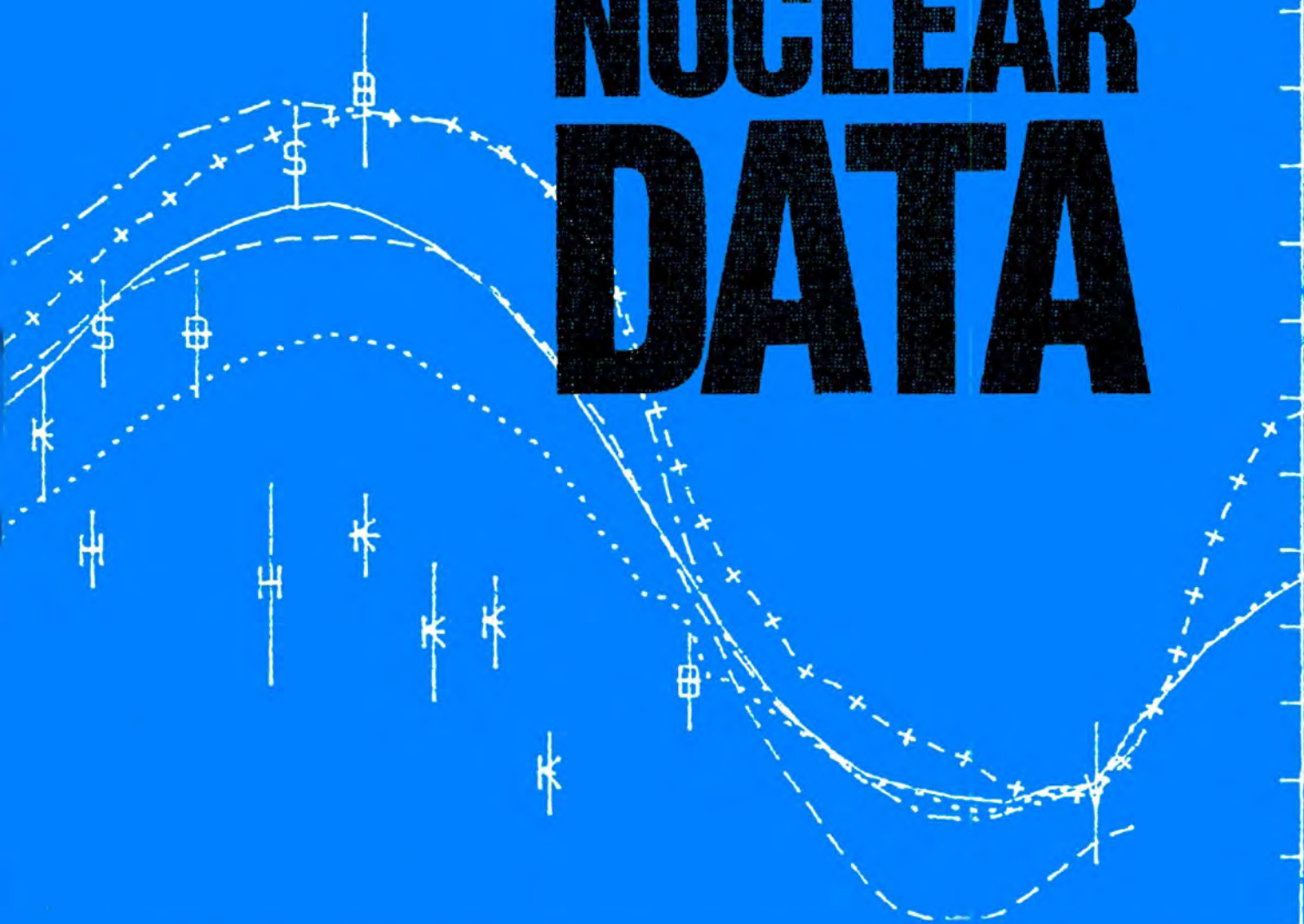


**PART  
A**

**COMPILATION OF  
ACTINIDE  
NEUTRON  
NUCLEAR  
DATA**



KDK-75, Part A  
NEANDC(OR) 159/A,U  
INDC(SWD) 21/G

COMPILATION  
OF  
ACTINIDE NEUTRON NUCLEAR DATA

PART A:  
EXPERIMENTAL AND EVALUATED CROSS SECTIONS

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Stockholm

1985

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## 1. INTRODUCTION

The Swedish Nuclear Data Committee has initiated a compilation of a selected set of neutron cross section data for the most important actinide isotopes. The compilation work has been done by a working group sponsored by the Swedish Nuclear Power Inspectorate. The main part of the data information has been obtained from the OECD/NEA Data Bank at Saclay, France.

The aim of the report is to present available neutron cross section data in a comprehensible way to allow a comparison between different evaluated libraries and to judge about the reliability of these libraries from the experimental data.

The first result of the compilation was reported in 1979 (1). Since that time the compilation has been updated and further isotopes have been added. It now consists of 24 isotopes ranging from  $^{232}\text{Th}$  to  $^{252}\text{Cf}$  (KDK-75, Part A). Furthermore, in place of the resonance integrals reported in KDK-35 the compilation now includes group cross sections of the main evaluated data files for each of the 24 isotopes (KDK-75, Part B).

Part A of the compilation consists of experimental and evaluated neutron cross section data in the neutron energy regions from  $10^{-4}$  to 1 eV and from 10 keV to 20 MeV. The reported data are the total, capture and fission cross sections for  $^{232}\text{Th}$ ,  $^{233,235,238}\text{U}$ ,  $^{237}\text{Np}$ ,  $^{239-242}\text{Pu}$ ,  $^{241-243}\text{Am}$ ,  $^{242-248}\text{Cm}$ ,  $^{249}\text{Bk}$ ,  $^{249-252}\text{Cf}$ , furthermore the elastic cross sections for  $^{235,238}\text{U}$  and  $^{239}\text{Pu}$ , the neutron inelastic and (n,2n) cross sections for  $^{238}\text{U}$  and the  $\bar{\nu}$ -values of  $^{232}\text{Th}$ ,  $^{233,235,238}\text{U}$  and  $^{239}\text{Pu}$ . Evaluated data are from the last available versions of the main libraries i.e. versions IV and V of the U.S. Evaluated Neutron Data File part B (ENDF/B), the 1982 version of the Lawrence Livermore Laboratory Evaluated Neutron Data Library (ENDL), the 1981 version of the U.K. Neutron Data Library (UKNDL), the version 4 of Karlsruhe Evaluated Data File (KEDAK) and version 2 of the Japanese Evaluated Data Library (JENDL). Furthermore, recent versions of  $^{239-242}\text{Pu}$  evaluations from A.V.Lykov Institute of Thermal and Mass Exchange Byelorussian SSR Academy of Sciences, Minsk, USSR (ITMO) and a  $^{232}\text{Th}$  evaluation from the IAEA/NDS International Neutron Data Library (INDL) are also given.

The experimental data are taken from the "International Library of Nuclear Experimental Information" (EXFOR) and from recent publications. A representative subset of the most recent information is included.

The data information is stored in a computer by which drawings could be made of selected subsets of the information in an interactive manner. In preparing the figures in the report a compromise had often to be done between the magnification necessary to avoid too much overlap between different data sets and the number of pages that could be accepted.

Part B of the compilation gives the total, elastic, capture and fission group cross sections for the same isotopes as in Part A. The CSEWG 239 group structure (2) was chosen which gives a reasonable detailed information for a comparison of different data libraries. The flat weighted cross sections averaged over the group structure from any evaluated file format was calculated with the program HENRI (3). A computerized plotting of the group cross sections was made by Studsvik Data, Studsvik Energiteknik AB.

The authors wish to acknowledge L. Björklund, FOA, G. Olsson, Studsvik Data and M-Ch Malmström for helping with the computer plottings and Ch. Spolén for typing the manuscript.

#### References

1. Compilation of Actinide Neutron Nuclear Data, Swedish Nuclear Data Committee Report, KDK-35 (NEANDC(OR) 153/L, INDC(SWD) 13L, SKI B32/78), 1979
2. Specification of a Generally Useful Multigroup Structure for Neutron Transport, Los Alamos Scientific Laboratory Report LA-5277-MS
3. Nordborg C., HENRI - a computer program for calculation of average cross sections in the resonance region of evaluated files. (Not published)

## 2.1 LIST OF EVALUATED AND EXPERIMENTAL DATA LIBRARIES

- ENDF/B: Evaluated Nuclear Data File, Version B, National Neutron Cross Section Center, Brookhaven National Laboratory, Upton, New York 11973
- UKNDL: United Kingdom Atomic Energy Authority Nuclear Data Library
- ENDL: Lawrence Livermore Laboratory Evaluated Nuclear Data Library, Lawrence Livermore Laboratory, University of California, Livermore, California 94550
- KEDAK: Karlsruhe Evaluated Nuclear Data Library, Kernforschungszentrum Karlsruhe, Karlsruhe, Germany
- JENDL: Japanese Evaluated Neutron Data Library, Japan Atomic Energy Research Institute, Tokai-Mura, Naka-Gun, Ibaraki-Ken, Japan
- ITMO: A.V. Lykov Institute of Thermal and Mass Exchange Byelorussian SSR Academy of Sciences, Minsk, USSR
- INDL/A: International Nuclear Data Library for the Actinides, Nuclear Data Section, IAEA, Vienna
- EXFOR: Computerized system of codes and formats used for the exchange of experimental neutron nuclear data between the Four Neutron Data Centres
- BNL 325: Neutron Cross Sections, Vol 1, Neutron Resonance Parameters and Thermal Cross Sections, Part B: Z = 61-100, S.F. Mughabghab, NNDC, Academic Press 1984

NNDC  
(1983) J.R. Stehn, M. Divadeenam, N.E. Holden, Eval. of the Thermal Neutron Constants for  $^{233}\text{U}$ ,  $^{235}\text{U}$ ,  $^{239}\text{Pu}$  and  $^{241}\text{Pu}$ . Proc. Conf. on Nuclear Data for Science and Technology, Antwerp, 6-10 Sept. 1982. Revised values presented at the IAEA Consultants' Meeting on "The U-235 fast-neutron fission cross section", Smolenice, 28-29 March, 1983

84 NPL  
AXTON E.J. Axton, Eval. of the thermal neutron constants of  $^{233}\text{U}$ ,  $^{235}\text{U}$ ,  $^{239}\text{Pu}$  and  $^{241}\text{Pu}$ , European Applied Research Report, EARF 5, No 4 (1984) 609

## 2.2 QUANTITY DEFINITIONS

<u>Quantity</u>	<u>Definition</u>
$\sigma_t, \sigma_{tot}$	Total neutron cross section
$\sigma_f, \sigma_{fiss}$	Neutron induced fission cross section
$\sigma_\gamma$	Radiative capture cross section
$\sigma_{n,n}$	Total neutron elastic scattering cross section
$\sigma_{n,n'}$	Total neutron inelastic scattering cross section
$\sigma_{n,2n}$	Cross section for neutron induced reactions resulting in the emission of two neutrons
$\sigma_{th}$	Cross section for thermal neutrons
RI	Resonance integral ( $RI_\gamma = RI$ for capture, $RI_f = RI$ for fission)
$\bar{\nu}$	Average number of neutrons emitted per fission ( $\bar{\nu}_p =$ number of prompt neutrons, $\bar{\nu}_d =$ number of delayed neutrons, $\bar{\nu}^{sp} = \bar{\nu}$ for spontaneous fission, $\bar{\nu}_+ =$ total number of neutrons emitted per fission = $\bar{\nu}_p + \bar{\nu}_d$ )
$T_{1/2}$	Half life
$Q_\alpha$	Alpha disintegration energy





<sup>232</sup>Th

NUCLEAR PROPERTIES

Spin and parity of ground state: 0<sup>+</sup>

Ground state decay:

Alpha to <sup>228</sup>Ra: 100%, Q<sub>α</sub> = 4.082 MeV

Half-life: 1.405 · 10<sup>10</sup> yr

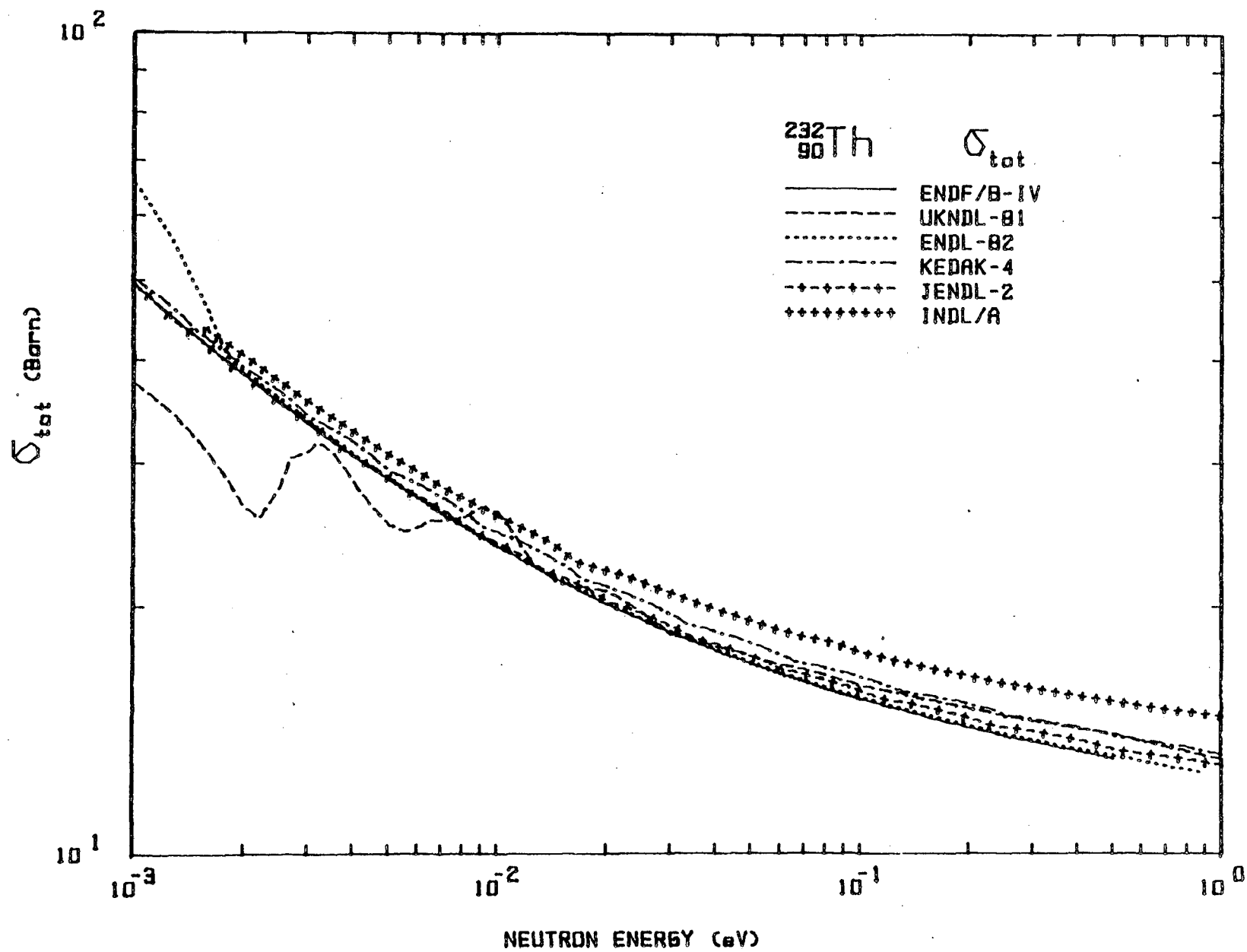
10<sup>21</sup> yr - spontaneous fission

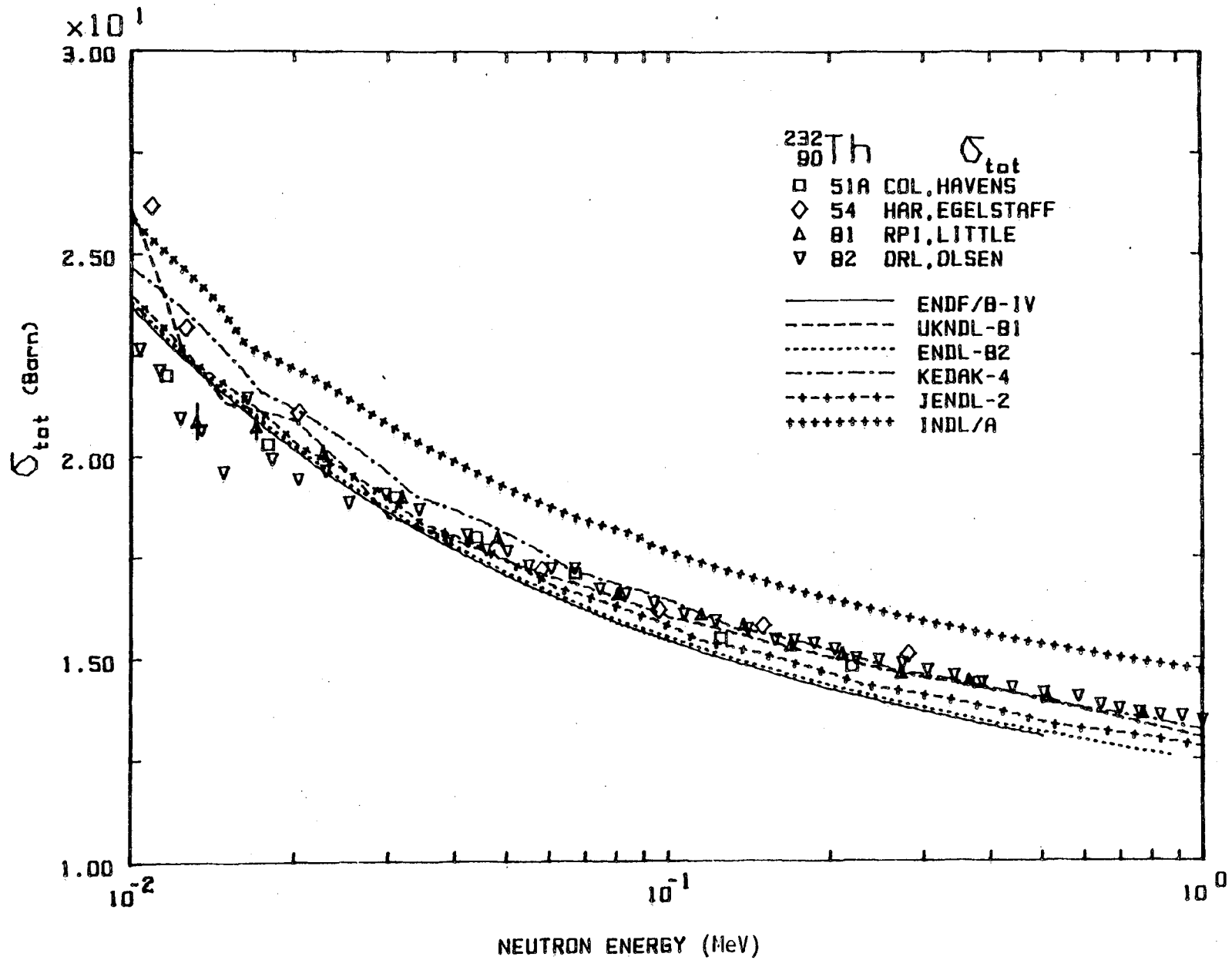
THERMAL CROSS SECTIONS (2200 m/s)

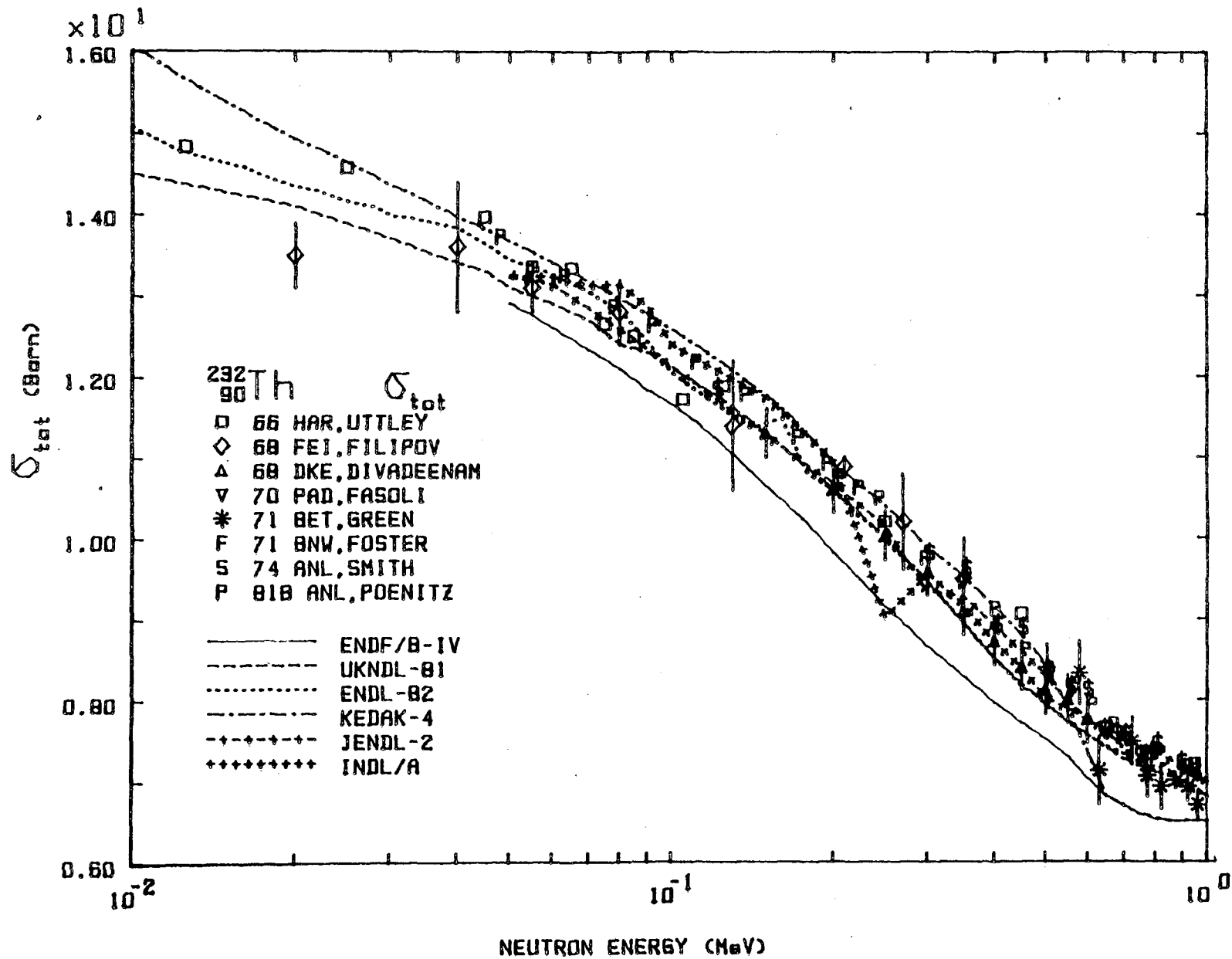
Reference	$\sigma_{\gamma}$	$\sigma_t$	(barns)
ENDF/B - IV	7.41	19.2	
ENDF/B - V	7.405	20.36	
UKNDL - 81	7.400	19.62	
ENDL - 82	7.433	19.34	
KEDAK - 4	7.406	20.34	
JENDL - 2	7.262	19.60	
BNL 325 (1984)	7.37	20.14	

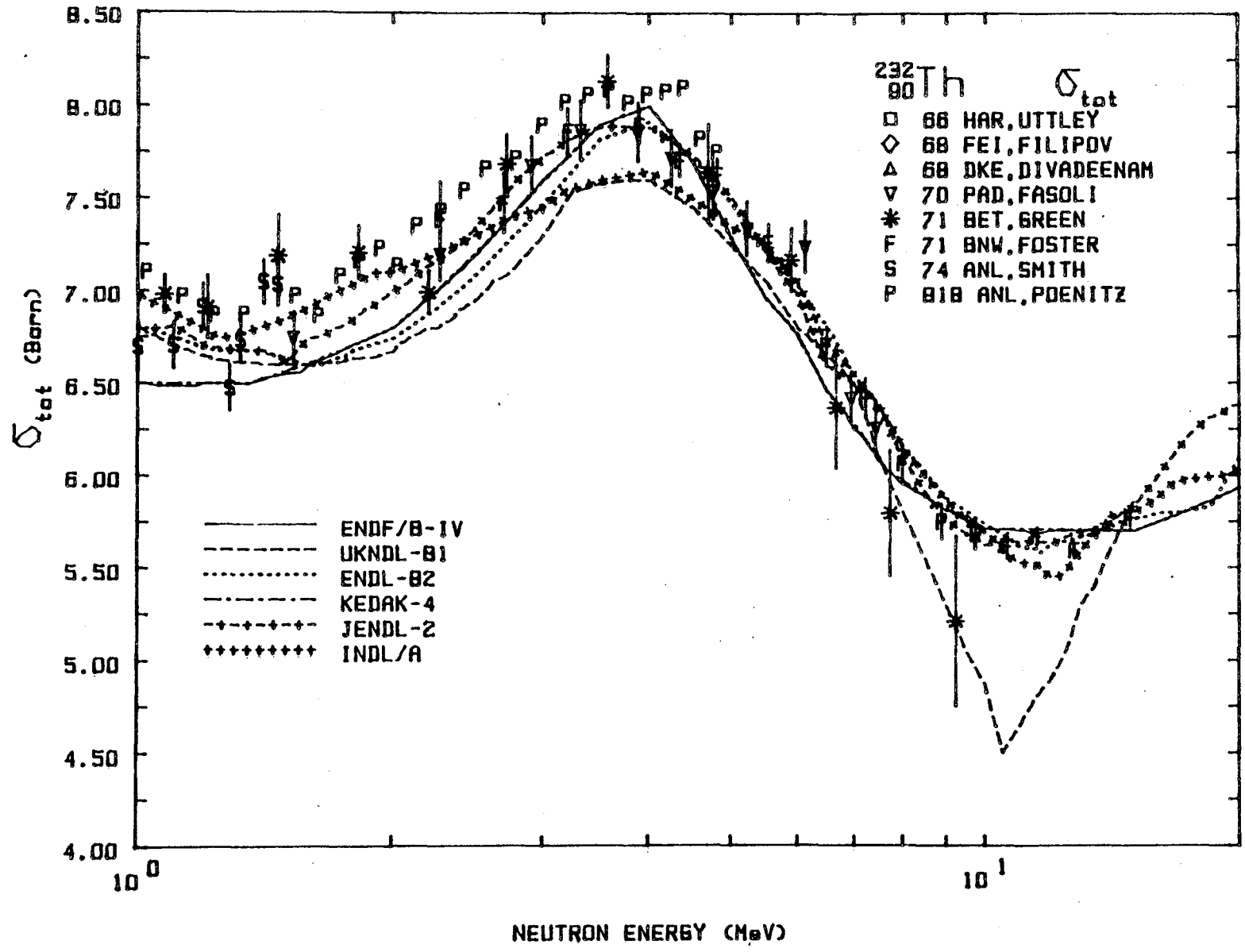
RESONANCE INTEGRALS

Reference	RI <sub>γ</sub>	RI <sub>f</sub>	(barns)
ENDF/B - IV	83.6		
ENDF/B - V	83.96	0.6185	
UKNDL - 81	110.8	0.5133	
ENDL - 82	93.87	0.6432	
KEDAK - 4	82.99	0.5928	
JENDL - 2	79.93	0.6362	
BNL 325 (1984)	85		
73 MUN, ALIAN	86		



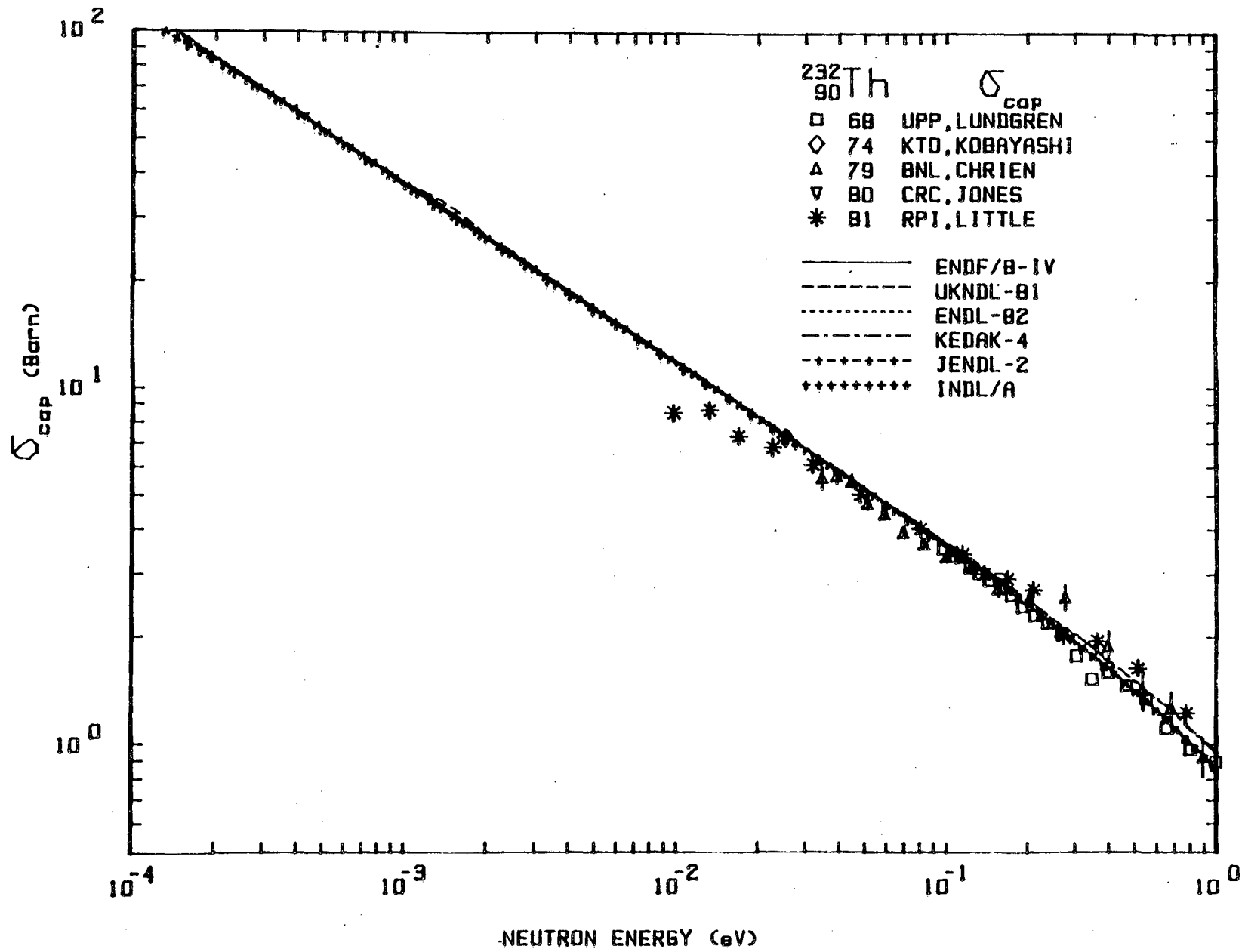




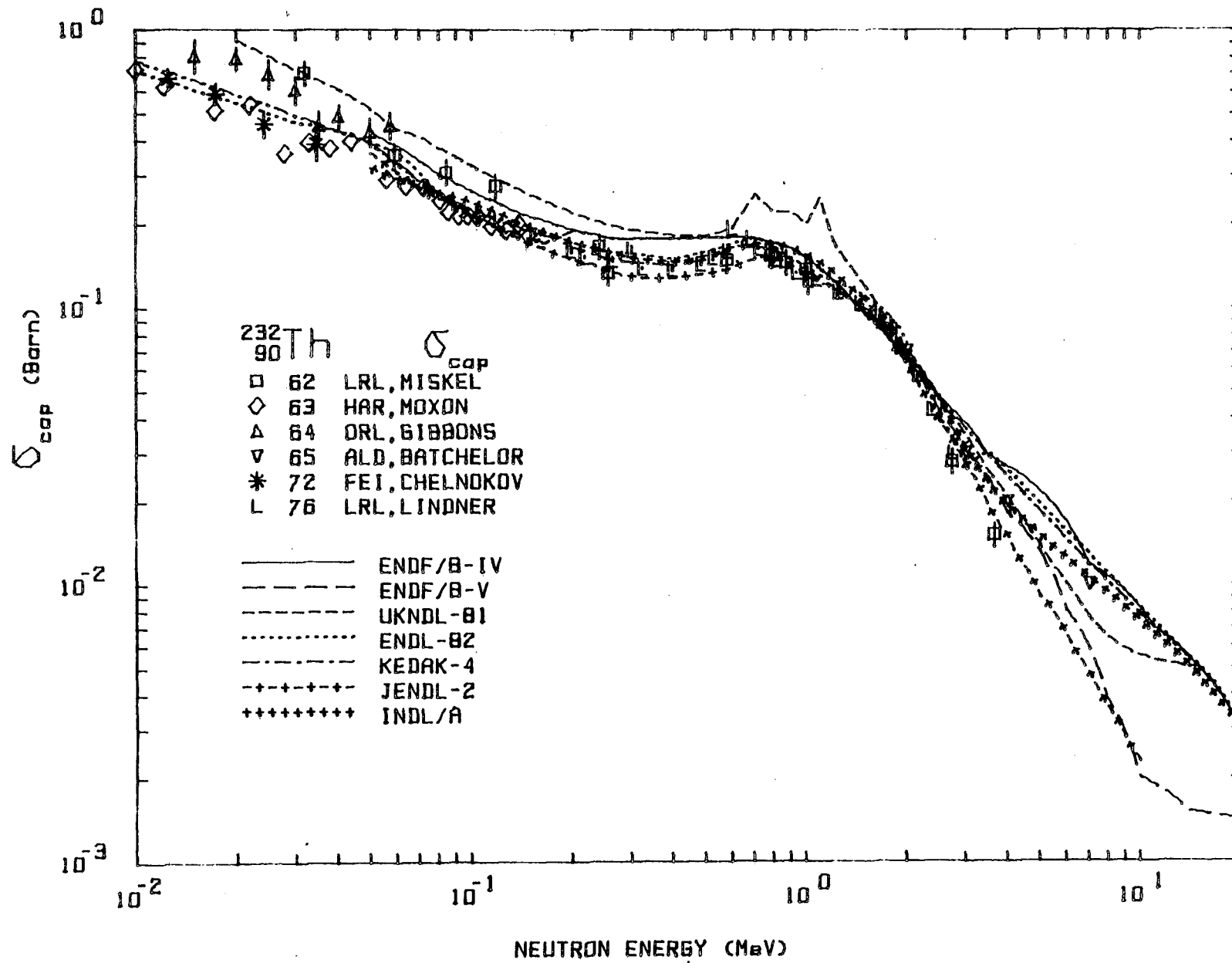


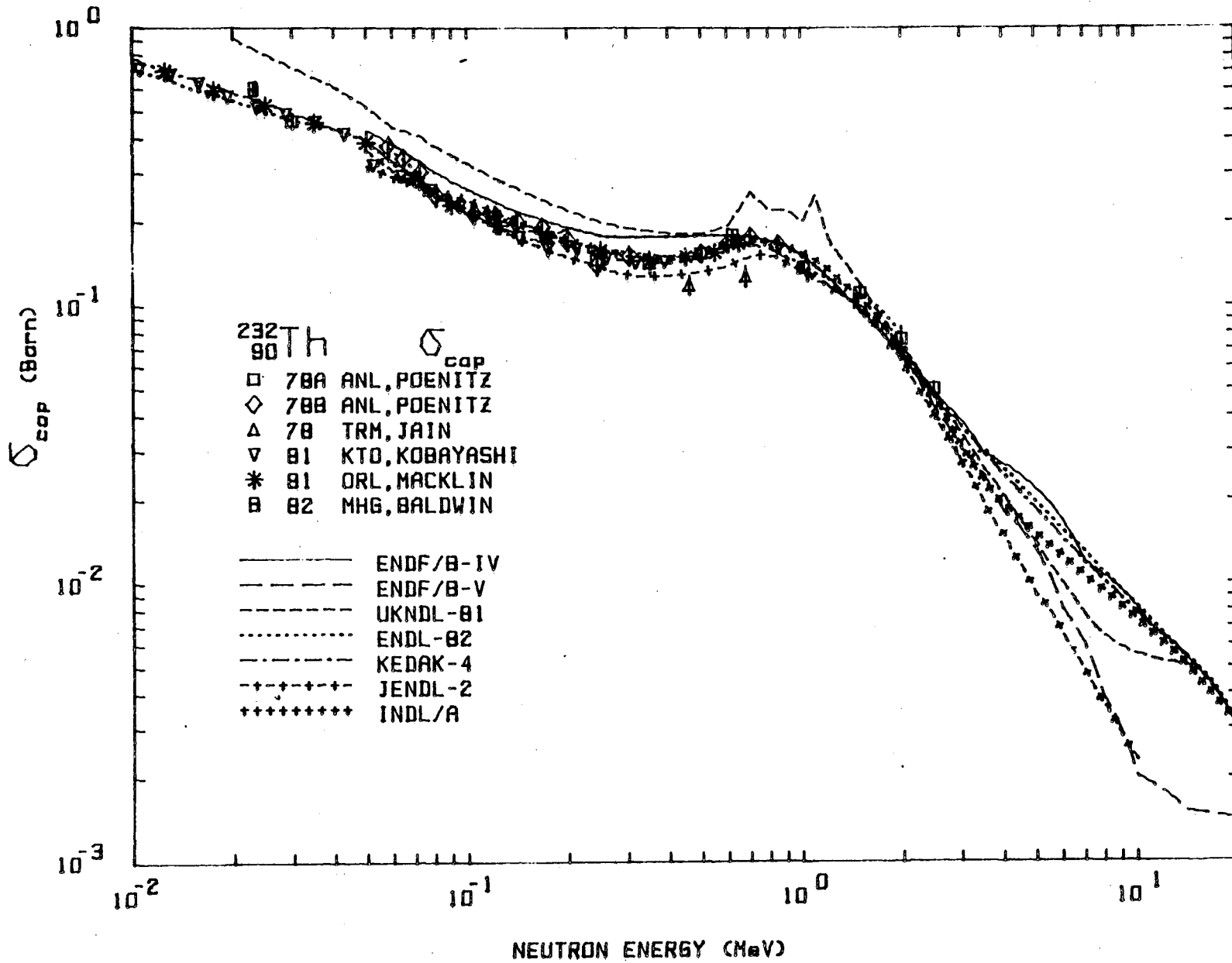
Experimental information  $^{232}\text{Th}, \sigma_{\text{tot}}$

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
51A COL, HAVENS	66	0.01-5.8 eV	ABS.		
54 HAR, EGELSTAFF	52	0.002-2.5 eV	ABS.		
66 HAR, UTTLEY	28	6.5-95 keV	ABS.		
68 DKE, DIVADEENAM	10	150-600 keV	ABS.	4 %	
68 FEI, FILIPOV	8	20-350 keV	ABS.	3-5 %	
70 PAD, FASOLI	139	1.5-8.6 MeV	ABS.	1-2 %	
71 BET, GREEN	356	0.5-9.6 MeV	ABS.	2-3 %	
71 BNW, FOSTER	242	2.3-14.9 MeV	ABS.	1-3 %	
74 ANL, SMITH	513	0.1-1.5 MeV	ABS.	2 %	
81 RPI, LITTLE	118	0.006-18 eV	ABS.	1-8 %	Error < 1 % $E_n > 0.022$ eV 1-8 % $E_n = 0.022-0.006$ eV
81B ANL, POENITZ	47	0.048-4.8 MeV	ABS.	2 %	
82 ORL, OLSEN	1782	0.0074-15 eV	ABS.	$\pm 0.3$ %	Systematic error



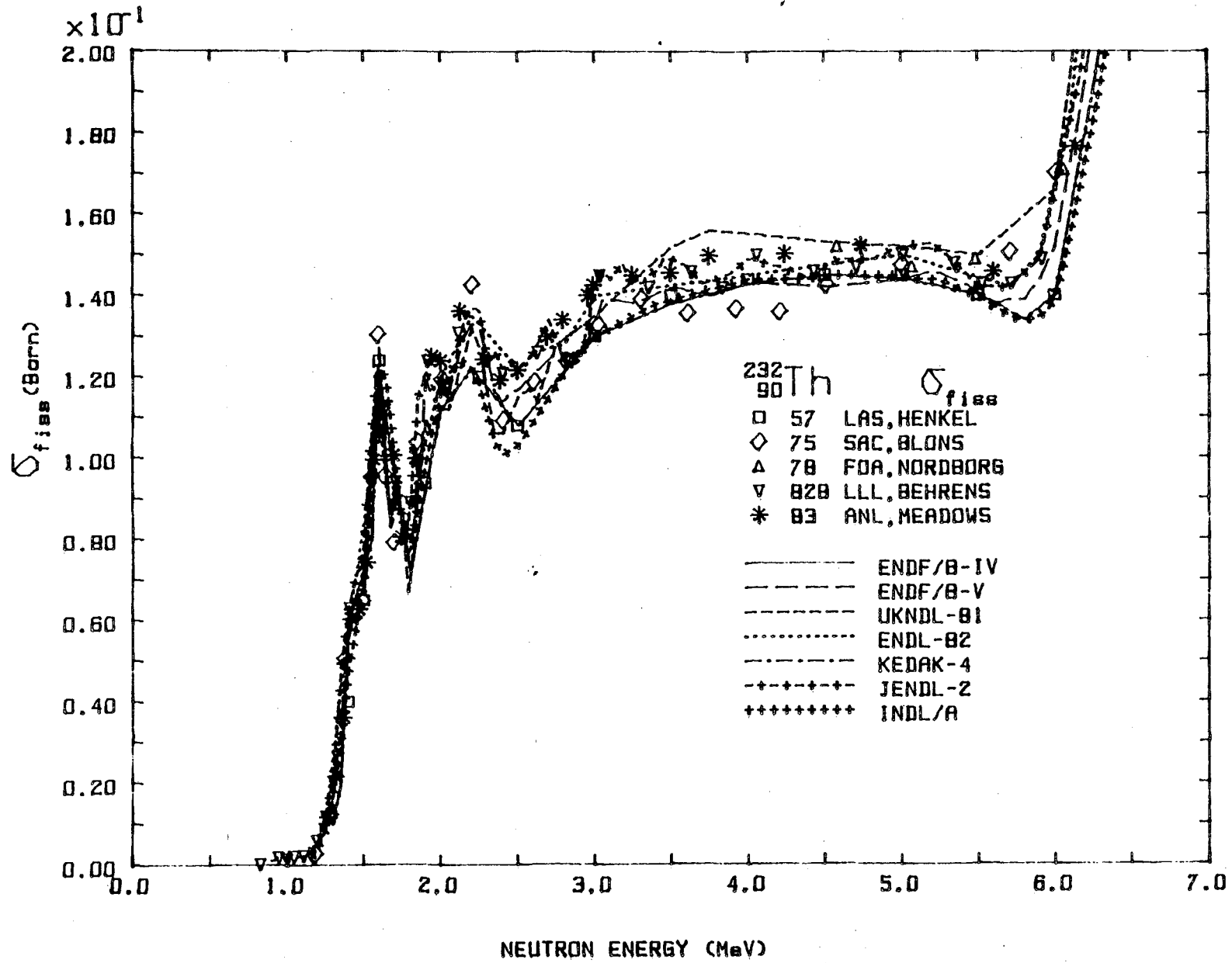


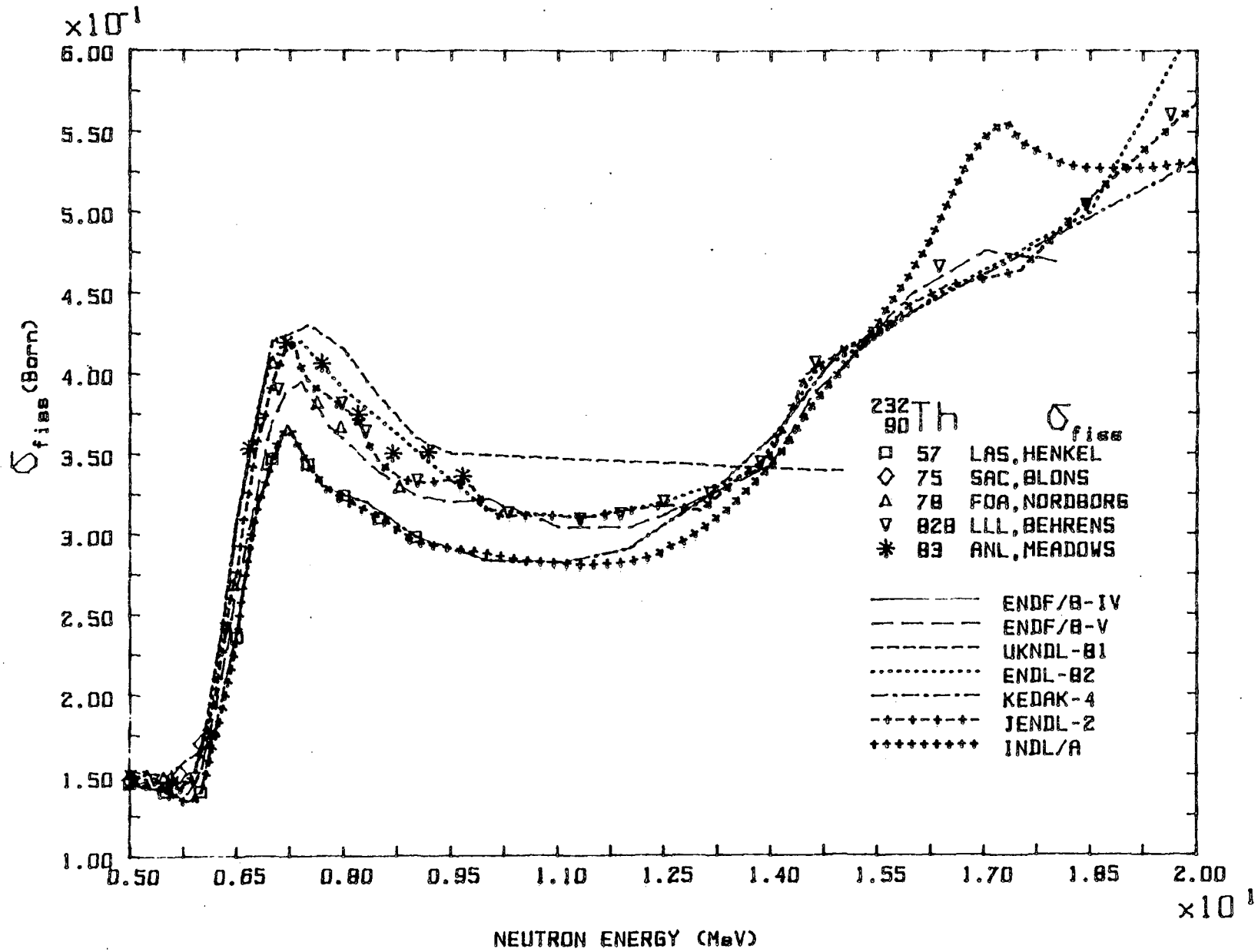




Experimental information  $^{232}\text{Th}, \sigma_{\gamma}$

Reference	Points	Range	Standard	Error	Comments
62 LRL, MISKEL	26	0.03-4 MeV	$^{235}\text{U}, \sigma_f$	10 %	Data renorm. to $^{235}\text{U}, \sigma_f$ BNL-325 (1964) Energy spread 2-30 %
63 HAR, MOXON	98	5.5-148 keV			
64 ORL, GIBBONS	127	10-58.5 keV		10-30 %	The data points given re- present average values for the energy intervals ( $E_n - 10^{-2}E_n$ ) - ( $E_n + 10^{-2}E_n$ )
65 ALD, BATCHELOR	4	2-7 MeV			
68 UPP, LUNGGREN	47	0.1-3.4 eV	---	---	
72 FEI, CHELNOKOV	26	0.2-35 keV	$^{197}\text{Au}, \sigma_{\gamma}$	6-13 %	
74 KTO, KOBAYASHI	1	0.0253 eV (MXW)	---	3 %	
76 LRL, LINDNER	30	0.1-2.7 MeV	$^{235}\text{U}, \sigma_f$	0.6-4 %	Energy spread 1-61 %
78A ANL, POENITZ	8	30-2.5 keV	$\left\{ \begin{array}{l} ^{235}\text{U}, \sigma_f \text{ and} \\ ^{197}\text{Au}, \sigma_{\gamma} \end{array} \right.$	5-10 %	Energy spread 1-10 %
78B ANL, POENITZ	15	60-850 keV			
78 TRM, JAIN	3	350-680 keV	$^{197}\text{Au}, \sigma_{n,\alpha}$	10 %	Activation method
79 BNL, CHRIEN	45	0.003-15 eV	$^{232}\text{Th}, \sigma_{\gamma}(\text{thermal})$ 7.41 b $\gamma$	13 %	Statistical errors
80 CRC, JONES	1	0.0253 eV (MXW)	---	0.7 %	
81 KTO, KOBAYASHI	60	1 keV-408 keV	$^{10}\text{B}, \sigma_{n,\alpha}$	10 %	
81 ORL, MACKLIN	18	3-700 keV	---	---	
81 RPI, LITTLE	118	0.006-18 eV		2-6 %	Data norm to ENDF/B V $\sigma_{\gamma}$ between 0.1 and 0.3 eV selected every fifth point
82 MHG, BALDWIN	1	23 keV	---	3.2 %	Absolute meas.

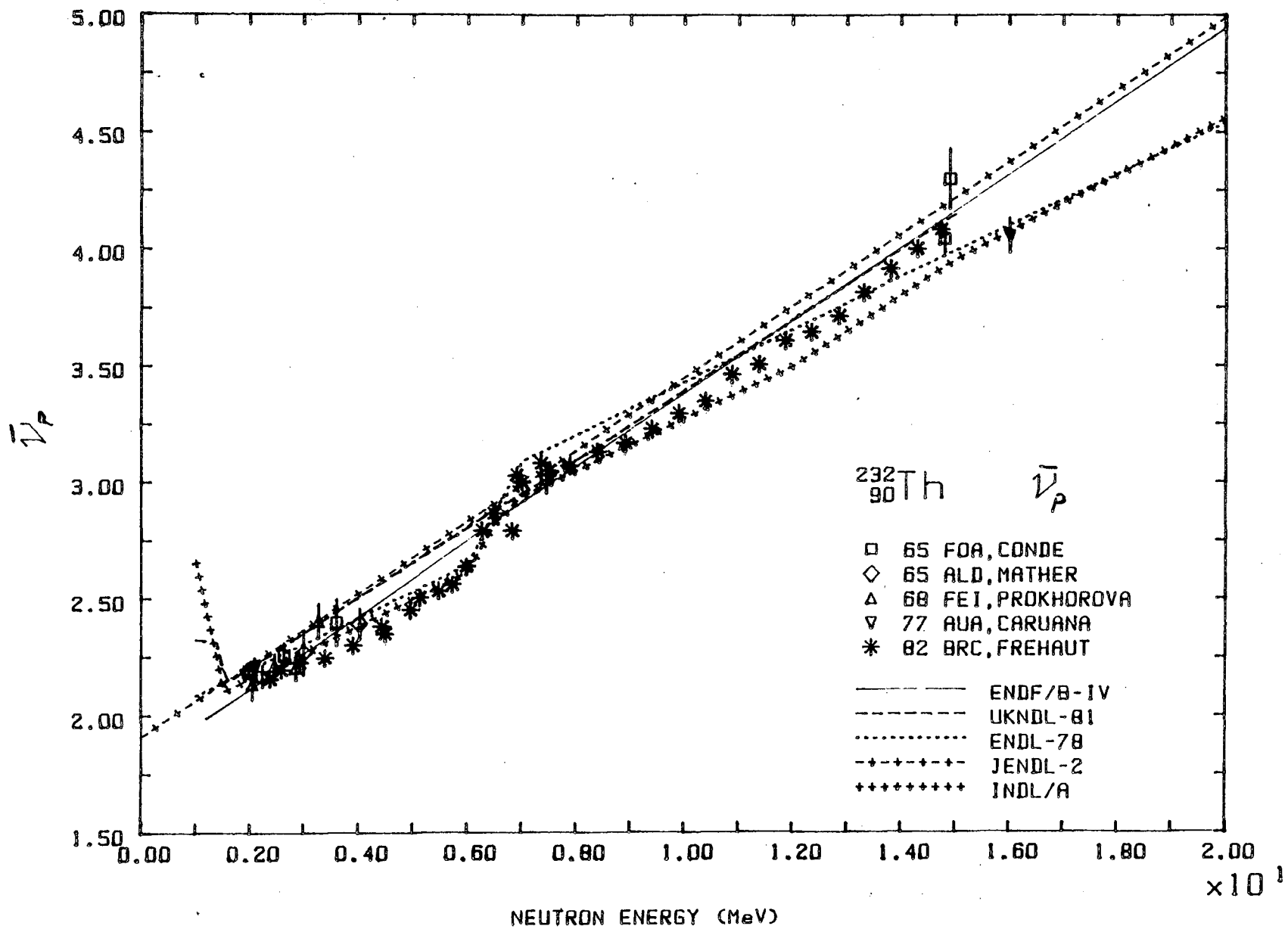




Experimental information  $^{232}\text{Th}, \sigma_{\text{fiss}}$

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
57 LAS, HENKEL	209	1-9 MeV	$^{235}\text{U}, \sigma_{\text{f}}$		
75 SAC, BLONS	823	1-6 MeV		2 %	Norm. to integrated $^{232}\text{Th}, \sigma_{\text{f}}$ between 1.4-2 MeV from UKNDL-DFN 930. Stat error
78 FOA, NORDBORG	23	4.6-8.8 MeV	$^{235}\text{U}, \sigma_{\text{f}}$	2 %	Stat. error
82B LLL, BEHRENS	144	0.7-30 MeV	$^{235}\text{U}, \sigma_{\text{f}}$	≈ 3 %	Rel. error above 1.3 MeV
83 ANL, MEADOWS	70	1.2-10 MeV	$^{235}\text{U}, \sigma_{\text{f}}$	1.5-10 %	Rel. error

General comments: Experimental data from ratio measurements given in the figures are calculated using cross sections from ENDF/B-V as standards



Experimental information  $^{232}\text{Th}, \bar{\nu}$

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
65 ALD, MATHER	4	1.4-4 MeV	$^{252}\text{Cf}, \bar{\nu}_p^{-\text{sp}}$	2-3 %	
65 FOA, CONDÉ	9	1.6-15 MeV	$^{252}\text{Cf}, \bar{\nu}_p^{-\text{sp}}$	2-3 %	
68 FEI, PROKHOROVA	7	1.5-3.3 MeV	$^{235}\text{U}, \bar{\nu}_p^{-\text{th}}$	2-3 %	
77 AUA, CARUANA	8	1.4-2.1 MeV	$^{252}\text{Cf}, \bar{\nu}_p^{-\text{sp}}$	1.5 %	Meas. also at 16 MeV
82 BRC, FREHAUT	34	2.3-14.7 MeV	$^{252}\text{Cf}, \bar{\nu}_p^{-\text{sp}}$	0.5 %	Rel. error

General comments: Data normalized to  $\bar{\nu}_p^{-\text{sp}}(^{252}\text{Cf}) = 3.756$  and  $\bar{\nu}_p^{-\text{th}}(^{235}\text{U}) = 2.407$





233<sub>U</sub>

## NUCLEAR PROPERTIES

Spin and parity of ground state:  $5/2^+$ 

Ground state decay:

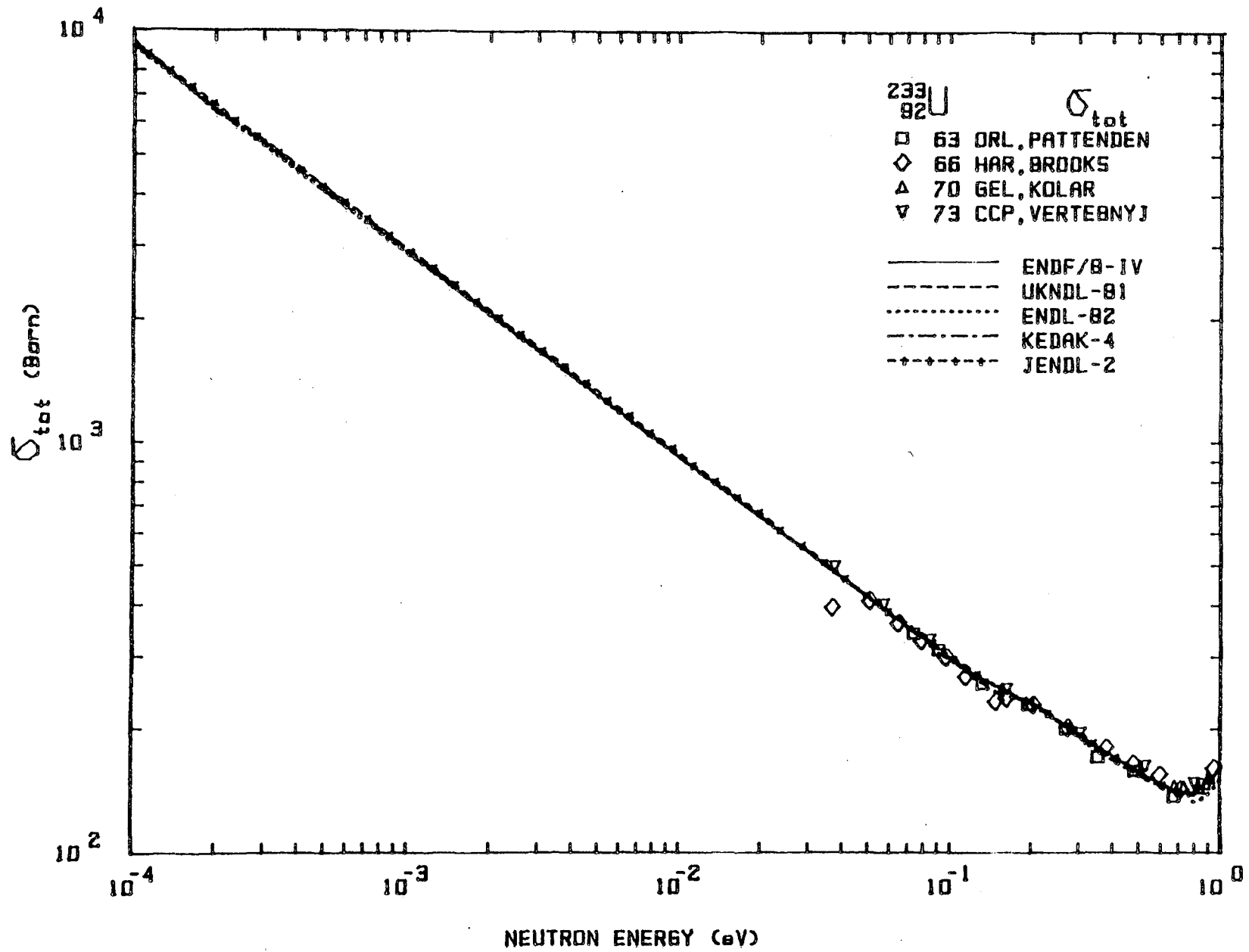
Alpha to  $^{229}\text{Th}$ : 100%,  $Q_\alpha = 4.909$ Half life:  $1.592 \cdot 10^5$  yr  
 $1.200 \cdot 10^{17}$  yr spontaneous fission

