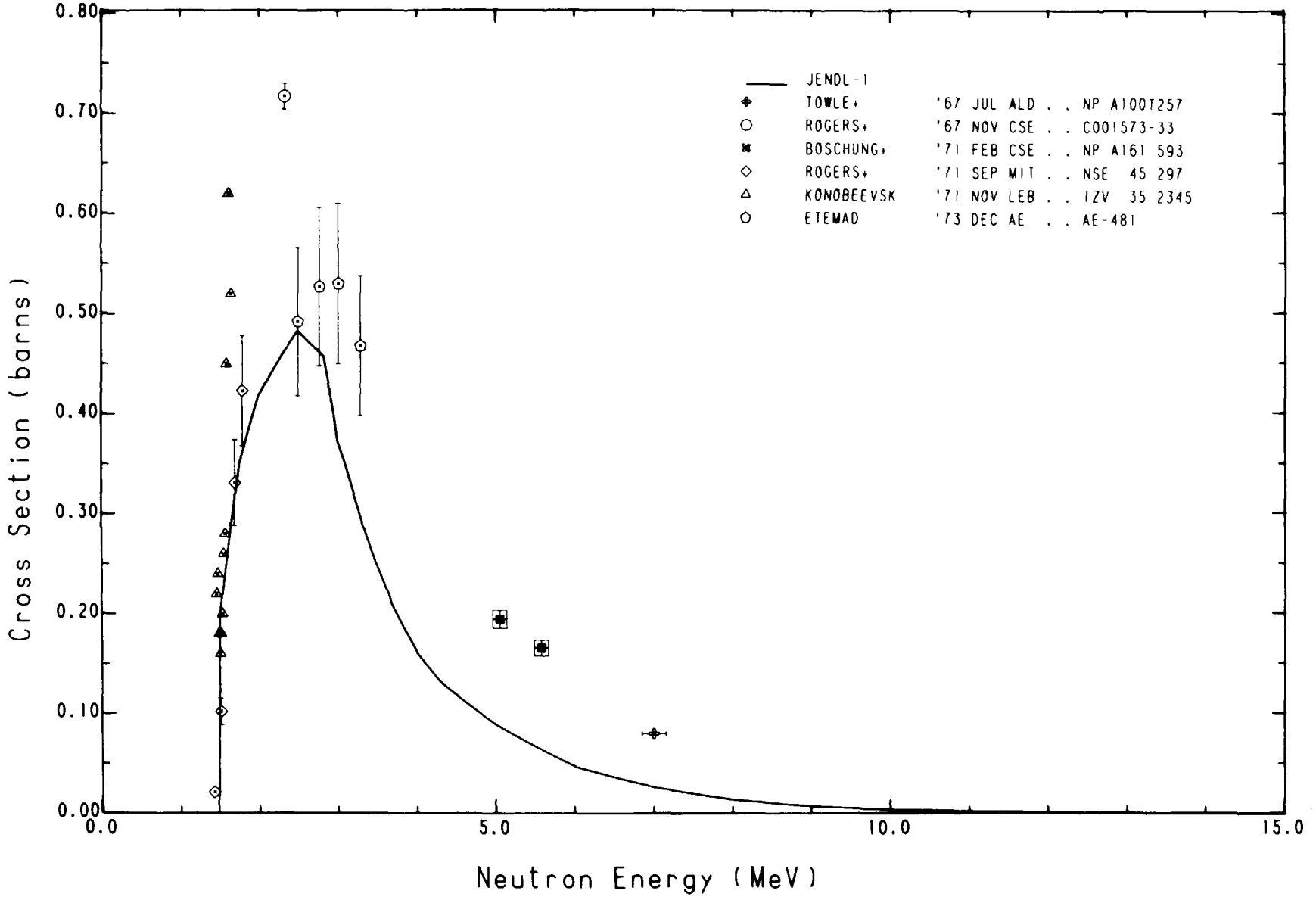
(n, γ)


JENDL-1
ERNST+
'70 JUN KFK . . 70HELST.633
Cross Section (barns)
Neutron Energy (eV)
10^2
10^1
10^0
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^4
10^5
10^6
10^7

^{58}Ni

(n,n')

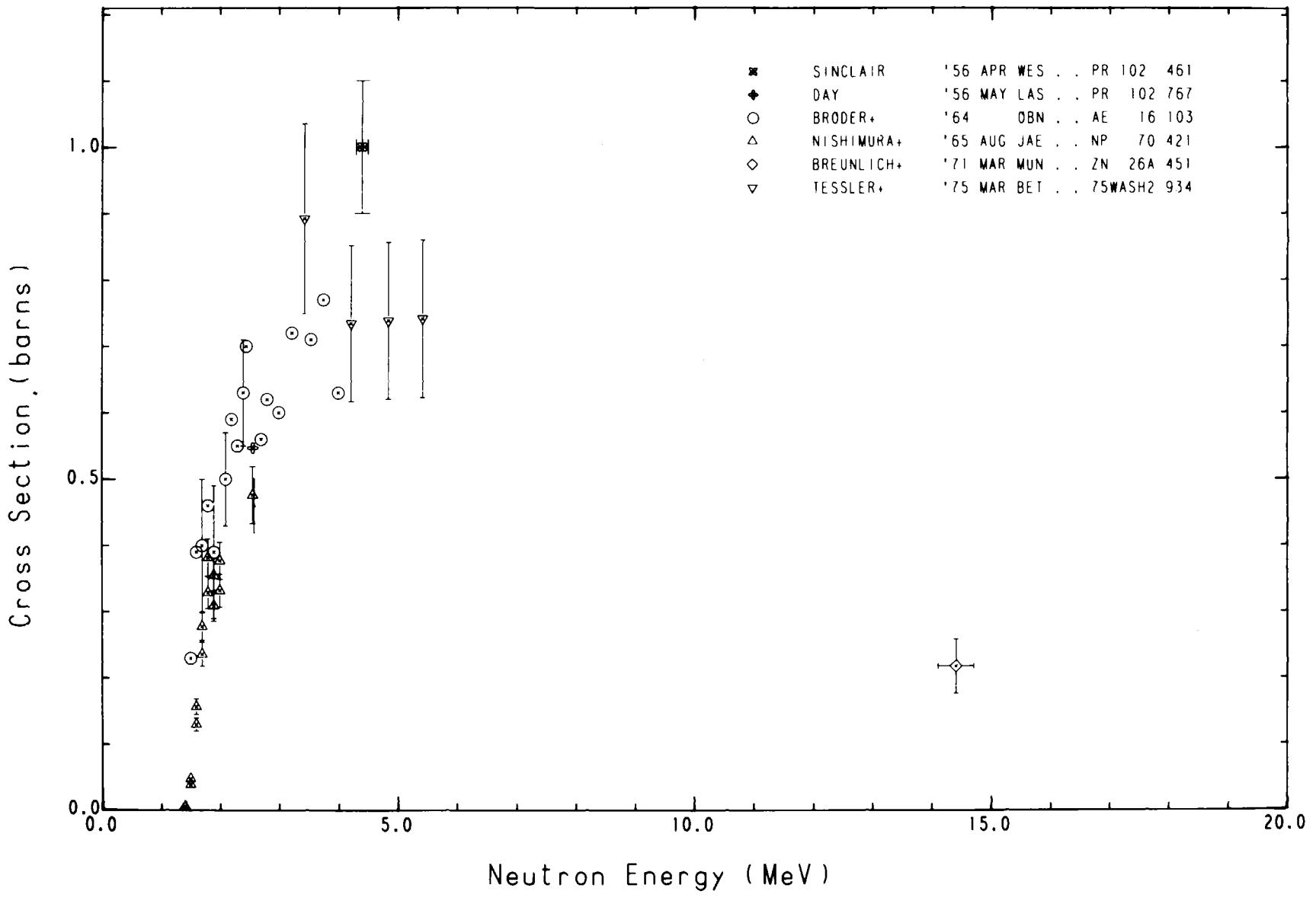
E_x=1.452 MeV



^{58}Ni

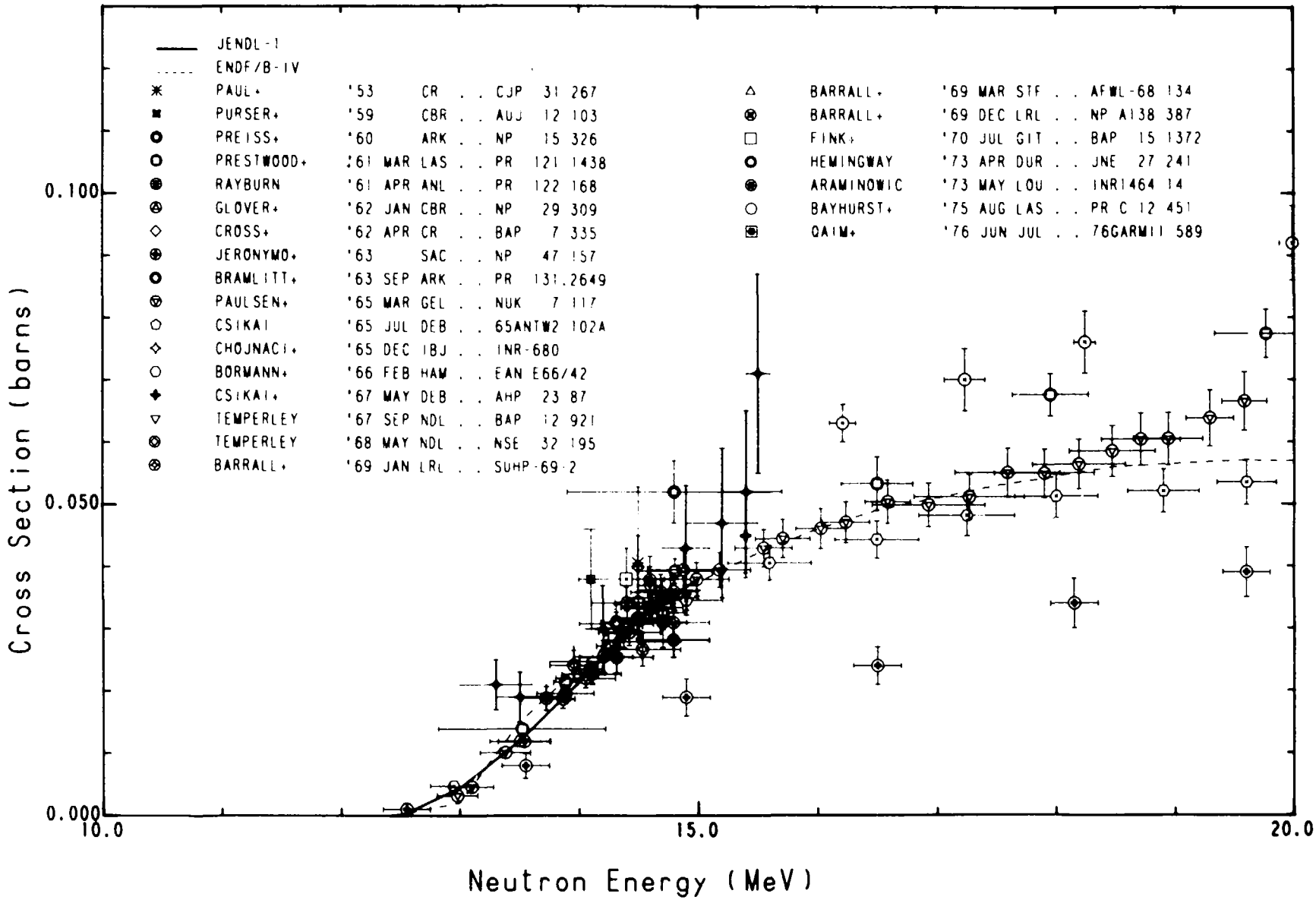
(n,n'γ)

E_γ=1.452 MeV



^{58}Ni

(n,2n)


JENDL-1
ENDF/B-IV
PAUL+ '53 CR . . CJP 31 267
PURSER+ '59 CBR . . AUJ 12 103
PREISS+ '60 ARK . . NP 15 326
PRESTWOOD+ '61 MAR LAS . . PR 121 1438
RAYBURN '61 APR ANL . . PR 122 168
GLOVER+ '62 JAN CBR . . NP 29 309
CROSS+ '62 APR CR . . BAP 7 335
JERONYMO+ '63 SAC . . NP 47 157
BRAMLITT+ '63 SEP ARK . . PR 131.2649
PAULSEN+ '65 MAR GEL . . NUK 7 117
CSIKAI '65 JUL DEB . . 65ANTW2 102A
CHOJNACI+ '65 DEC IBJ . . INR-680
BORMANN+ '66 FEB HAM . . EAN E66/42
CSIKAI+ '67 MAY DEB . . AHP 23 87
TEMPERLEY '67 SEP NDL . . BAP 12 921
TEMPERLEY '68 MAY NDL . . NSE 32 195
BARRALL+ '69 JAN LRL . . SUHP-69-2
BARRALL+ '69 MAR STF . . AFWL-68 134
BARRALL+ '69 DEC LRL . . NP A138 387
FINK+ '70 JUL GIT . . BAP 15 1372
HEMINGWAY '73 APR DUR . . JNE 27 241
ARAMINOWIC '73 MAY LOU . . INR1464 14
BAYHURST+ '75 AUG LAS . . PR C 12 451
QAIM+ '76 JUN JUL . . 76GARMIT 589
0.100
0.050
0.000
10.0
15.0
20.0
Cross Section (barns)
Neutron Energy (MeV)

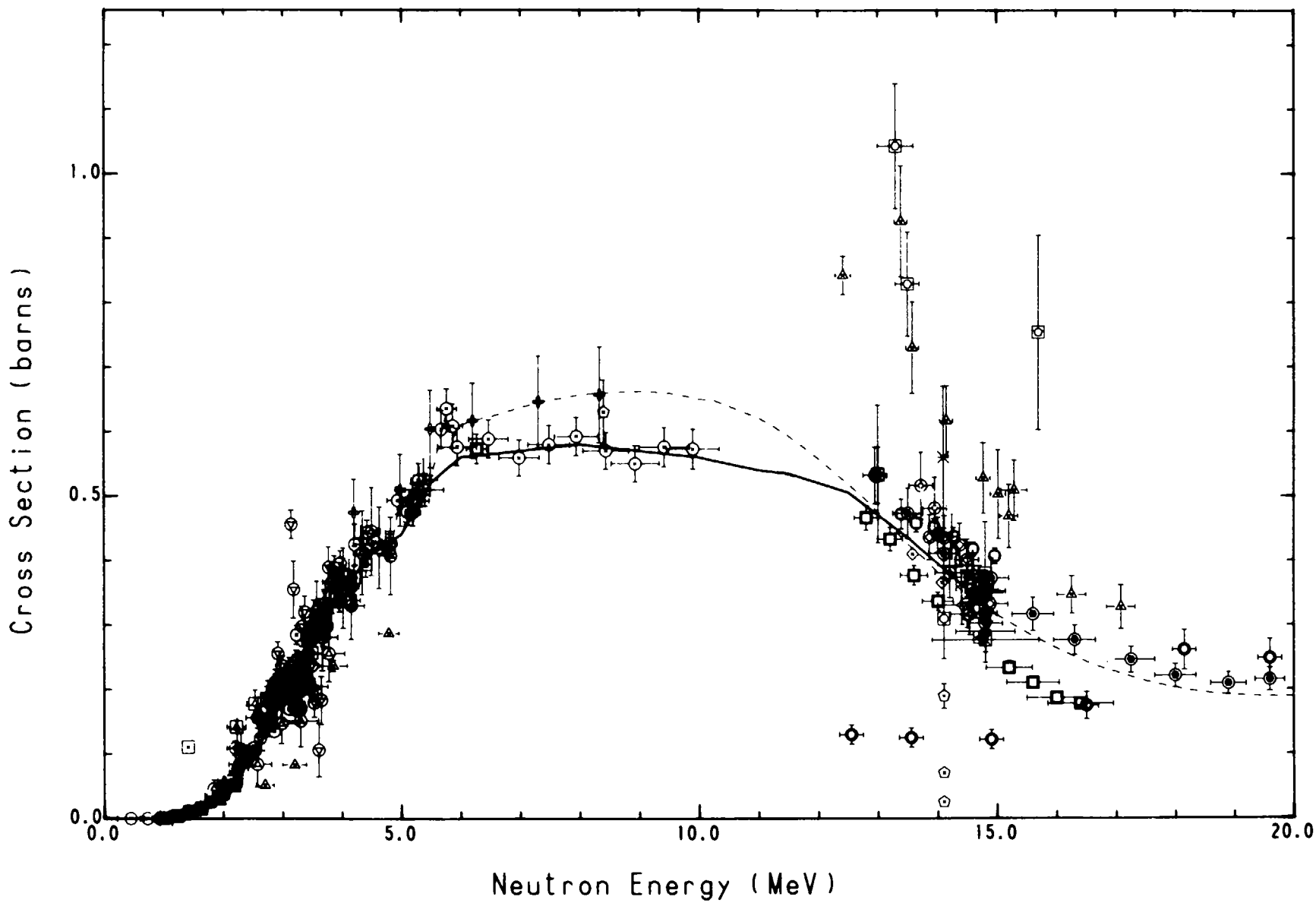
^{58}Ni

(n,p)

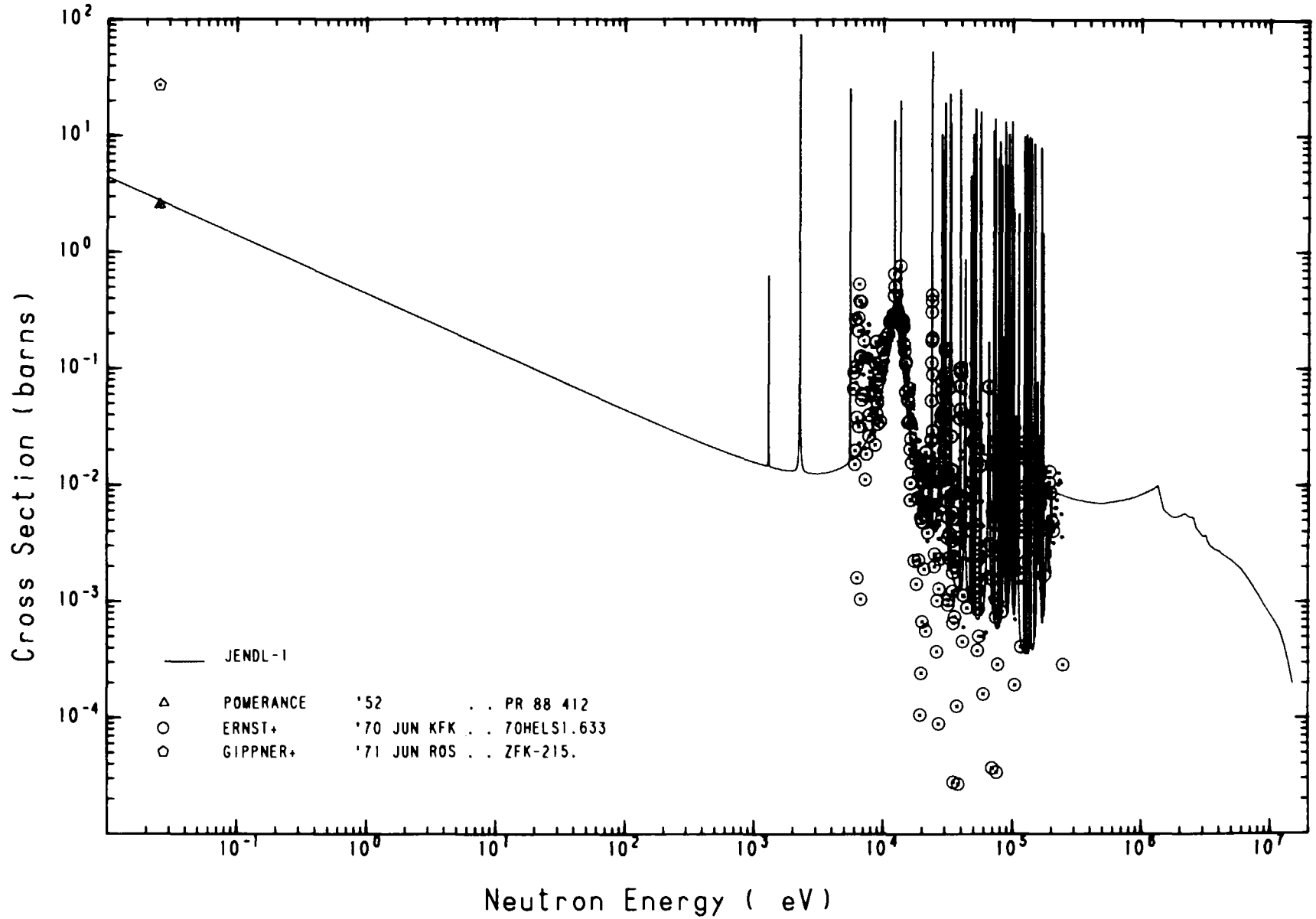
———	JENDL-1									
-----	ENDF/B-IV									
⊡	ALLAN+	'53	MAR	HAR	. .	PPS	70	195		
✱	PURSER+	'59	MAR	CBR	. .	AUJ	12	103		
⊠	PREISS+	'60		ARK	.3.	NP	15	326		
⊡	STOREY+	'60		GLS	. .	PPS75		526		
⊡	GONZALEZ+	'60	NOV	SAN	. .	PR	120	1319		
⊡	VAN LOEF	'61	APR	SAN	. .	NP	24	340		
⊕	ALLAN	'61	APR	HAR	. .	NP	24	274		
✦	BARRY	'62		ALD	. .	JNE	16	467		
◇	CROSS+	'62		CRC	. .	AECL		1542		
⊙	GLOVER+	'62	JAN	CBR	. .	NP	29	309		
○	CROSS+	'62	APR	CRC	. .	BAP	7	335		
⊕	NAKAI+	'62	AUG	JAE	. .	JPJ	17	1215		
✖	MEADOWS+	'63	JUN	ANL	. .	PR	130	2022		
○	JERONYMO+	'63	AUG	SAC	. .	NP	47	157		
⊕	KONIJN+	'63	OCT	AE	. .	NP	48	191		
⊡	STRAIN+	'65			. .	ORNL	3672			
⊡	CHOJNACKI+	'65			. .	INR-680/1/PH				
○	DEBERTIN+	'65	AUG	FRK	. .	NP	70	89		
⊕	BORMANN+	'66	FEB	HAM	. .	EAN	E66	42		
⊡	BORMANN+	'66	SEP	HAM	. .	ZN	21A	988		
○	OKUMURA	'67	MAR	KTO	. .	NP	A93	74		
△	DECOWSKI+	'68	MAY	WWA	. .	NP	A112	513		
⊕	TEMPERLEY	'68	MAY	NDL	. .	NSE	32	195		
⊡	LEVKOVSKIJ	'69	JAN	KAZ	. .	YF	10	44		
▽	BARRALL+	'69	MAR	STF	. .	AFWL-68		134		
⊕	BARRALL+	'69	APR	LRL	. .	WASH		1127		
●	BARRALL+	'69	DEC	LRL	. .	NP	A138	387		
◇	FINK+	'70	JUL	GIT	. .	BAP	15	1372		
□	PAULSEN+	'71	SEP	GEL	. .	71CANT		P16		
⊠	MASLOV+	'72		CCP	. .	YK-	9	50		
○	HEMINGWAY	'73	APR	DUR	. .	JNE	27	241		
○	DRESLER+	'73	MAY	LOU	. .	INR1464		12		
○	SMITH+	'75	NOV	ANL	. .	NSE	58	314		
⊡	CSIKAI+	'76	NOV	KOS	. .	ANE	3	527		
⊡	WU+	'77	JUL	SHI	. .	NSE	63	268		

^{58}Ni

(n,p)


Cross Section (barns)
1.0
0.5
0.0
0.0
5.0
10.0
15.0
20.0
Neutron Energy (MeV)

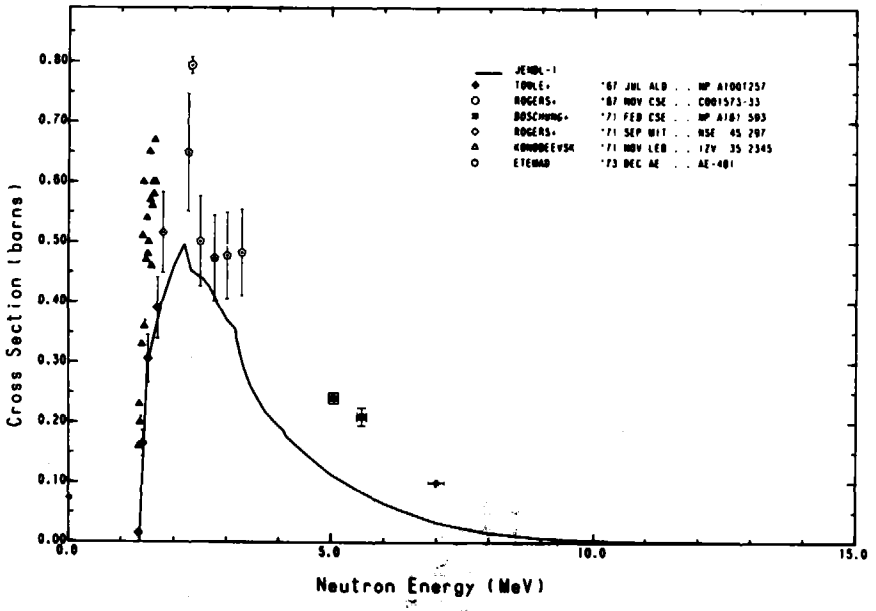
^{60}Ni
(n, γ)


Cross Section (barns)
Neutron Energy (eV)
JENDL-1
POWERANCE '52 . . PR 88 412
ERNST+ '70 JUN KFK . . 70HELSI.633
GIPPNER+ '71 JUN ROS . . ZFK-215.

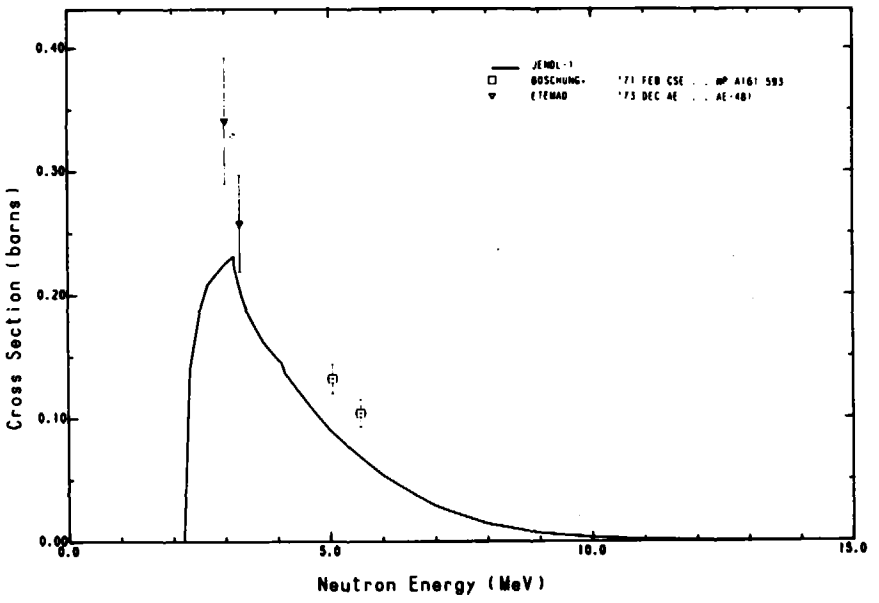
^{60}Ni

(n,n')
(n,n'γ)

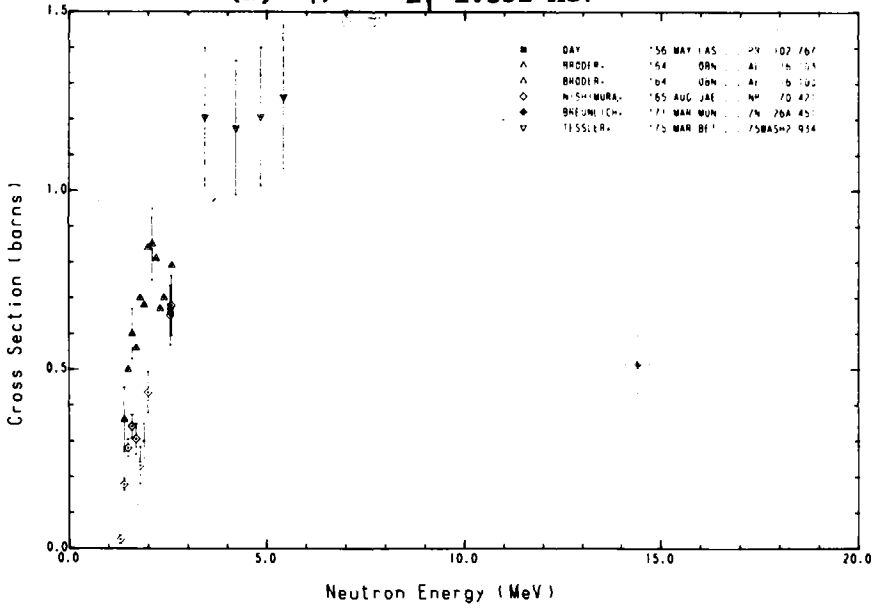
(n,n') E_x=1.333 MeV



(n,n') E_x=2.16 MeV

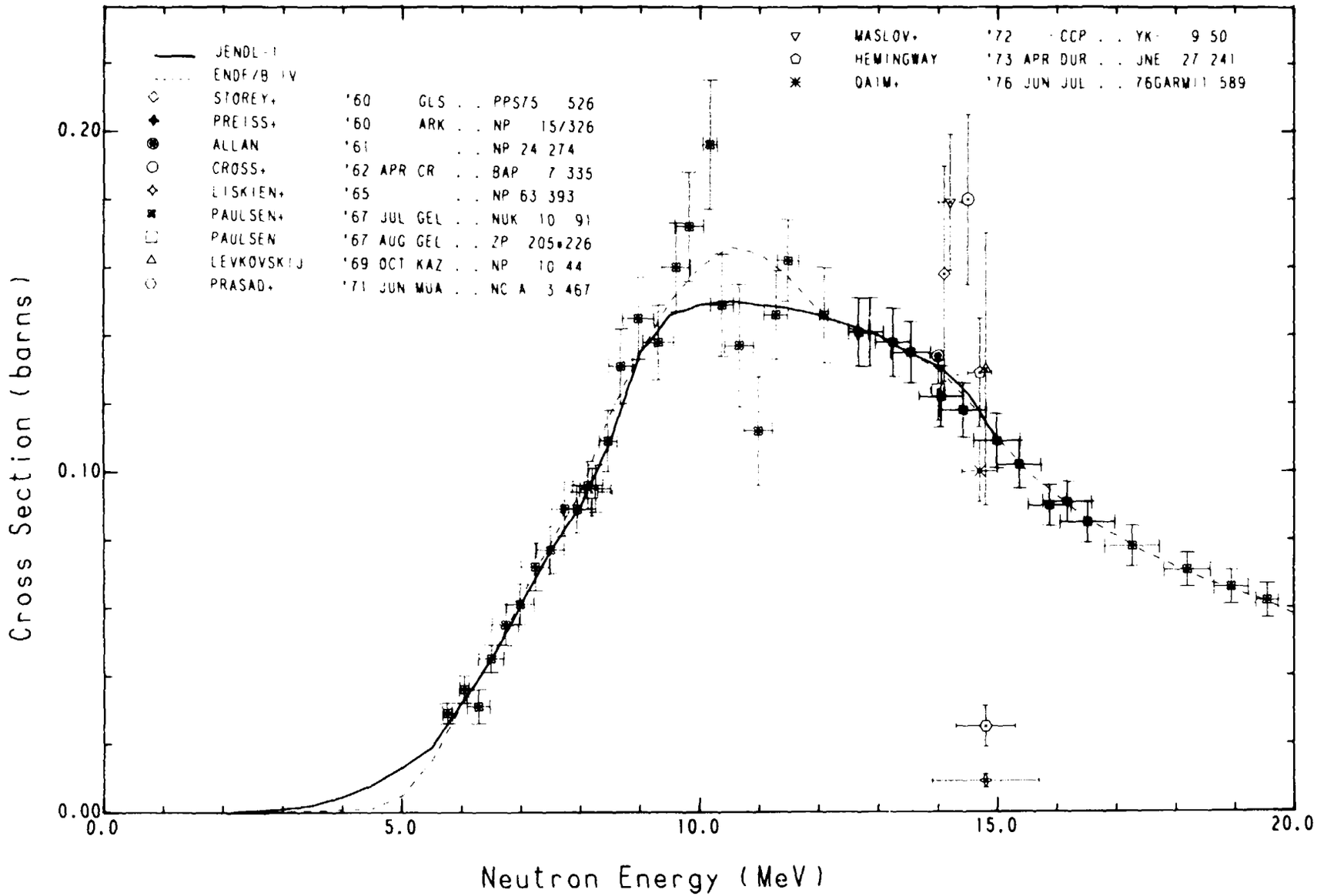


(n,n'γ) E_γ=1.332 MeV

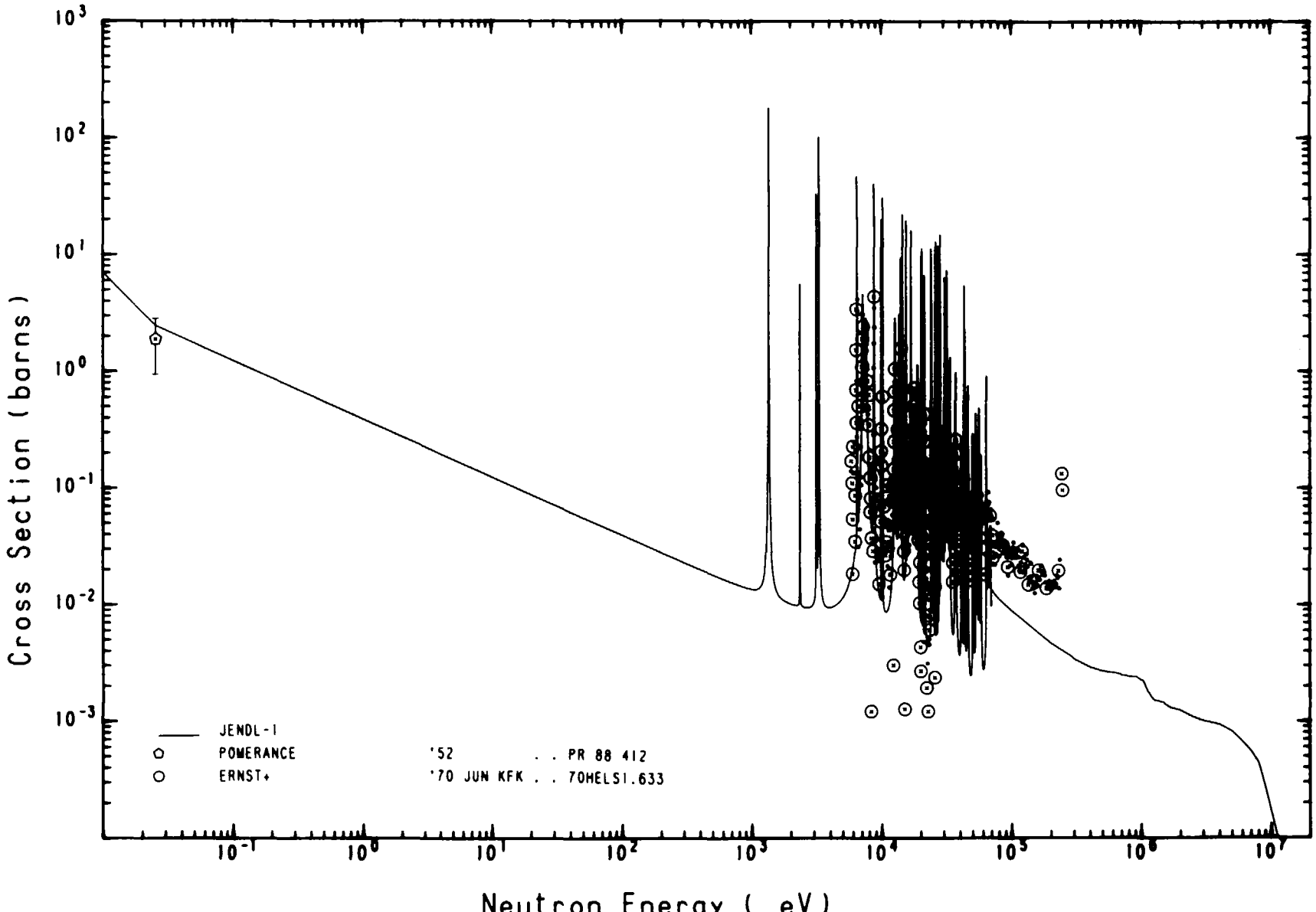


^{60}Ni

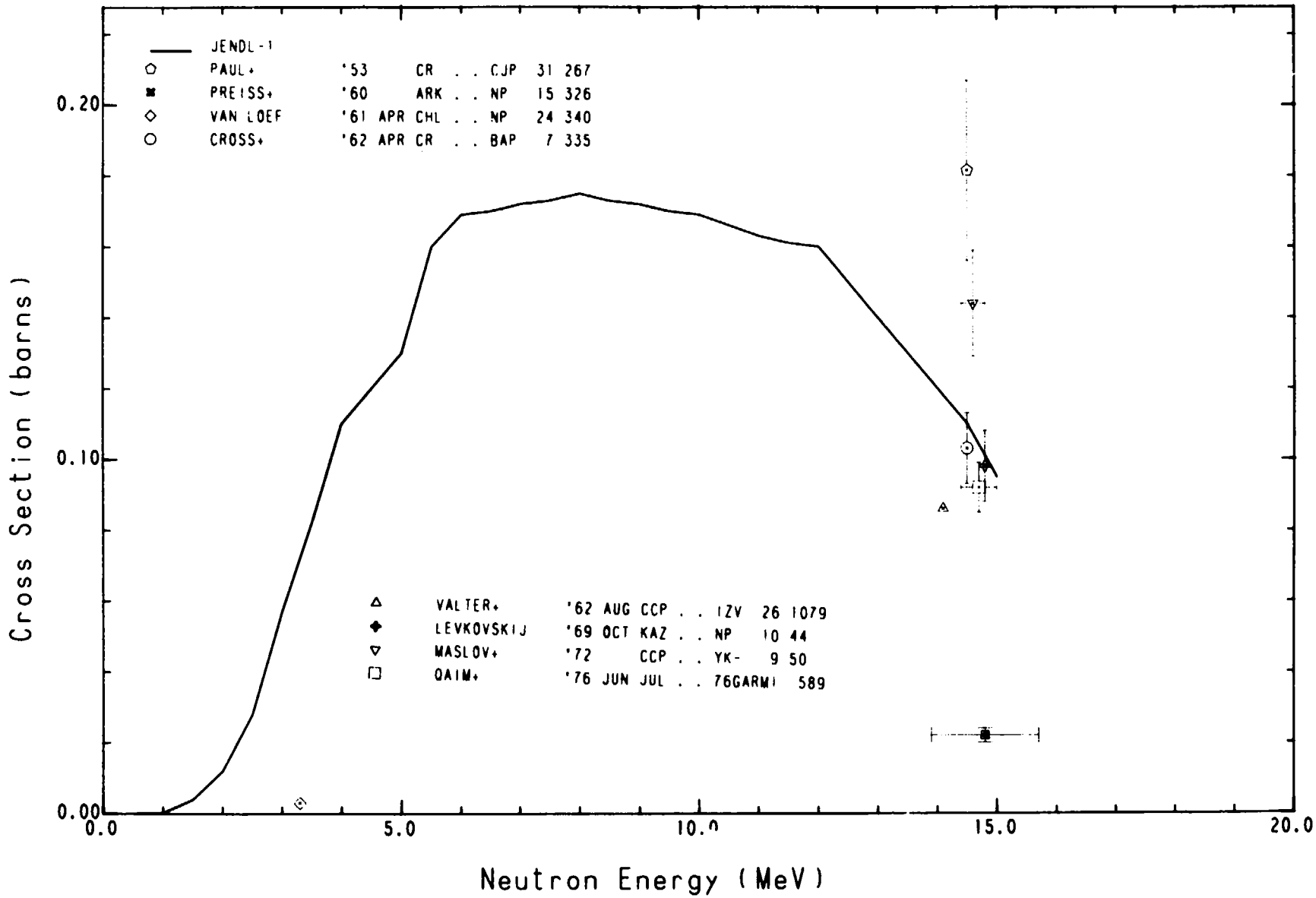
(n,p)


JENDL-1
ENDF/B-IV
STOREY+ '60 GLS . . PPS75 526
PREISS+ '60 ARK . . NP 15/326
ALLAN '61 . . NP 24 274
CROSS+ '62 APR CR . . BAP 7 335
LISKIEN+ '65 . . NP 63 393
PAULSEN+ '67 JUL GEL . . NUK 10 91
PAULSEN '67 AUG GEL . . ZP 205•226
LEVKOVSKIJ '69 OCT KAZ . . NP 10 44
PRASAD+ '71 JUN MUA . . NC A 3 467
MASLOV+ '72 CCP . . YK 9 50
HEMINGWAY '73 APR DUR . . JNE 27 241
DAIM+ '76 JUN JUL . . 76GARMIT 589
0.20
0.10
0.00
0.0
5.0
10.0
15.0
20.0
Cross Section (barns)
Neutron Energy (MeV)

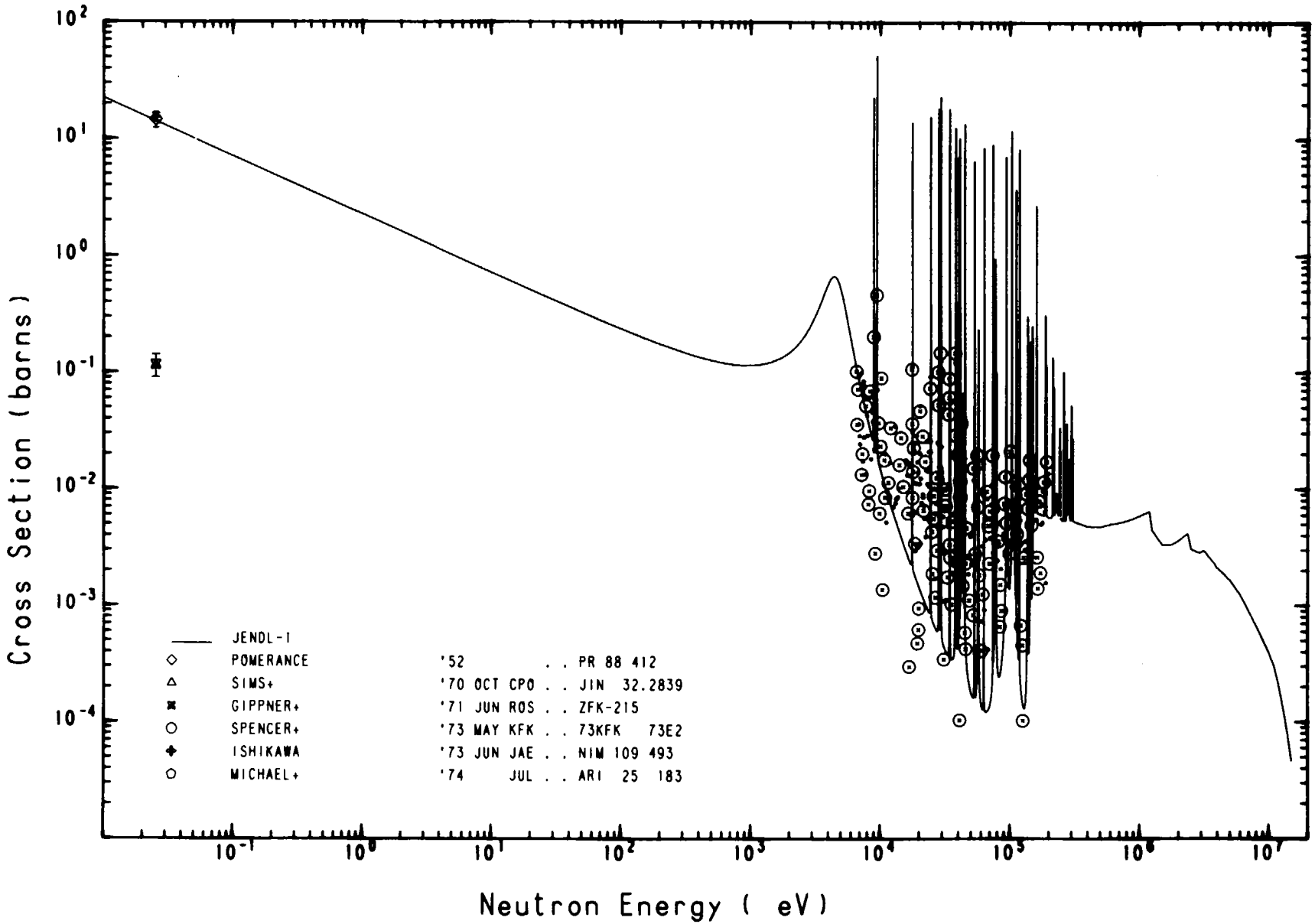
^{61}Ni
(n, γ)


Cross Section (barns)
Neutron Energy (eV)
JENDL-1
POMERANCE '52 . . PR 88 412
ERNST+ '70 JUN KFK . . 70HELS1.633

^{61}Ni
(n,p)


JENDL-1
PAUL+ '53 CR . . CJP 31 267
PREISS+ '60 ARK . . NP 15 326
VAN LOEF '61 APR CHL . . NP 24 340
CROSS+ '62 APR CR . . BAP 7 335
VALTER+ '62 AUG CCP . . IZV 26 1079
LEVKOVSKIJ '69 OCT KAZ . . NP 10 44
MASLOV+ '72 CCP . . YK- 9 50
QAIM+ '76 JUN JUL . . 76GARMI 589
Cross Section (barns)
0.00
0.10
0.20
0.0
5.0
10.0
15.0
20.0
Neutron Energy (MeV)

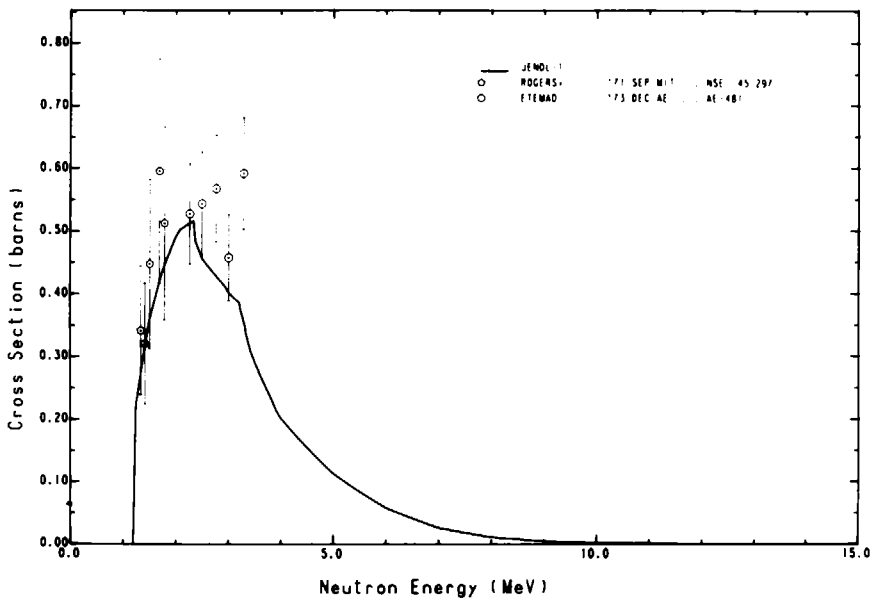
^{62}Ni
(n,γ)


Cross Section (barns)
Neutron Energy (eV)
JENDL-1
POMERANCE '52 . . PR 88 412
SIMS+ '70 OCT CPO . . JIN 32.2839
GIPPNER+ '71 JUN ROS . . ZFK-215
SPENCER+ '73 MAY KFK . . 73KFK 73E2
ISHIKAWA '73 JUN JAE . . NIM 109 493
MICHAEL+ '74 JUL . . ARI 25 183

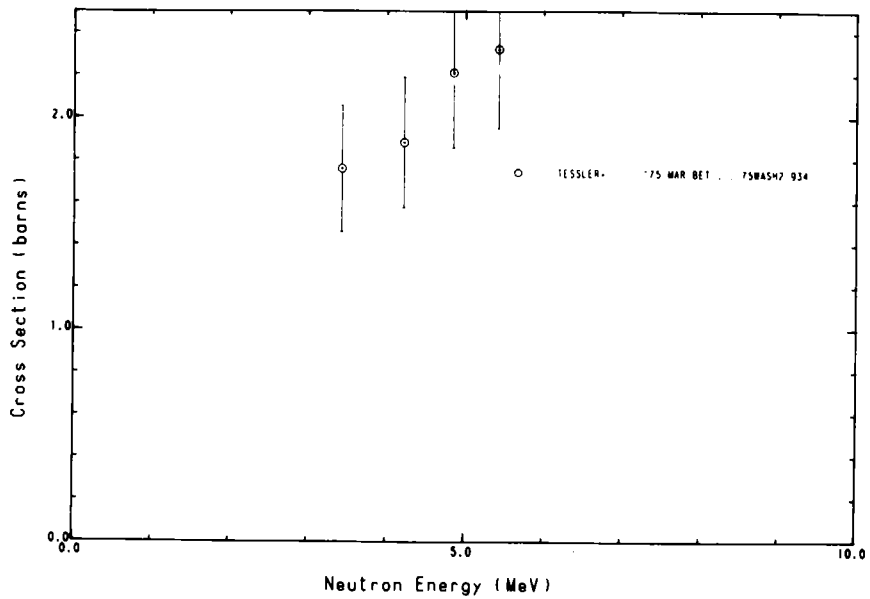
^{62}Ni

(n,n')
(n,n'γ)
(n,p)

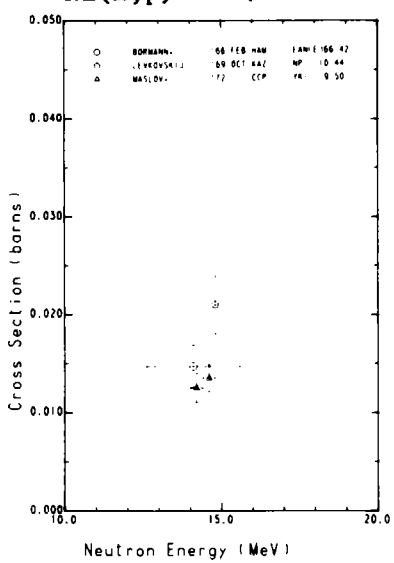
(n,n') E_x=1.17 MeV



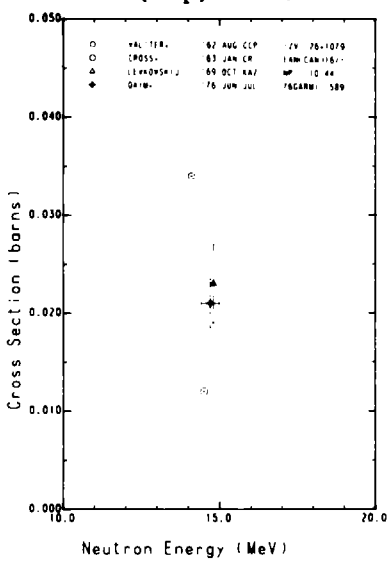
(n,n'γ) E_γ=1.17 MeV



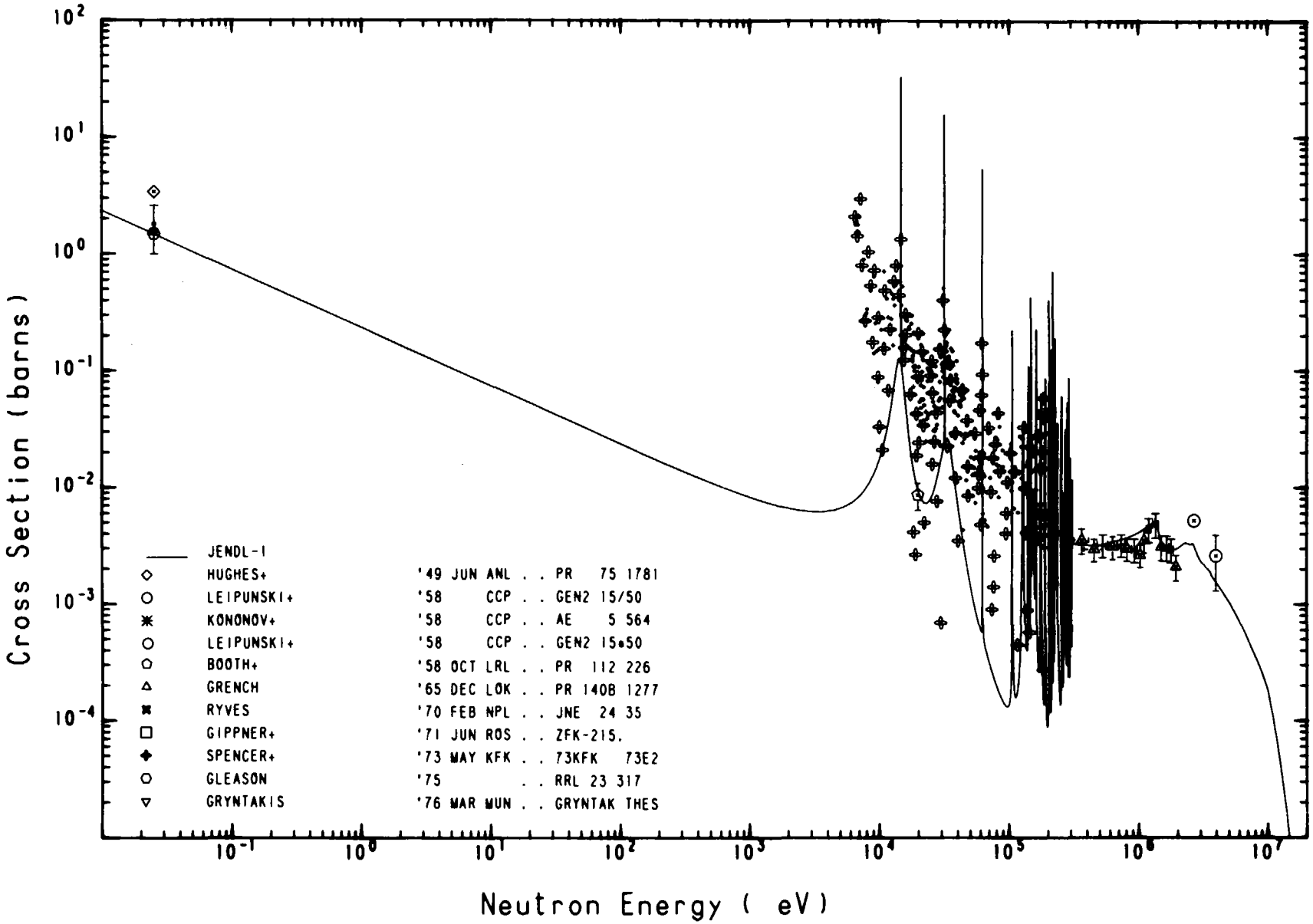
^{62}Ni(n,p)^{62}Co(13.9 m)



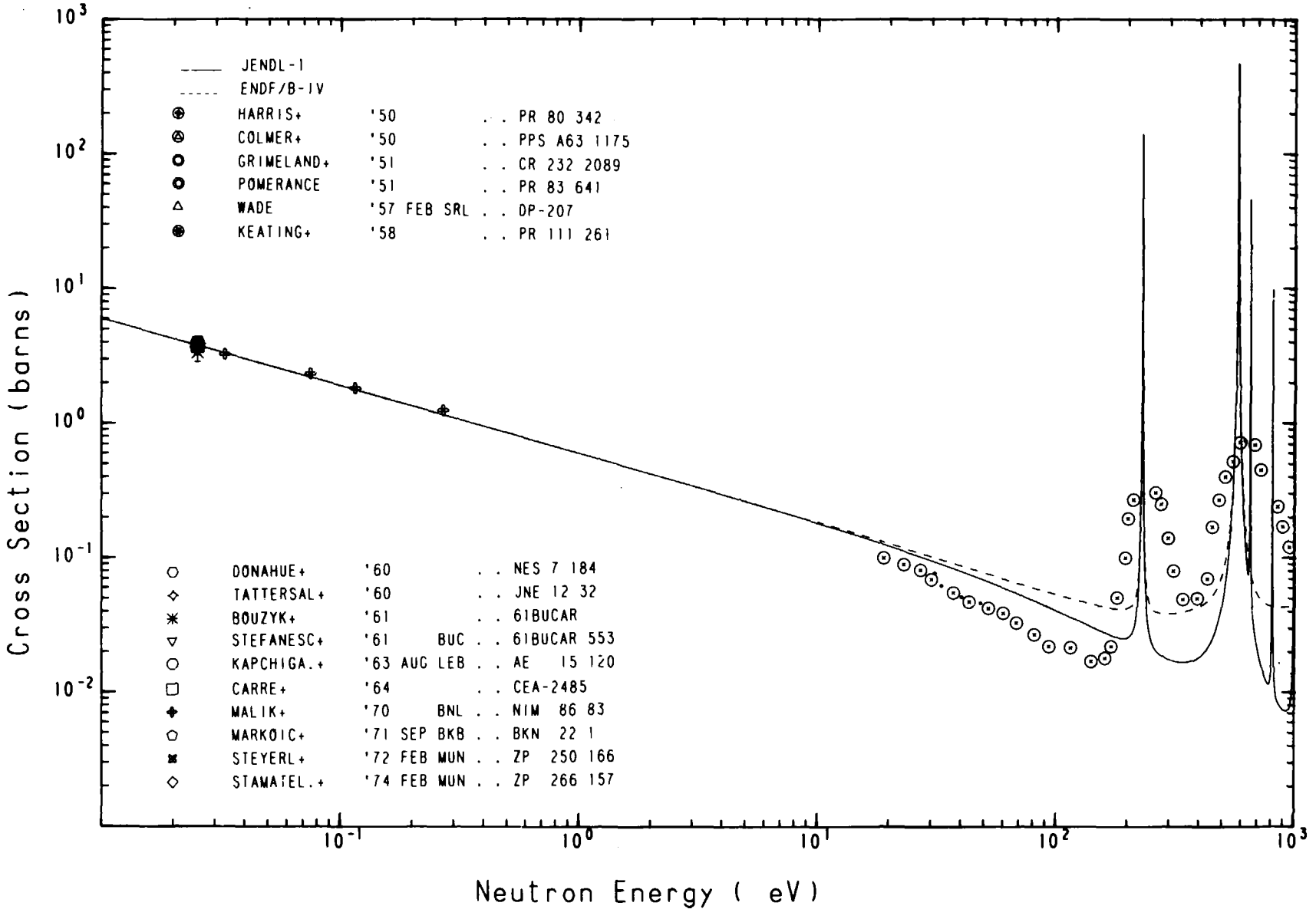
^{62}Ni(n.p)^{62}Co(1.5 m)



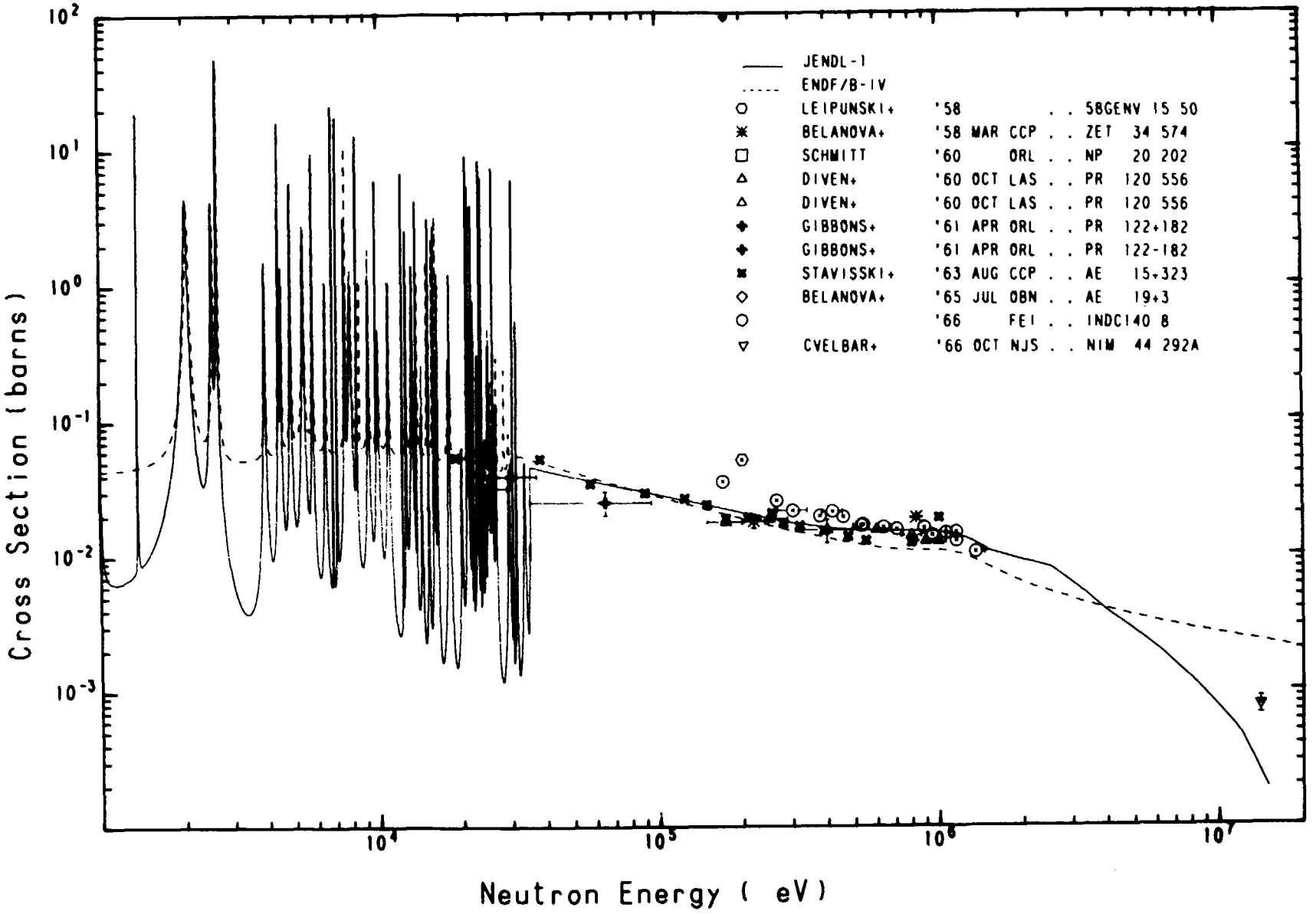
^{64}Ni (n,γ)


Cross Section (barns)
Neutron Energy (eV)
JENDL-1
HUGHES+ '49 JUN ANL . . PR 75 1781
LEIPUNSKI+ '58 CCP . . GEN2 15/50
KONONOV+ '58 CCP . . AE 5 564
LEIPUNSKI+ '58 CCP . . GEN2 15•50
BOOTH+ '58 OCT LRL . . PR 112 226
GRENCH '65 DEC LOK . . PR 140B 1277
RYVES '70 FEB NPL . . JNE 24 35
GIPPNER+ '71 JUN ROS . . ZFK-215.
SPENCER+ '73 MAY KFK . . 73KFK 73E2
GLEASON '75 . . RRL 23 317
GRYNTAKIS '76 MAR MUN . . GRYNTAK THES

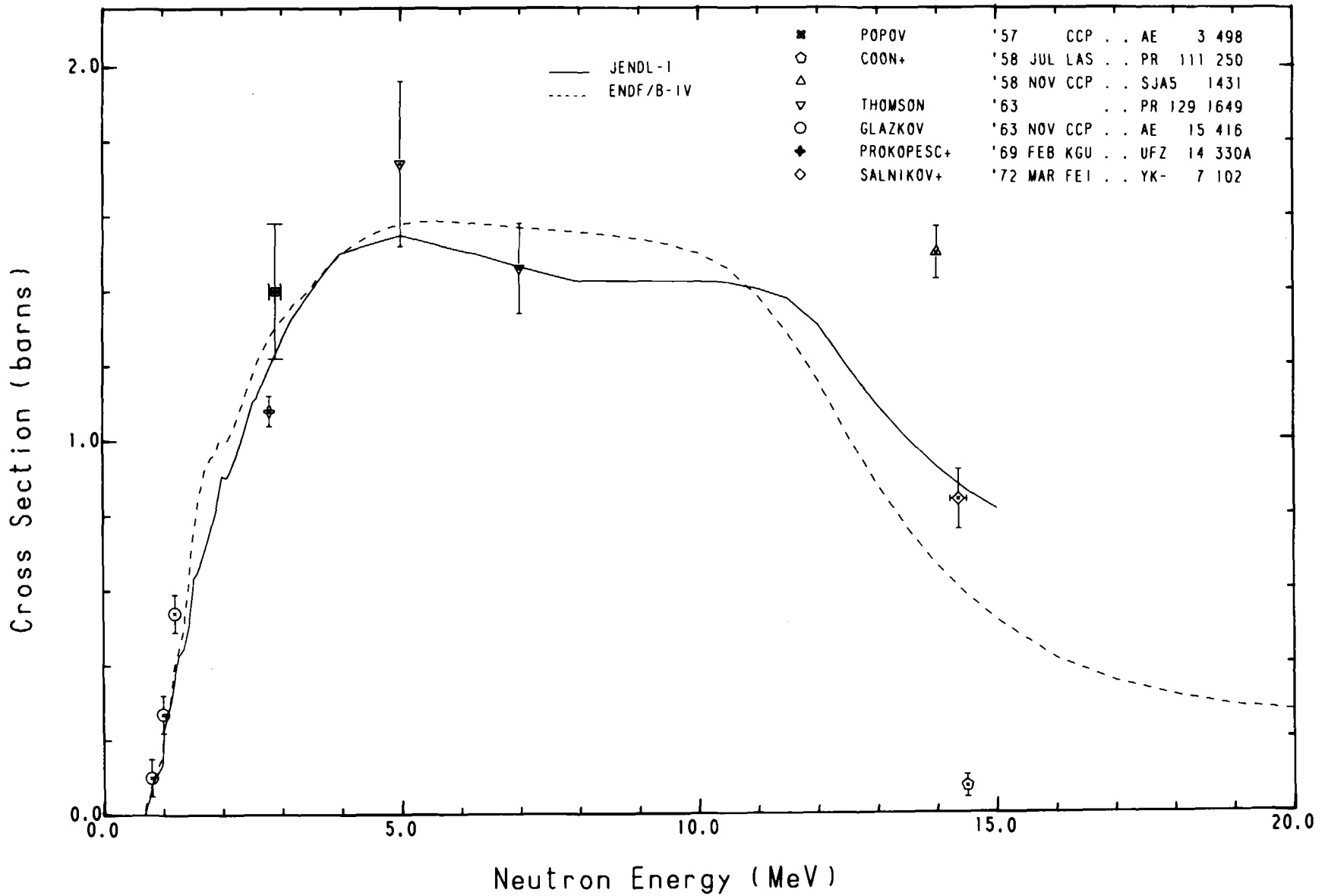
$_{29}$Cu
(n,γ)
(1)


JENDL-1
ENDF/B-IV
HARRIS+ '50 . . PR 80 342
COLMER+ '50 . . PPS A63 1175
GRIMELAND+ '51 . . CR 232 2089
POMERANCE '51 . . PR 83 641
WADE '57 FEB SRL . . DP-207
KEATING+ '58 . . PR 111 261
DONAHUE+ '60 . . NES 7 184
TATTERSAL+ '60 . . JNE 12 32
BOUZYK+ '61 . . 61BUCAR
STEFANESC+ '61 BUC . . 61BUCAR 553
KAPCHIGA.+ '63 AUG LEB . . AE 15 120
CARRE+ '64 . . CEA-2485
MALIK+ '70 BNL . . NIM 86 83
MARKOIC+ '71 SEP BKB . . BKN 22 1
STEYERL+ '72 FEB MUN . . ZP 250 166
STAMATEL.+ '74 FEB MUN . . ZP 266 157
Cross Section (barns)
Neutron Energy (eV)

$_{29}$Cu
(n,γ)
(2)

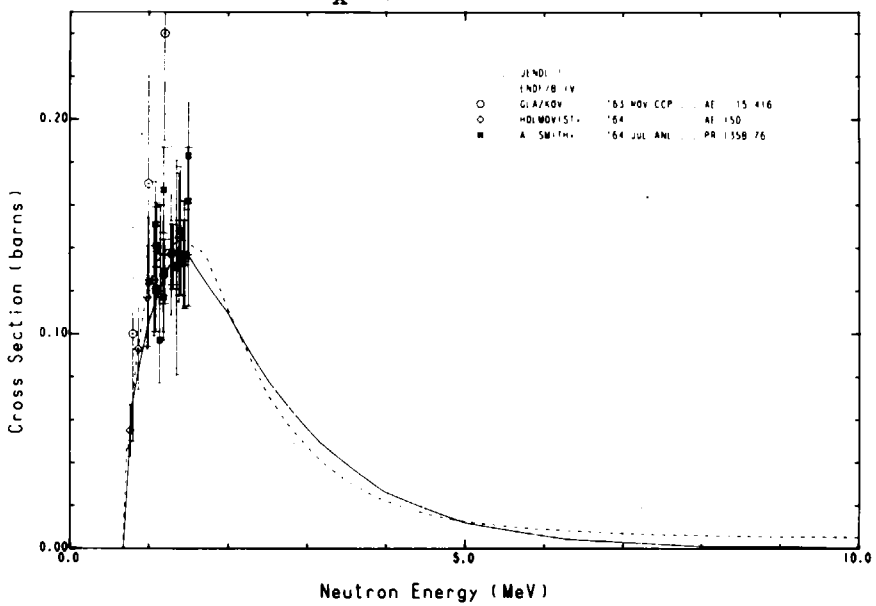

JENDL-1
ENDF/B-IV
LEIPUNSKI+ '58 . . 58GENV 15 50
BELANOVA+ '58 MAR CCP . . ZET 34 574
SCHMITT '60 ORL . . NP 20 202
DIVEN+ '60 OCT LAS . . PR 120 556
DIVEN+ '60 OCT LAS . . PR 120 556
GIBBONS+ '61 APR ORL . . PR 122+182
GIBBONS+ '61 APR ORL . . PR 122-182
STAVISSKI+ '63 AUG CCP . . AE 15+323
BELANOVA+ '65 JUL OBN . . AE 19+3
'66 FEI . . INDC140 8
CVELBAR+ '66 OCT NJS . . NIM 44 292A
Cross Section (barns)
Neutron Energy (eV)

$_{29}$Cu
(n,n')

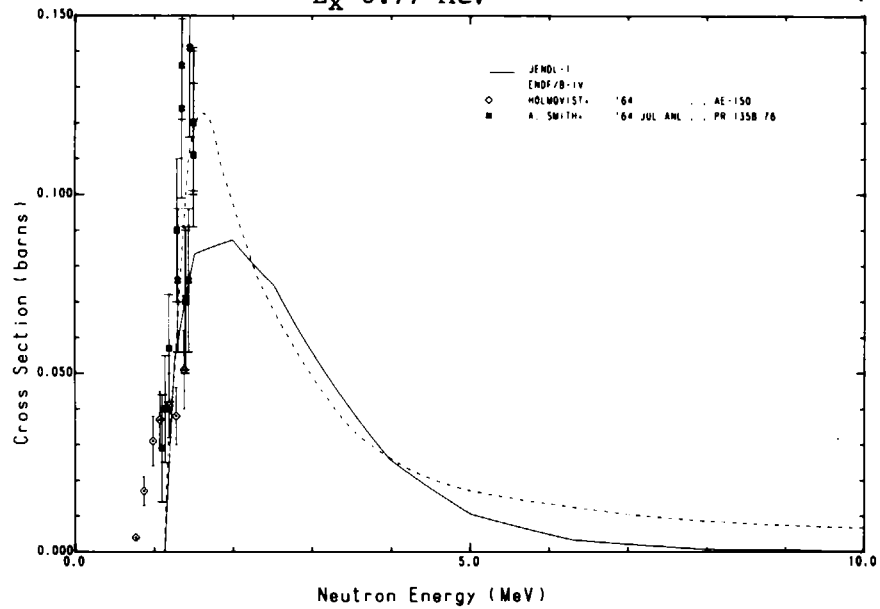

JENDL-I
ENDF/B-IV
POPOV '57 CCP . . AE 3 498
COON+ '58 JUL LAS . . PR 111 250
'58 NOV CCP . . SJA5 1431
THOMSON '63 . . PR 129 1649
GLAZKOV '63 NOV CCP . . AE 15 416
PROKOPESC+ '69 FEB KGU . . UFZ 14 330A
SALNIKOV+ '72 MAR FEI . . YK- 7 102
Cross Section (barns)
Neutron Energy (MeV)
0.0
1.0
2.0
5.0
10.0
15.0
20.0

$_{29}$Cu (n,n')

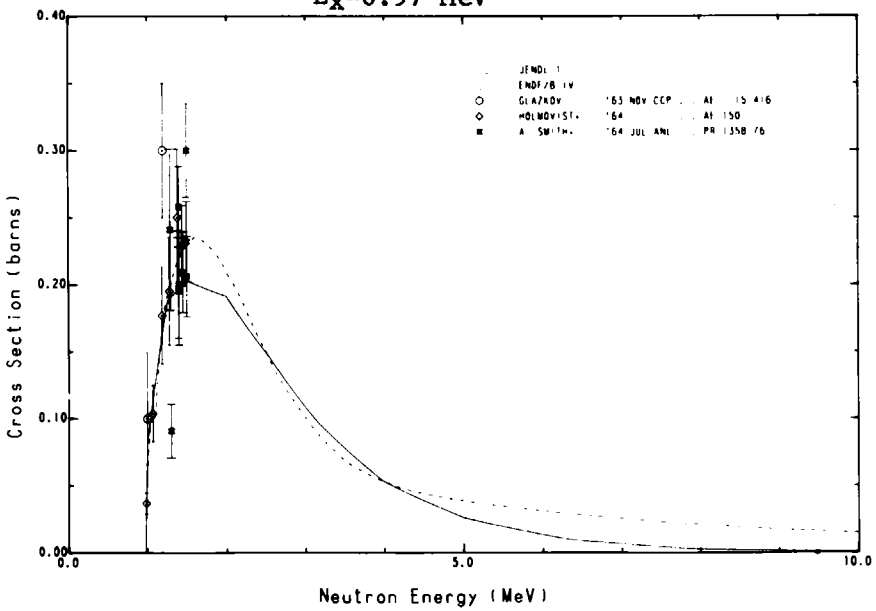
E_x=0.67 MeV



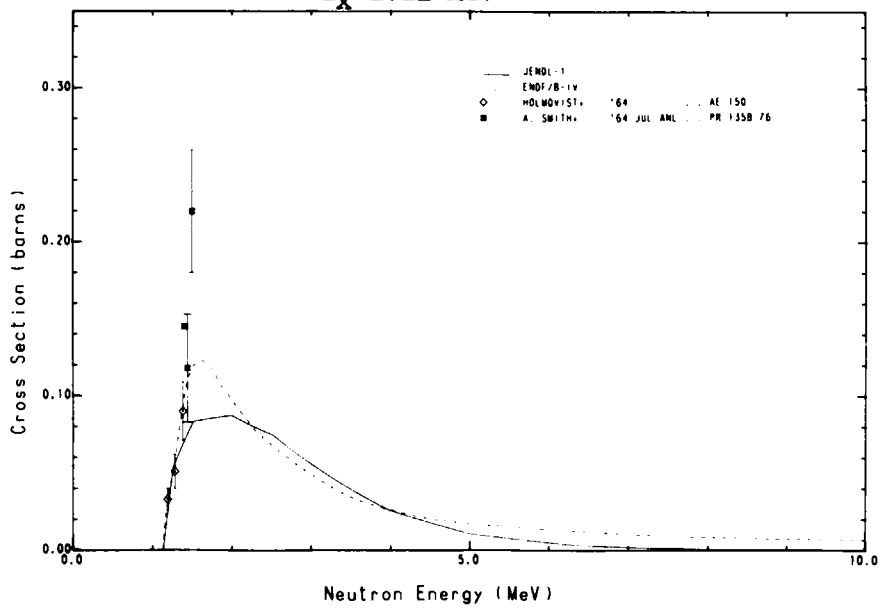
E_x=0.77 MeV



E_x=0.97 MeV

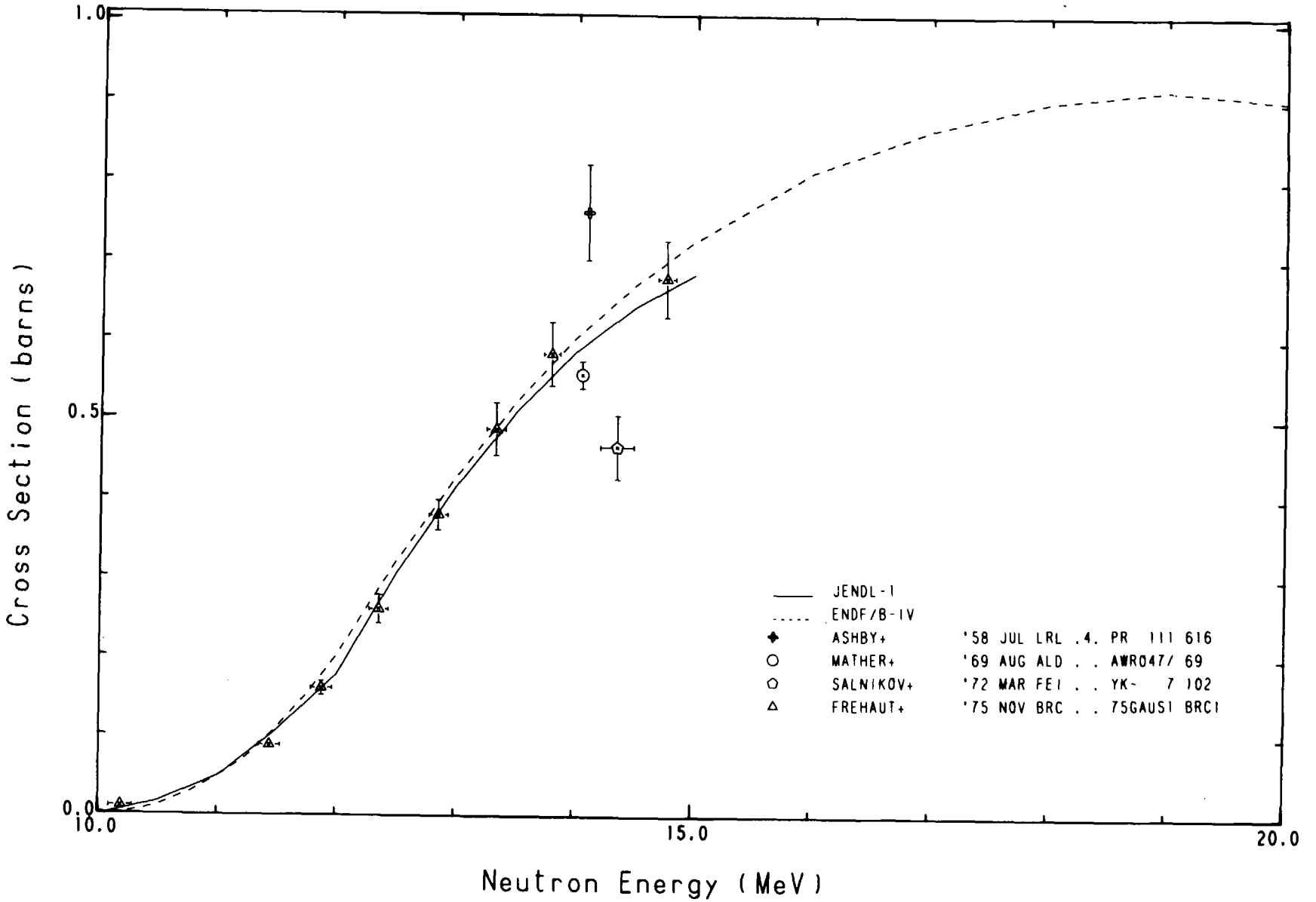


E_x=1.11 MeV

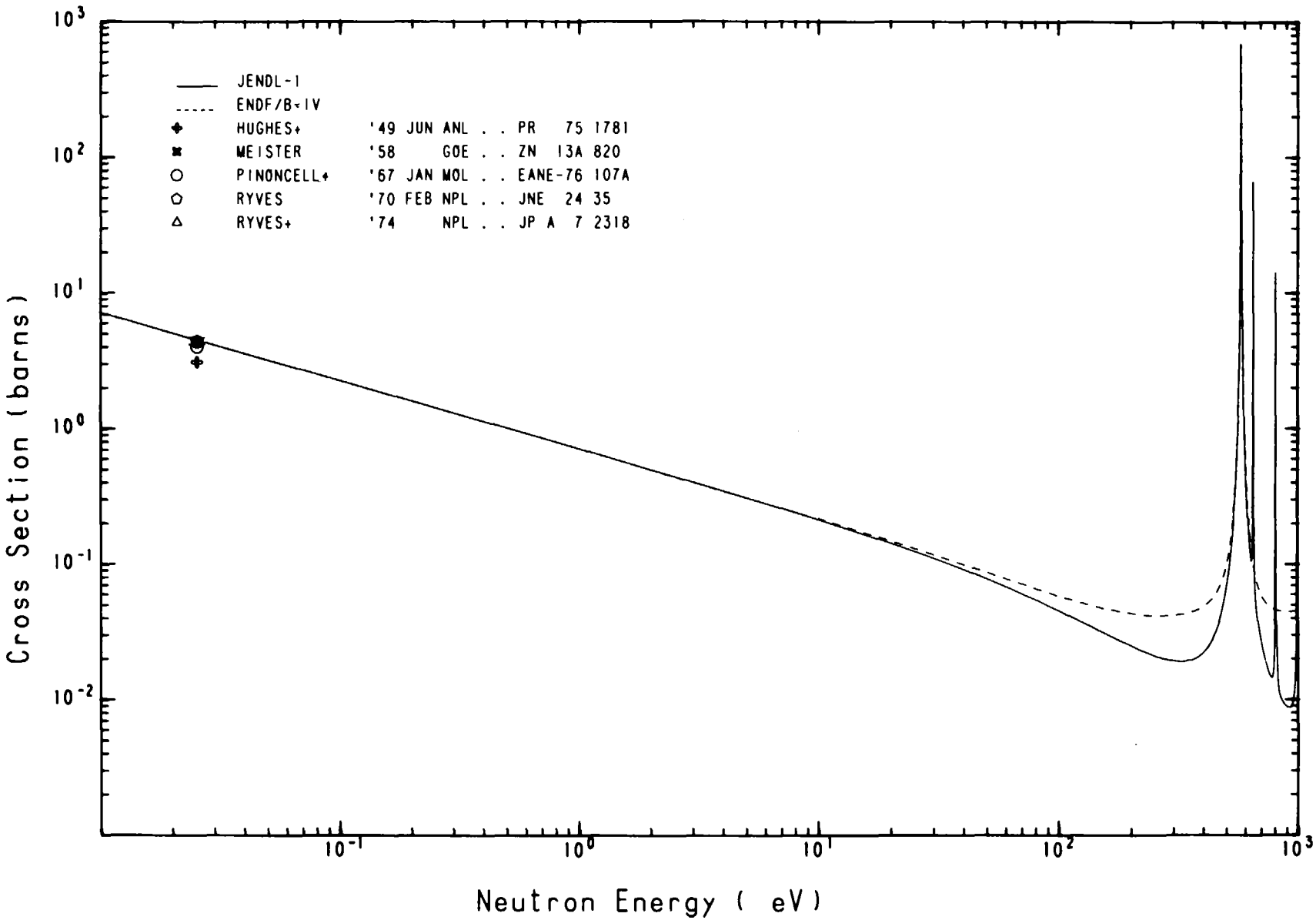


$_{29}$Cu

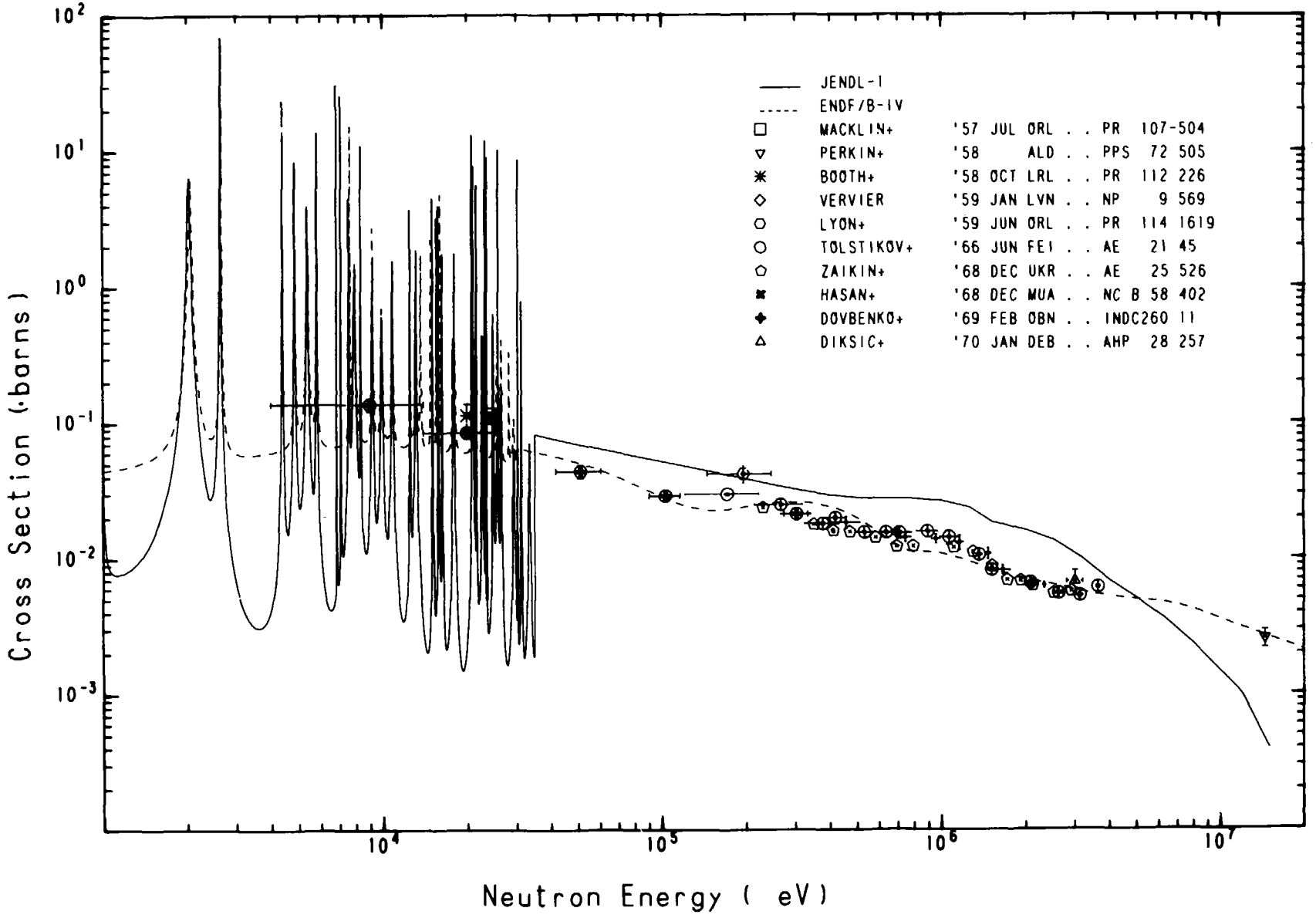
(n,2n)


1.0
0.5
0.0
10.0
15.0
20.0
Cross Section (barns)
Neutron Energy (MeV)
JENDL-1
ENDF/B-IV
ASHBY+ '58 JUL LRL .4. PR 111 616
MATHER+ '69 AUG ALD . . AWR047/ 69
SALNIKOV+ '72 MAR FEI . . YK- 7 102
FREHAUT+ '75 NOV BRC . . 75GAUS1 BRC1

^{63}Cu
(n,γ)
(1)

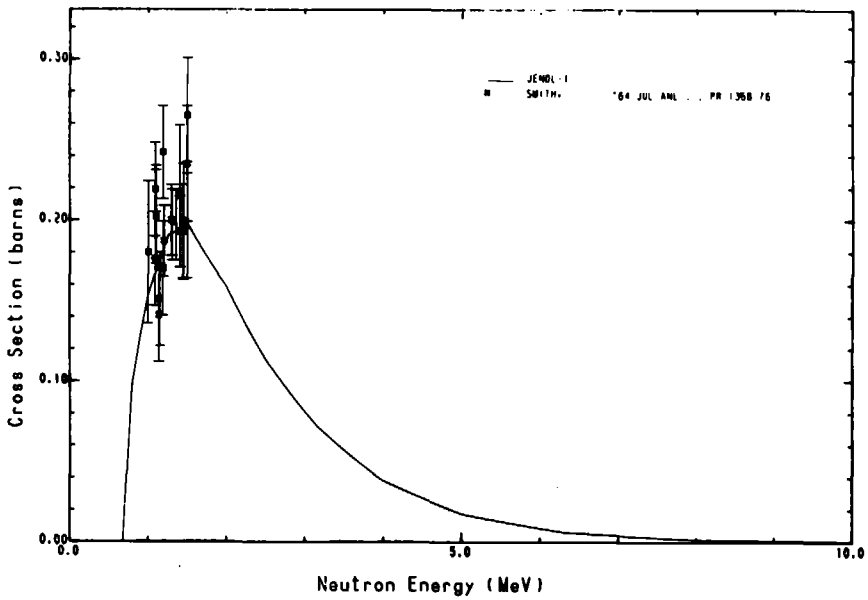

JENDL-1
ENDF/B-IV
HUGHES+ '49 JUN ANL . . PR 75 1781
MEISTER '58 GOE . . ZN 13A 820
PINONCELL+ '67 JAN MOL . . EANE-76 107A
RYVES '70 FEB NPL . . JNE 24 35
RYVES+ '74 NPL . . JP A 7 2318
Cross Section (barns)
Neutron Energy (eV)
10^3
10^2
10^1
10^0
10^{-1}
10^{-2}
10^{-1}
10^0
10^1
10^2
10^3

^{63}Cu
(n, γ)
(2)

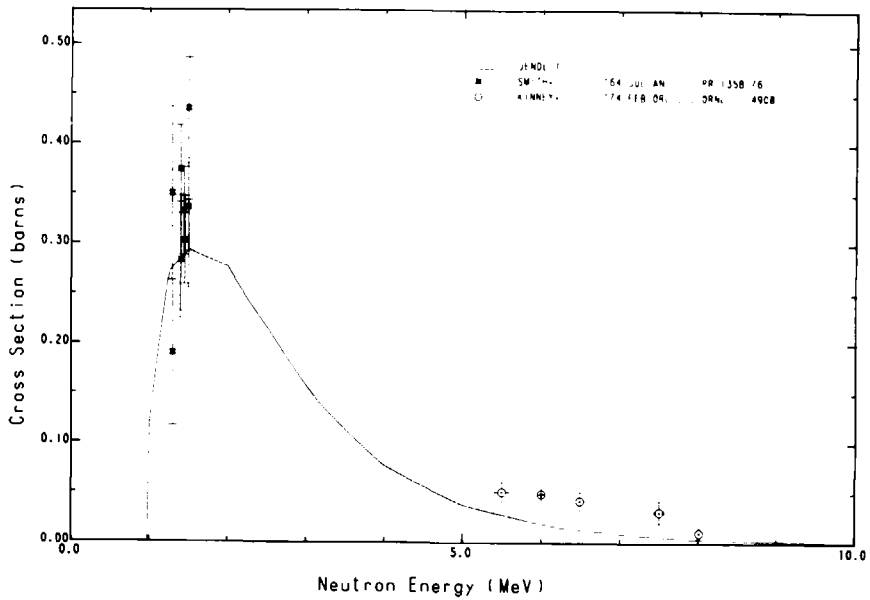

JENDL-1
ENDF/B-IV
MACKLIN+ '57 JUL ORL . . PR 107-504
PERKIN+ '58 ALD . . PPS 72 505
BOOTH+ '58 OCT LRL . . PR 112 226
VERVIER '59 JAN LVN . . NP 9 569
LYON+ '59 JUN ORL . . PR 114 1619
TOLSTIKOV+ '66 JUN FEI . . AE 21 45
ZAIKIN+ '68 DEC UKR . . AE 25 526
HASAN+ '68 DEC MUA . . NC B 58 402
DOVBENKO+ '69 FEB OBN . . INDC260 11
DIKSIC+ '70 JAN DEB . . AHP 28 257
Cross Section (barns)
Neutron Energy (eV)

^{63}Cu (n,n')

E_x=0.669 MeV



E_x=0.962 MeV

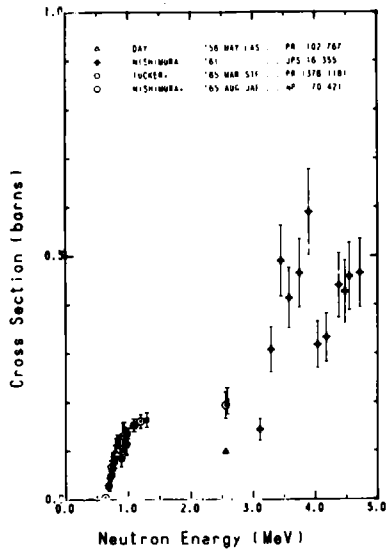


^{63}Cu

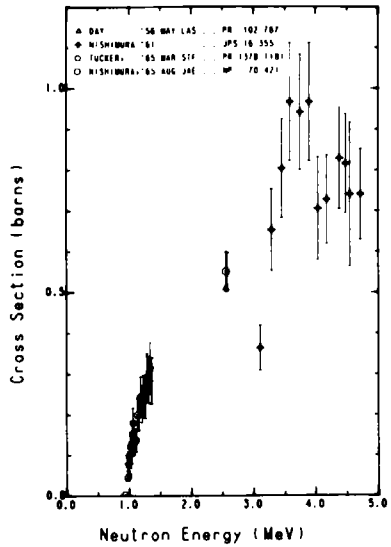
(n,n'γ)
(n,2n)

(n,n'γ)

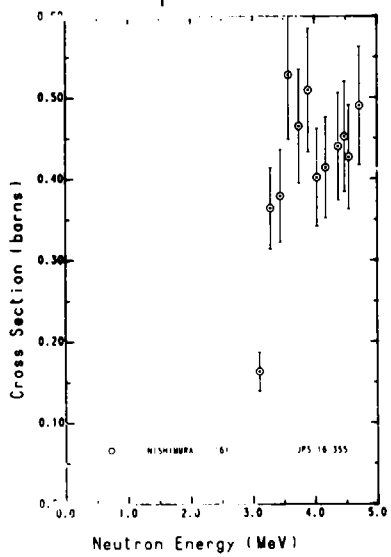
E_γ=0.668 MeV



E_γ=0.961 MeV



E_γ=1.33 MeV

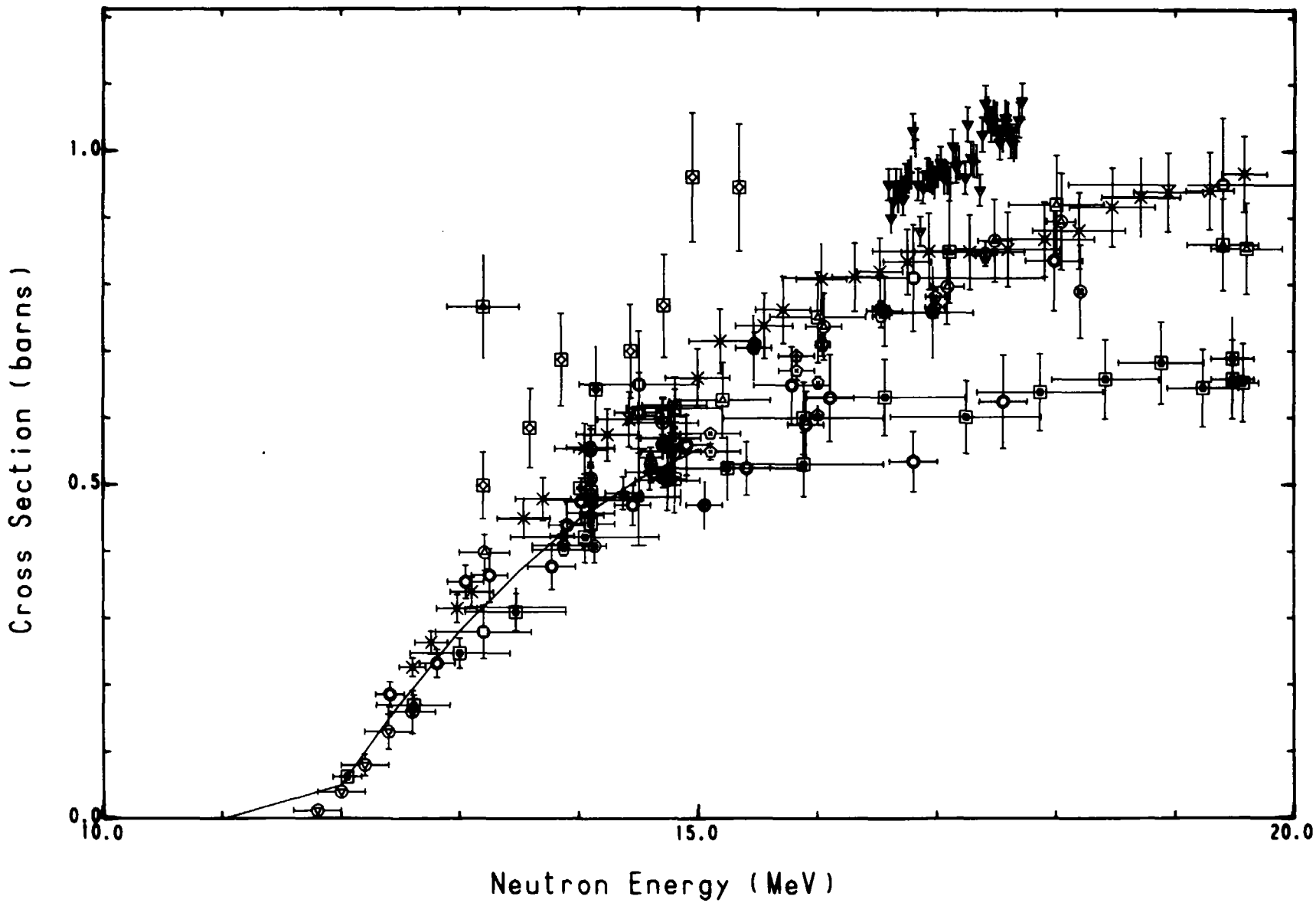


(n,2n)

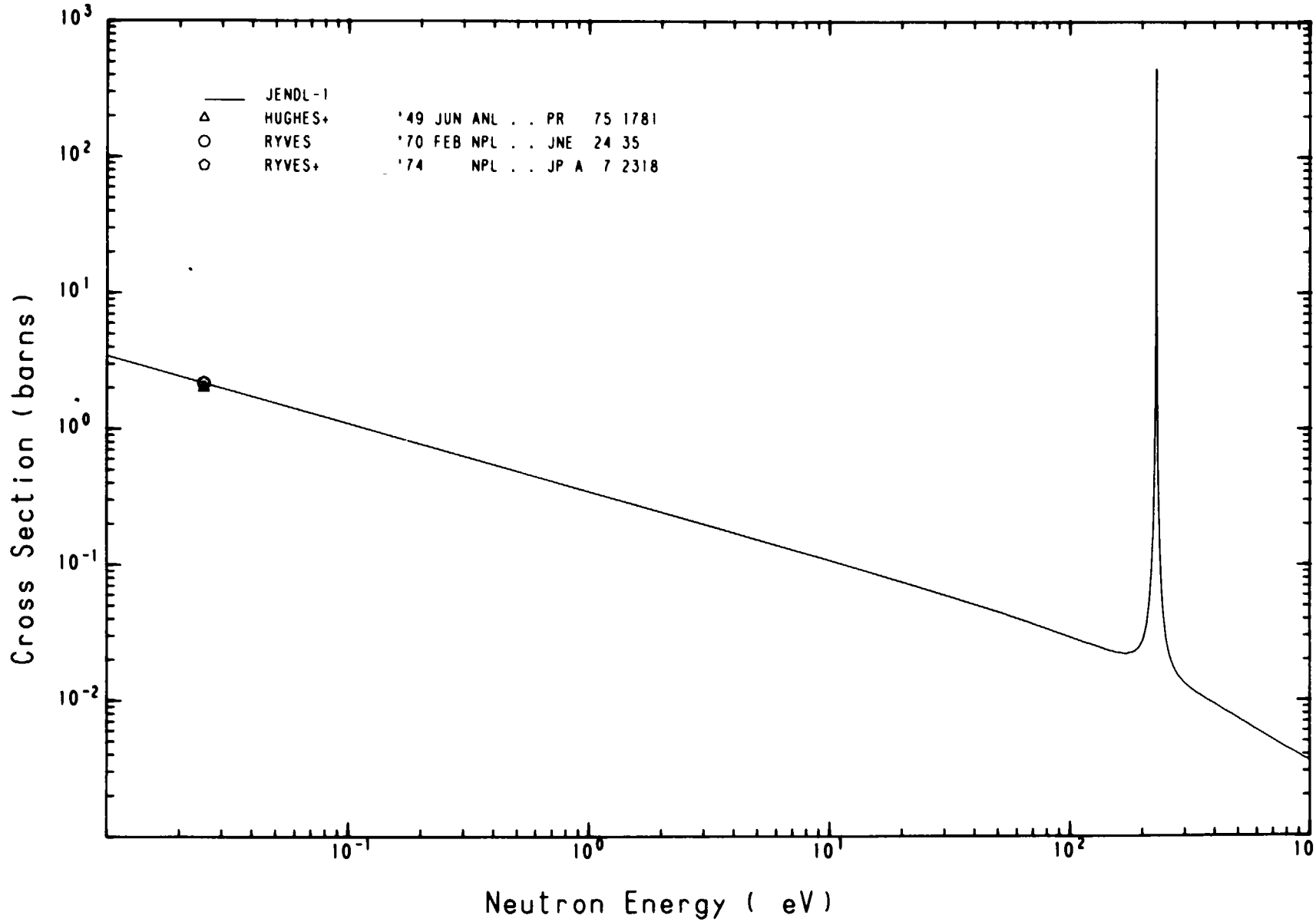
——	JENDL-1								
⊛	FOWLER+	'50	MAR	LAS	. .	PR	77	787
○	BROLLER JR	'52	NOV	LAS	. .	PR	88	618
●	FORBES	'52	DEC	LAS	. .	PR	88	1309
✖	PAUL+	'53		CRC	. .	CJP	31	267
⊙	COHEN+	'56		UK	. .	NP	1	73
○	YASUMI	'57	MAY	KON	. .	JPJ	12	443
⊠	MCCRARY+	'60	APR	TNC	. .	BAP	5	246
⊙	FERGUSON+	'60	APR	NRD	. .	PR	118	228
⊛	DEJUREN+	'60	NOV	WES	. .	PR	120	901
⊠	POLLEHN+	'61	FEB	HAM	. .	ZN	16A	227
✧	SAKISAKA+	'61	OCT	KON	. .	JPJ	16	1869
○	GRIMELAND	'65	FEB	OSL	. .	PR	B137.	878
✳	LISKIEN+	'65	MAR	GEL	. .	JNE	19	73
△	CSIKAI	'65	JUL	DEB	. .	65ANTW	2	102A
▽	BARDOLLE+	'65	AUG	BRC	. .	CR	261	1266
⊙	PASQUARELL	'67	MAR	TUR	. .	NP	A93	218
⊠	BORMANN+	'62		HAM	. .	ZP	166	477
✦	GLOVER+	'62	JAN	CBR	. .	NP	29	309
⊛	KOEHLER+	'62	APR	RED	. .	NP	11667	
●	CEVOLANI+	'62	DEC	BOL	. .	NC	26	1328
⊠	RAYBURN	'63	APR	ANL	. .	PR	130	731
◇	LETESSIER+	'64	DEC	BOR	. .	CR	259	4620
⊙	STRAIN+	'65	JAN	ORL	. .	ORNL		3672
⊠	CSIKAI+	'67	MAY	DEB	. .	AHP	23	87
⊠	CHATTERJE+	'67	OCT	BOS	. .	BARC	305	30
⬠	ANDREEV+	'68	APR	KUR	. .	YF	7	745
□	CRUMPTON+	'69	JAN	BIA	. .	JIN	31	1
⊠	BARRALL+	'69	APR	LRL	. .	WASH		1127
⊛	BORMANN+	'69	JUN	HAM	. .	NP	A130	195
⊠	MOGHARRAB+	'72	APR	HAM	. .	AKE	19	107
●	QAIM	'72	MAY	JUL	. .	NP	A185	614