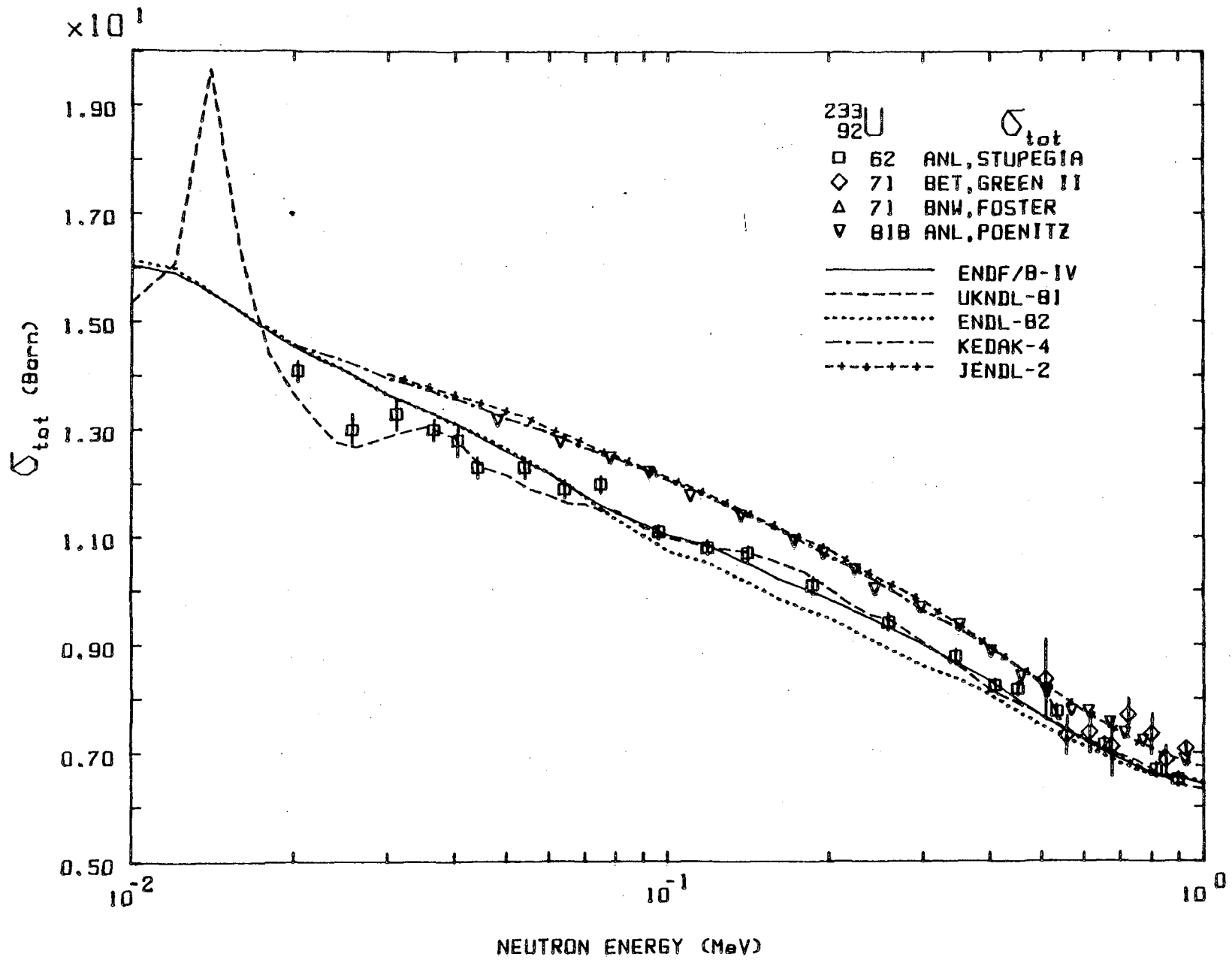
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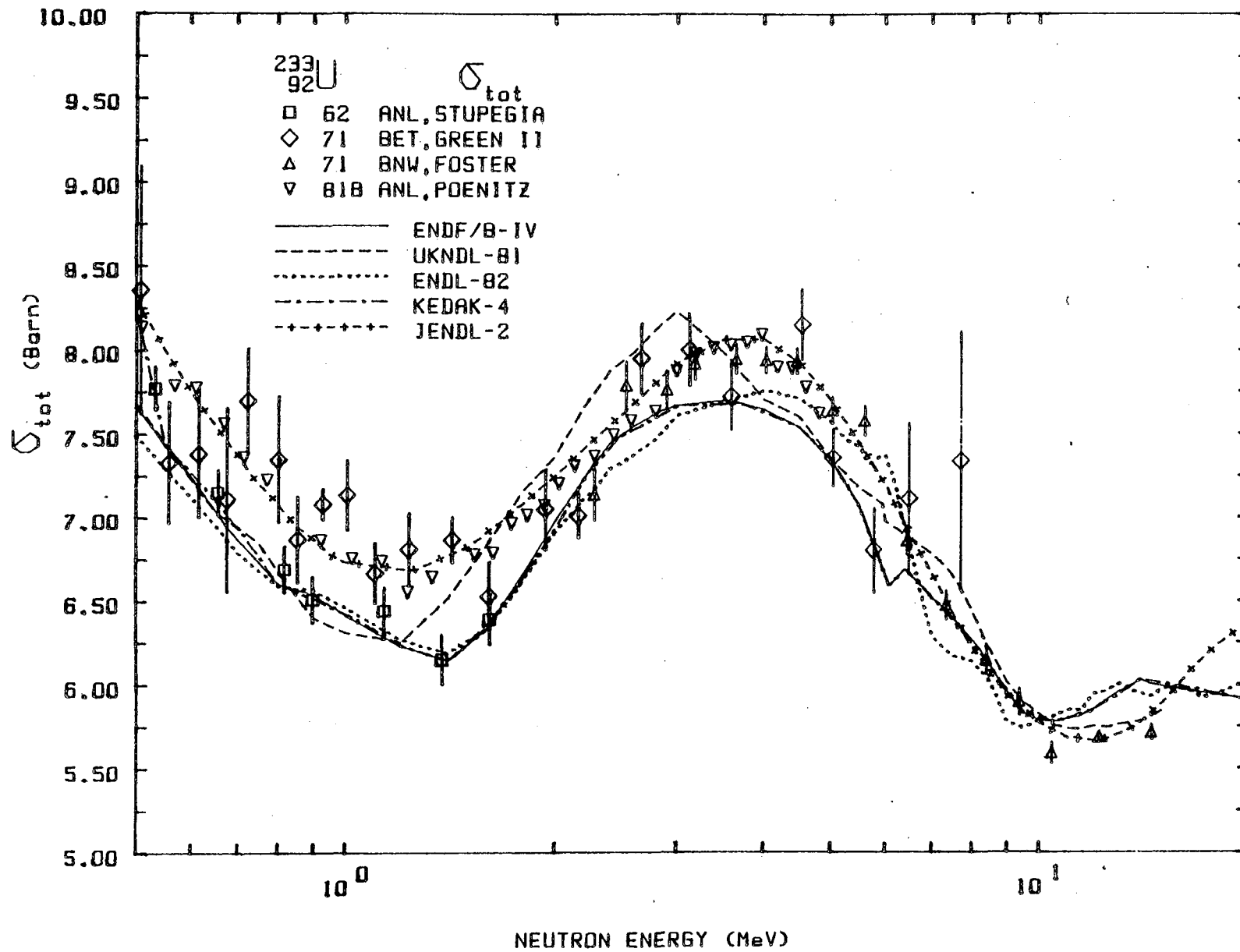
Reference	$\sigma_\gamma$	$\sigma_f$	$\sigma_t$	$\bar{\nu}_+$	(barns)
ENDF/B - IV	45.8	524.3		2.498	
ENDF/B - V	45.79	528.7	587.2	2.495	
UKNDL -81	48.60	528.0	588.5		
ENDL -82	45.90	525.1	585.5		
KEDAK-4	46.39	526.6	588.5		
JENDL-2	45.30	529.8	587.8		
71 KAP,CABELL	48.3				
BNL 325 (1984)	45.5	529.1	587.5	2.493	
NNDC (1983)	45.3	530.9		2.491	
84 NPL,AXTON	42.2	531.9		2.488	

## RESONANCE INTEGRALS

Reference	$RI_\gamma$	$RI_f$	(barns)
ENDF/B - IV	142.2	702.9	
ENDF/B - V	136.6	756.0	
UKNDL -81	145.7	756.9	
ENDL -82	133.9	754.8	
KEDAK-4	134.9	764.3	
JENDL-2	138.6	771.4	
BNL 325 (1984)	137	760	

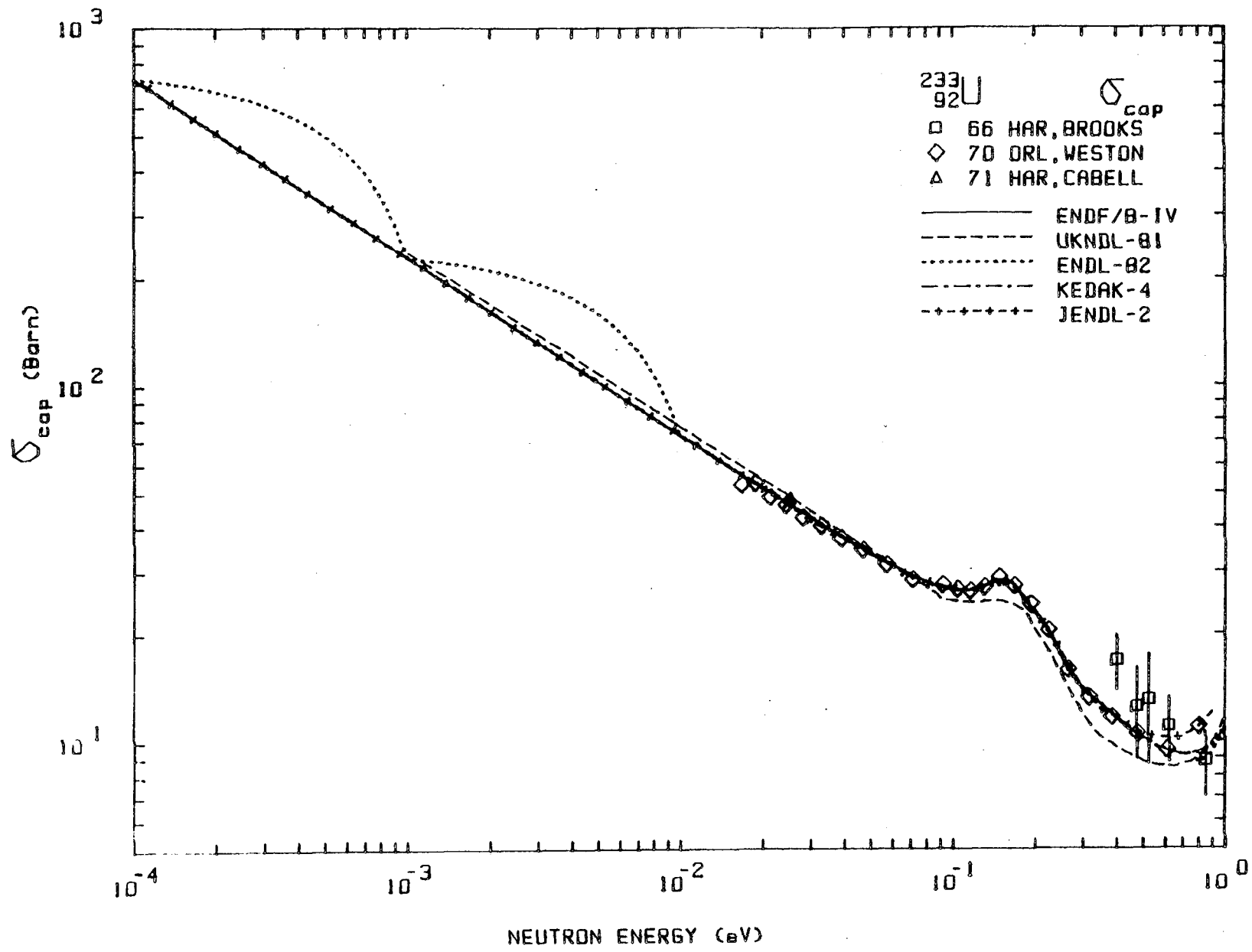


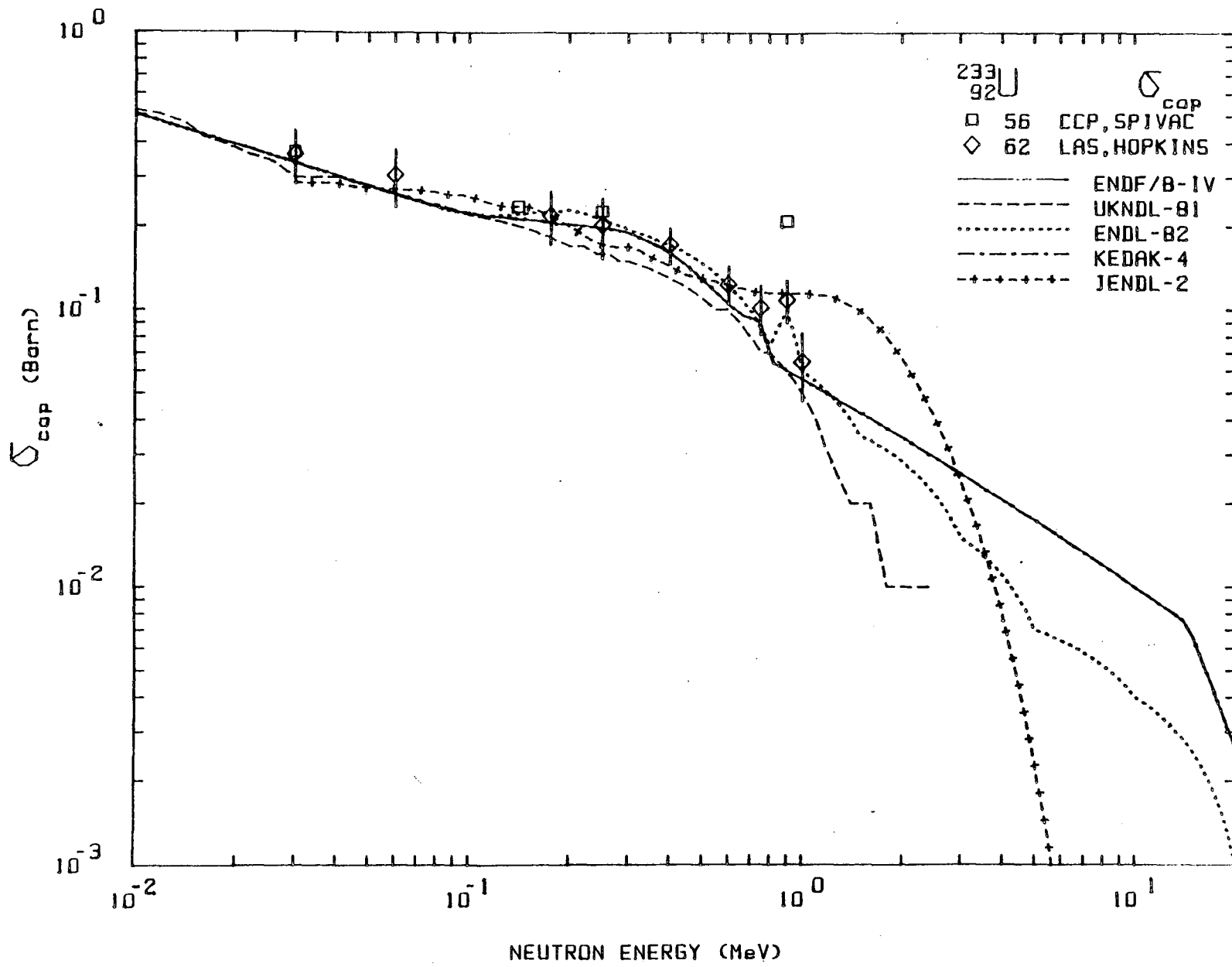




Experimental information  $^{233}\text{U}, \sigma_{\text{tot}}$

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
62 ANL, STUPEGIA	45	3.4 keV-1.6 MeV	ABS.		
63 ORL, PATTENDEN	1 512	0.07 eV-8.8 keV			
66 HAR, BROOKS	663	0.035-11 eV		1-3 %	
70 GEL, KOLAR	3 189	0.7-320 eV	ABS.	0.6-1.5 %	Stat. error
71 BET, GREEN I	336	0.9-10 MeV	ABS.	1-3 %	Sample 0.114 atoms/b
71 BET, GREEN II	360	0.5-8 MeV	ABS.	1-3 %	Sample 0.962 atoms/b
71 BNW, FOSTER	244	2.3-15 MeV	ABS.	1-3 %	
73 CCP, VERTEBNYJ	29	0.035-1 eV	ABS.	1.5 %	
81B ANL, POENITZ	47	0.048-4.8 MeV	ABS.	2 %	

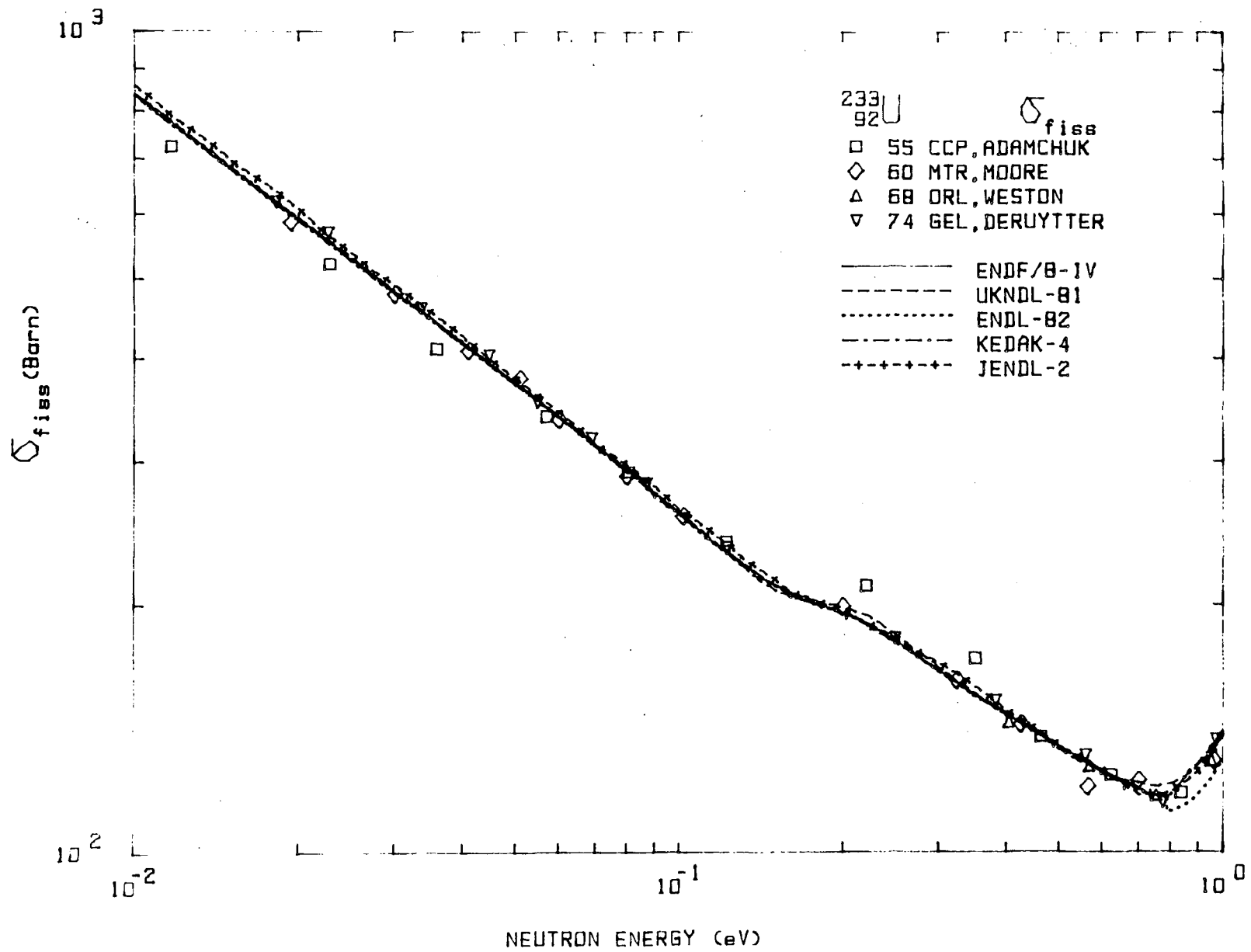


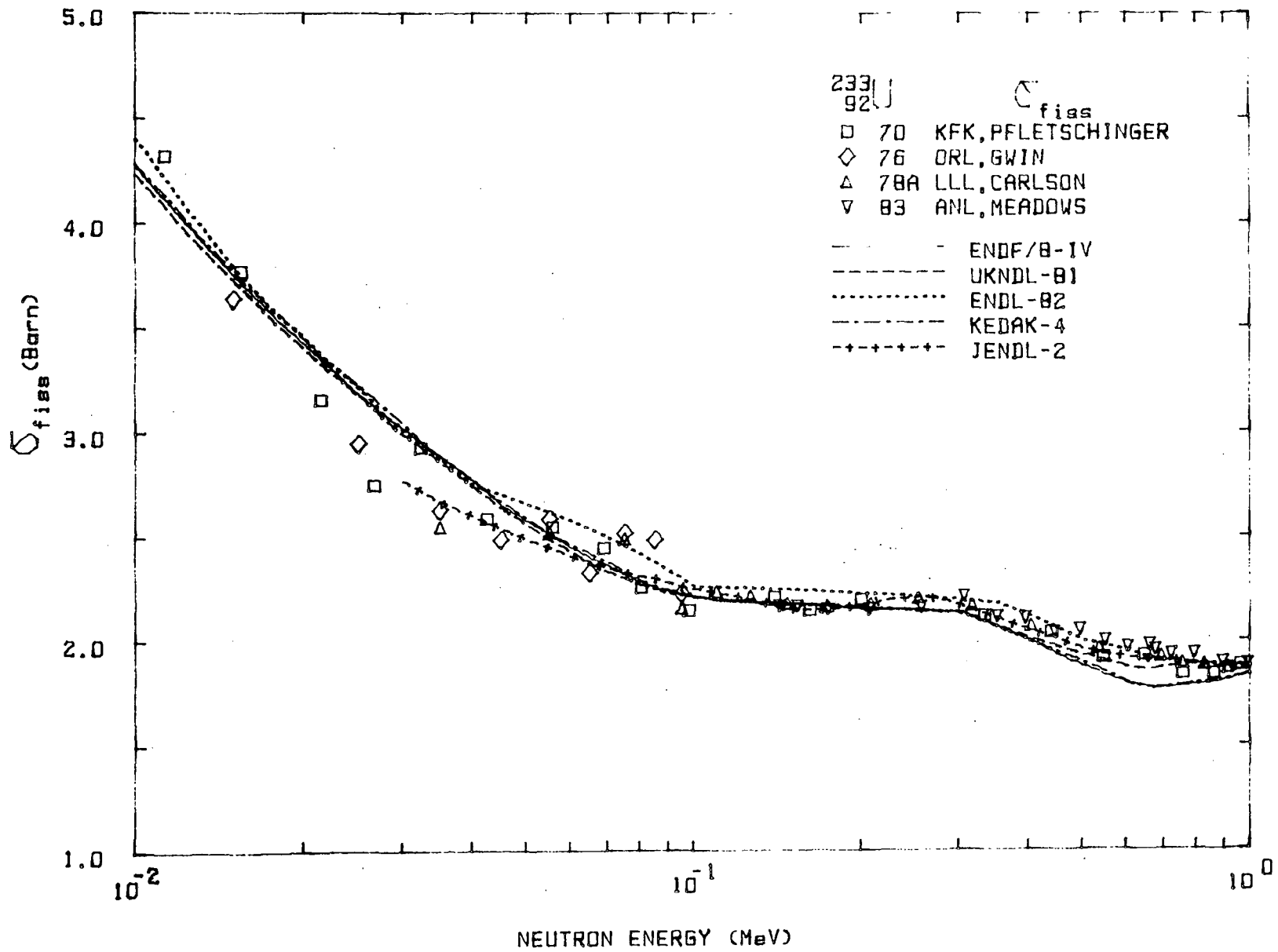


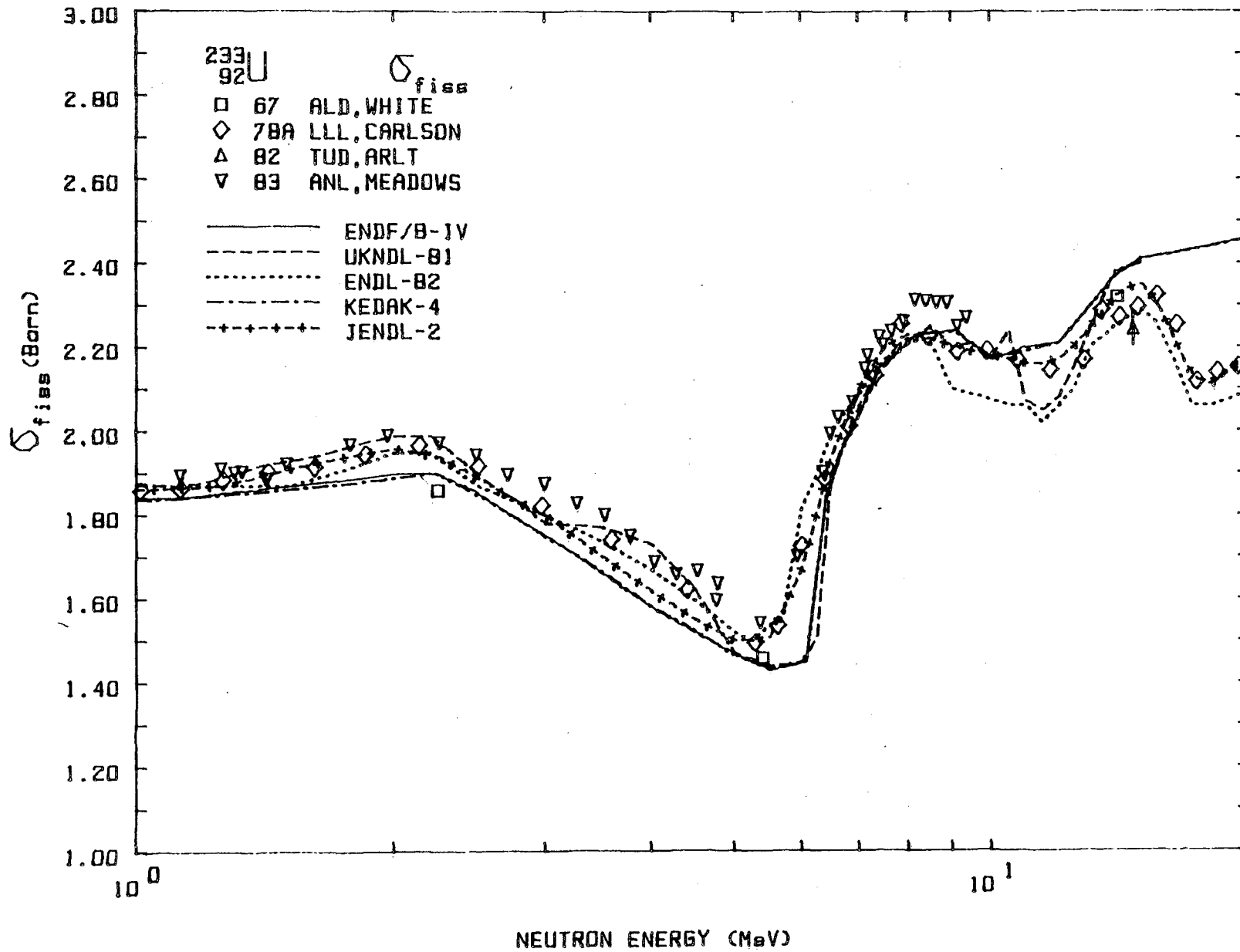


Experimental information  $^{233}\text{U}, \sigma_{\gamma}$ 

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
56 CCP, SPIVAC	4	30-900 keV	$^{235}\text{U}, \sigma_f$		
62 LAS, HOPKINS	9	0.03-1 MeV	$^{233}\text{U}, \sigma_f$	14-24 %	Renorm. to BNL-325(1965), $\sigma_f$
66 HAR, BROOKS	5	0.35-1.0 eV		20-30 %	
70 ORL, WESTON	50	0.017-1.06 eV		5-20 %	
71 HAR, CABELL	1	0.0253 eV		3 %	



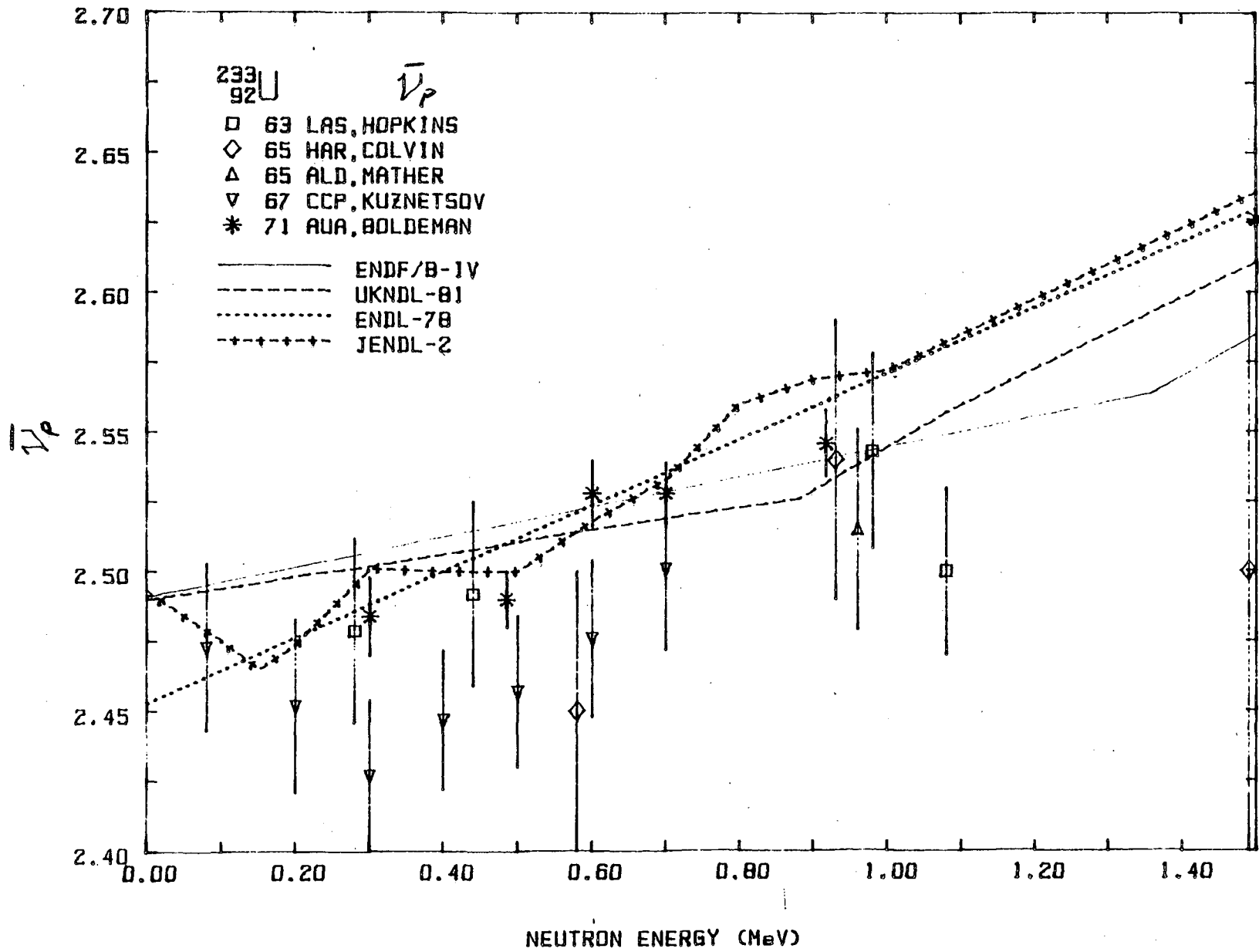


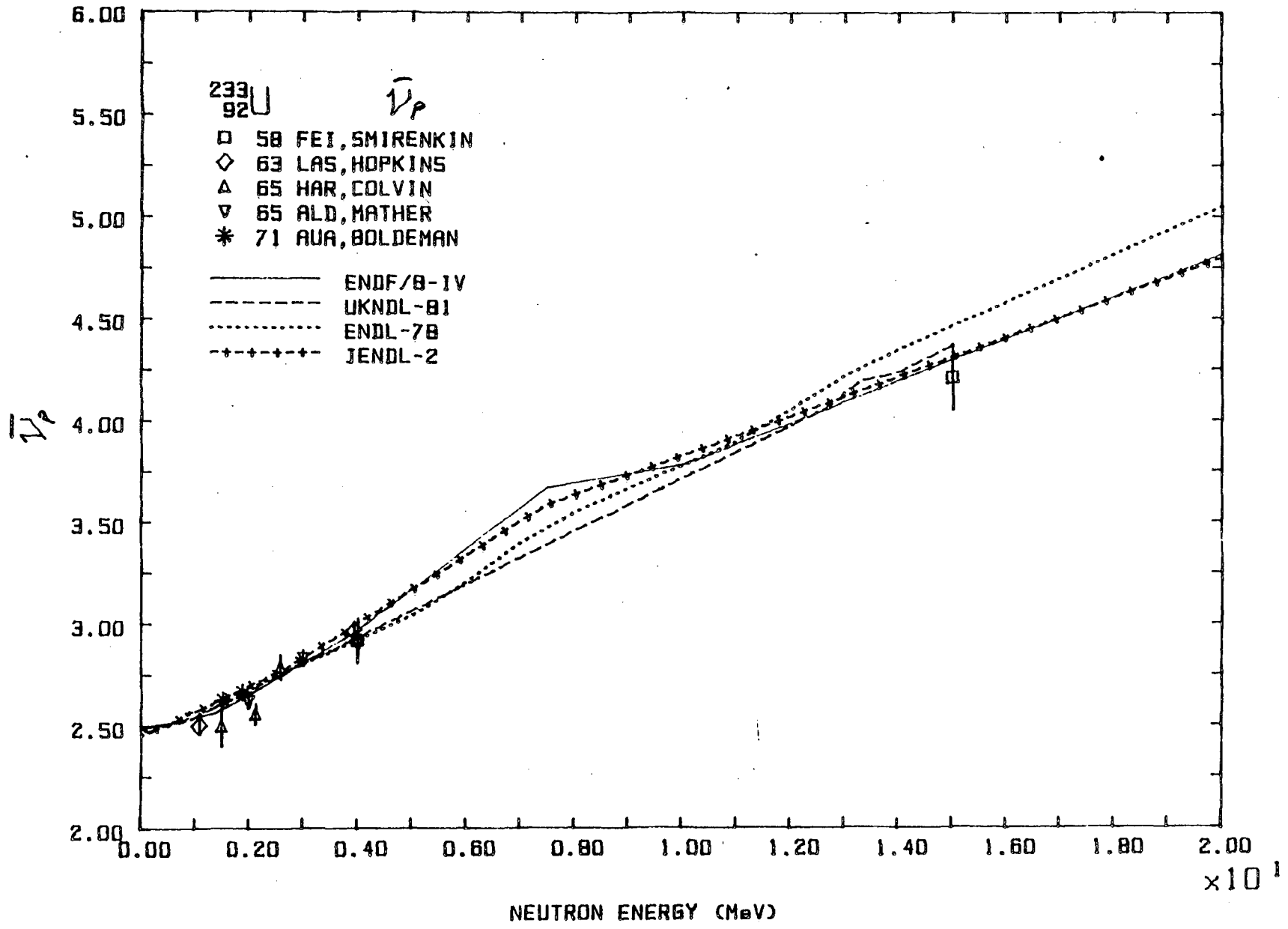


Experimental information  $^{233}\text{U}, \sigma_{\text{fiss}}$ 

Reference	Points	Range	Standard	Error	Comments
55 CCP, ADAMCHUK	244	0.01 eV-0.7 keV	$^{233}\text{U}, \sigma_{\text{f}}^{\text{th}}$		
60 MTR, MOORE	953	0.02 eV-1 keV	$^{233}\text{U}, \sigma_{\text{f}}^{\text{th}}$		
67 ALD, WHITE	4	1-14 MeV	$^{235}\text{U}, \sigma_{\text{f}}$	2 %	Error in relative value
68 ORL, WESTON	3 416	0.4 eV-2 keV	$^{233}\text{U}, \sigma_{\text{tot}}^{\text{th}}$	3-4 %	Data norm. to $\sigma_{\text{tot}}$ from 63 ORL. PATTENDEN
70 KFK, PFLETSCHINGER	49	5.2-1 015 keV	$^{235}\text{U}, \sigma_{\text{f}}$	1.6-2.7 %	Error in relative value
74 GEL, DERUYTTER	1 121	0.018-30 eV	$^{233}\text{U}, \sigma_{\text{f}}^{\text{th}}$		Two series of measure- ments 0.018-10 eV and 0.5-30 eV. Abs. fission integral $\int_{8.1 \text{ eV}}^{17.6 \text{ eV}} \sigma_{\text{f}}(E) dE =$ $= (968.7 \pm 10) \text{ b eV}$
76 ORL, GWIN	12	0.02-200 keV	$^{235}\text{U}, \sigma_{\text{f}}$	5-8 %	Error in relative value
78A LLL, CARLSON	107	1 keV-30 MeV	$^{235}\text{U}, \sigma_{\text{f}}$	2-4 %	
82 TND, ARLT	1	14.7 MeV	Abs.	1.8 %	
83 ANL, MEADOWS	56	0.1-9.5 MeV	$^{235}\text{U}, \sigma_{\text{f}}$	1-2 %	Error in relative value

General comments: Experimental data from ratio measurements given in the figures are calculated using cross sections from ENDF/B-V as standards.





Experimental information  $^{233}\text{U}, \bar{\nu}$

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
58 FEI, SMIRENKIN	2	4 and 15 MeV	$^{233}\text{U}, \bar{\nu}_p^{\text{-th}}$	4 %	
63 LAS, HOPKINS	5	0.3-3.9 MeV	$^{252}\text{Cf}, \bar{\nu}_p^{\text{-sp}}$	1.5 %	Stat. error
65 ALD, MATHER	4	1-4 MeV	$^{252}\text{Cf}, \bar{\nu}_p^{\text{-sp}}$	1.5 %	
65 HAR, COLVIN	5	0.6-2.6 MeV	$^{252}\text{Cf}, \bar{\nu}_p^{\text{-sp}}$	2-4 %	
67 CCP, KUZNETSOV	7	0.08-0.7 MeV	$^{233}\text{U}, \bar{\nu}_p^{-0.4 \text{ MeV}}$	1.5 %	$\bar{\nu}^{\text{-th}}/\bar{\nu}^{-0.4 \text{ MeV}} = 1.010$
71 AUA, BOLDEMAN	7	0.3-1.9 MeV	$^{252}\text{Cf}, \bar{\nu}_p^{\text{-sp}}$	0.5-1 %	

General comments: Data normalized to  $\bar{\nu}_p^{\text{-sp}}(^{252}\text{Cf}) = 3.756$  and  $\bar{\nu}_p^{\text{-th}}(^{233}\text{U}) = 2.480$





235<sub>U</sub>

## NUCLEAR PROPERTIES

Spin and parity of ground state:  $7/2^-$ 

Ground state decay:

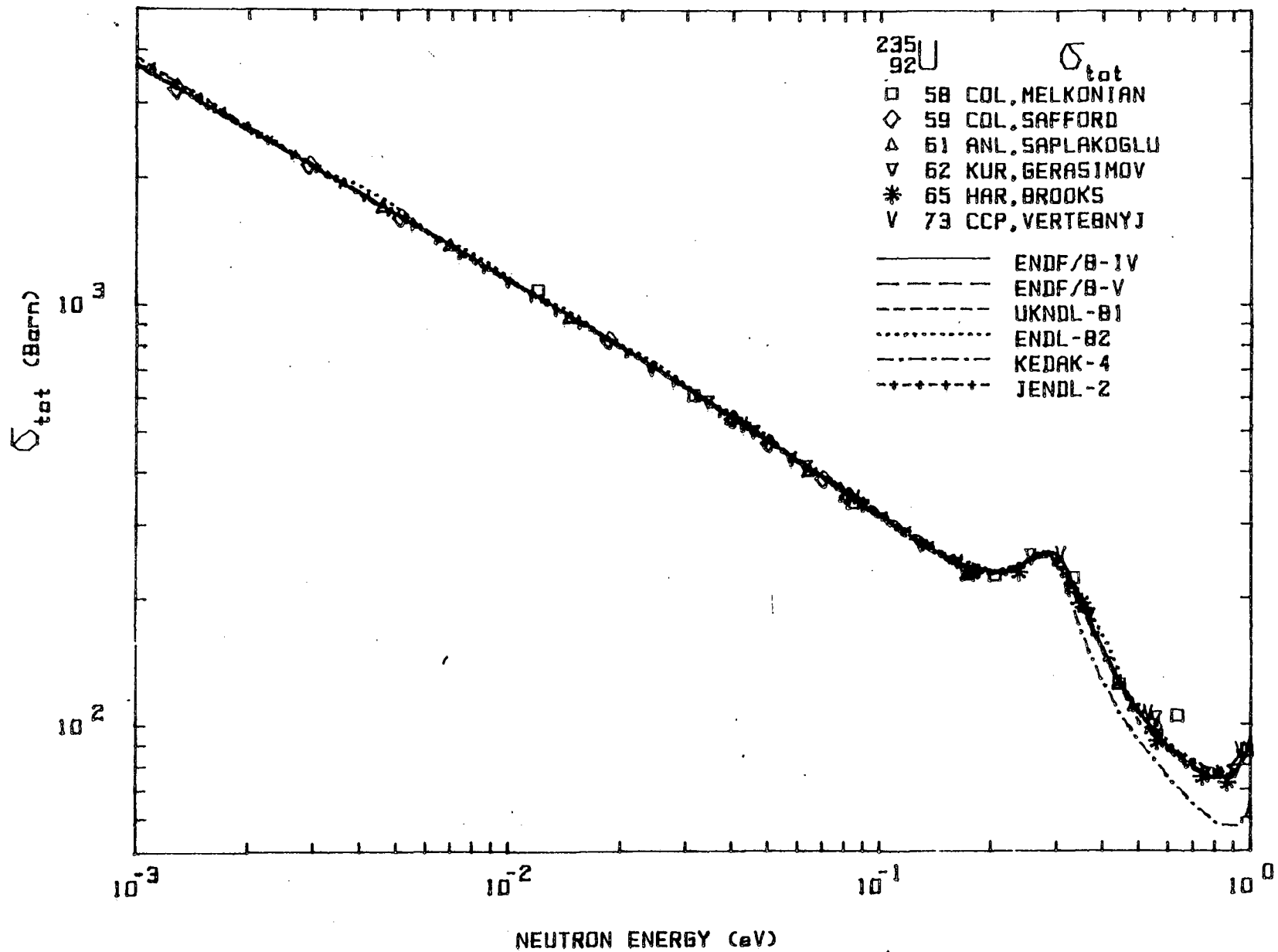
Alpha to  $^{231}\text{Th}$ : 100%,  $Q_\alpha = 4.679$ Half life:  $7.038 \cdot 10^8$  yr $9.8 \cdot 10^{18}$  yr spontaneous fission

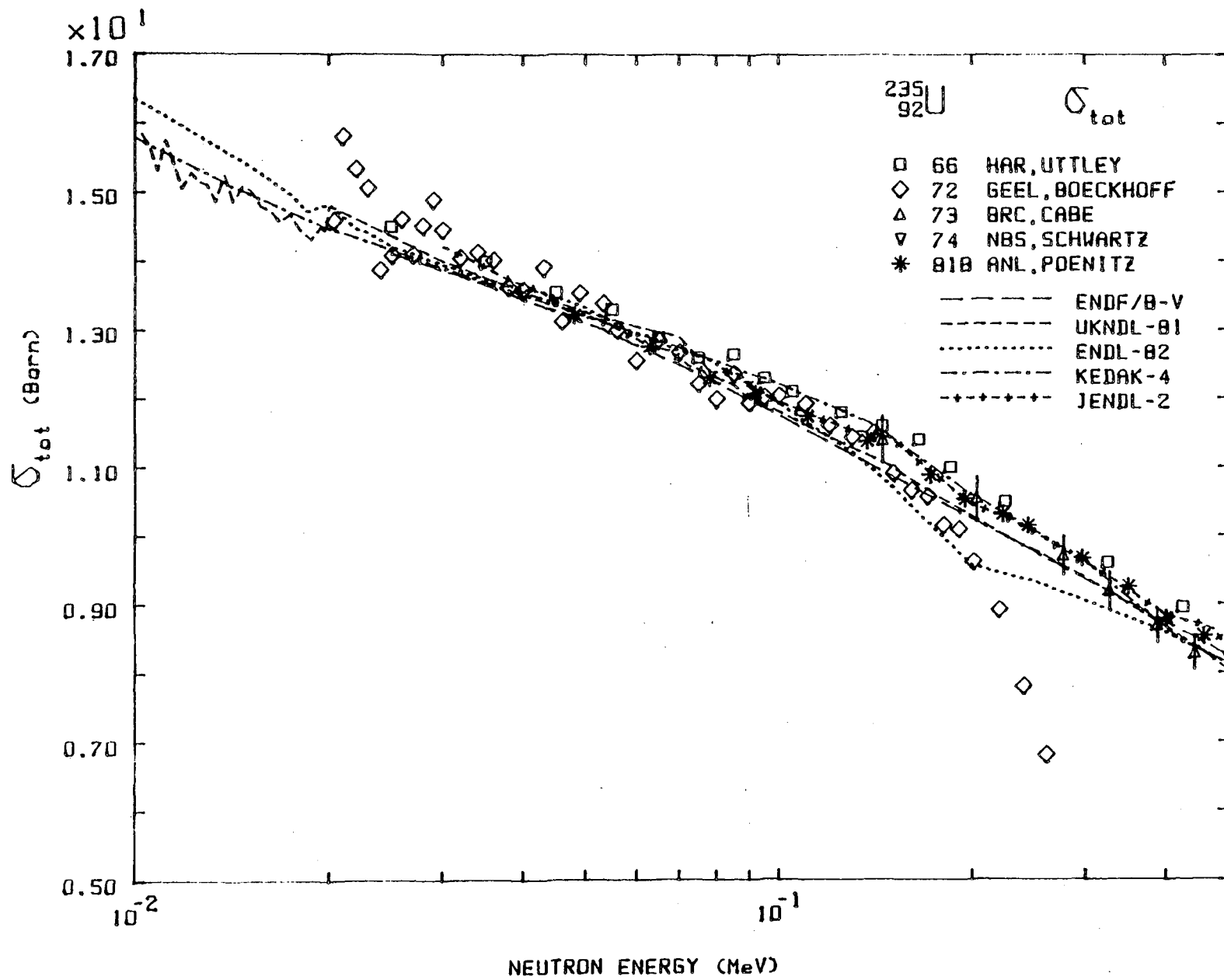
## THERMAL CROSS SECTIONS (2200 m/s)

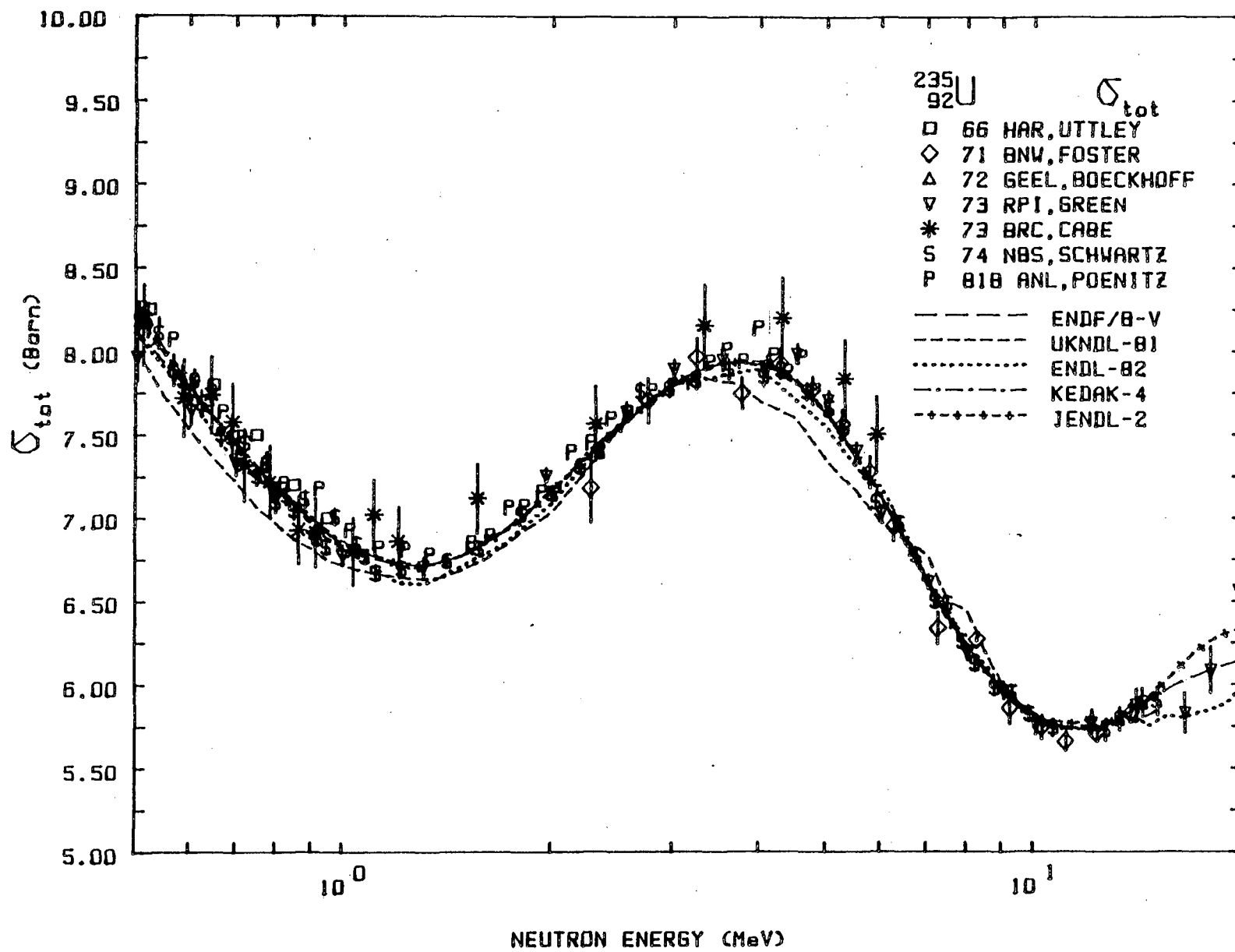
Reference	$\sigma_\gamma$	$\sigma_f$	$\sigma_t$	$\bar{\nu}_+$	(barns)
ENDF/B - IV	97.7	585.4		2.419	
ENDF/B - V	98.44	583.9	696.6	2.437	
UKNDL -81	100.5	579.4	696.1		
ENDL -82	100.9	602.0	717.9		
KEDAK-4	99.43	587.9	699.5		
JENDL-2	96.00	583.9	696.9		
71 GEL DERUYTTER		590.5			
BNL 325 (1984)	98.3	582.6	695.2	2.425	
NNDC (1983)	98.52	581.9		2.429	
84 NPL,AXTON	96.8	584.7		2.427	

## RESONANCE INTEGRALS

Reference	$RI_\gamma$	$RI_f$	(barns)
ENDF/B - IV	127.8	261.4	
ENDF/B - V	139.2	281.7	
UKNDL -81	140.6	275.5	
ENDL -82	139.8	284.0	
KEDAK-4	142.7	269.1	
JENDL-2	153.5	278.7	
71 KAP,EILAND	150	292	
BNL 325 (1984)	144	275	

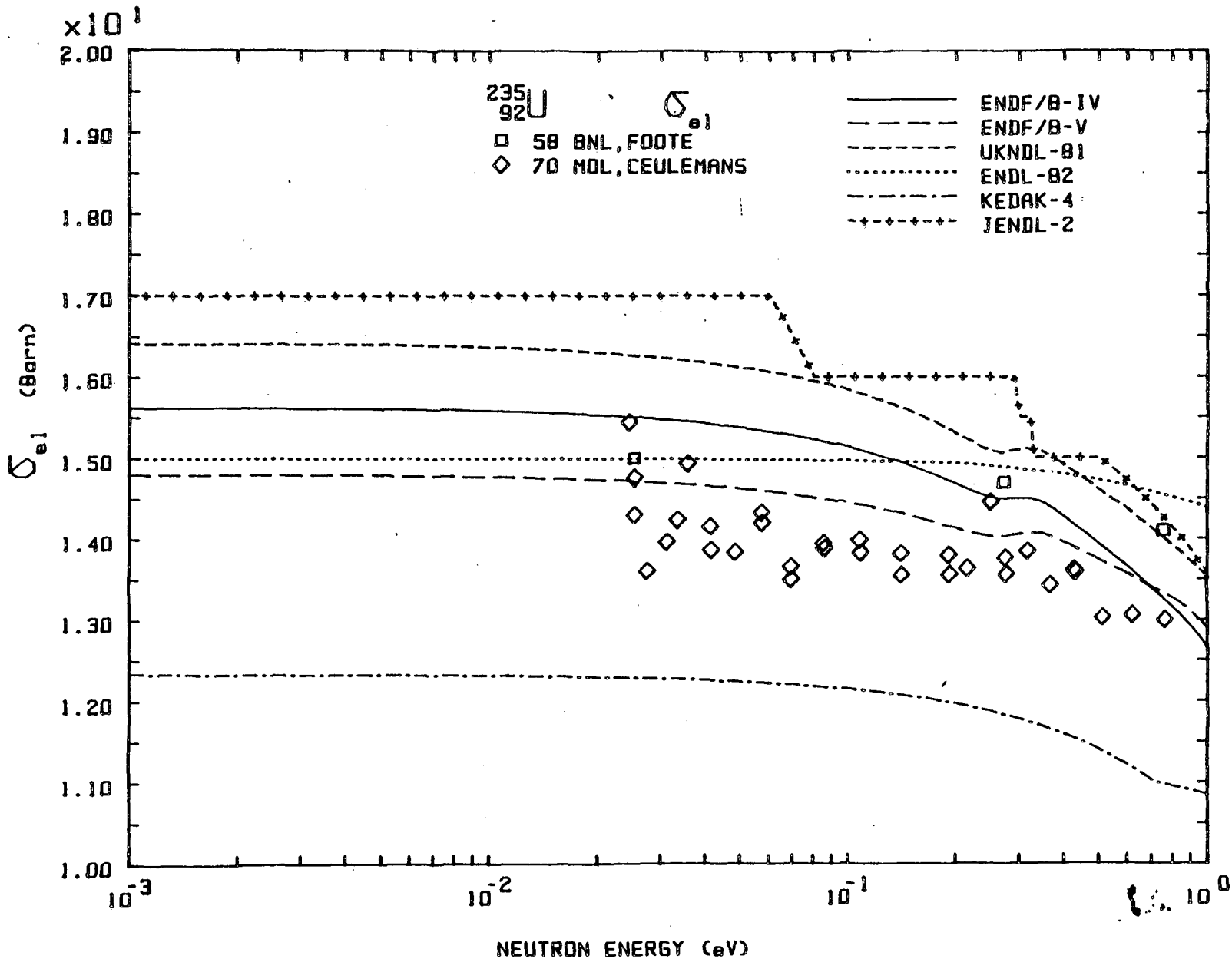


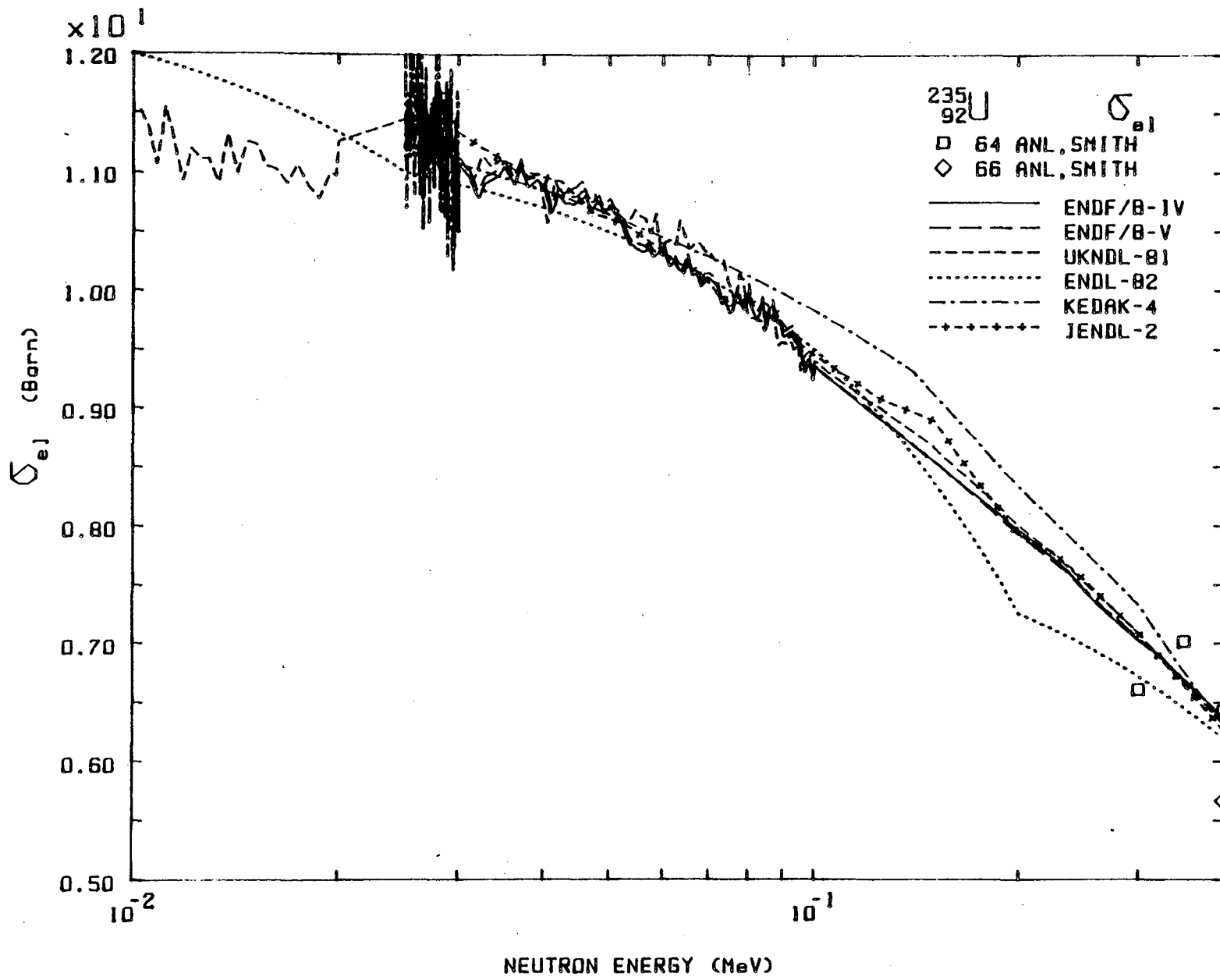




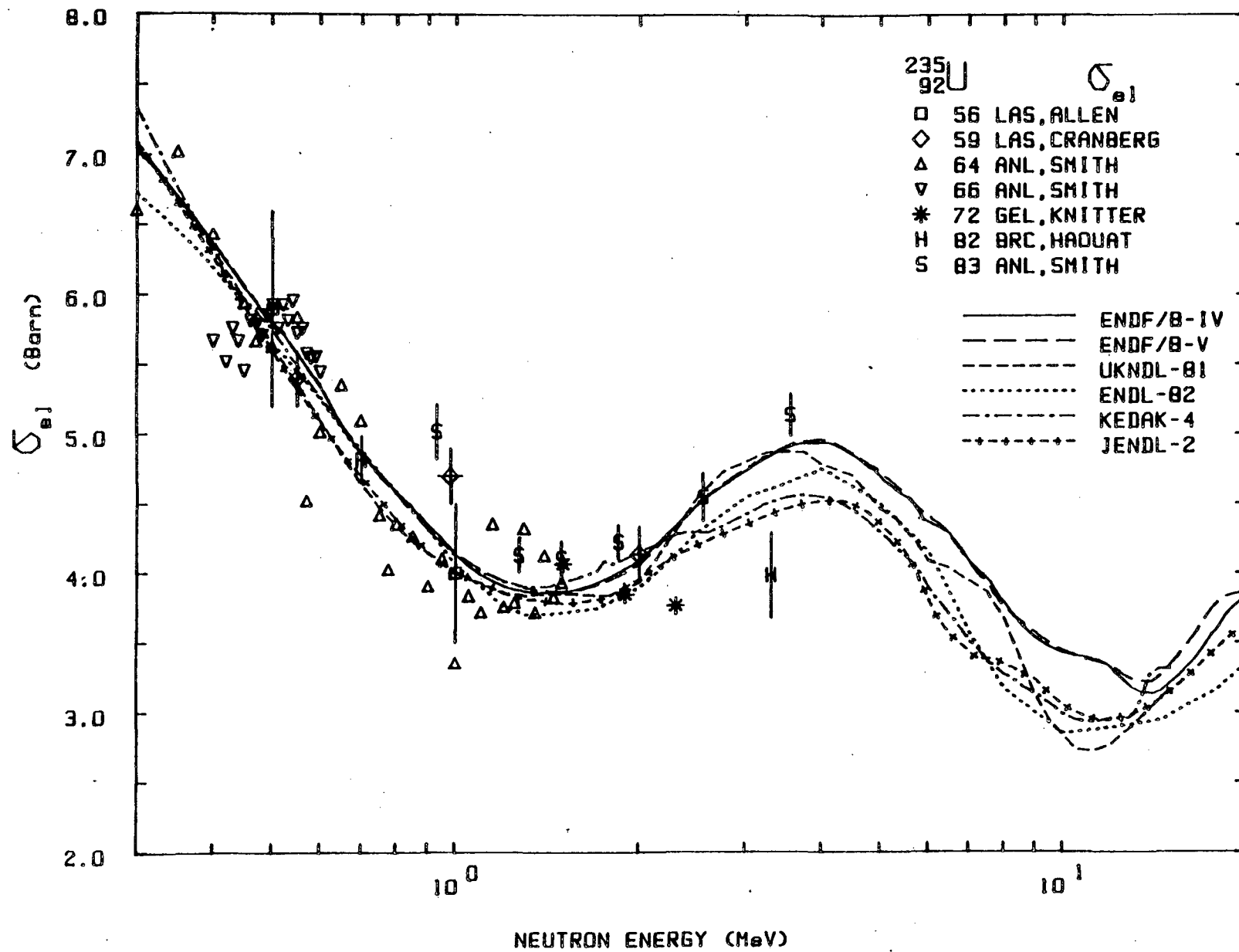
Experimental information  $^{235}\text{U}, \sigma_{\text{tot}}$