^{63}Cu

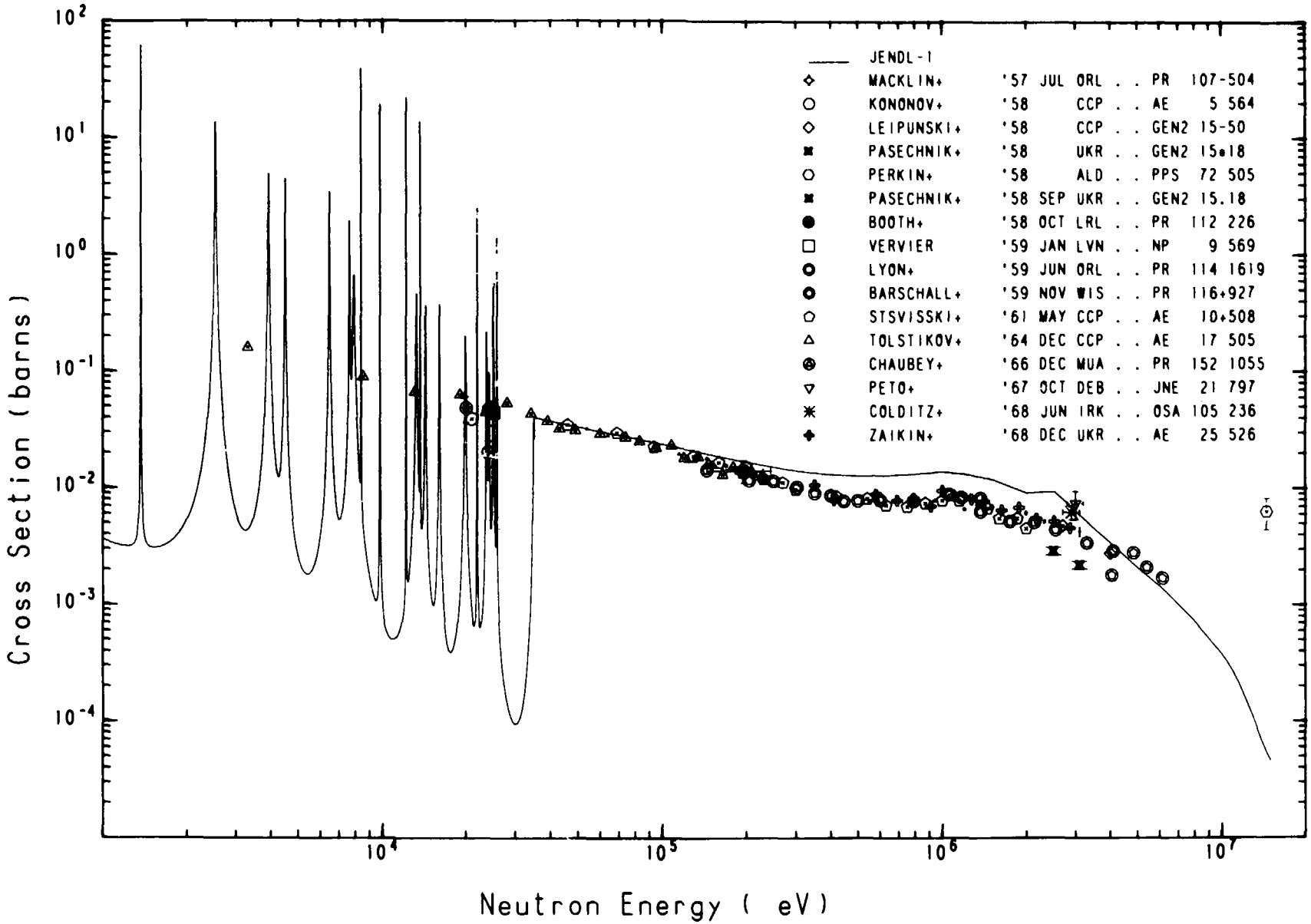
(n,2n)



^{65}Cu
(n,γ)
(1)

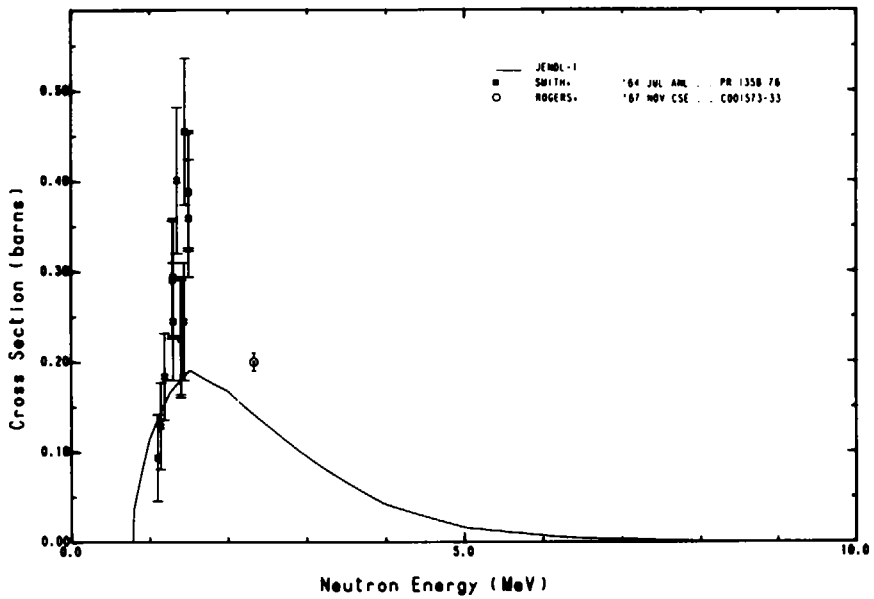

JENDL-1
HUGHES+ '49 JUN ANL . . PR 75 1781
RYVES '70 FEB NPL . . JNE 24 35
RYVES+ '74 NPL . . JP A 7 2318
Cross Section (barns)
Neutron Energy (eV)
10^3
10^2
10^1
10^0
10^{-1}
10^{-2}
10^{-1}
10^0
10^1
10^2
10^3

^{65}Cu
(n,γ)
(2)

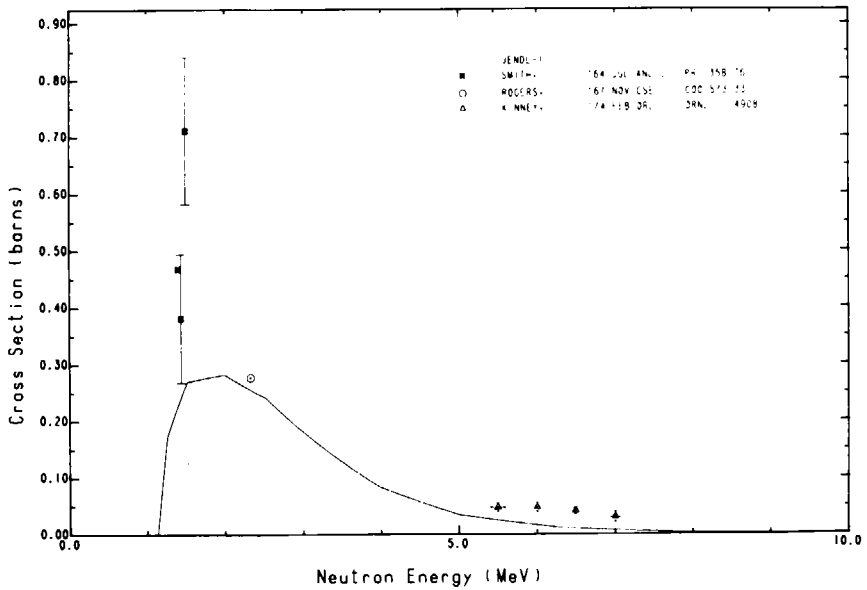

JENDL-1
MACKLIN+ '57 JUL ORL . . PR 107-504
KONONOV+ '58 CCP . . AE 5 564
LEIPUNSKI+ '58 CCP . . GEN2 15-50
PASECHNIK+ '58 UKR . . GEN2 15•18
PERKIN+ '58 ALD . . PPS 72 505
PASECHNIK+ '58 SEP UKR . . GEN2 15.18
BOOTH+ '58 OCT LRL . . PR 112 226
VERVIER '59 JAN LVN . . NP 9 569
LYON+ '59 JUN ORL . . PR 114 1619
BARSCHALL+ '59 NOV WIS . . PR 116+927
STSVISSKI+ '61 MAY CCP . . AE 10+508
TOLSTIKOV+ '64 DEC CCP . . AE 17 505
CHAUBEY+ '66 DEC MUA . . PR 152 1055
PETO+ '67 OCT DEB . . JNE 21 797
COLDITZ+ '68 JUN IRK . . OSA 105 236
ZAIKIN+ '68 DEC UKR . . AE 25 526
Cross Section (barns)
Neutron Energy (eV)

^{65}Cu
(n,n')

E_x=0.770 MeV



E_x=1.115 MeV

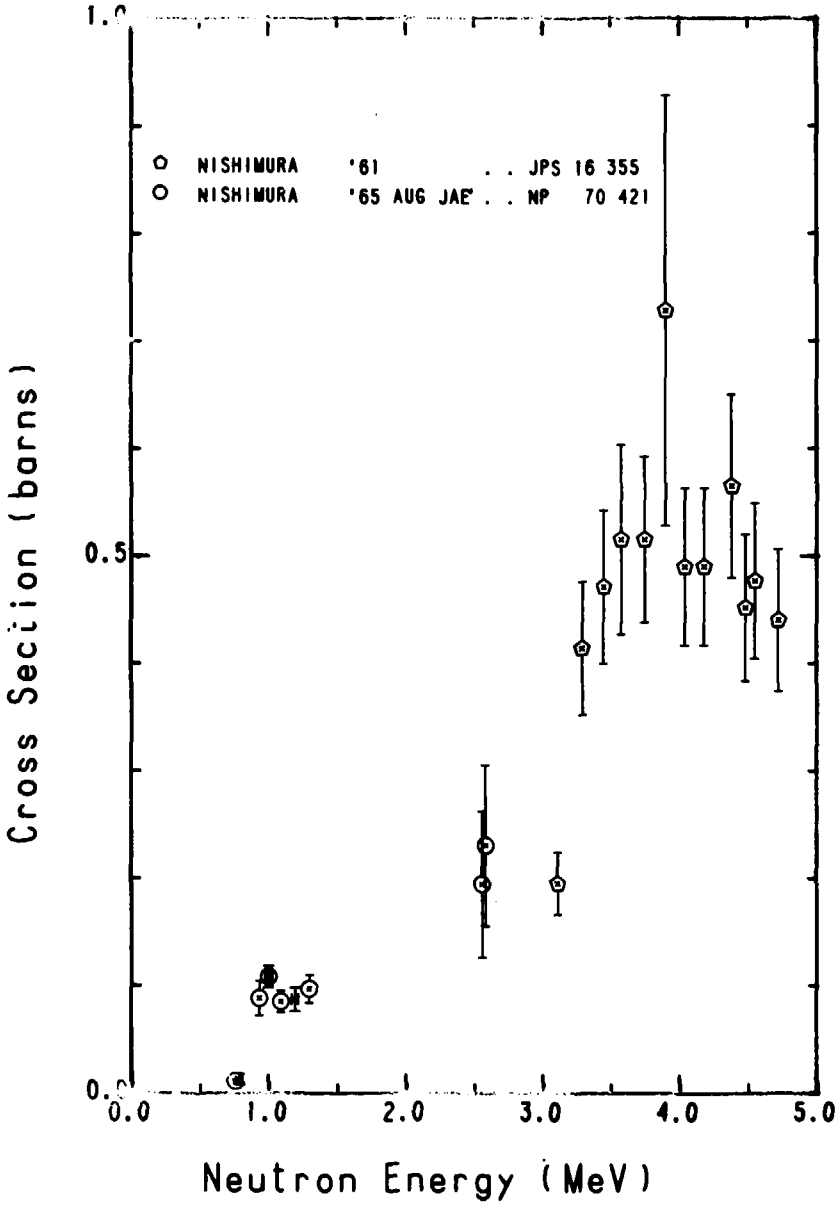


^{65}Cu

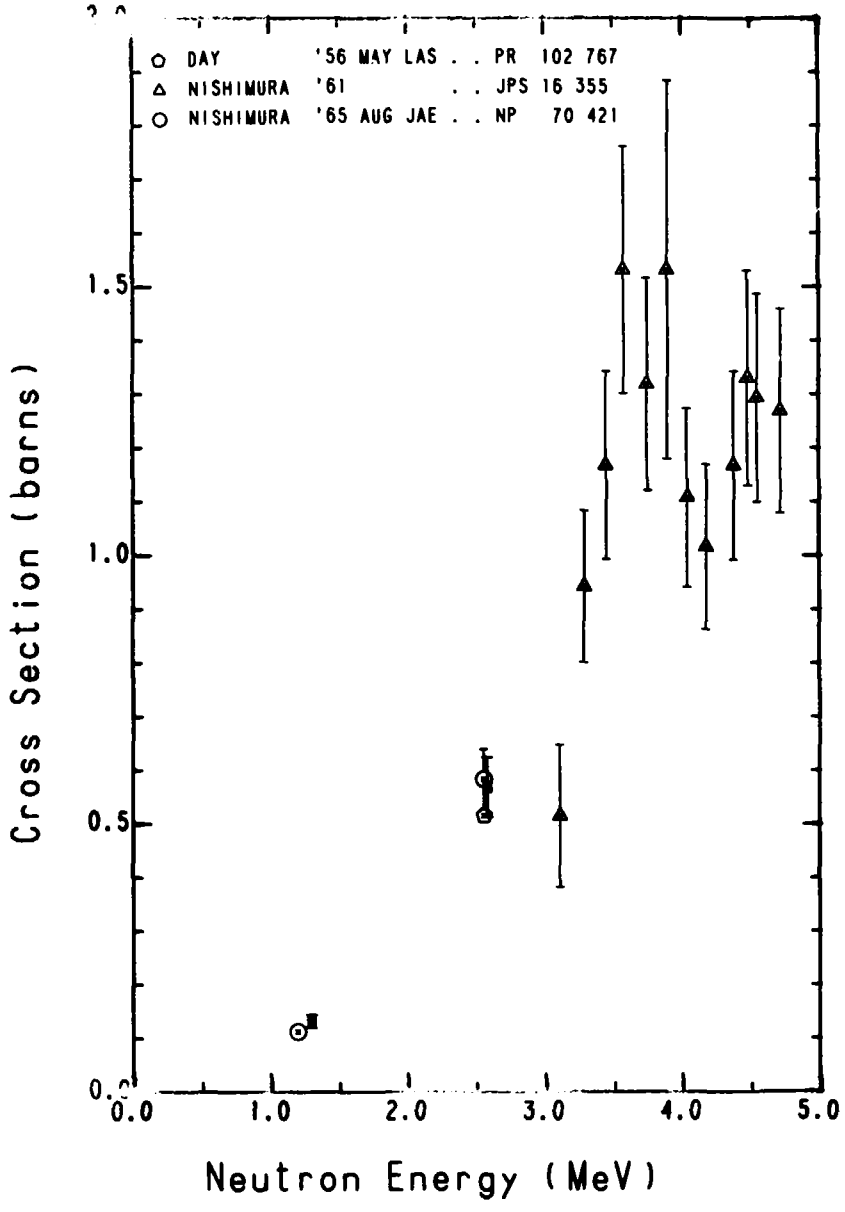
(n,n'γ)

~~E_γ = 0.770 MeV~~

E_γ=0.770 MeV



E_γ=1.114 MeV



^{65}Cu

(n,2n)

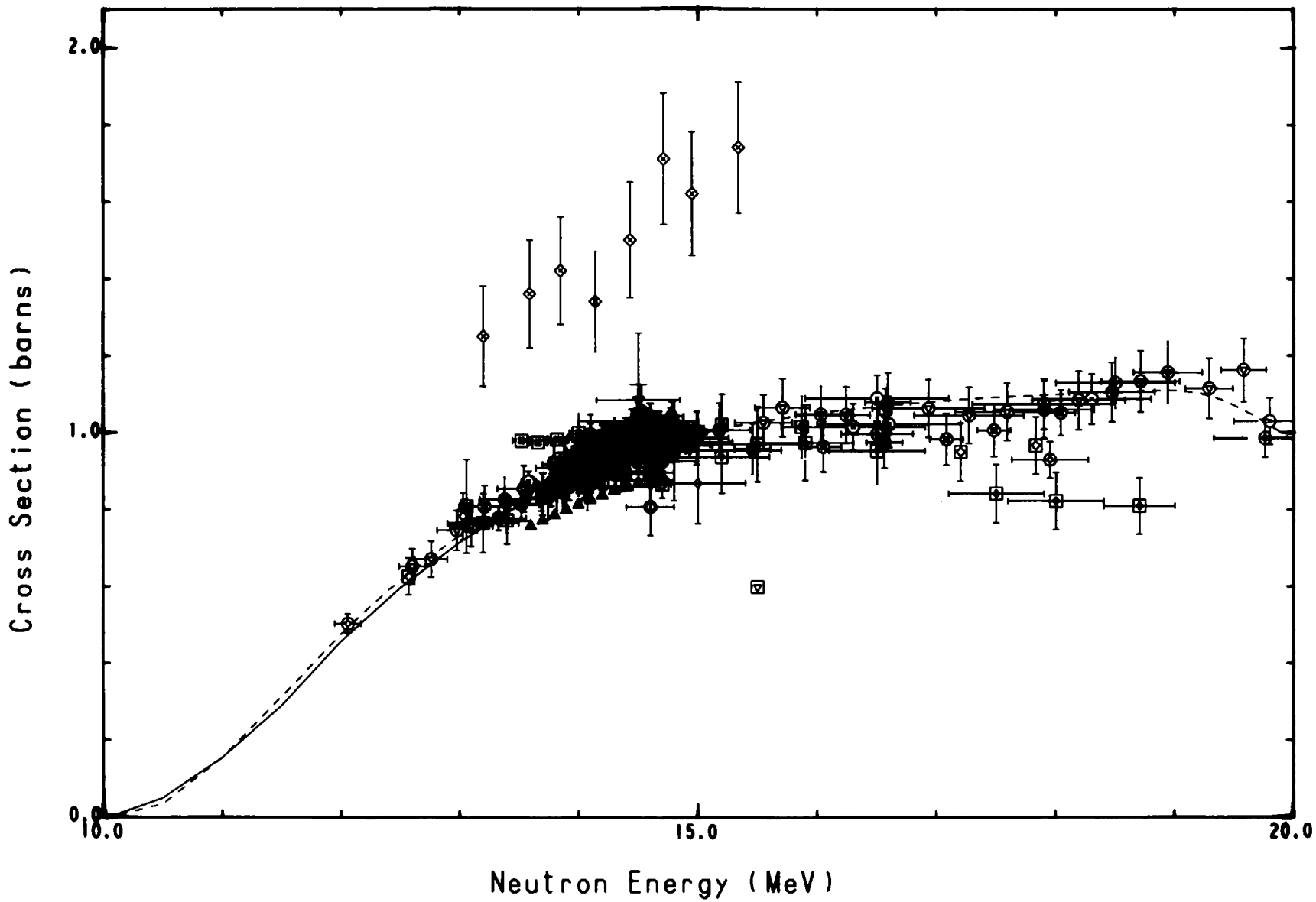
—— JENDL-1

----- ENDF/B-IV

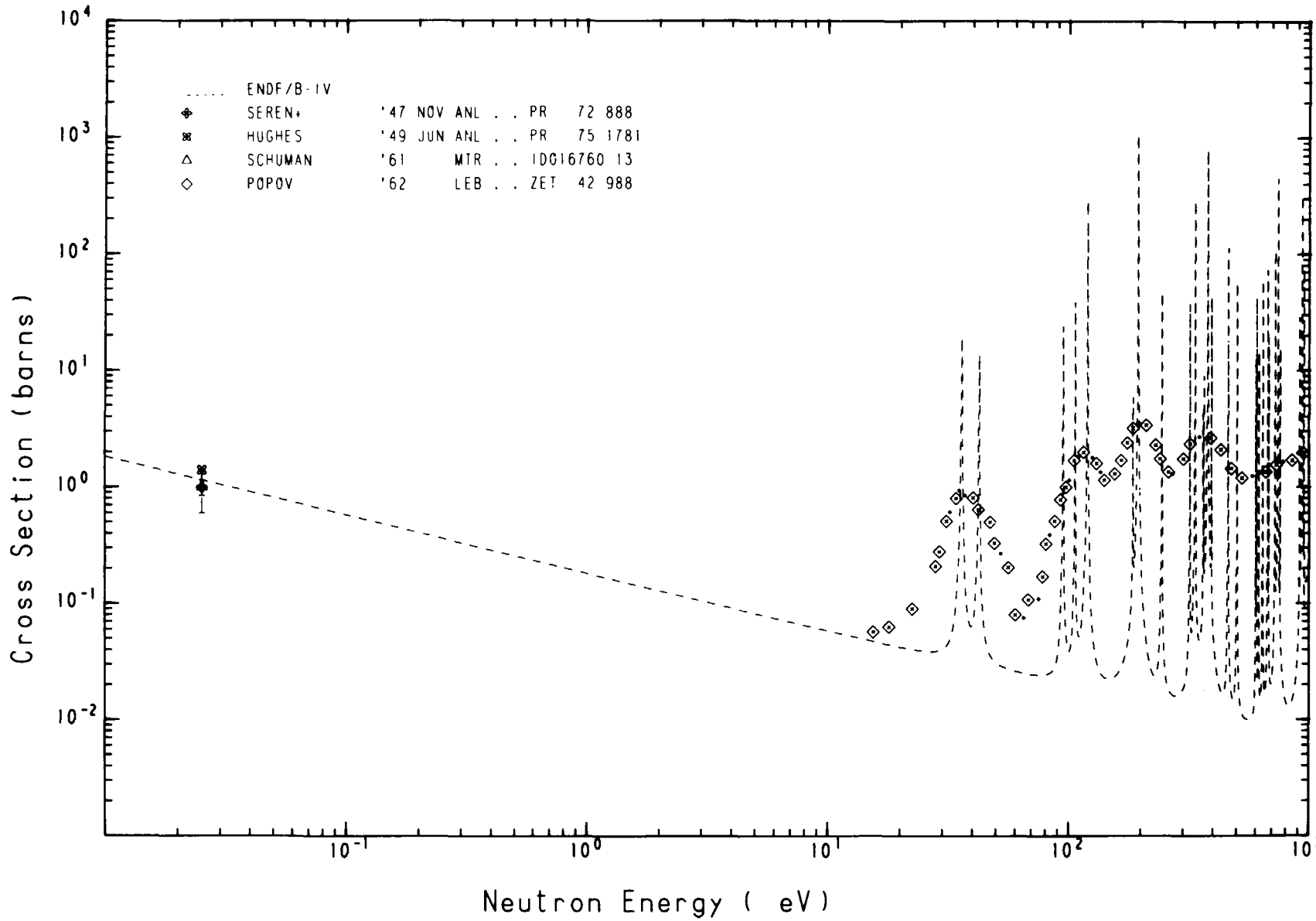
●	FORBES	'52	DEC	LAS	. .	PR	88	1309
▽	PAUL+	'53		CRC	. .	CJP	31	267
○	POULARIKS+	'59	AUG	ARK	. .	PR	115	989
✖	WEIGOLD	'60		CBR	. .	AUJ	13	186
◇	MCCRARY+	'60	APR	TNC	. .	BAP	5	246
◇	DEPRAZ+	'60	MAY	LYO	. .	JPR	21/377	
⊠	POLLEHN+	'61	FEB	HAM	. .	ZN	16A	227
⊕	PRESTWOOD+	'61	MAR	LAS	. .	PR	121	1438
⊠	RAYBURN	'61	APR	ANL	. .	PR	122	168
⊕	GLOVER+	'62	JAN	CBR	. .	NP	29	309
⊠	RAYBURN	'62	SEP	ANL	. .	62PADUA		322
⊞	BORMANN	'63		HAM	. .	ZP	174	1
⊕	BONAZZOLA+	'64	FEB	TUR	. .	NP	51	337
○	STRAIN+	'65	JAN	ORL	. .	ORNL		3672
⊕	PAULSEN+	'65	MAR	GEL	. .	NUK	7	117
✦	CSIKAI	'65	JUL	DEB	. .	65ANTW2		102
⬠	NAGEL+	'65	DEC	AMS	. .	PHY	31	1091
○	SANTRY+	'66	MAY	CRC	. .	CJP	44	1183
○	NAGEL	'66	DEC	AMS	. .	NAGEL.		66L
■	CSIKAI+	'67	MAY	DEB	. .	AHP	23	87
⊠	BORMANN+	'67	OCT	HAM	. .	ZP	207/64	
●	CSIKAI	'68	FEB	DEB	. .	MFF	16	123
⊠	VONACH+	'68	MAR	MUN	. .	WASHCON		E31
○	CUZZOCREA+	'68	MAR	CAT	. .	NC	B54	53
✳	CRUMPTON+	'69	JAN	BIA	. .	JIN	31	1
⊡	BARRALL+	'69	MAR	STF	. .	AFWL-68		134
⊠	JOENSSON+	'69	APR	LND	. .	AF	39	295
⊡	BARRALL+	'69	APR	LRL	. .	WASH		1127
●	BORMANN+	'69	JUN	HAM	. .	NP A130		195
⊠	MOGHARRAB+	'72	APR	HAM	. .	AKE	19	107
○	QAIM	'72	MAY	JUL	. .	NP A185		614
□	ARAMINOWIC	'73	MAY	LOU	. .	INR1464		14
⬡	ROBERTSON+	'73	AUG	NPL	. .	JNE	27	531
△	MANNHART+	'75	MAR	MUN	. .	ZP	272	279

^{65}Cu

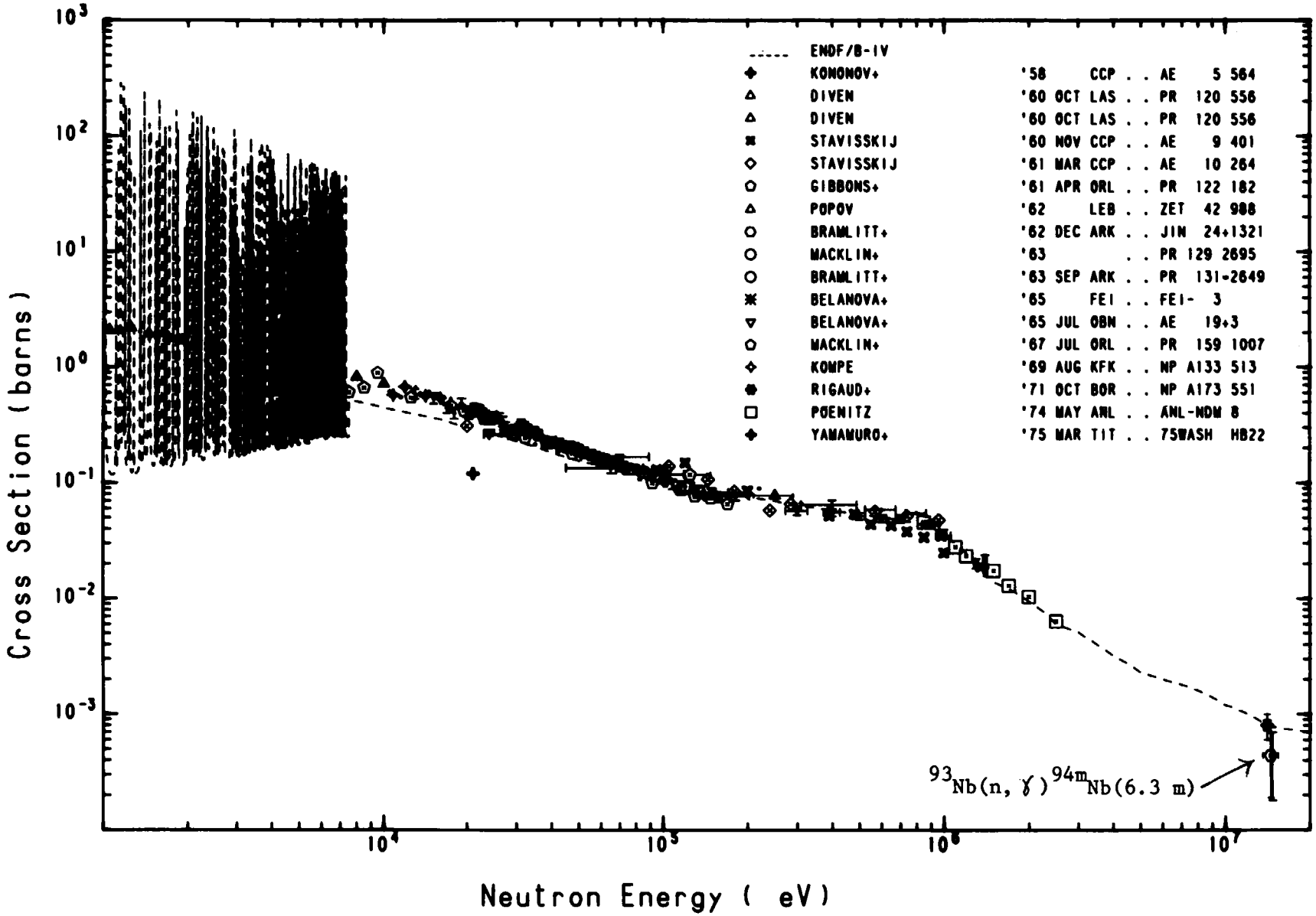
(n, 2n)



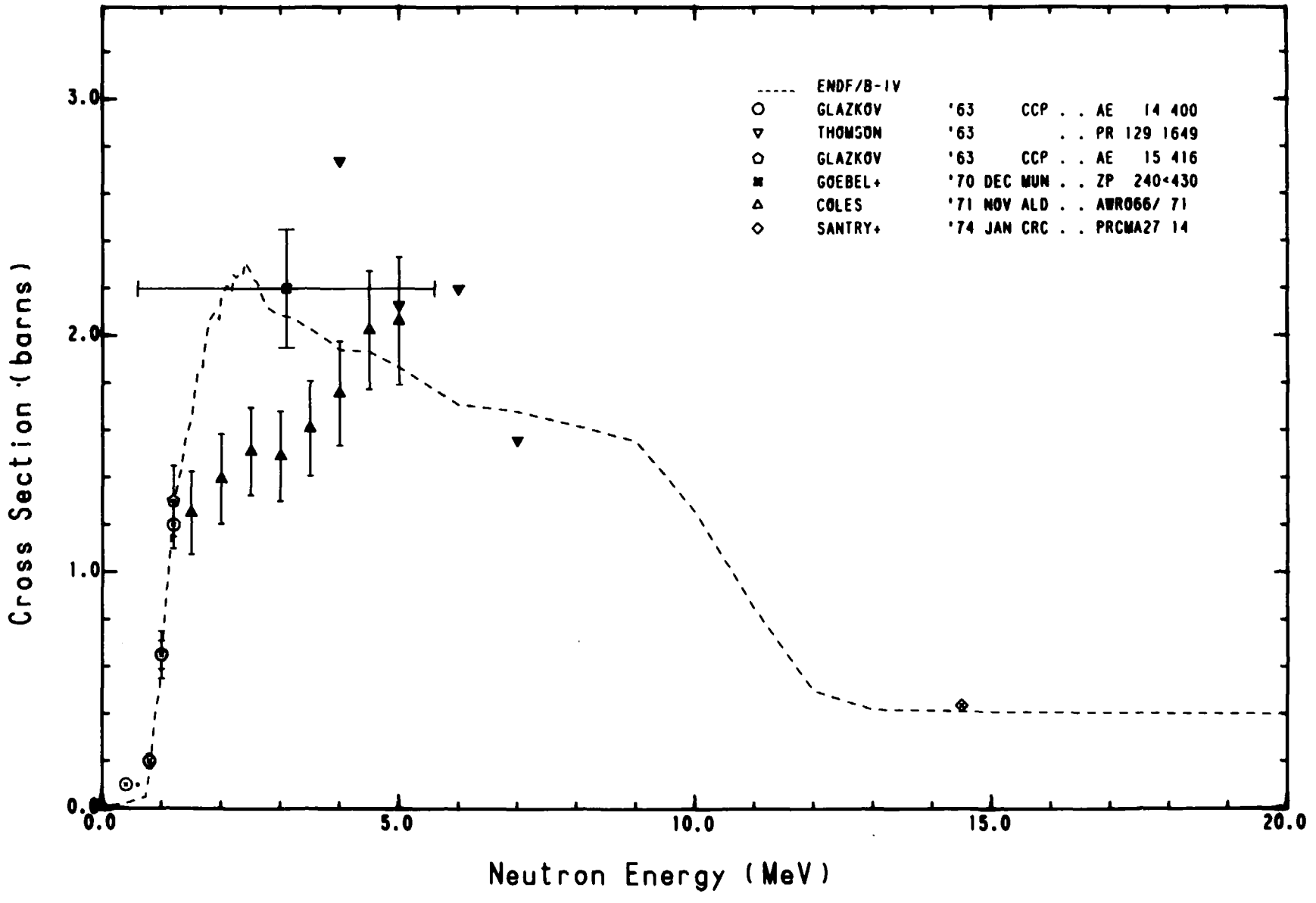
^{93}Nb
(n,γ)
(1)


ENDF/B-IV
SEREN+ '47 NOV ANL . . PR 72 888
HUGHES '49 JUN ANL . . PR 75 1781
SCHUMAN '61 MTR . . IDO16760 13
POPOV '62 LEB . . ZET 42 988
Cross Section (barns)
Neutron Energy (eV)

^{93}Nb
(n,γ)
(2)

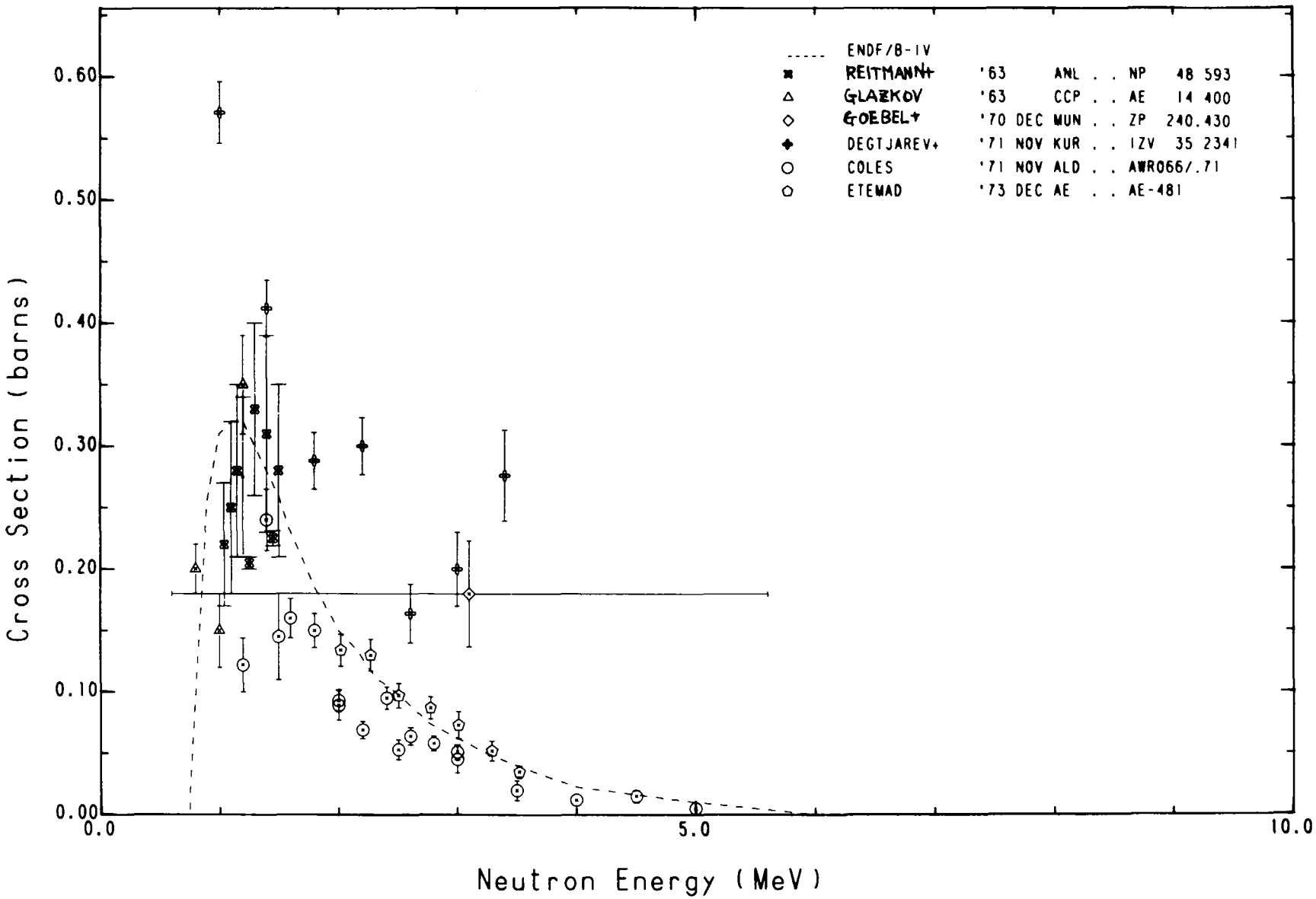

ENDF/B-IV
KONONOV+ '58 CCP . . AE 5 564
DIVEN '60 OCT LAS . . PR 120 556
DIVEN '60 OCT LAS . . PR 120 556
STAVISSKIJ '60 NOV CCP . . AE 9 401
STAVISSKIJ '61 MAR CCP . . AE 10 264
GIBBONS+ '61 APR ORL . . PR 122 182
POPOV '62 LEB . . ZET 42 988
BRAMLITT+ '62 DEC ARK . . JIN 24+1321
MACKLIN+ '63 . . PR 129 2695
BRAMLITT+ '63 SEP ARK . . PR 131-2649
BELANOVA+ '65 FEI . . FEI- 3
BELANOVA+ '65 JUL OBN . . AE 19+3
MACKLIN+ '67 JUL ORL . . PR 159 1007
KOMPE '69 AUG KFK . . NP A133 513
RIGAUD+ '71 OCT BOR . . NP A173 551
POENITZ '74 MAY ANL . . ANL-NDM 8
YAMAMURO+ '75 MAR TIT . . 75WASH HB22
^{93}Nb(n, γ) ^{94m}Nb(6.3 m)
Cross Section (barns)
Neutron Energy (eV)

^{93}Nb
(n,n')


ENDF/B-IV
GLAZKOV '63 CCP . . AE 14 400
THOMSON '63 . . PR 129 1649
GLAZKOV '63 CCP . . AE 15 416
GOEBEL+ '70 DEC MUN . . ZP 240<430
COLES '71 NOV ALD . . AWR066/ 71
SANTRY+ '74 JAN CRC . . PRCMA27 14
Cross Section (barns)
Neutron Energy (MeV)
0.
1.0
2.0
3.0
0.0
5.0
10.0
15.0
20.0

^{93}Nb
(n,n')

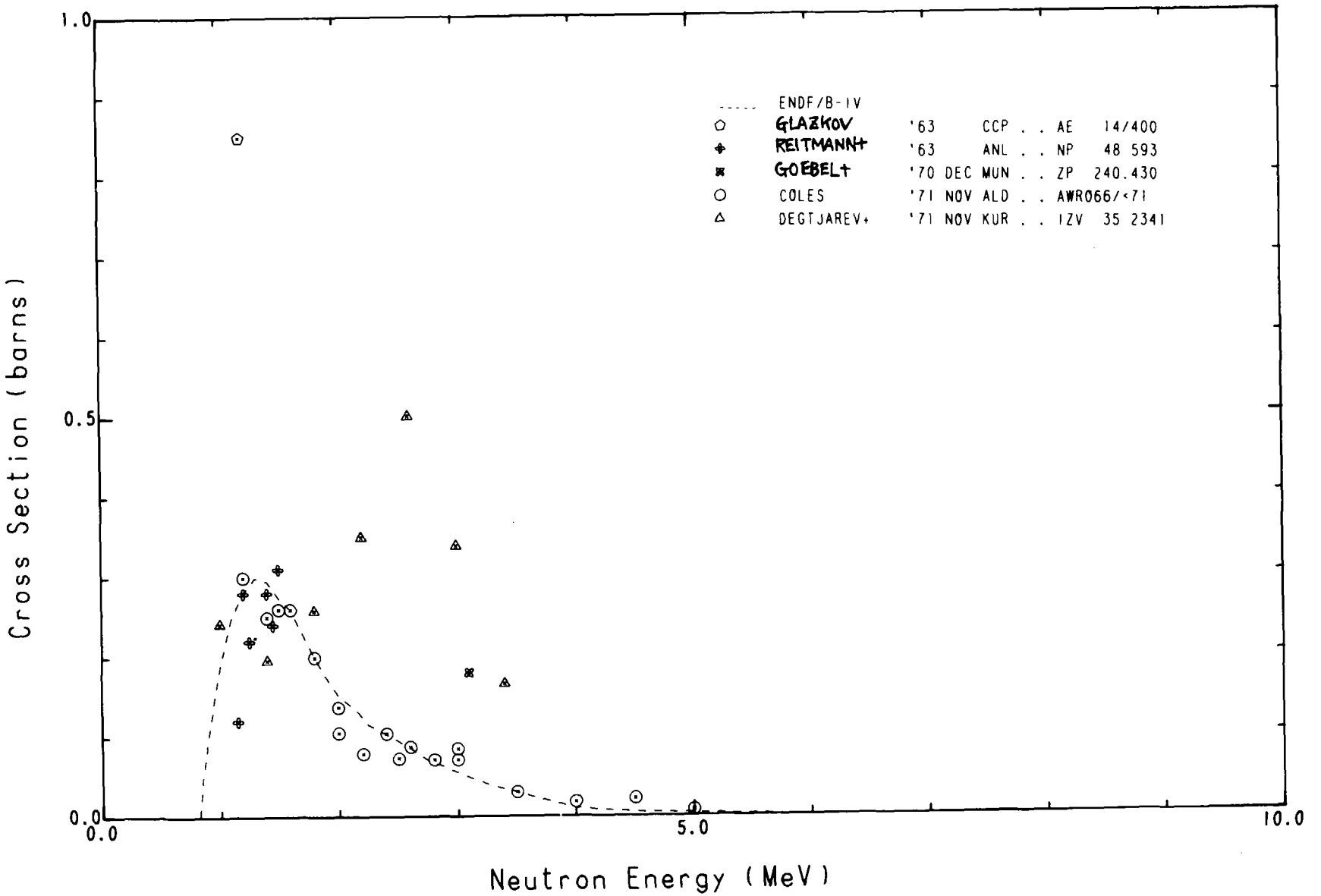
E_x=0.74 MeV



^{93}Nb

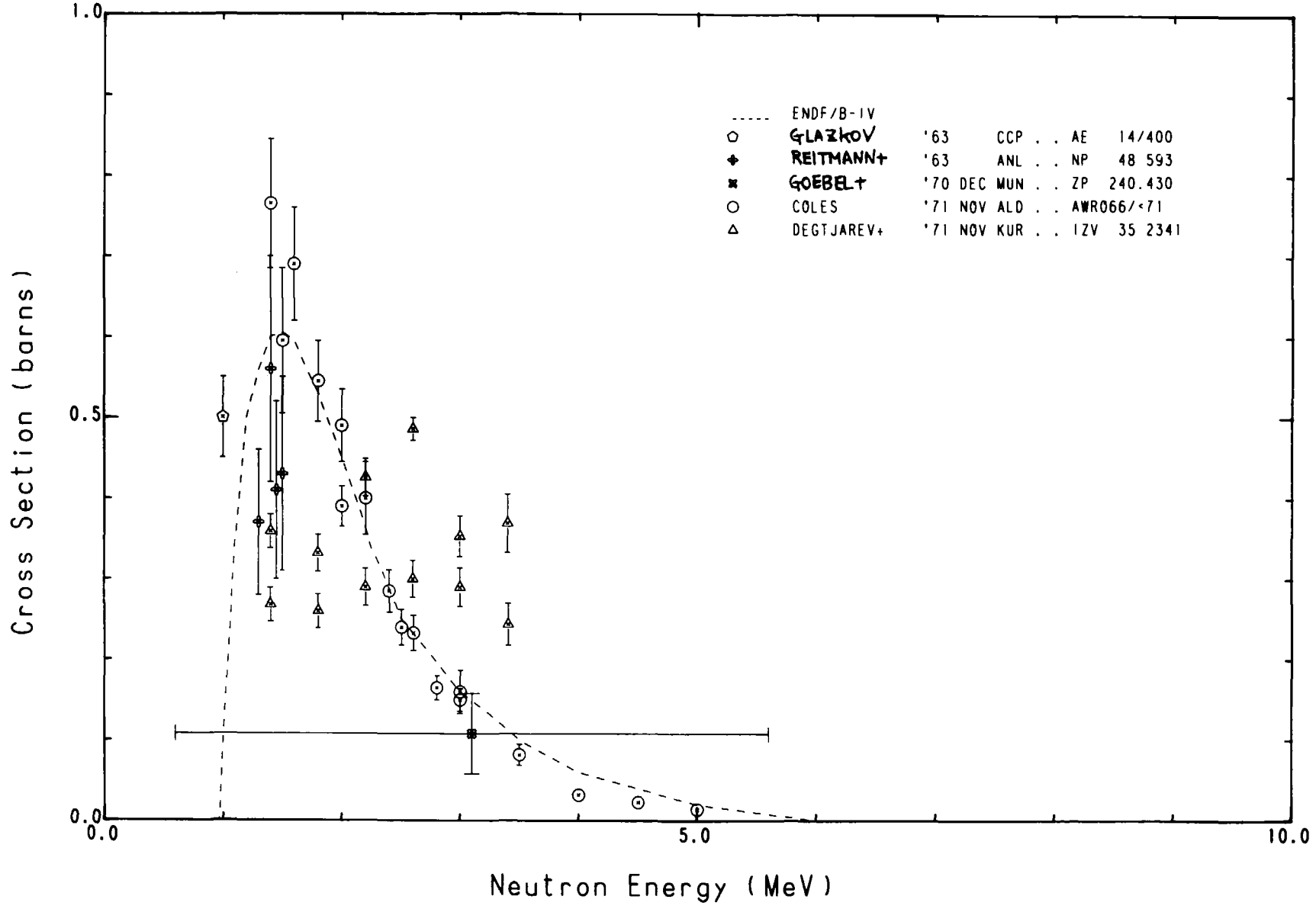
(n,n')

E_x=0.81 MeV



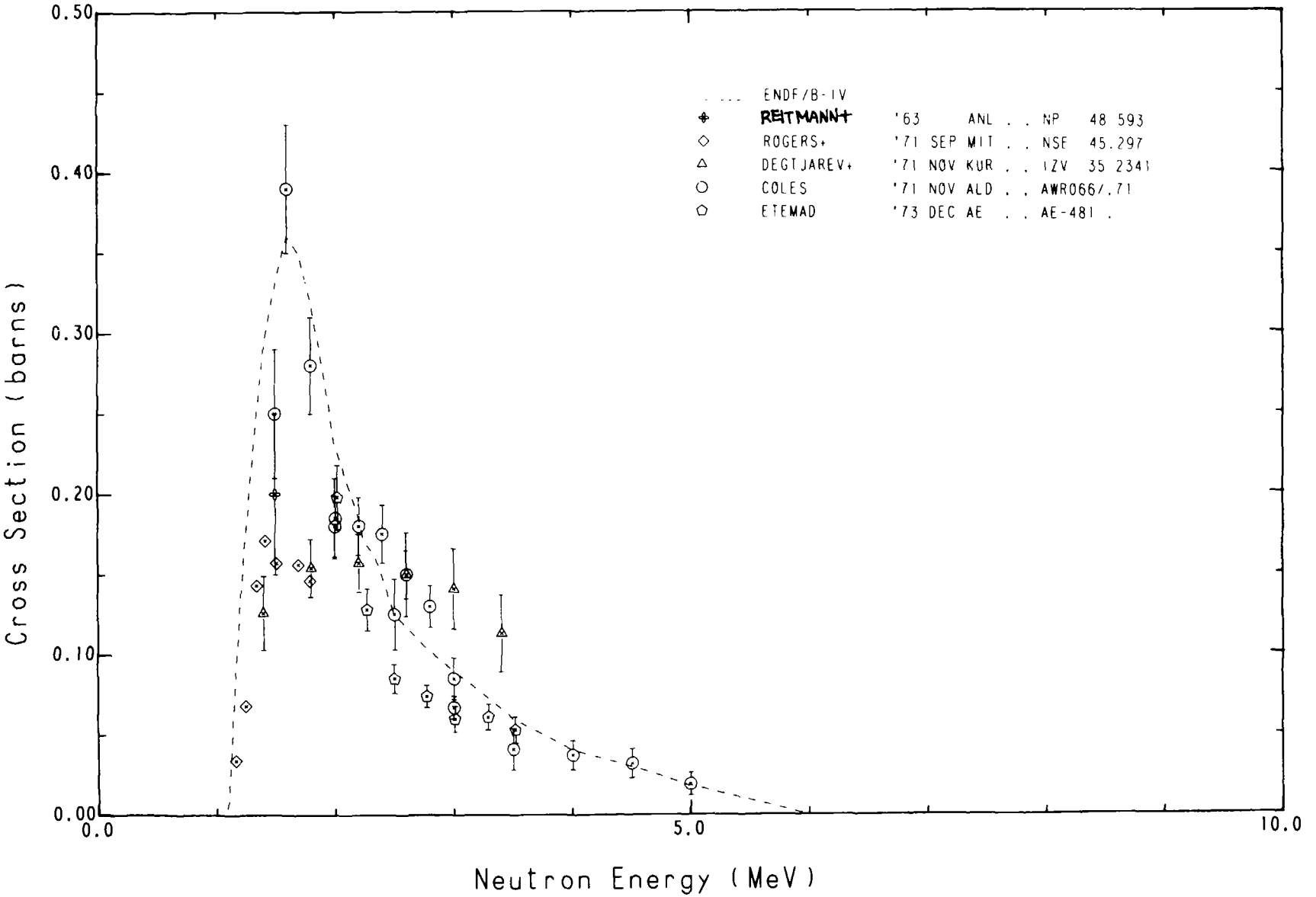
^{93}Nb
(n,n')

E_x=0.96 MeV



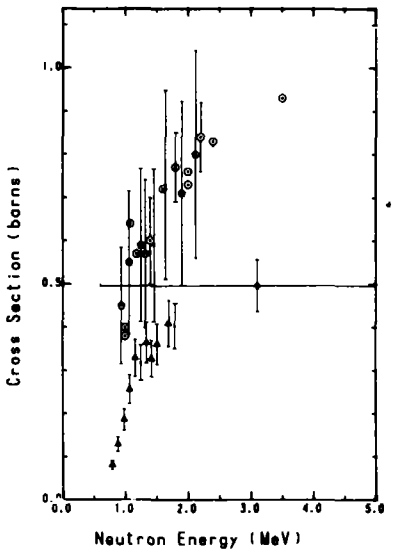
^{93}Nb
(n,n')

E_X=1.08 MeV

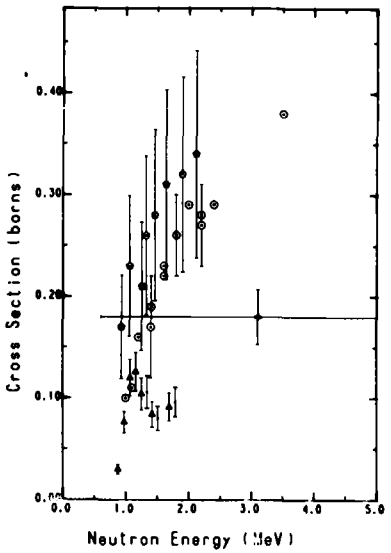


^{93}Nb (n,n'γ)

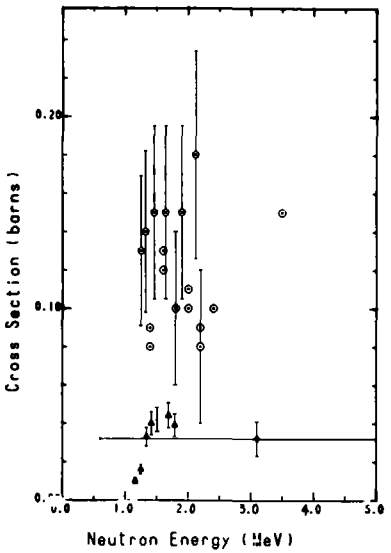
E_γ=0.74 MeV



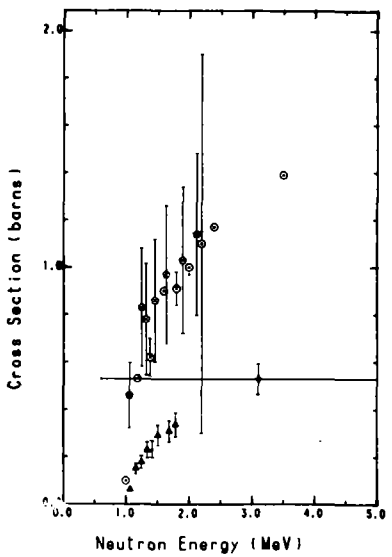
E_γ=0.81 MeV

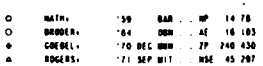


E_γ=0.96 MeV

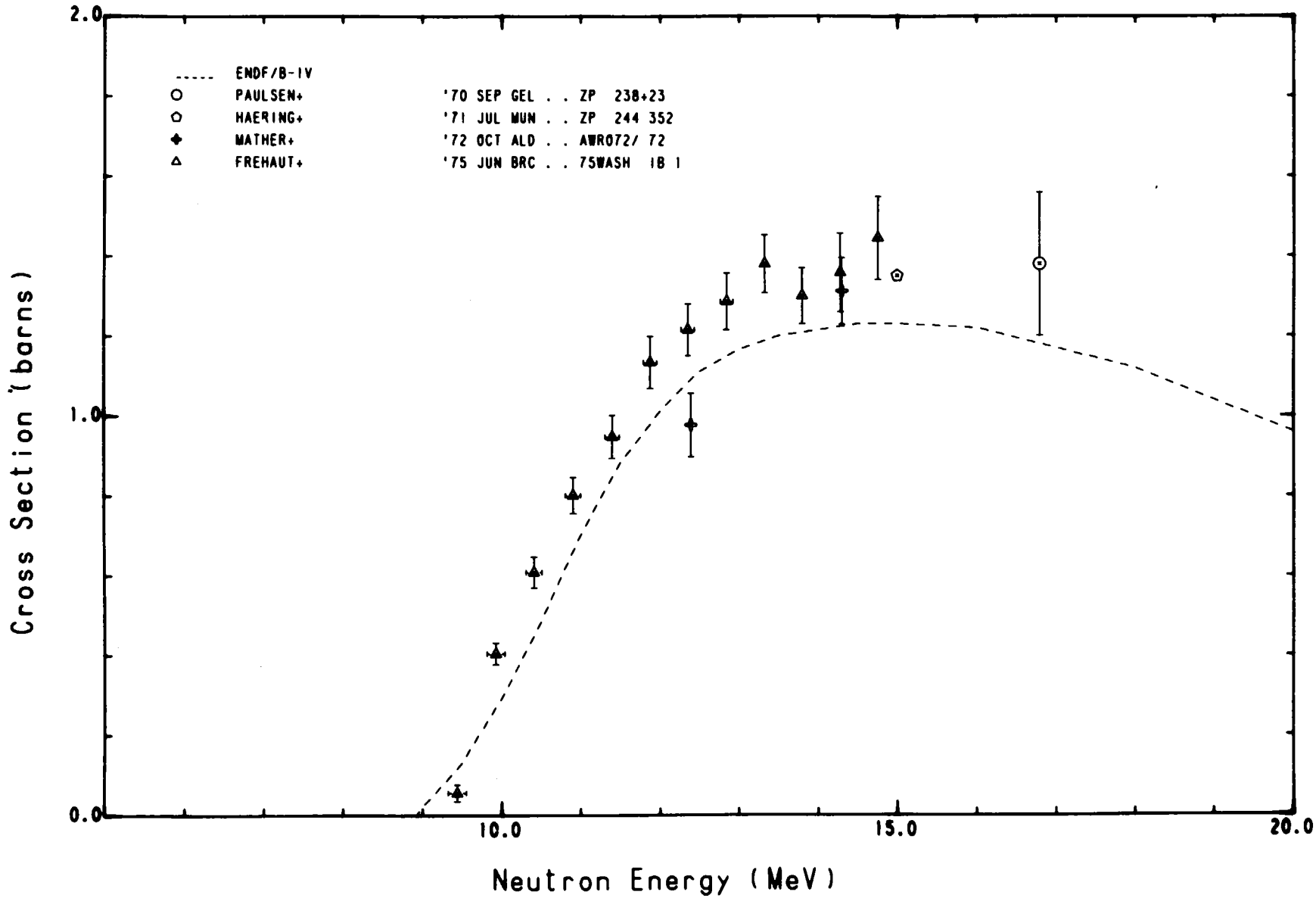


E_γ=1.08 MeV



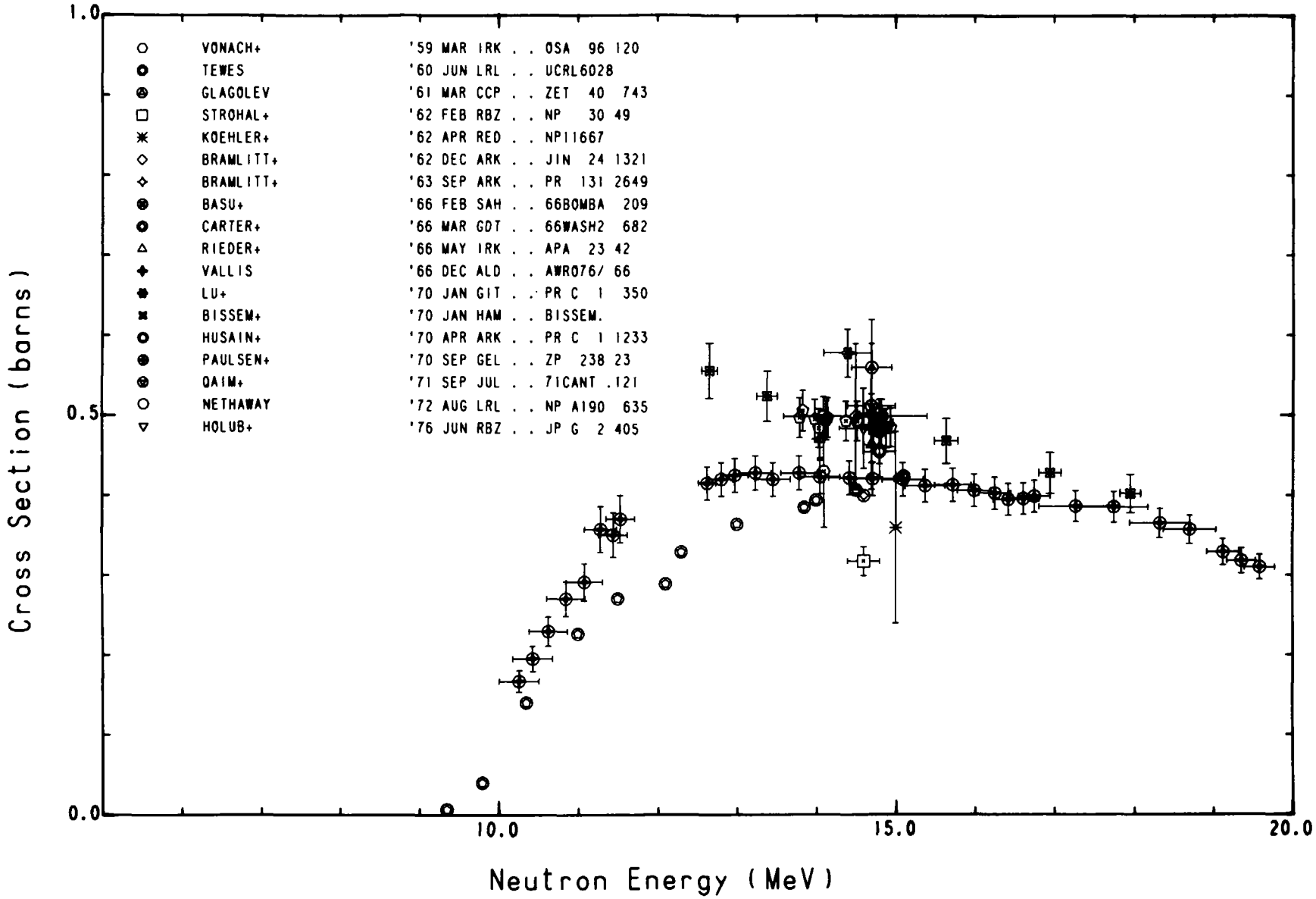


^{93}Nb
(n,2n)

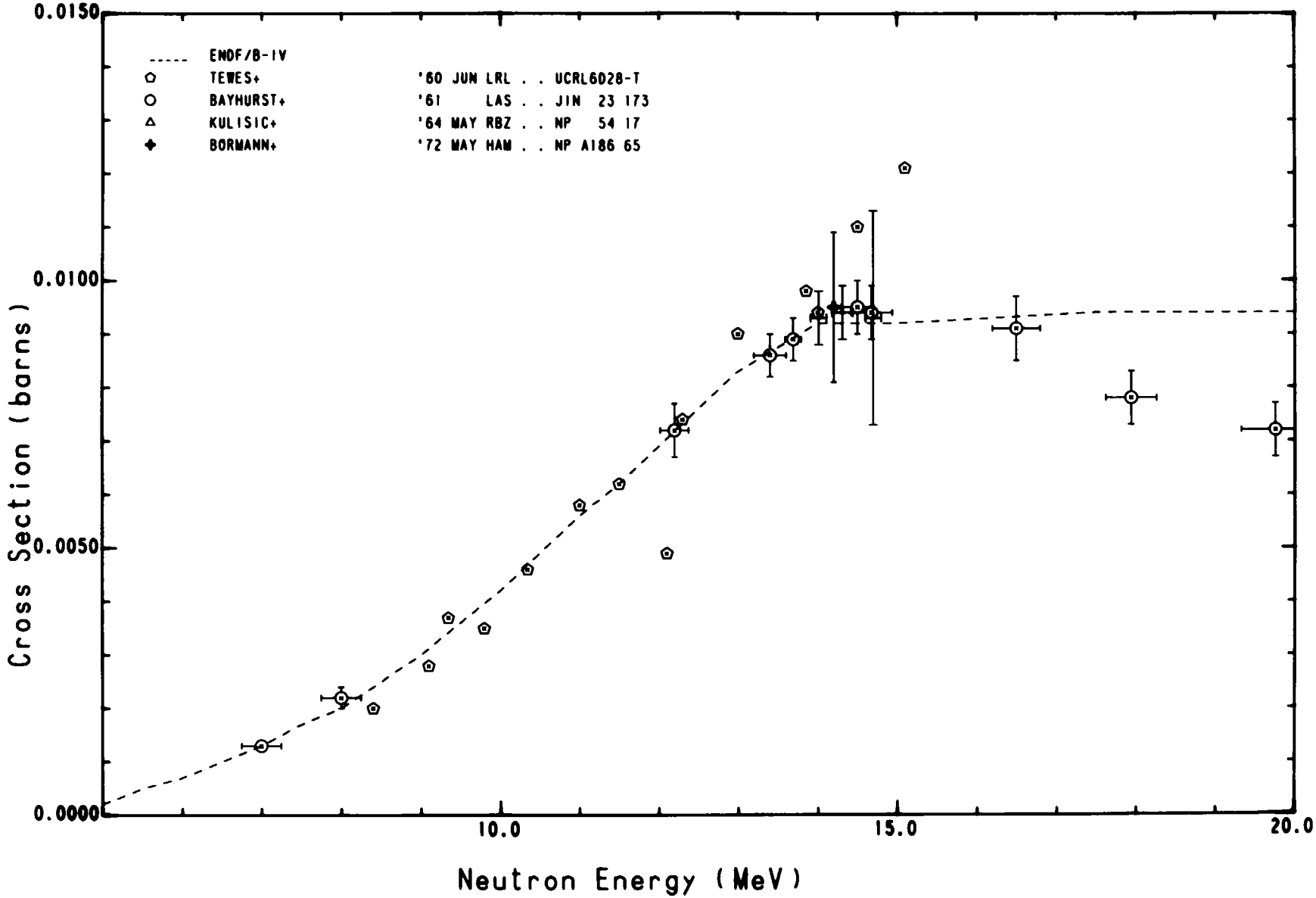

ENDF/B-IV
PAULSEN+ '70 SEP GEL . . ZP 238+23
HAERING+ '71 JUL MUN . . ZP 244 352
MATHER+ '72 OCT ALD . . AWR072/ 72
FREHAUT+ '75 JUN BRC . . 75WASH IB 1
2.0
1.0
0.0
10.0
15.0
20.0
Cross Section (barns)
Neutron Energy (MeV)

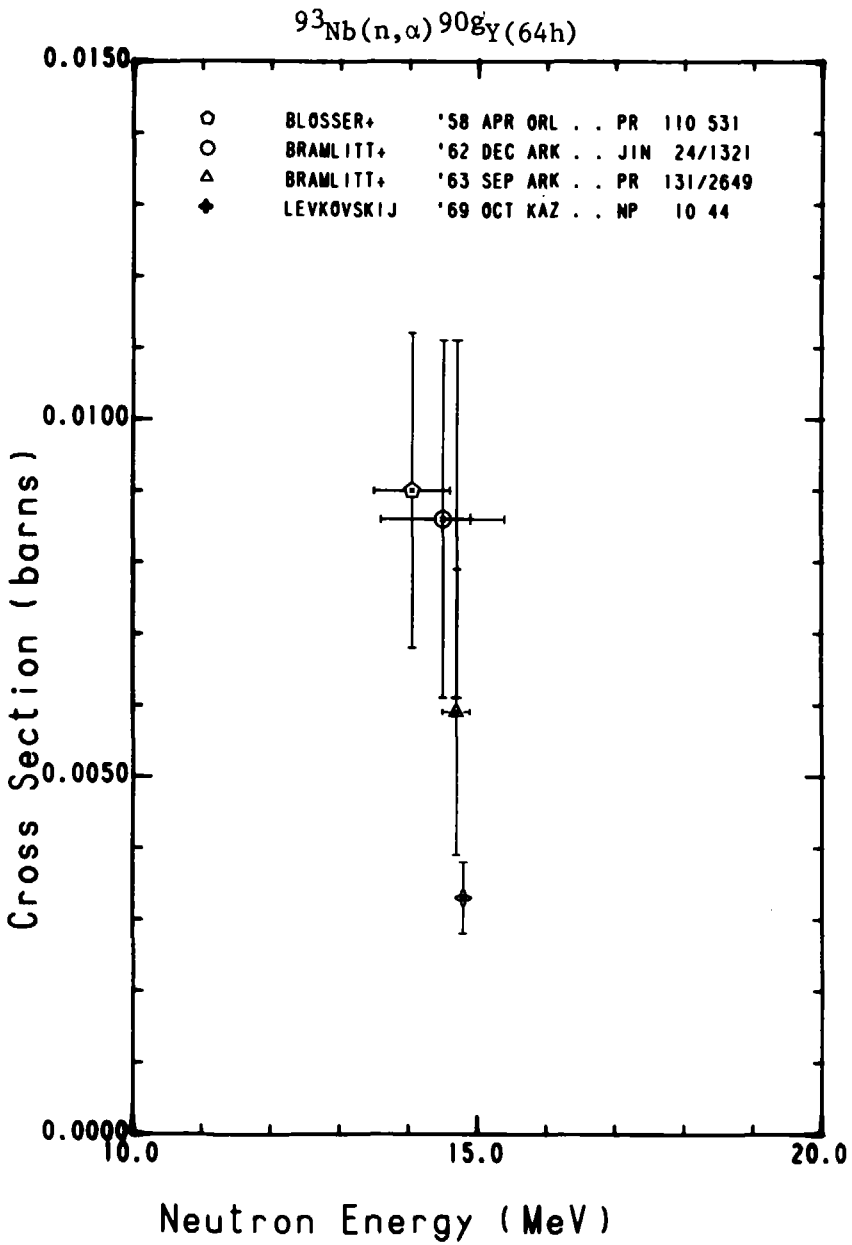
^{93}Nb

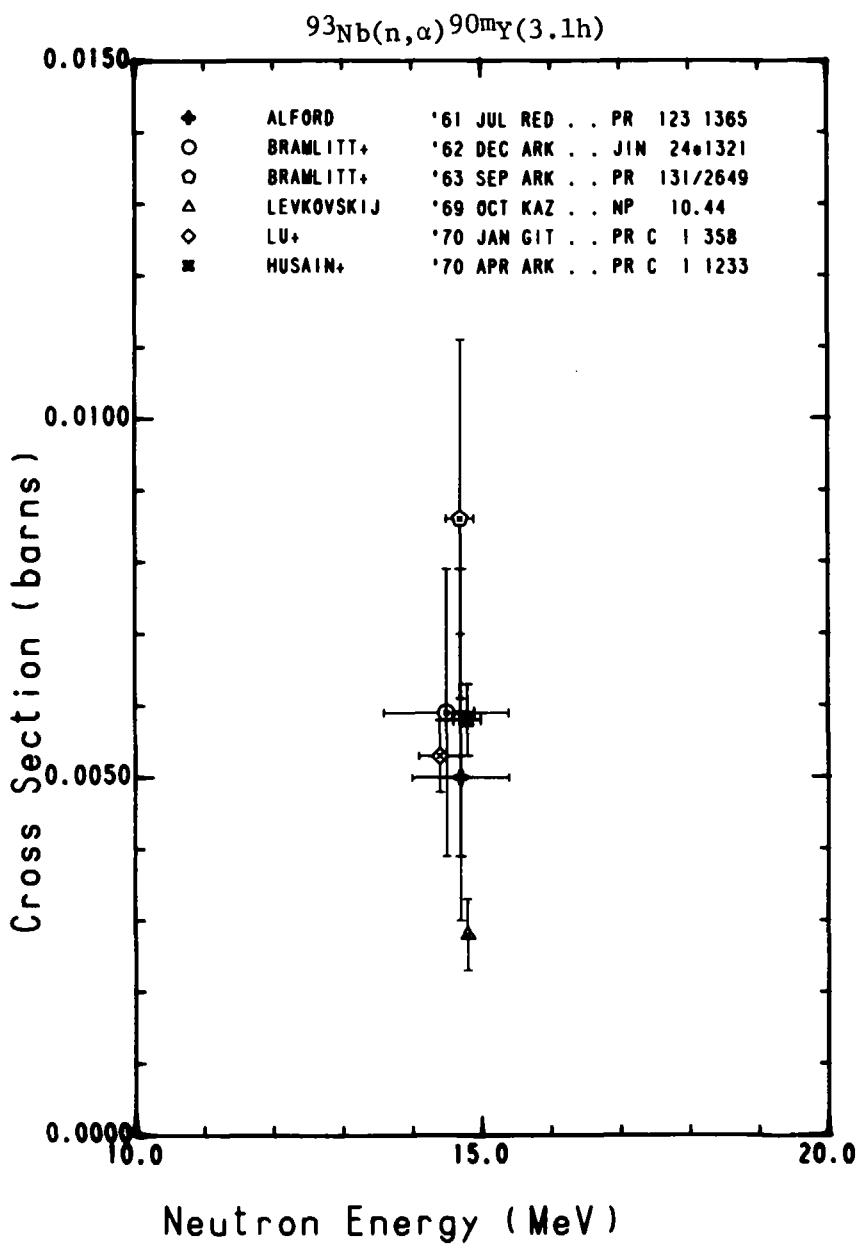
(n,2n)^{92m}Nb
(10.16d)



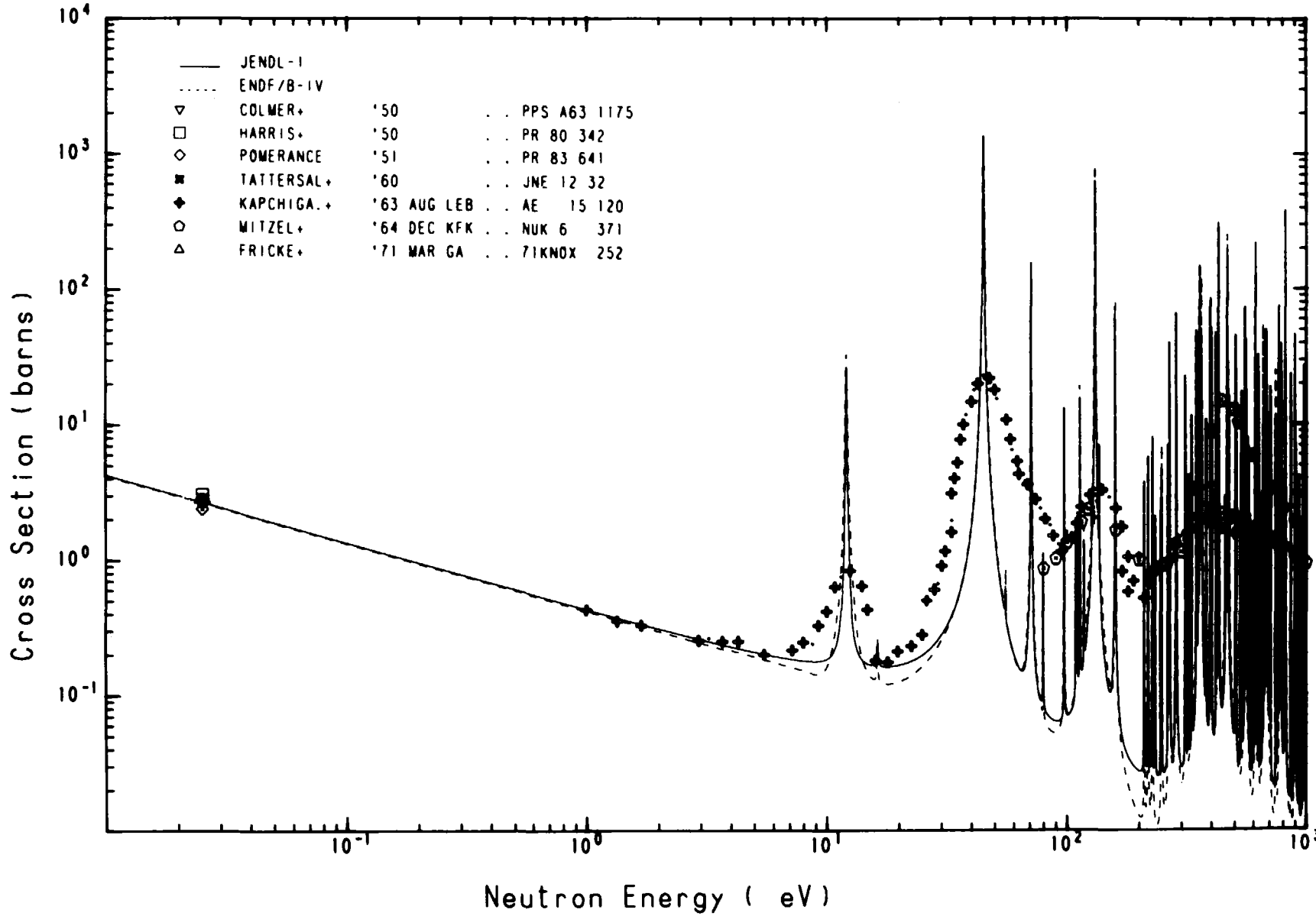
^{93}Nb
(n,α)


ENDF/B-IV
TEWES+ '60 JUN LRL . . UCRL6028-T
BAYHURST+ '61 LAS . . JIN 23 173
KULISIC+ '64 MAY RBZ . . NP 54 17
BORMANN+ '72 MAY HAM . . NP A186 65
0.0150
0.0100
0.0050
0.0000
Cross Section (barns)
10.0
15.0
20.0
Neutron Energy (MeV)

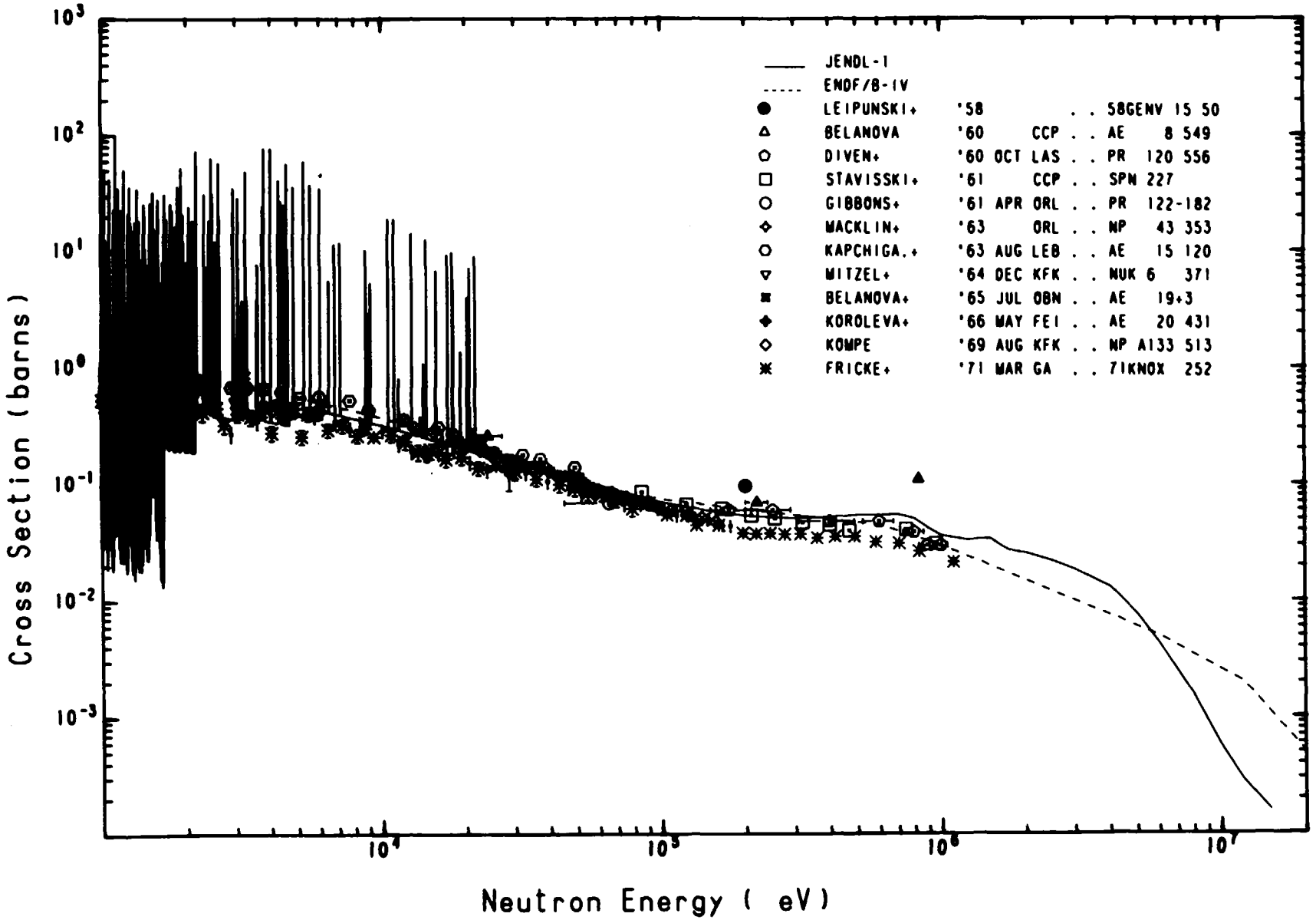

93Nb(n,α)90gY(64h)
BLOSSER+ '58 APR ORL . . PR 110 531
BRAMLITT+ '62 DEC ARK . . JIN 24/1321
BRAMLITT+ '63 SEP ARK . . PR 131/2649
LEVKOVSKIJ '69 OCT KAZ . . NP 10 44
0.0150
0.0100
0.0050
0.0000
10.0
15.0
20.0
Cross Section (barns)
Neutron Energy (MeV)


93Nb(n,α)90mY(3.1h)
ALFORD '61 JUL RED . . PR 123 1365
BRAMLITT+ '62 DEC ARK . . JIN 24•1321
BRAMLITT+ '63 SEP ARK . . PR 131/2649
LEVKOVSKIJ '69 OCT KAZ . . NP 10.44
LU+ '70 JAN GIT . . PR C 1 358
HUSAIN+ '70 APR ARK . . PR C 1 1233
0.0150
0.0100
0.0050
0.0000
10.0
15.0
20.0
Cross Section (barns)
Neutron Energy (MeV)

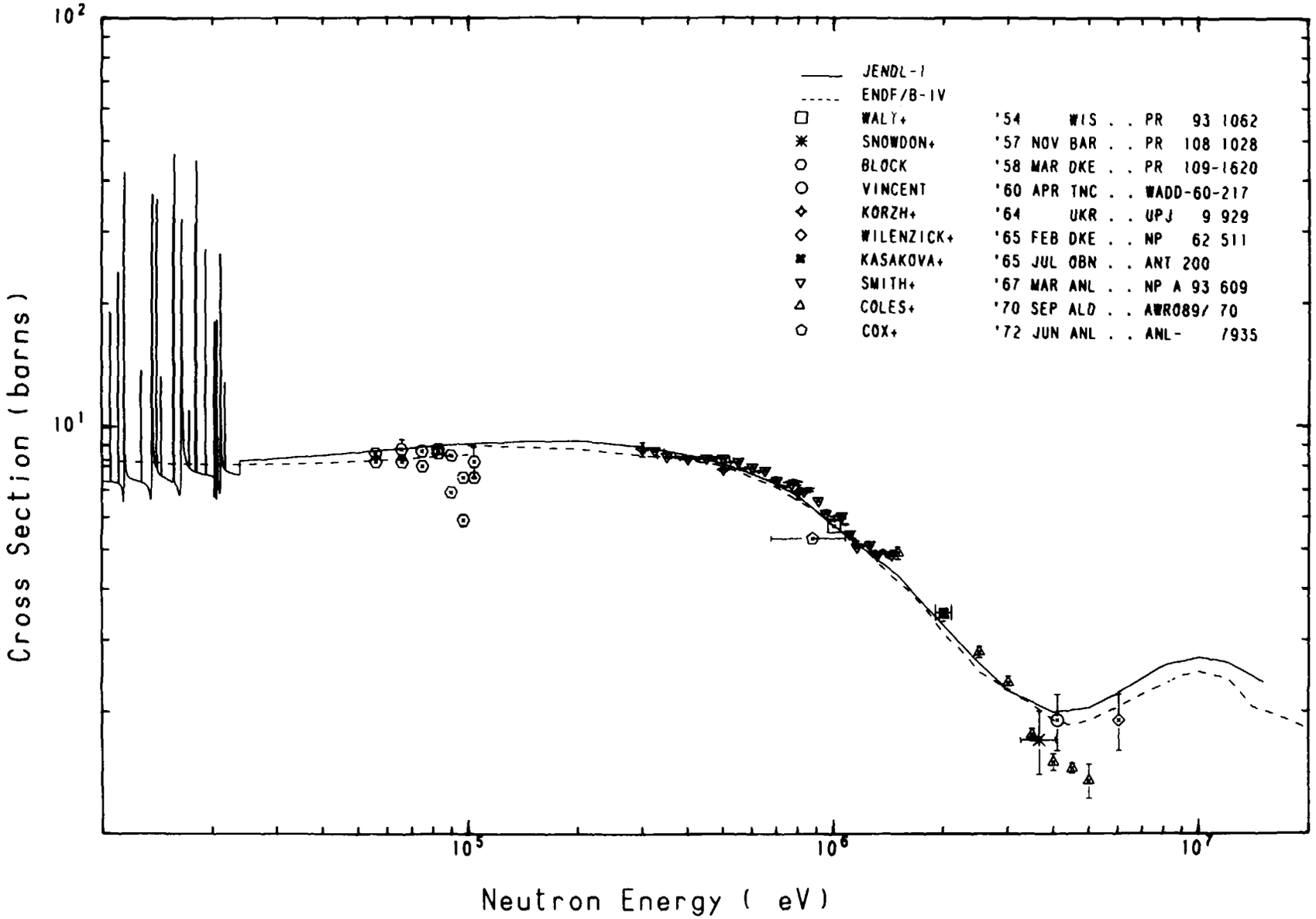
$_{42}$Mo
(n,γ)
(1)


JENDL-I
ENDF/B-IV
COLMER+ '50 . . PPS A63 1175
HARRIS+ '50 . . PR 80 342
POMERANCE '51 . . PR 83 641
TATTERSAL+ '60 . . JNE 12 32
KAPCHIGA.+ '63 AUG LEB . . AE 15 120
MITZEL+ '64 DEC KFK . . NUK 6 371
FRICKE+ '71 MAR GA . . 71KNOX 252
Cross Section (barns)
Neutron Energy (eV)

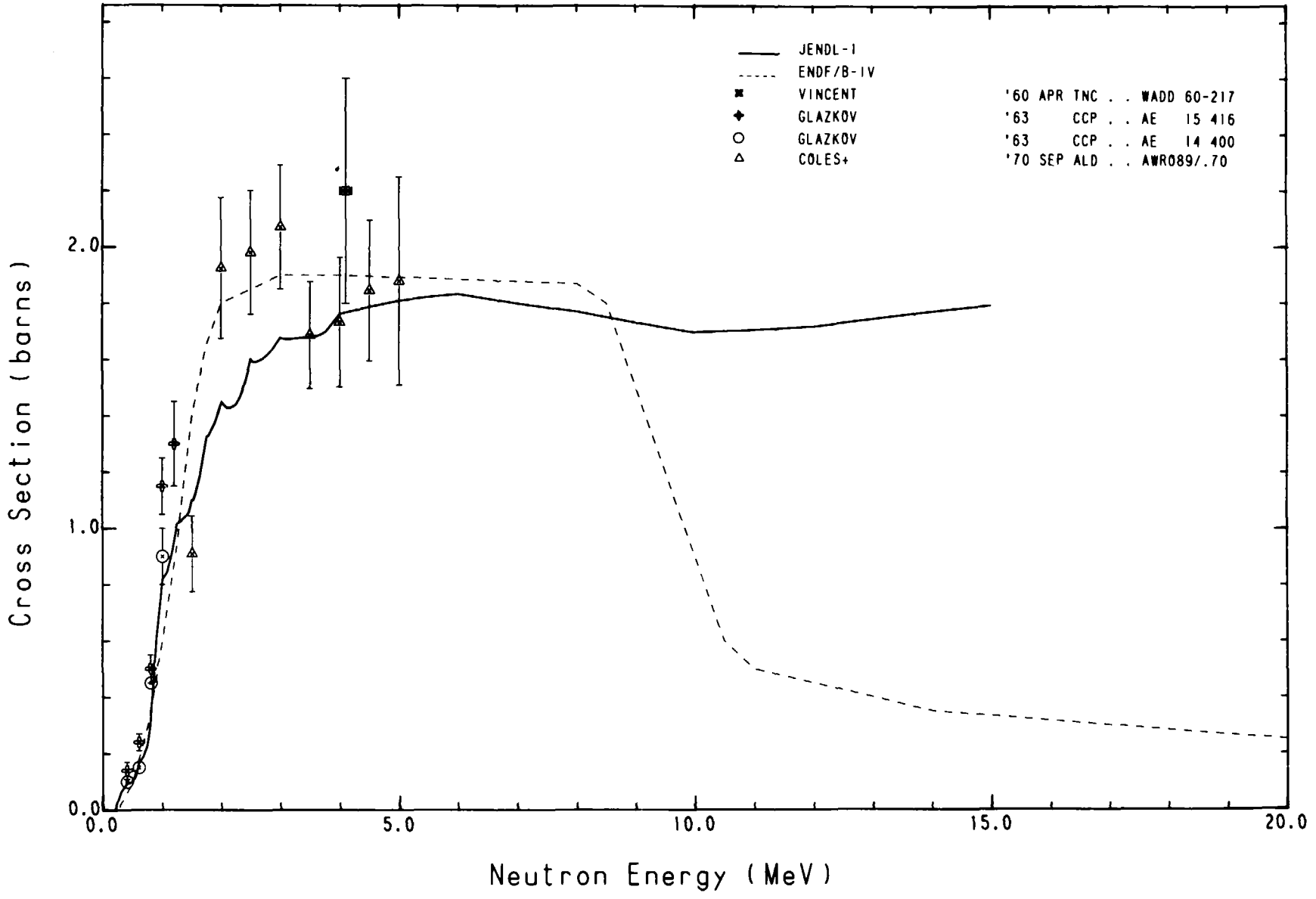
$_{42}$Mo
(n,γ)
(2)


JENDL-1
ENDF/B-IV
LEIPUNSKI+ '58 . . 58GENV 15 50
BELANOVA '60 CCP . . AE 8 549
DIVEN+ '60 OCT LAS . . PR 120 556
STAVISSKI+ '61 CCP . . SPM 227
GIBBONS+ '61 APR ORL . . PR 122-182
MACKLIN+ '63 ORL . . NP 43 353
KAPCHIGA.+ '63 AUG LEB . . AE 15 120
MITZEL+ '64 DEC KFK . . NUK 6 371
BELANOVA+ '65 JUL OBN . . AE 19+3
KOROLEVA+ '66 MAY FEI . . AE 20 431
KOMPE '69 AUG KFK . . NP A133 513
FRICKE+ '71 MAR GA . . 71KNOX 252
Cross Section (barns)
Neutron Energy (eV)

$_{42}$Mo
(n,n)

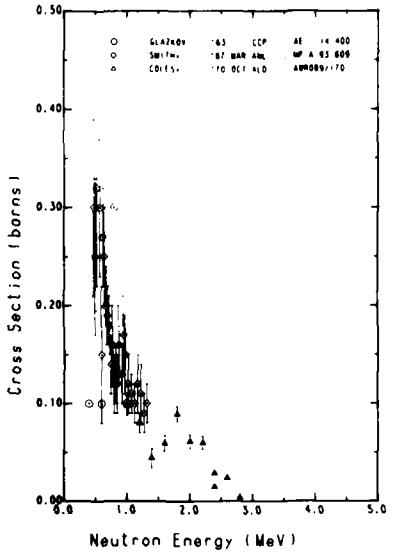

JENDL-I
ENDF/B-IV
WALY+ '54 WIS . . PR 93 1062
SNOWDON+ '57 NOV BAR . . PR 108 1028
BLOCK '58 MAR DKE . . PR 109-1620
VINCENT '60 APR TNC . . WADD-60-217
KORZH+ '64 UKR . . UPJ 9 929
WILENZICK+ '65 FEB DKE . . NP 62 511
KASAKOVA+ '65 JUL OBN . . ANT 200
SMITH+ '67 MAR ANL . . NP A 93 609
COLES+ '70 SEP ALD . . AWRO89/ 70
COX+ '72 JUN ANL . . ANL- /935
Cross Section (barns)
Neutron Energy (eV)
10^2
10^1
10^5
10^6
10^7

$_{42}$Mo
(n,n')

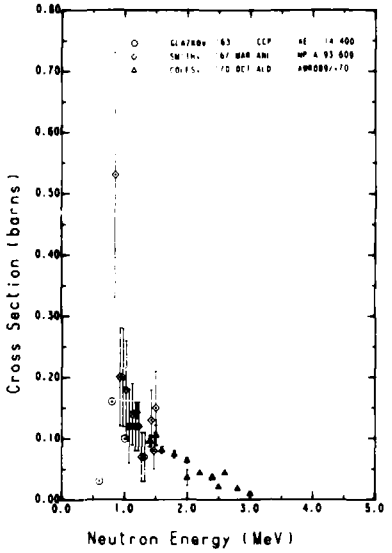

JENDL-1
ENDF/B-IV
VINCENT '60 APR TNC . . WADD 60-217
GLAZKOV '63 CCP . . AE 15 416
GLAZKOV '63 CCP . . AE 14 400
COLES+ '70 SEP ALD . . AWR089/.70
Cross Section (barns)
Neutron Energy (MeV)
0.0
1.0
2.0
0.0
5.0
10.0
15.0
20.0

$_{42}$Mo
(n,n')

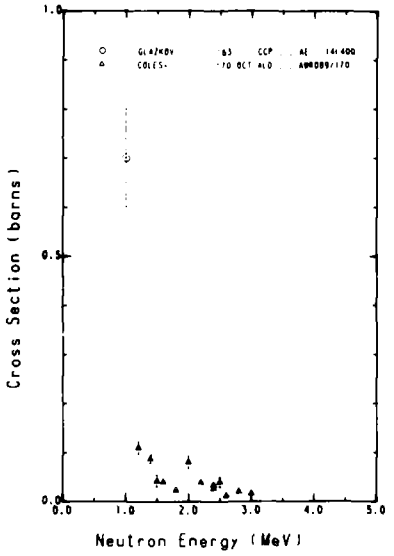
E_x=0.2 MeV



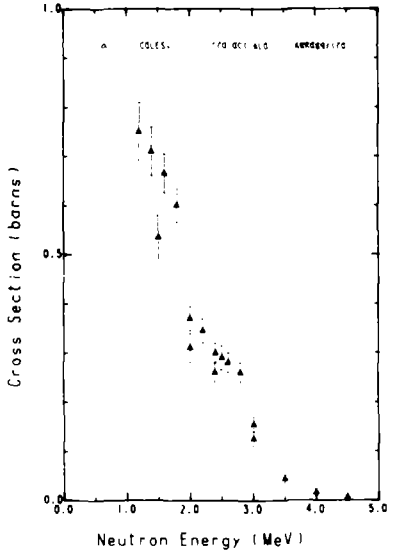
E_x=0.53 MeV



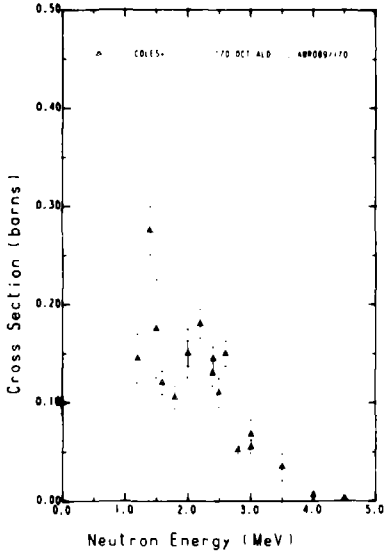
E_x=0.68 MeV



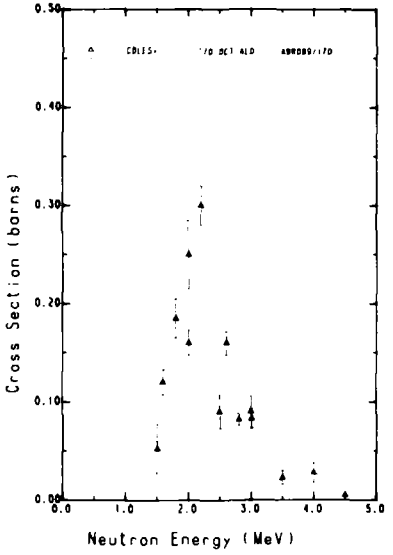
E_x=0.78 Mev



E_x=0.87 MeV

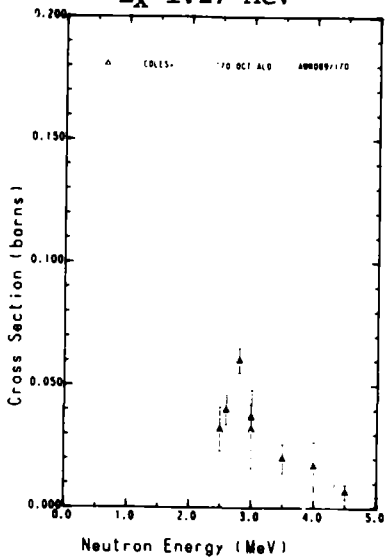


E_x=1.045 MeV

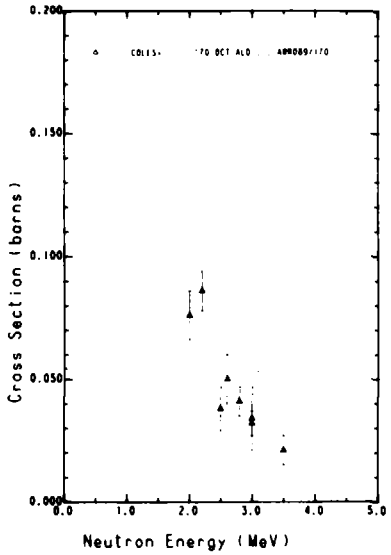


$_{42}$Mo
(n,n')
(n,nγ)

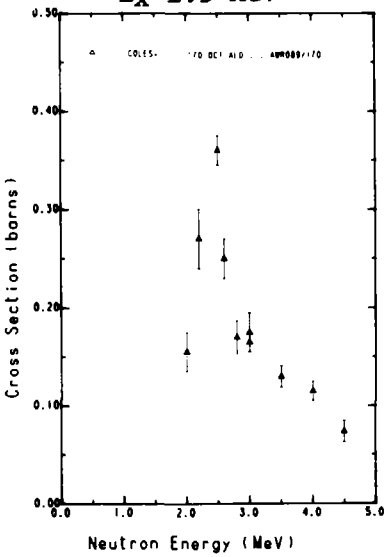
E_x=1.27 MeV



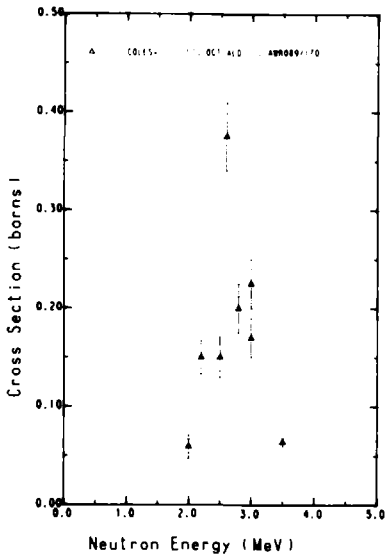
(n,n') E_x=1.41 MeV



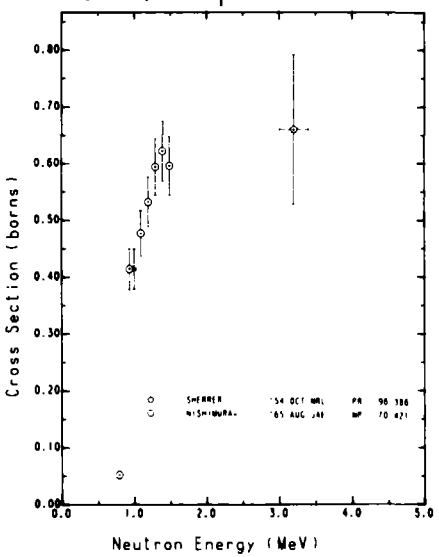
E_x=1.5 MeV



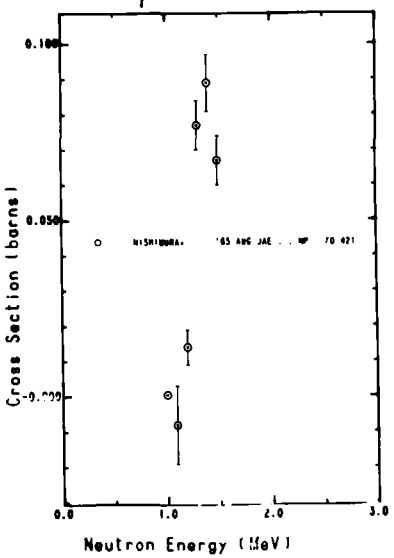
(n,n') E_x=1.6 MeV



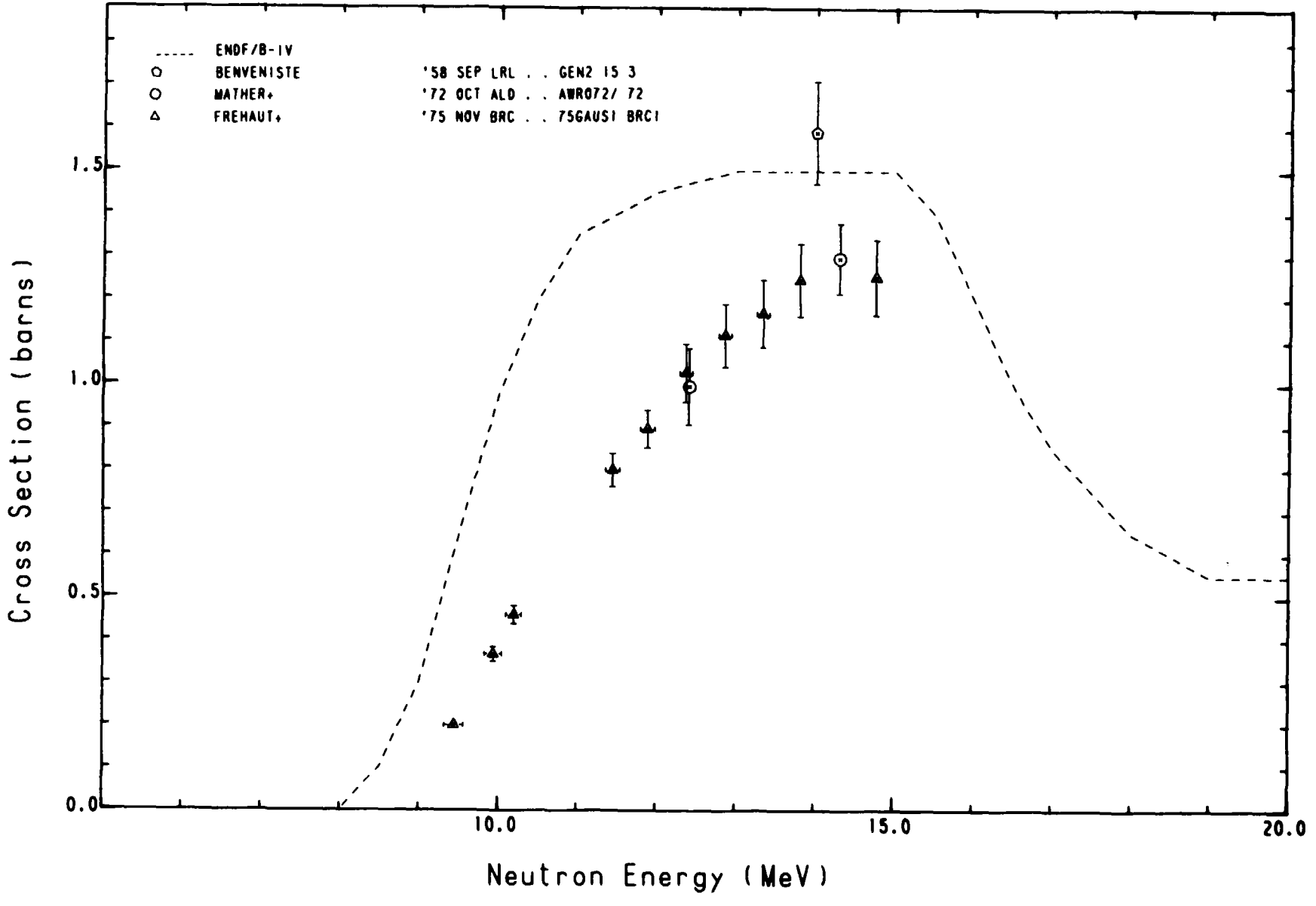
(n,n'γ) E_γ=0.74 MeV



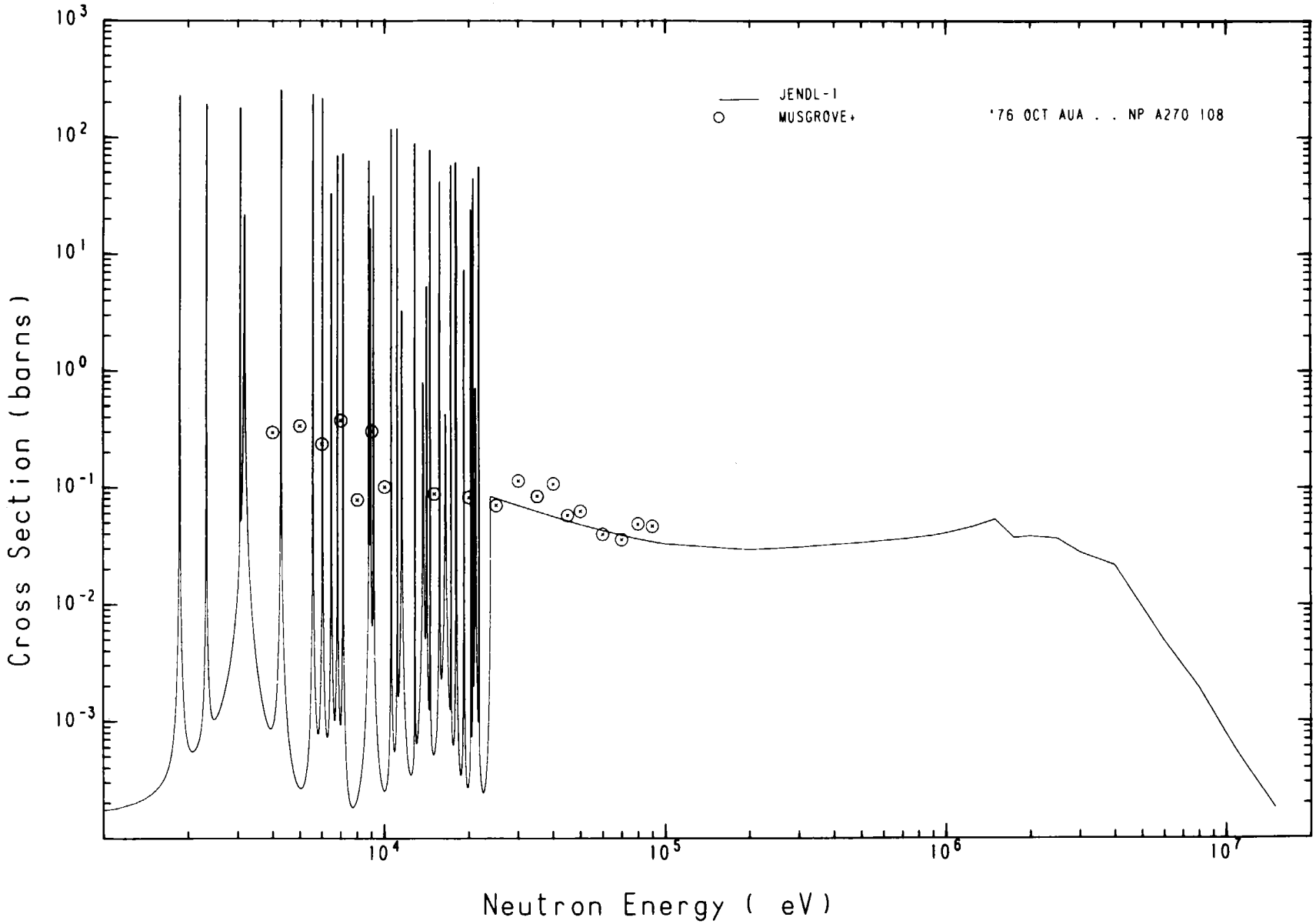
E_γ=1.06 MeV



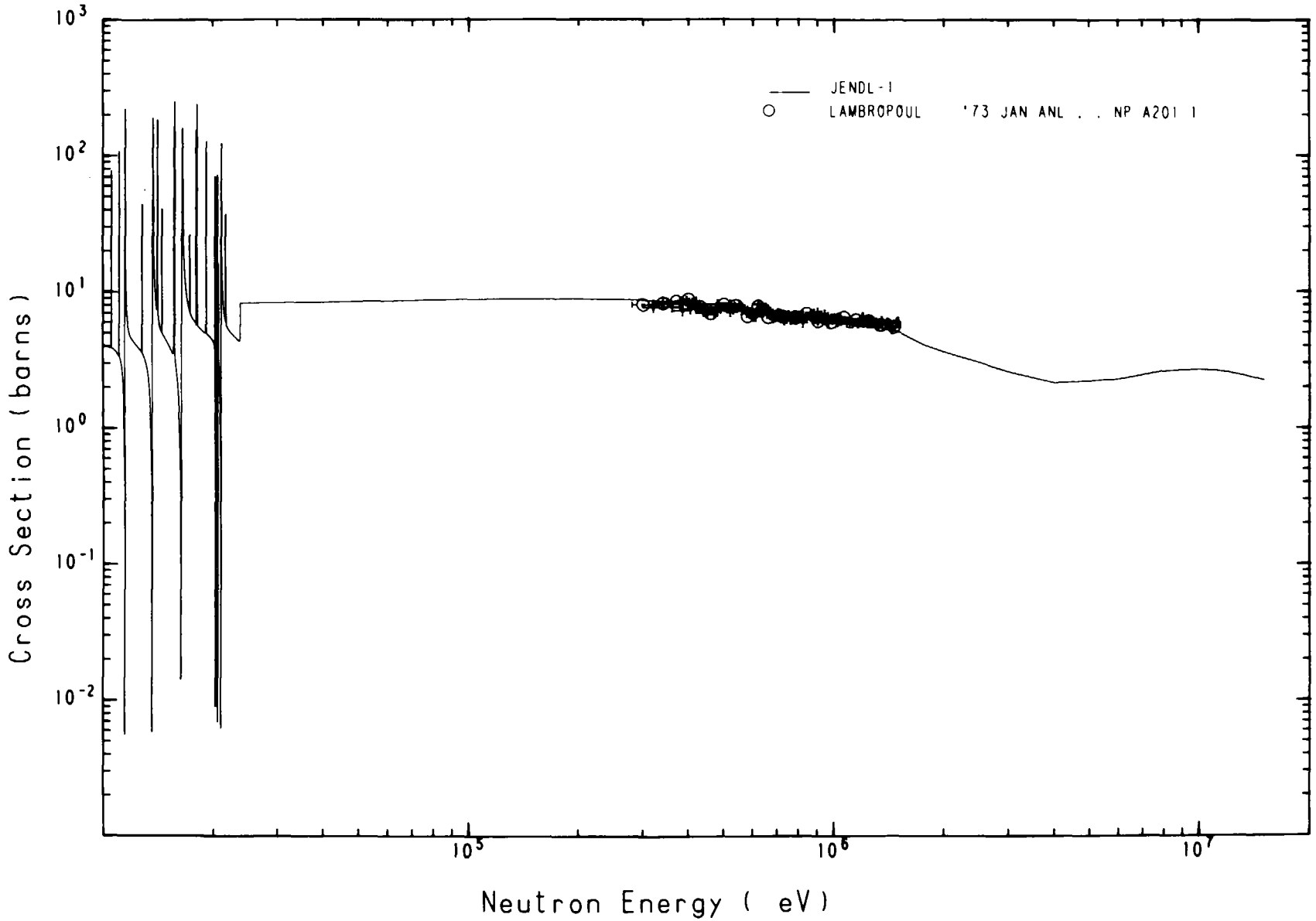
$_{42}$Mo
(n, 2n)