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
58 COL, MELKONIAN	223	0.01 eV-48 keV	ABS.	2-3 %	
59 COL, SAFFORD	31	0.0008-0.08 eV	ABS.	0.5 %	
61 ANL, SAPLAKOGLU	31	0.0045-0.56 eV		0.5-1 %	
62 KUR, GERASIMOV	130	0.02-2.2 eV			
65 HAR, BROOKS	1 489	0.02 eV-0.2 keV	ABS.	1.5 %	
66 HAR, UTTLEY	57	0.15-950 keV	ABS.		
71 BNW, FOSTER	243	2.2-14.9 MeV	ABS.	1-3 %	
72 GEL, BOECKHOFF	4 093	5.8-270 keV			
73 BRC, CABE	388	0.1-6 MeV	ABS.	3 %	
73 CCP, VERTEBNYJ	27	0.04-1 eV	ABS.	1.5 %	
73 RPI, GREEN	716	0.5-30 MeV	ABS.	1 %	
74 NBS, SCHWARTZ	1 680	0.5-15 MeV	ABS.	1 %	Stat. error
81B ANL, POENITZ	47	0.048-4.8 MeV	ABS.	2 %	







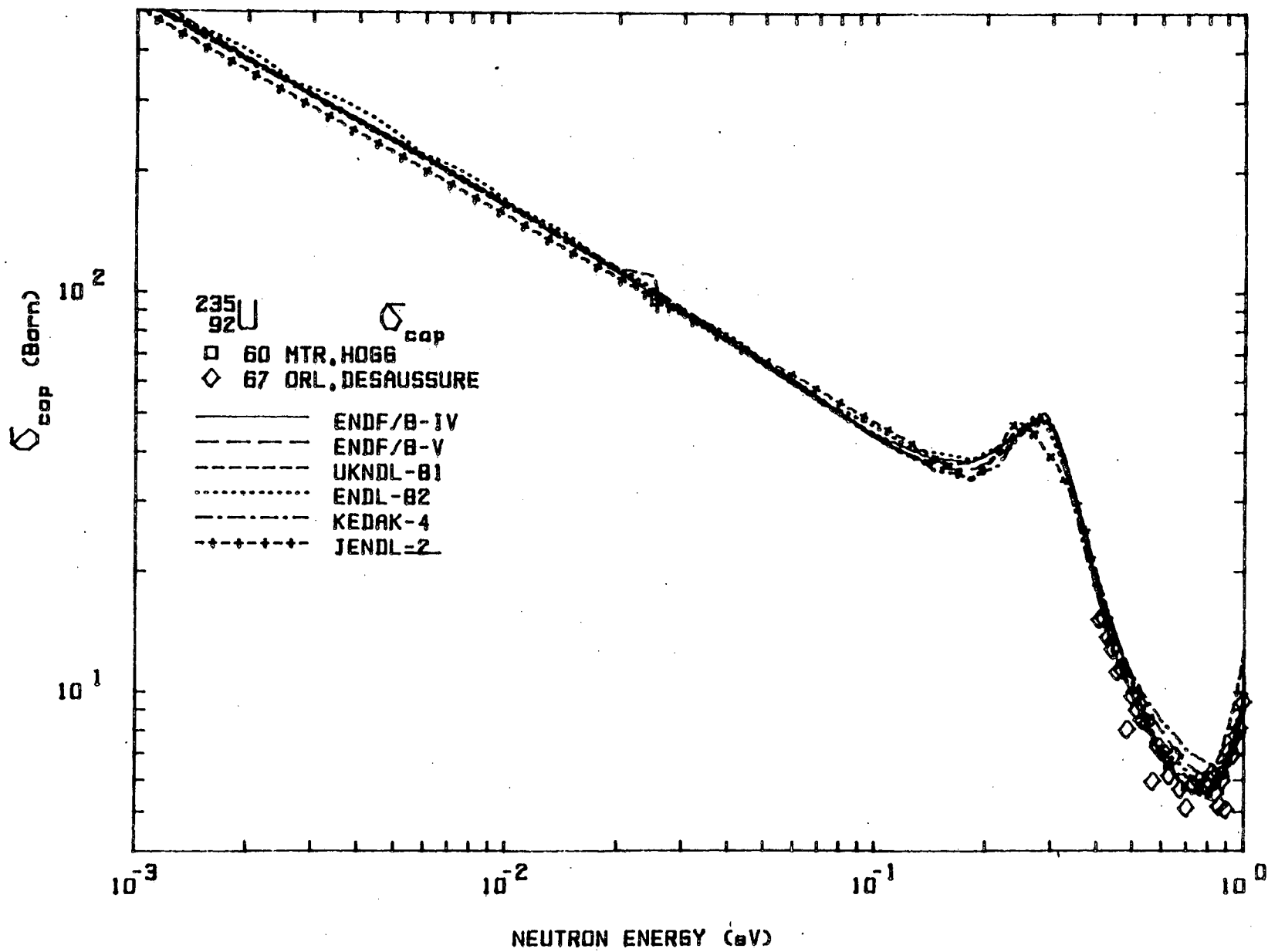


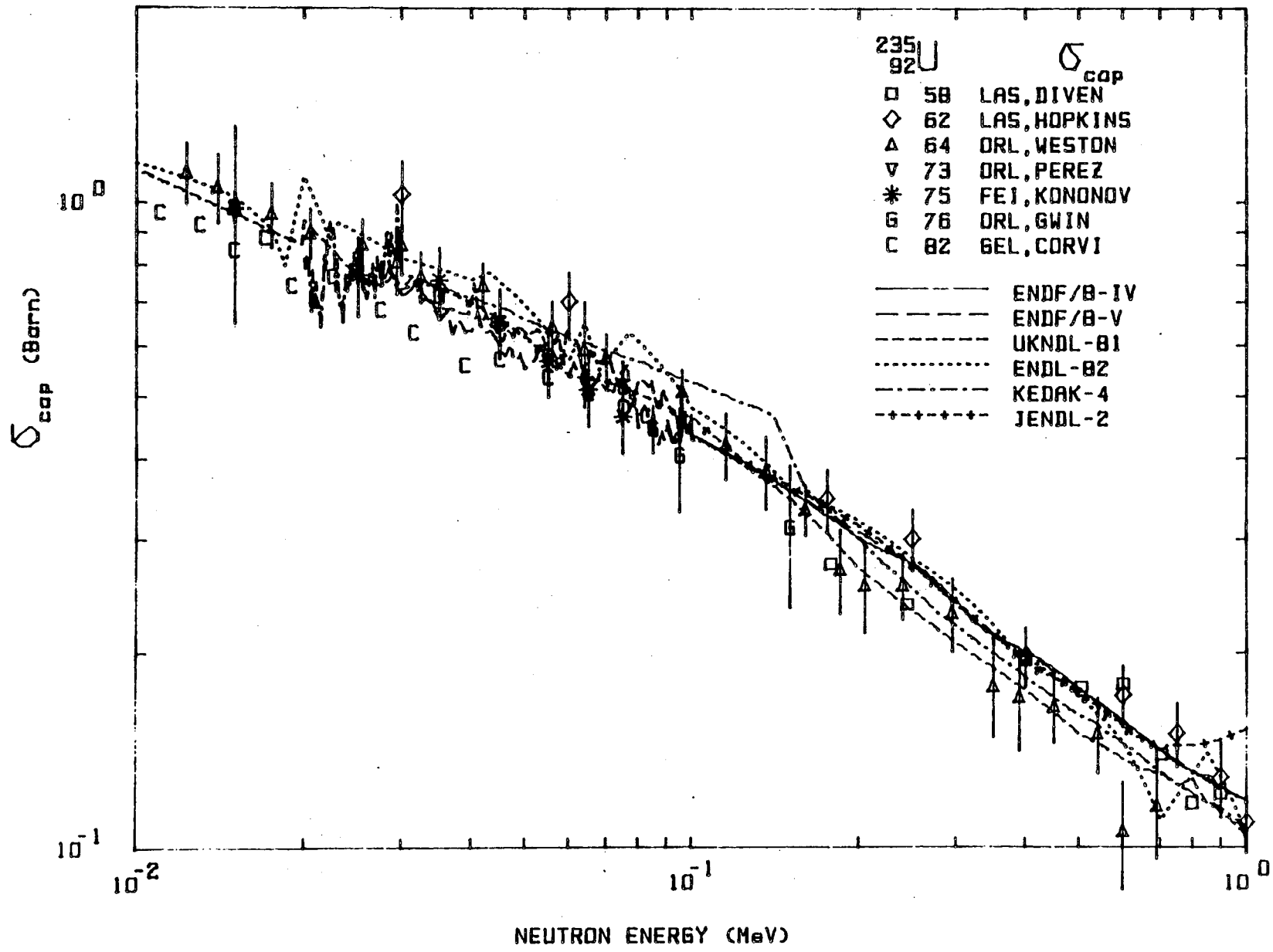
Experimental information  $^{235}\text{U}, \sigma_{n,n}$

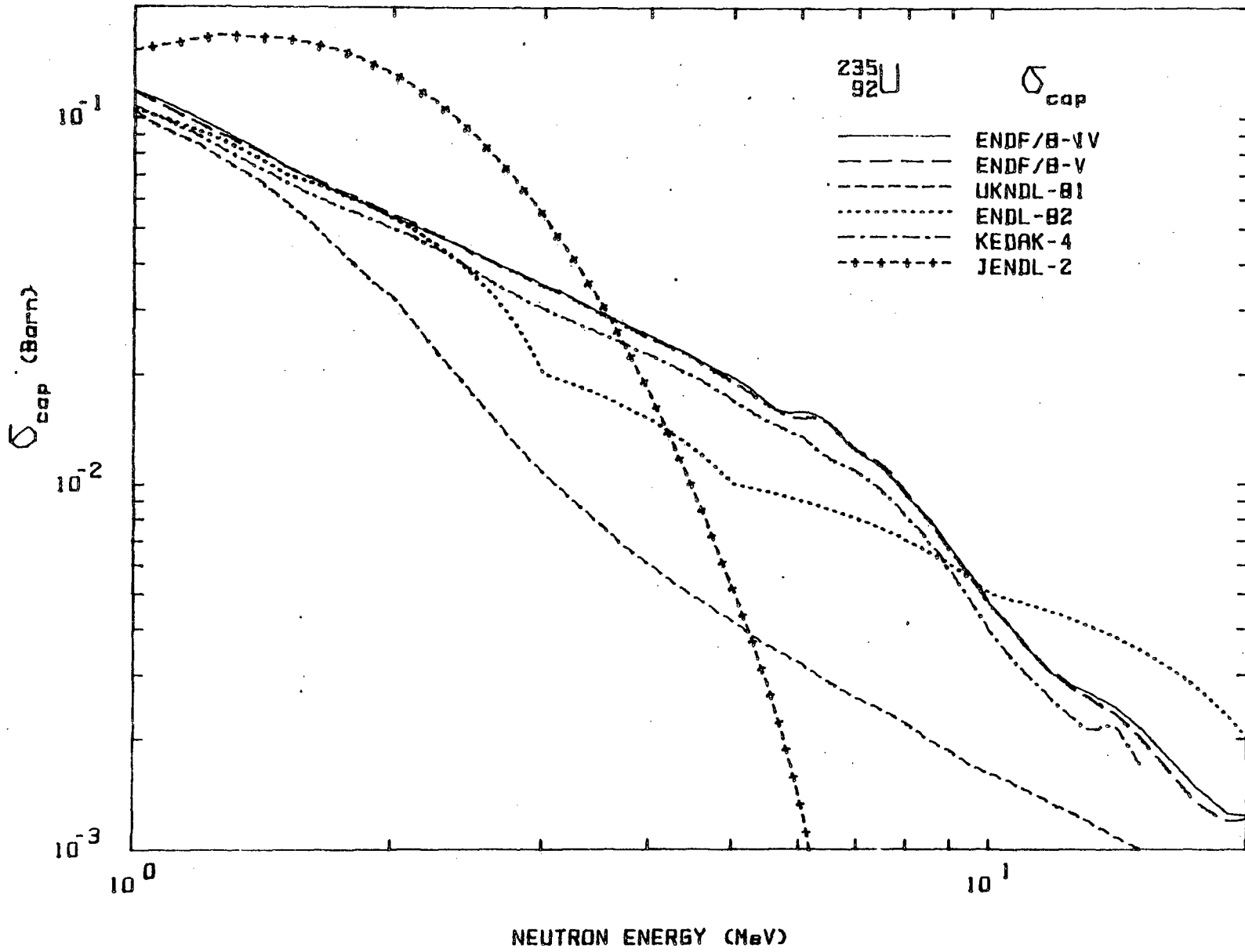
<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
51 ANL, HIBDON	1	0.0253 eV		20 %	
56 LAS, ALLEN	2	0.5-1 MeV	Abs.	10-15 %	A few hundred keV exp. resol.
58 BNL, FOOTE	8	0.025-7.7 eV	Pb		Meas. ratio $\sigma_{n,n}/\sigma_{\text{tot}}$ for $^{235}\text{U}$ to same quantity for Pb
59 LAS, CRANBERG	3	0.55-2.00 MeV	H, $\sigma_{n,n}$	4-5 %	Sum of elastic and unresolved inelastic cross sections. Exp. resolution 24-62 keV
64 ANL, SMITH	28	0.3-1.5 MeV	C, $\sigma_{n,n}$		Sum of elastic and unresolved inelastic cross sections. Exp. Resolution 24-62 keV
66 ANL, SMITH	20	0.4-0.6 MeV	C, $\sigma_{n,n}$		Sum of elastic and unresolved inelastic cross sections. Exp. resolution 25 keV
70 MOL, CEULEMANS	33	0.02-0.8 eV	V, $\sigma_{n,n}$		
72 GEL, KNITTER	3	1.5-2.3 MeV	H, $\sigma_{n,n}$		Sum of elastic and unresolved inelastic cross sections. Exp. resolution 500 keV
82 BRC, HAOUAT	2	0.7-3.3 MeV	Abs.	3-8 %	Exp. resol. 8-28 keV
83 ANL, SMITH	6	0.93-5.55 MeV	C, $\sigma_{\text{tot}}$	3-4 %	Sum of elastic and unresolved inelastic cross sections. Exp. resolution 90-300 keV

-47-

$^{235}\text{U}$   
92 U



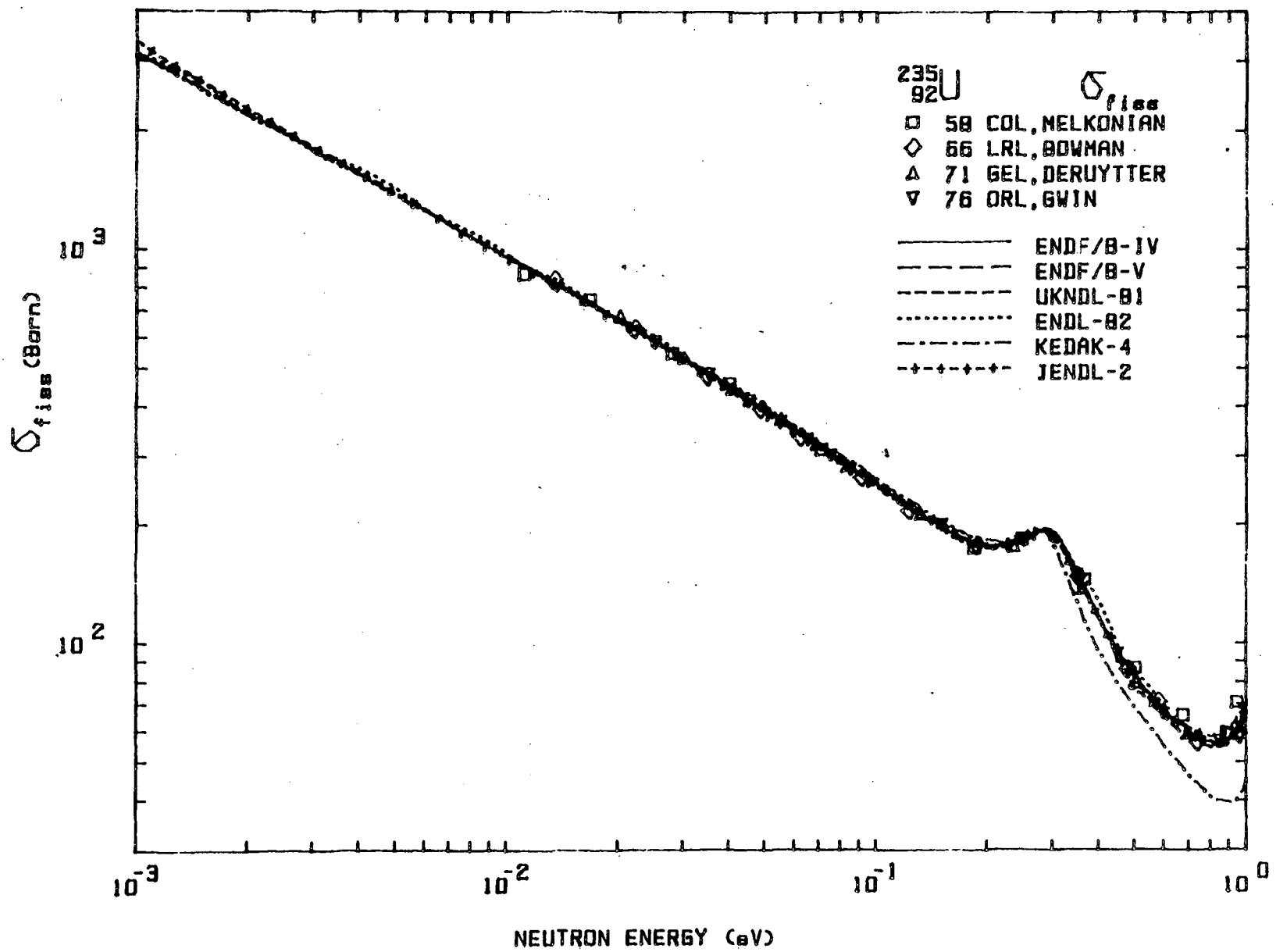


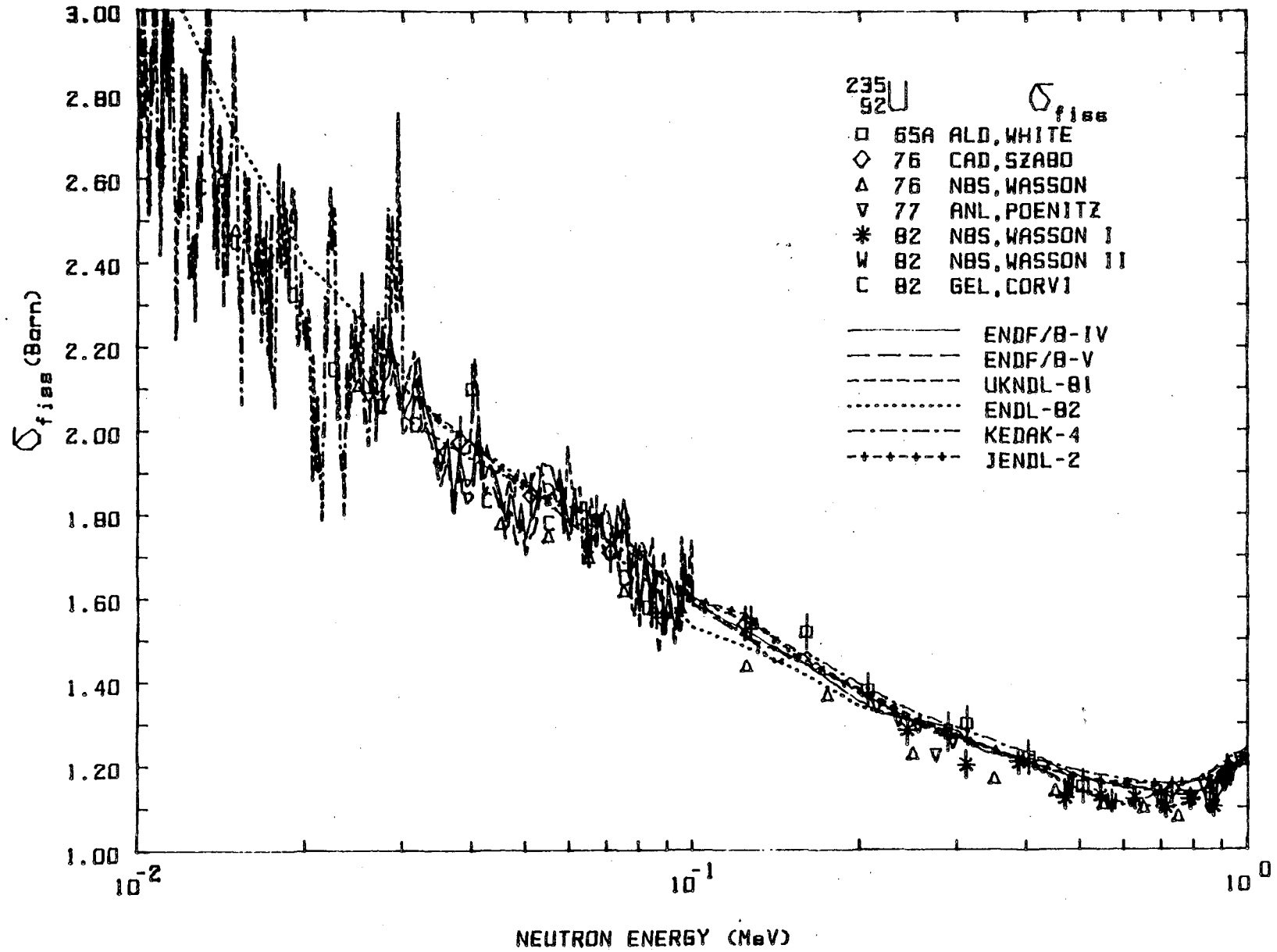


Experimental information  $^{235}\text{U}, \sigma_{\gamma}$

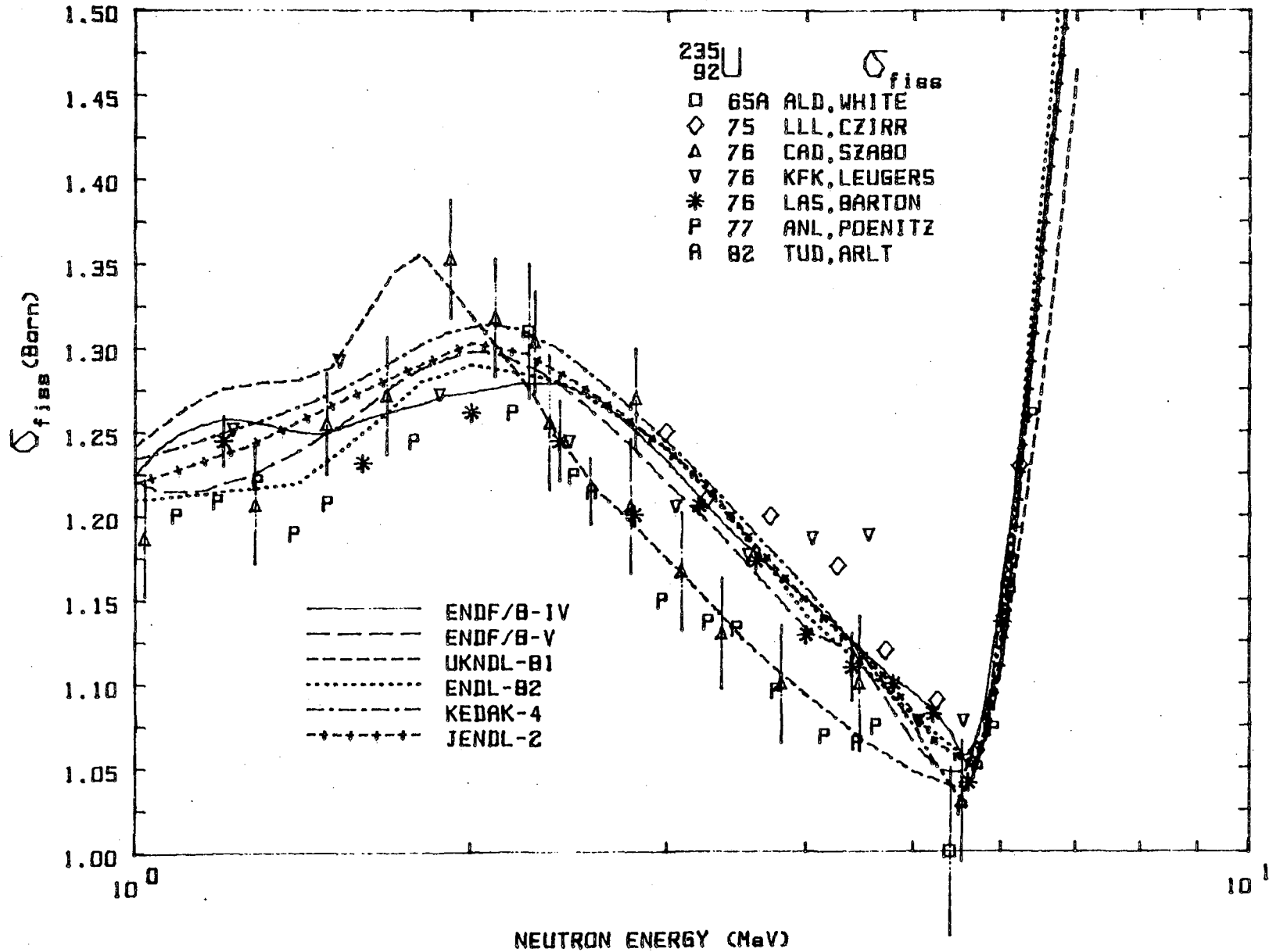
<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
58 LAS, DIVEN	9	0.18-1 MeV	$^{235}\text{U}, \sigma_f$	10-15 %	Uncertainties for individual data points are not given Norm. to BNL 325 (1965), $\sigma_f$
60 MTR, HOGG	1	0.0253 eV (MXW)		7 %	
62 LAS, HOPKINS	9	0.03-1 MeV	$^{235}\text{U}, \sigma_f$	13 %	
64 ORL, WESTON	26	12-690 keV	$^{235}\text{U}, \sigma_f$	8-20 %	Energy spread: 1-34 % Norm. to BNL 325 (1965), $\sigma_f$
67 ORL, DESAUSSURE	5384	0.4 eV-3 keV	$\int_{0.45}^{1.0} \text{abs } \frac{dE}{E} =$ = 58.03 b	5 %	
73 ORL, PEREZ	22	0.02-10 keV			Total estimated error 8 %
75 FEI, KONONOV	7	20-80 keV	$^{197}\text{Au}, \sigma_{\gamma}$	10-14 %	
76 ORL, GWIN	29	0.05-200 keV	$^{235}\text{U}, \sigma_f$	5-25 %	
82 GEL, CORVI	22	2-85 keV	$^{197}\text{Au}, \sigma_{\gamma}$ -value at thermal	6 %	

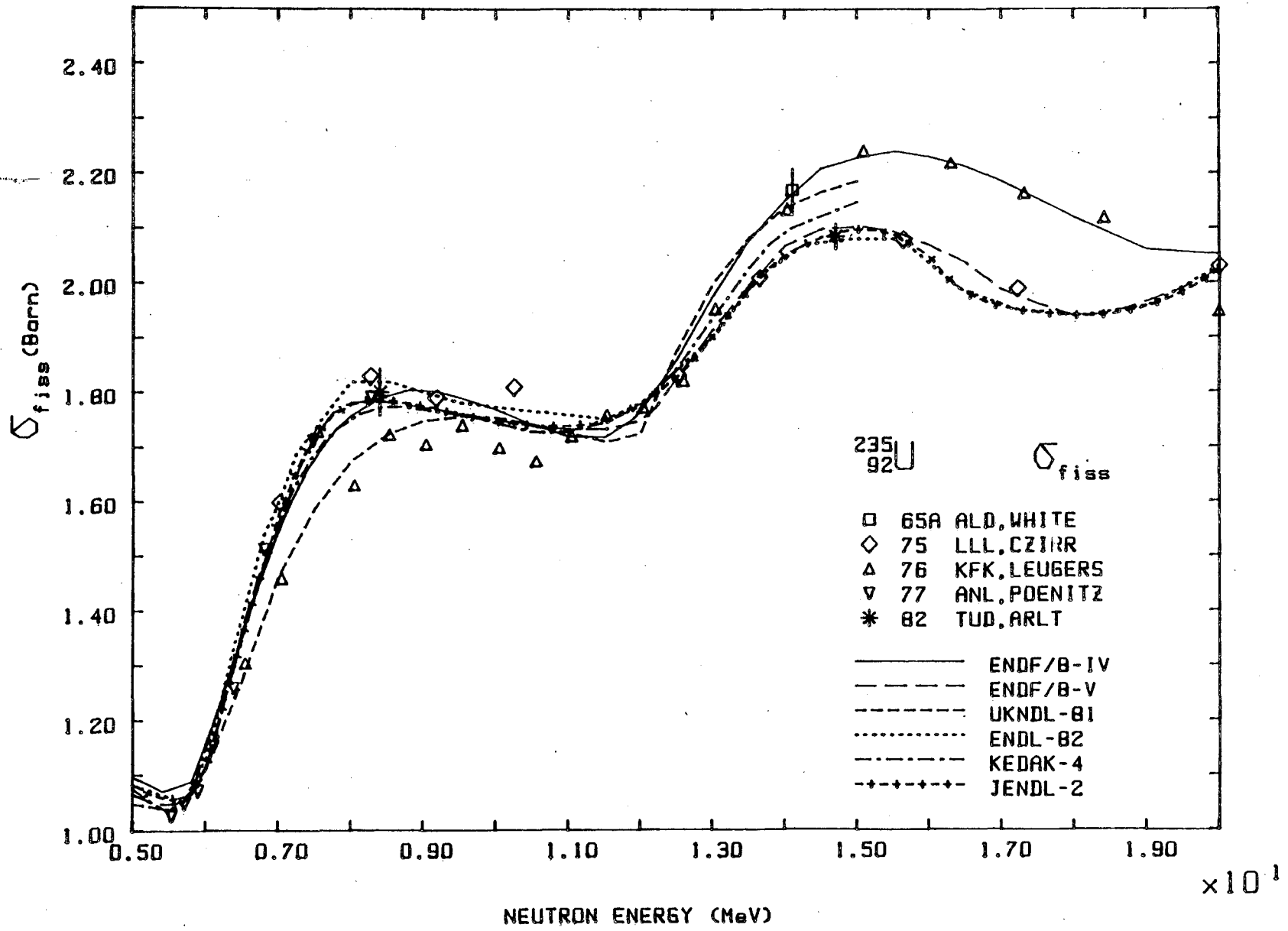
General comments: ENDF/B-IV & ENDF/B-V









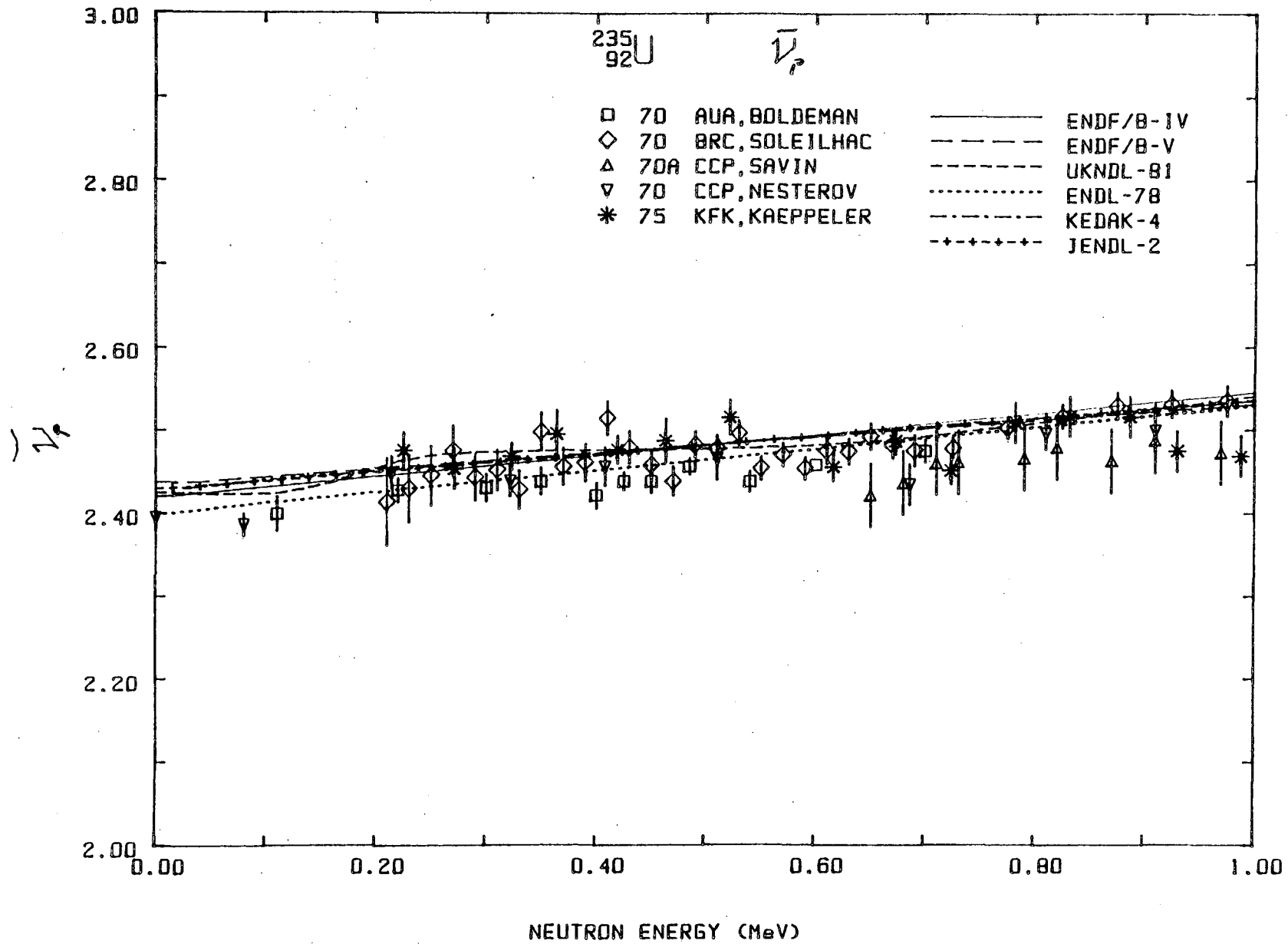


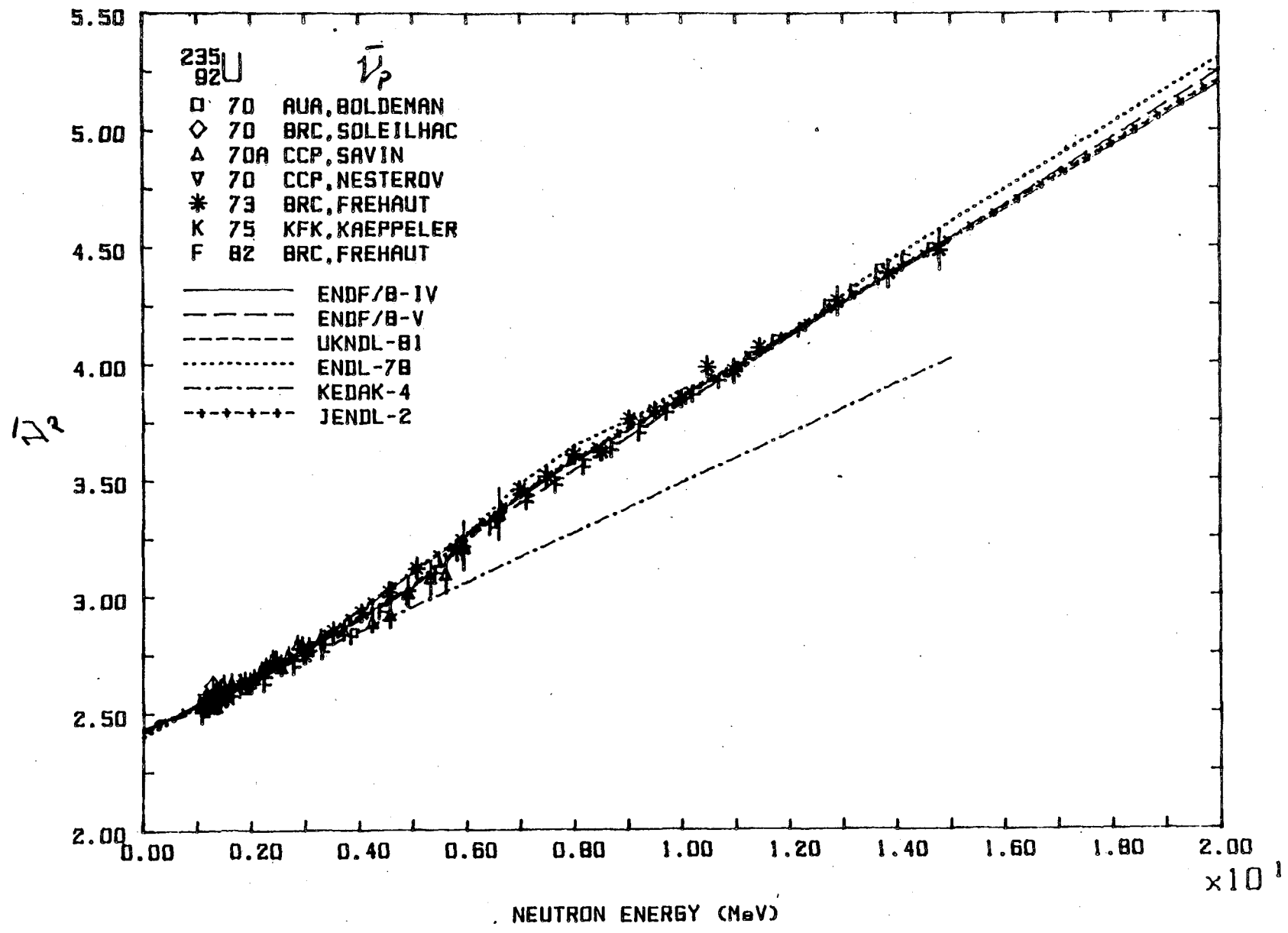
Experimental information  $^{235}\text{U}, \sigma_{\text{fiss}}$

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
58 COL, MELKONIAN	336	0.01 eV-40 keV	$^{235}\text{U}, \sigma_{\text{f}}^{\text{th}}$		
65A ALD, WHITE	12	40 keV-14.1 MeV	ABS.	2.5-3 %	
66 LRL, BOWMAN	1 596	0.02-80 eV	$^{235}\text{U}, \sigma_{\text{f}}^{\text{th}}$	3 %	Error in matching high-energy to low-energy data
71 GEL, DERUYTTER	870	0.01-11 eV	$^{235}\text{U}, \sigma_{\text{f}}^{\text{th}}$		Error 0.8 % in fission integral between 7.8-11 eV
75 LLL, CZIRR	61	3-20 MeV	H, $\sigma_{\text{n,n}}$	1-6 %	Stat. error
76 CAD, SZABO	31	17 keV-2.8 MeV	ABS.	2.5-3.5 %	
76 KFK, LEUGERS	144	1.2-20 MeV	H, $\sigma_{\text{n,n}}$	1-3 %	Stat. error
76 LAS, BARTON	41	1-6 MeV	H, $\sigma_{\text{n,n}}$	1-2 %	
76 NBS, WASSON	22	5-800 keV	H, $\sigma_{\text{n,n}}$	2 %	
76 ORL, GWIN	23	0.02 eV-200 keV		4-7 %	Norm. to $^{235}\text{U}, \sigma_{\text{f}}$ from ENDF/B-III between 0.02-0.4 eV
77 ANL, POENITZ	73	0.2-8.3 MeV	ABS.	1.5-3 %	Black Neutron detector

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
82 GEL, CORVI	22	2-85 keV		1-3 %	Norm to $^{235}\text{U}$ , $I_f$ between 7.8-11 eV = 241.2 beV
82 NBS, WASSON I	24	0.2-1.2 MeV	ABS	2 %	Al-walled coll
82 NBS, WASSON II	13	0.2-1.2 MeV	ABS	2 %	Brass-walled coll.
82 TUD, ARLT	3	2.56, 8.4, 14.7 MeV	ABS.	1.5, 2.4, 1.1 %	

General comments: Experimental data from ratio measurements given in the figures are calculated using cross sections from ENDF/B-V standards





Experimental information  $^{235}\text{U}, \bar{\nu}$ 

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
70 AUA, BOLDEMAN	14	0.1-1.9 MeV	$^{252}\text{Cf}, \bar{\nu}_p^{\text{sp}}$	0.5 %	
70 BRC, SOLEILHAC	40	0.2-1.4 MeV	$^{252}\text{Cf}, \bar{\nu}_p^{\text{sp}}$	1 %	
70 CCP, NESTEROV	13	Therm.-1.5 MeV	$^{252}\text{Cf}, \bar{\nu}_p^{\text{sp}}$	0.5-1 %	
70A CCP, SAVIN	37	0.65-6.6 MeV	$^{252}\text{Cf}, \bar{\nu}_p^{\text{sp}}$	1.5 %	
73 BRC, FREHAUT	22	1.9-14.8 MeV	$^{252}\text{Cf}, \bar{\nu}_p^{\text{sp}}$	1 %	
75 KFK, KÄPPELER	22	0.2-1.4 MeV	$^{235}\text{U}, \bar{\nu}_p$	1-1.5 %	Shape measurement. Norm. to value recommended by Manero and Konshin, At. En. Rev. <u>10</u> , IAEA (1972) p. 637
82 BRC, FREHAUT	29	1-15 MeV	$^{252}\text{Cf}, \bar{\nu}_p^{\text{sp}}$	0.5-1.5 %	

General comments: Data normalized to  $\bar{\nu}_p^{\text{sp}}(^{252}\text{Cf}) = 3.756$

238<sub>U</sub>

## NUCLEAR PROPERTIES

Spin and parity of ground state:  $0^+$ 

Ground state decay:

Alpha to  $^{234}\text{Th}$ : 100%,  $Q_\alpha = 4.270$  MeVHalf-life:  $4.468 \cdot 10^9$  yr $8.19 \cdot 10^{15}$  yr - spontaneous fission

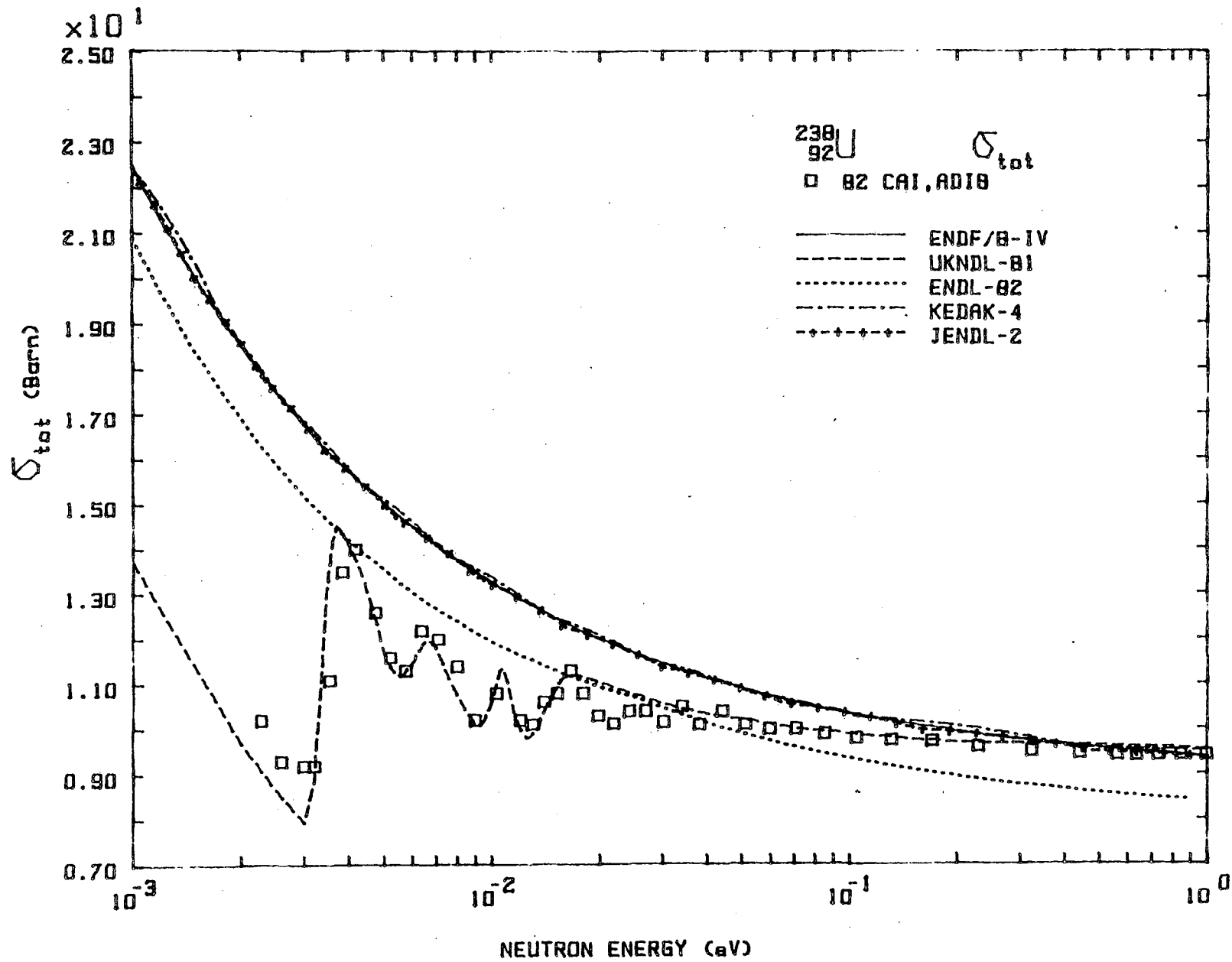
## THERMAL CROSS SECTIONS (2200 m/s)

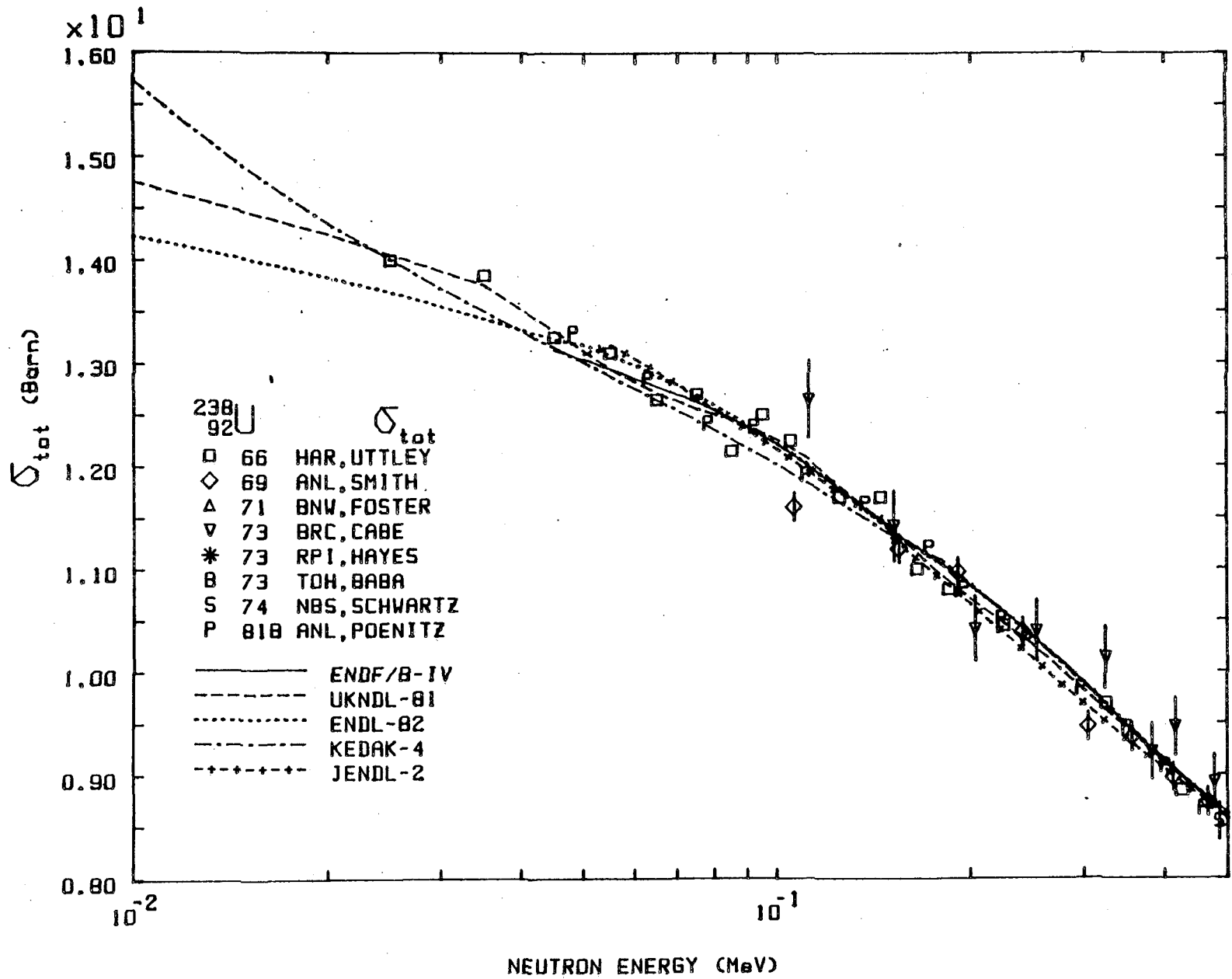
Reference	$\sigma_\gamma$	$\sigma_f$	$\sigma_t$	$\bar{\nu}_{sp}$	(barns)
ENDF/B - IV	2.70	0.00	11.65		
ENDF/B - V	2.700	$5.280 \cdot 10^{-6}$	11.60		
UKNDL -81	2.730		10.74		
ENDL -82	2.736		10.69		
KEDAK-4	2.714		11.67		
JENDL-2	2.700	$3.239 \cdot 10^{-6}$	11.57		
BNL 325 (1984)	2.680	0.004		1.98	

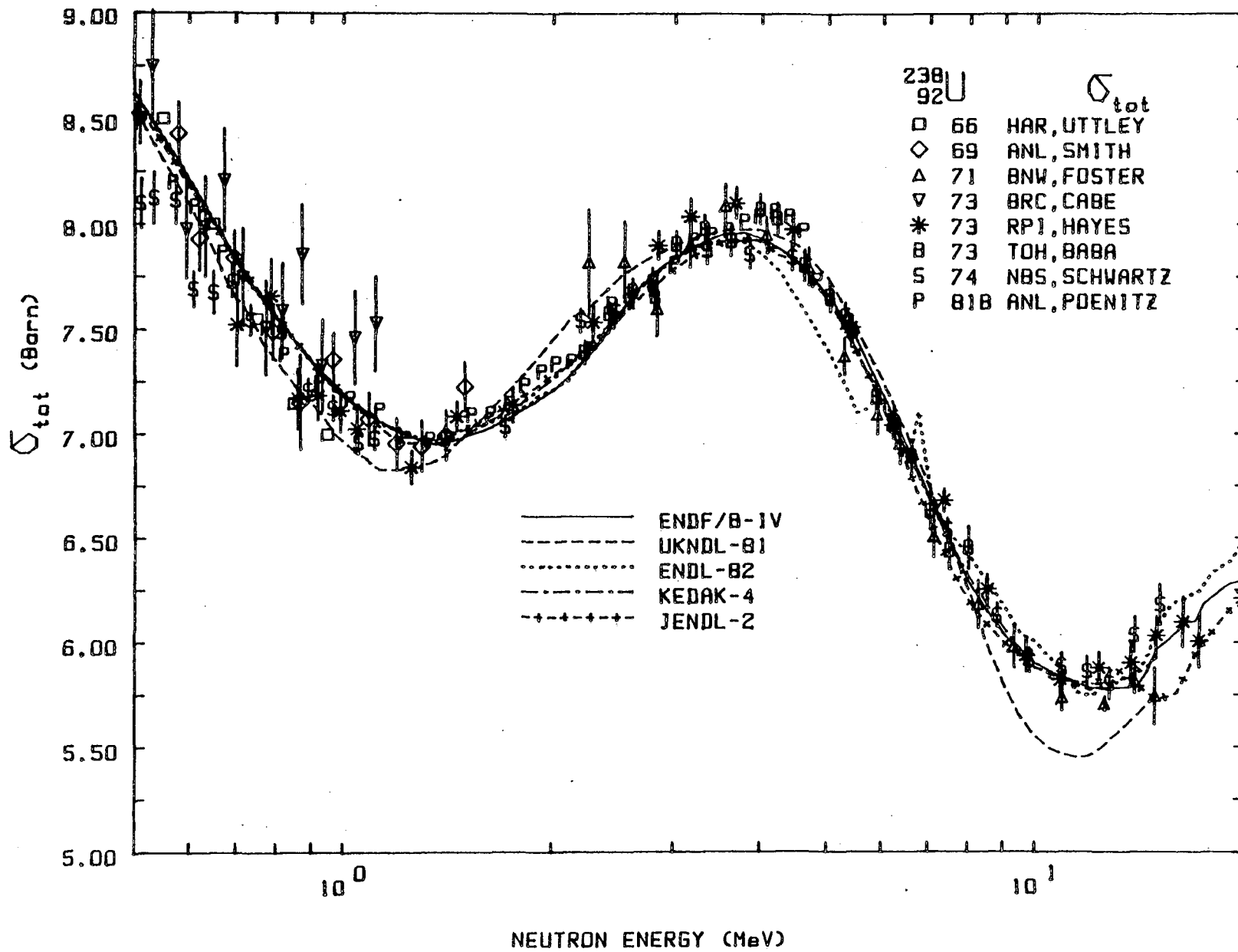
## RESONANCE INTEGRALS

Reference	$RI_\gamma$	$RI_f$	(barns)
ENDF/B - IV	268.0	0.0	
ENDF/B - V	279.5	2.032	
UKNDL -81	269.6	1.593	
ENDL -82	274.2	2.056	
KEDAK-4	279.0	1.654	
JENDL-2	279.0	2.053	
72 KJL,STEINNES	267	0.0	
BNL 325 (1984)	277	0.0	