ENDF/B-IV
BENVENISTE '58 SEP LRL . . GEN2 15 3
MATHER+ '72 OCT ALD . . AWR072/ 72
FREHAUT+ '75 NOV BRC . . 75GAUS1 BRC1
1.5
1.0
0.5
0.0
10.0
15.0
20.0
Cross Section (barns)
Neutron Energy (MeV)

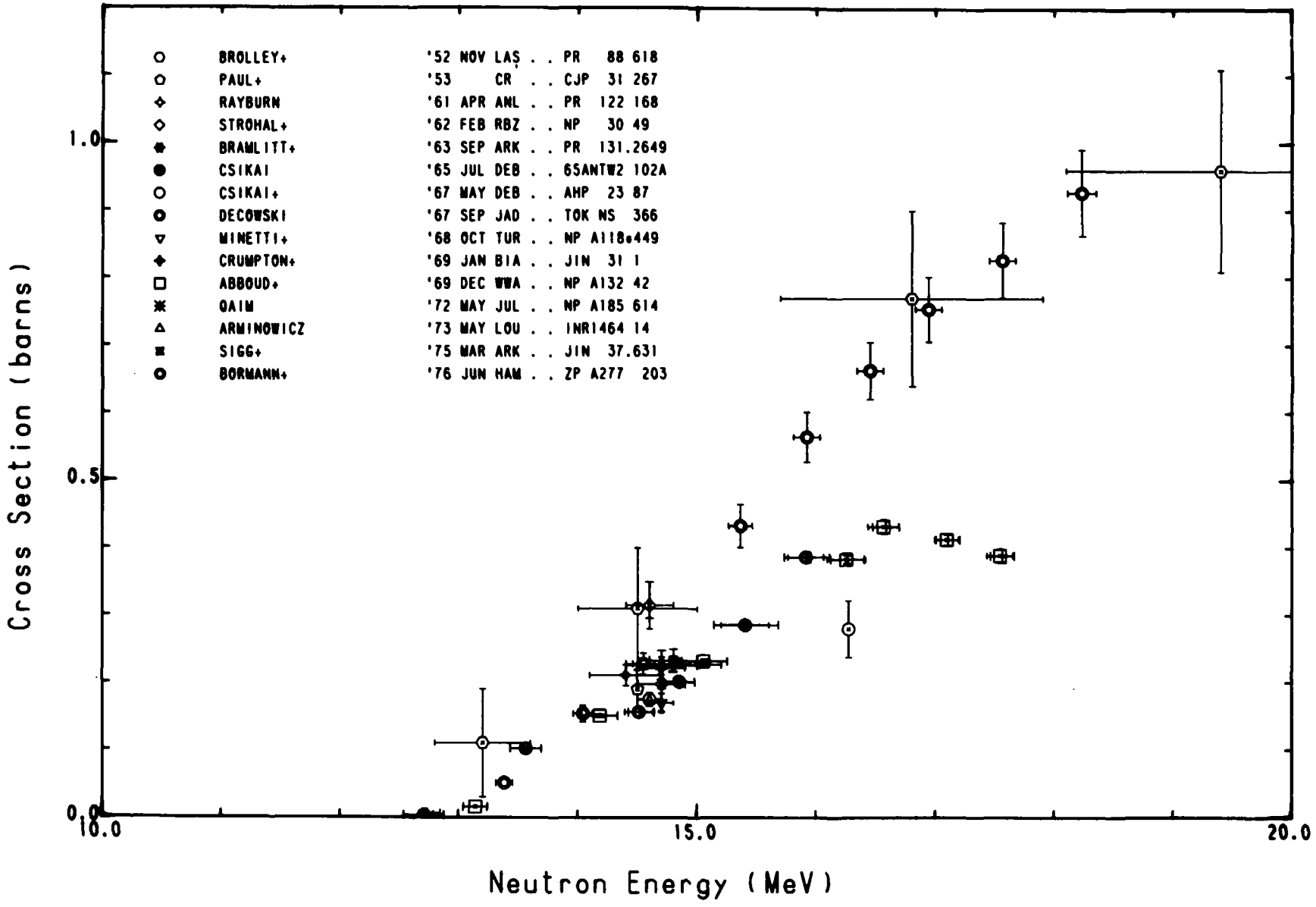
^{92}Mo
(n,γ)


JENDL-1
MUSGROVE+
'76 OCT AUA . . NP A270 108
Cross Section (barns)
Neutron Energy (eV)
10^3
10^2
10^1
10^0
10^-1
10^-2
10^-3
10^4
10^5
10^6
10^7

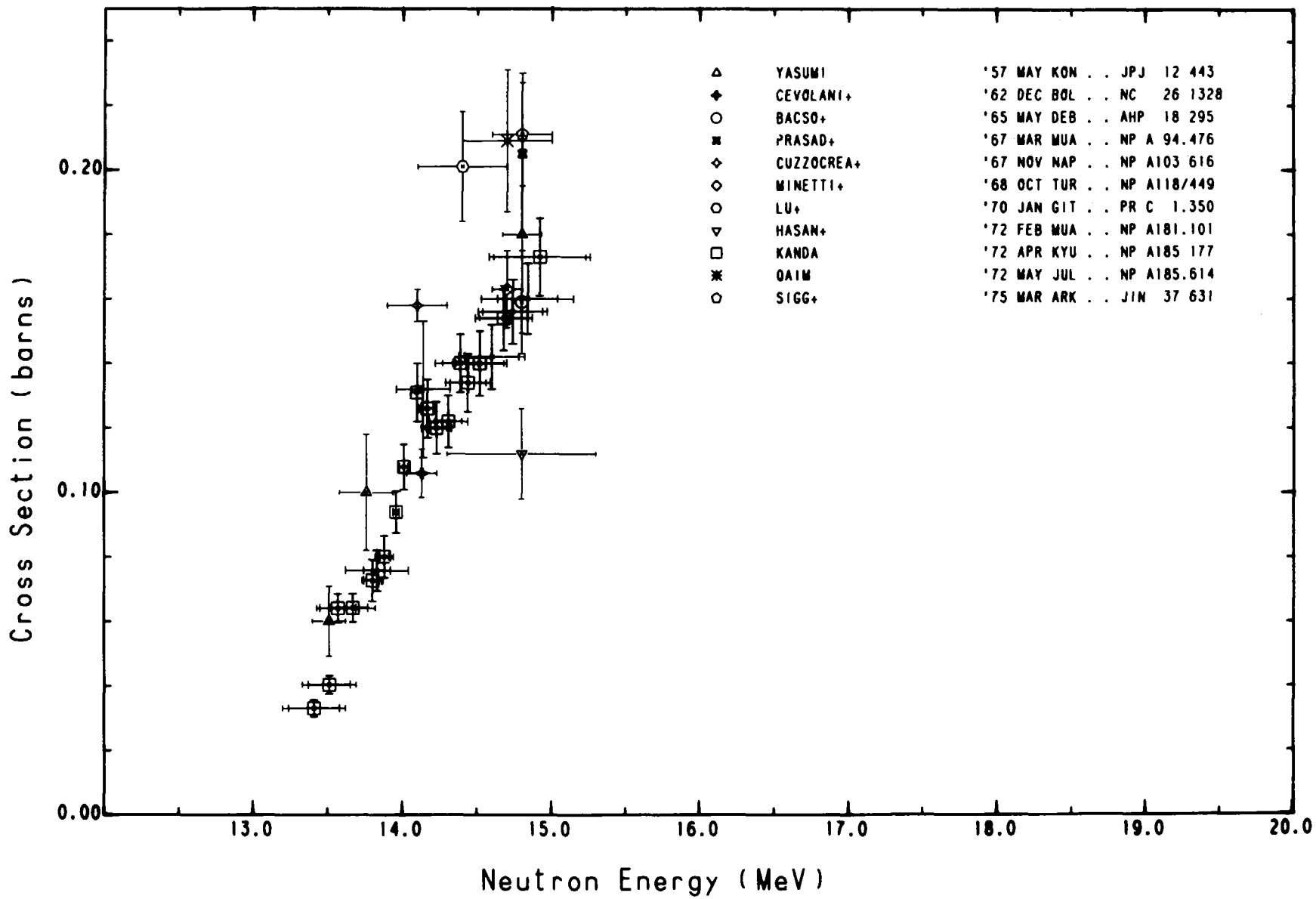
^{92}Mo
(n,n)


JENDL-1
LAMBROPOUL '73 JAN ANL . . NP A201 1
Cross Section (barns)
Neutron Energy (eV)
10^3
10^2
10^1
10^0
10^-1
10^-2
10^5
10^6
10^7

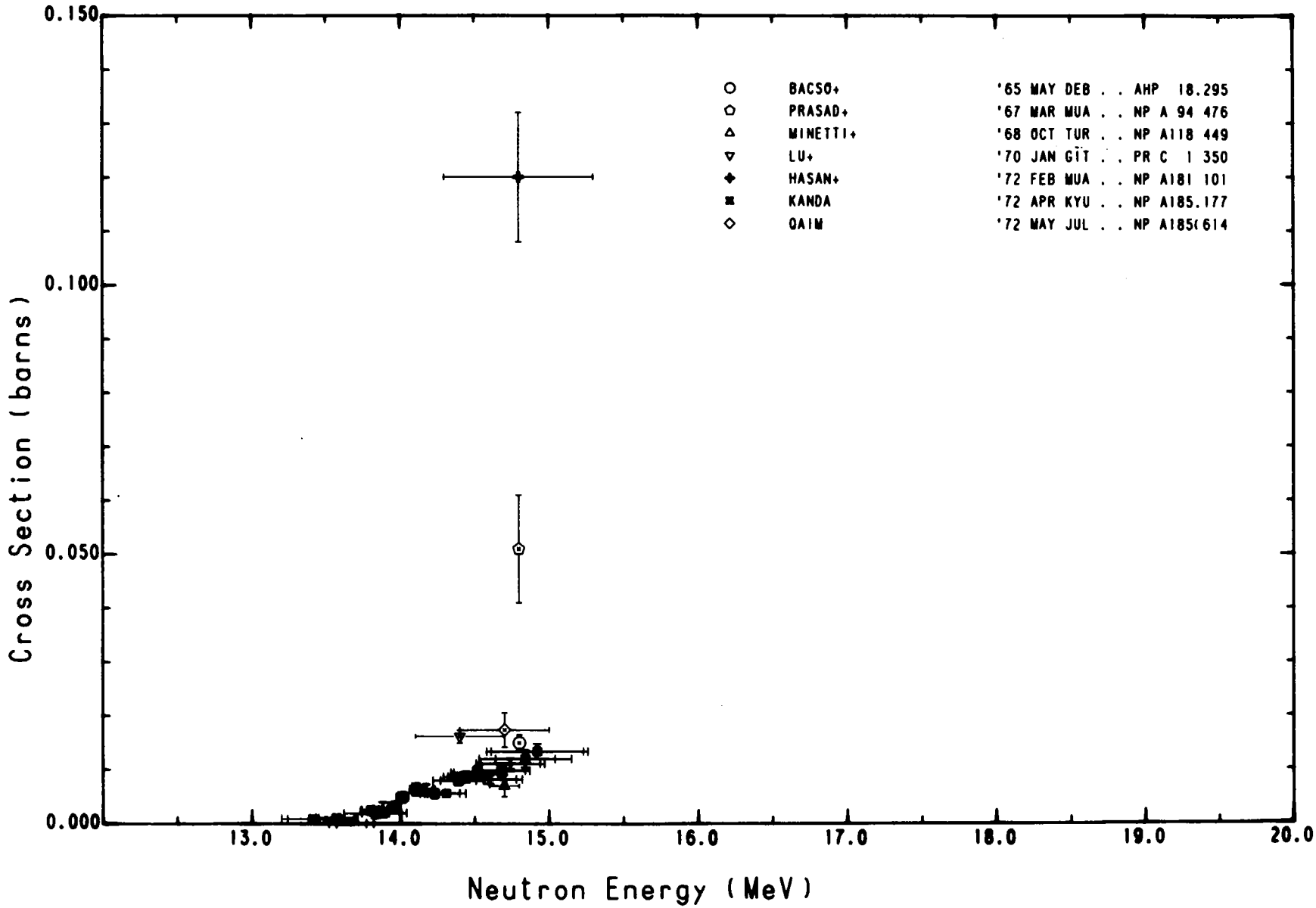
^{92}Mo
(n,2n)


BROLLEY+ '52 NOV LAS . . PR 88 618
PAUL+ '53 CR . . CJP 31 267
RAYBURN '61 APR ANL . . PR 122 168
STROHAL+ '62 FEB RBZ . . NP 30 49
BRAMLITT+ '63 SEP ARK . . PR 131.2649
CSIKAI '65 JUL DEB . . 65ANTW2 102A
CSIKAI+ '67 MAY DEB . . AHP 23 87
DECOWSKI '67 SEP JAD . . TOK NS 366
MINETTI+ '68 OCT TUR . . NP A118.449
CRUMPTON+ '69 JAN BIA . . JIN 31 1
ABBOUD+ '69 DEC WWA . . NP A132 42
OAIM '72 MAY JUL . . NP A185 614
ARMINOWICZ '73 MAY LOU . . INR1464 14
SIGG+ '75 MAR ARK . . JIN 37.631
BORMANN+ '76 JUN HAM . . ZP A277 203
Cross Section (barns)
1.0
0.5
0.0
10.0
15.0
20.0
Neutron Energy (MeV)

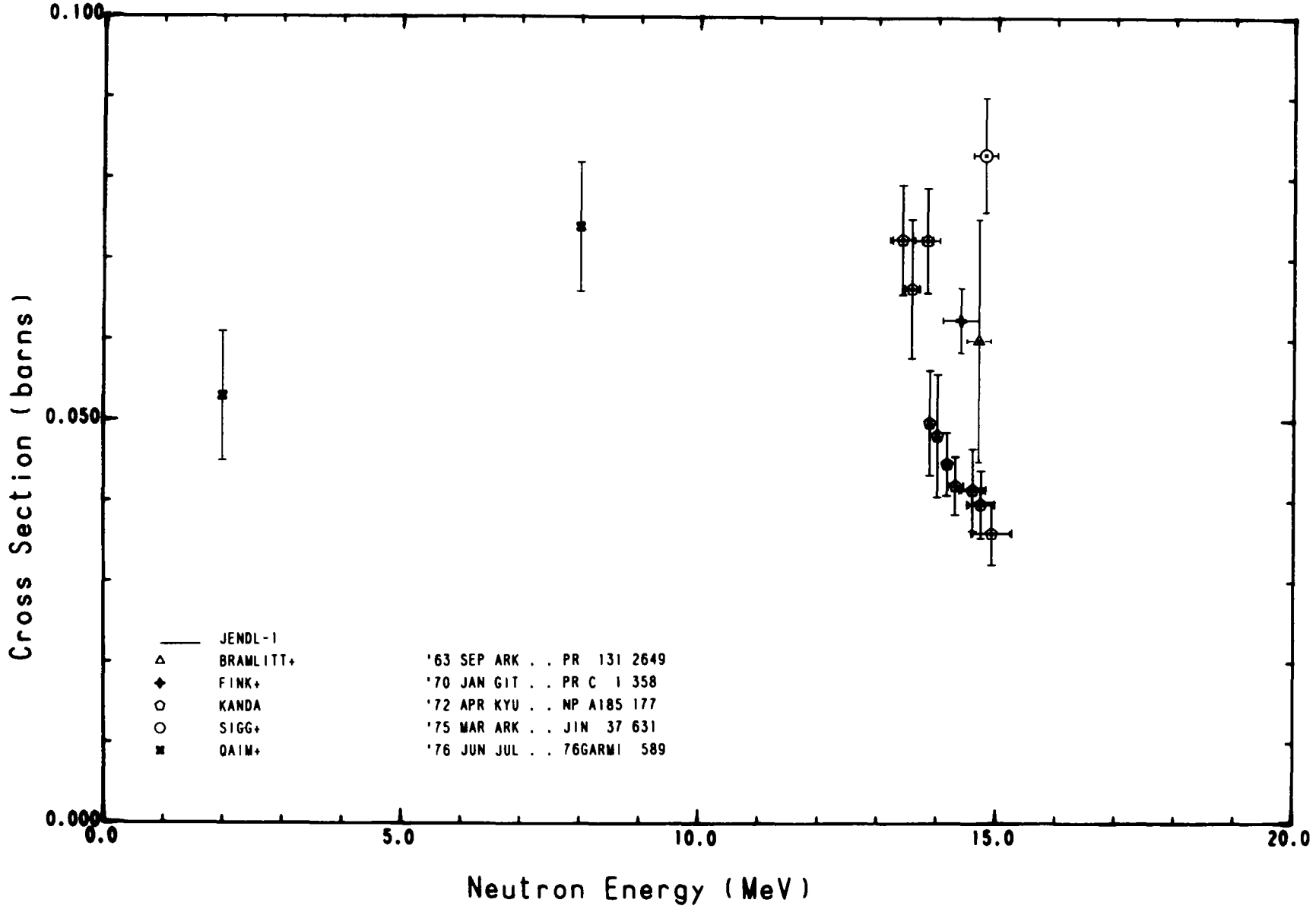
^{92}Mo
(n,2n)^{91g}Mo
(15.5m)



^{92}Mo
(n,2n)^{91m}Mo
(66 s)

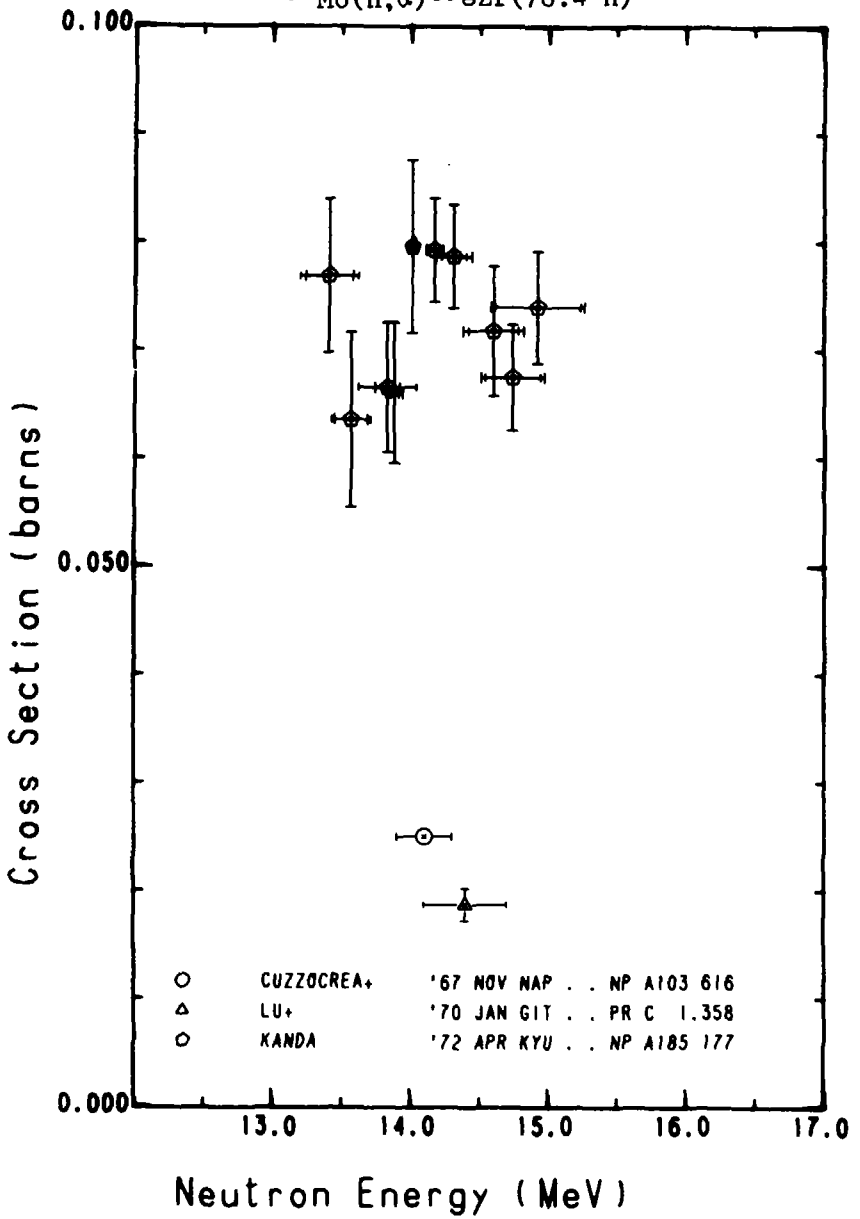


^{92}Mo
(n,p)

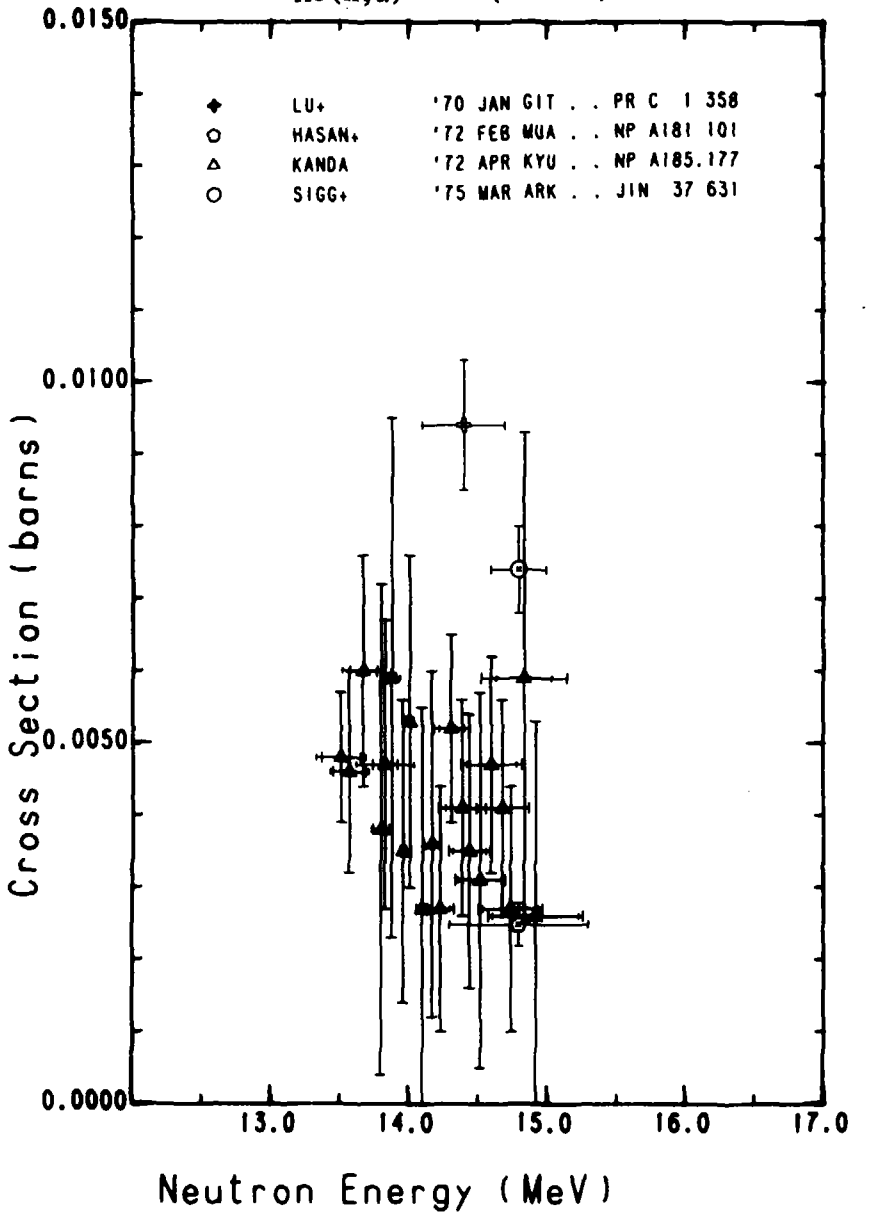

0.100
0.050
0.000
Cross Section (barns)
0.0
5.0
10.0
15.0
20.0
Neutron Energy (MeV)
JENDL-1
BRAMLITT+ '63 SEP ARK . . PR 131 2649
FINK+ '70 JAN GIT . . PR C 1 358
KANDA '72 APR KYU . . NP A185 177
SIGG+ '75 MAR ARK . . JIN 37 631
OAIM+ '76 JUN JUL . . 76GARMI 589

^{92}Mo (n,α)

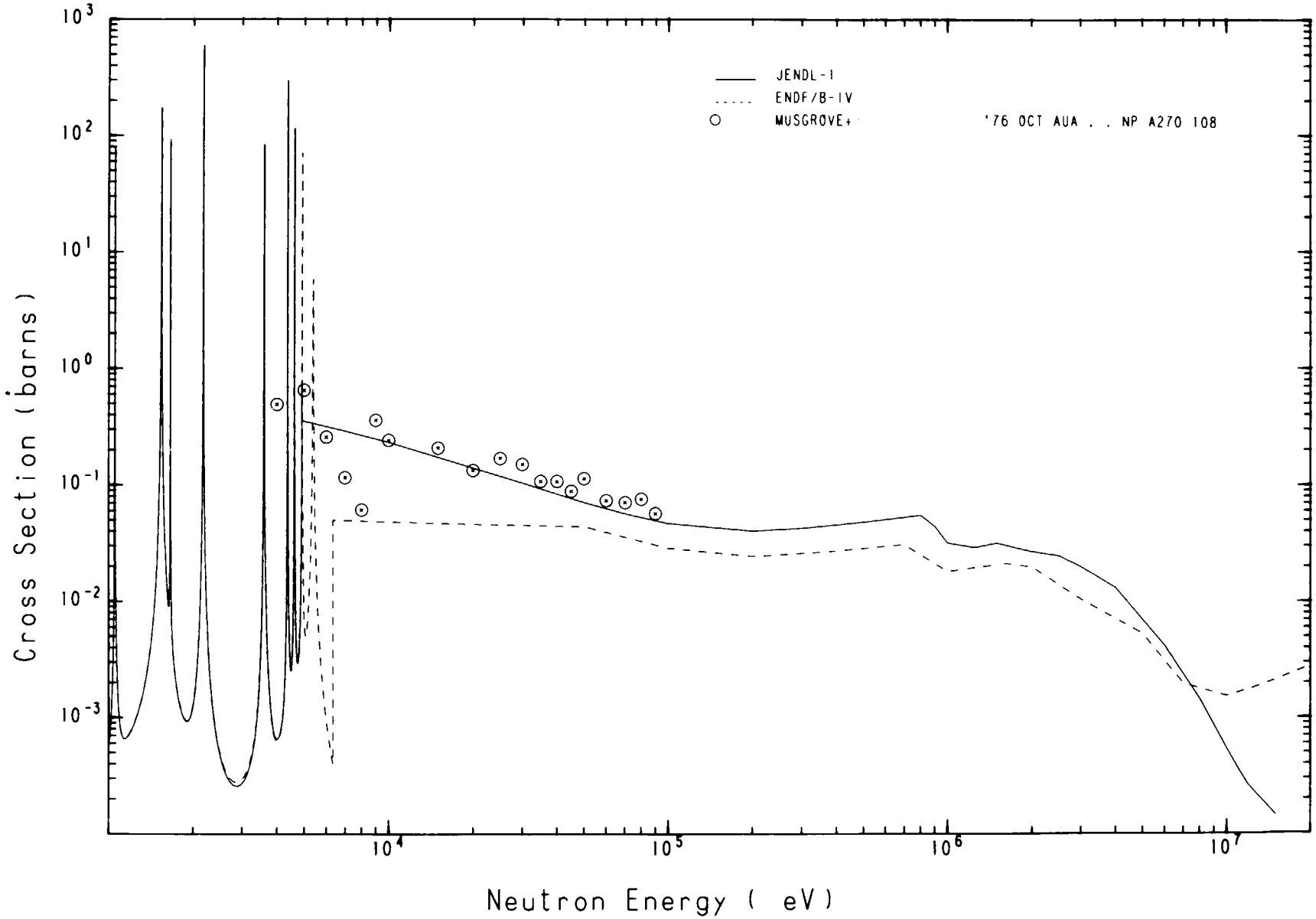
^{92}Mo(n,α)^{89g}Zr(78.4 h)



^{92}Mo(n,α)^{89m}Zr(4.18 m)

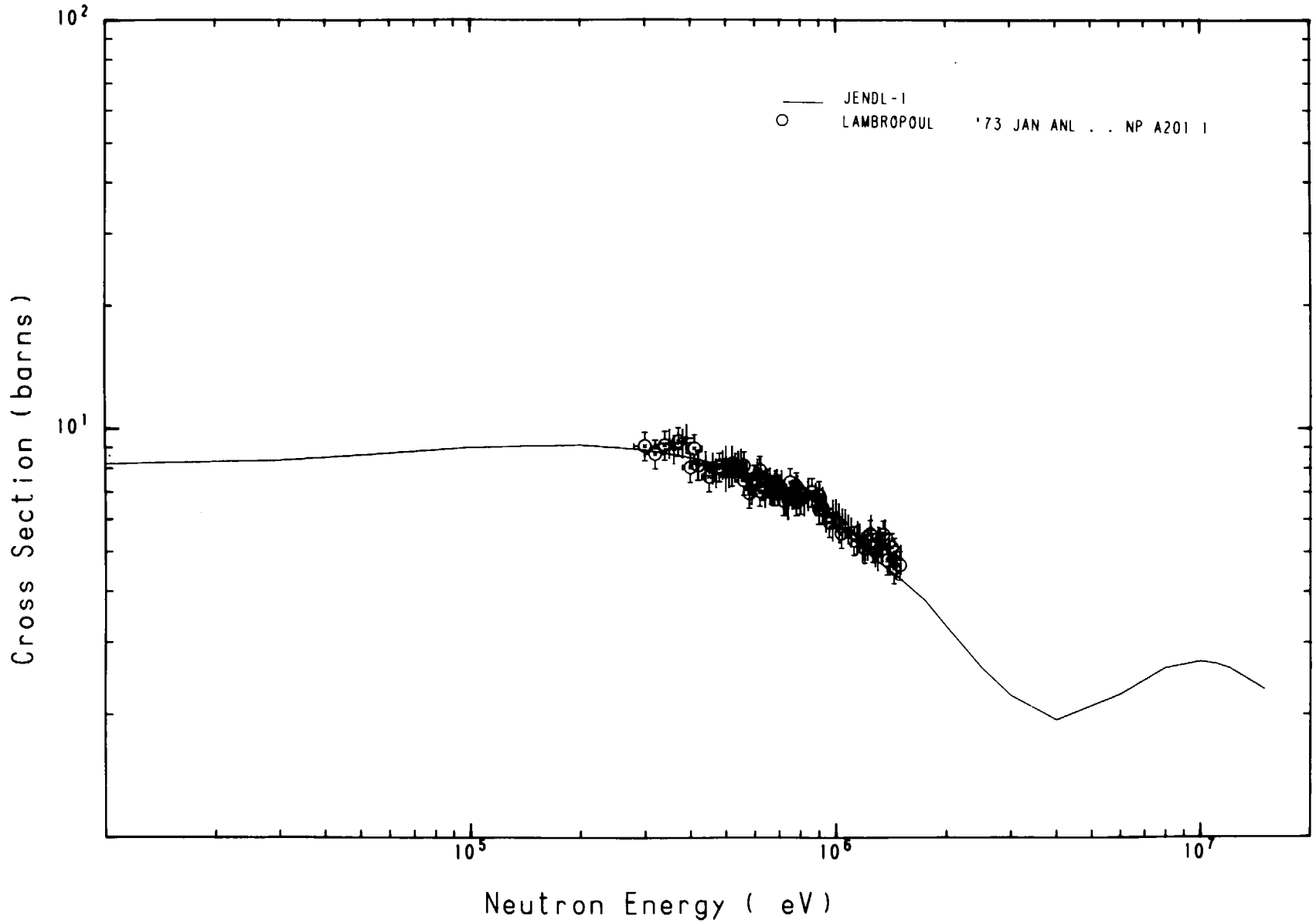


^{94}Mo
(n,γ)


JENDL-1
ENDF/B-IV
MUSGROVE+
'76 OCT AUA . . NP A270 108
Cross Section (barns)
Neutron Energy (eV)
10^3
10^2
10^1
10^0
10^-1
10^-2
10^-3
10^4
10^5
10^6
10^7

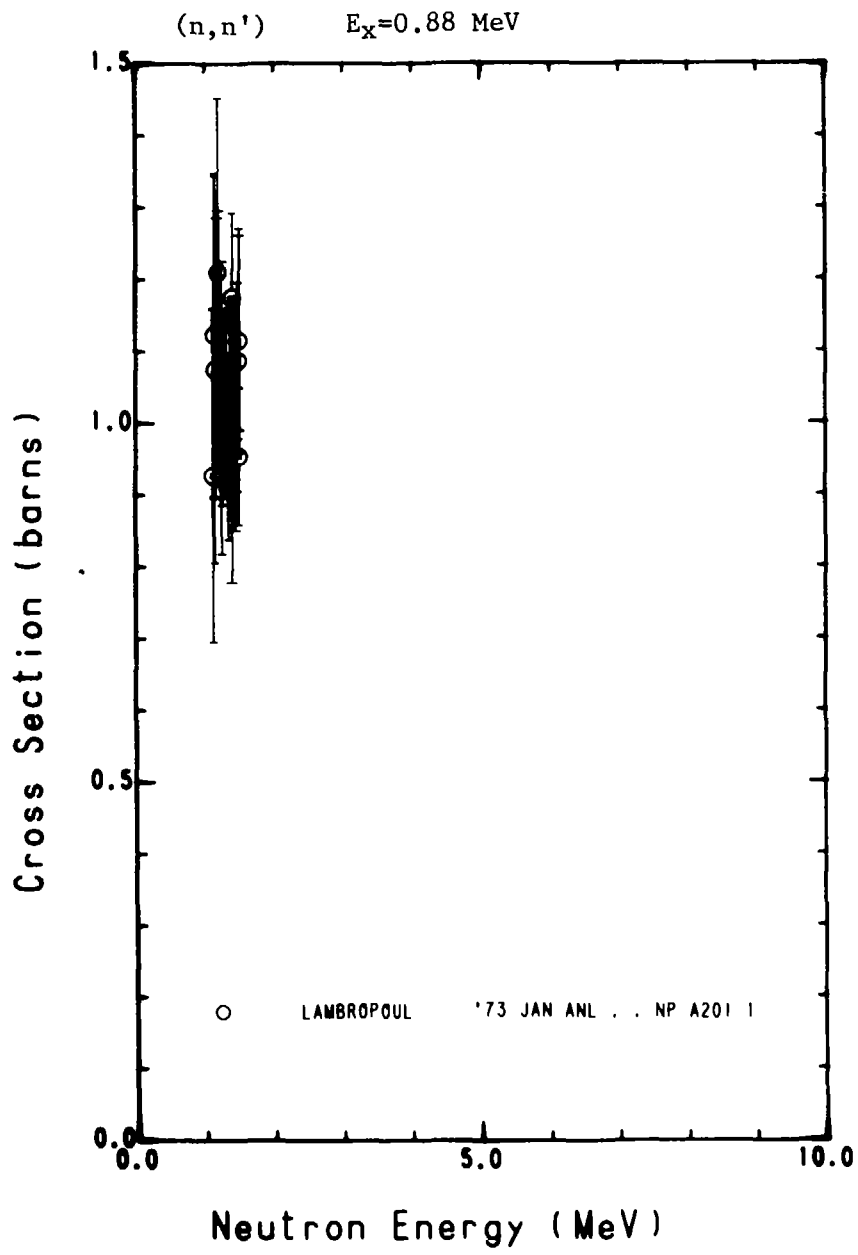
^{94}Mo

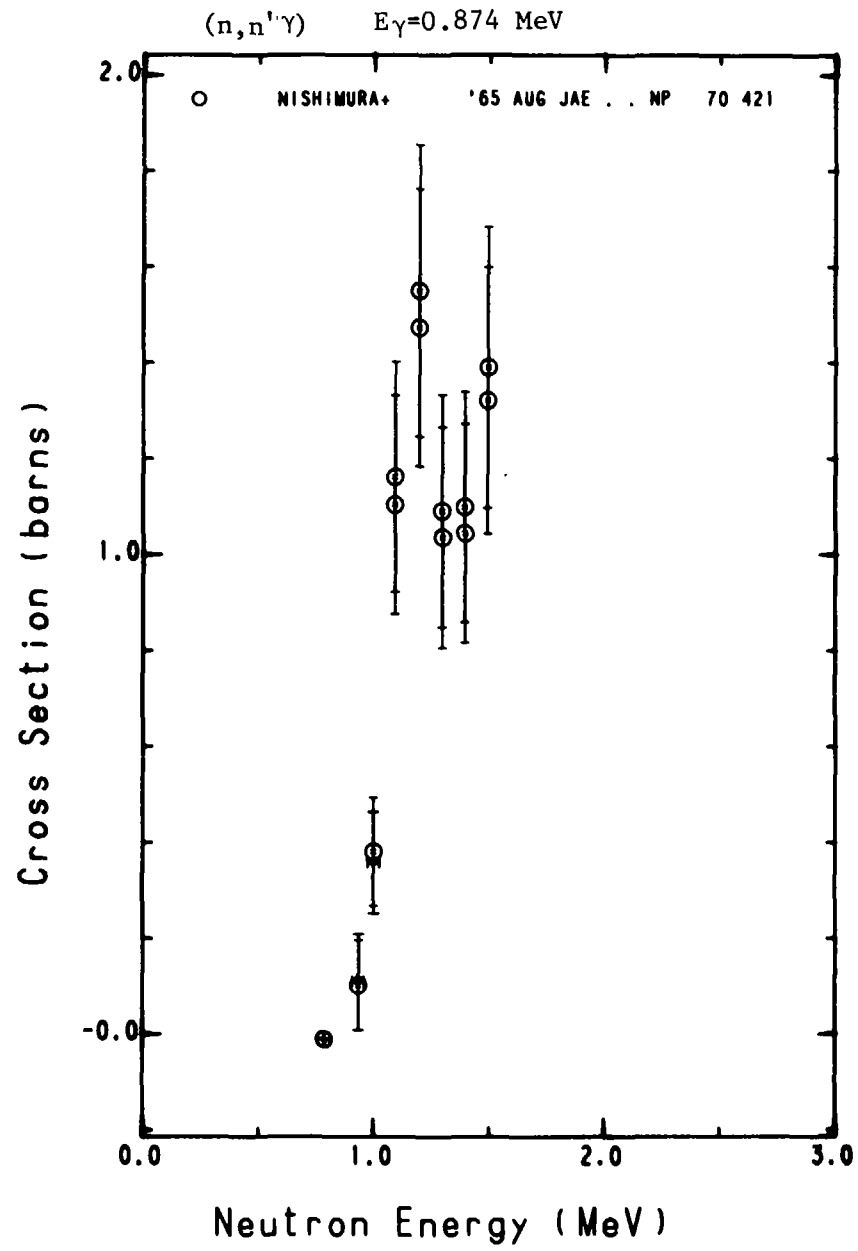
(n,n)


JENDL-1
LAMBROPOUL '73 JAN ANL . . NP A201 1
Cross Section (barns)
Neutron Energy (eV)
10²
10¹
10⁵
10⁶
10⁷

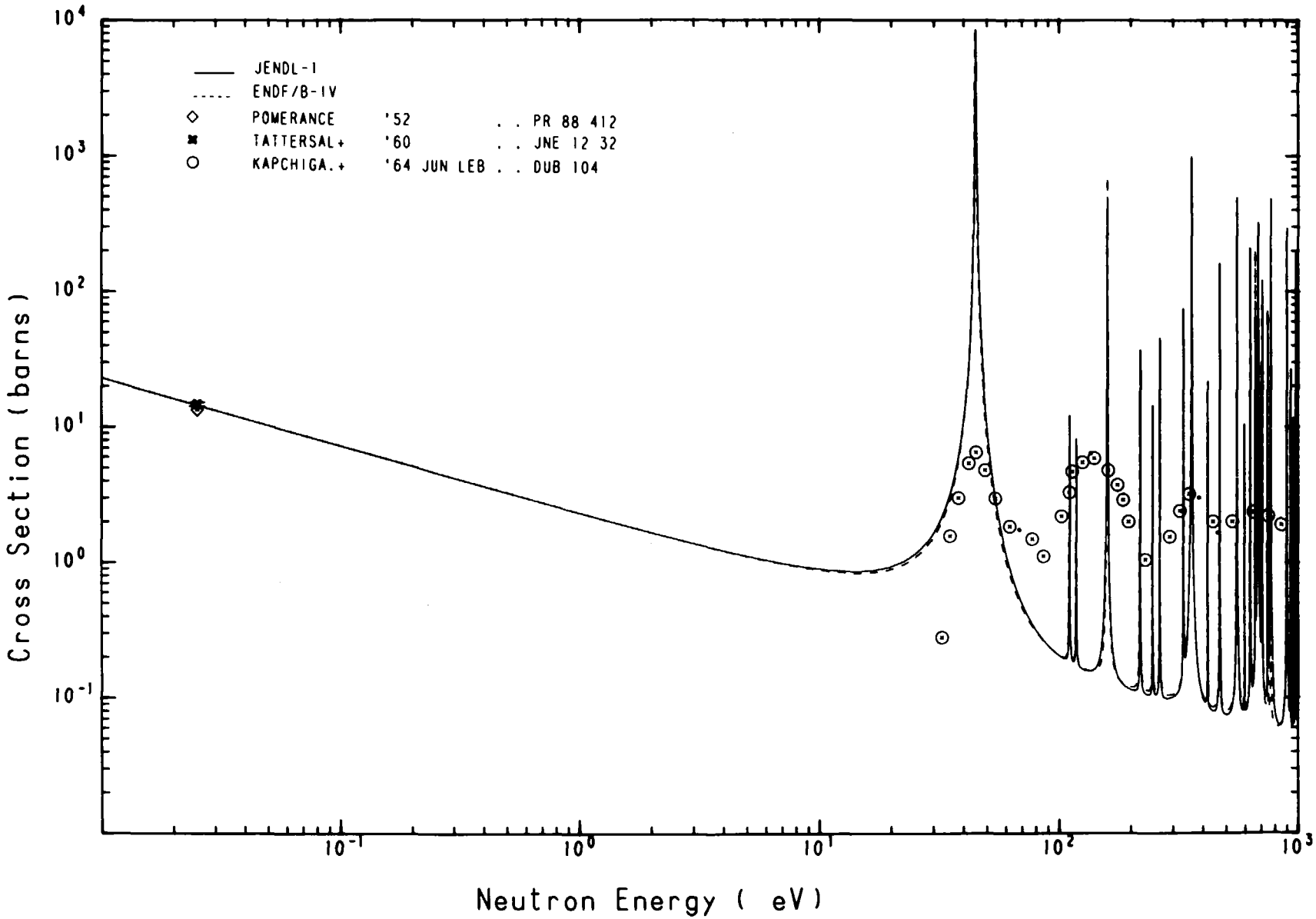
^{94}Mo

(n,n')
(n,n'γ)


(n,n')
Ex=0.88 MeV
1.5
1.0
0.5
0.0
0.0
5.0
10.0
Cross Section (barns)
Neutron Energy (MeV)
LAMBROPOUL '73 JAN ANL . . NP A201 1

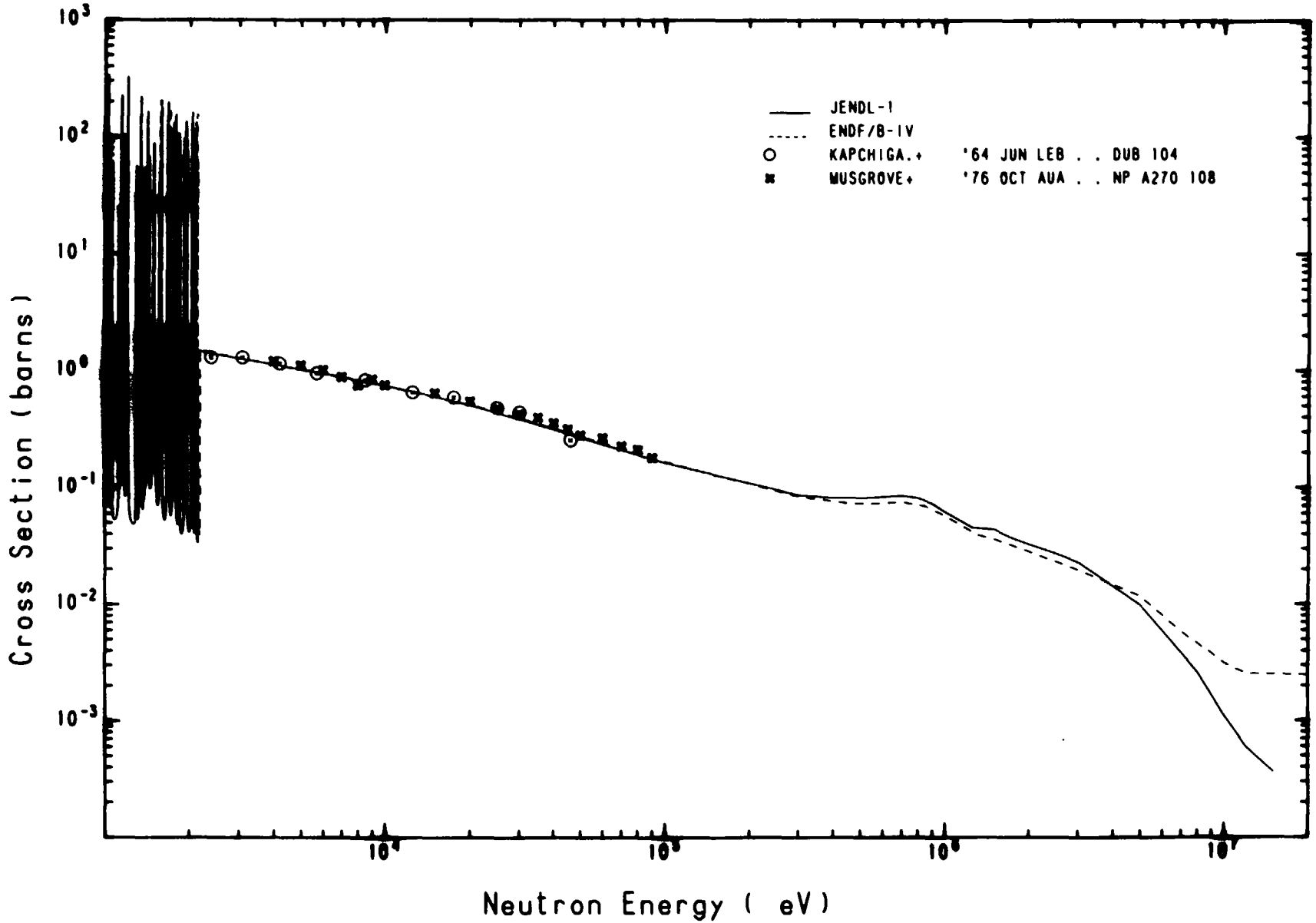

(n,n'γ)
Eγ=0.874 MeV
2.0
1.0
-0.0
0.0
1.0
2.0
3.0
Cross Section (barns)
Neutron Energy (MeV)
NISHIMURA+ '65 AUG JAE . . NP 70 421

^{95}Mo
(n,γ)
(1)


JENDL-I
ENDF/B-IV
POMERANCE '52 . . PR 88 412
TATTERSAL+ '60 . . JNE 12 32
KAPCHIGA.+ '64 JUN LEB . . DUB 104
Cross Section (barns)
Neutron Energy (eV)
10^4
10^3
10^2
10^1
10^0
10^{-1}
10^{-1}
10^0
10^1
10^2
10^3

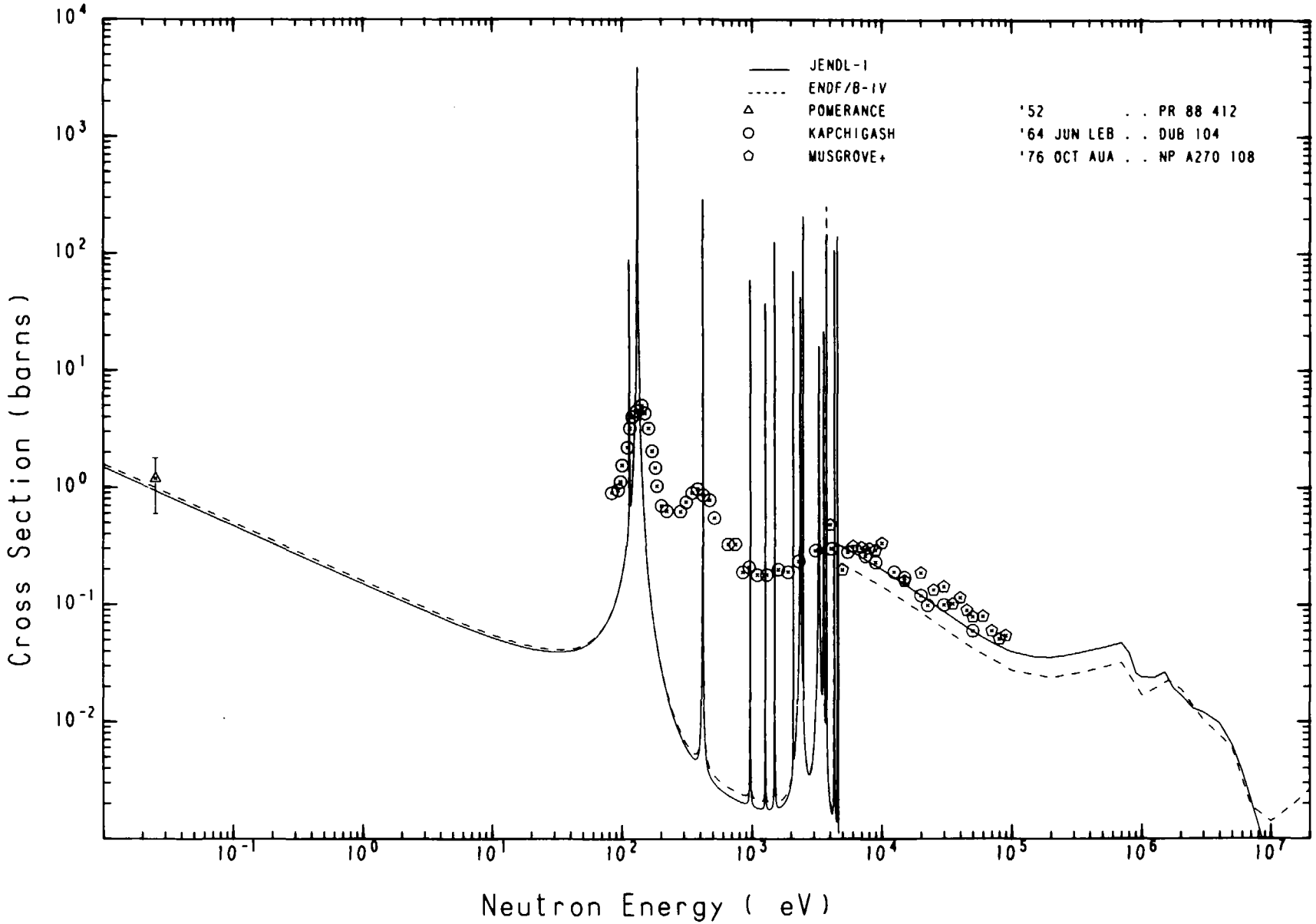
^{95}Mo

(n,γ)
(2)

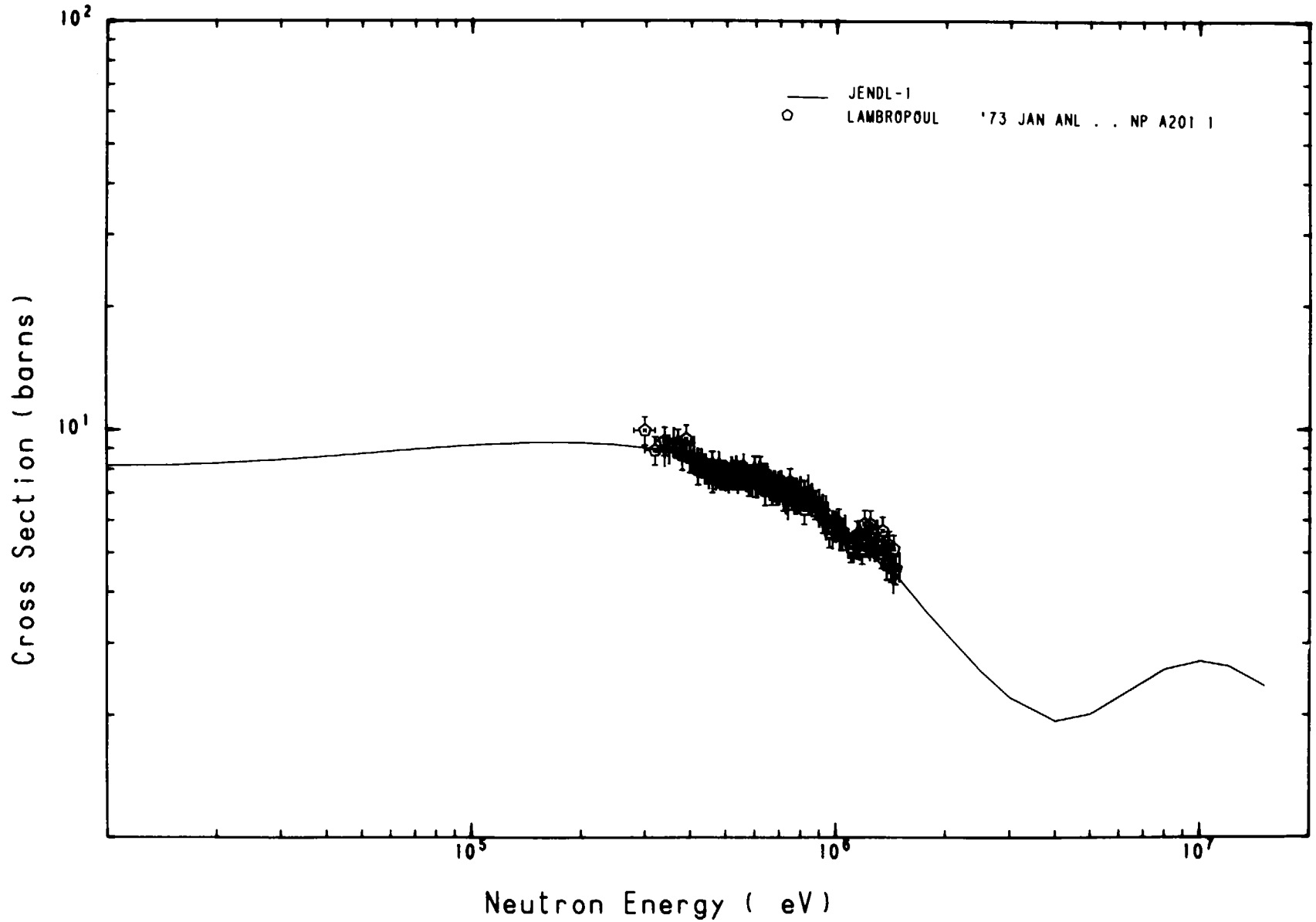

JENDL-1
ENDF/B-IV
KAPCHIGA.+ '64 JUN LEB . . DUB 104
MUSGROVE+ '76 OCT AUA . . NP A270 108
Cross Section (barns)
Neutron Energy (eV)

^{96}Mo

(n,γ)


JENDL-1
ENDF/B-IV
POMERANCE '52 . . PR 88 412
KAPCHIGASH '64 JUN LEB . . DUB 104
MUSGROVE+ '76 OCT AUA . . NP A270 108
Cross Section (barns)
Neutron Energy (eV)

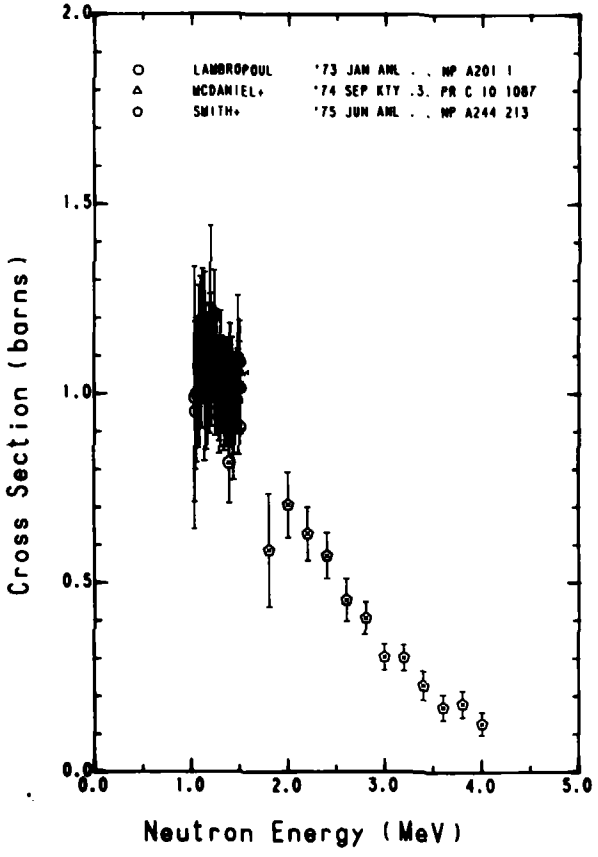
^{96}Mo
(n,n)


JENDL-1
LAMBROPOUL '73 JAN ANL . . NP A201 1
Cross Section (barns)
Neutron Energy (eV)
10²
10¹
10⁵
10⁶
10⁷

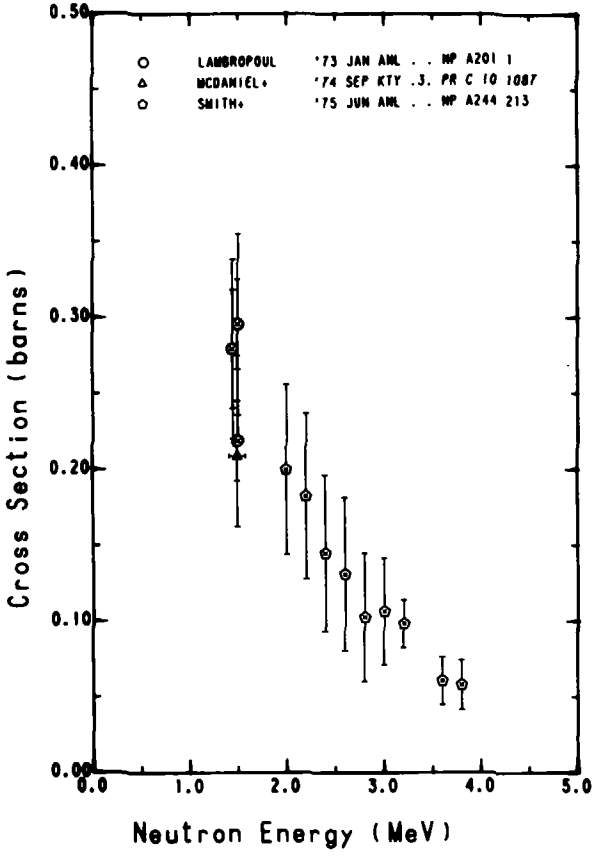
^{96}Mo
(n,n')
(n,p)

(n,n')

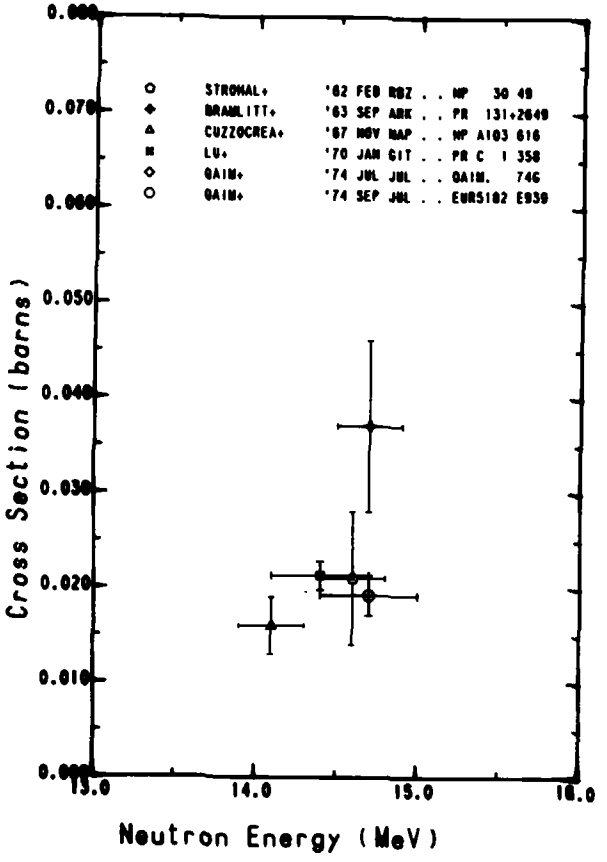
E_x=0.78 MeV



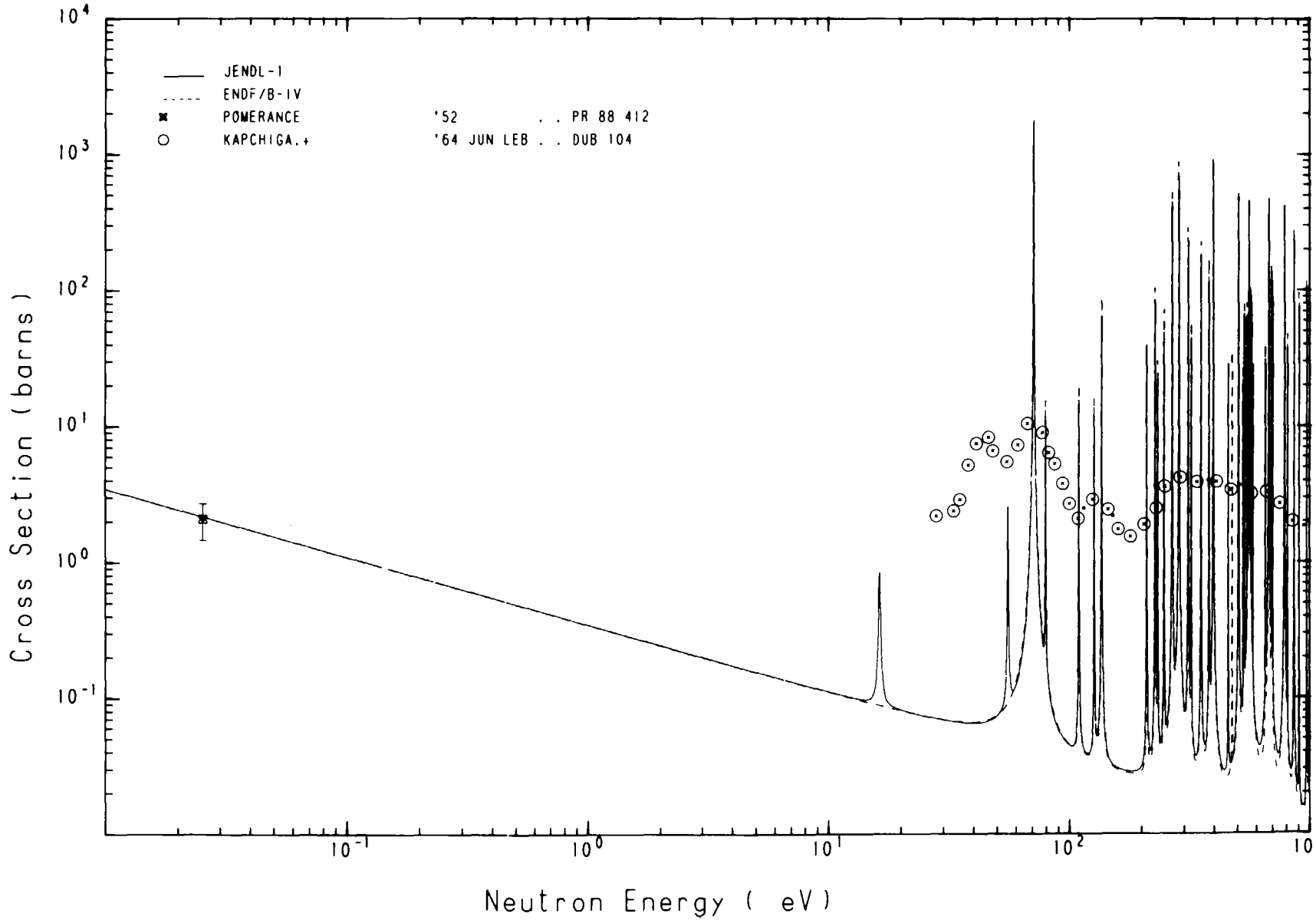
E_x=1.15 MeV



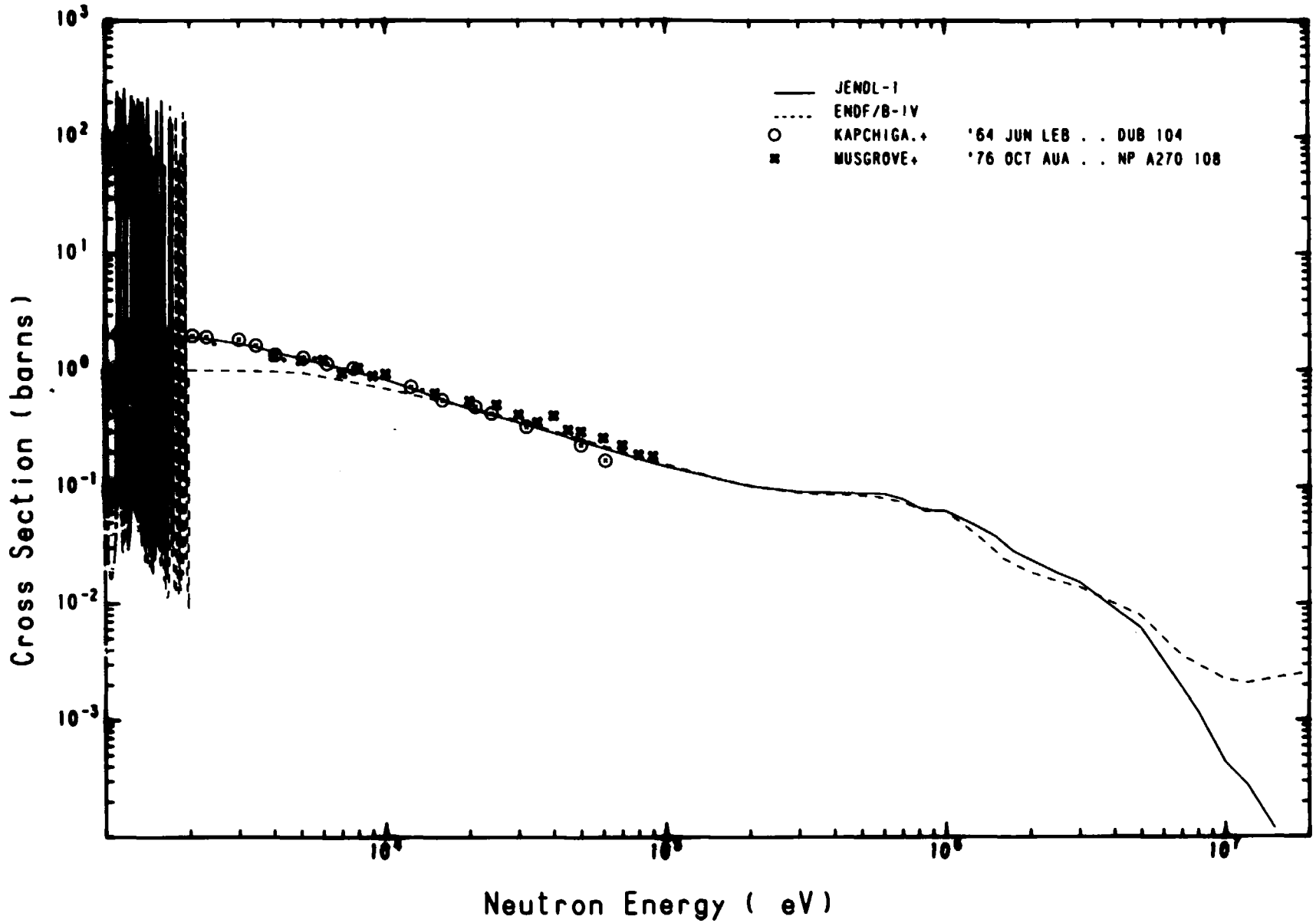
(n,p)



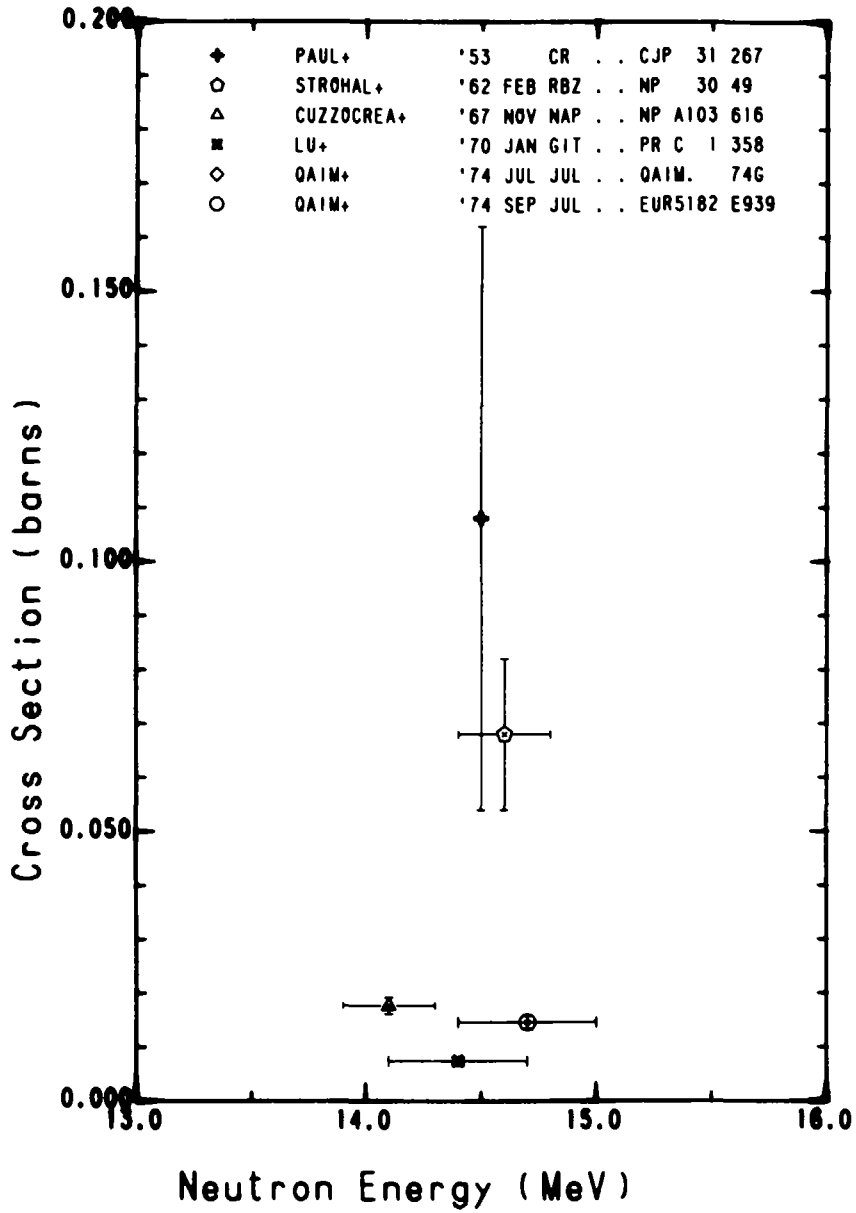
^{97}Mo
(n, γ)


JENDL-1
ENDF/B-IV
POMERANCE '52 . . PR 88 412
KAPCHIGA.+ '64 JUN LEB . . DUB 104
Cross Section (barns)
Neutron Energy (eV)
10^4
10^3
10^2
10^1
10^0
10^{-1}
10^{-1}
10^0
10^1
10^2
10^3

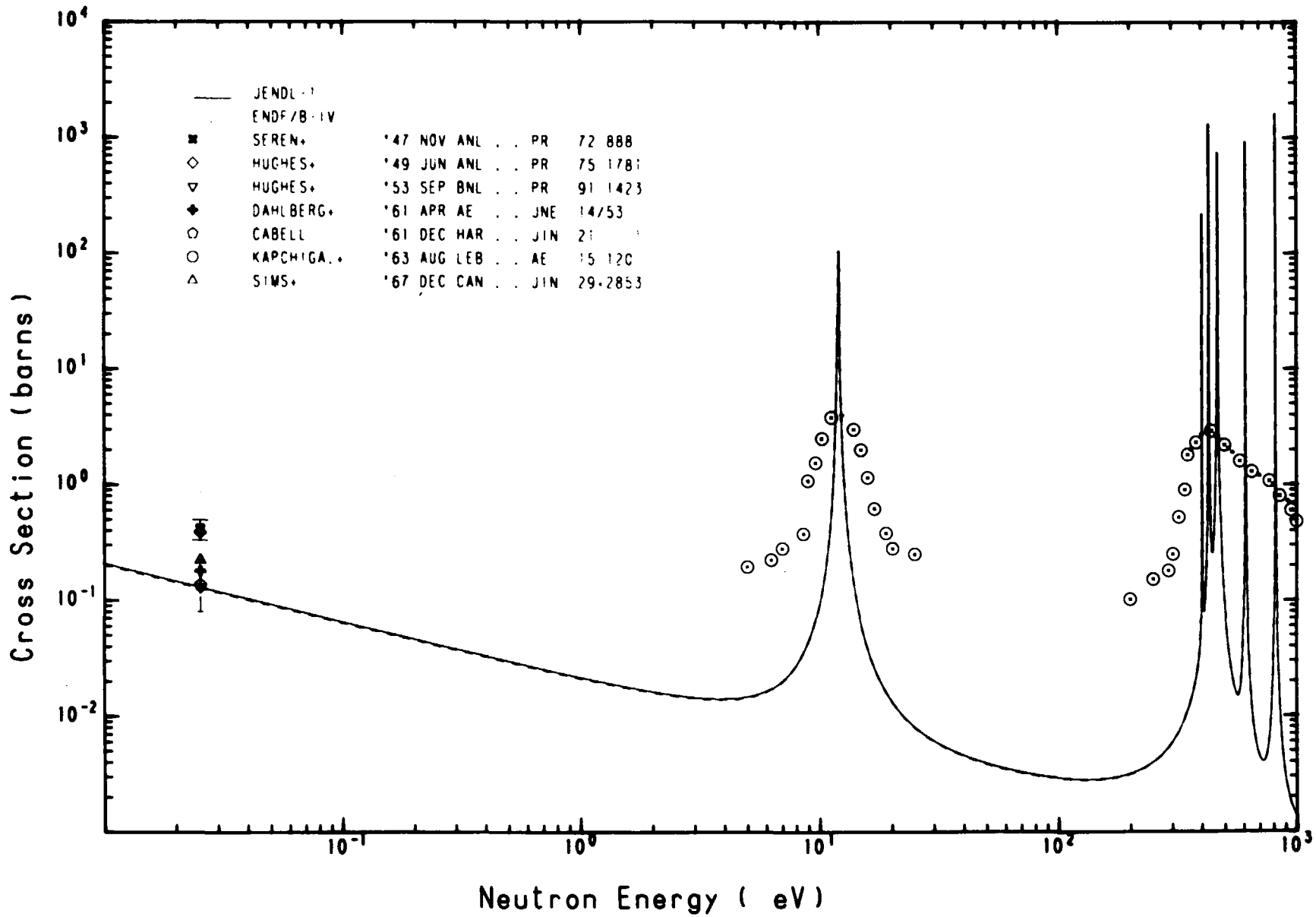
^{97}Mo
(n,γ)


JENDL-1
ENDF/B-IV
KAPCHIGA.+ '64 JUN LEB . . DUB 104
MUSGROVE+ '76 OCT AUA . . NP A270 108
Cross Section (barns)
Neutron Energy (eV)

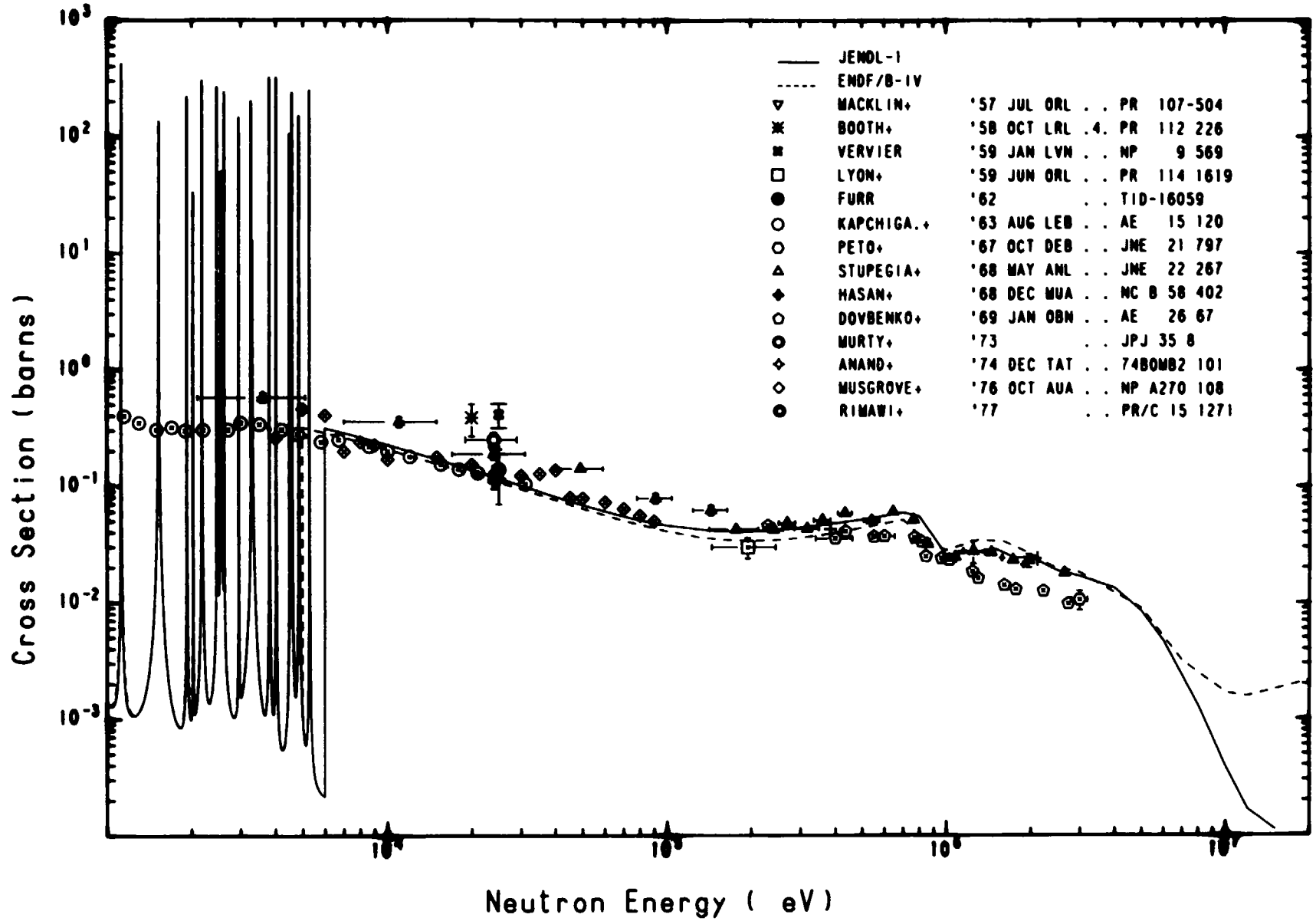
^{97}Mo
(n,p)


PAUL+ '53 CR . . CJP 31 267
STROHAL+ '62 FEB RBZ . . NP 30 49
CUZZOCREA+ '67 NOV NAP . . NP A103 616
LU+ '70 JAN GIT . . PR C 1 358
QAIM+ '74 JUL JUL . . QAIM. 74G
QAIM+ '74 SEP JUL . . EUR5182 E939
0.200
0.150
0.100
0.050
0.000
13.0
14.0
15.0
16.0
Cross Section (barns)
Neutron Energy (MeV)

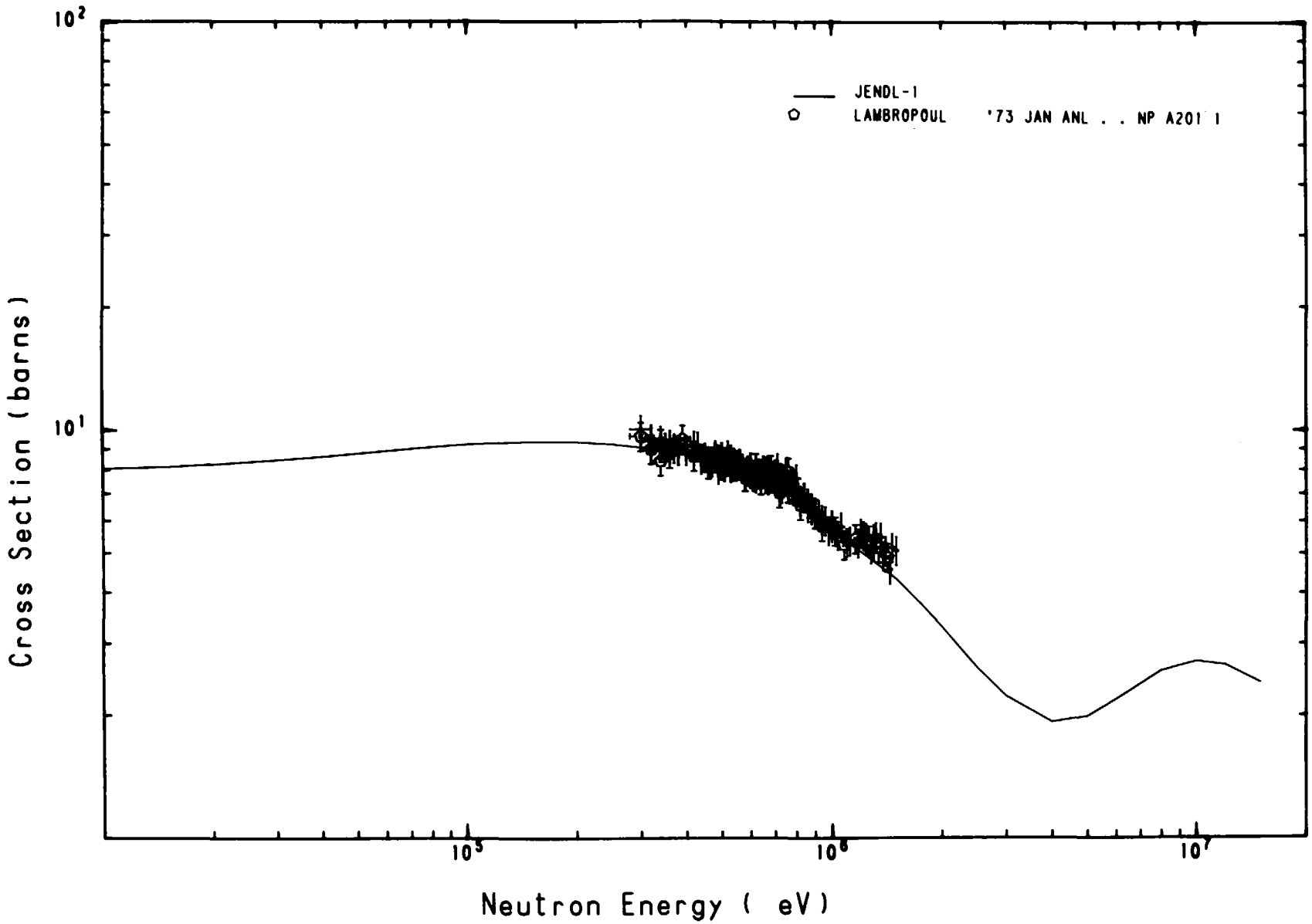
^{98}Mo
(n,γ)
(1)


JENDL-1
ENDF/B-IV
SEREN+ '47 NOV ANL . . PR 72 888
HUGHES+ '49 JUN ANL . . PR 75 1781
HUGHES+ '53 SEP BNL . . PR 91 1423
DAHLBERG+ '61 APR AE . . JNE 14/53
CABELL '61 DEC HAR . . JIN 21
KAPCHIGA.+ '63 AUG LEB . . AE 15 120
SIMS+ '67 DEC CAN . . JIN 29-2853
Cross Section (barns)
Neutron Energy (eV)

^{98}Mo
(n,γ)
(2)

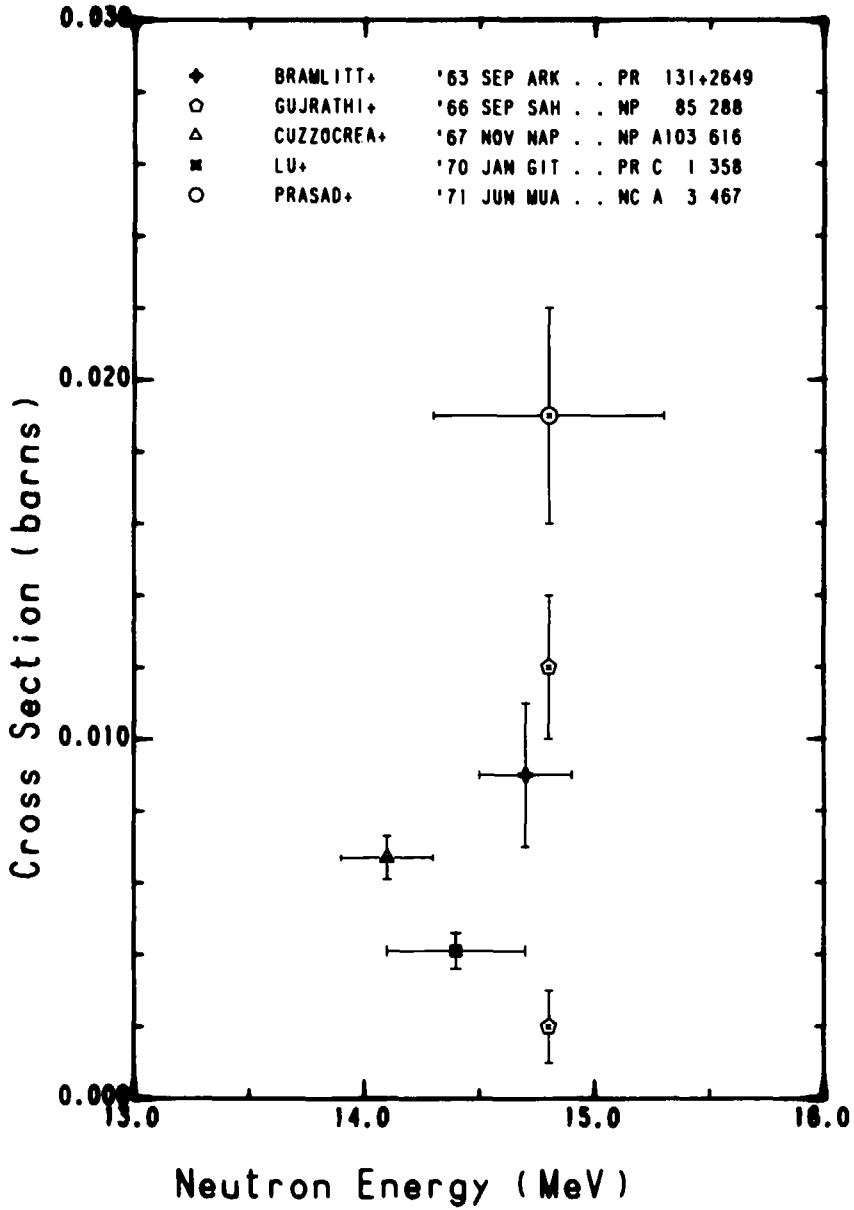

JENDL-1
ENDF/B-IV
MACKLIN+ '57 JUL ORL . . PR 107-504
BOOTH+ '58 OCT LRL .4. PR 112 226
VERVIER '59 JAN LVN . . NP 9 569
LYON+ '59 JUN ORL . . PR 114 1619
FURR '62 . . TID-16059
KAPCHIGA.+ '63 AUG LEB . . AE 15 120
PETO+ '67 OCT DEB . . JNE 21 797
STUPEGIA+ '68 MAY ANL . . JNE 22 267
HASAN+ '68 DEC MUA . . NC B 58 402
DOVBENKO+ '69 JAN OBN . . AE 26 67
MURTY+ '73 . . JPJ 35 8
ANAND+ '74 DEC TAT . . 74BOMB2 101
MUSGROVE+ '76 OCT AUA . . NP A270 108
RIMAWI+ '77 . . PR/C 15 1271
Cross Section (barns)
Neutron Energy (eV)

^{98}Mo
(n,n)

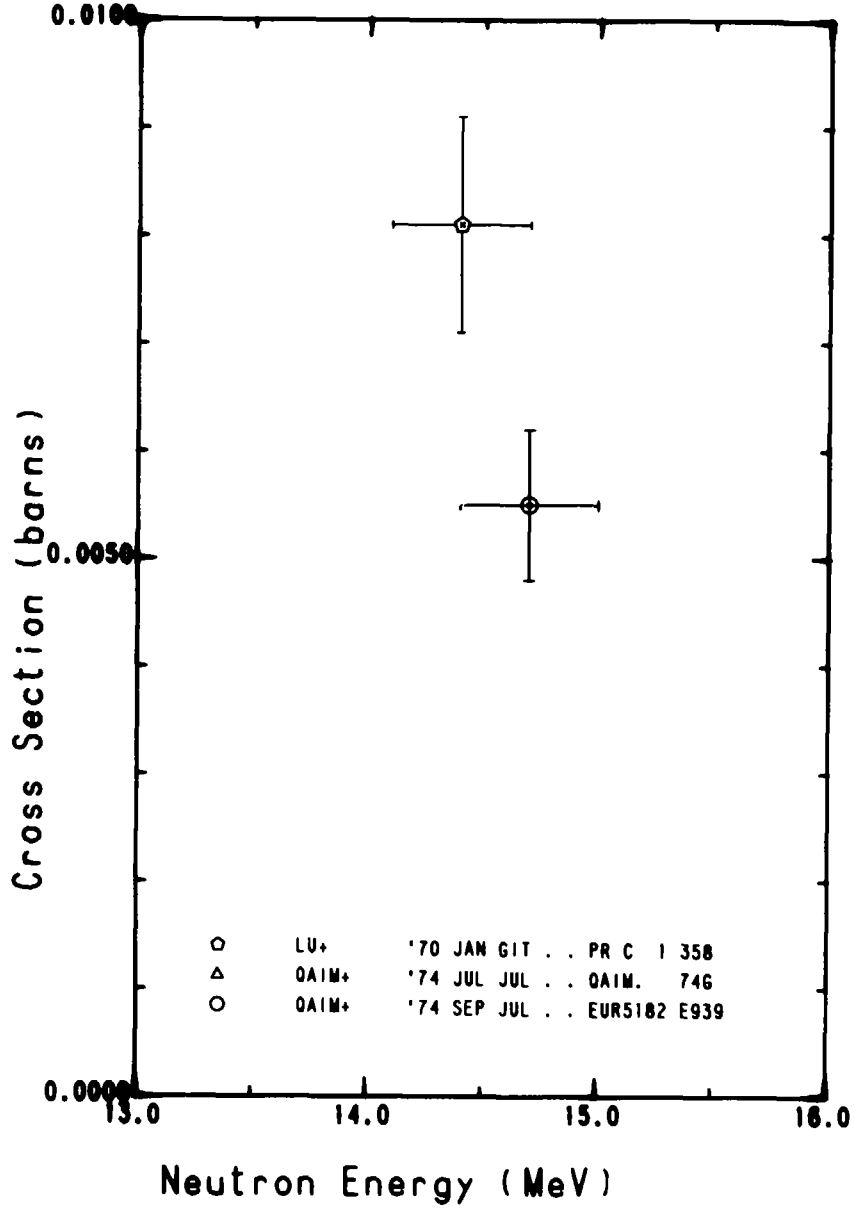

JENDL-1
LAMBROPOUL '73 JAN ANL . . NP A201 1
Cross Section (barns)
Neutron Energy (eV)
10²
10¹
10⁵
10⁶
10⁷

^{98}Mo
(n,p)
(n,α)

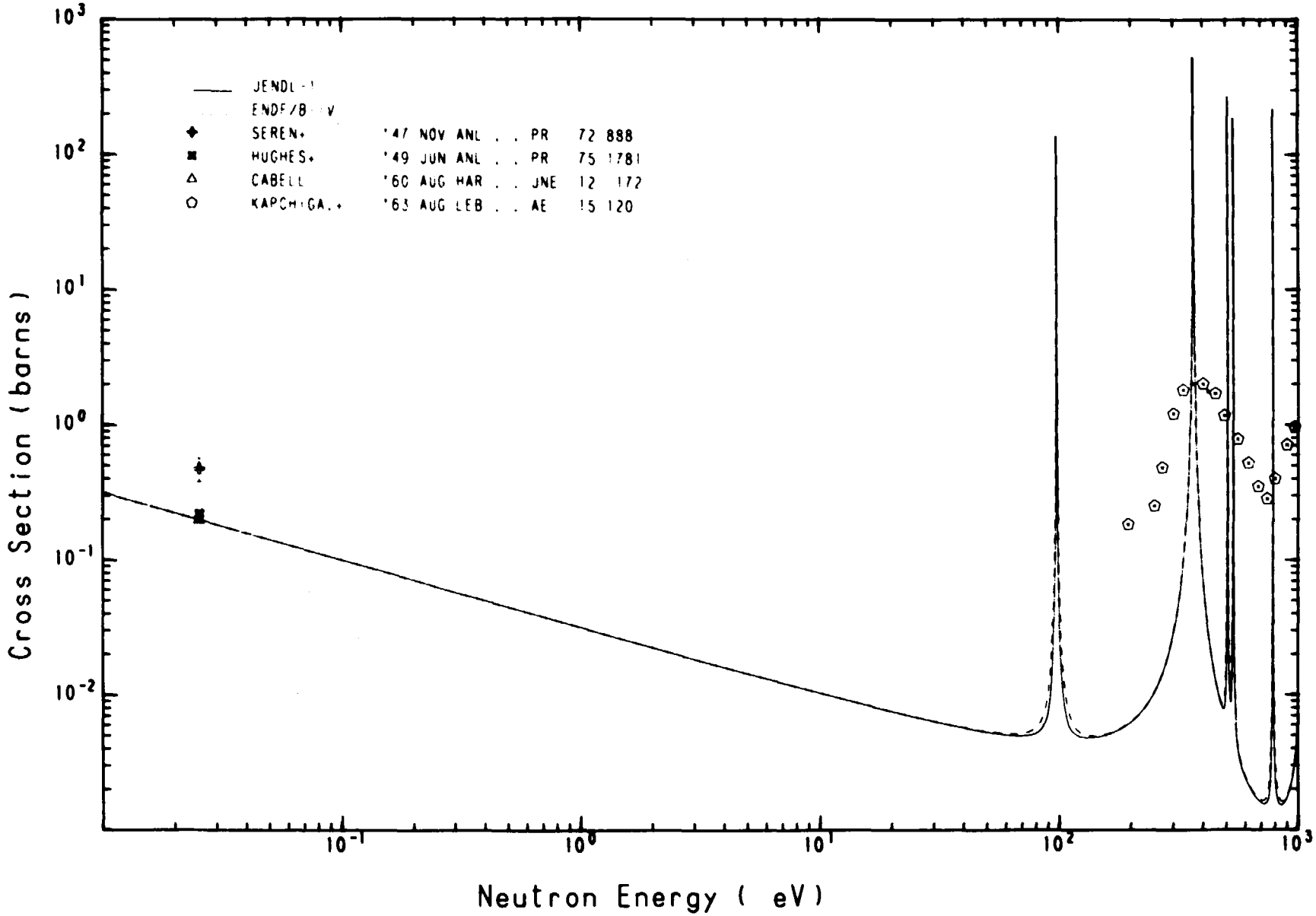
(n,p)