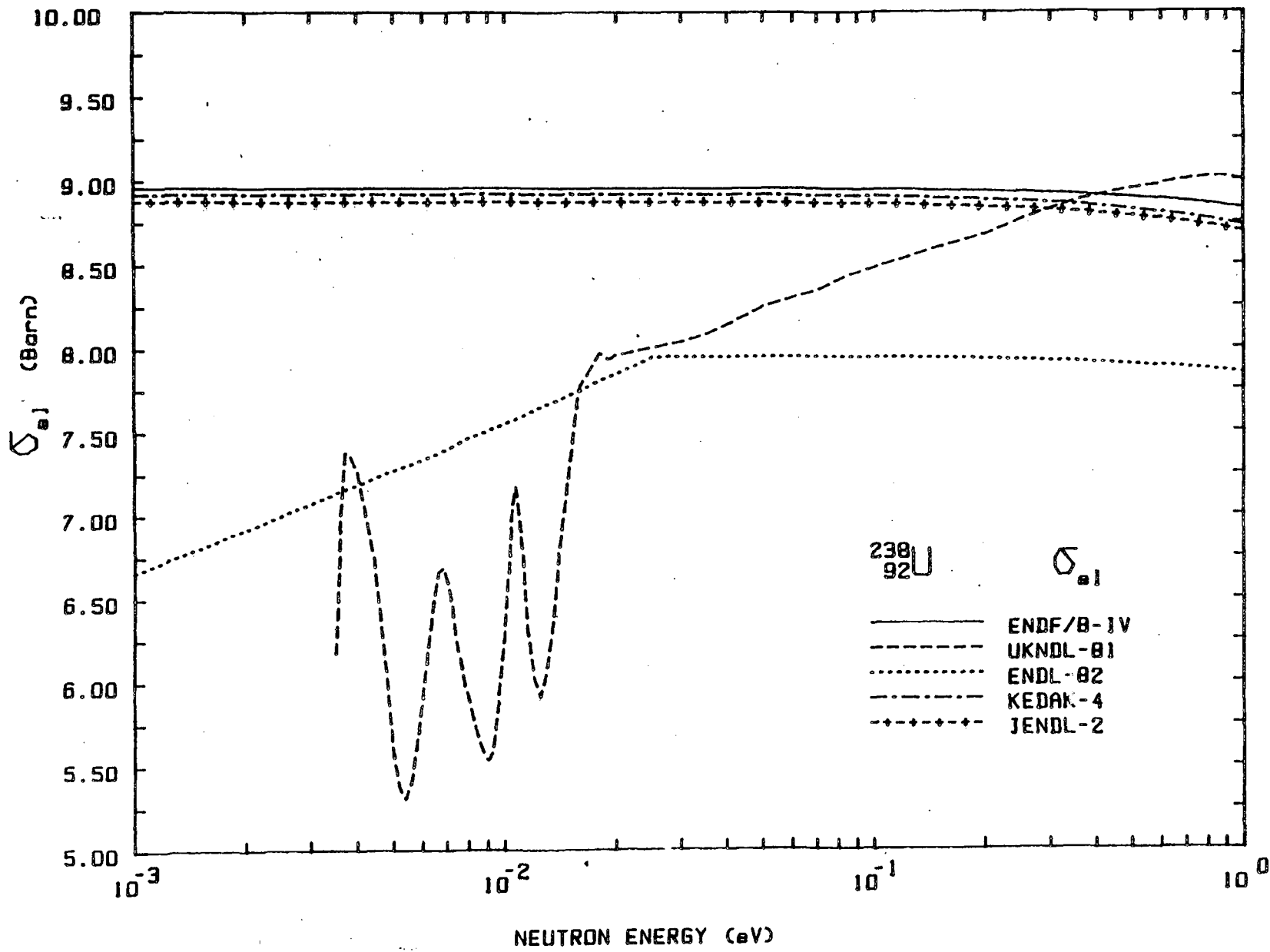


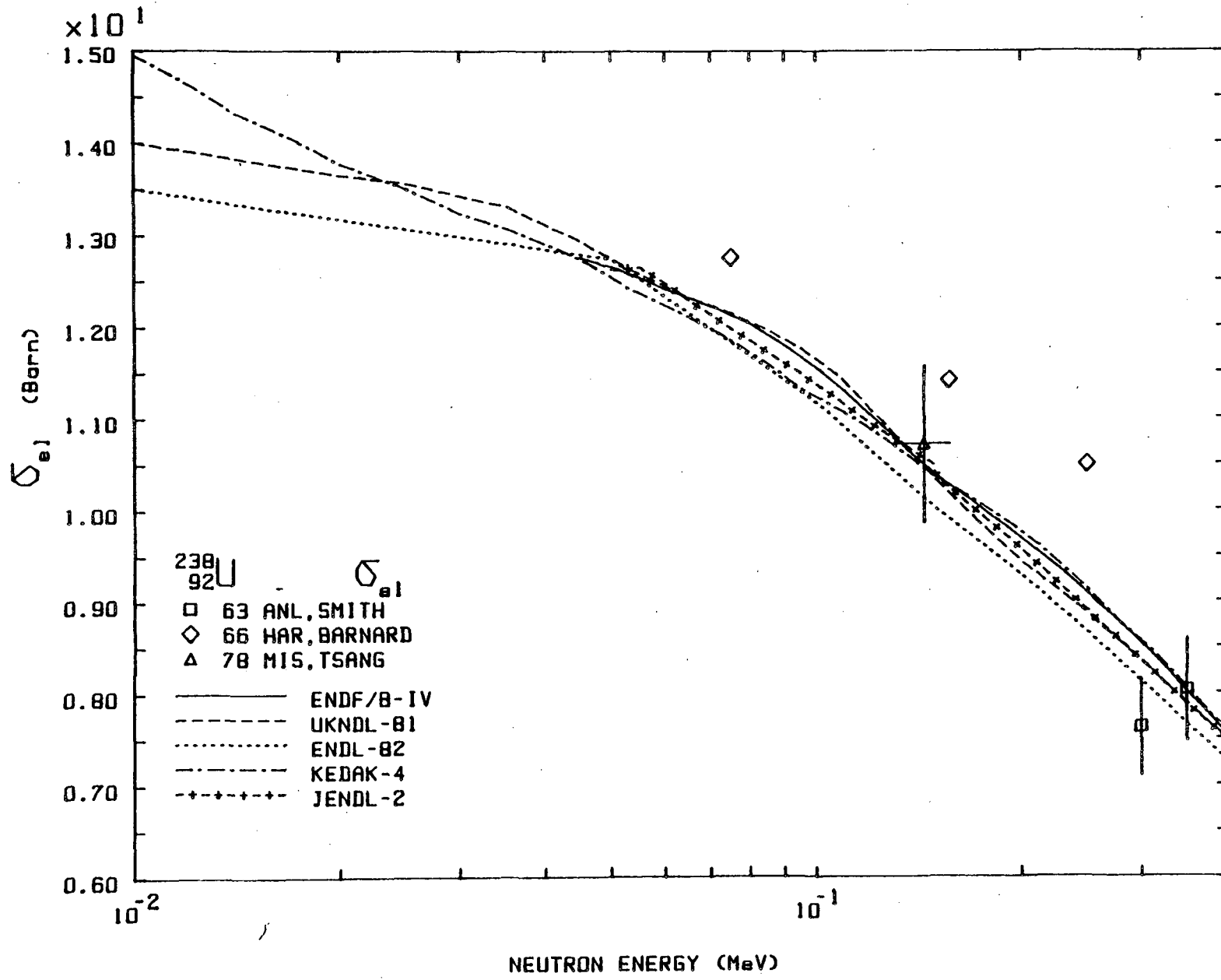


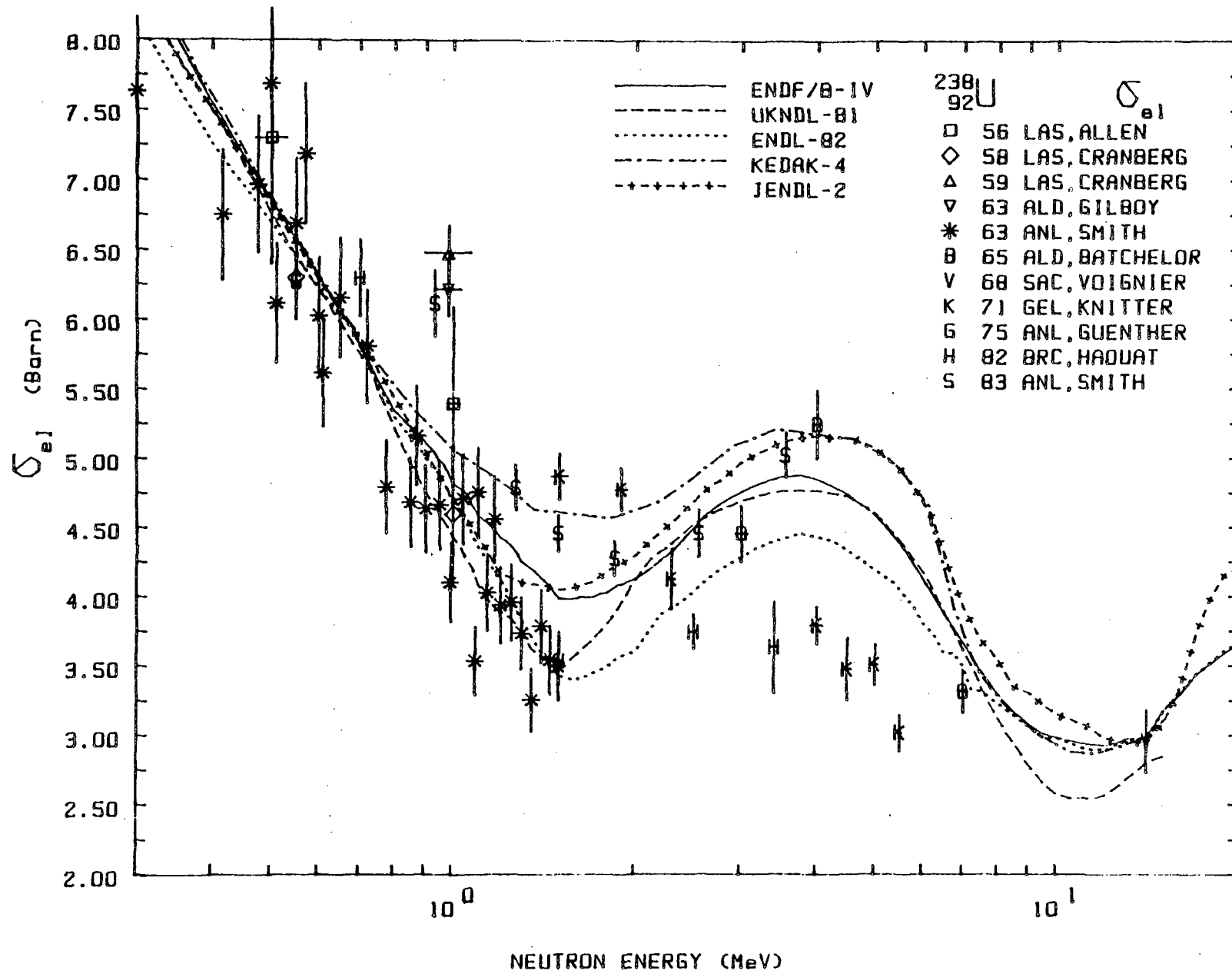


Experimental information  $^{238}\text{U}, \sigma_{\text{tot}}$

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
66 HAR, UTTLEY	34	6.5-950 keV	ABS.		
69 ANL, SMITH	524	0.1-1.5 MeV	ABS.	1.5-2 %	Stat. error
71 BNW, FOSTER	244	2.2-14.9 MeV	ABS.	1-3 %	
73 BRC, CABE	431	0.1-6.1 MeV	ABS.	3 %	Stat. error
73 RPI, HAYES	747	0.7-30 MeV	ABS.	1 %	Stat. error
73 TOH, BABA	369	2.2-8 MeV	ABS.		
74 NBS, SCHWARTZ	1 706	0.5-15.2 MeV	ABS.	1 %	Stat. error
81B ANL, POENITZ	47	0.048-4.8 MeV	ABS.	2 %	
82 CAI, ADIB	165	0.0023-2.2 eV	ABS.	---	



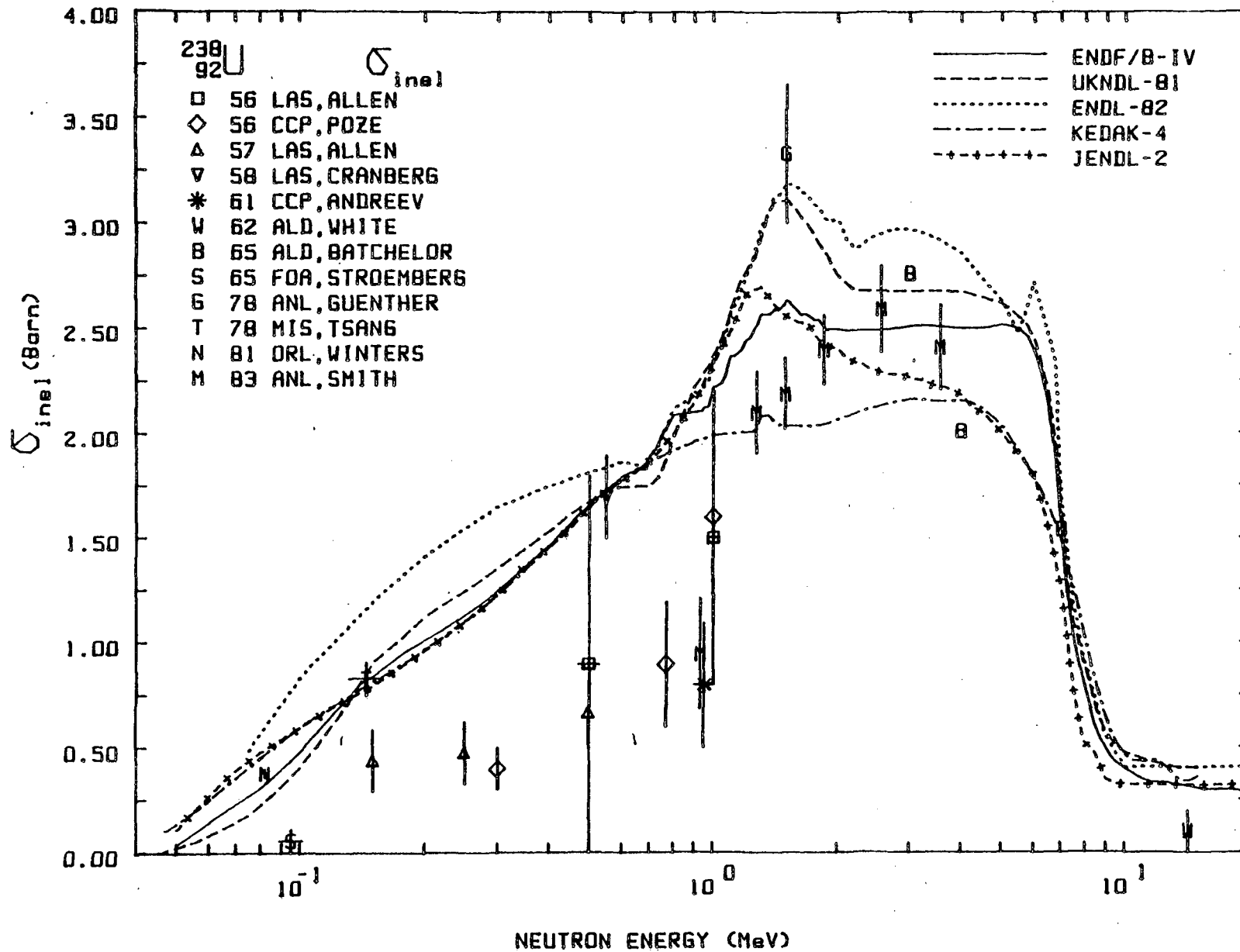




Experimental information  $^{238}\text{U}, \sigma_{n,n}$

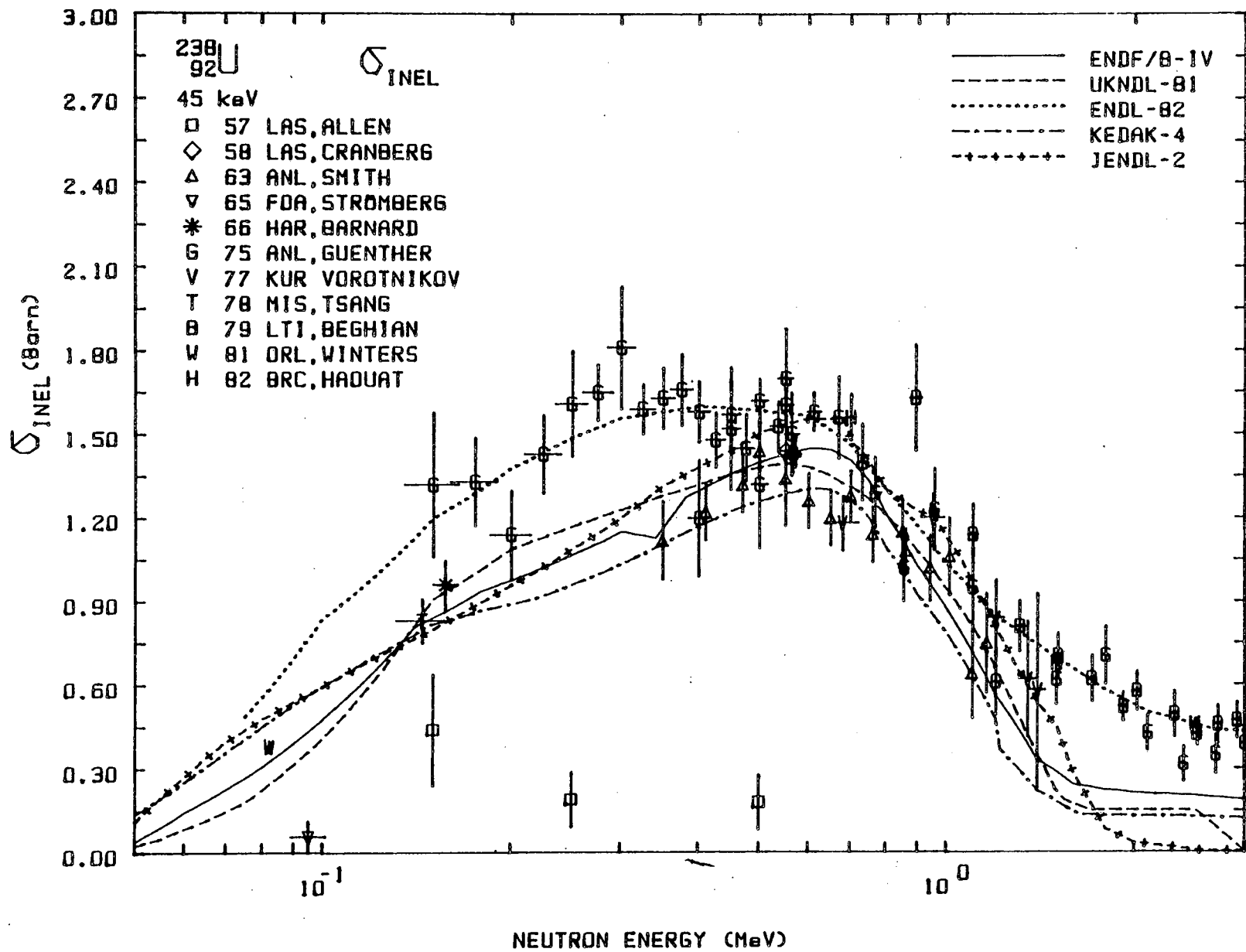
<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
51 ANL, HIBDON	1	0.0253 eV			
56 LAS, ALLEN	2	0.5-1.0 MeV	Abs.	13 %	A few hundred keV exp. resol.
58 LAS, CRANBERG	2	0.55-2.0 MeV	H, $\sigma_{n,n}$	5 %	0.5 MeV exp. resol. at 2.0 MeV
59 LAS, CRANBERG	1	0.98 MeV	Abs. H, $\sigma_{n,n}$	3 %	Sum of elastic and unresolved inelastic cross sections to 45 and 148 keV levels
63 ALD, GILBOY	1	0.98 MeV	H, $\sigma_{n,n}$	3 %	0.25 MeV exp. resol.
63 ANL, SMITH	30	0.3-1.5 MeV	C, $\sigma_{n,n}$	7 %	
65 ALD, BATCHELOR	4	2-7 MeV	H, $\sigma_{n,n}$	5 %	0.57-2.6 MeV exp. resol.
66 HAR, BARNARD	5	0.075-0.550 MeV	Abs.		
68 SAC, VOIGNIER	1	14.1 MeV	Abs.	8 %	
71 GEL, KNITTER	7	1.5-5.5 MeV	H, $\sigma_{n,n}$	3-6 %	0.5 MeV exp. resol. for $E_n < 2.3$ MeV 1.5 MeV exp. resol. for $E_n > 2.3$ MeV
75 ANL, GUENTHER	1	0.55 MeV	C, $\sigma_{n,n}$	3 %	
78 MIS, TSANG	1	0.144 MeV	Pb, $\sigma_{n,n}$	8 %	13 keV exp. resol.
82 BRC, HAOUAT	4	0.7-3.4 MeV	Abs.	3-9 %	Exp. resol. 8-28 keV
83 ANL, SMITH	6	0.93-3.55 MeV	C, $\sigma_{n,tot}$	3-4 %	Sum of elastic and unresolved inelastic cross sections to 45 keV level for $E_n < 1.85$ MeV 45 and 148 keV levels for $E_n > 1.85$ MeV





Experimental information  $^{238}\text{U}, \sigma_{n,n}, \text{total}$

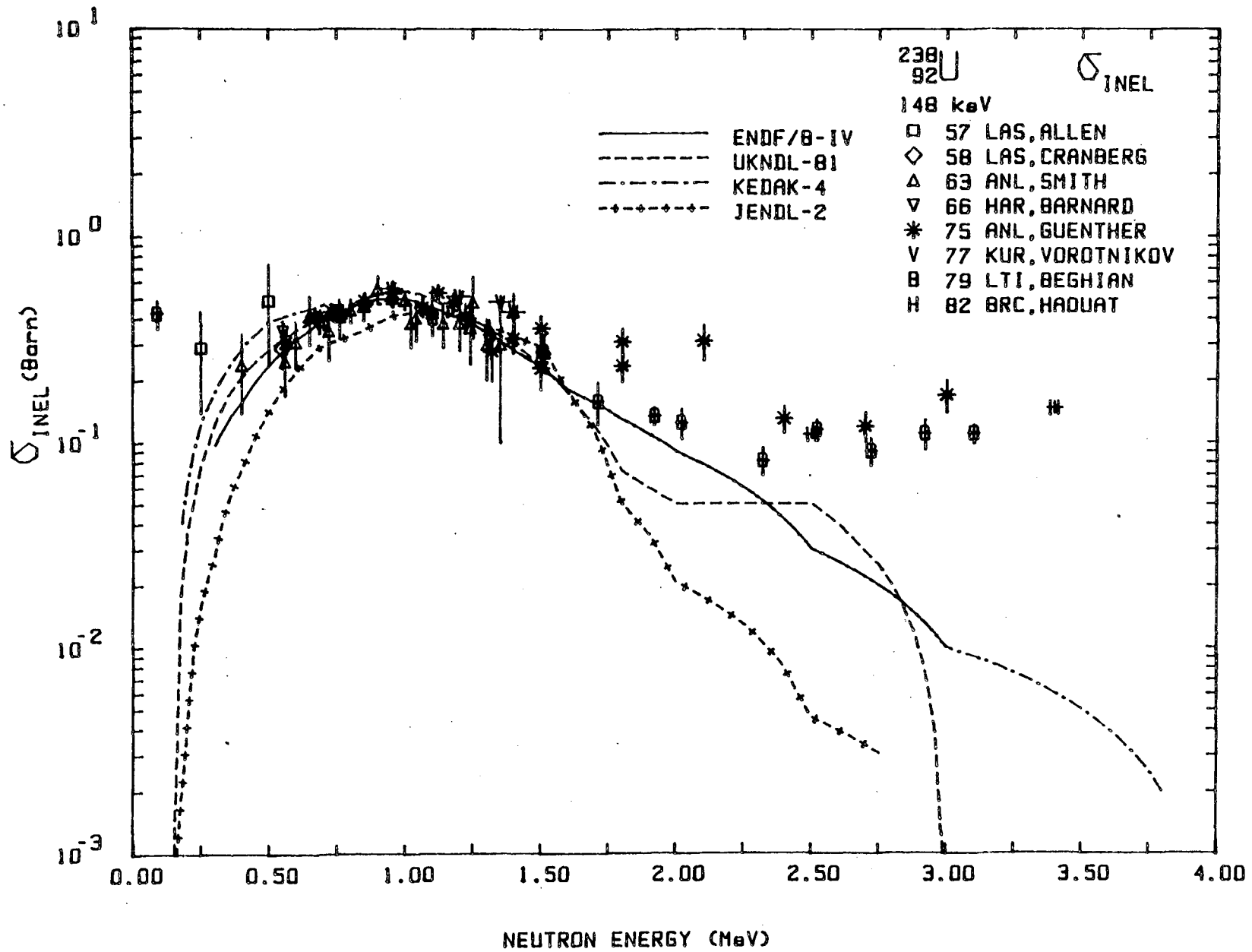
<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
56 CCP, POZE	3	0.3-1.0 MeV		30 %	
56 LAS, ALLEN	2	0.5-1.0 MeV	Abs.	50-100 %	A few hundred keV exp. resol.
57 LAS, ALLEN	3	0.15-0.5 MeV		20-45 %	
57 LAS, ROSEN	1	14 MeV		15 %	-6.5 MeV < Q < -2.0 MeV
58 LAS, CRANBERG	3	0.55-2.00 MeV	H, $\sigma_{n,n}$	8-20 %	45 and 148 keV levels not included for $E_n = 2.0$ MeV
61 ALD, ALLEN	1	14 MeV	Abs.		Upper limit given
61 CCP, ANDREEV	1	0.95 MeV		40 %	
62 ALD, WHITE	1	14.2 MeV		200 %	
65 ALD, BATCHELOR	3	3-7 MeV	H, $\sigma_{n,n}$		
65 FOA, STRÖMBERG	1	0.095 MeV	$^{238}\text{U}, \sigma_{n,n}$	250 %	
78 ANL, GUENTHER	1	1.5 MeV	H, $\sigma_{n,n}$	10 %	
78 MIS, TSANG	1	0.144 MeV	Pb, $\sigma_{n,n}$	10 %	
81 ORL, WINTERS	1	0.082 MeV	$^{238}\text{U}, \sigma_{n,n}$	5 %	
83 ANL, SMITH	6	0.93-3.55 MeV	C, $\sigma_{n,tot}$	7-30 %	45 keV level not included 148 keV level not included for $E_n > 2.55$ MeV



Experimental information  $^{238}\text{U}, \sigma_{n,n}, Q = -45 \text{ keV}, 2+$

Reference	Points	Range	Standard	Error	Comments
57 LAS, ALLEN	3	0.15-0.50 MeV		50 %	Q = -50 keV
58 LAS, CRANBERG	1	0.55 MeV	H, $\sigma_{n,n}$	20 %	Q = -44±4 keV
63 ANL, SMITH	16	0.35-1.16 MeV	C, $\sigma_{n,n}$	4-25 %	Q = -45±3 keV
65 FOA, STROEMBERG	1	0.095 MeV	$^{238}\text{U}, \sigma_{n,n}$	250 %	
66 HAR, BERNARD	1	0.157 MeV	Abs.	10 %	Q = -45 keV Int $\sigma = 4\pi\sigma(90^\circ)$
75 ANL, GUENTHER	37	0.15-3.00 MeV	C, $\sigma_{n,n}$ H, $\sigma_{n,n}$	4-30 %	Q = -45 keV
77 KUR, VOROTNIKOV	5	0.68-1.40 MeV	Abs.	8-60 %	Q = -45 keV
78 MIS, TSANG	1	0.144 MeV	Pb, $\sigma_{n,n}$	10 %	
79 LTI, BEGHIAN	12	0.89-3.10 MeV	Abs.	10-17 %	Q = -45 keV, exp. resol. 20 keV
81 ORL, WINTERS	1	0.082 MeV	$^{238}\text{U}, \sigma_{n,n}$	5 %	Q = -44.9 keV
82 BRC, HAOUAT	4	0.7-3.4 MeV	Abs.	4-12 %	Q = -45 keV, exp. resol. 8-28 keV

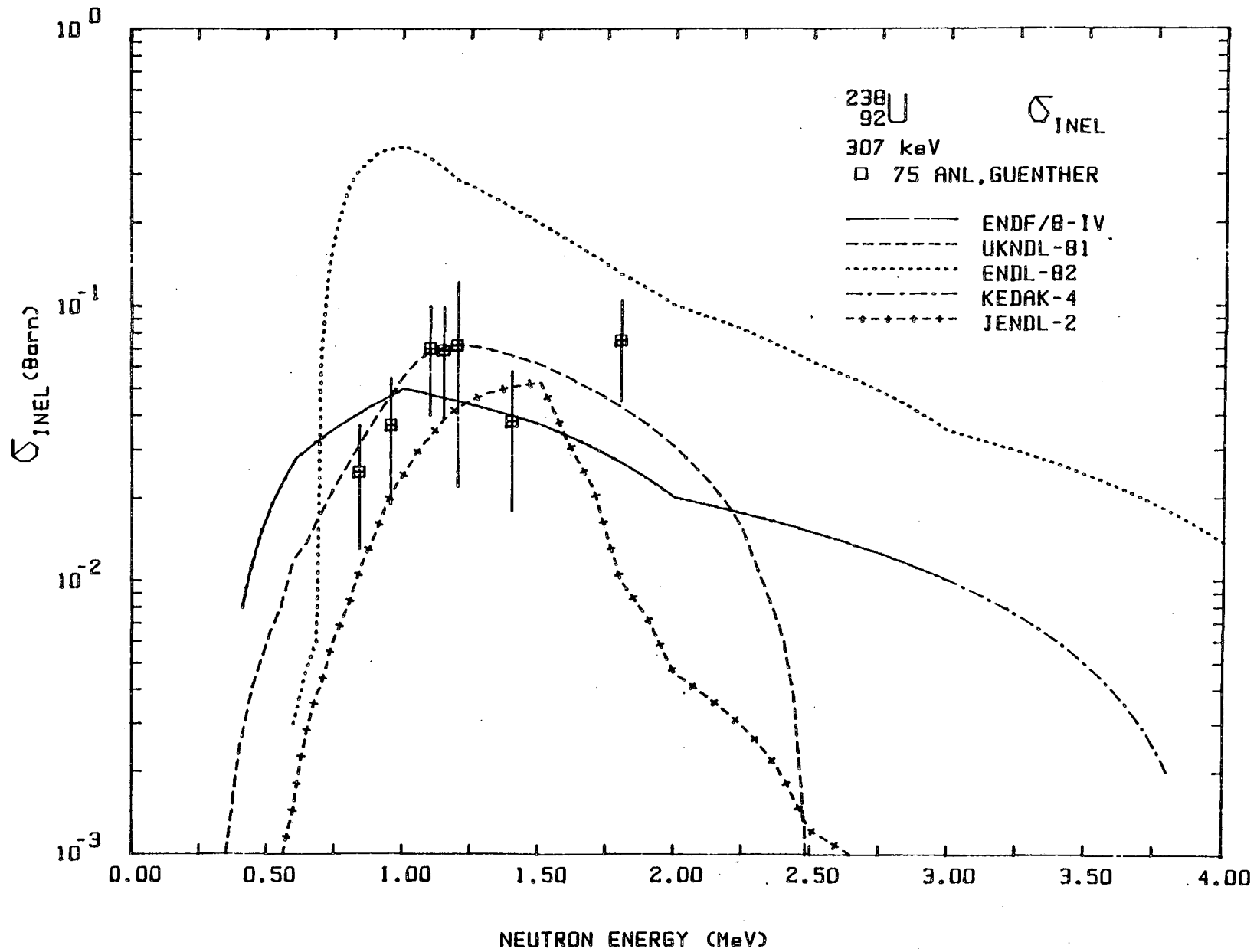
-73-



Experimental information  $^{238}\text{U}, \sigma_{n,n}, Q = -148 \text{ keV}, 4+$

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
57 LAS, ALLEN	2	0.25-0.50 MeV		50 %	$Q = -140 \text{ keV}$
58 LAS, CRANBERG	1	0.55 MeV	H, $\sigma_{n,n}$	20 %	$Q = -146 \pm 6 \text{ keV}, \text{Int}\sigma = 4\pi\sigma (90^\circ)$
63 ANL, SMITH	21	0.40-1.40 MeV	C, $\sigma_{n,n}$	10-70 %	$Q = -150 \pm 5 \text{ keV}$
66 HAR, BARNARD	1	0.550 MeV	Abs.	10 %	$Q = -149 \pm 2 \text{ keV}, \text{Int}\sigma = 4\pi\sigma (90^\circ)$
75 ANL, GUENTHER	20	0.56-3.00 MeV	C, $\sigma_{n,n}$	10-30 %	$Q = -148 \text{ keV}$
77 KUR, VOROTNIKOV	5	0.68-1.40 MeV	Abs.	7-10 %	$Q = -148 \text{ keV}$
79 LTI, BEGHIAN	12	0.89-3.10 MeV	Abs.	10-23 %	$Q = -148 \text{ keV}, \text{exp. resol.}$ 20 keV
82 BRC, HAOUAT	4	0.7-3.4 MeV	Abs.	4-7 %	$Q = -148 \text{ keV}, \text{exp. resol.}$ 8-28 keV

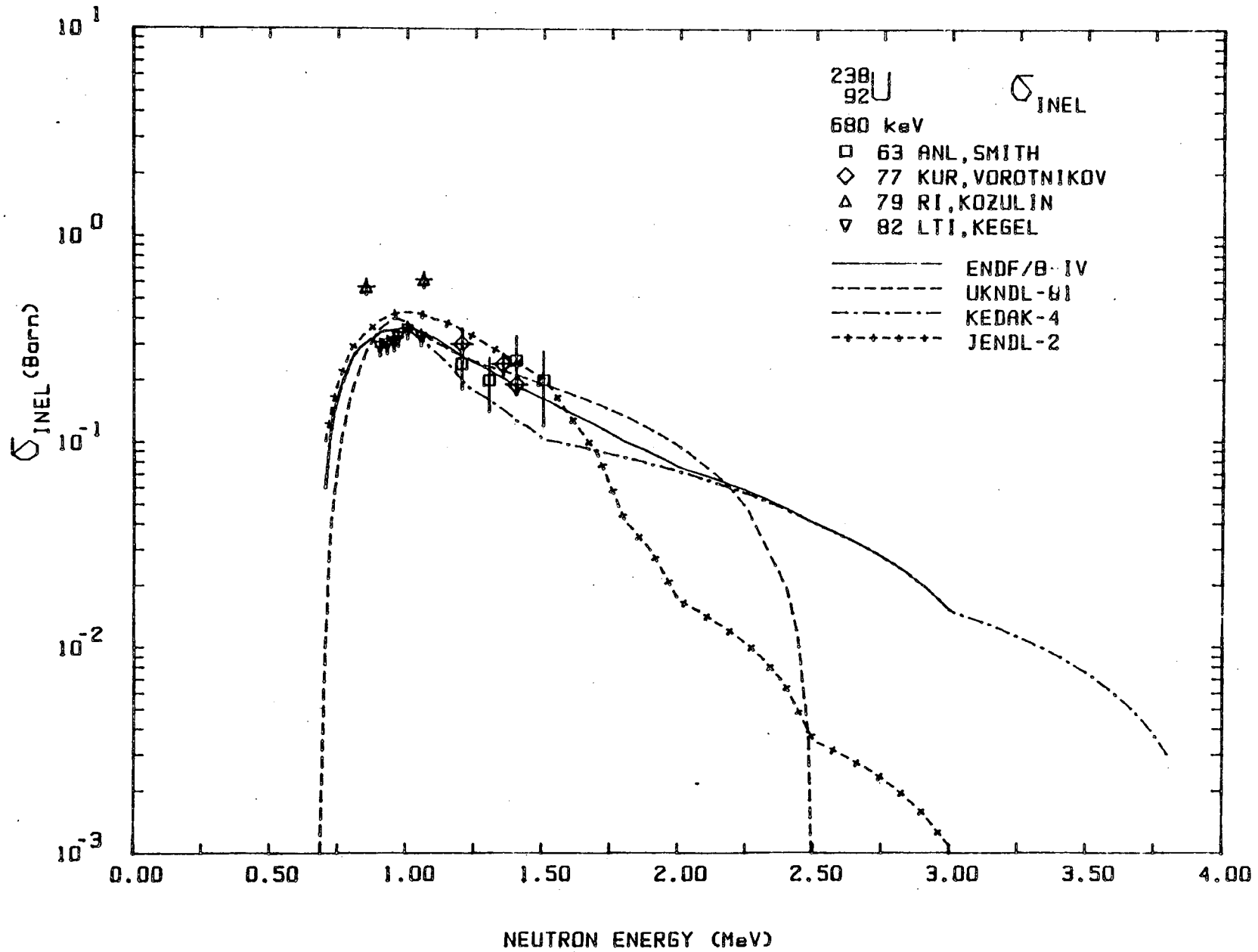
-75-



Experimental information  $^{238}\text{U}, \sigma_{n,n'}, Q = -307 \text{ keV}, 6+$

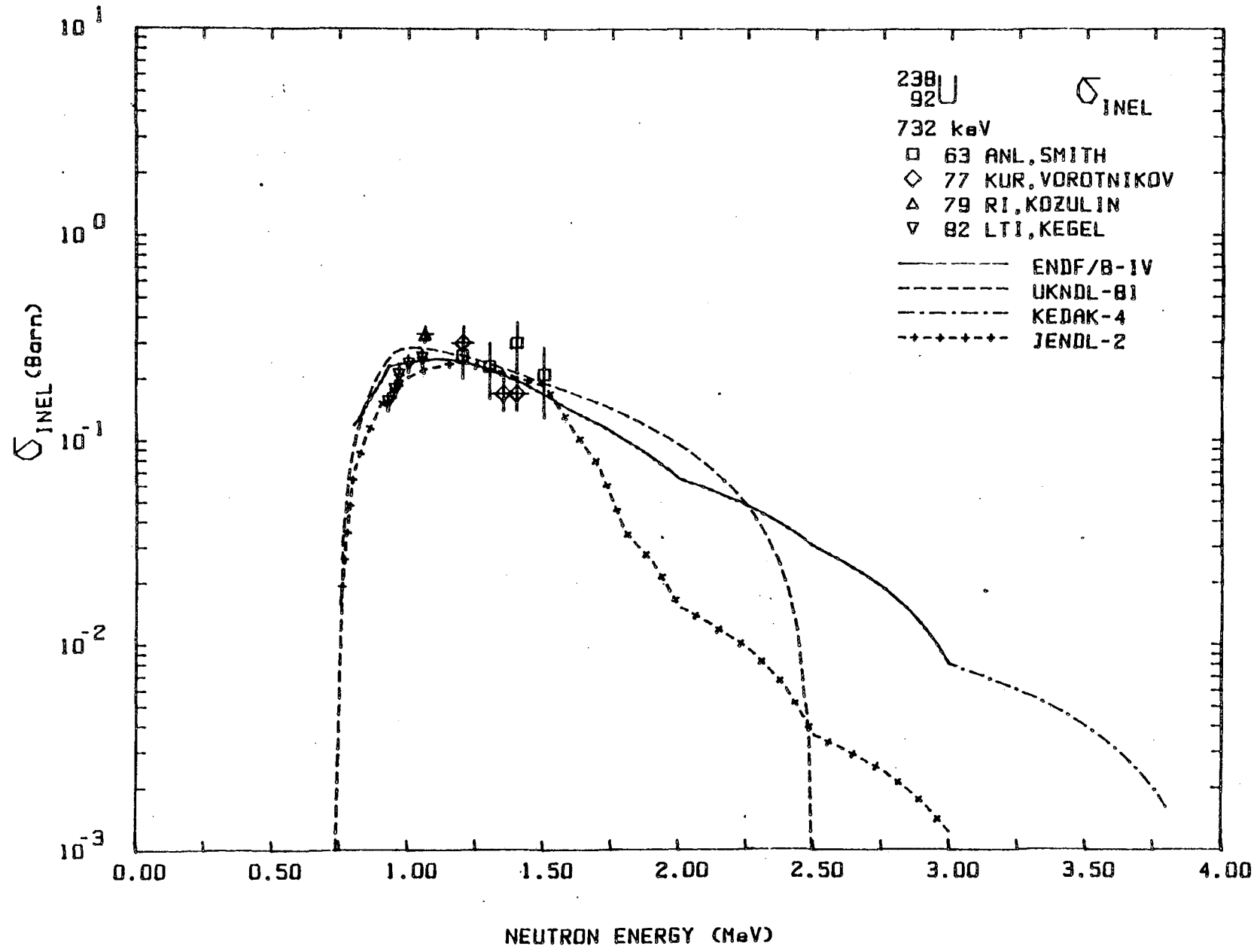
<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
75 ANL, GUENTHER	7	0.84-1.80 MeV	C, $\sigma_{n,n}$ H, $\sigma_{n,n}$	40-70 %	Q = -308 keV





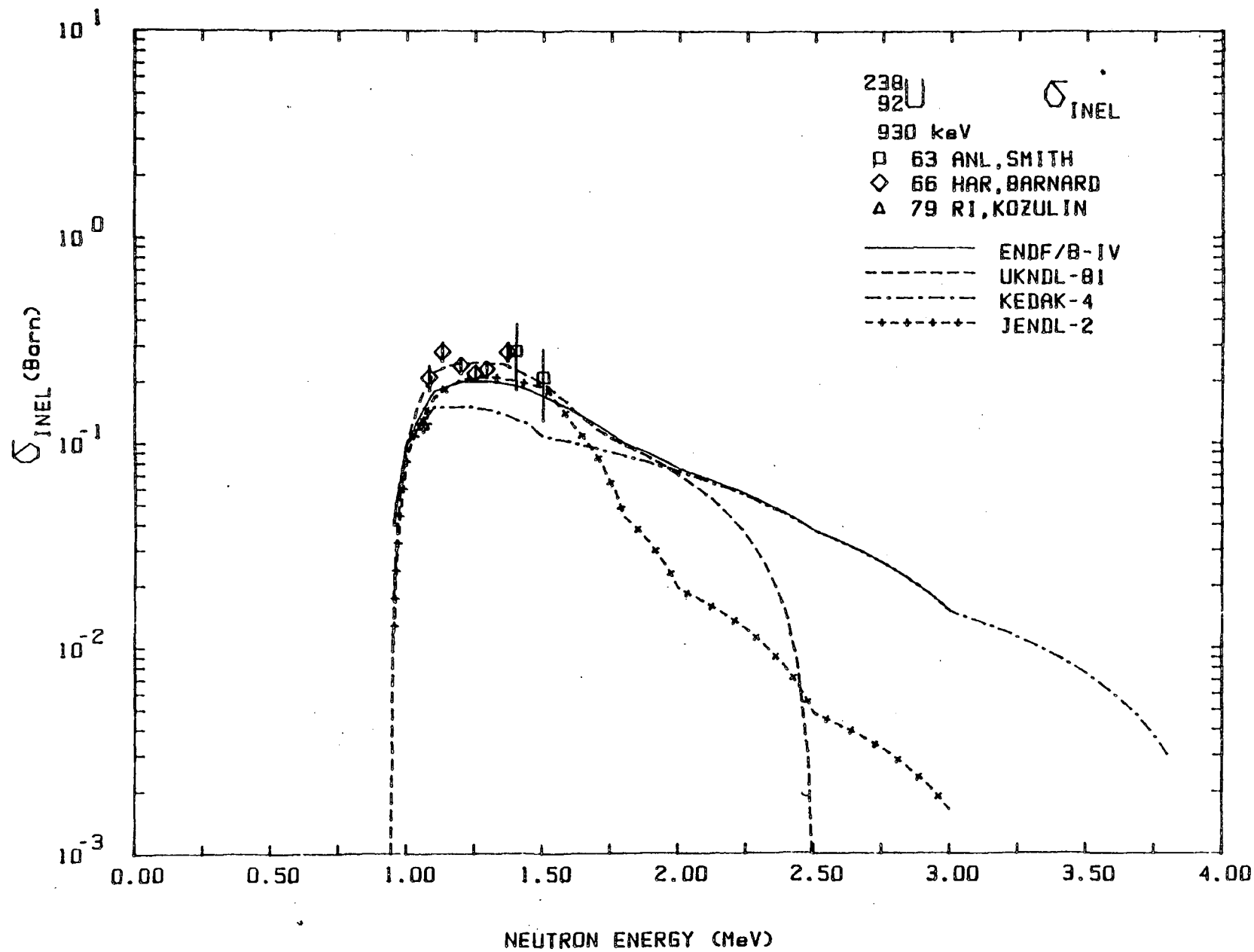
Experimental information  $^{238}\text{U}, \sigma_{n,n'}, Q = -680 \text{ keV}, 1-$

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
63 ANL, SMITH	4	1.20-1.50 MeV	C, $\sigma_{n,n}$	25-40 %	$Q = -630 \pm 20 \text{ keV}$
77 KUR, VOROTNIKOV	3	1.20-1.40 MeV	Abs.	10-20 %	$Q = -680 \text{ keV}$
79 RI, KOZULIN	2	0.85-1.06 MeV	$^{235}\text{U}, \sigma_{n,f}$	9 %	$Q = -680 \text{ keV}, \text{Int}\sigma = 4\pi\sigma(90^\circ),$ $(n,n'\gamma) \text{ meas}$
82 LTI, KEGEL	6	0.90-1.05 MeV	$^{235}\text{U}, \sigma_{n,f}$	10 %	$Q = -680.1 \text{ keV}$



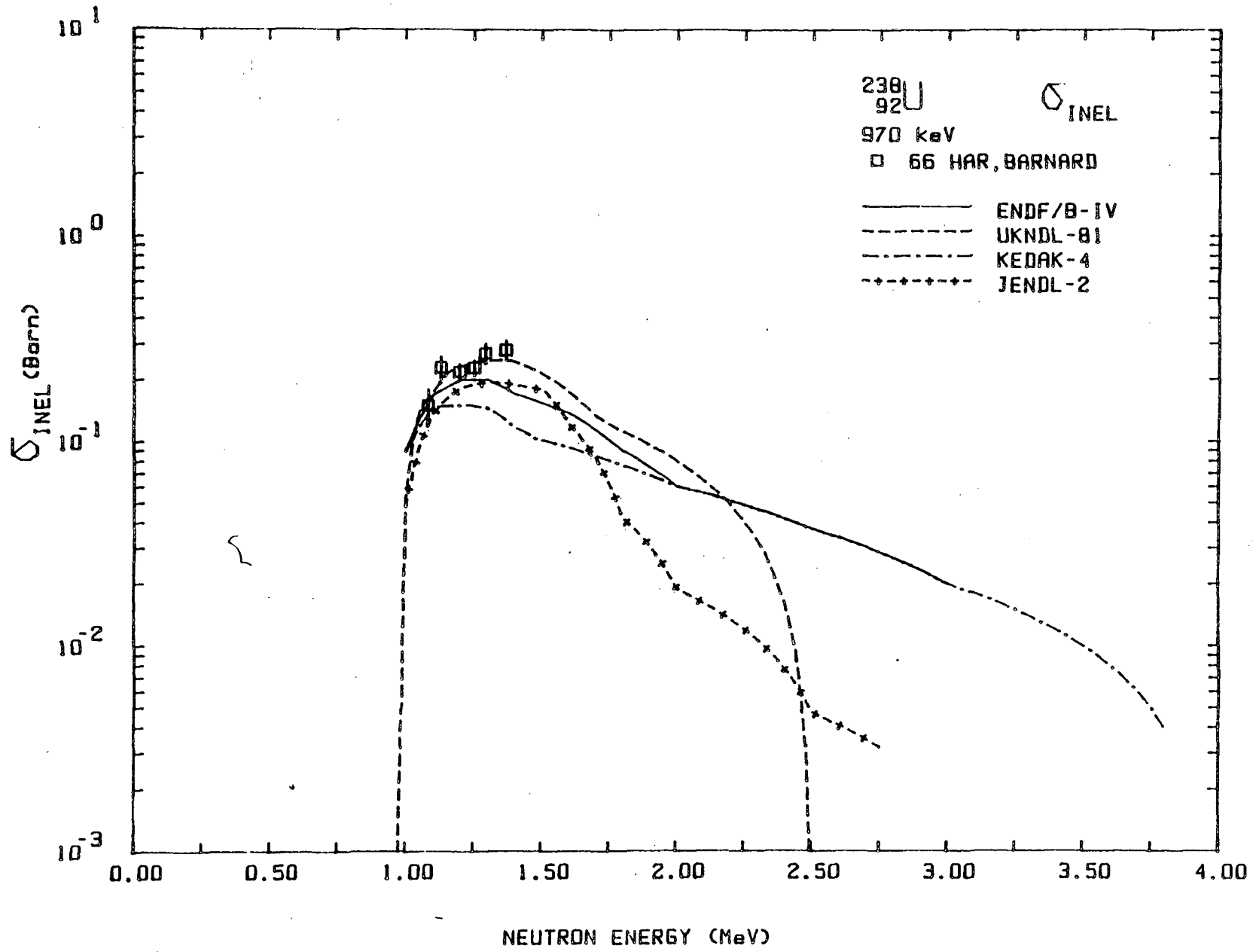
Experimental information  $^{238}\text{U}, \sigma_{n,n'}$ ,  $Q = -732 \text{ keV}$ , 3-

	<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
63	ANL, SMITH	4	1.20-1.50 MeV	C, $\sigma_{n,n}$	25-40 %	$Q = -720 \pm 20 \text{ keV}$
77	KUR, VOROTNIKOV	3	1.20-1.40 MeV	Abs.	20 %	$Q = -730 \text{ keV}$
79	RI, KOZULIN	1	1.06 MeV	$^{235}\text{U}, \sigma_{n,f}$	9 %	$Q = -732 \text{ keV}$ , Int $\sigma = 4\pi \sigma(90^\circ)$ , $n, n'$ gamma
82	LTI, KEGEL	5	0.925-1.050 MeV	$^{235}\text{U}, \sigma_{n,f}$	10 %	$Q = -731.9 \text{ keV}$



Experimental information  $^{238}\text{U}$ ,  $\sigma_{n,n'}$ ,  $Q = -930$  keV

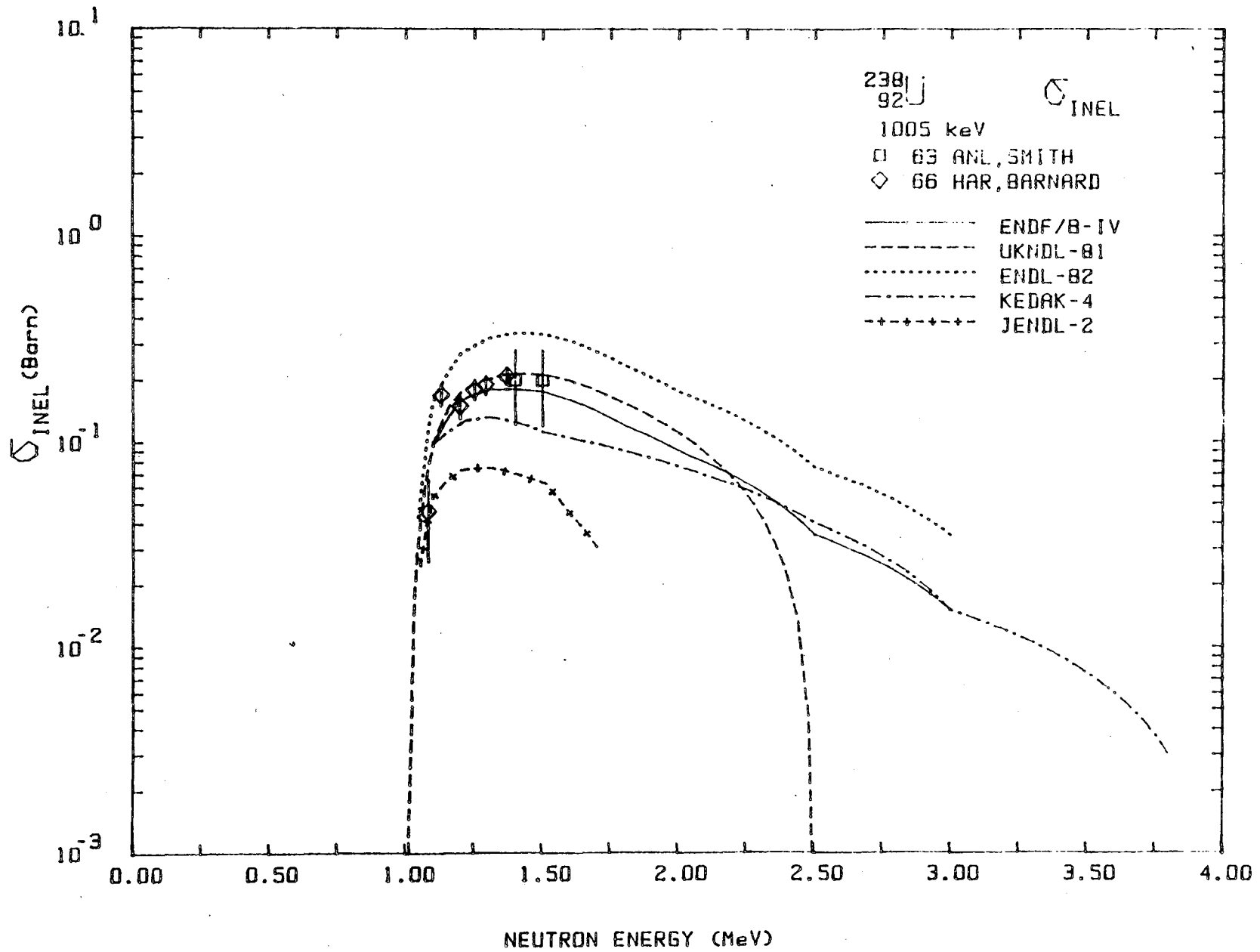
<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
63 ANL, SMITH	2	1.40-1.50 MeV	C, $\sigma_{n,n}$	35 %	$Q = -930 \pm 30$ keV
66 HAR, BARNARD	6	1.081-1.368 MeV	Abs.	10 %	$Q = -939 \pm 5$ keV, Int $\sigma = 4\pi \sigma(90^\circ)$
79 RI, KOZULIN	1	1.06 MeV	$^{235}\text{U}$ , $\sigma_{n,f}$	9 %	$Q = -930$ keV, Int $\sigma = 4\pi \sigma(90^\circ)$ , n,n'gamma



Experimental information  $^{238}\text{U}, \sigma_{n,n'}, Q = -970 \text{ keV}$

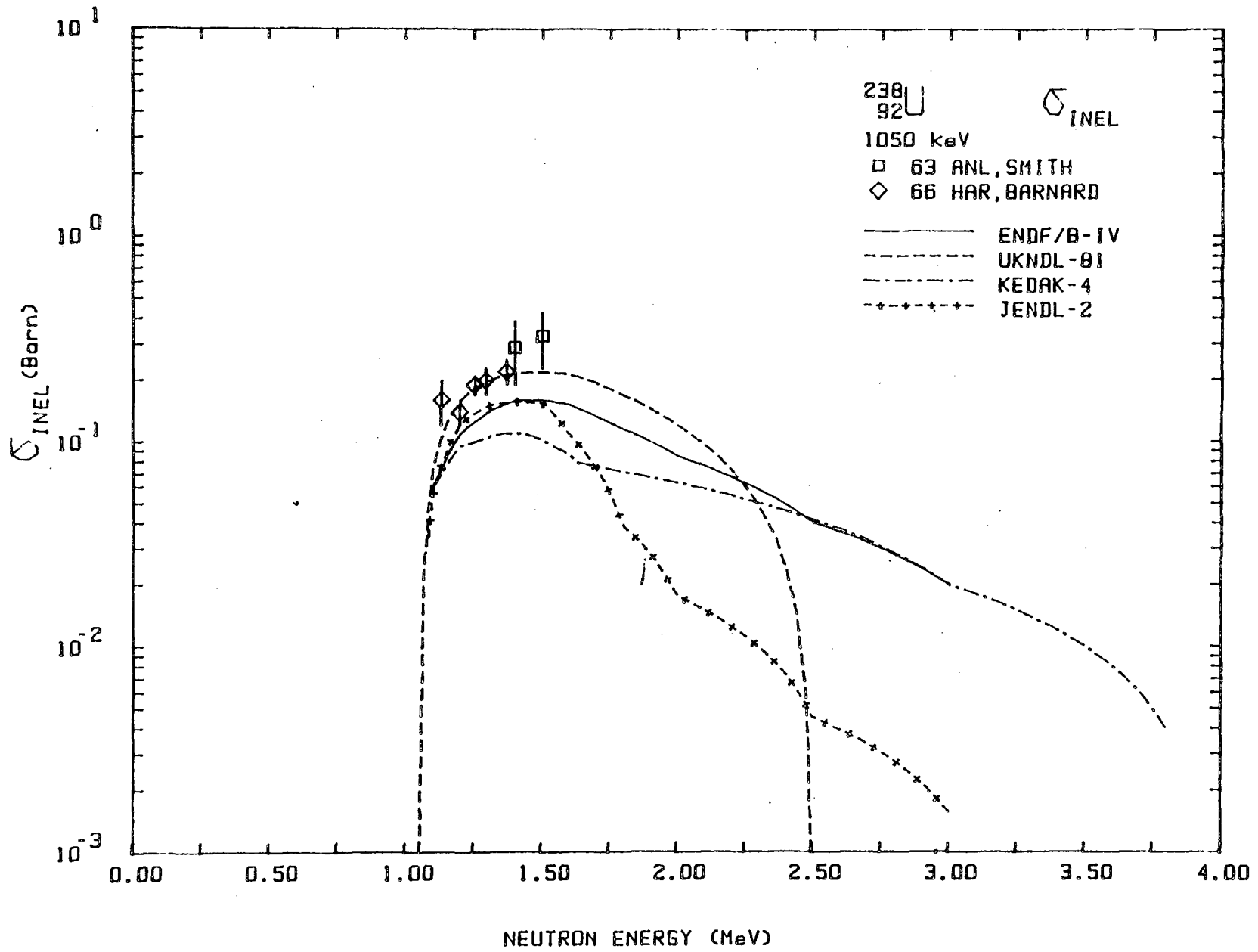
<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
66 HAR, BERNARD	6	1.081-1.368 MeV	Abs.	10-20 %	$Q = -968 \pm 6 \text{ keV},$ $\text{Int } \sigma = 4\pi \sigma(90^\circ),$





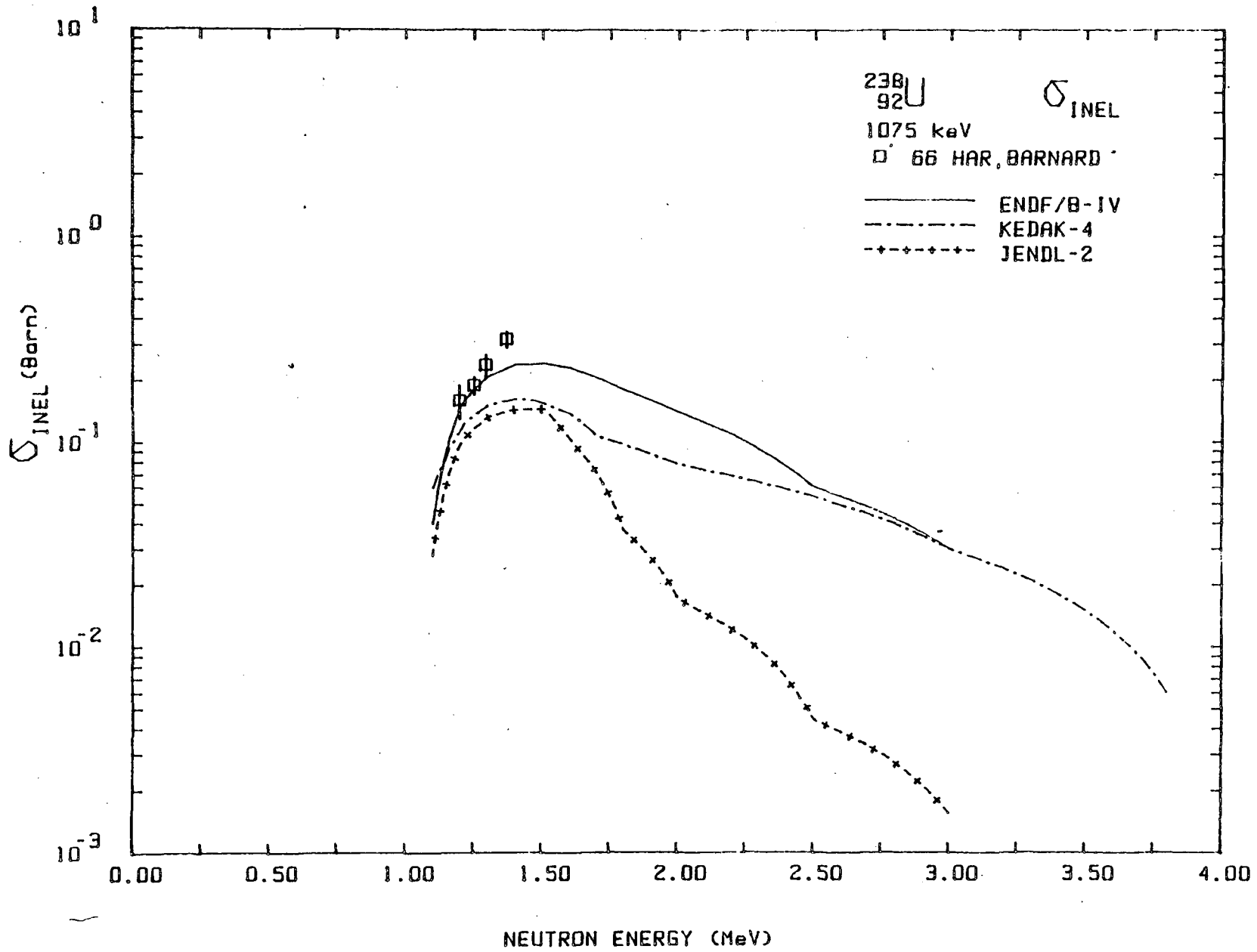
Experimental information  $^{238}\text{U}, \sigma_{n,n'}, Q = -1005 \text{ keV}$

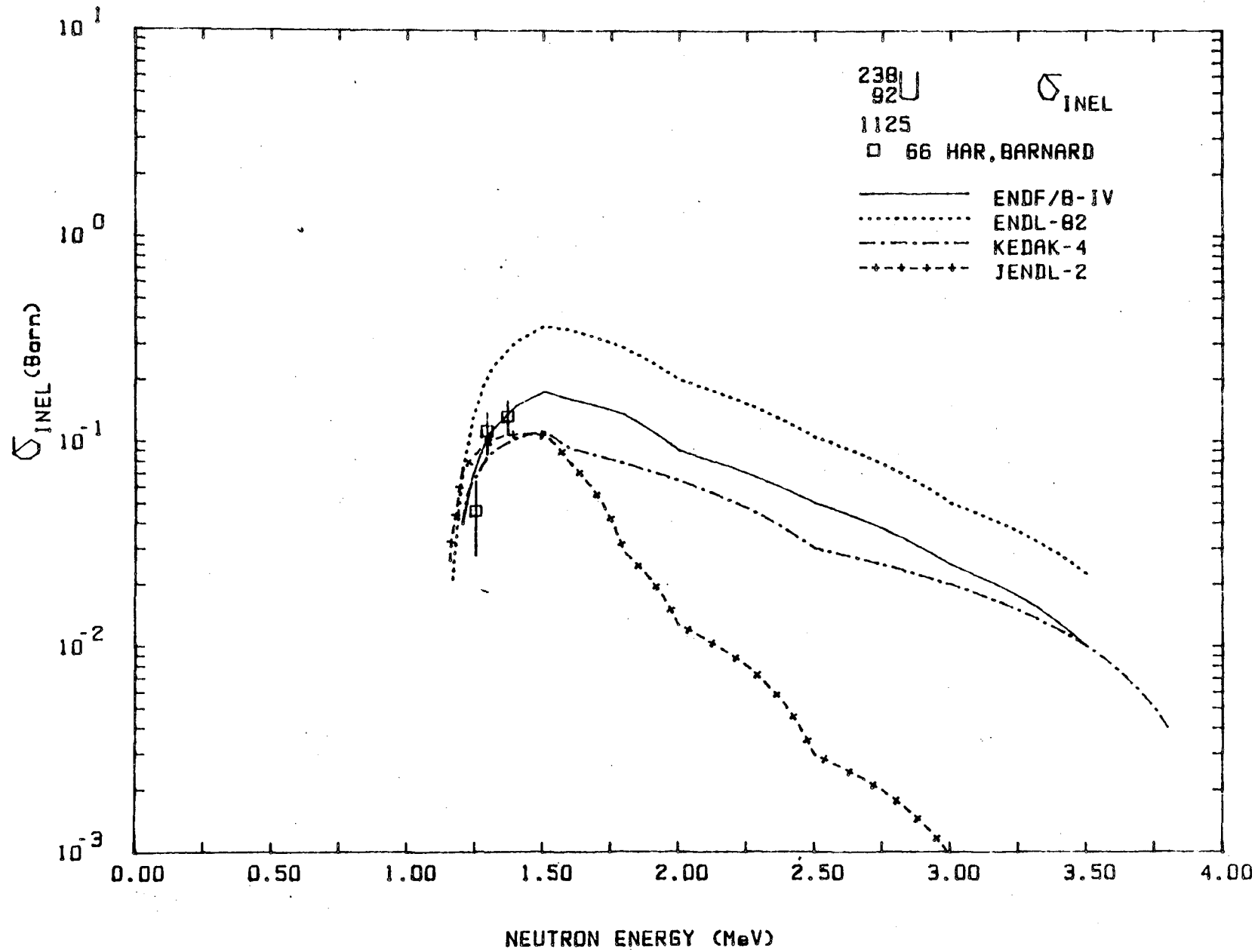
	<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
63	ANL, SMITH	2	1.40-1.50 MeV	C, $\sigma_{n,n}$	40 %	$Q = -1000 \pm 30 \text{ keV}$
66	HAR, BERNARD	6	1.081-1.368 MeV	Abs.	10-40 %	$Q = -1006 \pm 6 \text{ keV}$ Int $\sigma = 4\pi \sigma(90^\circ)$ ,

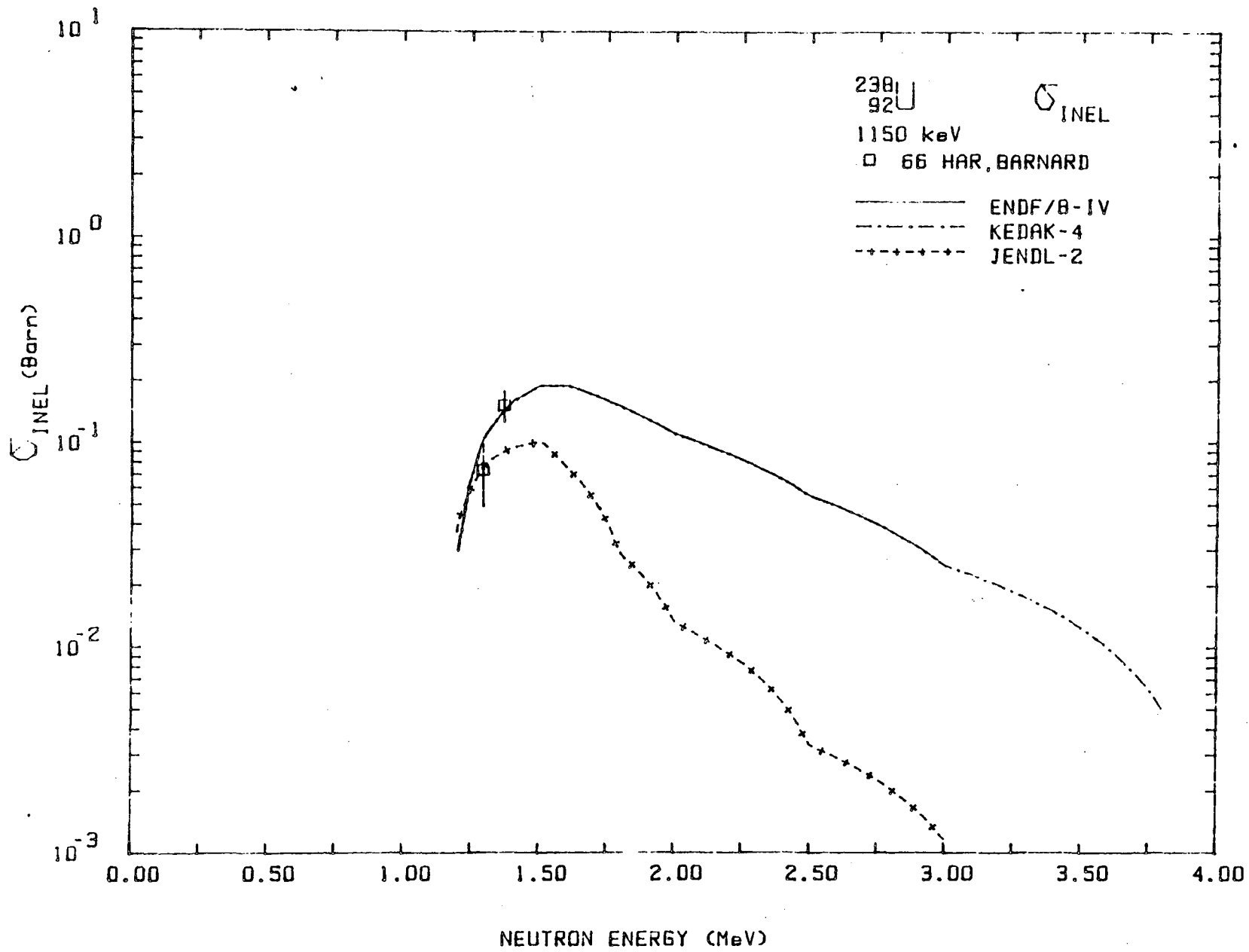


Experimental information  $^{238}\text{U}, \sigma_{n,n'}, Q = -1050 \text{ keV}$

	<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
63	ANL, SMITH	2	1.40-1.50 MeV	C, $\sigma_{n,n}$	30-35 %	$Q = -1050 \pm 30 \text{ keV}$
66	HAR, BARNARD	5	1.129-1.368 MeV	Abs.	10-25 %	$Q = -1047 \pm 7 \text{ keV}$ Int $\sigma = 4\pi \sigma(90^\circ)$







Experimental information  $^{238}\text{U}, \sigma_{n,n'}, Q = -1075 \text{ keV}$

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
66 HAR, BARNARD	4	1.198-1.368 MeV	Abs.	10-20 %	$Q = -1076 \pm 7 \text{ keV}$ $\text{Int } \sigma = 4\pi \sigma(90^\circ)$

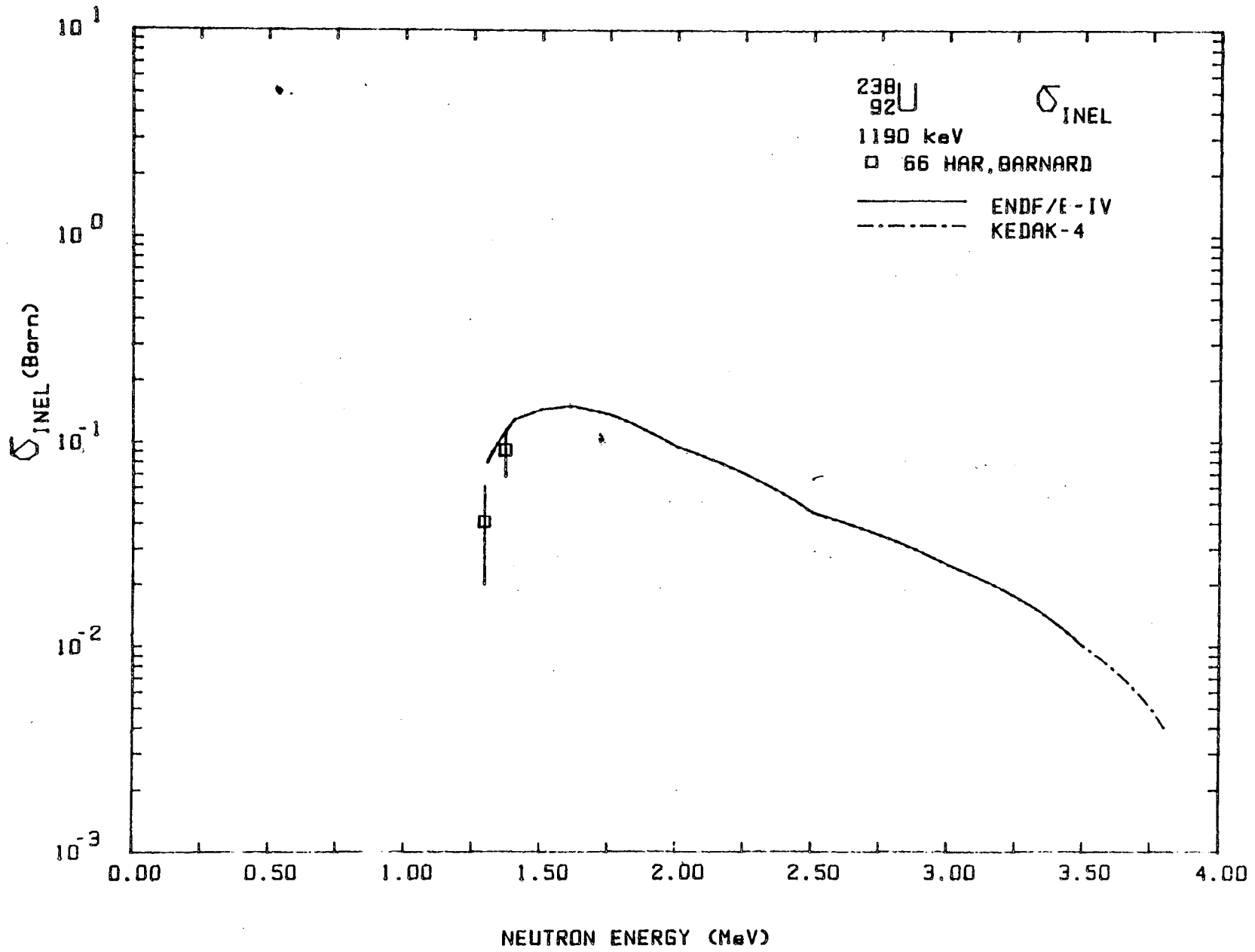
Experimental information  $^{238}\text{U}, \sigma_{n,n'}, Q = -1125 \text{ keV}$

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
66 HAR, BARNARD	3	1.251-1.368 MeV	Abs.	20-40 %	$Q = -1123 \pm 8 \text{ keV}$ $\text{Int } \sigma = 4\pi \sigma(90^\circ)$

Experimental information  $^{238}\text{U}, \sigma_{n,n'}, Q = -1150 \text{ keV}$

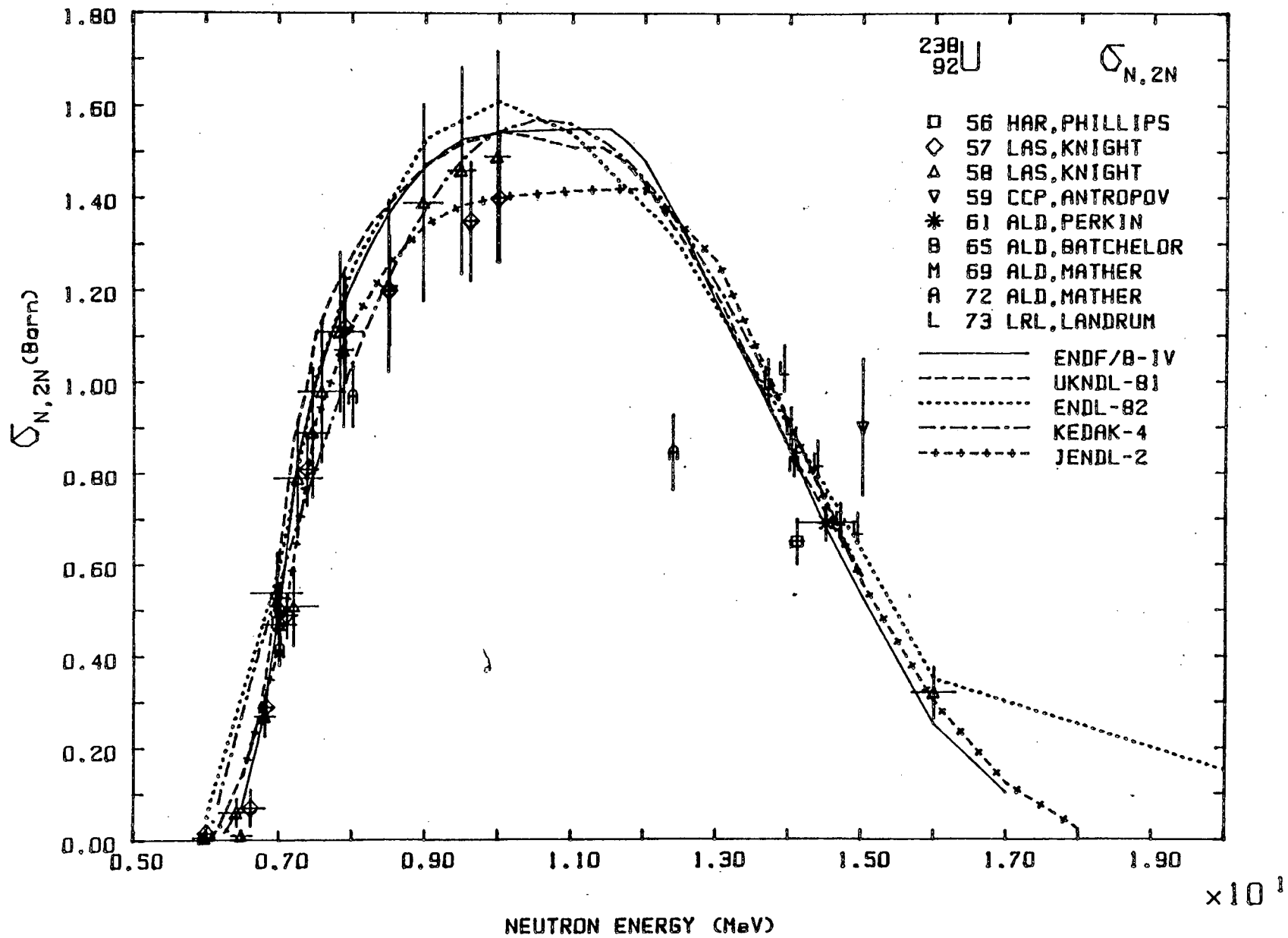
<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
66 HAR, BARNARD	2	1.292-1.368 MeV	Abs.	20-30 %	$Q = -1150 \pm 8 \text{ keV}$ $\text{Int } \sigma = 4\pi \sigma(90^\circ)$

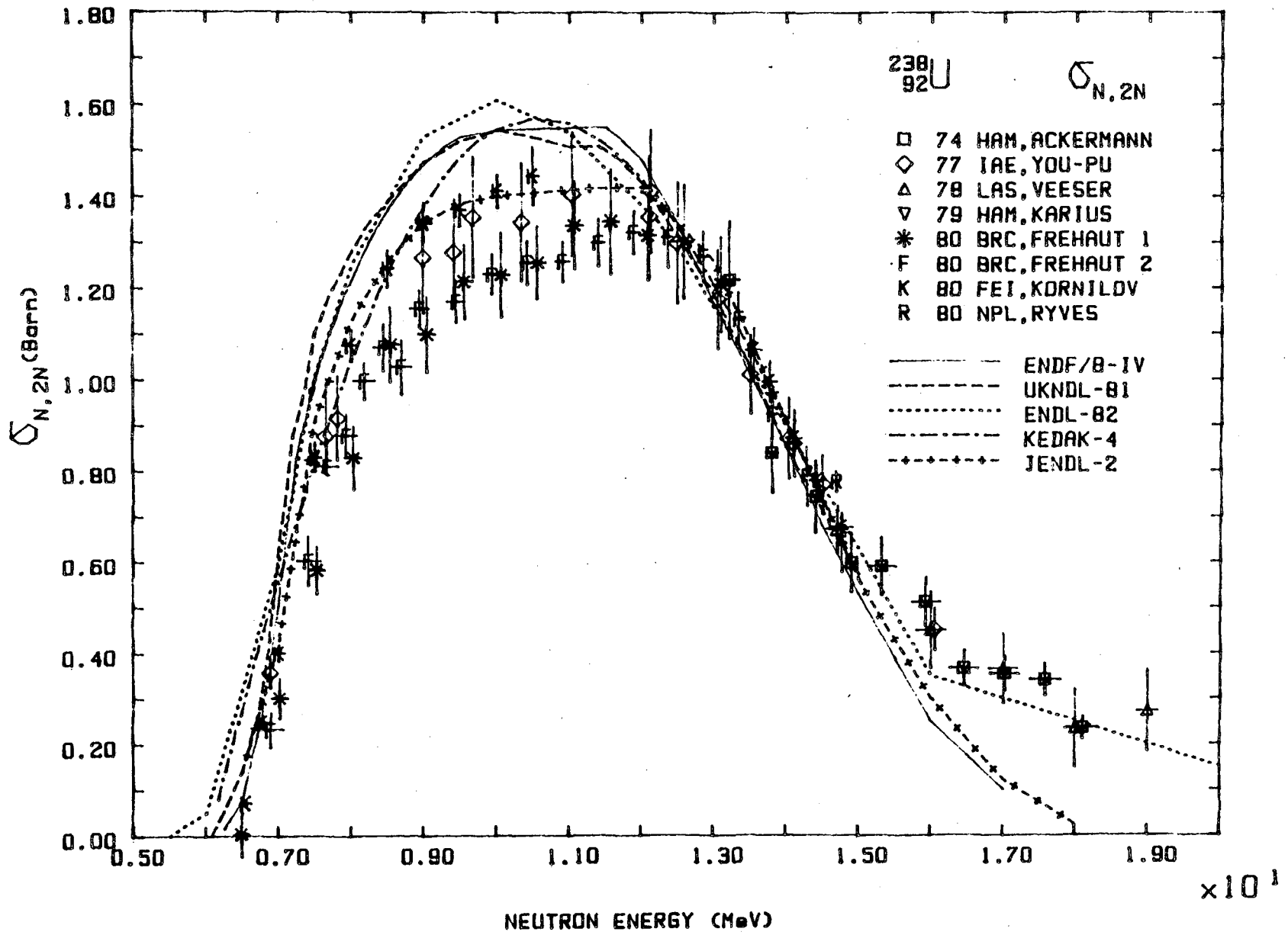




Experimental information  $^{238}\text{U}, \sigma_{n,n'}, Q = -1190 \text{ keV}$

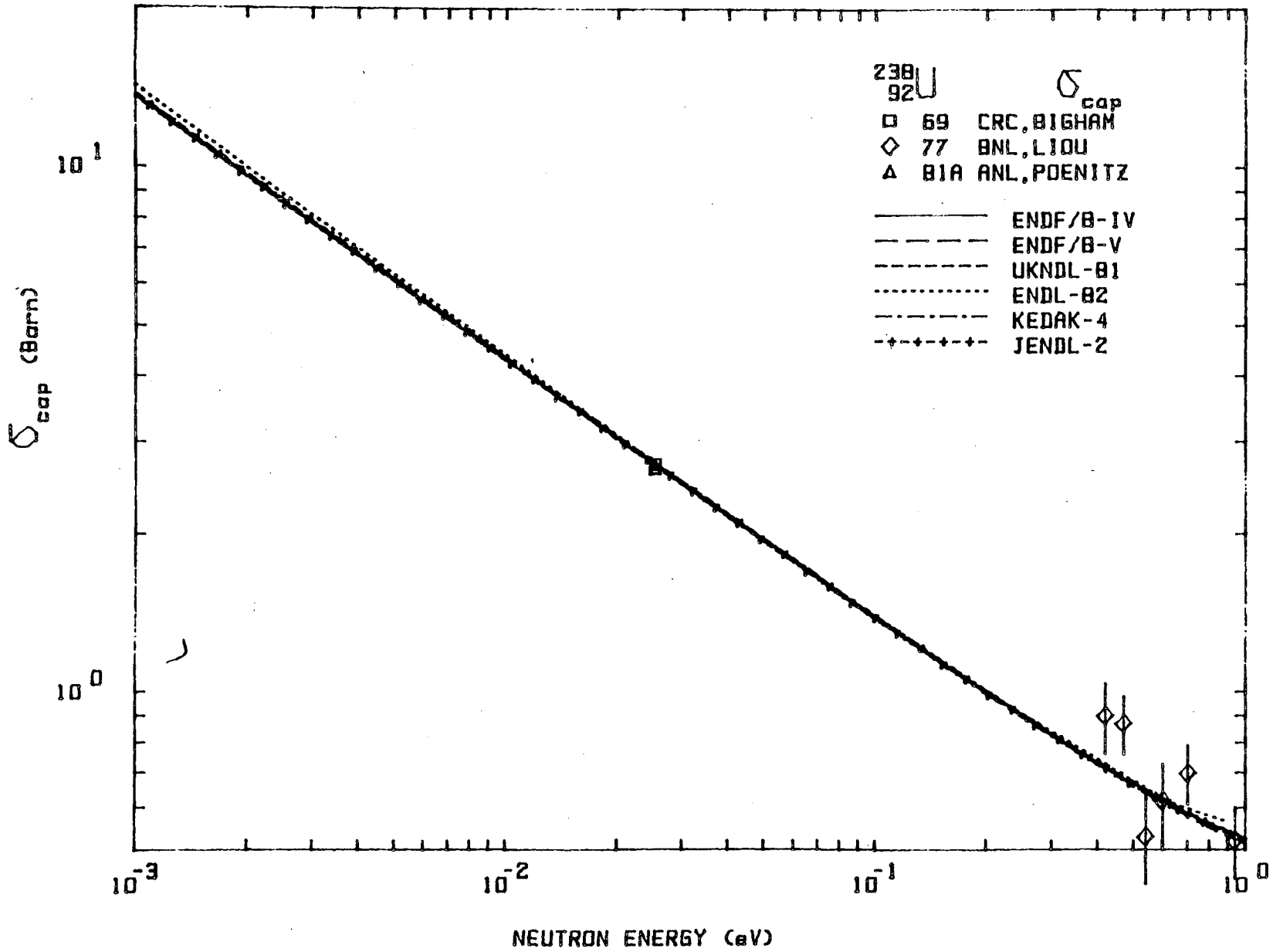
<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
66 HAR, BARNARD	2	1.292-1.368 MeV	Abs.	25-50 %	$Q = -1190 \pm 10 \text{ keV}$ , $\text{Int } \sigma = 4\pi \sigma(90^\circ)$ .

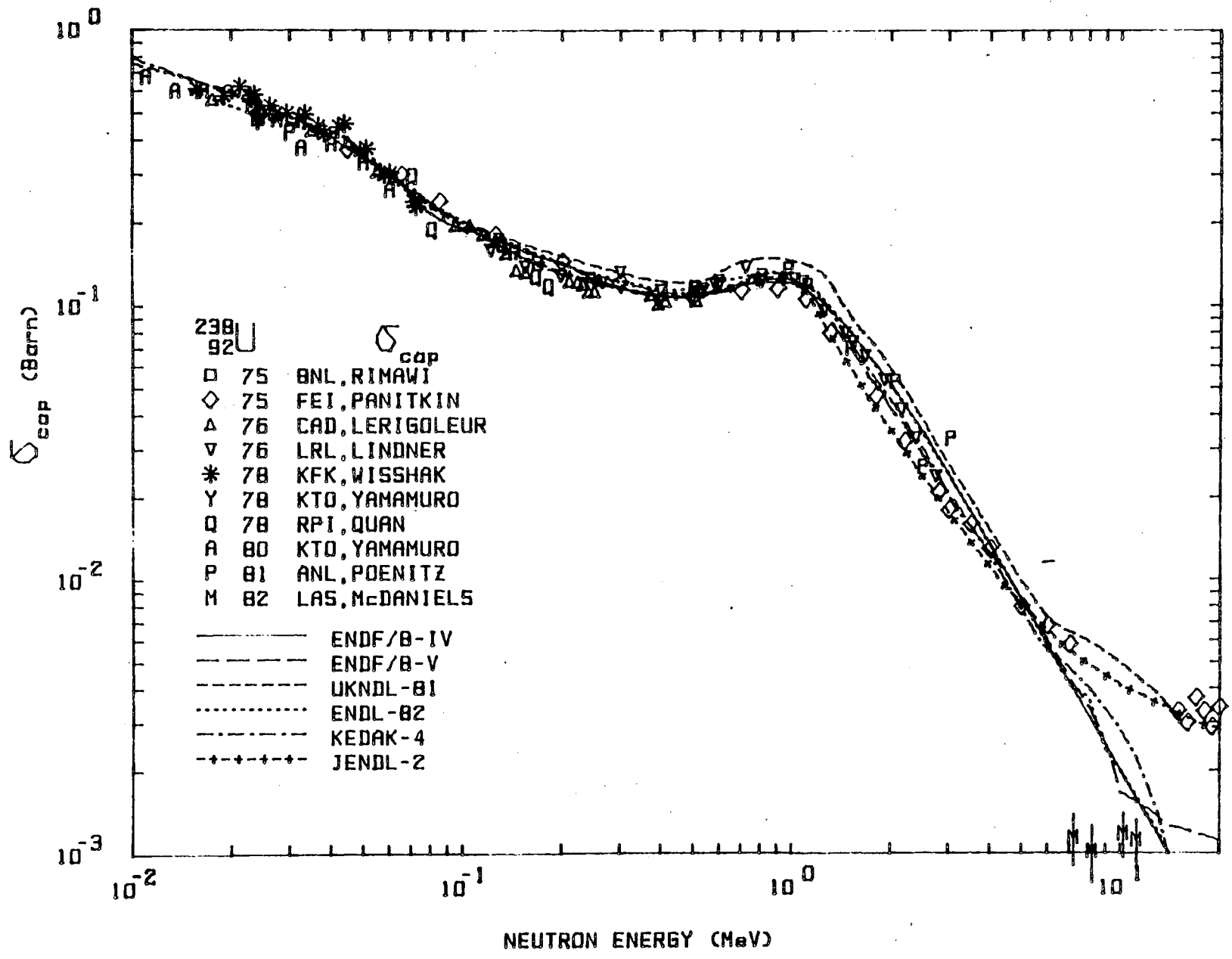




Experimental information  $^{238}\text{U}, \sigma_{n,2n}$ 

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
56 HAR, PHILLIPS	1	14 MeV	Abs.	8 %	Activation
57 LAS, KNIGHT	9	6-10 MeV	$^{238}\text{U}, \sigma_f$	10 %	Activation
58 LAS, KNIGHT	17	6-16 MeV	$^{238}\text{U}, \sigma_f$	15 %	Activation
59 CCP, ANTROPOV	1	15 MeV	$^{238}\text{U}, \sigma_f$	17 %	
61 ALD, PERKIN	1	14.5 MeV	$\text{Cu}, \sigma_{n,2n}$	6 %	Activation
65 ALD, BATCHELOR	1	7 MeV	$\text{H}, \sigma_{n,n}$	12 %	
69 ALD, MATHER	1	14 MeV	$^{238}\text{U}, \sigma_f$	4 %	
72 ALD, MATHER	3	7.0-12.4 MeV	$^{238}\text{U}, \sigma_f$	7-10 %	
73 LRL, LANDRUM	7	13.7-14.9 MeV	$\text{Al}, \sigma_{n,\text{alfa}}$	5 %	Activation
77 IAE, YOU-PU	19	6.9-16.1 MeV	Abs.	9-14 %	Activation
78 LAS, VEESER	5	14.7-19.0 MeV		10-35 %	
79 HAM, KARIUS	10	13.2-18.1 MeV	$\text{H}, \sigma_{n,n}$	10 %	Activation
80 BRC, FREHAUT 1	14	6.5-13.1 MeV	$^{238}\text{U}, \sigma_f$	7-15 %	
80 BRC, FREHAUT 2	20	6.9-14.8 MeV	$^{238}\text{U}, \sigma_f$	4-17 %	
80 FEI, KORNILOV	17	6.5-14.8 MeV	$^{238}\text{U}, \sigma_f$	3-7 %	Activation
			$^{27}\text{Al}, \sigma_{n,\text{alfa}}$		
			$^{56}\text{Fe}, \sigma_{n,p}$		
80 NPL, RYVES	1	14.7 MeV	$^{56}\text{Fe}, \sigma_{n,p}$	3 %	Activation





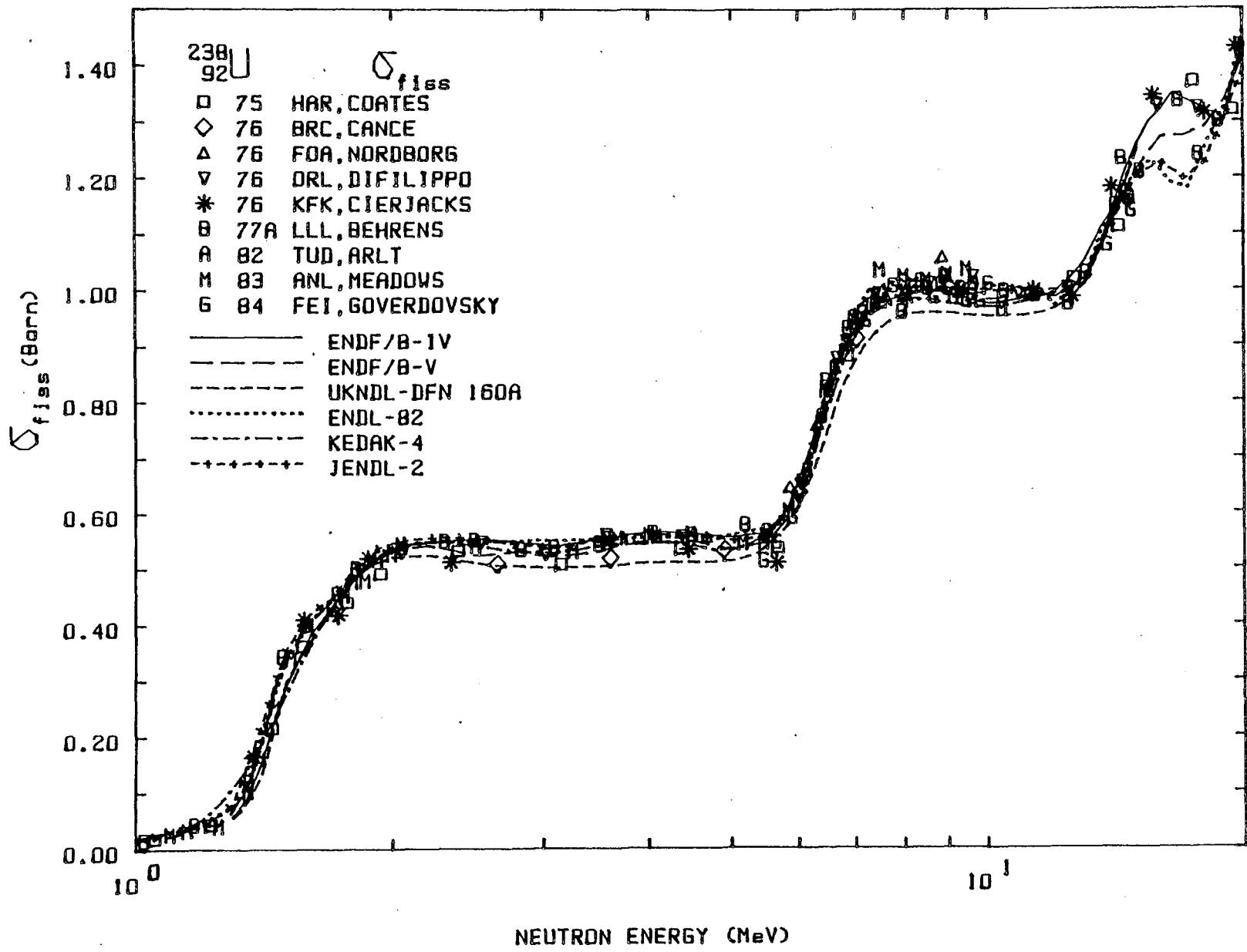
		Experimental information $^{238}\text{U}, \sigma_{\gamma}$				
Reference	Points	Range	Standard	Error	Comments	
69 HAR, MOXON	18	2-100 keV	$^{10}\text{B}, \sigma$	5-8 %		
71 LAS, DRAKE	1	14 MeV	H, $\sigma_{n,n}$	25 %		
72 FEI, CHELNOKOV	26	0.2-35 keV	$^{197}\text{Au}, \sigma_{\gamma}$	13 %		
75 ANL, POENITZ	54	0.02-1.2 MeV	$^{197}\text{Au}, \sigma_{\gamma}$	8-10 %	Energy spread: 5-22 %	
75 FEI, PANITKIN	41	0.024-20 MeV	Abs.	5-50 %	Energy spread: 10-14 % for $E_n > 10$ MeV and only a few percent for $E_n < 10$ MeV	
75 BNL, RAMAWI	1	24 keV		8 %		
76 LRL, LINDNER	23	0.12-2.7 MeV	$^{235}\text{U}, \sigma_f$	0.6-4.8 %	Energy spread: 7-44 %	
77 BNL, LIQU	7	0.4-0.9 eV		15 %		
78 KFK, WISSHAK	39	16-74 keV	$^{197}\text{Au}, \sigma_{\gamma}$	4-10 %		
81A ANL, POENITZ	19	0.03-3.03 MeV	$^{235}\text{U}, \sigma_f$ $^{197}\text{Au}, \sigma_{\gamma}$	3-20 %		
82 LAS, MCDANIELS	8	7.2-14.2 MeV		20-30 %		

General comments: KEDAK-3 and ENDF/B-V within 10 % between 150 keV and 7 MeV



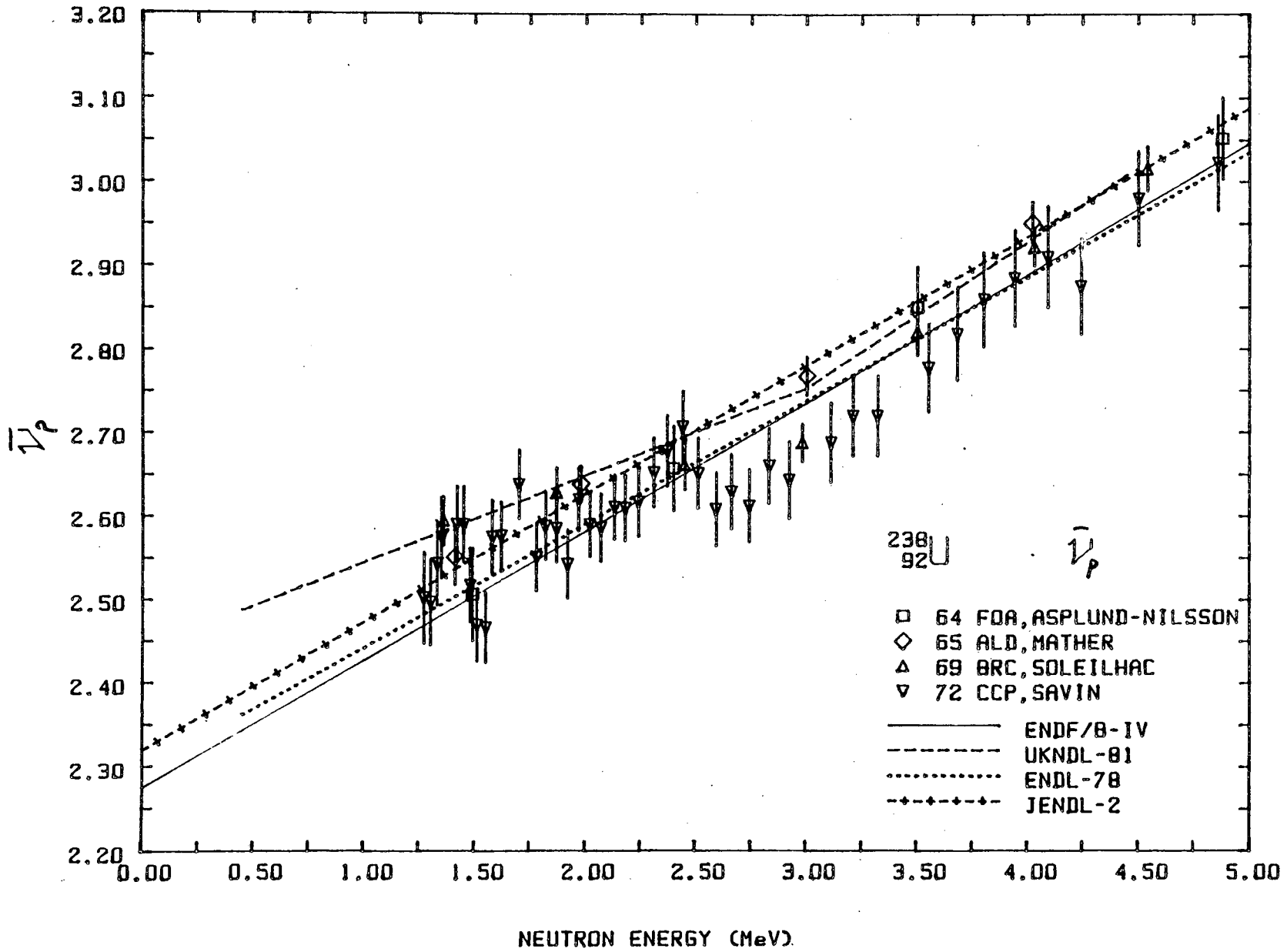
Experimental information  $^{238}\text{U}; \sigma_{\gamma}$  (cont.)

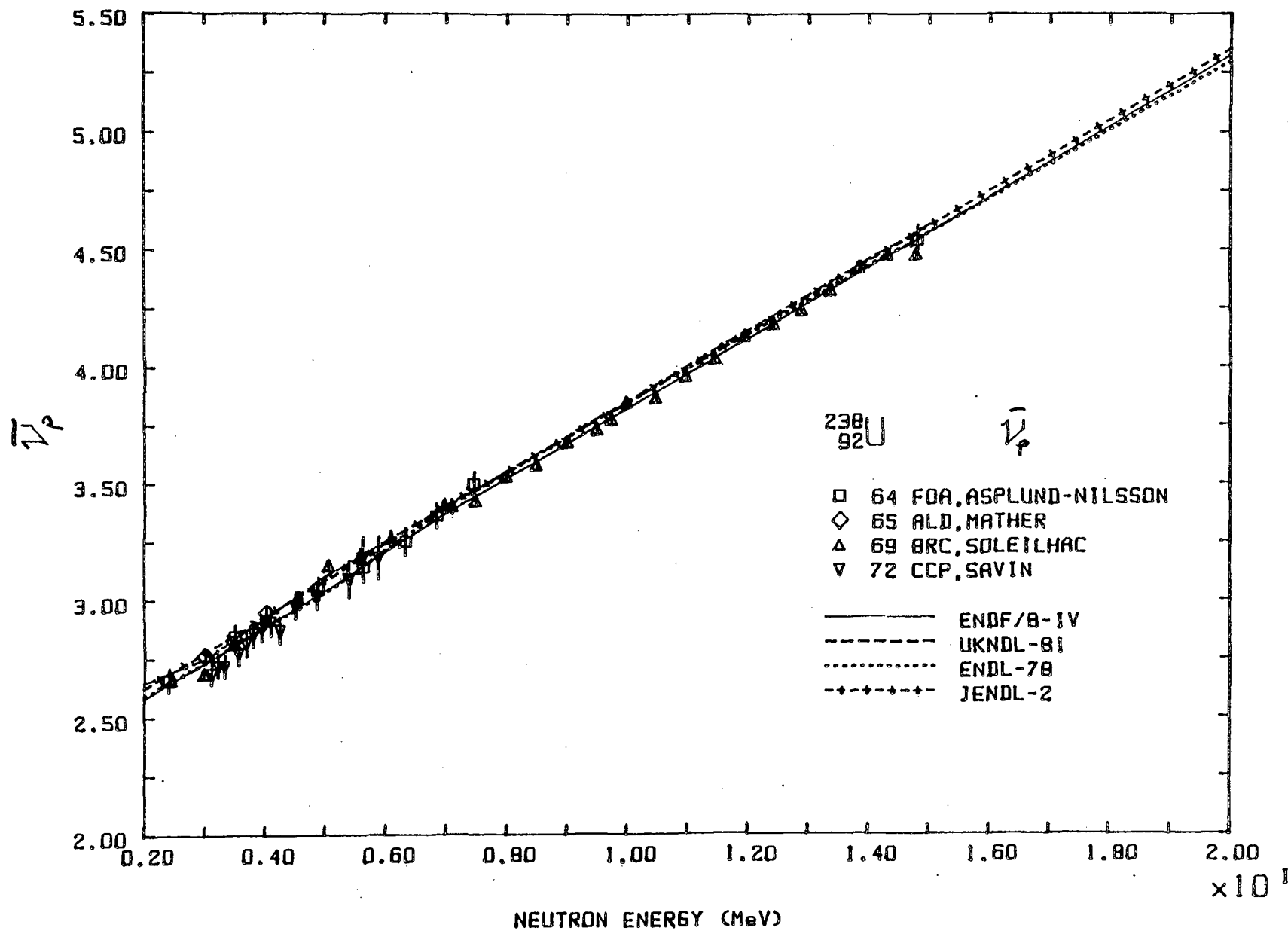
<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
73 ORL, DeSAUSSURE	27	0.1-100 keV	$^{10}\text{B}, \sigma_{n,\alpha}$	5-10 %	
76 CAD, LERIGOLEUR	25	15-500 keV		5-6 %	
78 KTO, YAMAMURO	1	24 keV		8 %	
78 RPI, QUAN	6	24-181 keV	6.67 eV resonance in $^{238}\text{U}$	5-7 %	Iron filtered beam
80 KTO, YAMAMURO	16	3.2-80 keV	$^{238}\text{U}, \sigma_{\gamma}$ at 24 keV $\gamma$	10 %	



Experimental information  $^{238}\text{U}, \sigma_{\text{fiss}}$

	<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
75	HAR, COATES	225	0.6-22 MeV	$^{235}\text{U}, \sigma_{\text{f}}$	2.5 %	
76	BRC, CANCE	9	2-7 MeV	$^{235}\text{U}, \sigma_{\text{f}}$	3 %	
76	FOA, NORDBORG	23	4.7-8.9 MeV	$^{235}\text{U}, \sigma_{\text{f}}$	3 %	
76	KFK, CIERJACKS	89	0.5-30 MeV	$^{235}\text{U}, \sigma_{\text{f}}$	3 %	Rel. stat. error
76	ORL, DEFILIPPO	77	2-25 MeV	$^{235}\text{U}, \sigma_{\text{f}}$	1.5-2 %	
77A	LLL, BEHRENS	154	0.1-30 MeV	$^{235}\text{U}, \sigma_{\text{f}}$	1.5 %	Rel. error
82	TUD, ARLT	1	14.4 MeV	Abs.	1.8 %	
83	ANL, MEADOWS	69	0.9-10 MeV	$^{235}\text{U}, \sigma_{\text{f}}$	1-6 %	Rel. error
84	FEI, GOVERDOVSKY	32	5.4-14.8 MeV	$^{235}\text{U}, \sigma_{\text{f}}$	1.5-2.2 %	Rel. error





Experimental information  $^{238}\text{U}, \bar{\nu}_p$

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
64 FOA, ASPLUND-NILSSON	9	1.5-15 MeV	$^{252}\text{Cf}, \bar{\nu}_p^{\text{sp}}$	2 %	
65 ALD, MATHER	4	1.4-4 MeV	$^{252}\text{Cf}, \bar{\nu}_p^{\text{sp}}$	1 %	
69 BRC, SOLEILHAC	35	1.4-30 MeV	$^{252}\text{Cf}, \bar{\nu}_p^{\text{sp}}$	0.5-1 %	
72 CCP, SAVIN	46	1.3-6 MeV	$^{252}\text{Cf}, \bar{\nu}_p^{\text{sp}}$	1.5-2 %	

General comments: Data normalized to  $\bar{\nu}_p^{\text{sp}}(^{252}\text{Cf}) = 3.756$



<sup>237</sup>Np

## NUCLEAR PROPERTIES

Spin and parity of ground state: 5/2<sup>+</sup>

Ground state decay:

Alpha to <sup>233</sup>Pa: 100%, Q<sub>α</sub> = 4.957 MeVHalf-life: 2.14·10<sup>6</sup> yr·10<sup>18</sup> yr - spontaneous fission

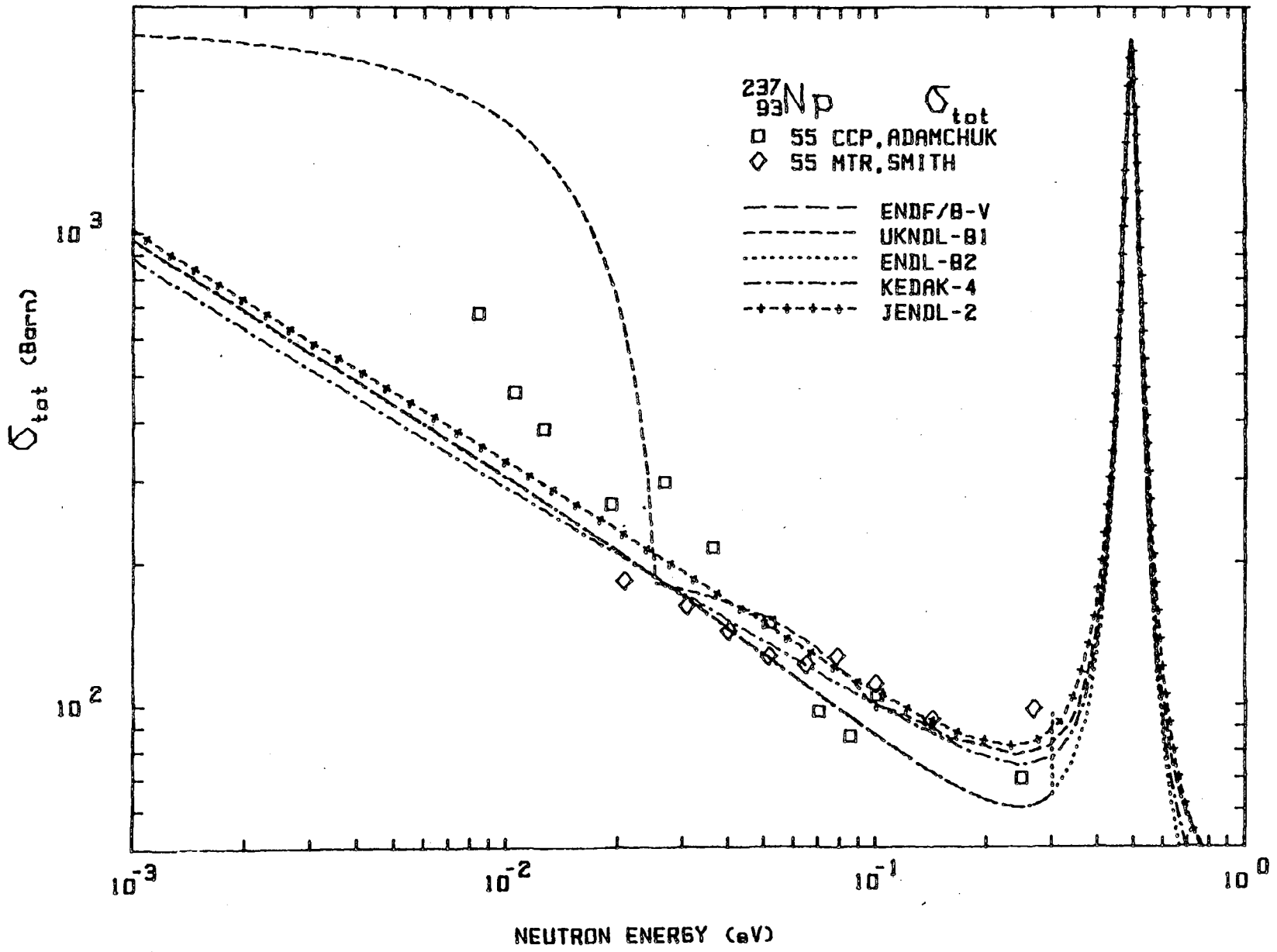
## THERMAL CROSS SECTIONS (2200 m/s)

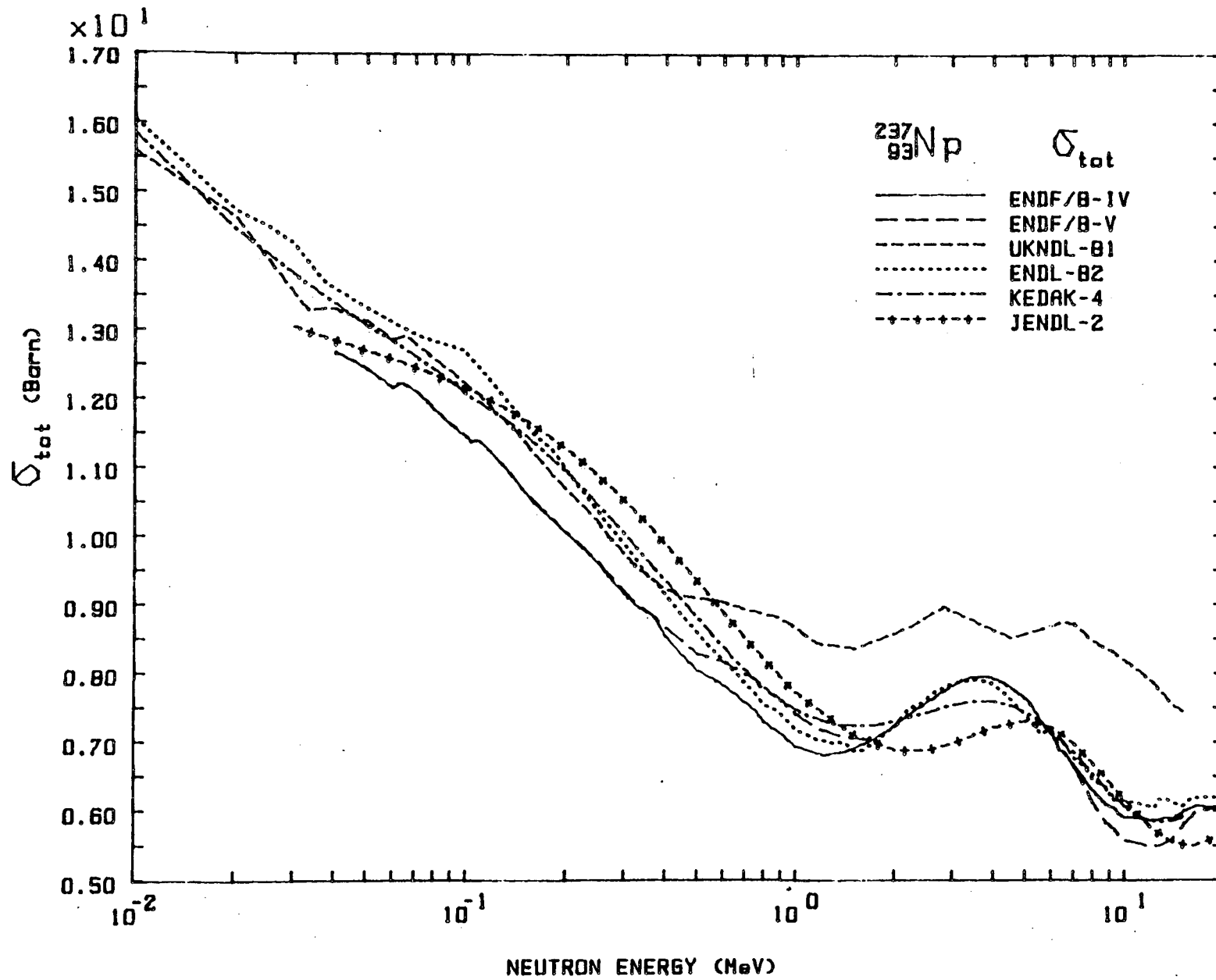
Reference	σ <sub>γ</sub>	σ <sub>f</sub>	σ <sub>t</sub>	$\bar{\nu}_p$	(barns)
ENDF/B - IV	169.1	0.02	186.6		
ENDF/B - V	169.1	0.01663	186.7		
UKNDL -81	169.0	0.01903	181.0		
ENDL -82	169.7	0.01498	187.3		
KEDAK-4	169.1	0.01701	186.6		
JENDL-2	180.7	0.01930	208.9		
BNL 325 (1984)	175.9	0.02		2.525	

## RESONANCE INTEGRALS

Reference	RI <sub>γ</sub>	RI <sub>f</sub>	(barns)
ENDF/B - IV	634.6	0.26	
ENDF/B - V	640.4	6.870	
UKNDL -81	652.0	6.906	
ENDL -82	591.5	7.478	
KEDAK-4	642.8	5.845	
JENDL-2	662.5	6.255	
68 MTR,SCOVILLE	900		
BNL 325 (1984)	640	6.9	



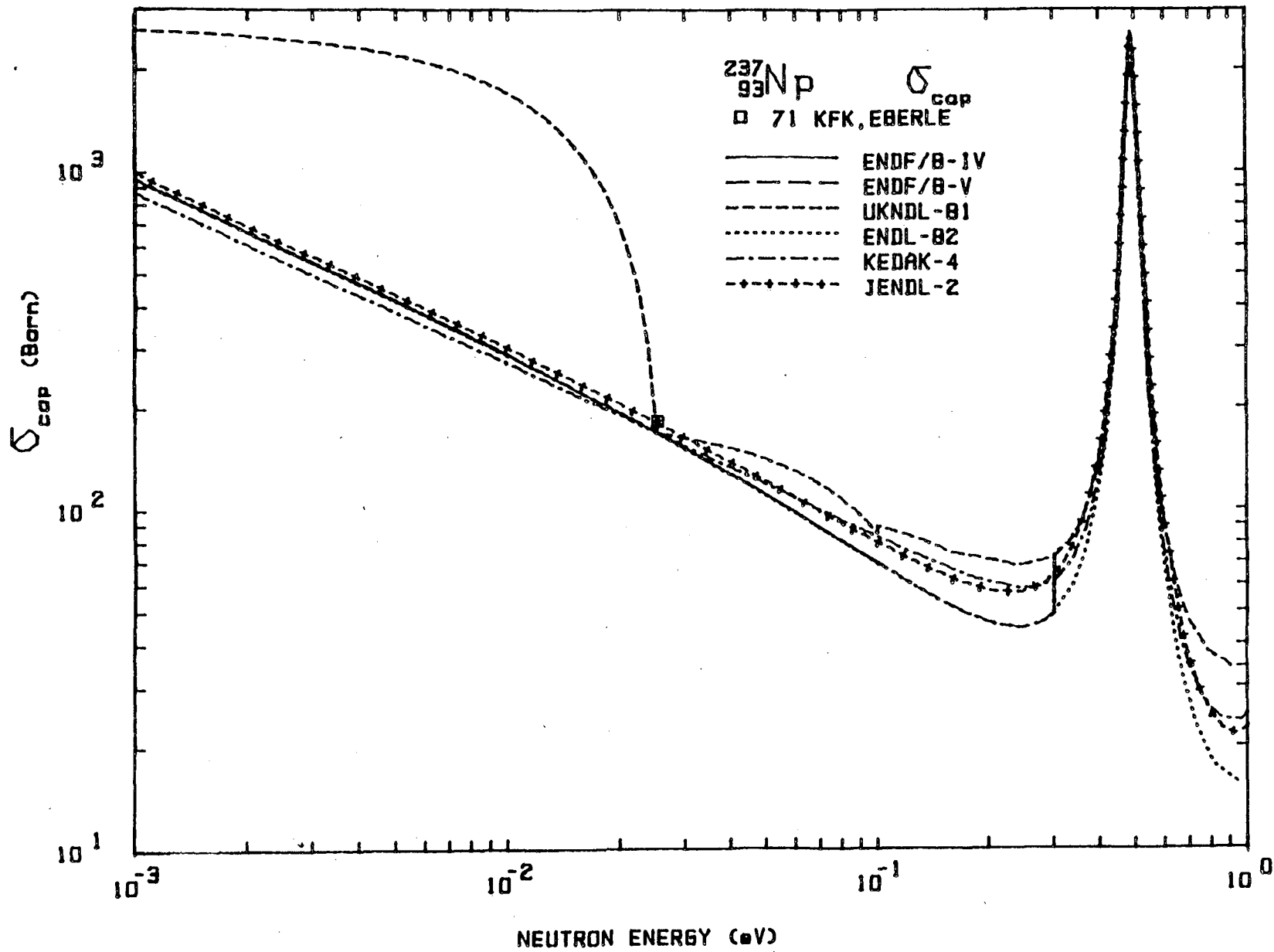


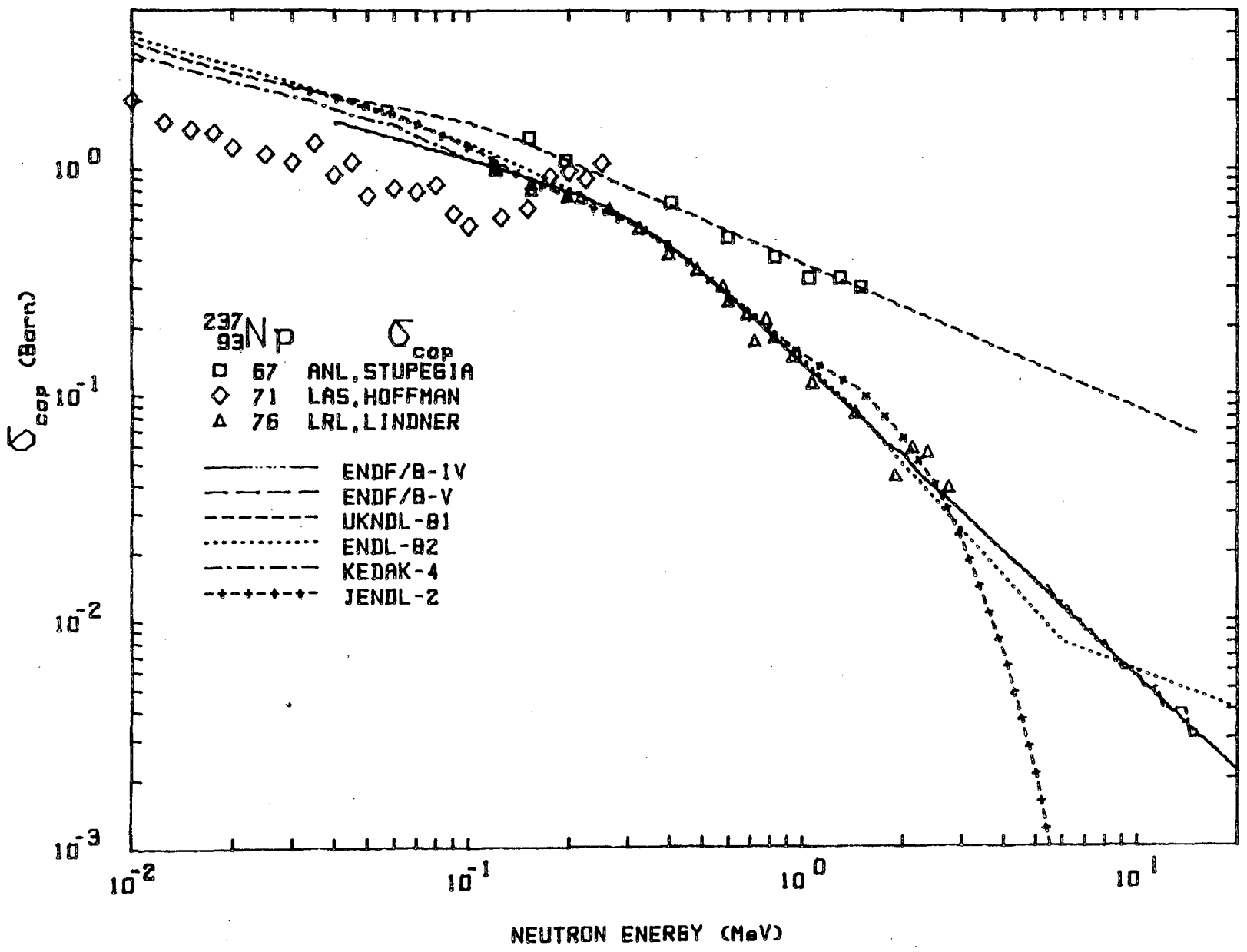


Experimental information  $^{237}\text{Np}, \sigma_{\text{tot}}$ 

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
55 CCP, ADAMCHUK	88	0.008-9.7 eV	ABS.		
55 MTR., SMITH	312	0.02-2.8 eV	ABS.		