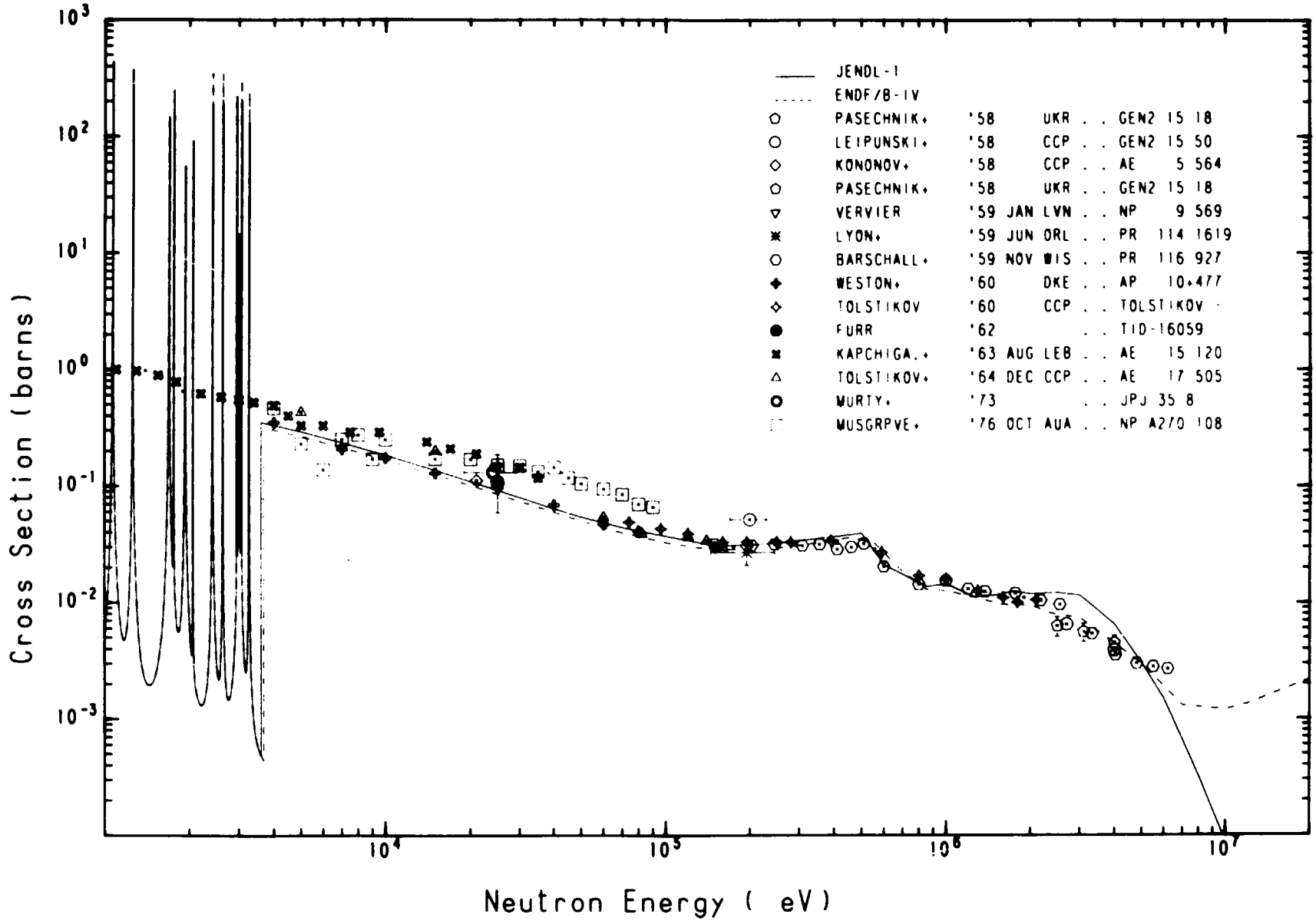
(n,α)



^{100}Mo
(n, γ)
(1)

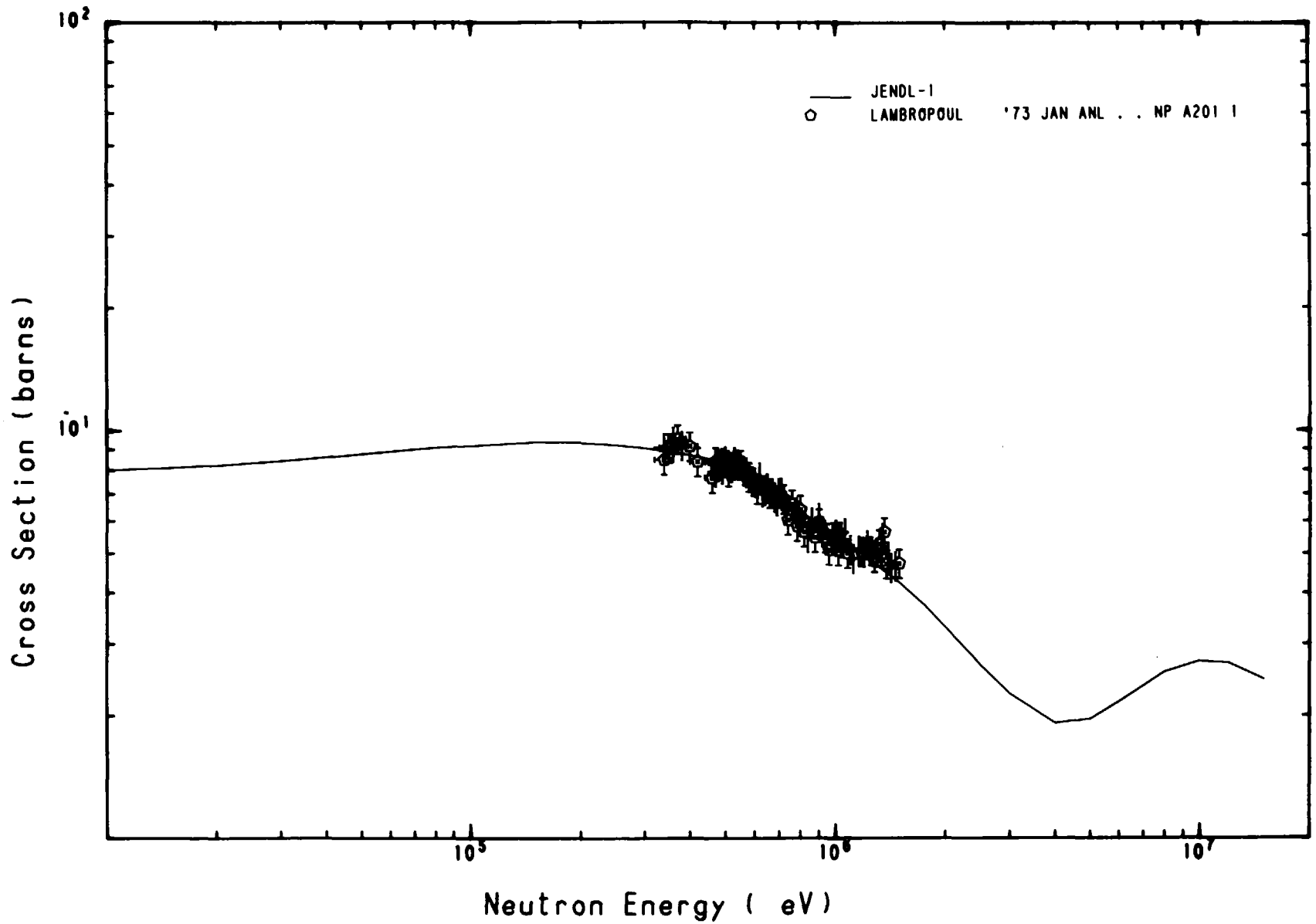

JENDL-1
ENDF/B-V
SEREN+ '47 NOV ANL . . PR 72 888
HUGHES+ '49 JUN ANL . . PR 75 1781
CABELL '60 AUG HAR . . JNE 12 172
KAPCHIGA.+ '63 AUG LEB . . AE 15 120
Cross Section (barns)
Neutron Energy (eV)
10^3
10^2
10^1
10^0
10^{-1}
10^{-2}
10^{-1}
10^0
10^1
10^2
10^3

^{100}Mo
(n,γ)
(2)


JENDL-1
ENDF/B-IV
PASECHNIK+ '58 UKR . . GEN2 15 18
LEIPUNSKI+ '58 CCP . . GEN2 15 50
KONONOV+ '58 CCP . . AE 5 564
PASECHNIK+ '58 UKR . . GEN2 15 18
VERVIER '59 JAN LVN . . NP 9 569
LYON+ '59 JUN ORL . . PR 114 1619
BARSCHALL+ '59 NOV WIS . . PR 116 927
WESTON+ '60 DKE . . AP 10+477
TOLSTIKOV '60 CCP . . TOLSTIKOV
FURR '62 . . TID-16059
KAPCHIGA.+ '63 AUG LEB . . AE 15 120
TOLSTIKOV+ '64 DEC CCP . . AE 17 505
MURTY+ '73 . . JPJ 35 8
MUSGRPVE+ '76 OCT AUA . . NP A270 108
Cross Section (barns)
Neutron Energy (eV)

^{100}Mo

(n,n)

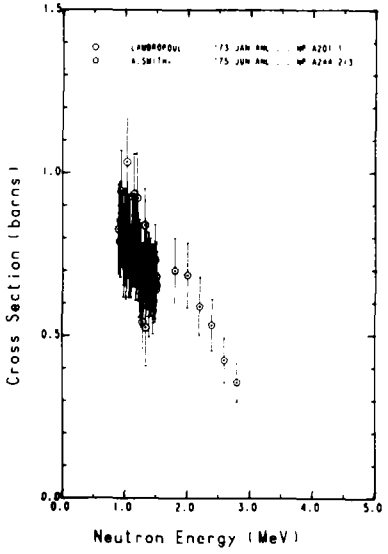

JENDL-1
LAMBROPOUL '73 JAN ANL . . NP A201 1
Cross Section (barns)
Neutron Energy (eV)
10²
10¹
10⁵
10⁶
10⁷

^{100}Mo

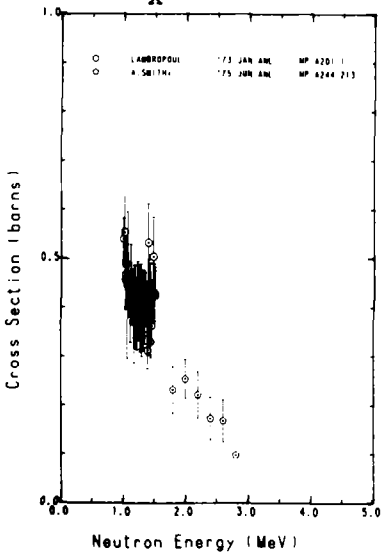
(n,n')
(n,2n)
(n,α)

(n,n')

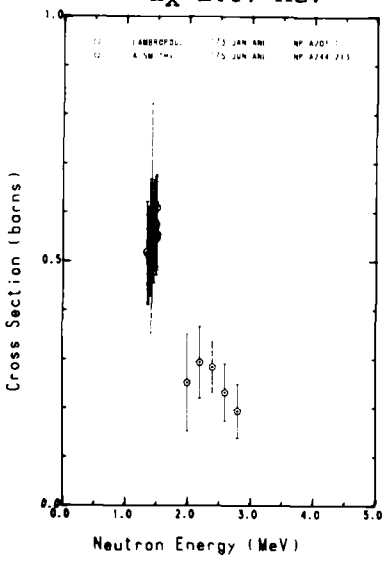
E_x=0.5 MeV



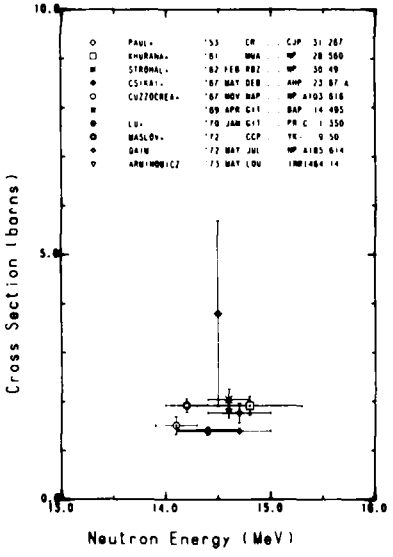
E_x=0.7 MeV



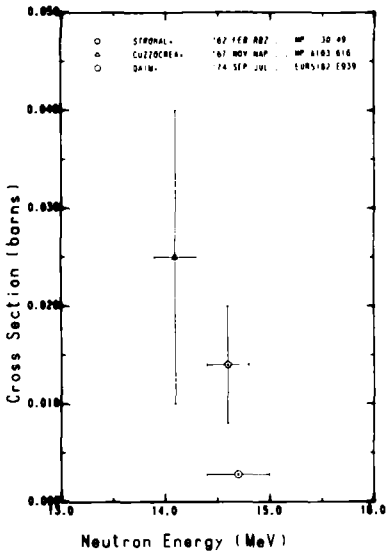
E_x=1.07 MeV



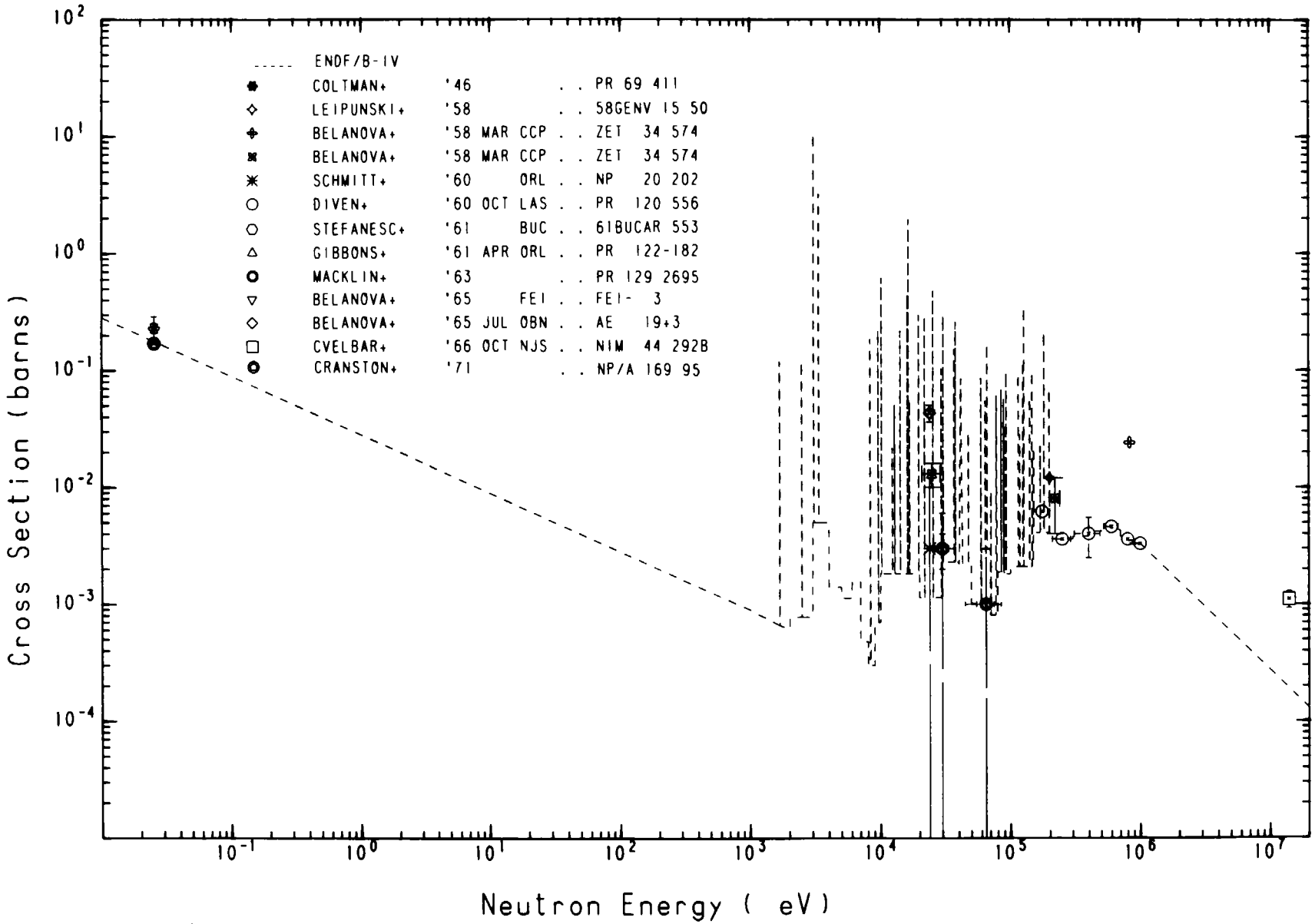
(n,2n)



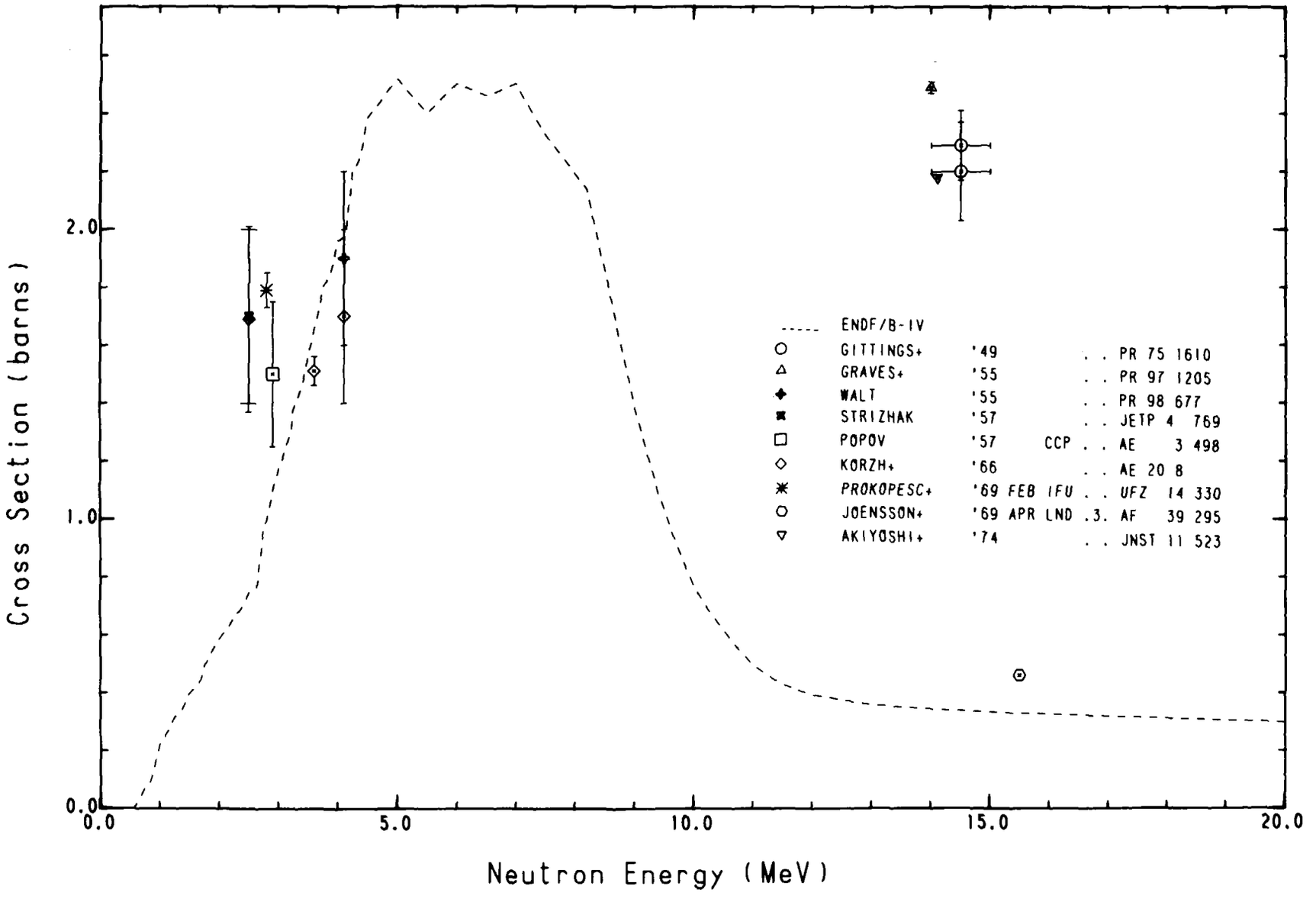
(n,α)



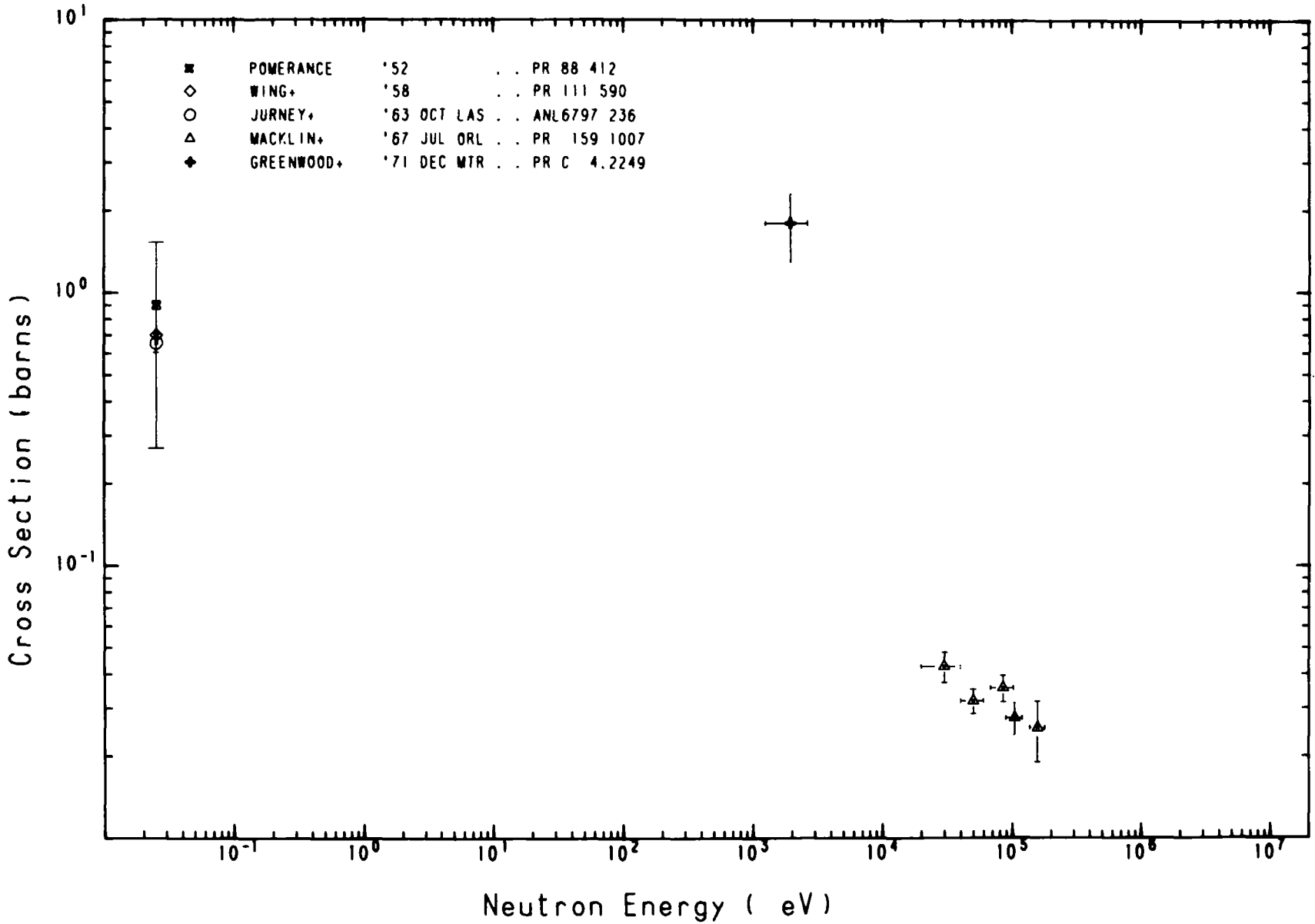
$_{82}$Pb
(n,γ)


ENDF/B-IV
COLTMAN+ '46 . . PR 69 411
LEIPUNSKI+ '58 . . 58GENV 15 50
BELANOVA+ '58 MAR CCP . . ZET 34 574
BELANOVA+ '58 MAR CCP . . ZET 34 574
SCHMITT+ '60 ORL . . NP 20 202
DIVEN+ '60 OCT LAS . . PR 120 556
STEFANESC+ '61 BUC . . 61BUCAR 553
GIBBONS+ '61 APR ORL . . PR 122-182
MACKLIN+ '63 . . PR 129 2695
BELANOVA+ '65 FEI . . FEI- 3
BELANOVA+ '65 JUL OBN . . AE 19+3
CVELBAR+ '66 OCT NJS . . NIM 44 292B
CRANSTON+ '71 . . NP/A 169 95
Cross Section (barns)
Neutron Energy (eV)

$_{82}$Pb
(n,n')

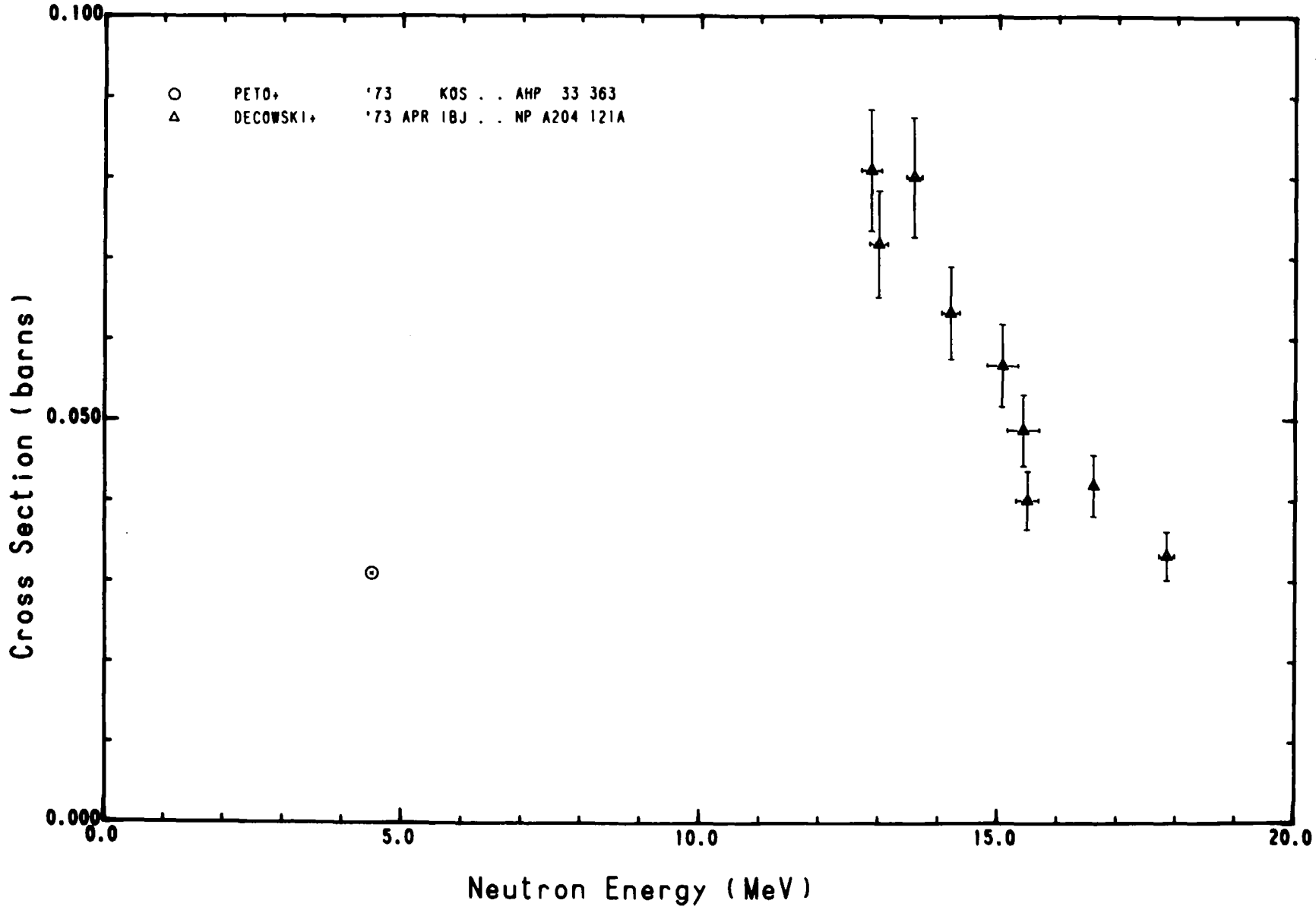

Cross Section (barns)
Neutron Energy (MeV)
0.0
1.0
2.0
0.0
5.0
10.0
15.0
20.0
ENDF/B-IV
GITTINGS+ '49 . . PR 75 1610
GRAVES+ '55 . . PR 97 1205
WALT '55 . . PR 98 677
STRIZHAK '57 . . JETP 4 769
POPOV '57 CCP . . AE 3 498
KORZH+ '66 . . AE 20 8
PROKOPESC+ '69 FEB IFU . . UFZ 14 330
JOENSSON+ '69 APR LND .3. AF 39 295
AKIYOSHI+ '74 . . JNST 11 523

^{204}Pb
(n, γ)

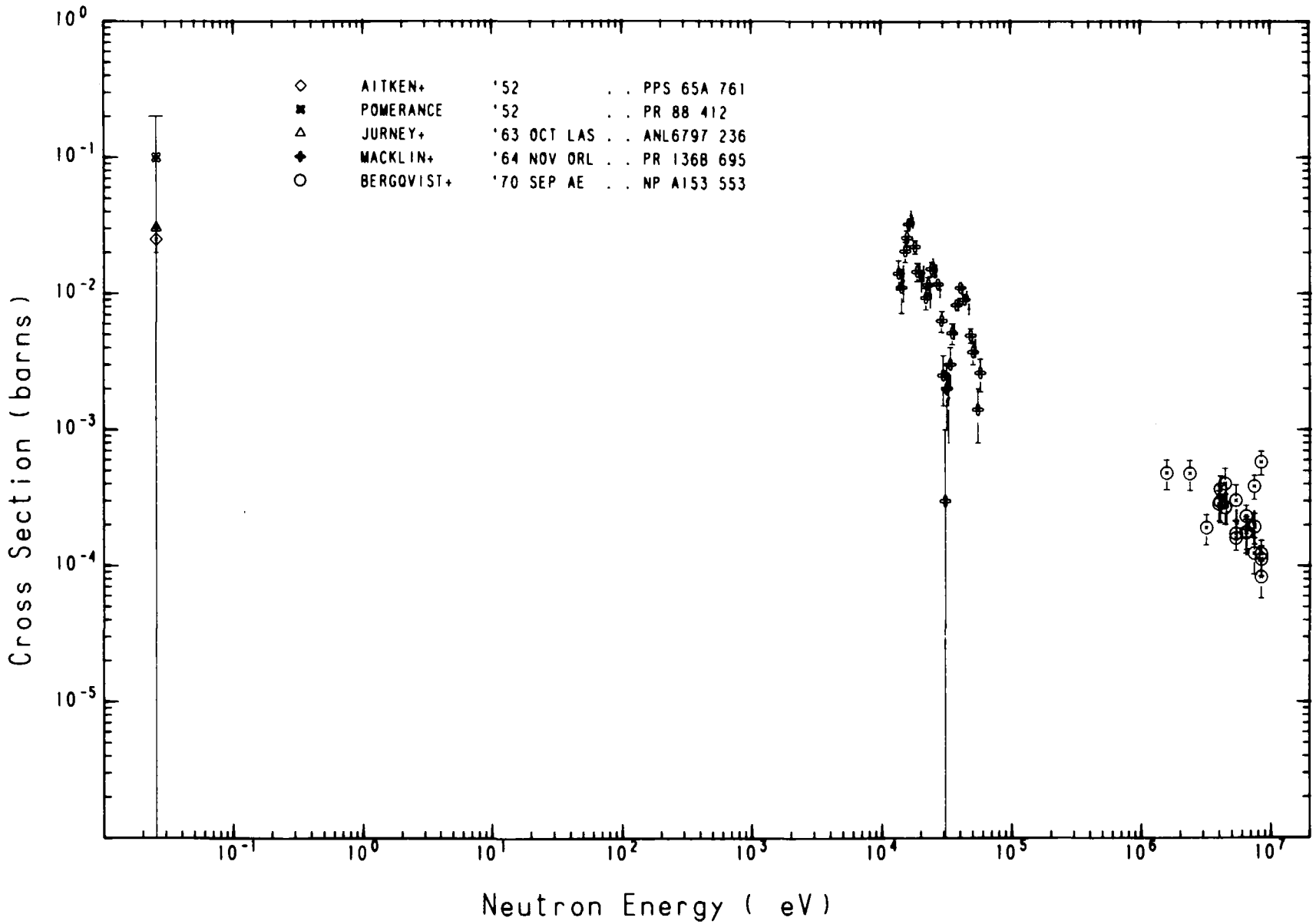

POMERANCE '52 . . PR 88 412
WING+ '58 . . PR 111 590
JURNEY+ '63 OCT LAS . . ANL6797 236
MACKLIN+ '67 JUL ORL . . PR 159 1007
GREENWOOD+ '71 DEC MTR . . PR C 4.2249
Cross Section (barns)
Neutron Energy (eV)

^{204}Pb

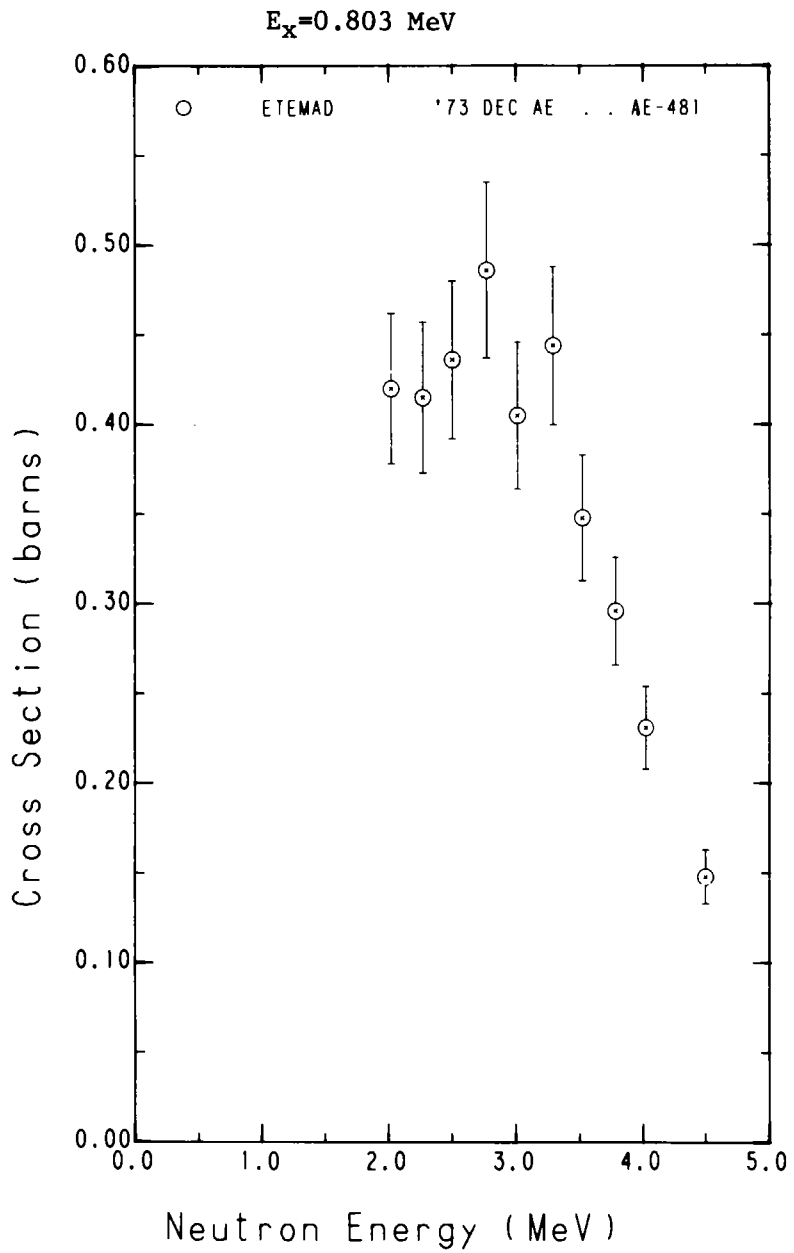
(n,n')^{204m}Pb
(66.9 min)

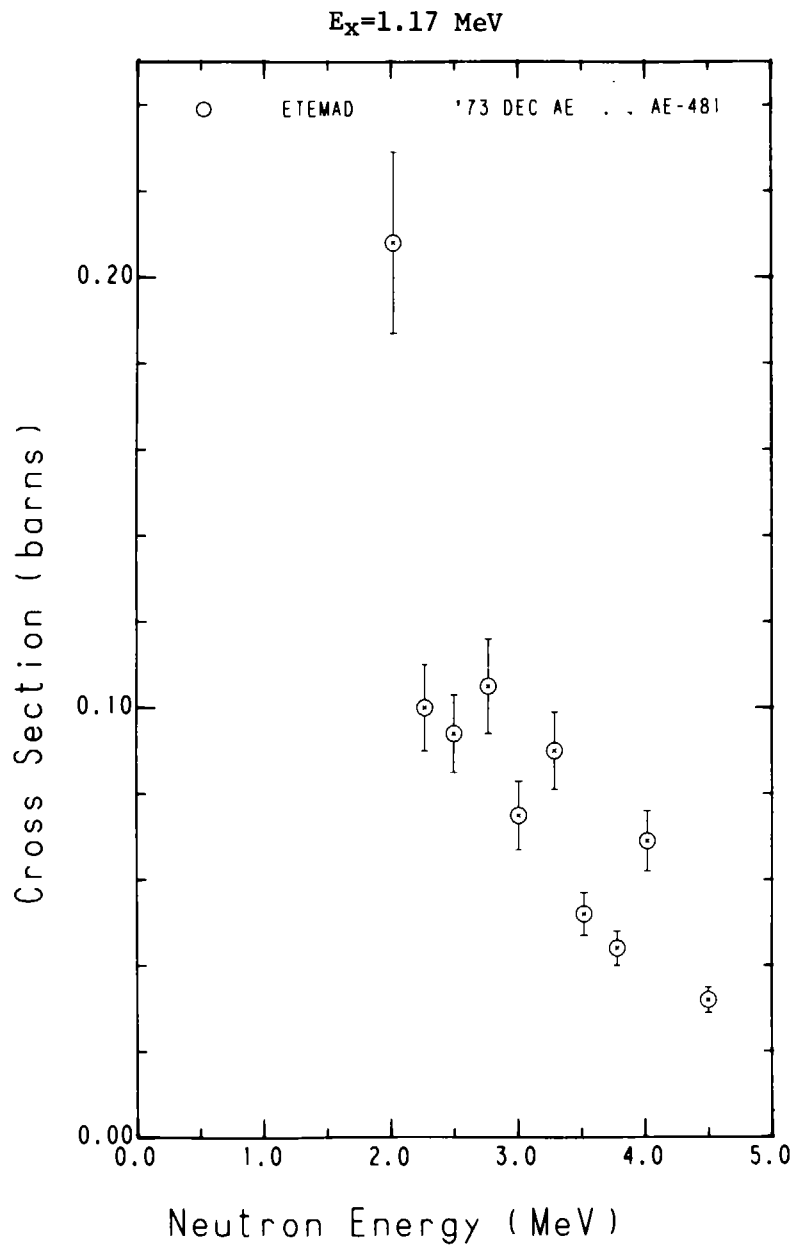


^{206}Pb
(n,γ)

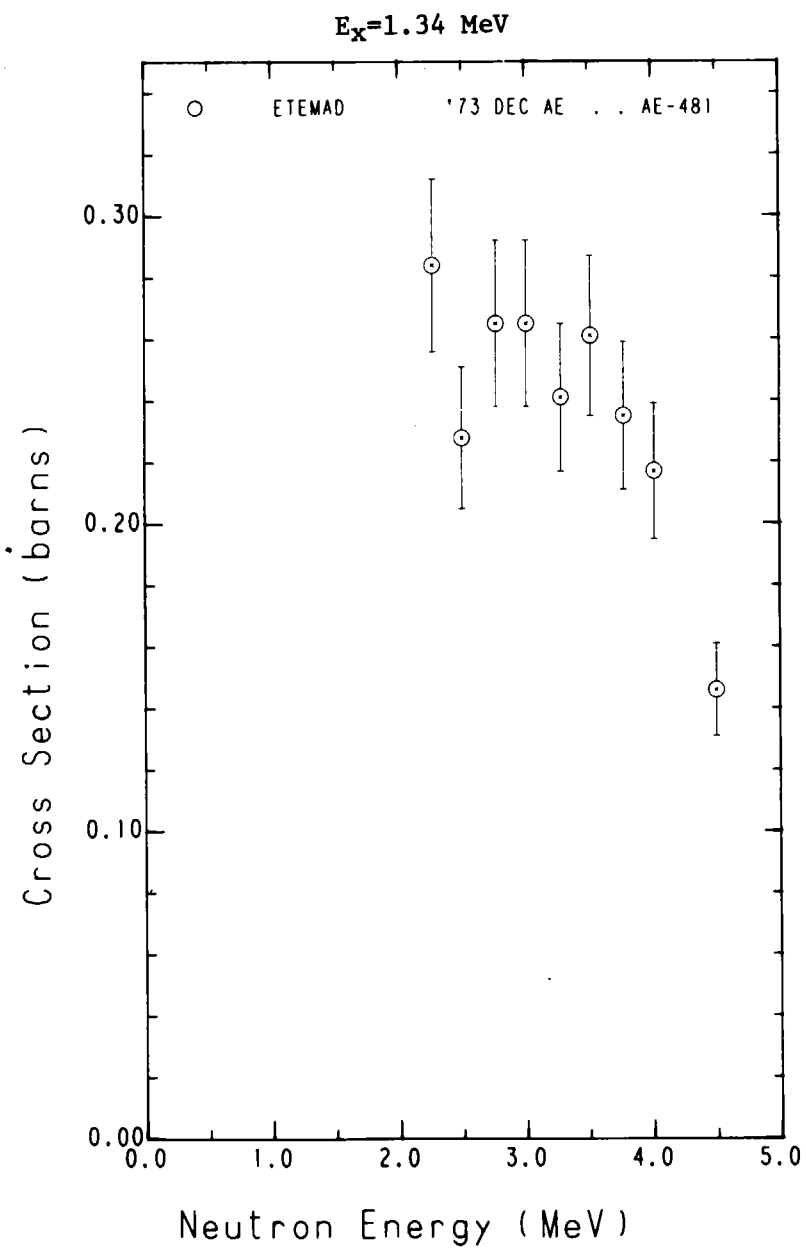

AITKEN+ '52 . . PPS 65A 761
POMERANCE '52 . . PR 88 412
JURNEY+ '63 OCT LAS . . ANL6797 236
MACKLIN+ '64 NOV ORL . . PR 136B 695
BERGQVIST+ '70 SEP AE . . NP A153 553
Cross Section (barns)
Neutron Energy (eV)

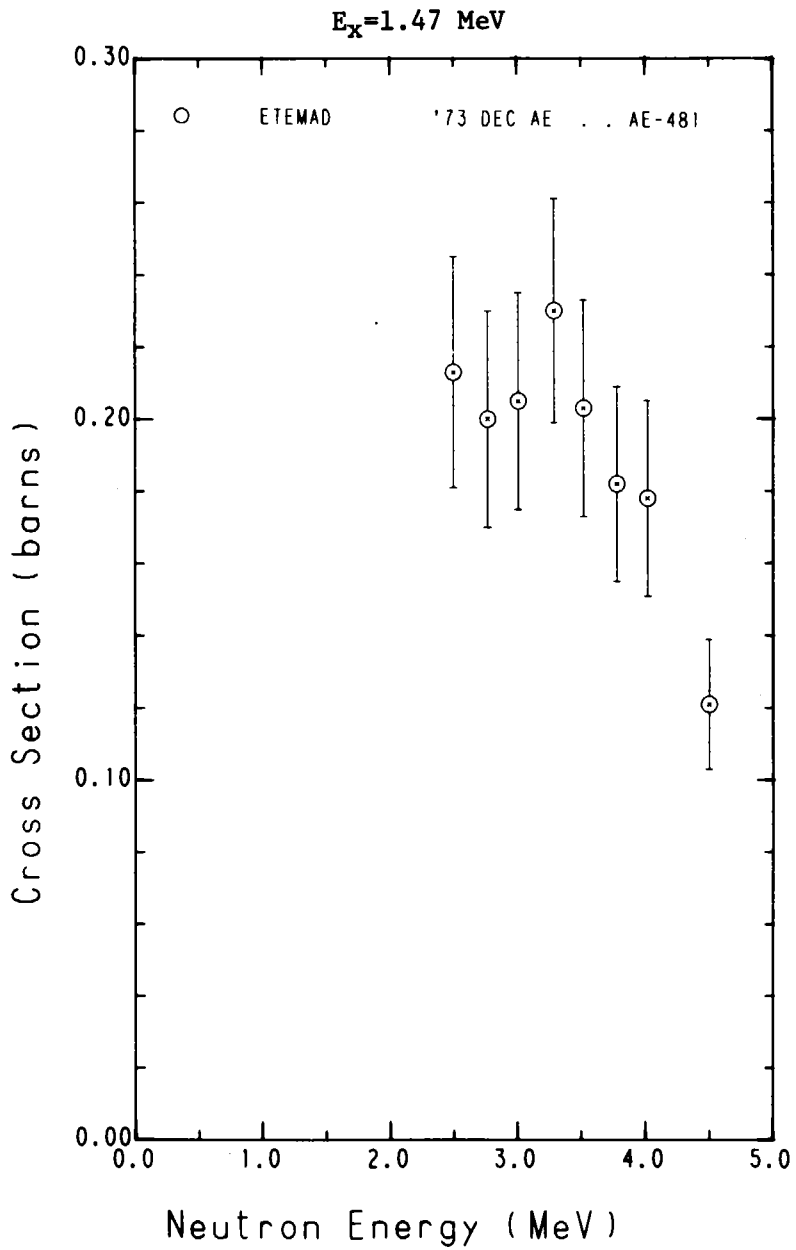
^{206}Pb
(n,n')


E_x=0.803 MeV
ETEMAD '73 DEC AE . . AE-481
Cross Section (barns)
Neutron Energy (MeV)
0.00
0.10
0.20
0.30
0.40
0.50
0.60
0.0
1.0
2.0
3.0
4.0
5.0


E_x=1.17 MeV
ETEMAD '73 DEC AE . . AE-481
Cross Section (barns)
Neutron Energy (MeV)
0.00
0.10
0.20
0.0
1.0
2.0
3.0
4.0
5.0

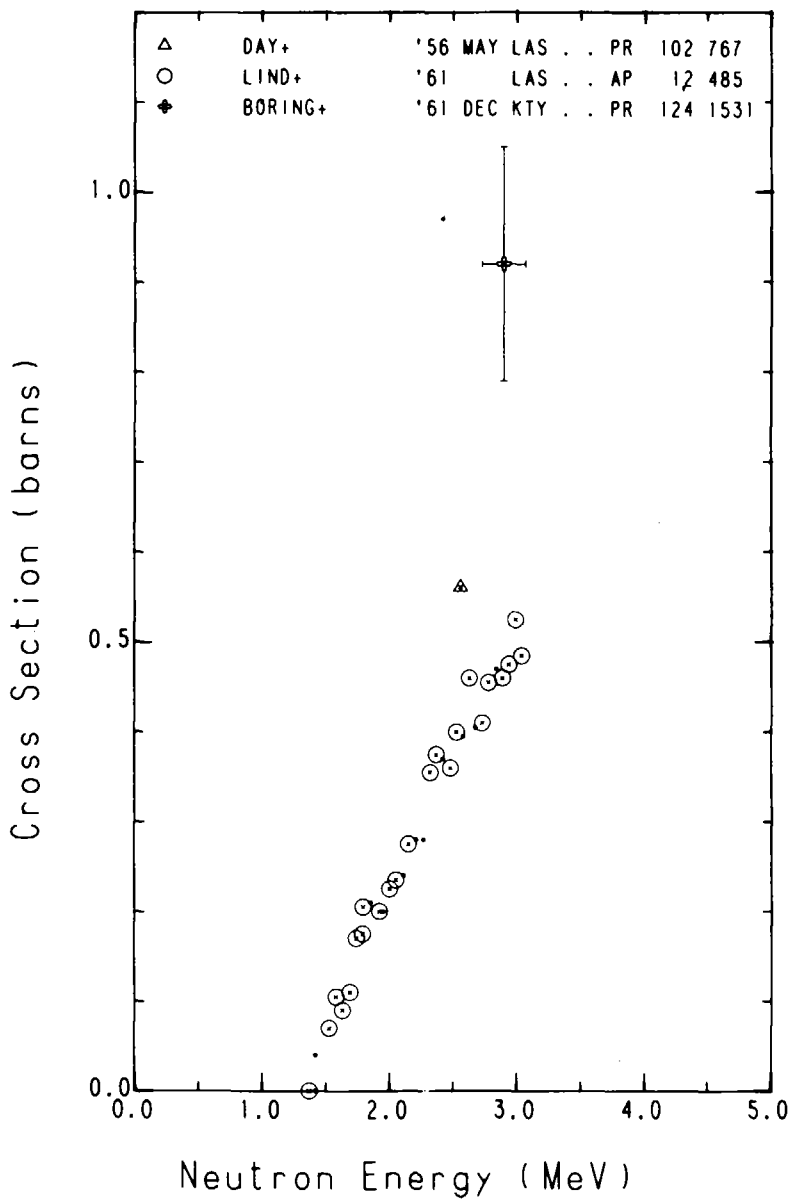
^{206}Pb
(n,n')


Ex=1.34 MeV
ETEMAD '73 DEC AE . . AE-481
Cross Section (barns)
0.00
0.10
0.20
0.30
0.0
1.0
2.0
3.0
4.0
5.0
Neutron Energy (MeV)

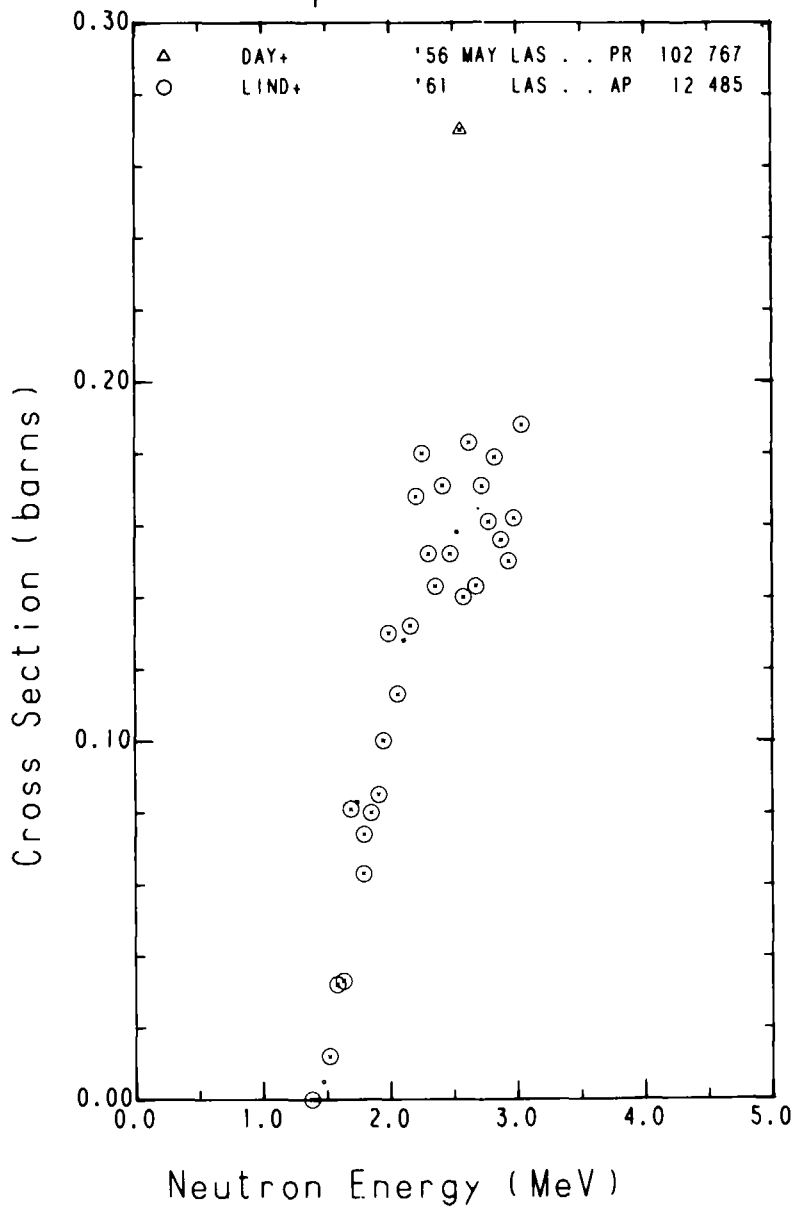

Ex=1.47 MeV
ETEMAD '73 DEC AE . . AE-481
Cross Section (barns)
0.00
0.10
0.20
0.30
0.0
1.0
2.0
3.0
4.0
5.0
Neutron Energy (MeV)

^{206}Pb
(n,n'γ)