General comments: ENDF/B-IV = ENDF/B-V for  $E_n < 0.3$  eV

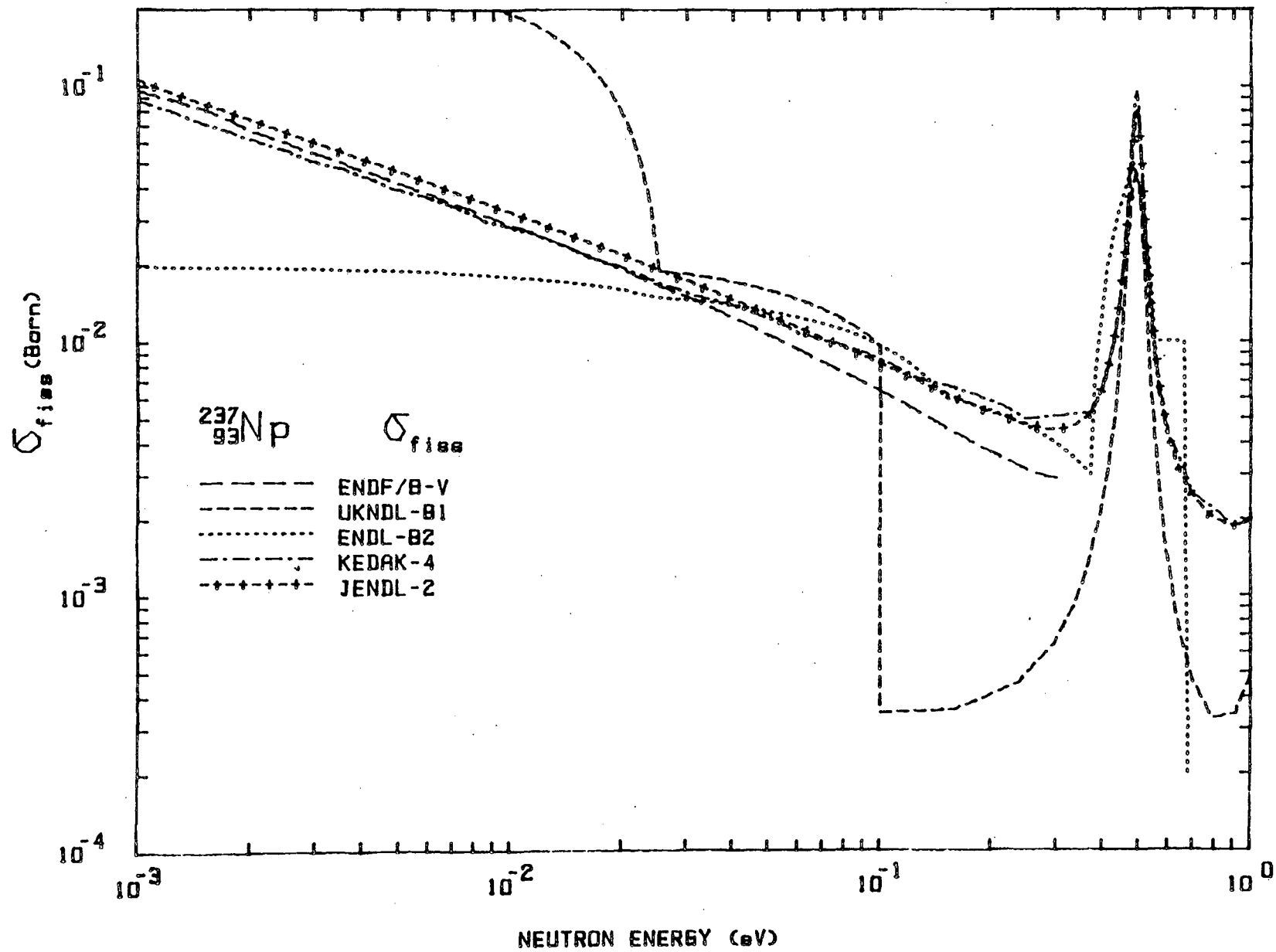


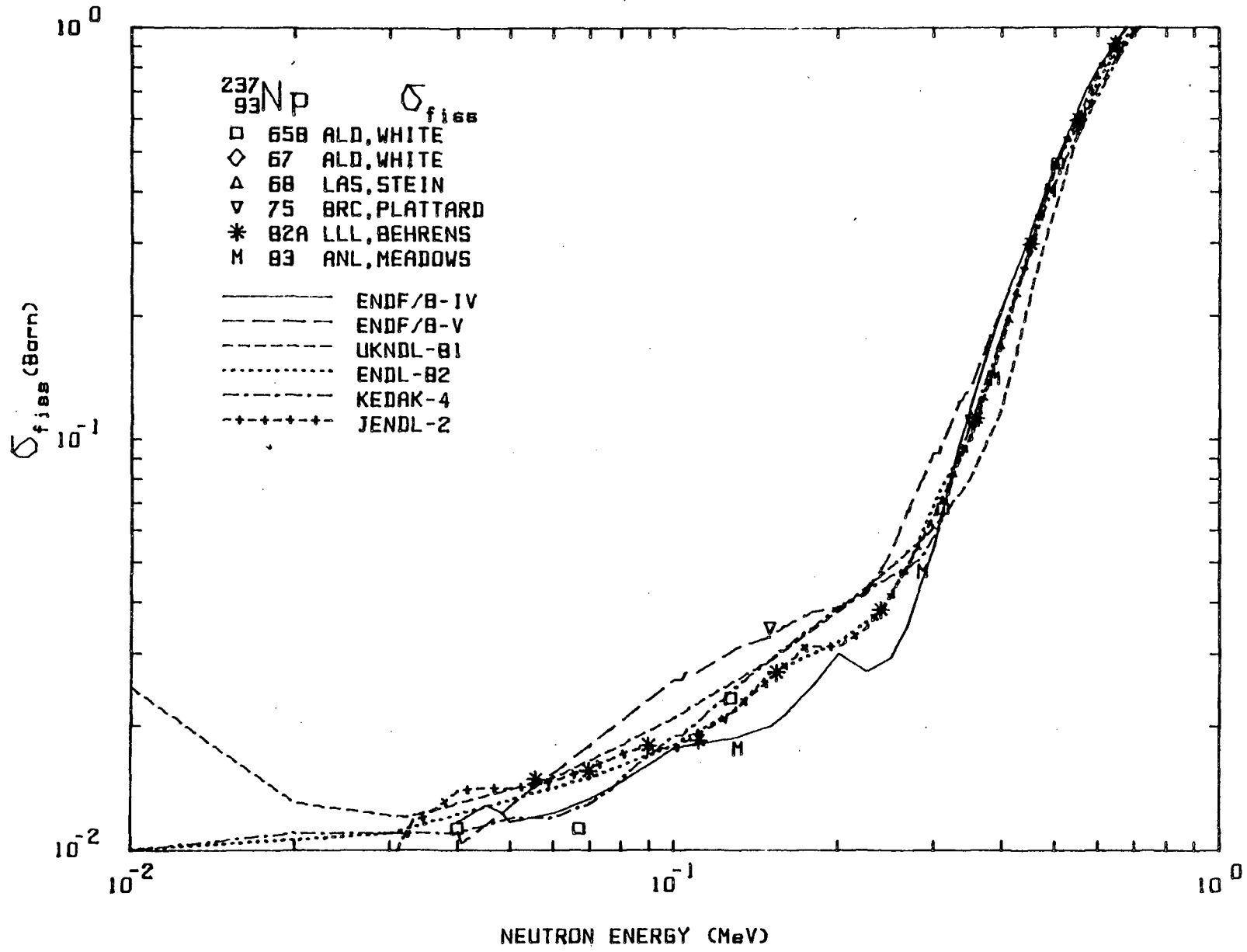


Experimental information  $^{237}\text{Np}, \sigma_{\gamma}$

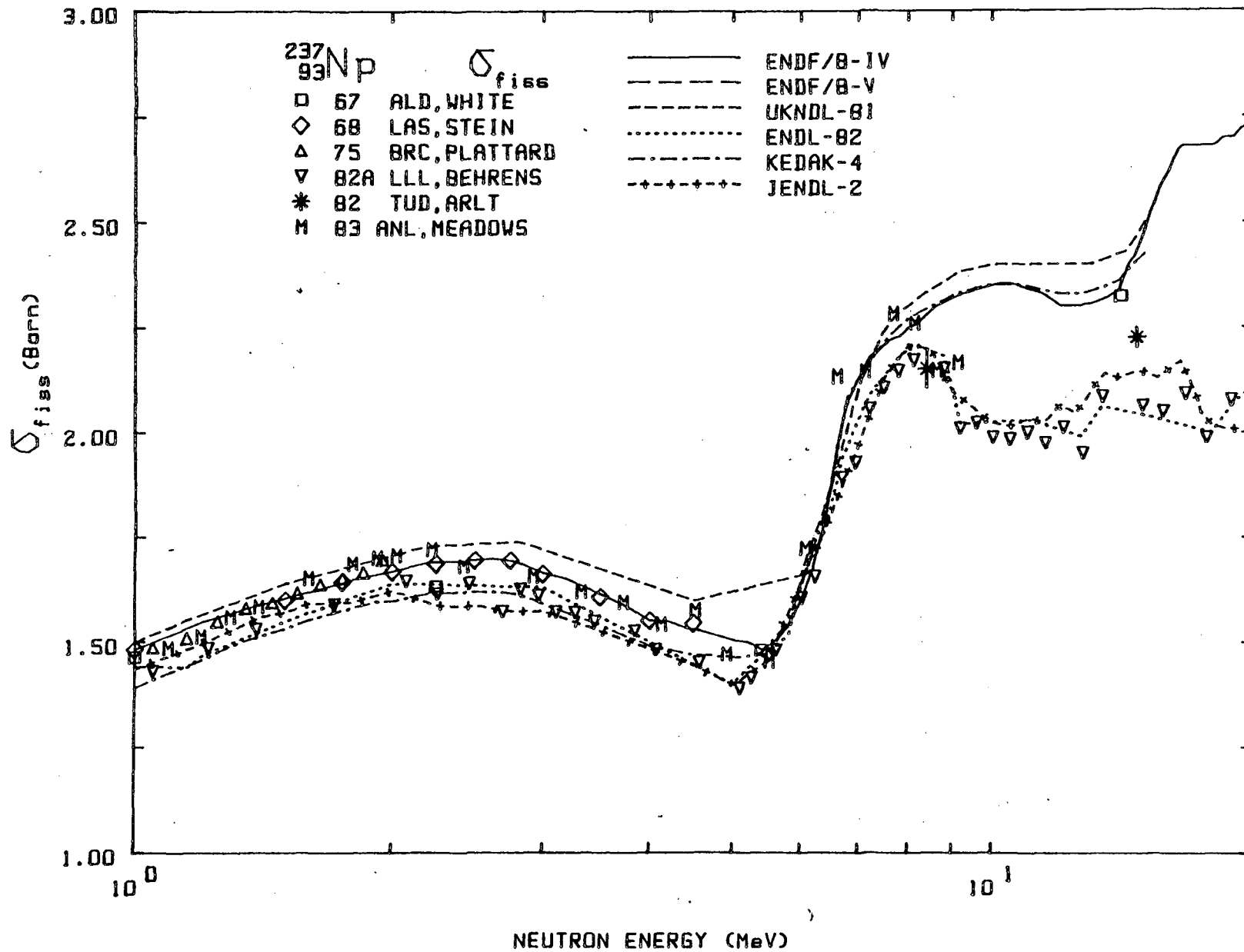
<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
67 ANL, STUPEGIA	8	0.15-1.5 MeV	$^{235}\text{U}, \sigma_f$	6-7 %	Energy spread: 4-16 %
71 KFK, EBERLE	1	Pile		3 %	
71 LAS, HOFFMAN	19 300	0.02-255 keV	$^{235}\text{U}, \sigma_f$	30 %	The data points given represent average values for the energy intervals $(E_n - 10^{-2}E_n) - (E_n + 10^{-2}E_n)$
76 LRL, LINDNER	23	0.12-2.7 MeV	$^{235}\text{U}, \sigma_f$	4-44 %	Energy spread: 6-61 %

General comments: ENDF/B-IV & ENDF/B-V









Experimental information  $^{237}\text{Np}, \sigma_f$

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
65B ALD, WHITE	5	40-500 keV	$^{235}\text{U}, \sigma_f$	3 %	
67 ALD, WHITE	4	1-14 MeV	$^{235}\text{U}, \sigma_f$	3.5 %	
68 LAS, STEIN	12	1-5 MeV	$^{235}\text{U}, \sigma_f$	2.6 %	
75 BRC, PLATTARD	19	0.1-2 MeV	$^{235}\text{U}, \sigma_f$	1-2 %	Error at 0.1 MeV about 20 %
79 NBS, CARLSSON		1-20 MeV	$^{235}\text{U}, \sigma_f$	2-3 %	Relative error. Shape measurement made relative to H(n,n) cross section.
82A LLL, BEHRENS	129	0.02-30 MeV	$^{235}\text{U}, \sigma_f$	2 %	
82 TUD, ARLT	2	8.4, 14.7 MeV	Abs.	2.1, 1.1 %	
83 ANL, MEADOWS	66	0.1-9 MeV	$^{235}\text{U}, \sigma_f$	1-5 %	

General comments:

Experimental data from ratio measurements given in the figures are calculated using cross sections from ENDF/B-V as standards. ENDF/B-IV = ENDF/B-V for  $E_n < 0.3$  eV



<sup>239</sup>Pu

## NUCLEAR PROPERTIES

Spin and parity of ground state: 1/2<sup>+</sup>

Ground state decay:

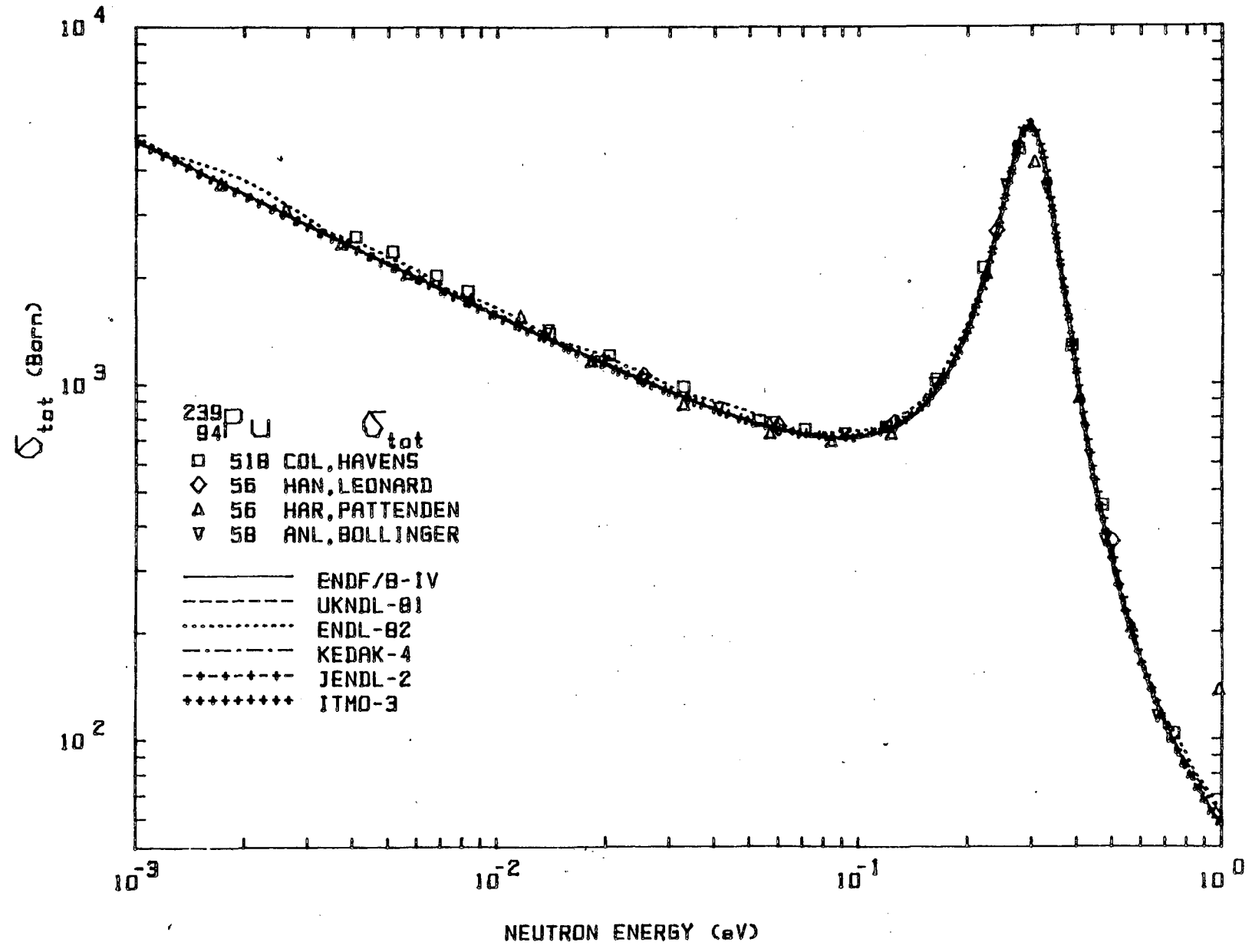
Alpha to <sup>235</sup>U: 100%, Q<sub>α</sub> = 5.244 MeVHalf-life: 2.411·10<sup>4</sup> yr5.5·10<sup>15</sup> yr - spontaneous fission

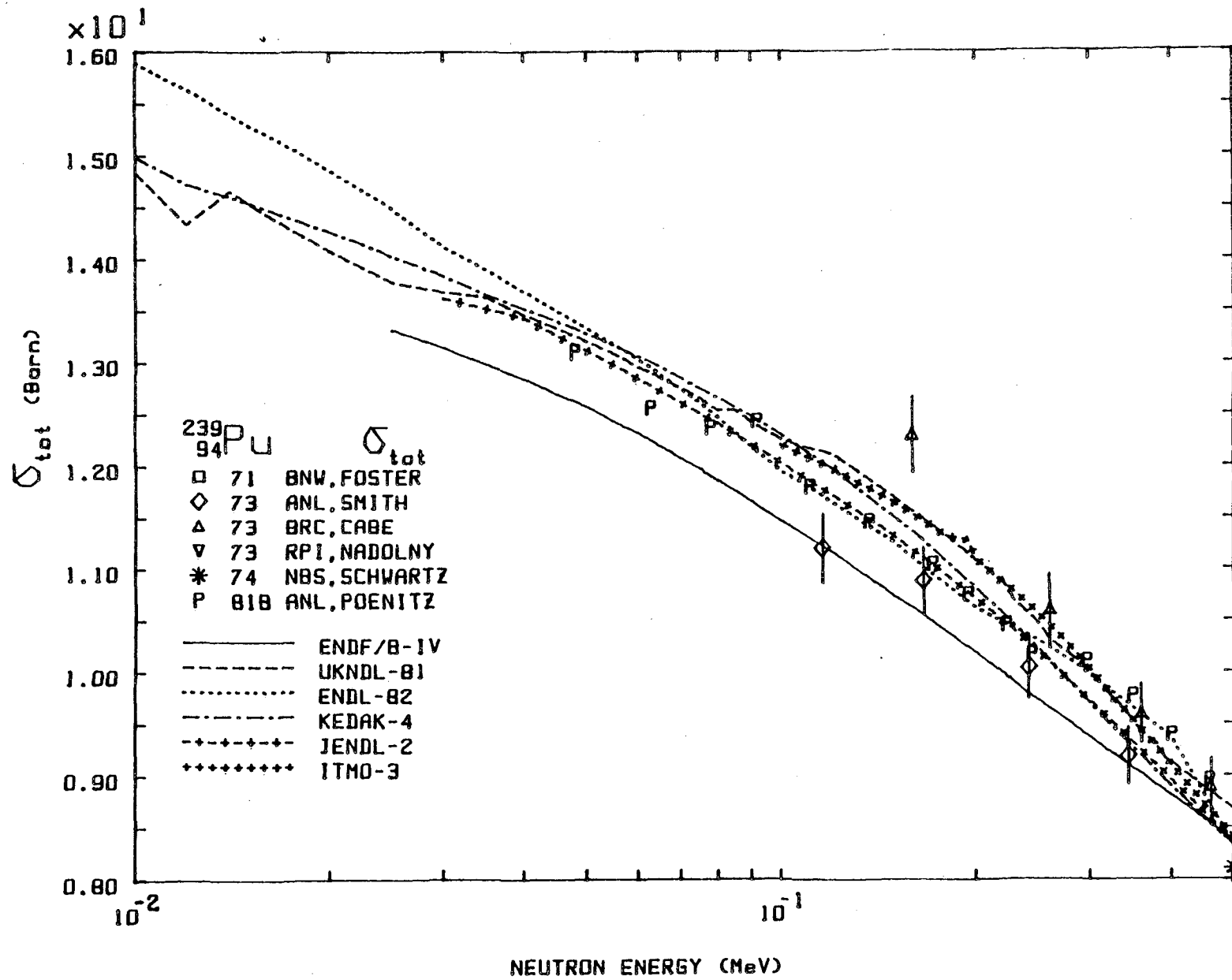
## THERMAL CROSS SECTIONS (2200 m/s)

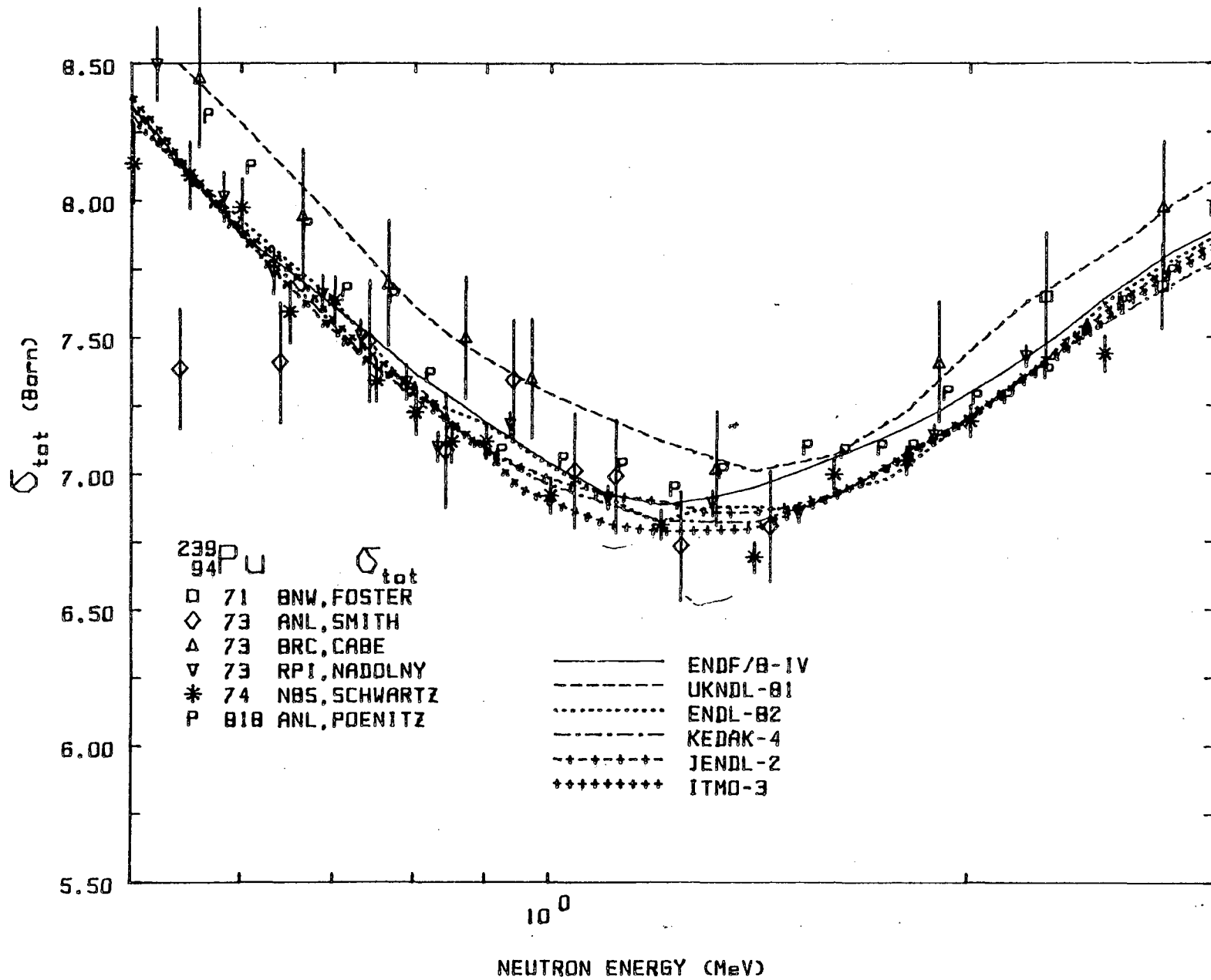
Reference	σ <sub>γ</sub>	σ <sub>f</sub>	σ <sub>t</sub>	$\bar{\nu}_+$	(barns)
ENDF/B - IV	270.2	741.7	1020	2.873	
ENDF/B - V	270.2	741.7	1020	2.891	
UKNDL -81	265.7	742.4	1018		
ENDL -82	278.0	785.7	1075		
KEDAK-4	270.7	745.3	1023		
JENDL-2	270.2	741.7	1020		
70 GEL, DERUYTTER		742.5			
BNL 325 (1984)	269.3	748.1	1024.9	2.877	
NNDC (1983)	268.98	748.23		2.878	
84 NPL, AXTON	269.4	748.3		2.876	

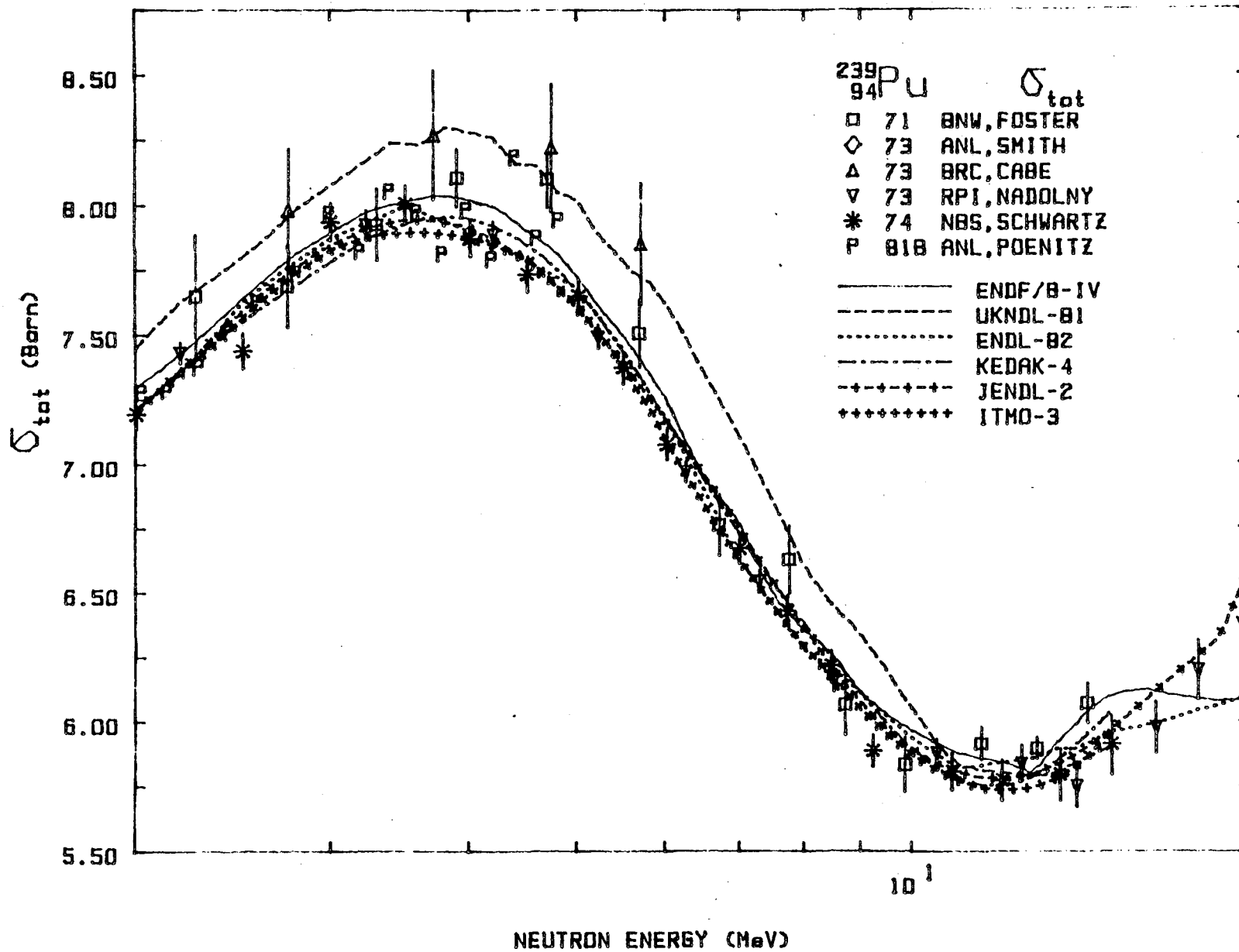
## RESONANCE INTEGRALS

Reference	RI <sub>γ</sub>	RI <sub>f</sub>	(barns)
ENDF/B - IV	192.4	288.0	
ENDF/B - V	193.3	303.5	
UKNDL -81	179.8	301.2	
ENDL -82	205.3	306.7	
KEDAK-4	194.0	304.2	
JENDL-2	195.2	301.50	
71 KAP, EILAND		327	
BNL 325 (1984)	200	301	





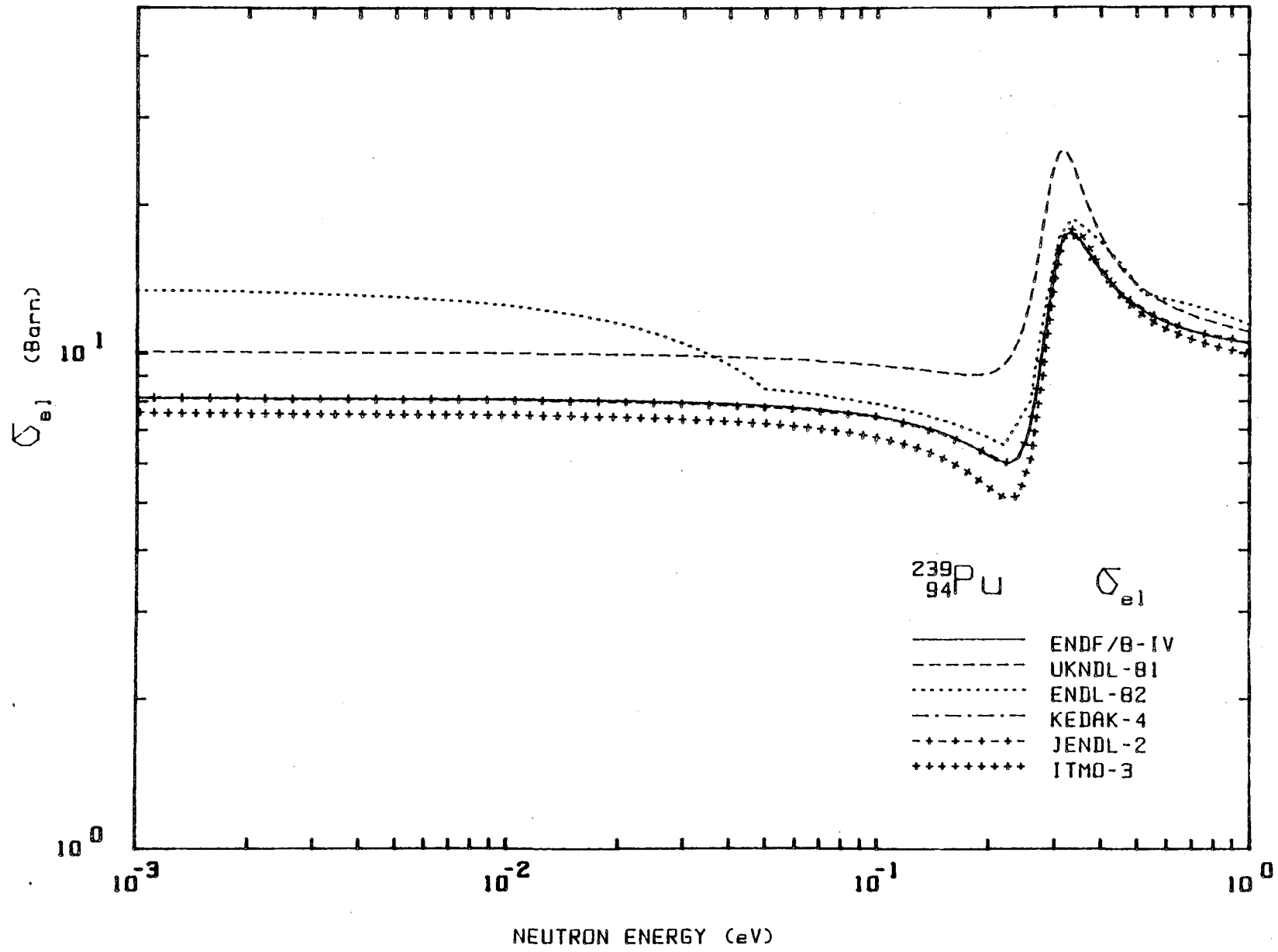


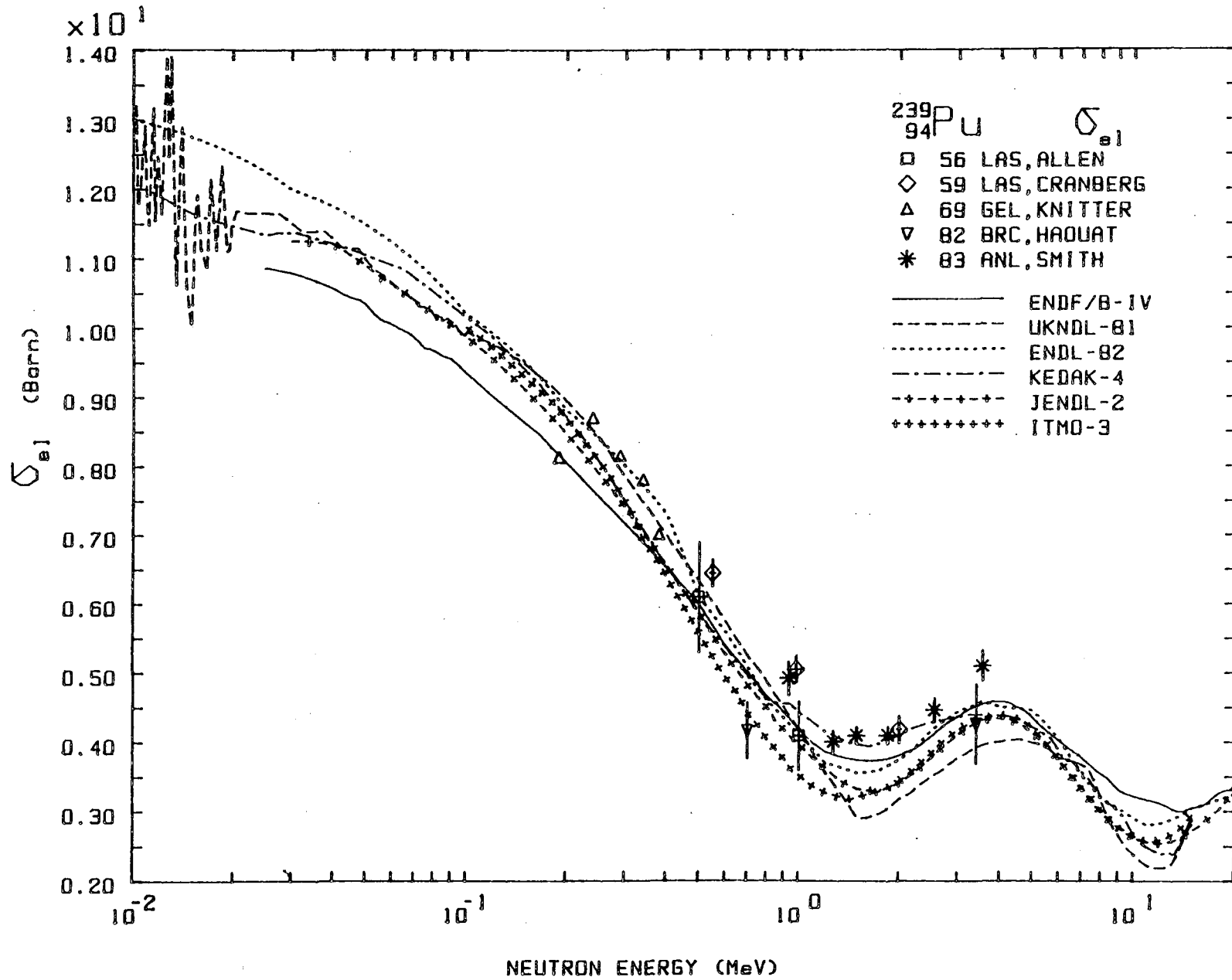


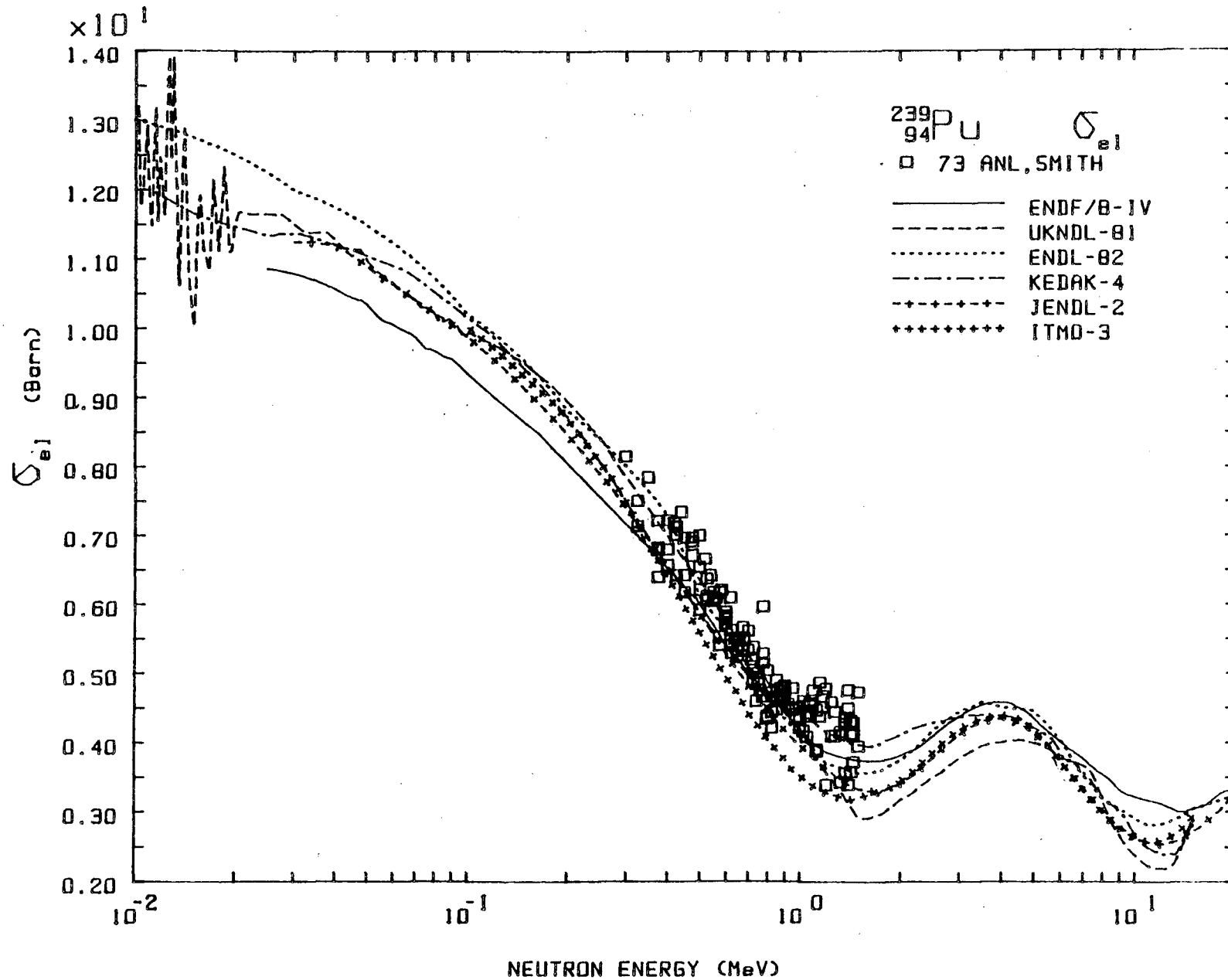


Experimental information  $^{239}\text{Pu}, \sigma_{\text{tot}}$

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
51B COL, HAVENS	58	0.004-0.74 eV	ABS.		
56 HAN, LEONARD	22	0.0253-0.5 eV	ABS.		
56 HAR, PATTENDEN	178	0.017-19 eV	ABS.		
58 ANL, BOLLINGER	97	0.014-0.72 eV	ABS.		
71 BNW, FOSTER	243	2.2-15 MeV	ABS.	1-3 %	
73 ANL, SMITH	393	0.65-1.5 MeV	ABS.	1-2 %	
73 BRC, CABE	148	0.2-6 MeV	ABS.	3 %	
73 RPI, NADOLNY	719	0.5-30 MeV	ABS.	1-2 %	
74 NBS, SCHWARTZ	1680	0.5-15 MeV	ABS.	1 %	Stat. error
81B ANL, POENITZ	47	0.048-4.8 MeV	ABS.	2 %	

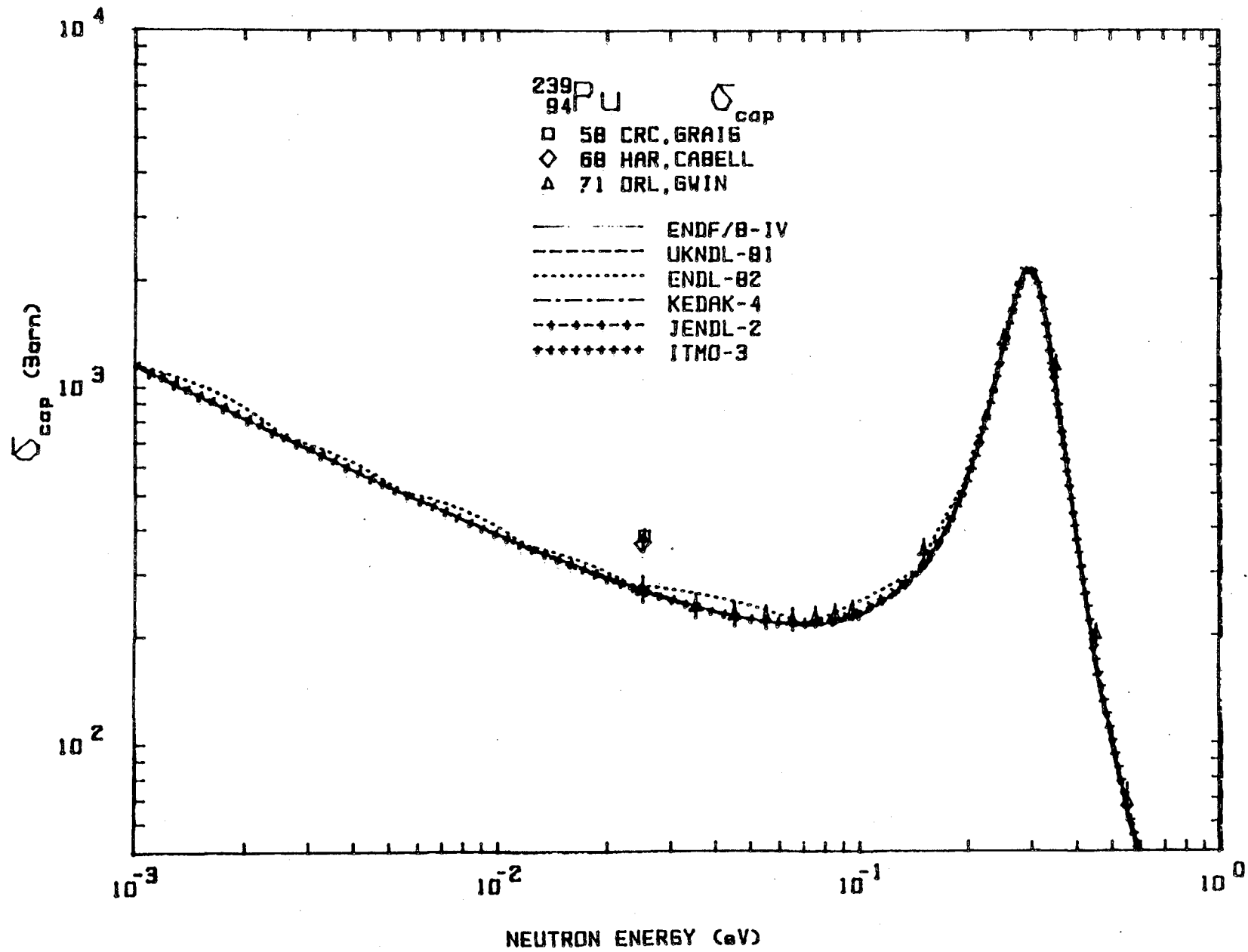


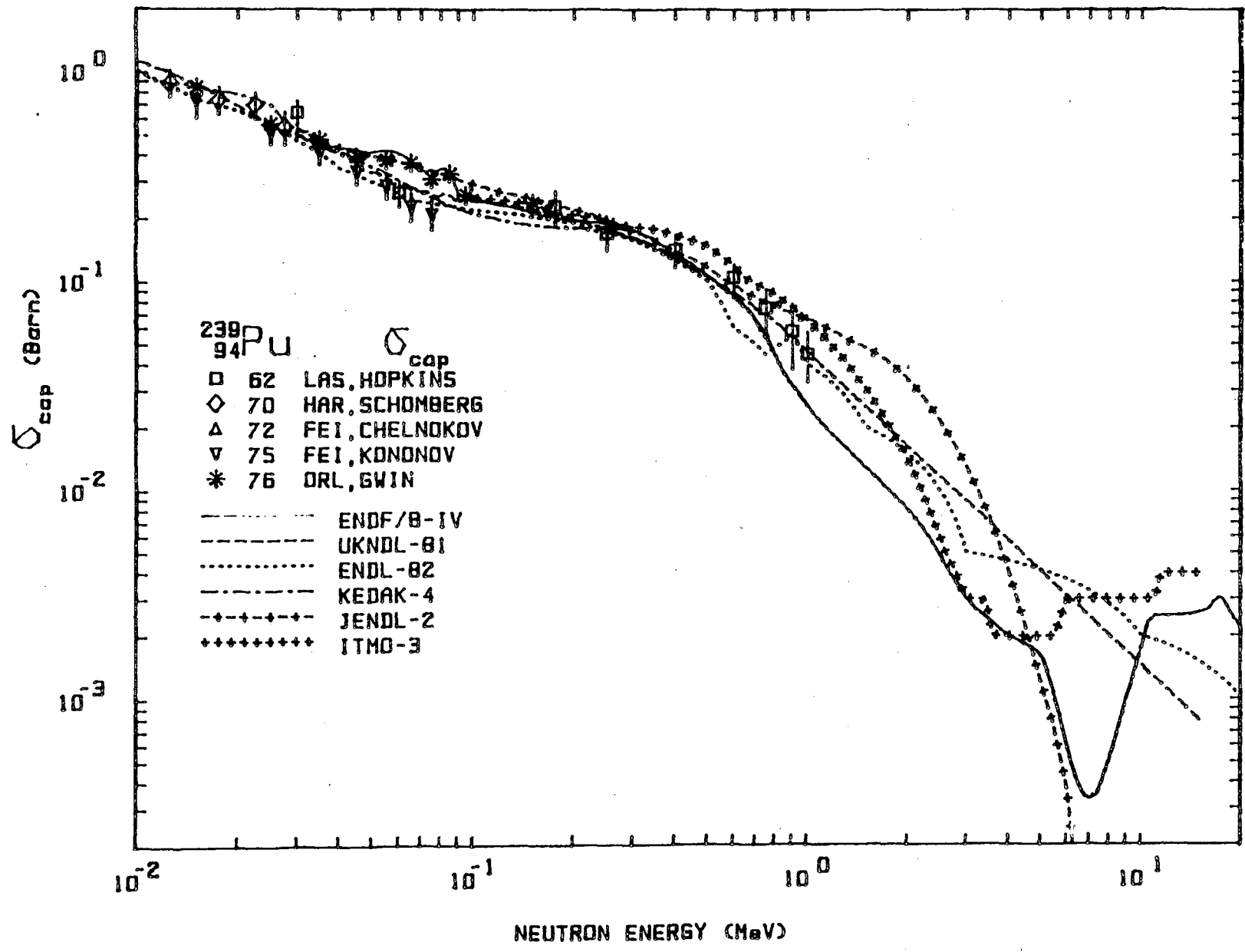




Experimental information  $^{239}\text{Pu}, \sigma_{n,n}$ 

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
56 LAS, ALLEN	2	0.5-1.0 MeV	ABS.	13 %	A few hundred keV exp. resol.
59 LAS, CRANBERG	3	0.55-2.00 MeV	ABS. $\text{H } \sigma_{n,n}$	3-5 %	Sum of elastic and unresolved inelastic cross sections. Exp. resol. 90-500 keV
69 GEL, KNITTER	5	0.19-0.38 MeV	$\text{H } \sigma_{n,n}$	6 %	Sum of elastic and unresolved inelastic cross sections to 7.8, 57 and 76 keV levels
73 ANL, SMITH	135	0.3-1.5 MeV	$\text{C } \sigma_{n,n}$		Sum of elastic and unresolved inelastic cross sections to 7.8 keV level for $E_n < 550$ keV, to 7.8 and 57 keV levels for $550 \leq E_n \leq 900$ keV and to 7.8, 57 and 76 keV levels for $E_n > 900$ keV
82 BRC, HAOUAT	2	0.7-3.4 MeV	ABS.	10-14 %	Exp. resol. 8-28 keV
83 ANL, SMITH	6	0.93-3.55 MeV	$\text{C } \sigma_{n,\text{tot}}$	3-5 %	Sum of elastic and unresolved inelastic cross sections to 7.8, 57 and 76 keV levels for $E_n \leq 1.85$ MeV and up to 300 keV excitation energy for $E_n > 1.85$ MeV

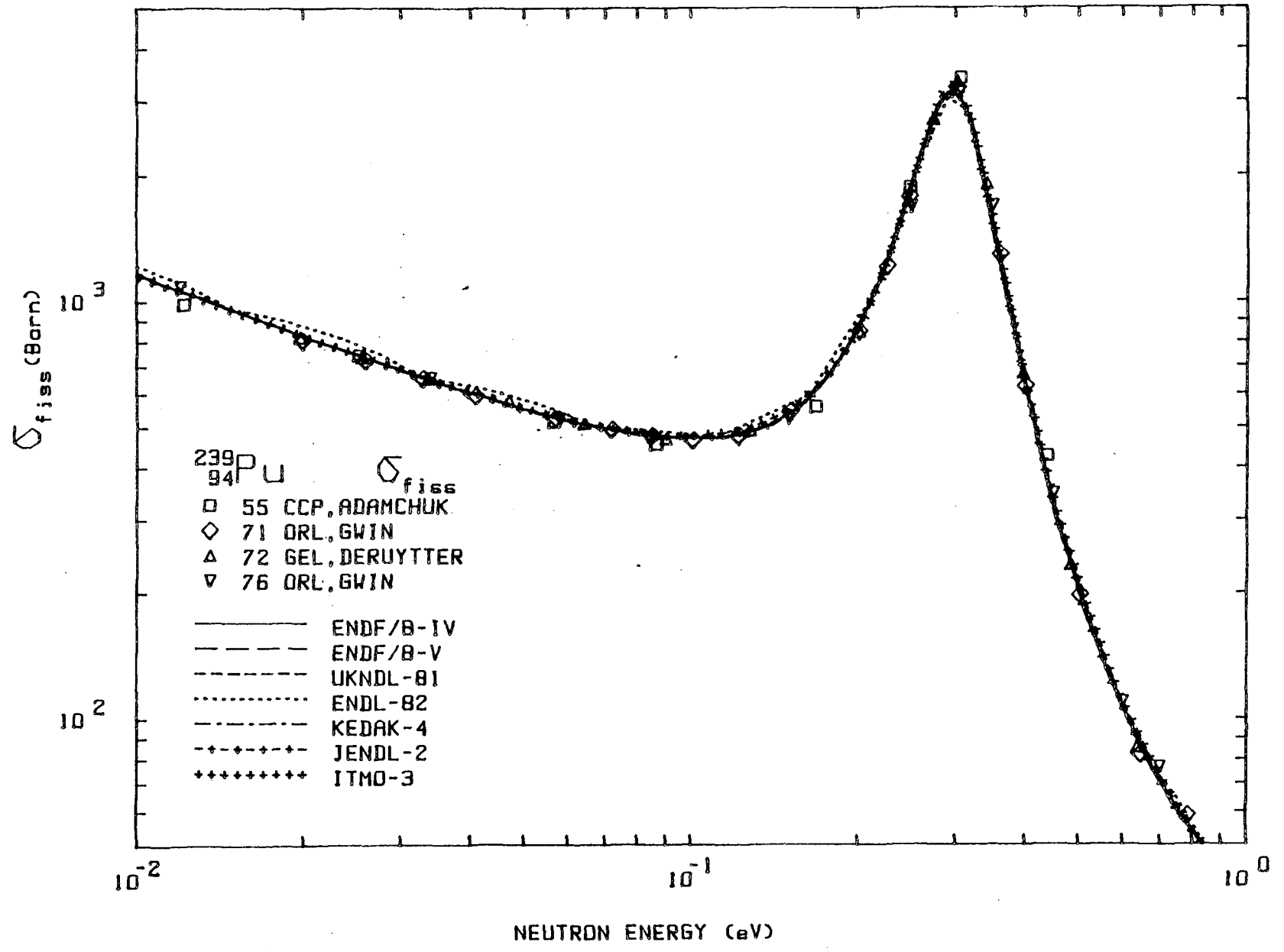


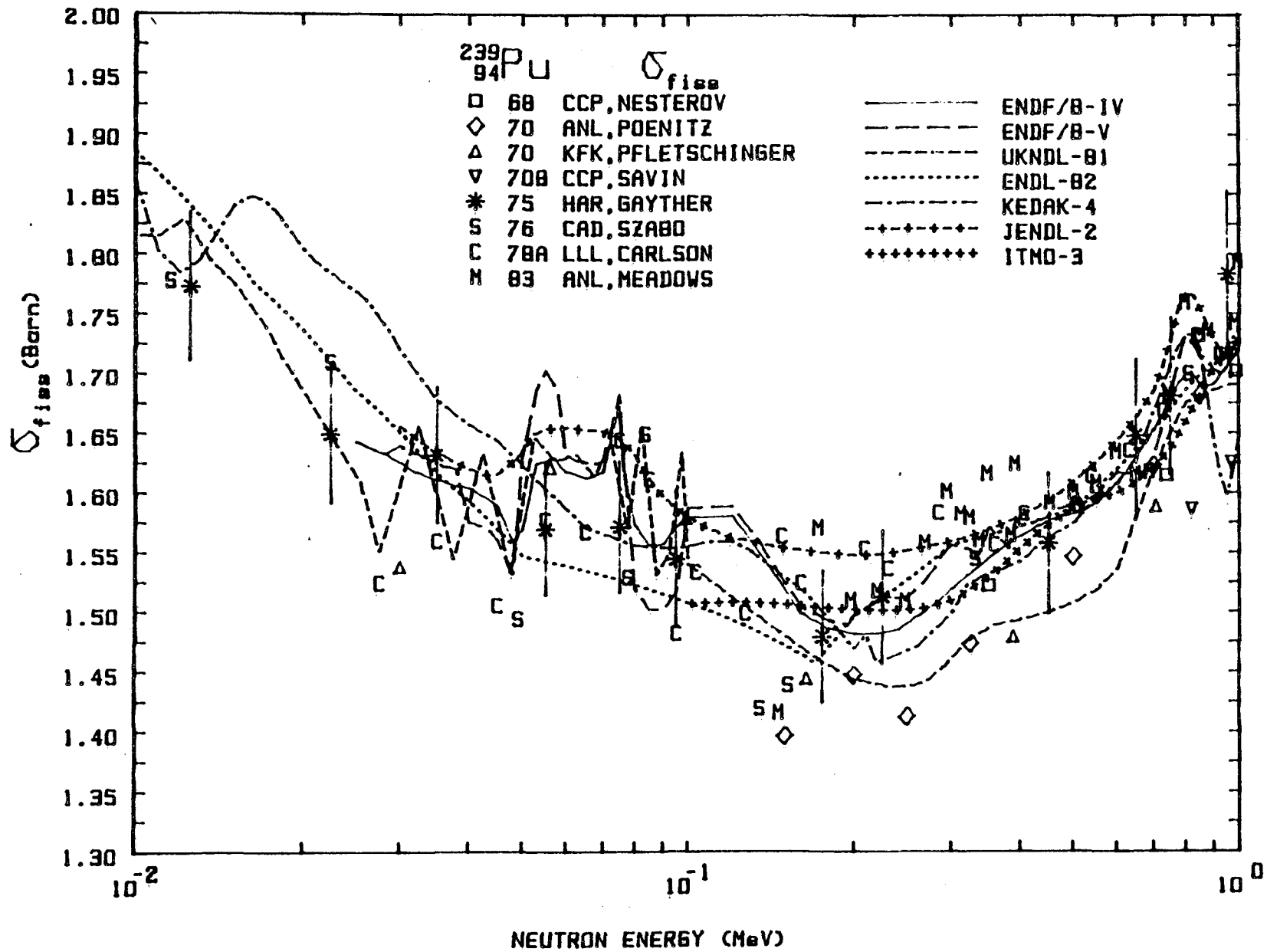


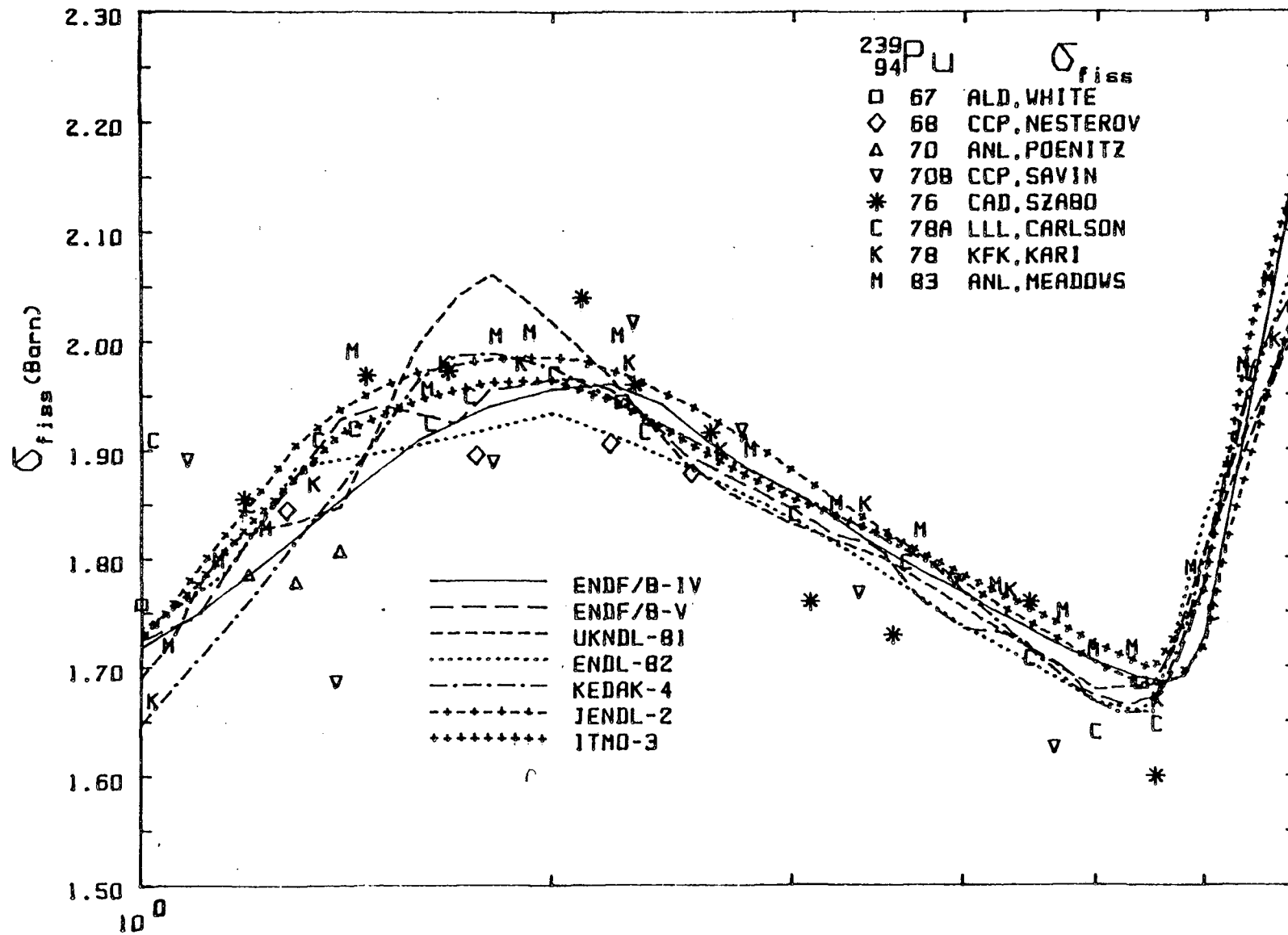
Experimental information  $^{239}\text{Pu}, \sigma_{\gamma}$

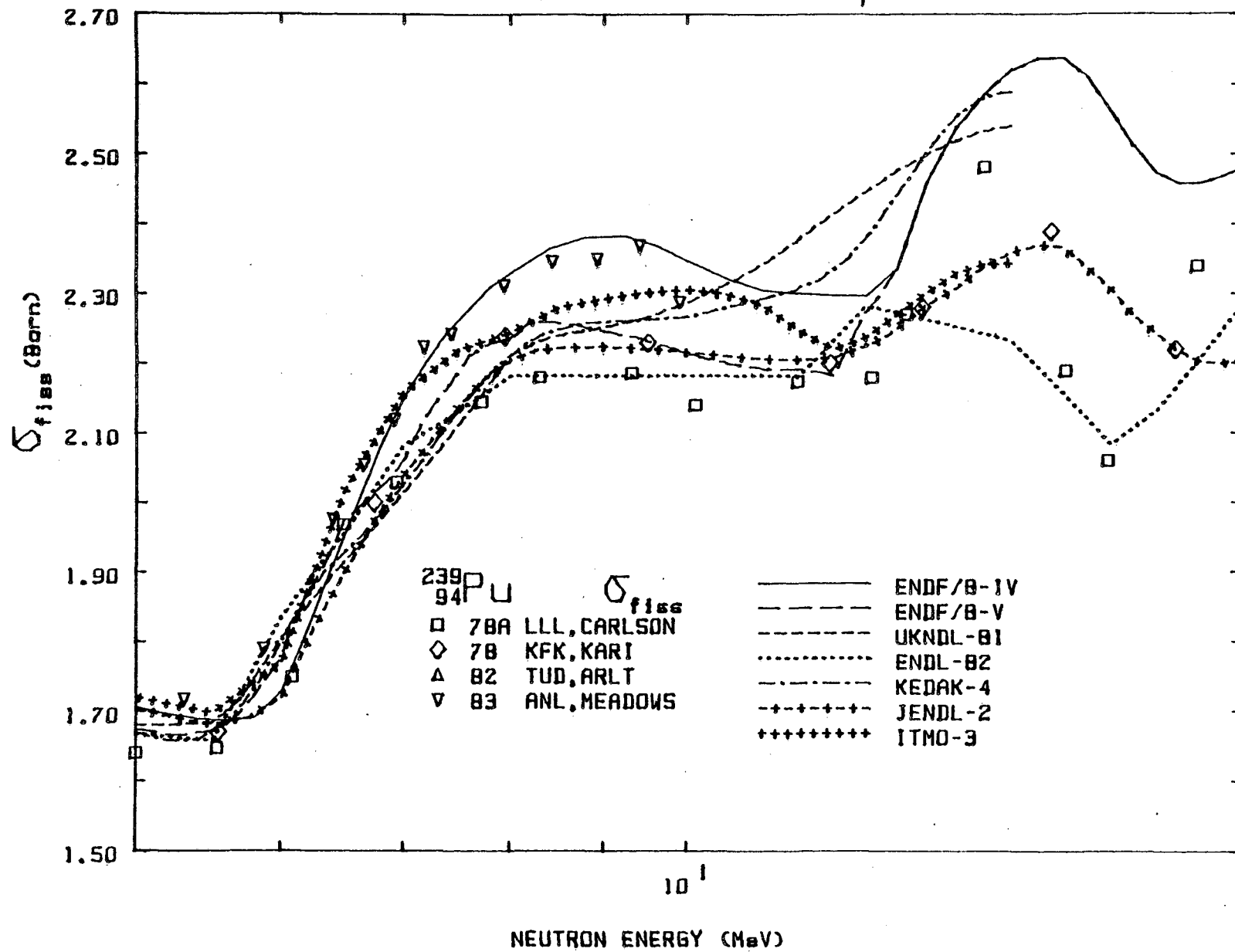
<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
58 CRC, CRAIG	1	Pile	$^{235}\text{U}, \sigma_f$	4 %	
62 LAS, HOPKINS	9	30-1000 keV	$^{239}\text{Pu}, \sigma_f$	14-34 %	Renorm. to BNL 325, $\sigma_f$
68 HAR, CABELL	1	Maxwell	Abs.	5 %	
70 HAR, SCHOMBERG	21	0.2-1130 keV	$^{239}\text{Pu}, \sigma_f$	15-20 %	
71 ORL, GWIN	17	0.02-1 eV	$^{10}\text{B}, \sigma_{n,\alpha}$	5-10 %	
72 FEI, CHELNOKOV	22	0.2-6 keV			
75 FEI, KONONOV	7	10-80 keV	$^{197}\text{Au}, \sigma_{\gamma}$	2-8 %	
76 ORL, GWIN	29	0.05-200 keV	$^{239}\text{Pu}, \sigma_f$	2-27 %	









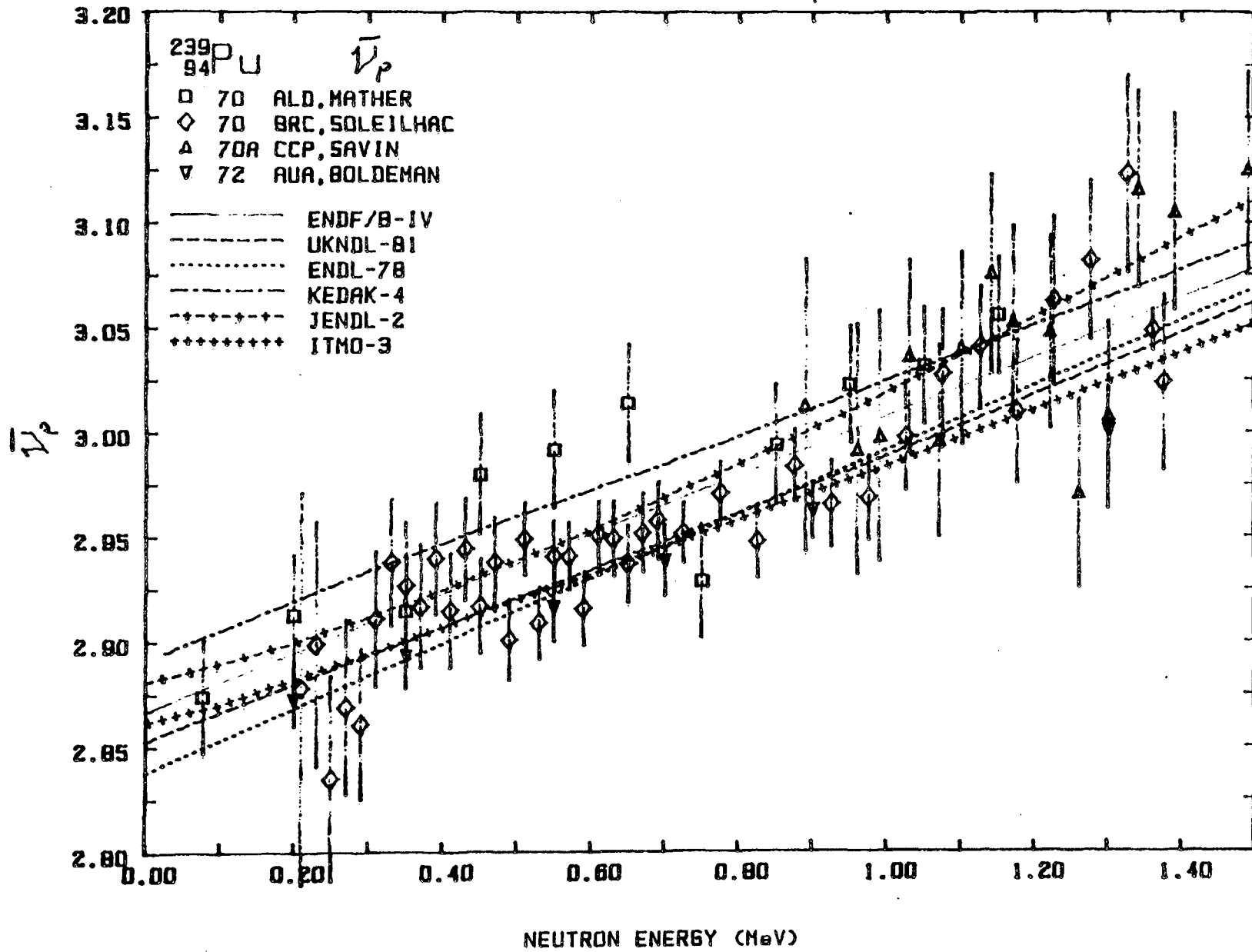


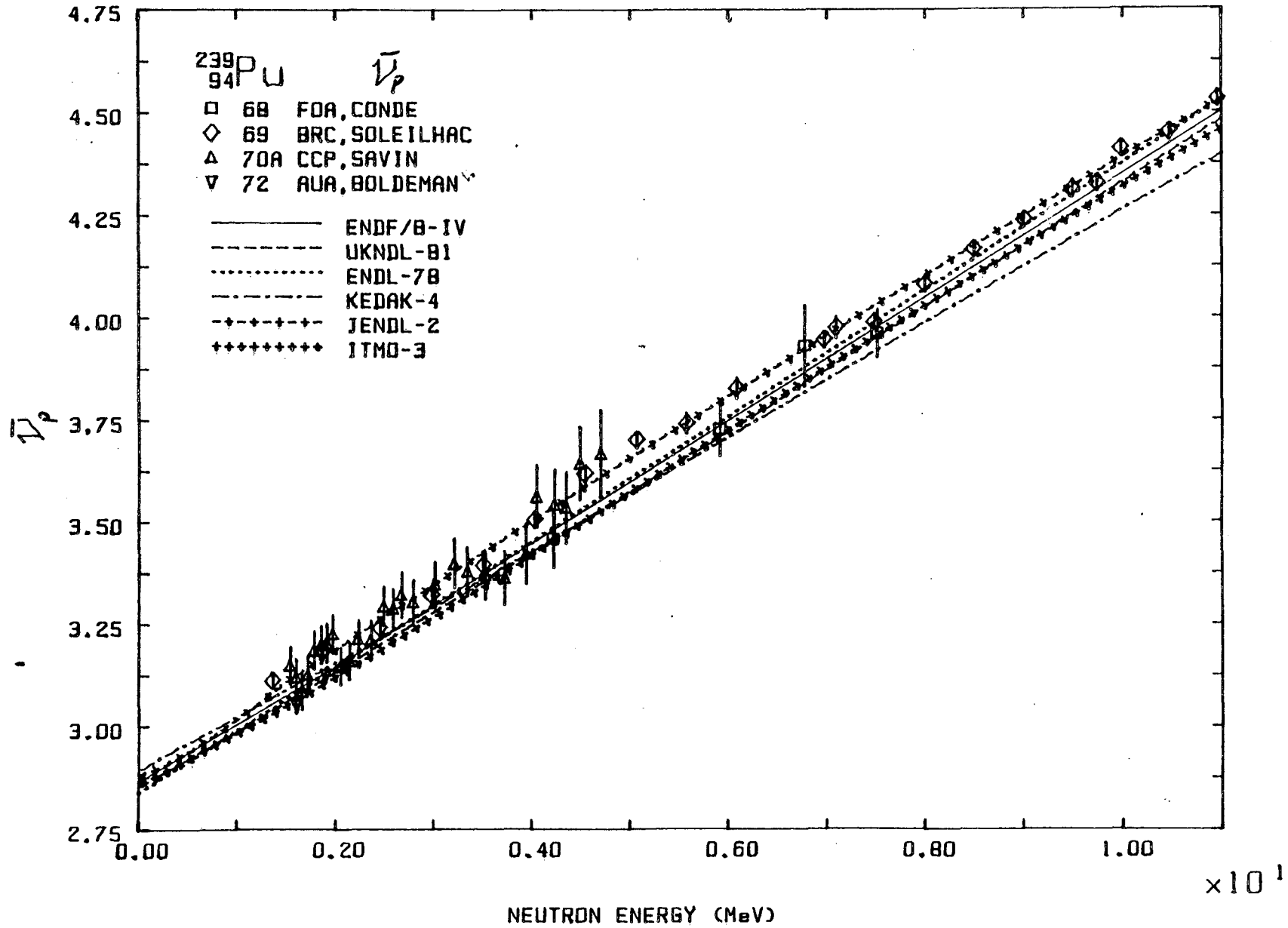
Experimental information <sup>239</sup>Pu,  $\sigma_f$

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
55 CCP, ADAMCHUK	237	0.01-1 000 eV	<sup>239</sup> Pu, $\sigma_f^{th}$		
67 ALD, WHITE	4	1-14 MeV	<sup>235</sup> U, $\sigma_f$	3.5 %	
68 CCP, NESTEROV	87	0.3-2.6 MeV	<sup>235</sup> U, $\sigma_f^{th}$	3 %	Two independent meas. with 3 and 2.7 % errors, respectively
70 ANL, POENITZ	11	0.15-1.4 MeV	<sup>235</sup> U, $\sigma_f$	2-3.5 %	
70B CCP, SAVIN	35	0.8-5.5 MeV	<sup>235</sup> U, $\sigma_f$	2-4 %	
70 KFK, PFLETSCHINGER	48	5 keV-1 MeV	<sup>235</sup> U, $\sigma_f$	2-2.5 %	
71 ORL, GWIN	1 317	0.02-30 keV	<sup>239</sup> Pu, $\sigma_f^{th}$	2-5 %	Two independent meas. using ionization chamber and metal foil
72 GEL, DERUYTTER	560	0.02-30 eV			Norm. to fiss. integral between 0.02-0.06 eV = 25.15 b. Error 10 % in integral between 9-20 eV

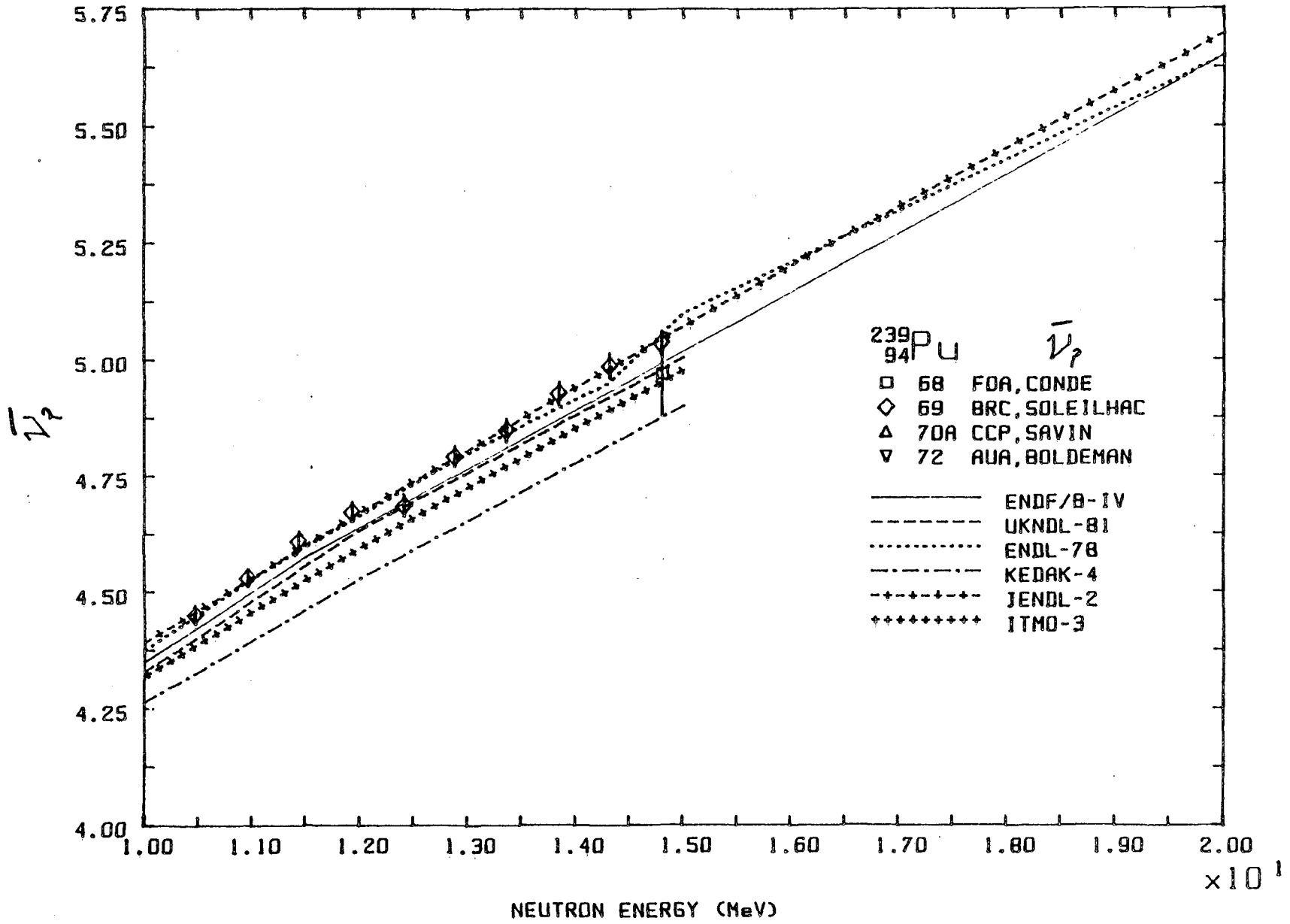
Experimental information  $^{239}\text{Pu}, \sigma_f$  (cont)

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
75 HAR, GAYTHER	33	1 keV-1 MeV	$^{235}\text{U}, \sigma_f$	3.5-4 %	$\sigma_f(239):\sigma_f(235)$ norm. to average values between 10 and 30 keV from eval. by Sowerby et al (Annals Nucl. Sci. Eng. 409 (1974))
76 CAD, SZABO	56	0.012-5.5 MeV	ABS	2-4 %	Final results of four meas. are given
76 ORL, GWIN	127	0.02 eV-200 keV		3-10 %	Error in relative value
78 KFK, KARI	169	1.0-20 MeV	$\text{H}, \sigma_{n,n}$	3-4 %	
78A LLL, CARLSON	107	1 keV-30 MeV	$^{235}\text{U}, \sigma_f$	1-4 %	Error in relative value
82 TUD, ARLT	1	14.7 MeV	ABS.	1.0 %	
83 ANL, MEADOWS	74	0.15-9.8 MeV	$^{235}\text{U}, \sigma_f$	1-2 %	Error in relative value









Experimental information  $^{239}\text{Pu}, \bar{\nu}$

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
68 FOA, CONDE	5	4.2-14.8 MeV	$^{252}\text{Cf}, \bar{\nu}_p^{\text{SP}}$	2 %	
69 BRC, SOLEILHAC	35	1.4-30 MeV	$^{252}\text{Cf}, \bar{\nu}_p^{\text{SP}}$	0.5-1 %	
70 ALD, MATHER	18	0.08-1.2 MeV	$^{252}\text{Cf}, \bar{\nu}_p^{\text{SP}}$	1-1.5 %	
70 BRC, SOLEILHAC	40	0.2-1.4 MeV	$^{252}\text{Cf}, \bar{\nu}_p^{\text{SP}}$	0.5-2 %	
70A CCP, SAVIN	41	0.9-4.7 MeV	$^{252}\text{Cf}, \bar{\nu}_p^{\text{SP}}$	1-2 %	
72 AUA, BOLDEMAN	8	0.2-1.9 MeV	$^{252}\text{Cf}, \bar{\nu}_p^{\text{SP}}$	0.5 %	

General comments: Data normalized to  $\bar{\nu}_p^{\text{SP}}(^{252}\text{Cf}) = 3.756$



$^{240}_{94}\text{Pu}$ 

## NUCLEAR PROPERTIES

Spin and parity of ground state:  $0^+$ 

Ground state decay:

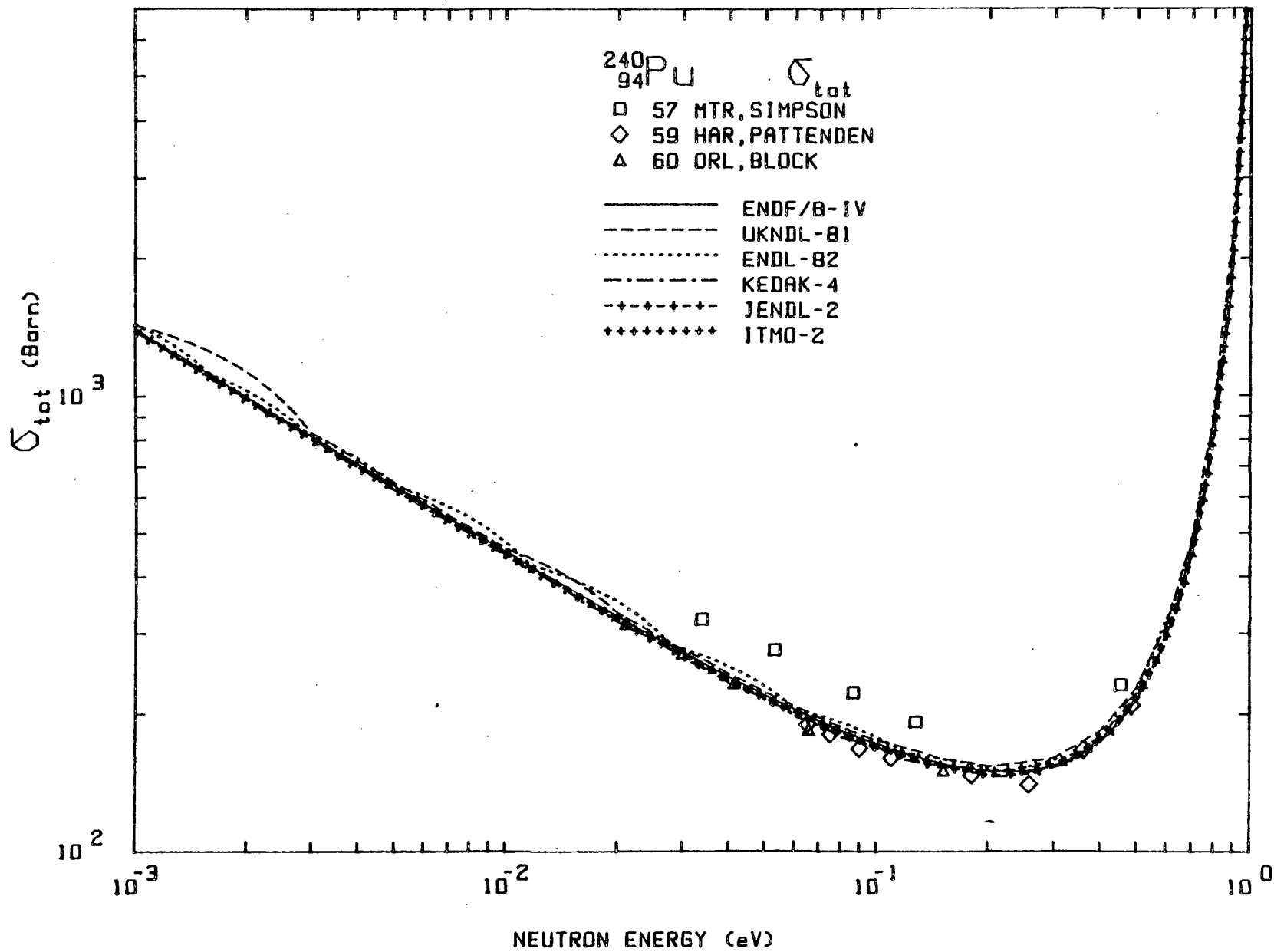
Alpha to  $^{236}\text{U}$ : 100%,  $Q_\alpha = 5.256$  MeV  
 Half life:  $6.550 \cdot 10^3$  yr  
 $1.15 \cdot 10^{11}$  yr - spontaneous fission

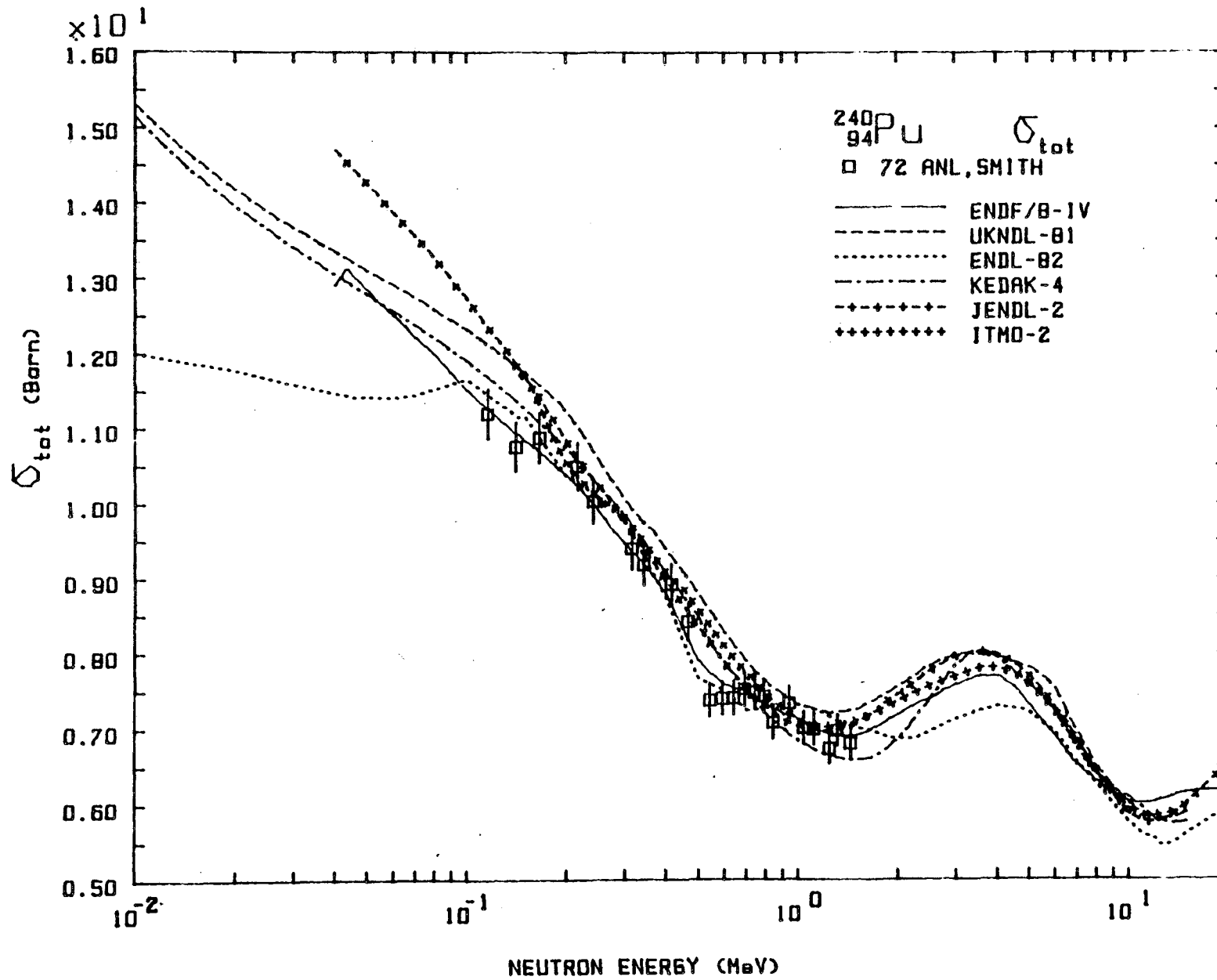
## THERMAL CROSS SECTIONS (2200 m/s)

Reference	$\sigma_\gamma$	$\sigma_f$	$\sigma_t$	$\bar{\nu}_{sp}$	(barns)
ENDF/B - IV	290.0	0.06	293.8		
ENDF/B - V	289.9	0.05709	291.5		
UKNDL -81	280.9	$7.715 \cdot 10^{-3}$	283.2		
ENDL -82	301.5	0.06014	307.0		
KEDAK-4	290.4	0.06121	289.3		
JENDL-2	288.4	0.06763	290.0		
70 CRC, LOUNSBURY BNL 325 (1984)	289.5 289.5	0.056		2.17	

## RESONANCE INTEGRALS

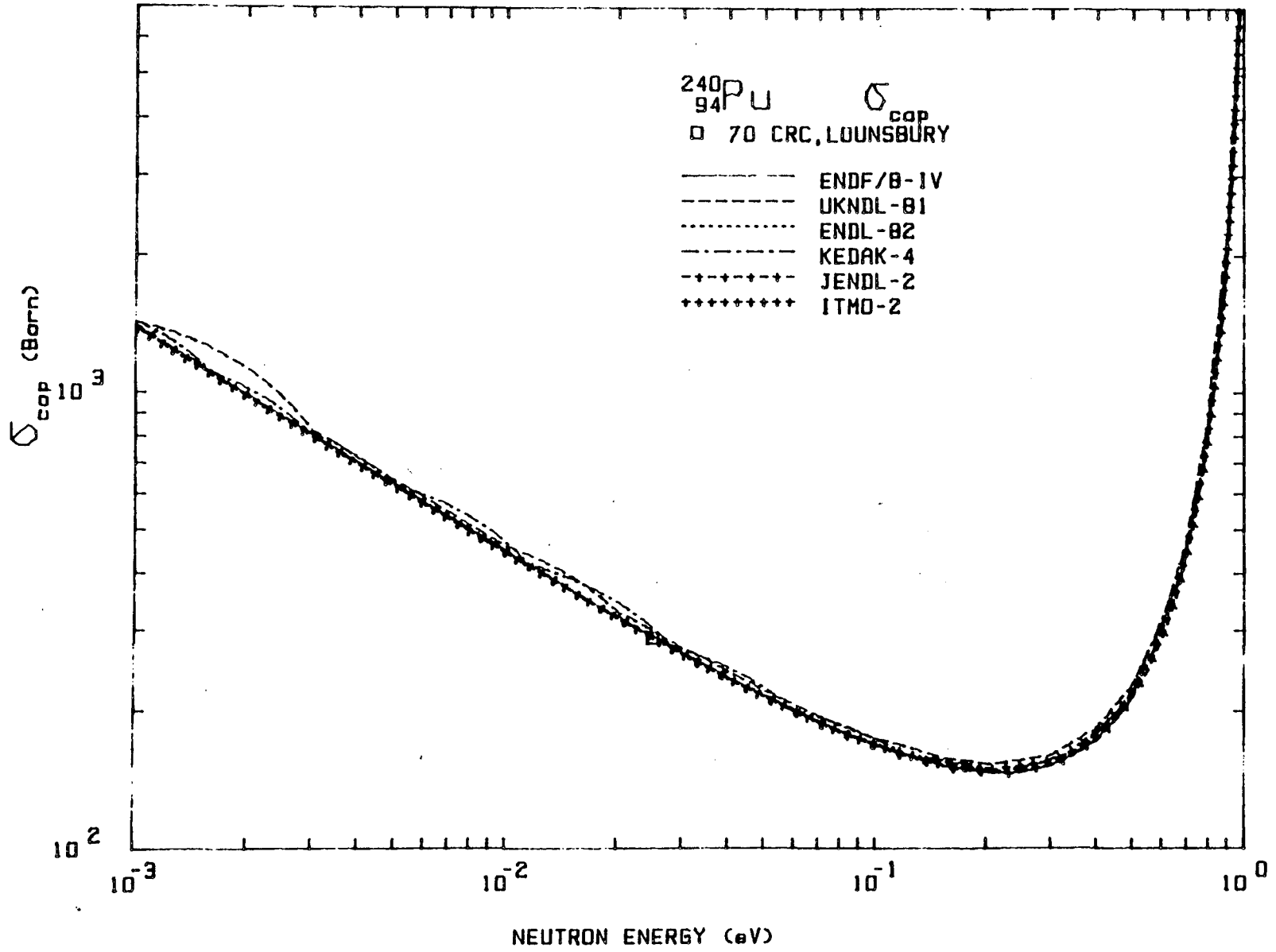
Reference	$RI_\gamma$	$RI_f$	(barns)
ENDF/B - IV	7793	3.2	
ENDF/B - V	7971	8.830	
UKNDL -81	8047	6.446	
ENDL -82	8329	10.03	
KEDAK-4	7982	8.359	
JENDL-2	8453	10.09	
BNL 325 (1984)	8100	8.8	



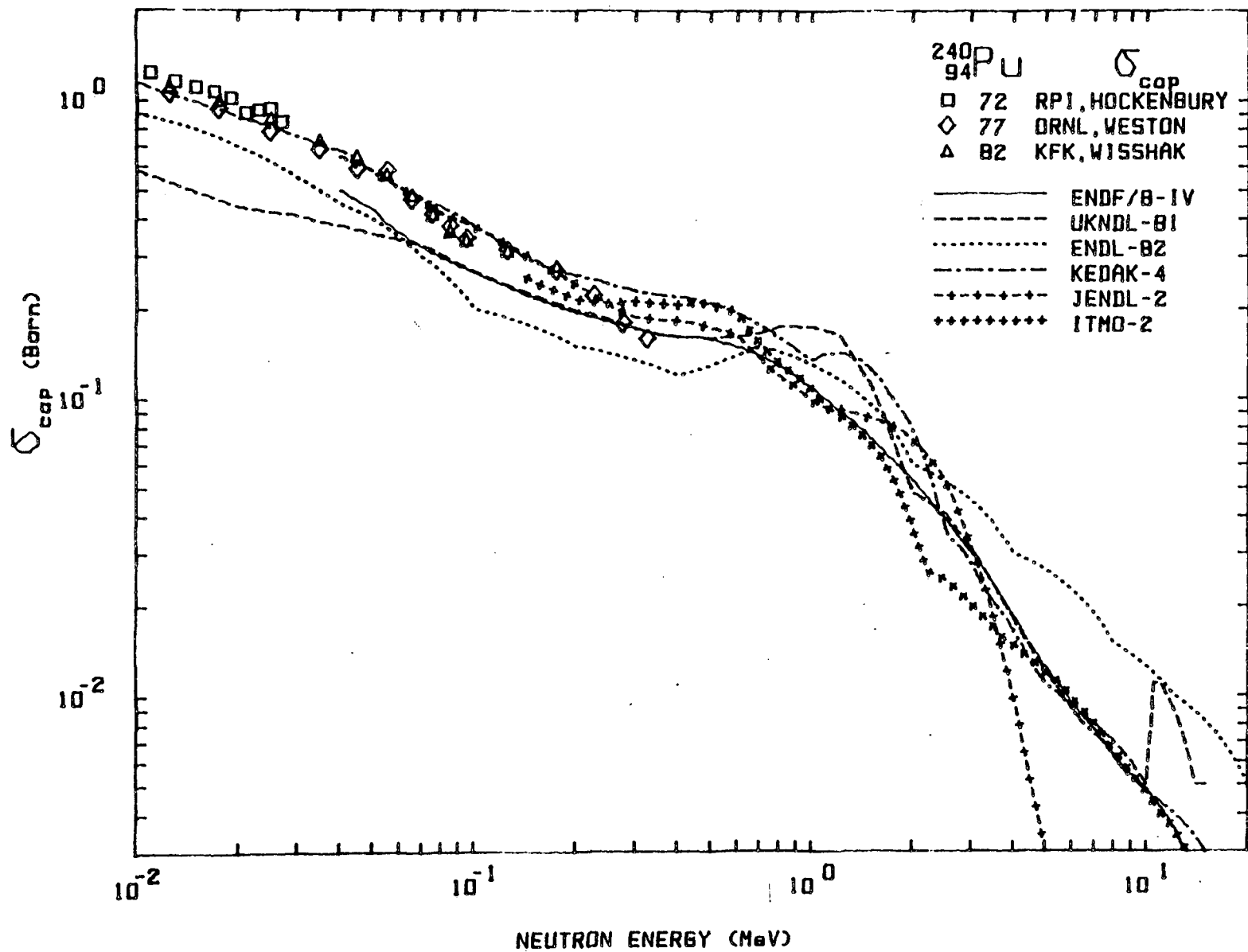


Experimental information  $^{240}\text{Pu}, \sigma_{\text{tot}}$

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
57 MTR, SIMPSON	240	0.033-43 eV	ABS.		
59 HAR, PATTENDEN	288	0.065-0.8 eV	ABS.		
60 ORL, BLOCK	35	0.02-0.15 eV	ABS.		
72 ANL, SMITH	55	0.1-1.5 MeV	ABS.	5 %	

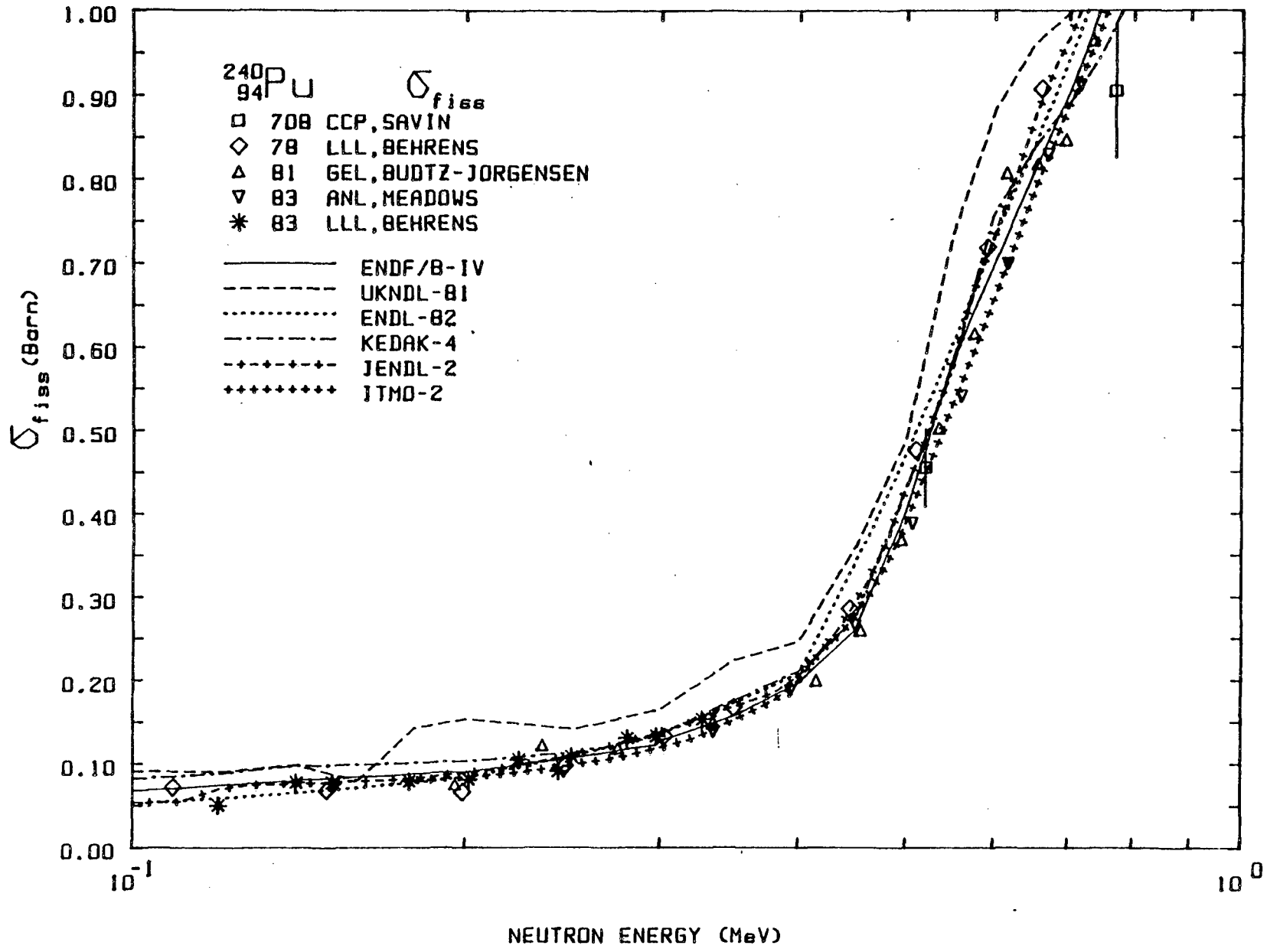


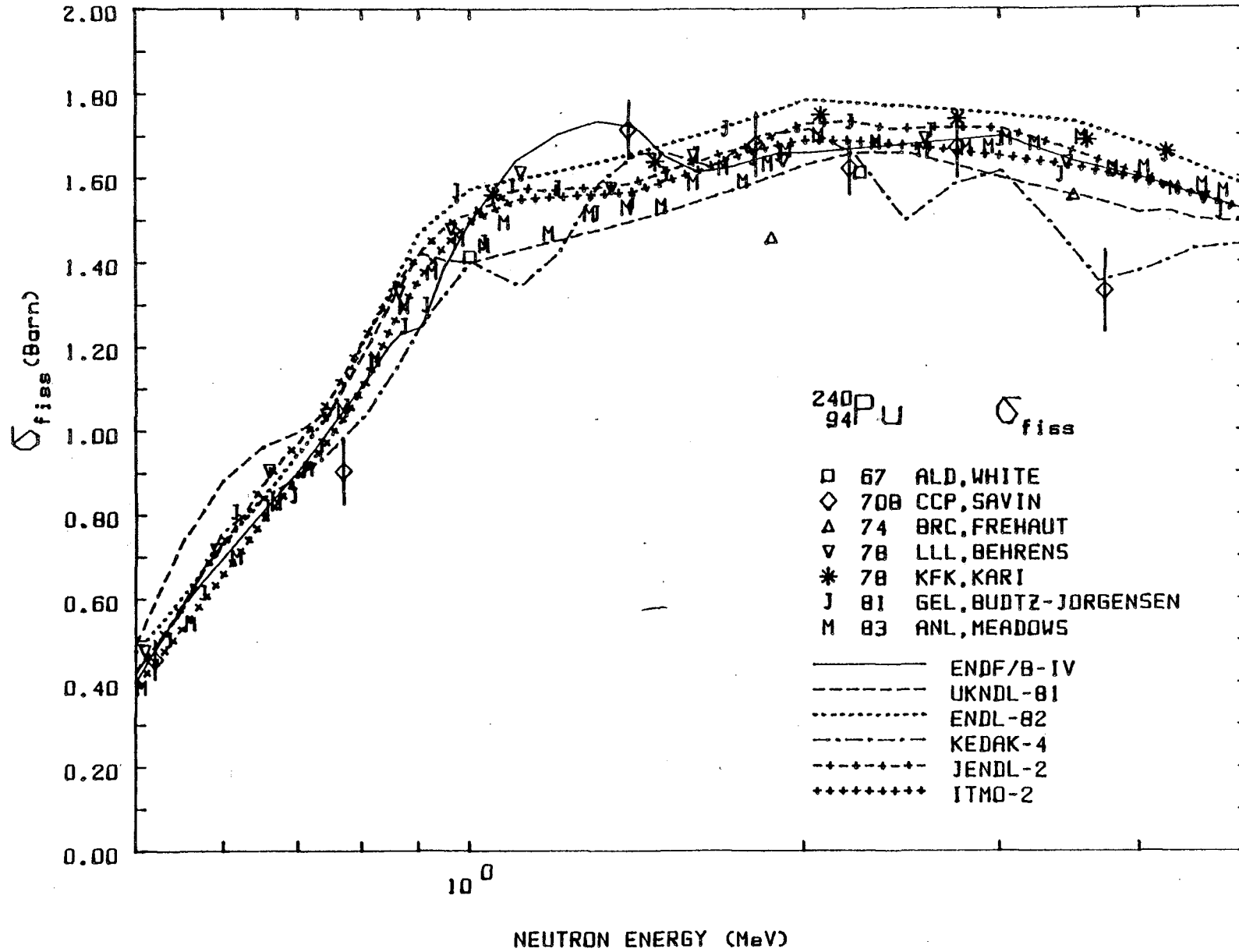


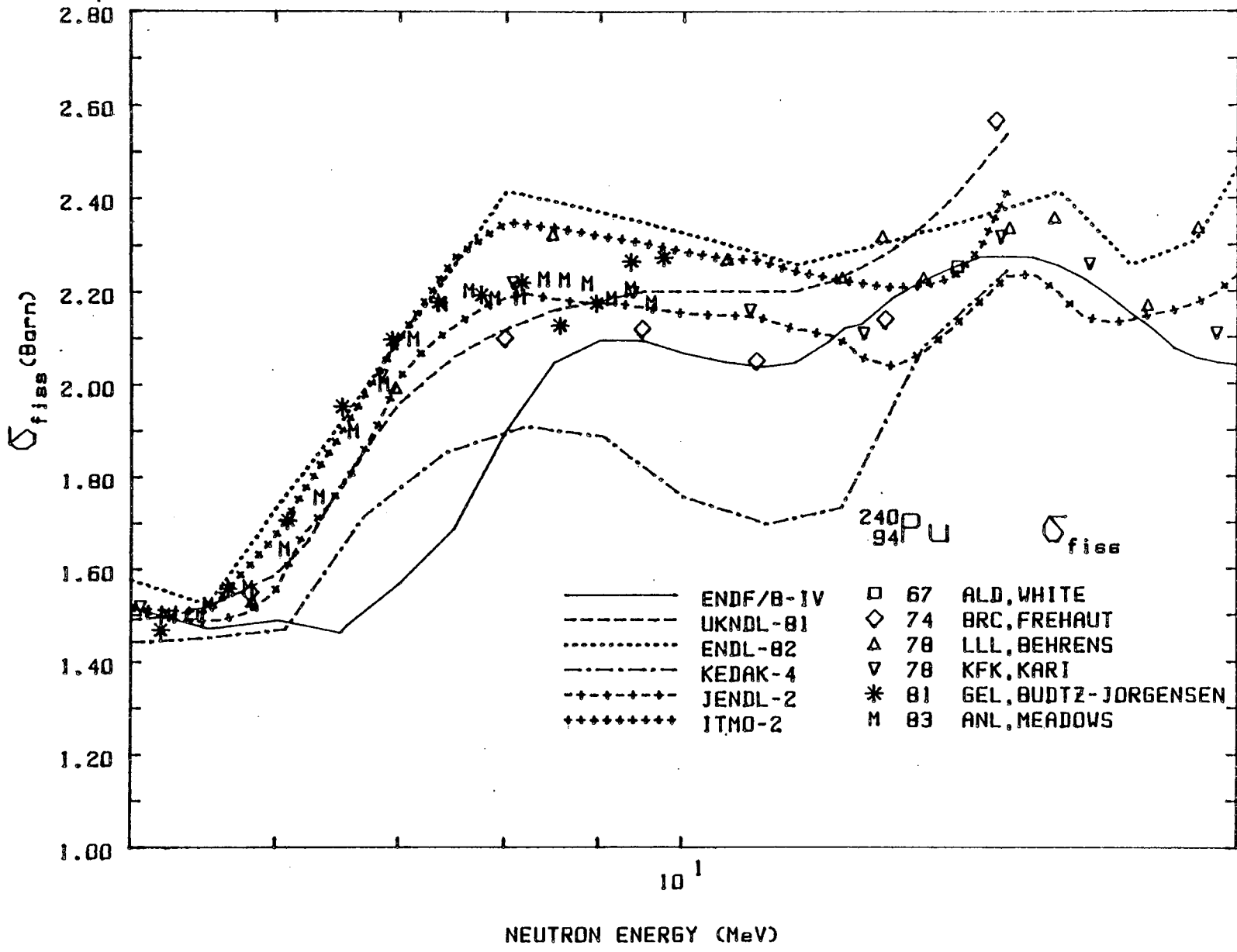


Experimental information  $^{240}\text{Pu}, \sigma_{\gamma}$

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
70 CRC, LOUNSBURY	1	$2.5-10^{-2}$ eV		0.5 %	
72 RPI, HOCKENBURY	11	6-28 keV	Transm. calc.	8 %	
77 ORL, WESTON	33	0.2-350 keV	$^{240}\text{Pu}, \sigma_{\gamma}^{\text{th}}$	7-20 %	
78 KFK, WISSHAK(I)	16	21-71 keV	$^{238}\text{U}, \sigma_{\gamma}$	7-11 %	Norm. to $\sigma_{\gamma} (^{238}\text{U})$ ENDF/B-IV. $\gamma$ Energy spread $\sim 5$ %
78 KFK, WISSHAK(II)	16	21-71 keV	$^{197}\text{Au}, \sigma_{\gamma}$	5-10 %	Norm. to $\sigma_{\gamma} (^{197}\text{Au})$ ENDF/B-IV. $\gamma$ Flight path 135 mm. Energy spread $\sim 5$ %
79 KFK, WISSHAK	17	48-213 keV	$^{197}\text{Au}, \sigma_{\gamma}$	6-13 %	Norm. to $\sigma_{\gamma} (^{197}\text{Au})$ ENDF/B-IV. $\gamma$ Energy spread 9-14 %. Includes two se- parate measurements







Experimental information  $^{240}\text{Pu}, \sigma_f$

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
67 ALD, WHITE	4	1-14 MeV	$^{235}\text{U}, \sigma_f$	3-5 %	
70B CCP, SAVIN	26	0.5-3.7 MeV	$^{235}\text{U}, \sigma_f$	5-10 %	Error in relative value
74 BRC, FREHAUT	22	1.5-15 MeV	$^{235}\text{U}, \sigma_f$	2-4 %	Error in relative value
78 KFK, KARI	124	1-20 MeV	H, $\sigma_{n,n}$	3-4 %	Meas. rel. $\sigma_f(^{235}\text{U})$ 0.5-20 MeV, rel. $\sigma_{n,n}(\text{H})$ 1-20 MeV
78 LLL, BEHRENS	135	0.1-30 MeV	$^{235}\text{U}, \sigma_f$	2-3 %	Error in relative value
81 GEL, BUDTZ-JORGENSEN	93	0.2-10 MeV	$^{235}\text{U}, \sigma_f$	2-4 %	Error in relative value
83 ANL, MEADOWS	55	0.35-9.6 MeV	$^{235}\text{U}, \sigma_f$	1.5-4 %	Error in relative value
83 LLL, BEHRENS	82	5-300 keV	$^{235}\text{U}, \sigma_f$	3-10 % ( $E_n > 40$ keV)	Error in relative value