E_γ=0.538 MeV

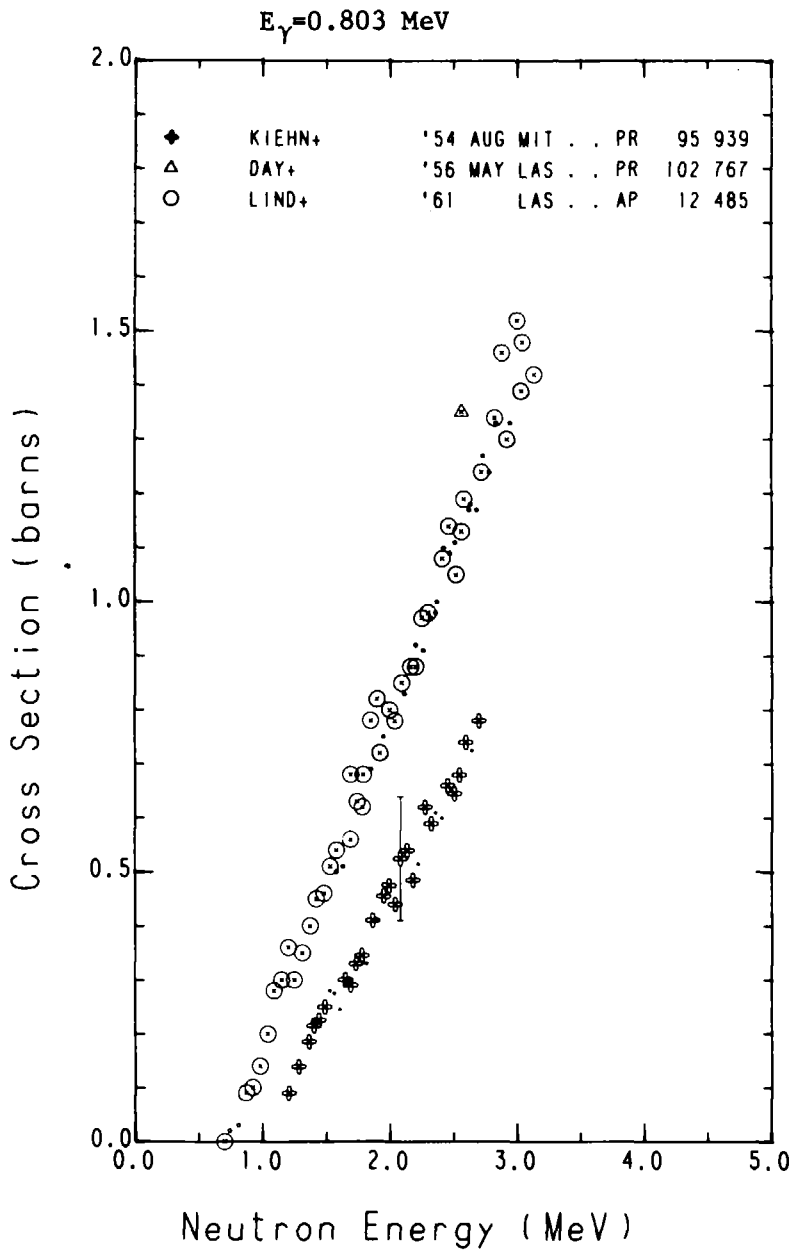


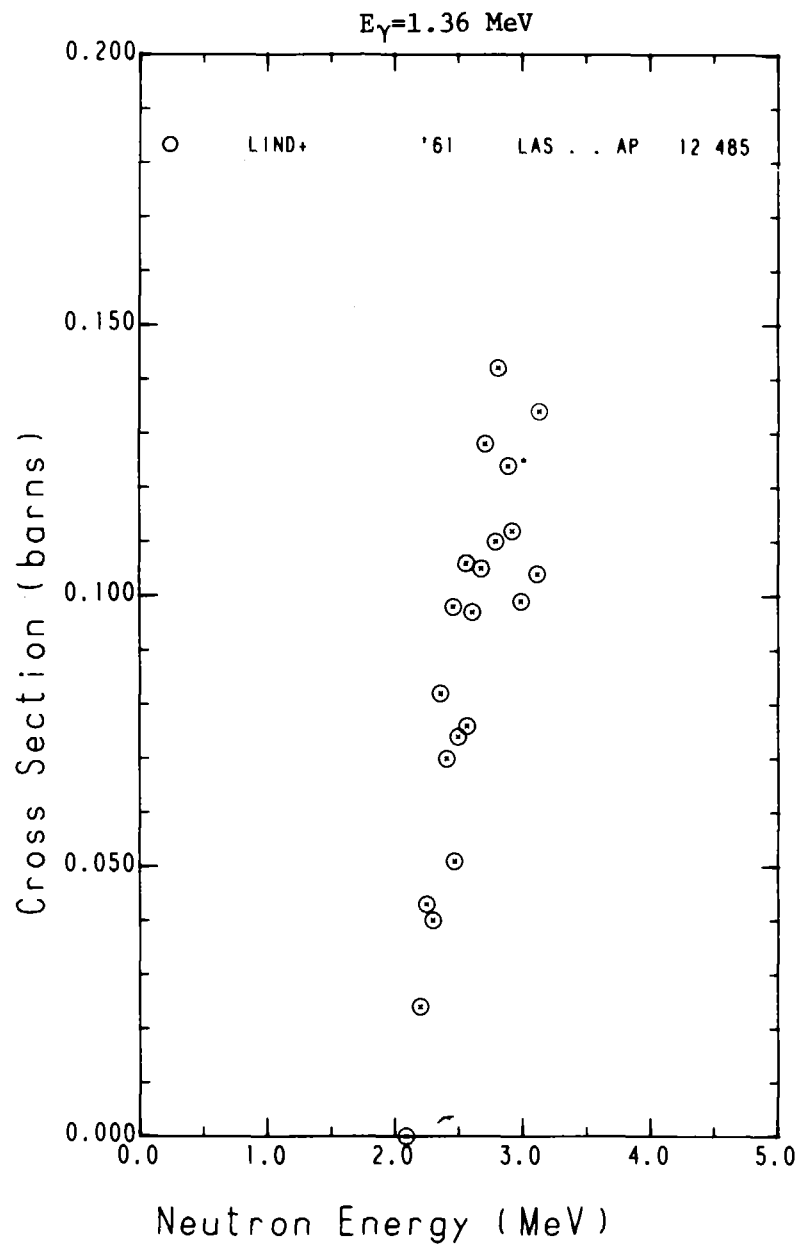
E_γ=0.662 MeV



^{206}Pb

(n,n'γ)

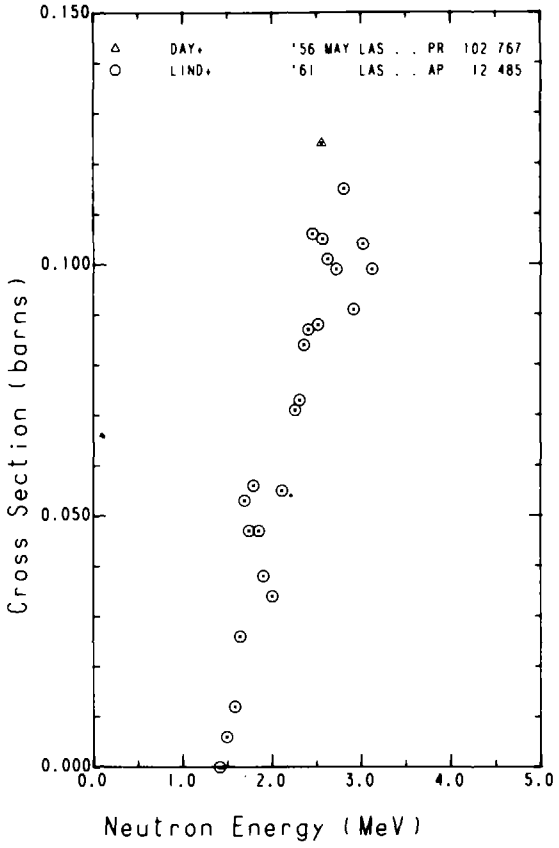

Eγ=0.803 MeV
KIEHN+ '54 AUG MIT . . PR 95 939
DAY+ '56 MAY LAS . . PR 102 767
LIND+ '61 LAS . . AP 12 485
Cross Section (barns)
Neutron Energy (MeV)
0.0
0.5
1.0
1.5
2.0
0.0
1.0
2.0
3.0
4.0
5.0


Eγ=1.36 MeV
LIND+ '61 LAS . . AP 12 485
Cross Section (barns)
Neutron Energy (MeV)
0.000
0.050
0.100
0.150
0.200
0.0
1.0
2.0
3.0
4.0
5.0

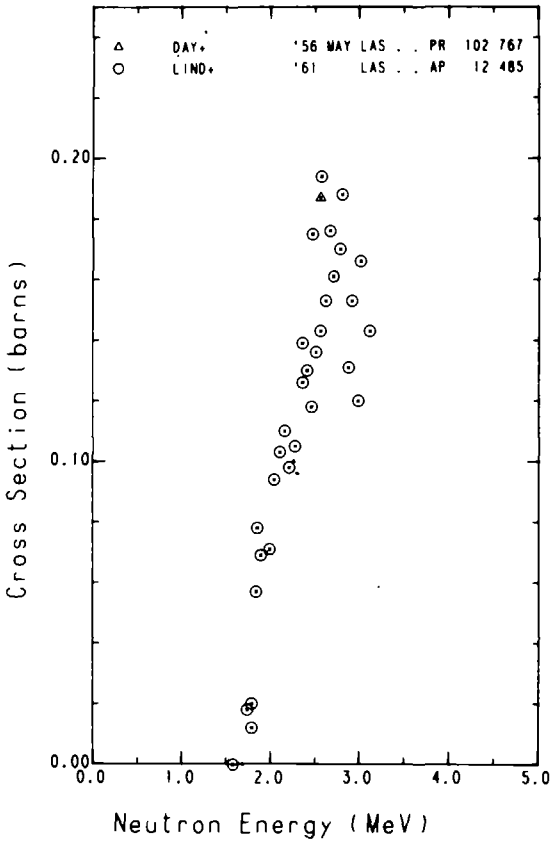
^{206}Pb

(n,n'γ)

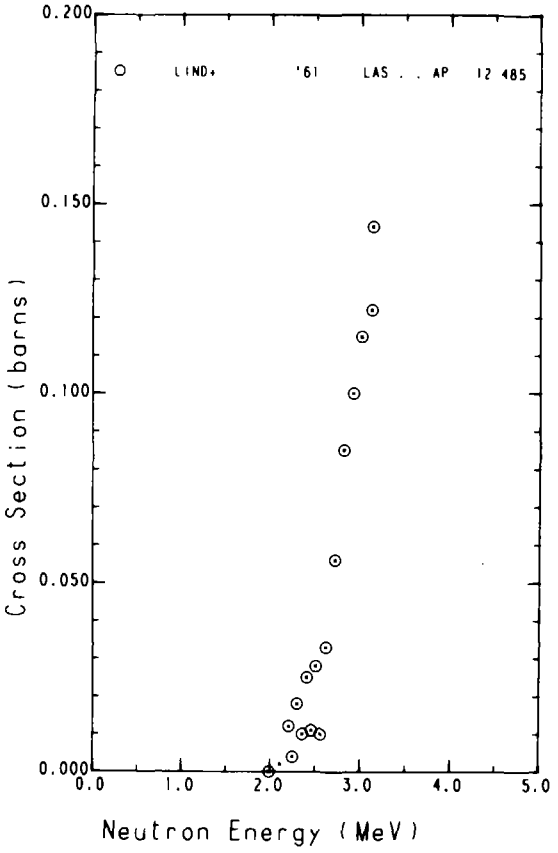
E_γ=1.45 MeV



E_γ=1.70 MeV

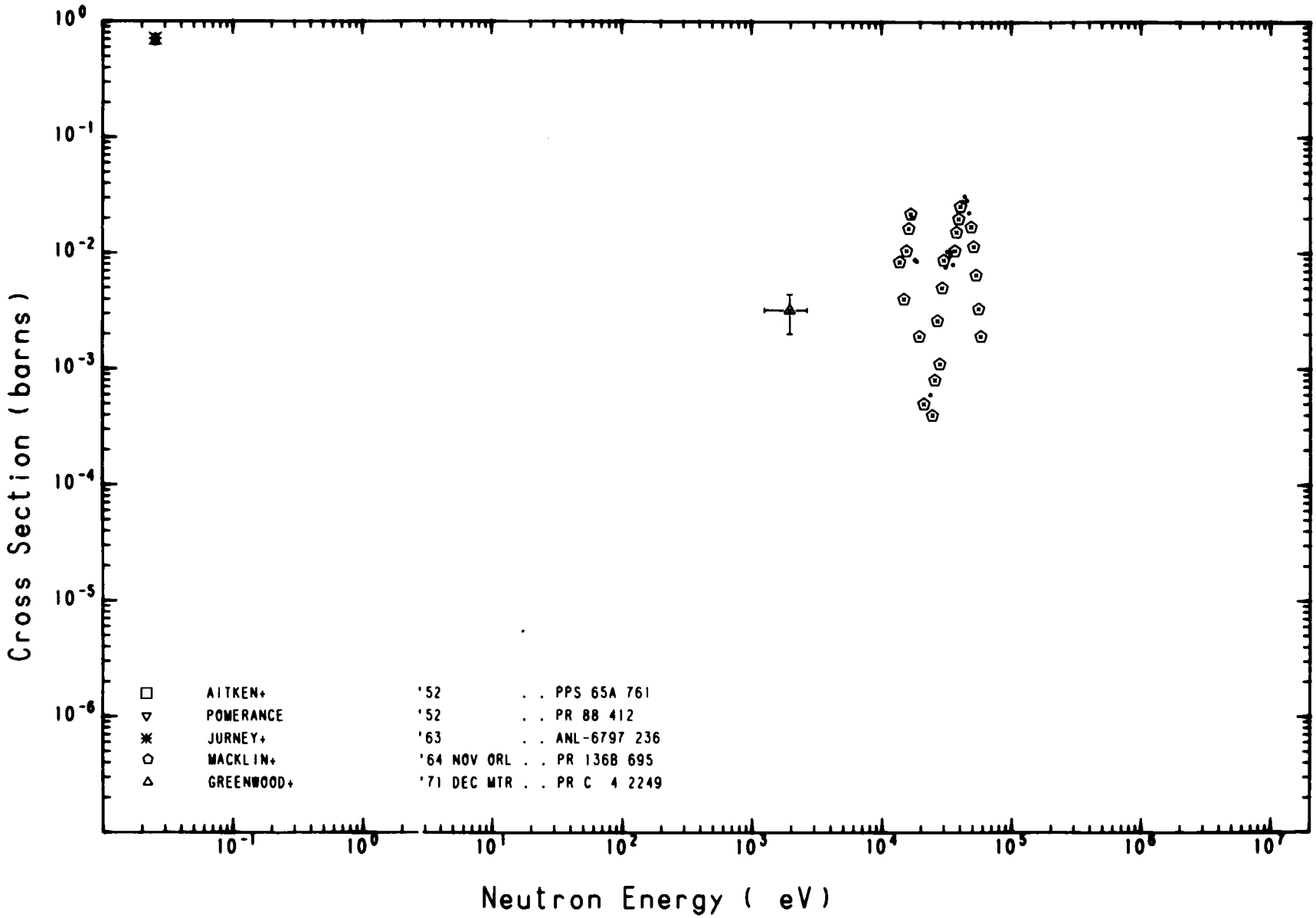


E_γ=1.82 MeV



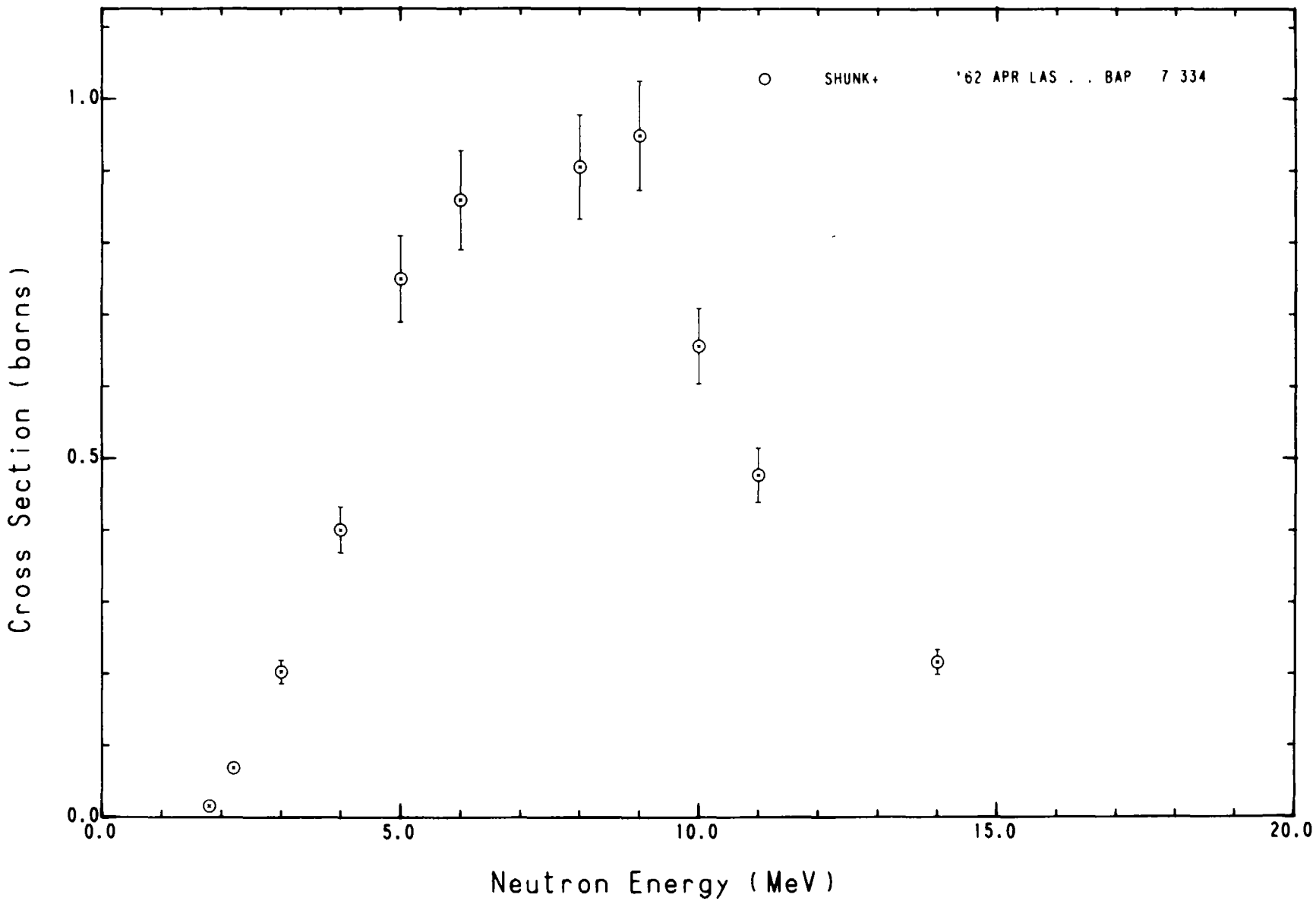
^{207}Pb

(n,γ)


Cross Section (barns)
Neutron Energy (eV)
AITKEN+ '52 . . PPS 65A 761
POMERANCE '52 . . PR 88 412
JURNEY+ '63 . . ANL-6797 236
MACKLIN+ '64 NOV ORL . . PR 136B 695
GREENWOOD+ '71 DEC MTR . . PR C 4 2249

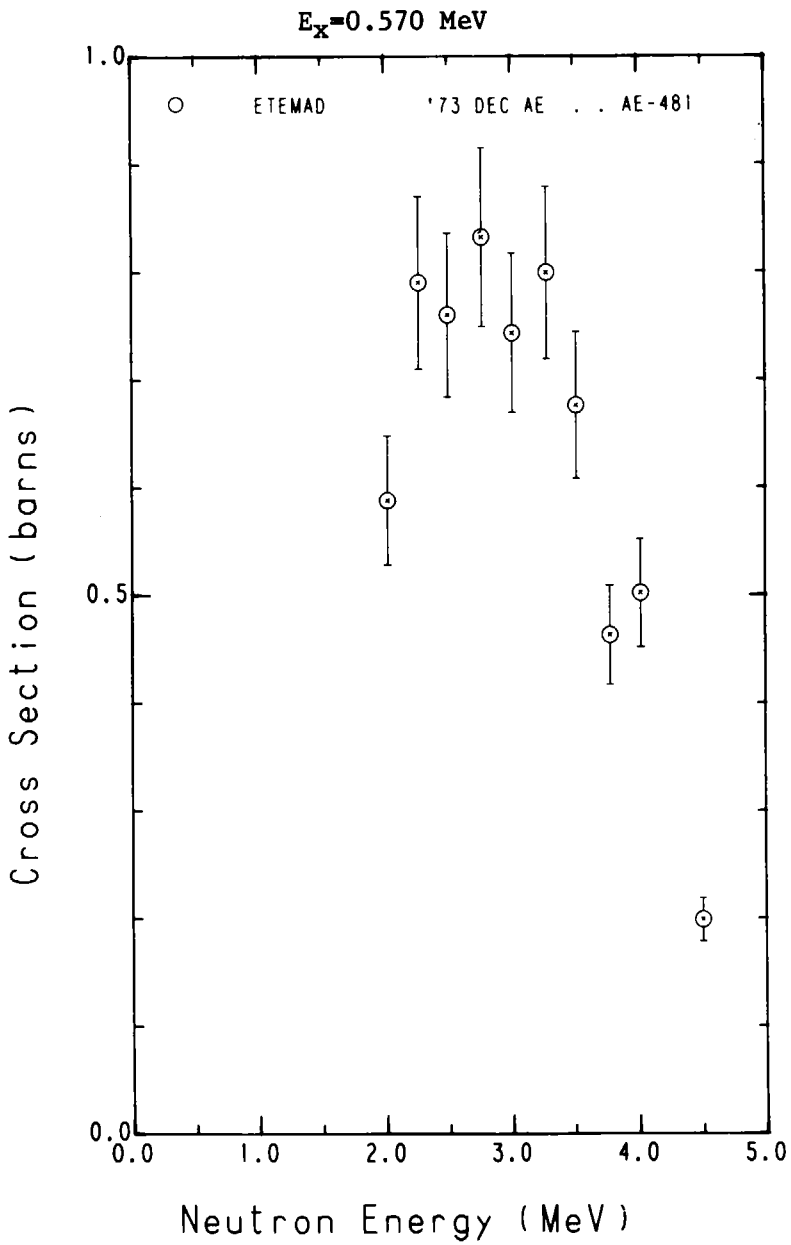
^{207}Pb

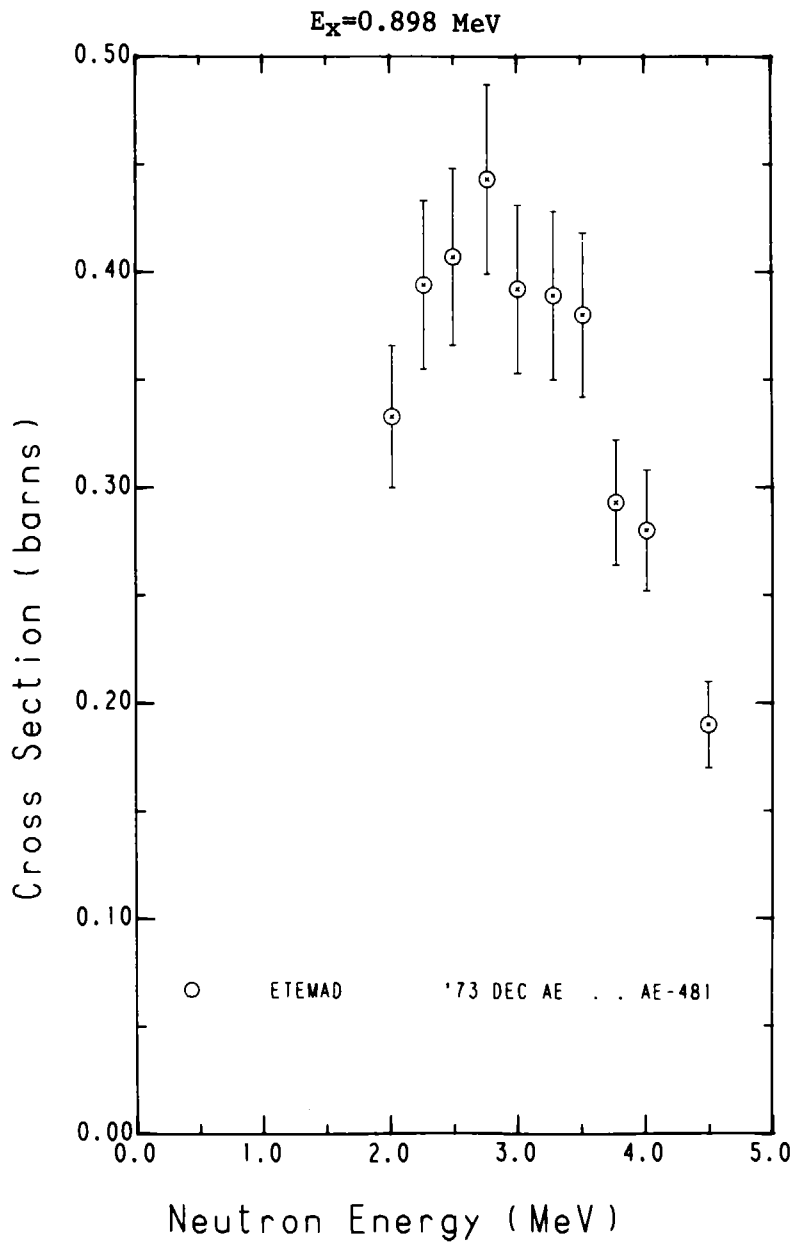
(n,n')^{207m}Pb
(0.80 sec)



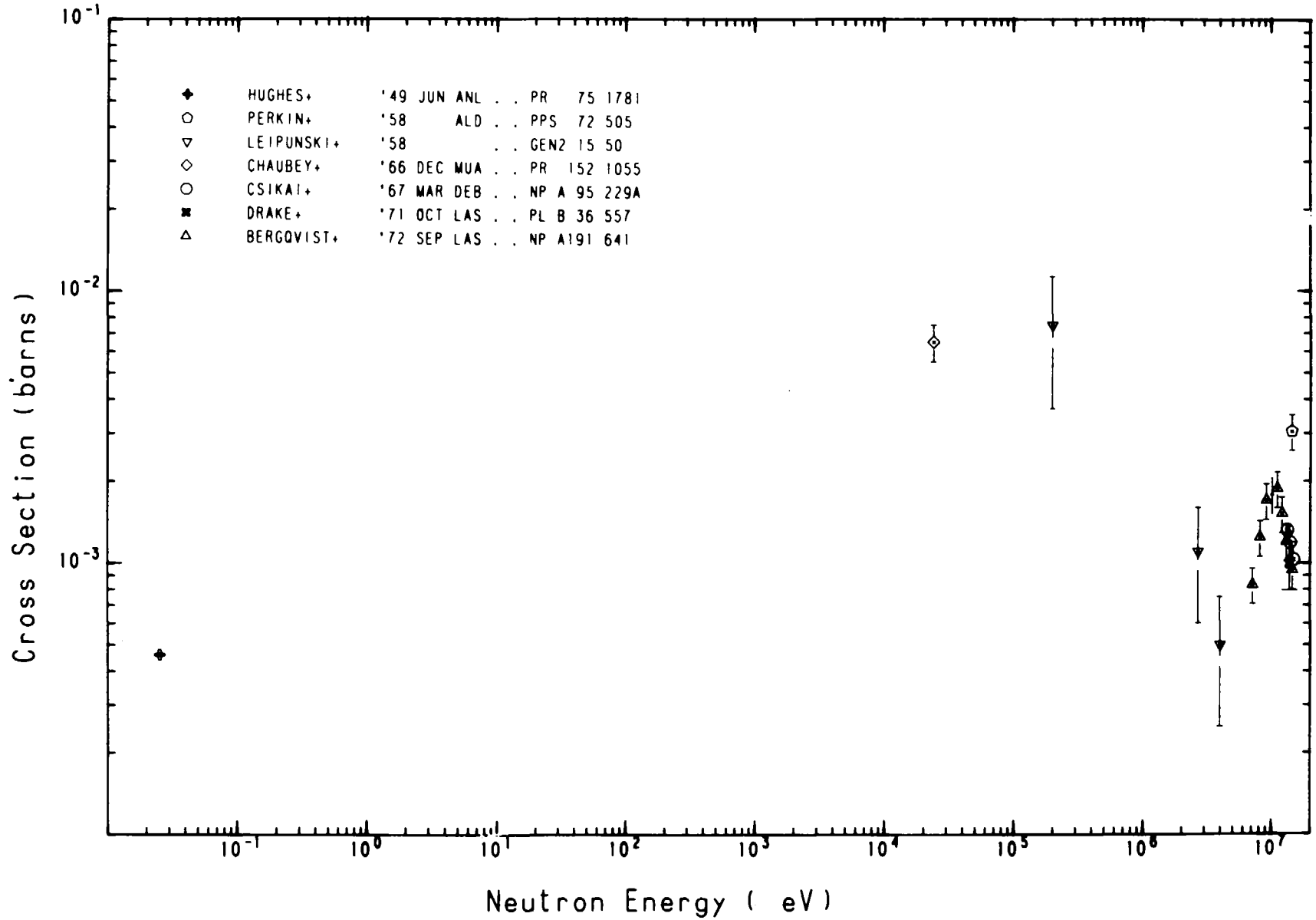
^{207}Pb

(n,n')

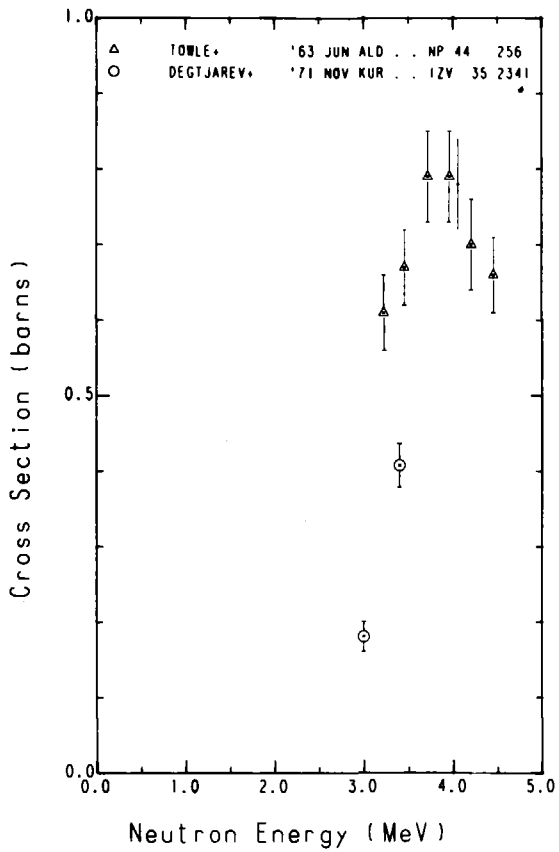

E_x=0.570 MeV
ETEMAD '73 DEC AE . . AE-481
Cross Section (barns)
Neutron Energy (MeV)
1.0
0.5
0.0
0.0
1.0
2.0
3.0
4.0
5.0


E_x=0.898 MeV
ETEMAD '73 DEC AE . . AE-481
Cross Section (barns)
Neutron Energy (MeV)
0.50
0.40
0.30
0.20
0.10
0.00
0.0
1.0
2.0
3.0
4.0
5.0

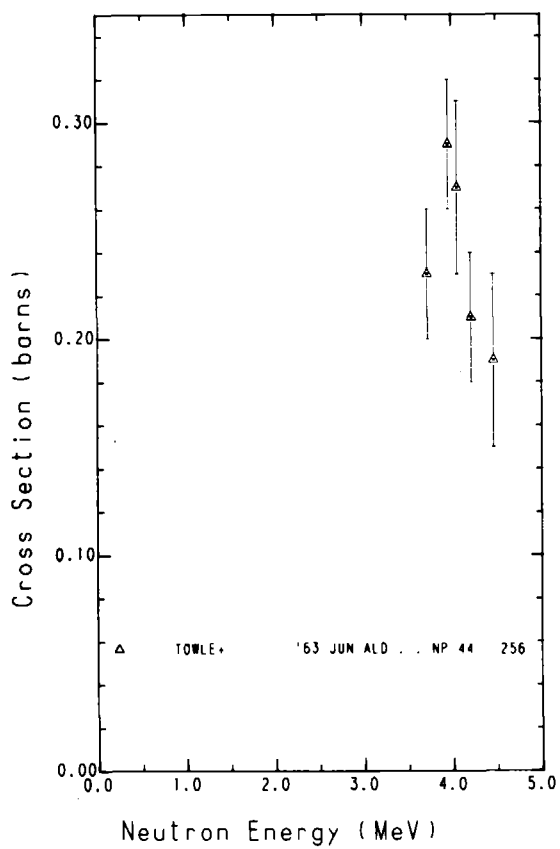
^{208}Pb
(n,γ)


HUGHES+ '49 JUN ANL . . PR 75 1781
PERKIN+ '58 ALD . . PPS 72 505
LEIPUNSKI+ '58 . . GEN2 15 50
CHAUBEY+ '66 DEC MUA . . PR 152 1055
CSIKAI+ '67 MAR DEB . . NP A 95 229A
DRAKE+ '71 OCT LAS . . PL B 36 557
BERGQVIST+ '72 SEP LAS . . NP A191 641
Cross Section (barns)
Neutron Energy (eV)

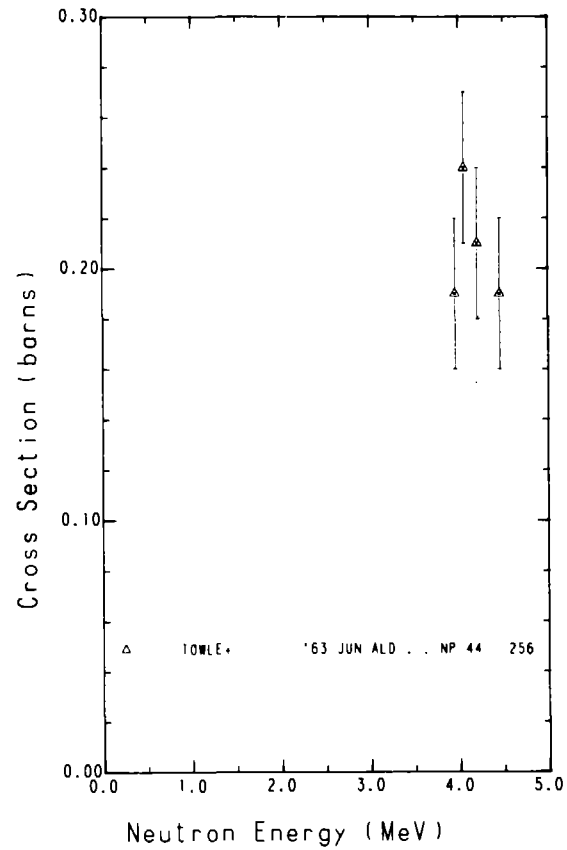
E_x=2.61 MeV



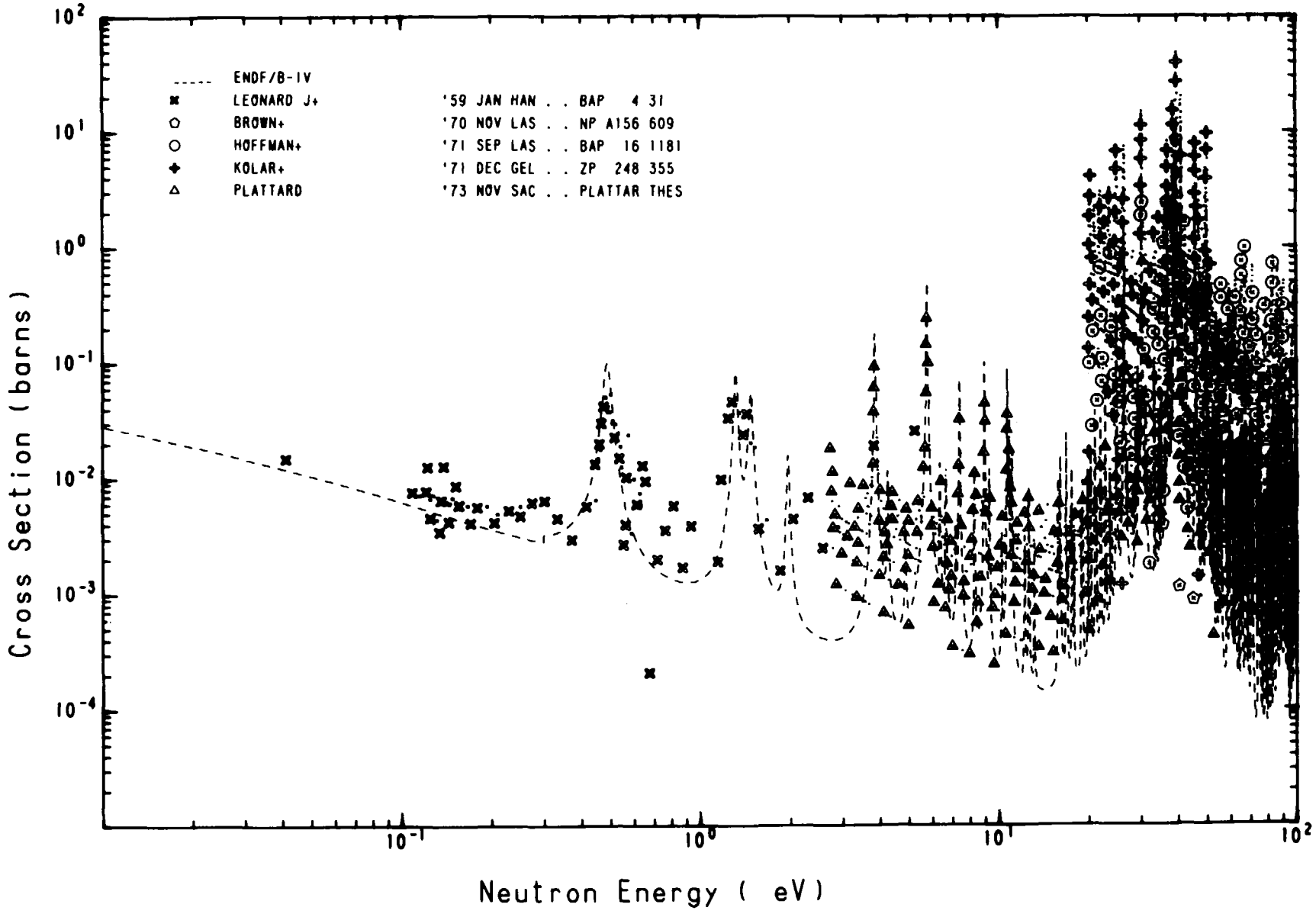
E_x=3.20 MeV



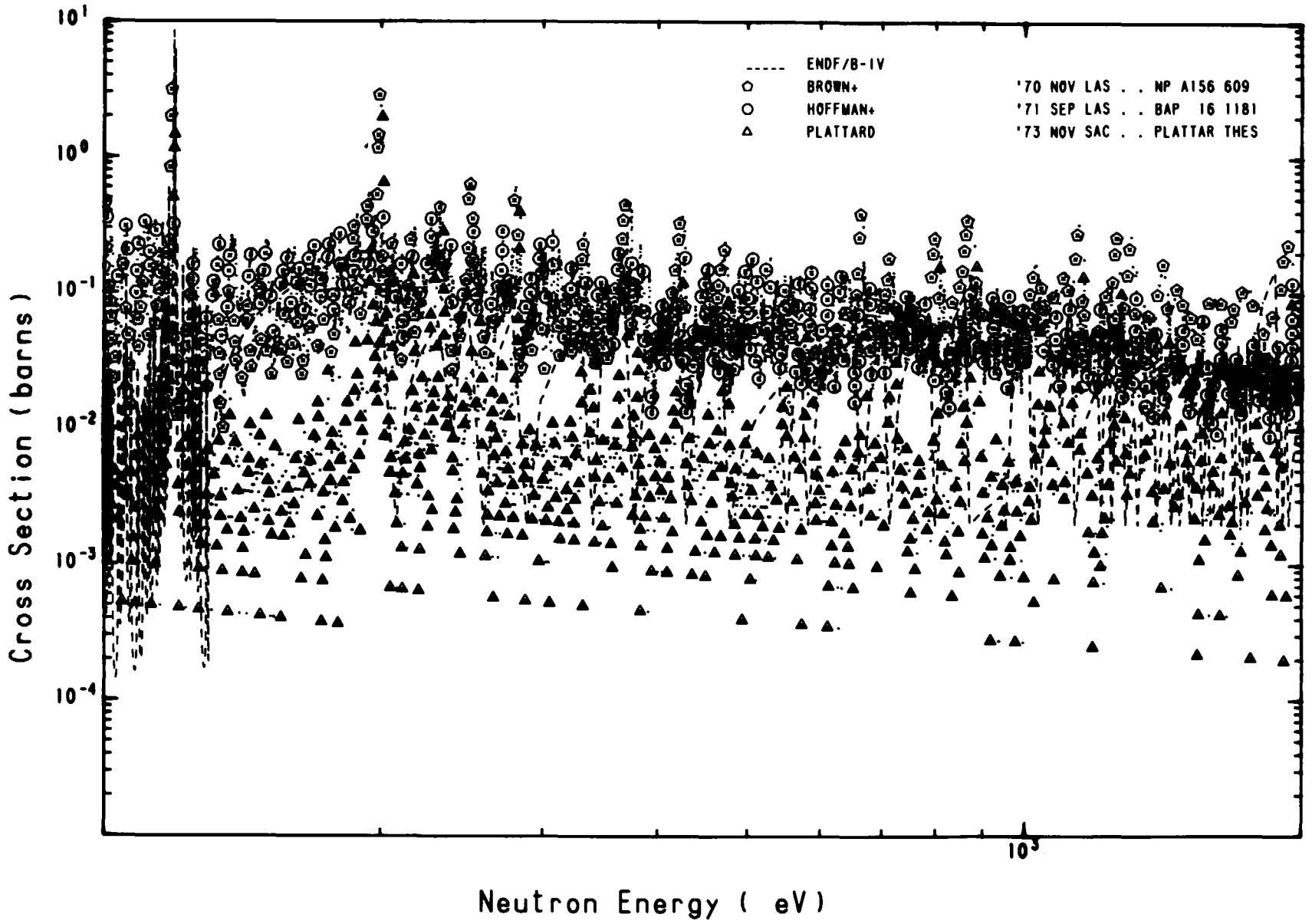
E_x=3.48 MeV



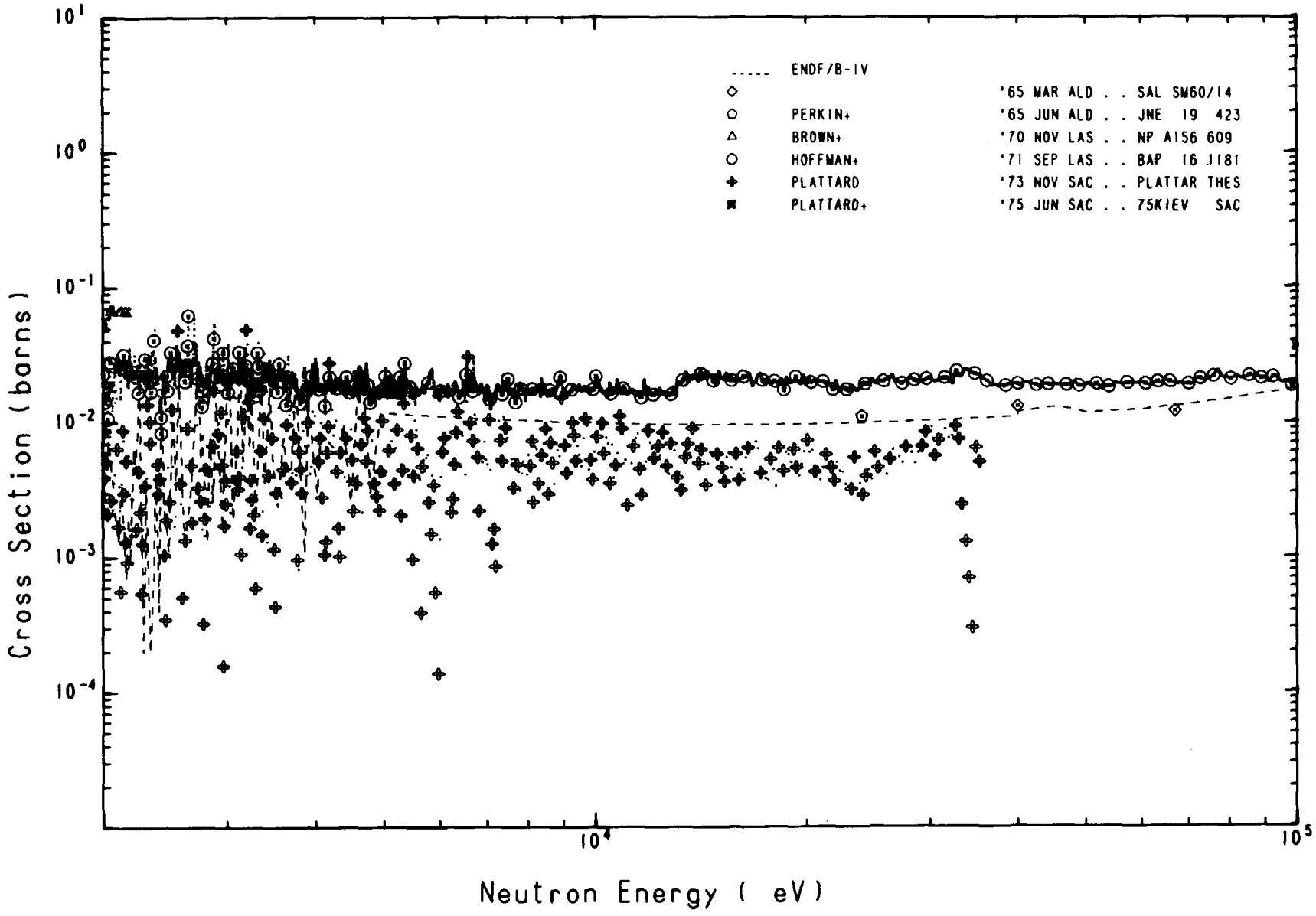
^{237}Np
(n,f)
(1)


ENDF/B-IV
LEONARD J+ '59 JAN HAN . . BAP 4 31
BROWN+ '70 NOV LAS . . NP A156 609
HOFFMAN+ '71 SEP LAS . . BAP 16 1181
KOLAR+ '71 DEC GEL . . ZP 248 355
PLATTARD '73 NOV SAC . . PLATTAR THES
Cross Section (barns)
Neutron Energy (eV)

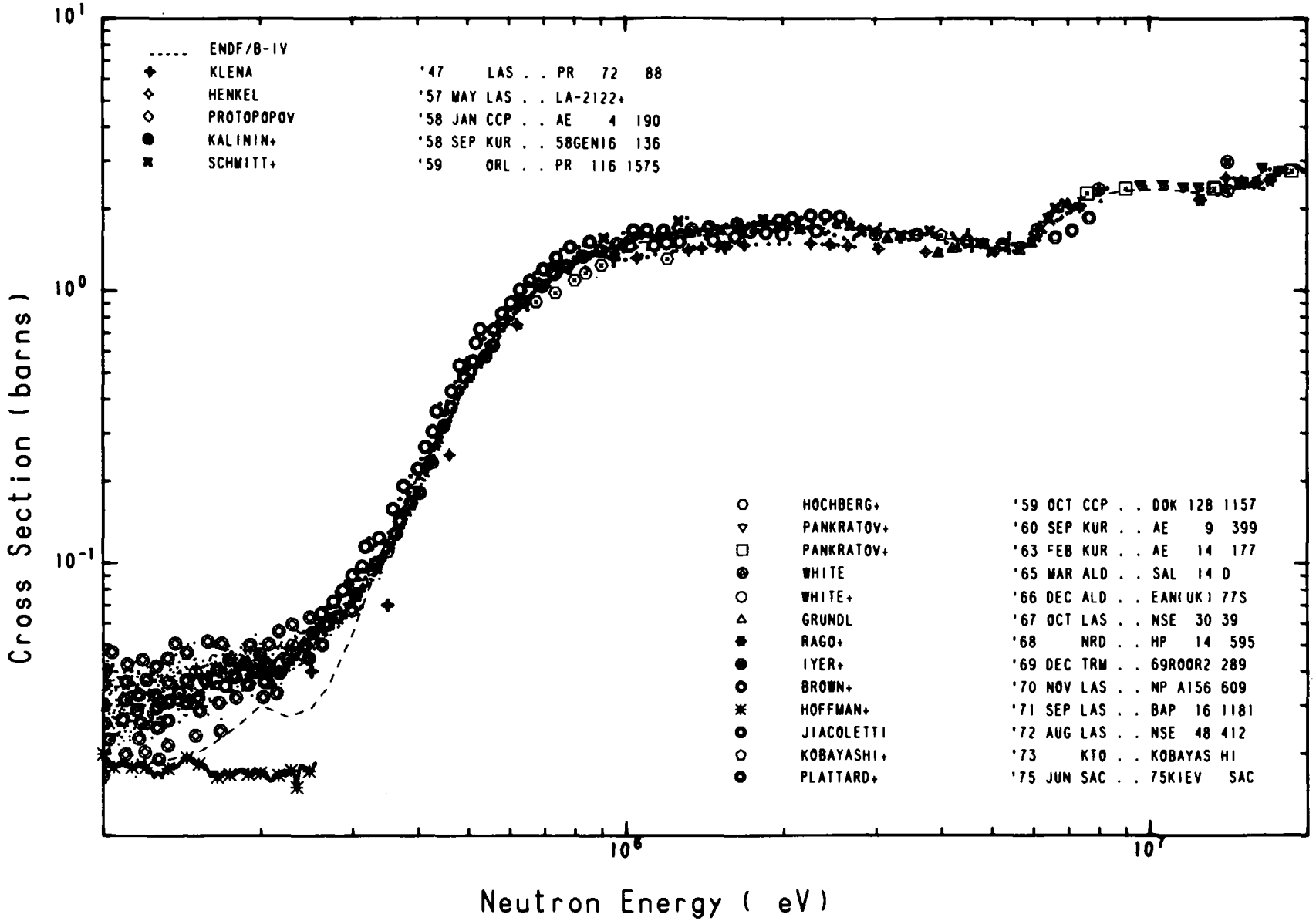
^{237}Np
(n,f)
(2)


ENDF/B-IV
BROWN+
HOFFMAN+
PLATTARD
'70 NOV LAS . . NP A156 609
'71 SEP LAS . . BAP 16 1181
'73 NOV SAC . . PLATTAR THES
Cross Section (barns)
Neutron Energy (eV)
10^1
10^0
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^5

^{237}Np
(n,f)
(3)


ENDF/B-IV
PERKIN+ '65 MAR ALD . . SAL SM60/14
BROWN+ '65 JUN ALD . . JNE 19 423
HOFFMAN+ '70 NOV LAS . . NP A156 609
PLATTARD '71 SEP LAS . . BAP 16 1181
PLATTARD+ '73 NOV SAC . . PLATTAR THES
'75 JUN SAC . . 75KIEV SAC
Cross Section (barns)
Neutron Energy (eV)
10^1
10^0
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^4
10^5

^{237}Np
(n,f)
(4)


ENDF/B-IV
KLENA '47 LAS . . PR 72 88
HENKEL '57 MAY LAS . . LA-2122+
PROTOPOPOV '58 JAN CCP . . AE 4 190
KALININ+ '58 SEP KUR . . 58GEN16 136
SCHMITT+ '59 ORL . . PR 116 1575
HOCHBERG+ '59 OCT CCP . . DOK 128 1157
PANKRATOV+ '60 SEP KUR . . AE 9 399
PANKRATOV+ '63 FEB KUR . . AE 14 177
WHITE '65 MAR ALD . . SAL 14 D
WHITE+ '66 DEC ALD . . EAN(UK) 77S
GRUNDL '67 OCT LAS . . NSE 30 39
RAGO+ '68 NRD . . HP 14 595
IYER+ '69 DEC TRM . . 69ROOR2 289
BROWN+ '70 NOV LAS . . NP A156 609
HOFFMAN+ '71 SEP LAS . . BAP 16 1181
JIACOLETTI '72 AUG LAS . . NSE 48 412
KOBAYASHI+ '73 KTO . . KOBAYAS HI
PLATTARD+ '75 JUN SAC . . 75KIEV SAC
Cross Section (barns)
Neutron Energy (eV)
10^1
10^0
10^{-1}
10^6
10^7

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