<sup>241</sup>Pu

## NUCLEAR PROPERTIES

Spin and parity of ground state: 5/2<sup>+</sup>

Ground state decay:

Beta ( $\beta^-$ ) to <sup>241</sup>Am: 100%,  $E_\beta = 20.8$  keVAlpha to <sup>237</sup>U: 0.0024%,  $Q_\alpha = 5.139$  MeV

Half-life: 14.4 yr

6  $10^5$  yr alpha decay

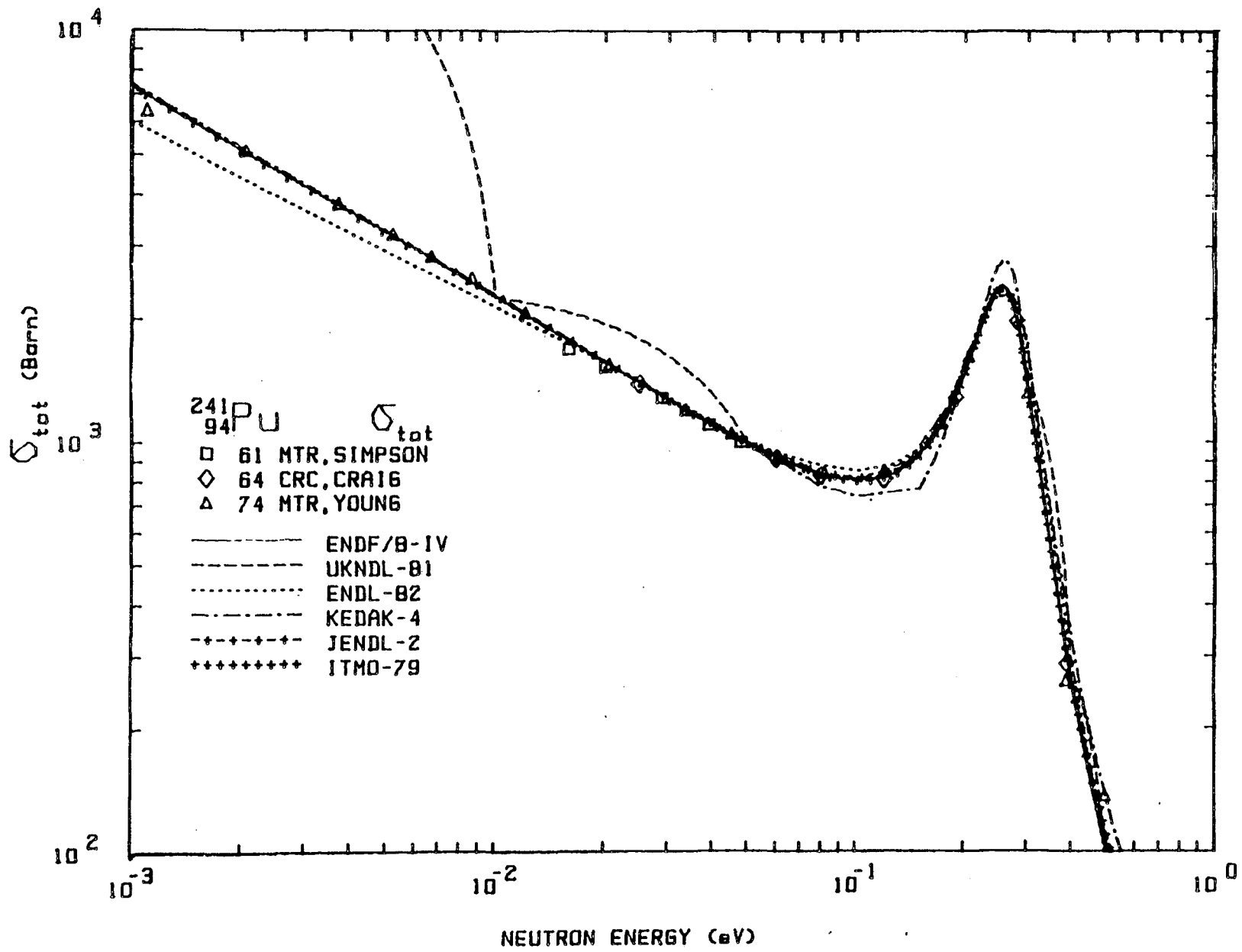
## THERMAL CROSS SECTIONS (2200 m/s)

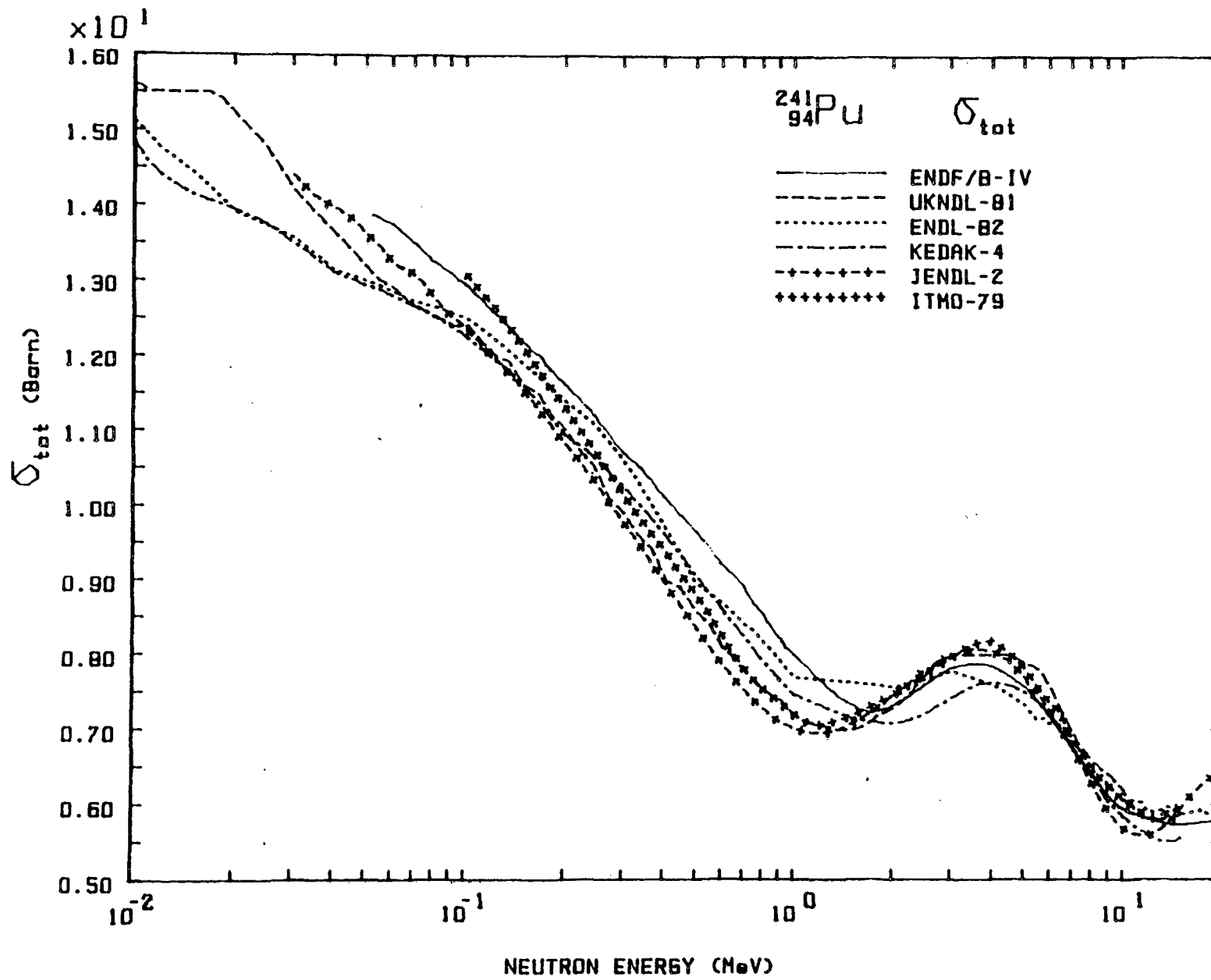
Reference	$\sigma_\gamma$	$\sigma_f$	$\sigma_t$	$\bar{\nu}_+$	(barns)
ENDF/B - IV	366.3	1008	1385		
ENDF/B - V	361.4	1016	1387	2.953	
UKNDL -81	355.8	1031	1400		
ENDL -82	398.6	996.5	1405		
KEDAK-4	364.8	1012	1386		
JENDL-2	362.9	1015	1388		
66 ALD,WHITE		1022			
BNL 325 (1984)	358	1011	1378	2.937	
NNDC (1983)	360.06	1011.50		2.942	
84 NPL,AXTON	360.9	1018.0		2.937	

## RESONANCE INTEGRALS

Reference	RI <sub><math>\gamma</math></sub>	RI <sub>f</sub>	(barns)
ENDF/B - IV	121.0	570.5	
ENDF/B - V	196.9	588.4	
UKNDL -81	168.8	564.7	
ENDL -82	225.8	581.0	
KEDAK-4	192.6	582.3	
JENDL-2	186.8	590.3	
71 KAP, EILAND	162	569	
BNL 325 (1984)	162	570	

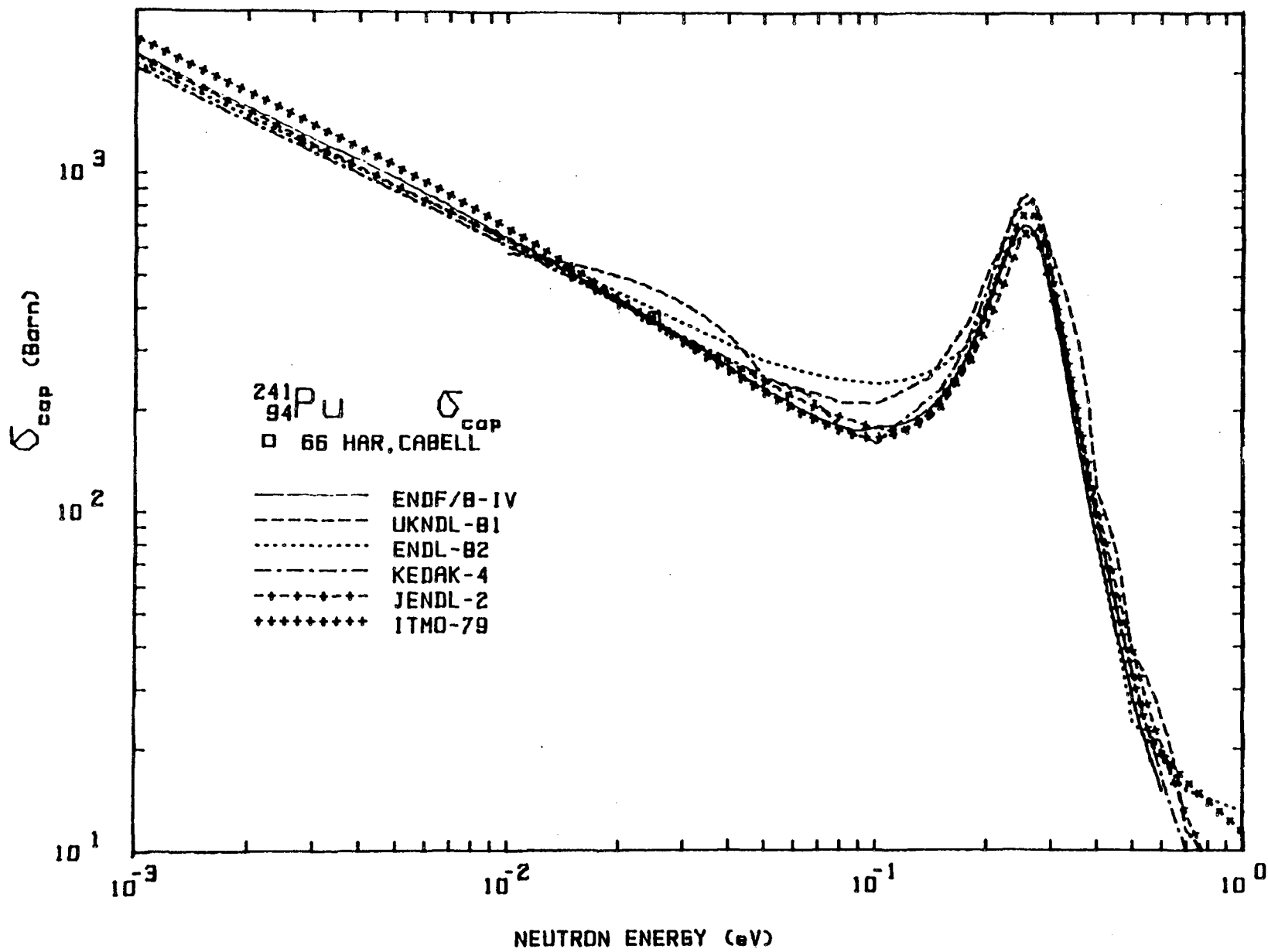


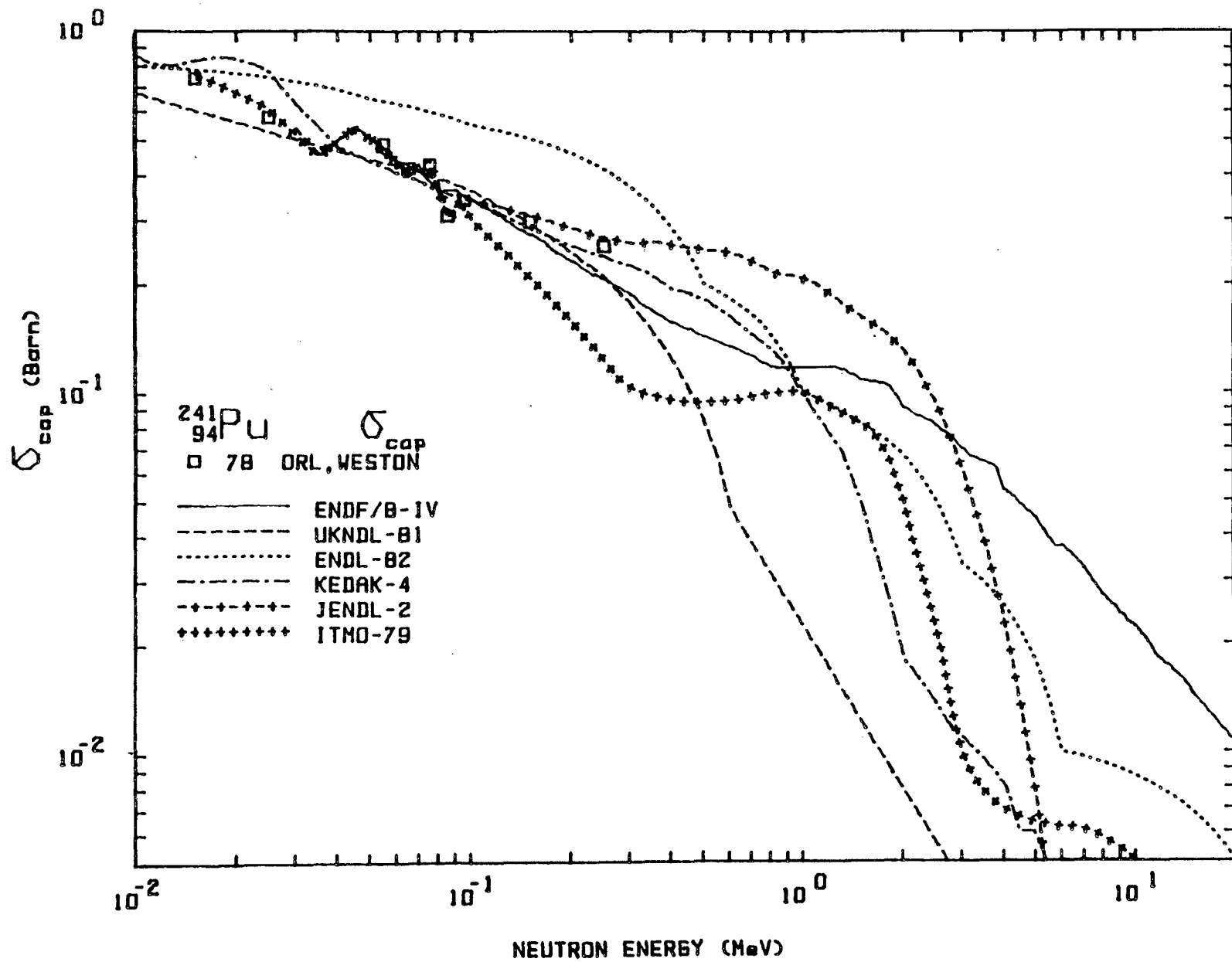




Experimental information  $^{241}\text{Pu}, \sigma_{\text{tot}}$

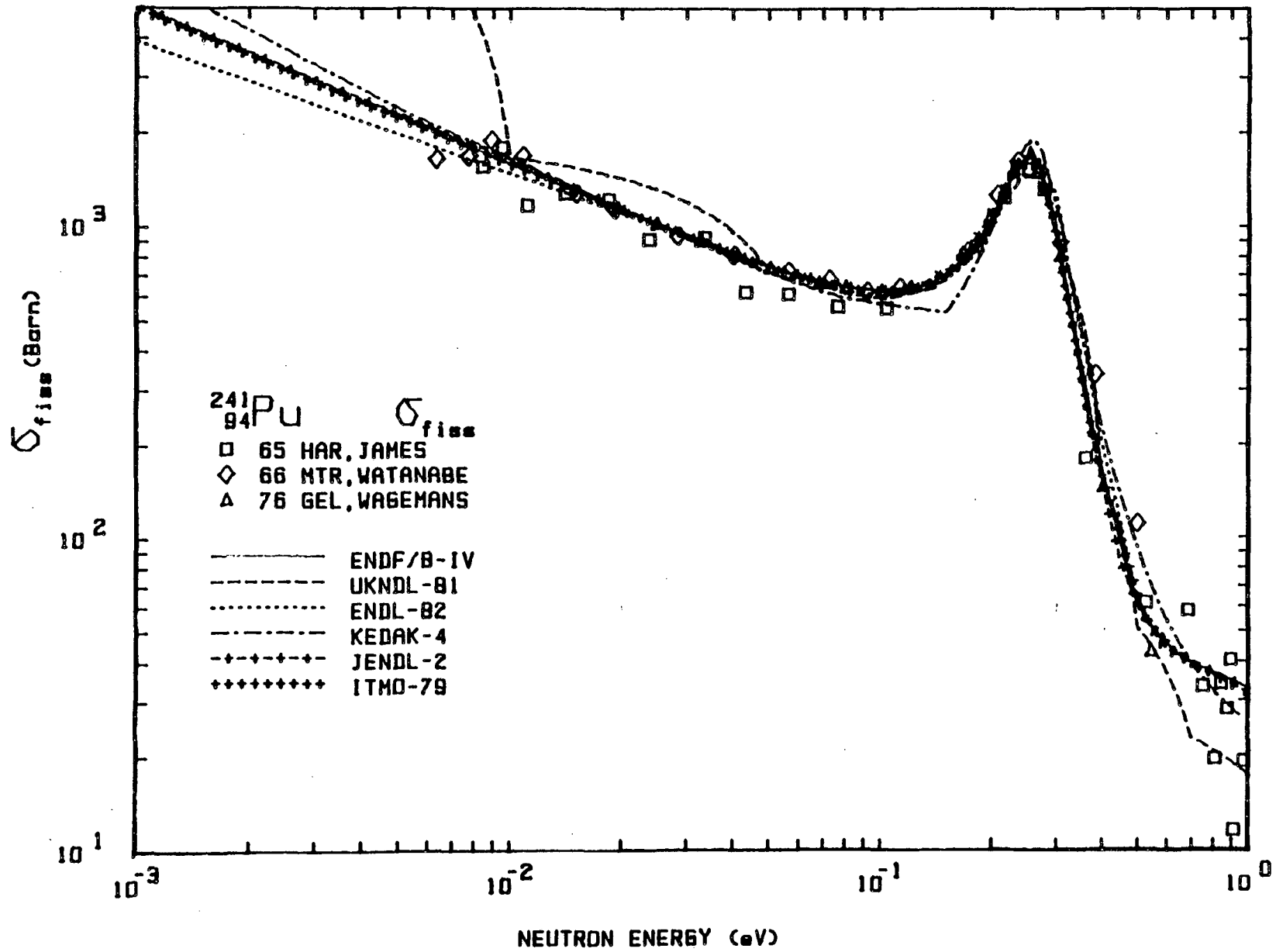
<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
61 MTR, SIMPSON	1 797	0.016-2 keV	ABS.	<5 %	Max. error at 0.264 eV
64 CRC, CRAIG	4 438	0.025 eV-1 keV	ABS.		Meas. at 0.025-0.7 eV and 13.8-1 000 eV. $\sigma_{\text{th}} = 1383 \pm 30 \text{ b}$ $\sigma_{\text{tot}}$
74 MTR, YOUNG	374	0.001-3.5 eV			

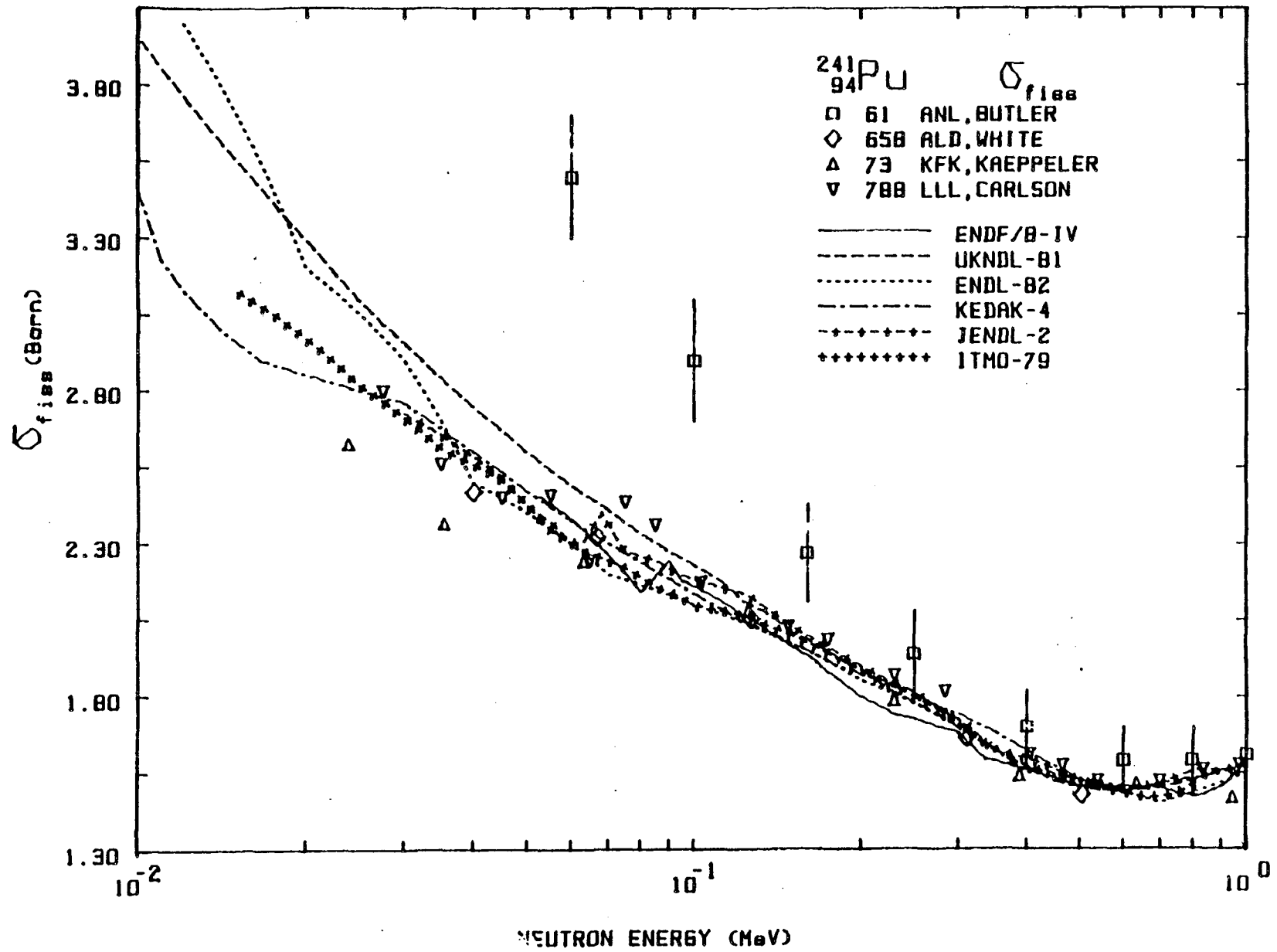




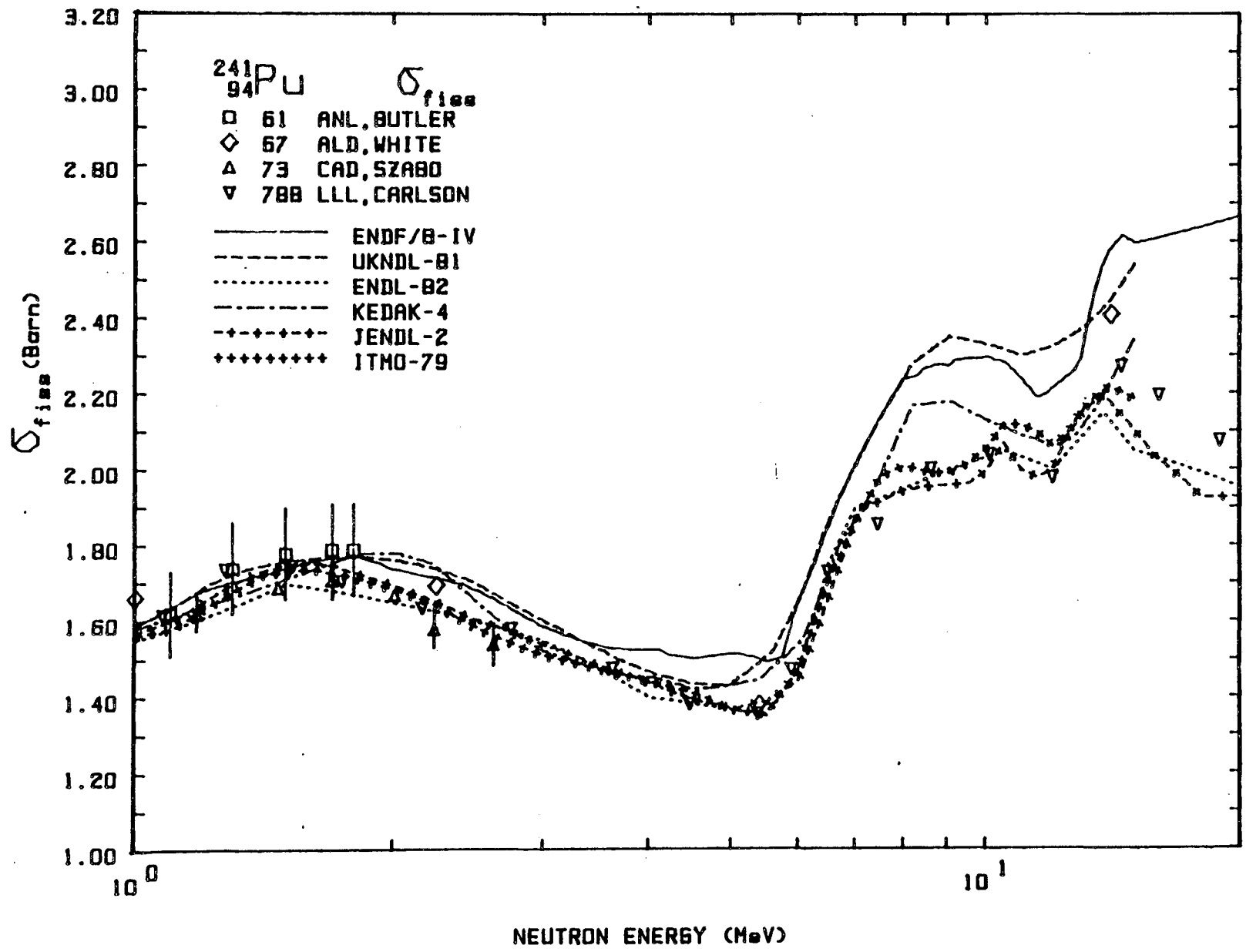
Experimental information  $^{241}\text{Pu}, \sigma_{\gamma}$

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
66 HAR, GABELL	1	Maxw.		4 %	
78 ORL, WESTON	38	0.01-300 keV	$^{241}\text{Pu}, \sigma_f$	6-10 %	Norm. to $\sigma_f(^{241}\text{Pu})$ ENDF/B-IV









Experimental information  $^{241}\text{Pu}, \sigma_f$

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
61 ANL, BUTLER	25	0.02-1.8 MeV	$^{235}\text{U}, \sigma_f$	>7 %	Error in relative value
65B ALD, WHITE	5	40-500 keV	$^{235}\text{U}, \sigma_f$	3 %	
65 HAR, JAMES	1 633	0.01 eV-3 keV	$^{241}\text{Pu}, \sigma_f^{\text{th}}$	3 % 8 %	Below 0.5 eV 0.5-1 eV
66 MTR, WATANABE	258	0.006-11 eV	$^{241}\text{Pu}, \sigma_f^{\text{th}}$	2.5 %	
67 ALD, WHITE	4	1-14 MeV	$^{235}\text{U}, \sigma_f$	3.5 %	
73 CAD, SZABO	6	1.2-2.6 MeV	ABS.	3 %	
73 KFK, KÄPPELER	43	5 keV-1.2 MeV	$^{235}\text{U}, \sigma_f$	3-4 %	
76 GEL, WAGEMANS	340	0.01-50 eV	$^{241}\text{Pu}, \sigma_f^{\text{th}}$		Abs. fission integral obtained $\int_{12 \text{ eV}}^{20 \text{ eV}} \sigma_f(E) dE =$ $= (1363 \pm 14) \text{ b eV}$
78B LLL, CARLSON	107	1 keV-30 MeV	$^{235}\text{U}, \sigma_f$	2 %	Error in relative value



<sup>242</sup>Pu

## NUCLEAR PROPERTIES

Spin and parity of ground state: 0<sup>+</sup>

Ground state decay:

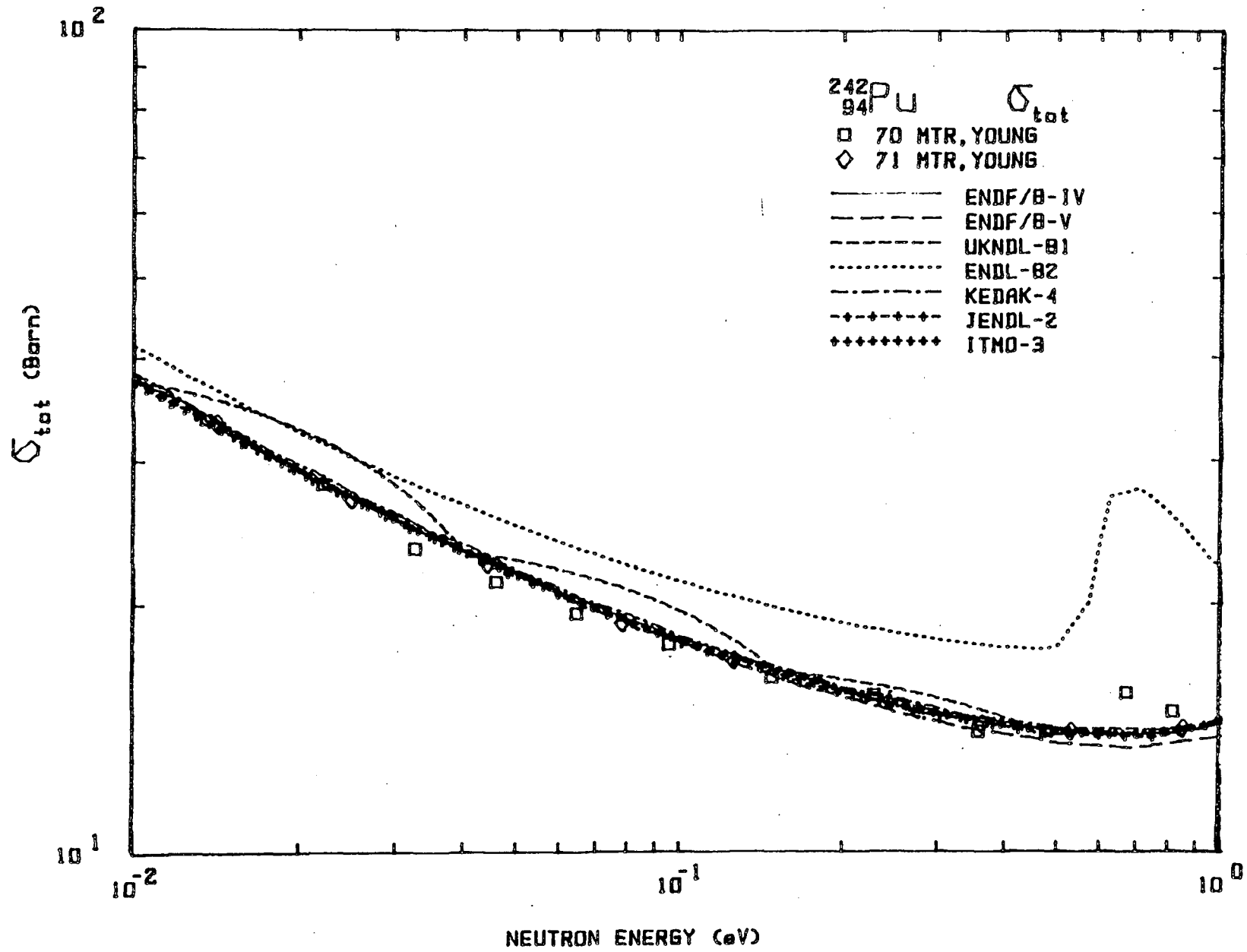
Alpha to <sup>238</sup>U: 100%, Q<sub>α</sub> = 4.983 MeVHalf-life: 3.760 10<sup>5</sup> yr6.8 10<sup>10</sup> yr - spontaneous fission

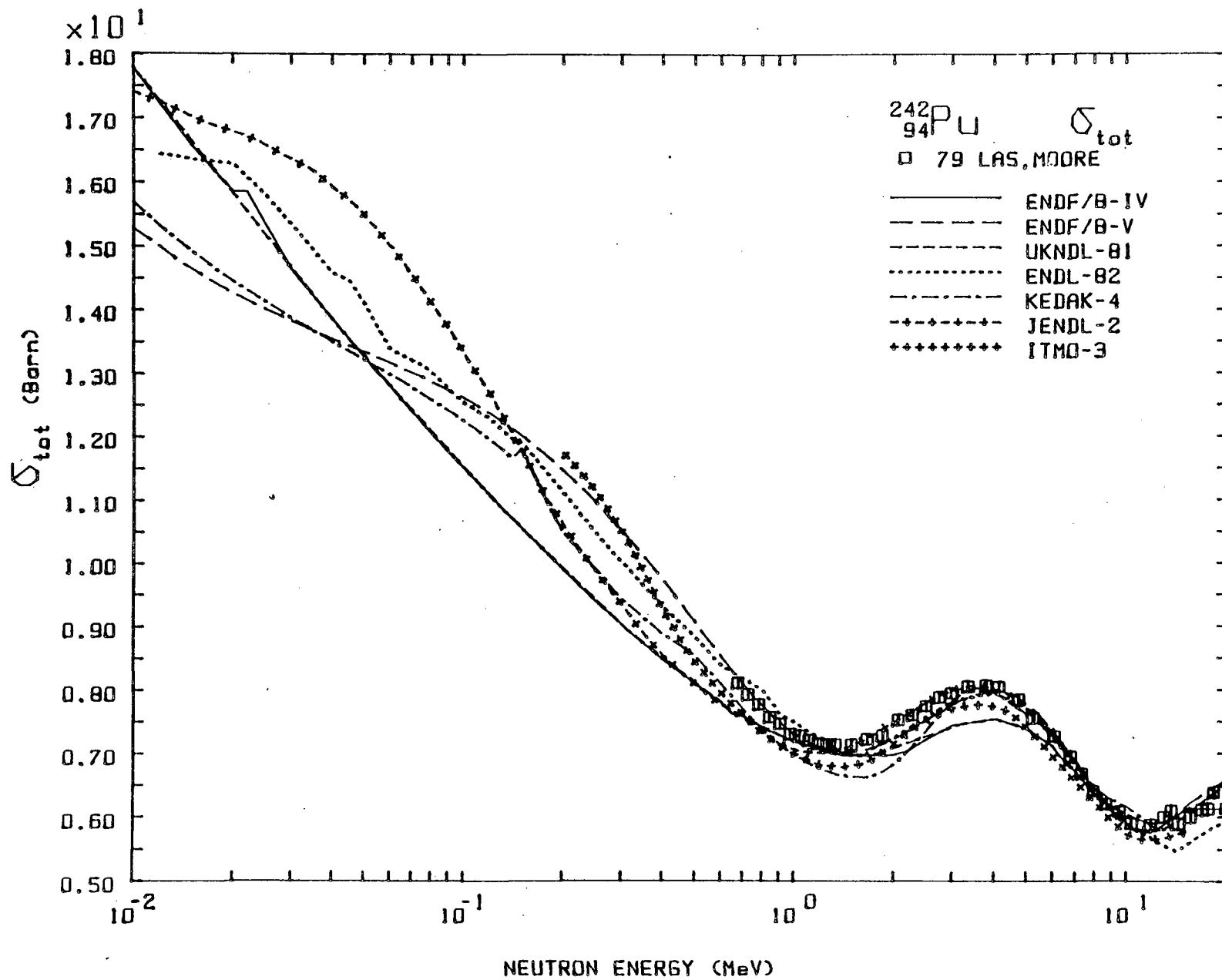
## THERMAL CROSS SECTIONS (2200 m/s)

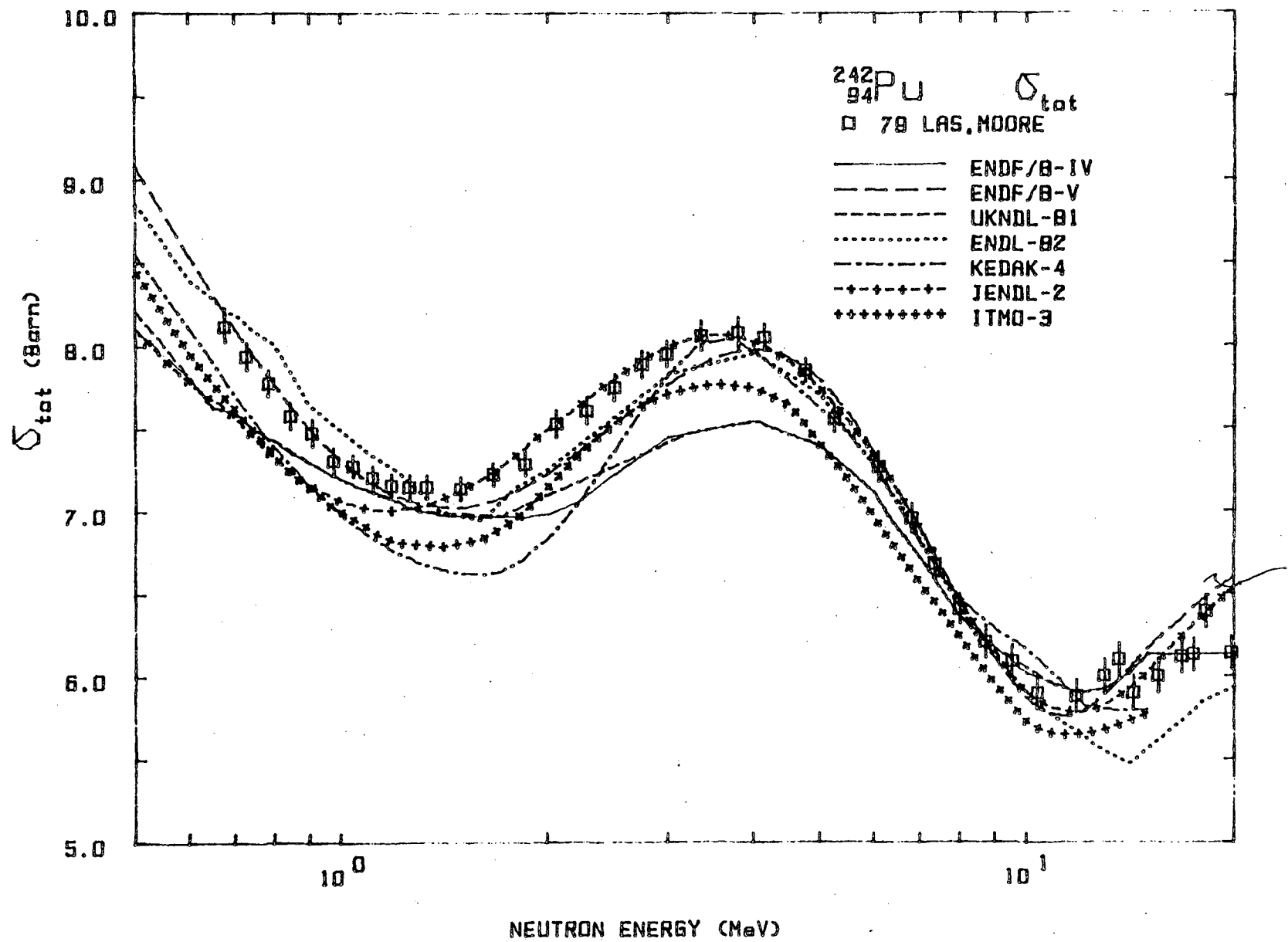
Reference	$\sigma_{\gamma}$	$\sigma_f$	$\sigma_t$	$\bar{\nu}_{sp}$	(barns)
ENDF/B - IV	18.5	0.0	26.9		
ENDF/B - V	19.17	1.043·10 <sup>-3</sup>	26.90		
UKNDL -81	18.55		27.21		
ENDL -82	18.79	884.5·10 <sup>-6</sup>	30.13		
KEDAK-4	18.95		27.26		
JENDL-2	18.42	0.1223	26.65		
70 CRC, DURHAM	18.7				
BNL 325 (1984)	18.5	<0.2	26.7	2.153	

## RESONANCE INTEGRALS

Reference	RI <sub>γ</sub>	RI <sub>f</sub>	(barns)
ENDF/B - IV	1122	0.08	
ENDF/B - V	1273	5.568	
UKNDL -81	1126	5.313	
ENDL -82	1302	39.95	
KEDAK-4	1125	4.689	
JENDL-2	1117	6.348	
70 MTR, YOUNG	1110		
BNL 325 (1984)	1115	5.0	





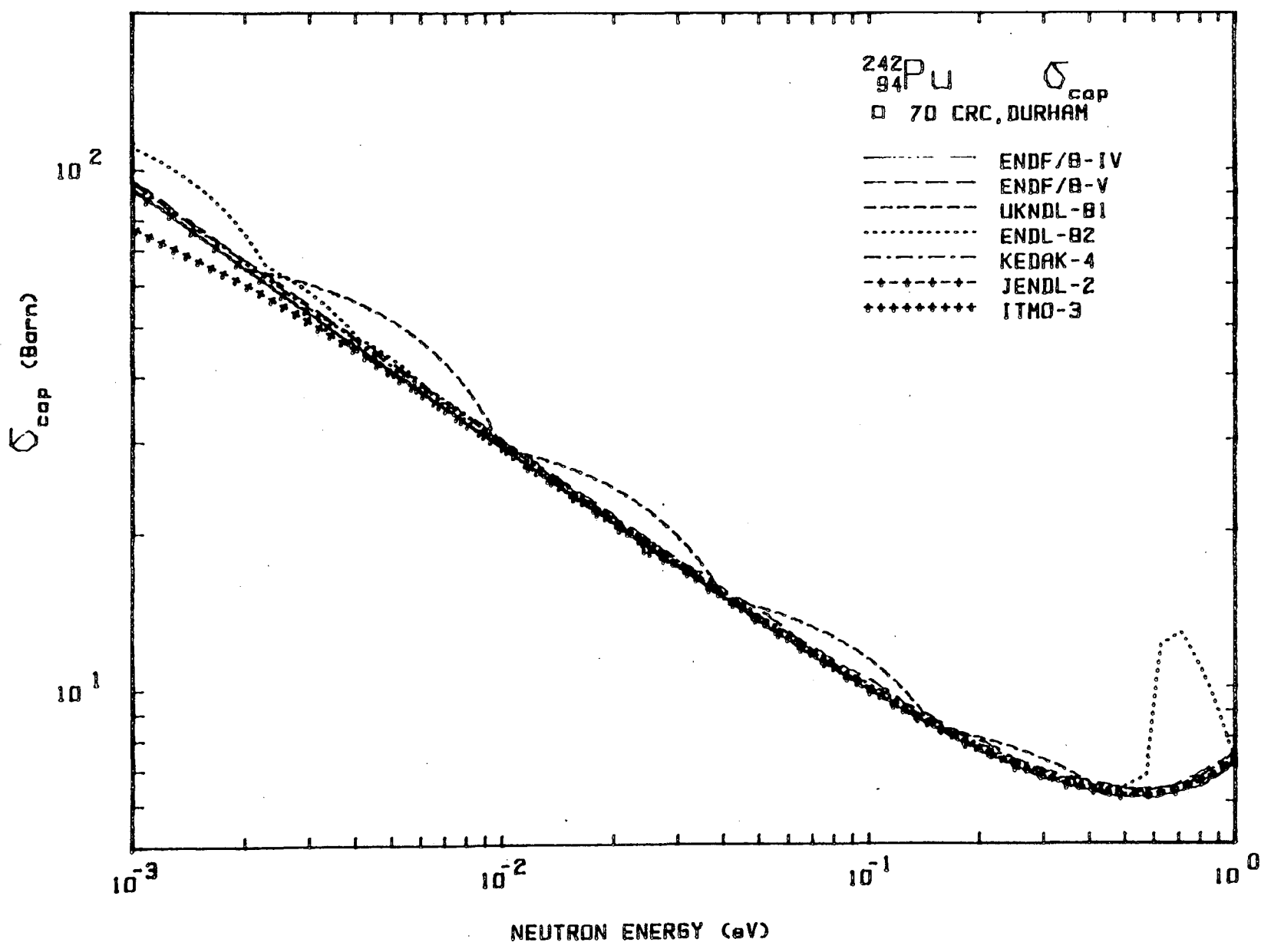


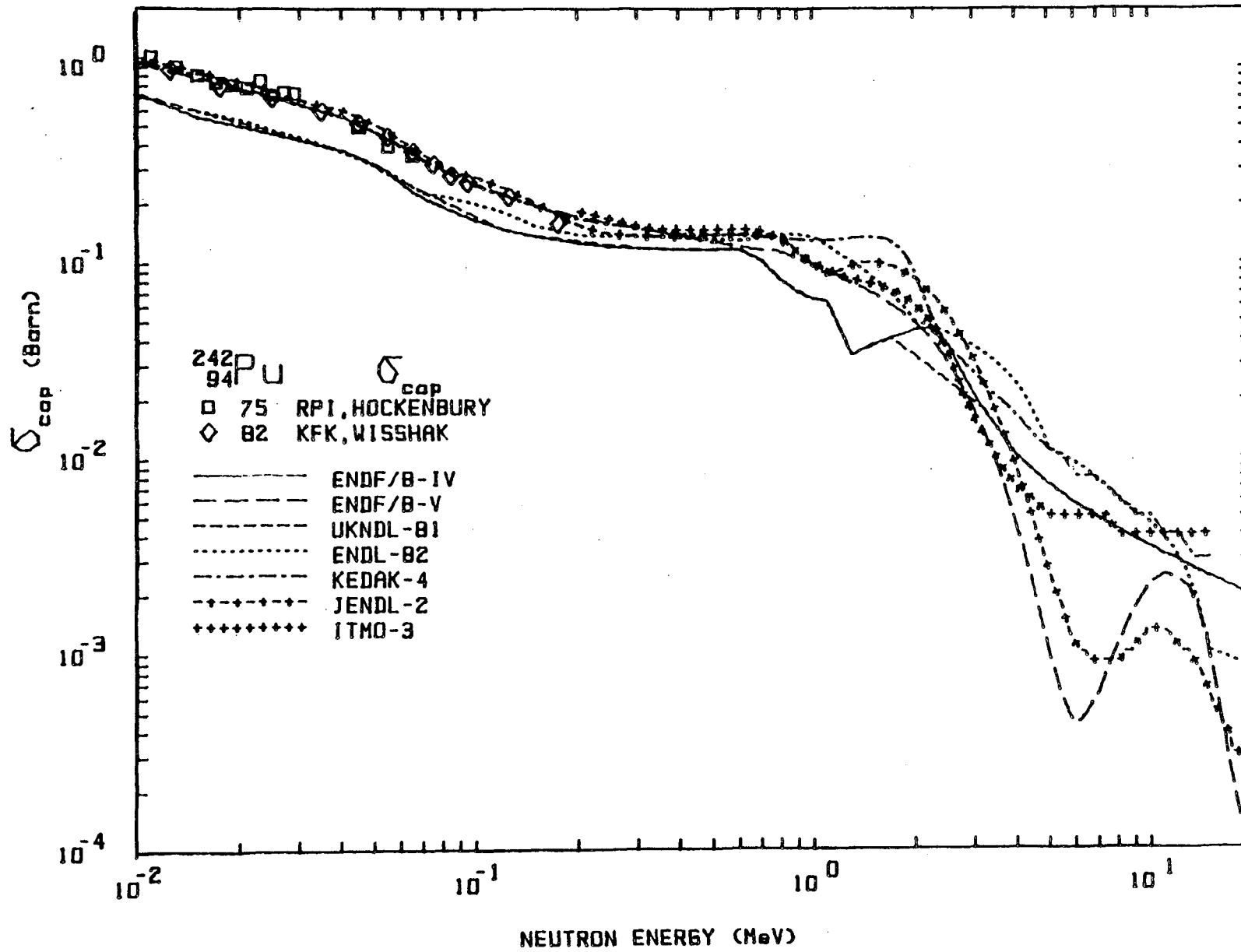
Experimental information  $^{242}\text{Pu}, \sigma_{\text{tot}}$

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
70 MTR, YOUNG	1 017	0.0015 eV-8 keV	ABS.	$\pm 2b$	Oxide sample
71 MTR, YOUNG	79	0.0013-2 eV	ABS.		Metal sample. Combined results from 70 MTR, YOUNG and 71 MTR, YOUNG gives $\sigma_t^{\text{th}} = (26.9 \pm 1)b$
79 LAS, MOORE	120	0.7-170 MeV	ABS.	1-1.5 %	

General comments: ENDF/B-V total cross section evaluation in the thermal energy range has been calculated from resonance parameters using the computer code RESEND (NEA Nuclear Data Bank)

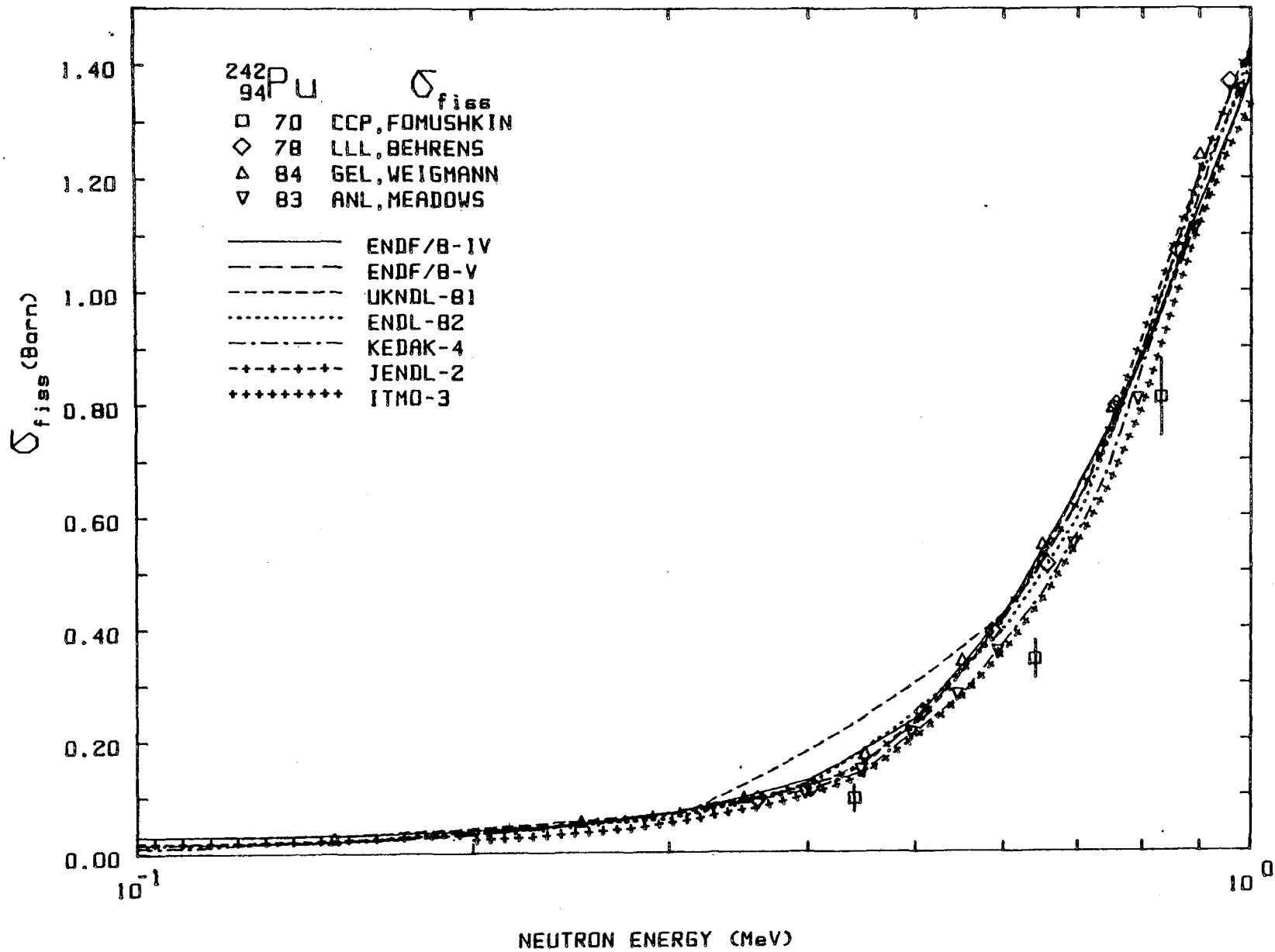


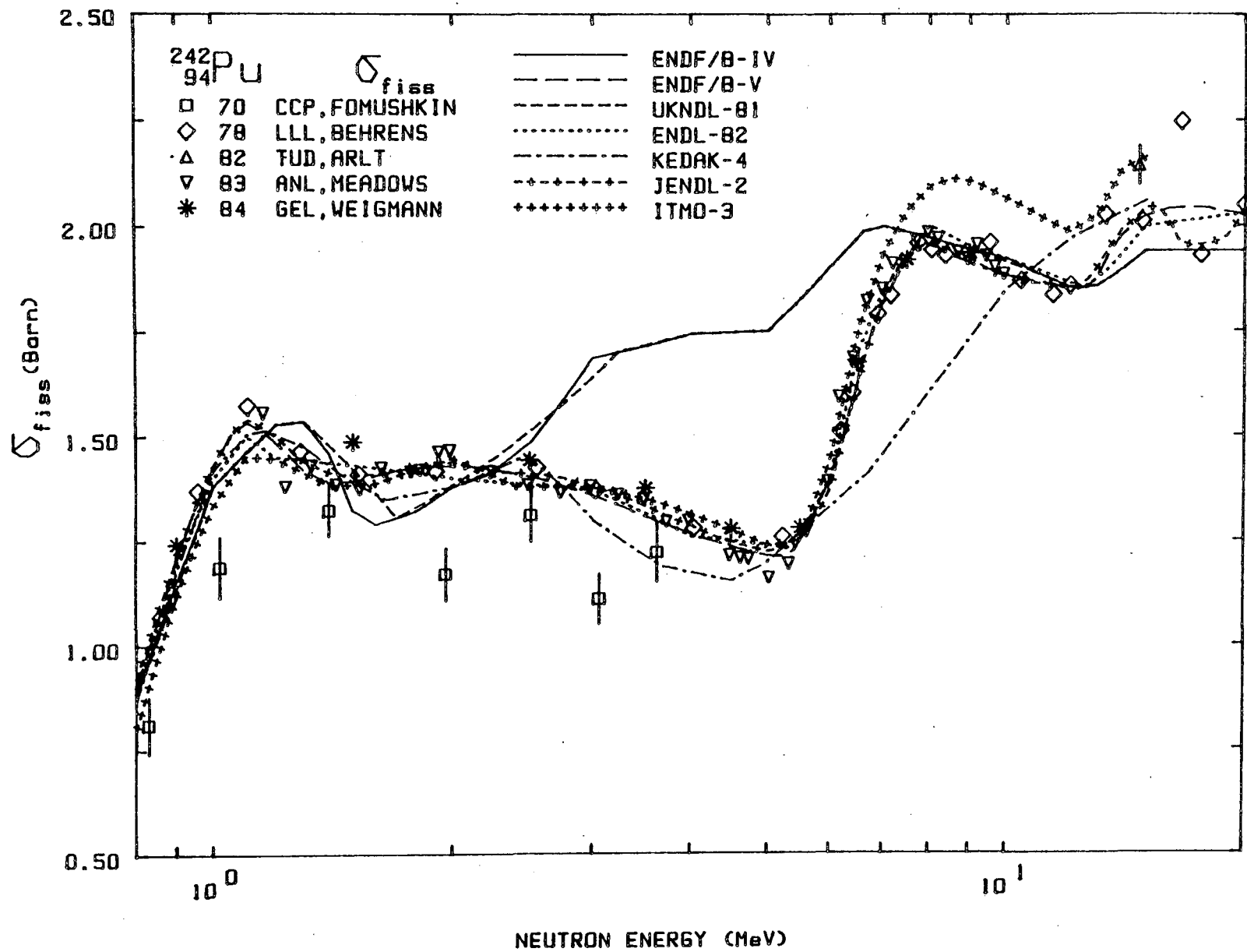




Experimental information  $^{242}\text{Pu}, \sigma_{\gamma}$

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
70 CRC, DURHAM	1	Maxw.		4 %	
75 RPI, HOCKENBURY	15	8-70 keV			
82 KFK, WISSHAK	12	10-200 keV	$^{238}\text{U}, \sigma_{\gamma}$	6-20 %	Norm. to $\sigma_{\gamma}(^{197}\text{Au})$ ENDF/B-V Energy spread 10-15 %





Experimental information  $^{242}\text{Pu}, \sigma_f$

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
70 CCP, FOMUSHKIN	14	0.4-3.6 MeV	$^{235}\text{U}, \sigma_f$	4-6 %	Error in relative value
78 LLL, BEHRENS	140	0.1-30 MeV	$^{235}\text{U}, \sigma_f$	3-5 %	Error in relative value
82 TUD, ARLT	1	14.7 MeV	ABS.	2.1 %	
83 ANL, MEADOWS	50	0.4-9.8 MeV	$^{235}\text{U}, \sigma_f$	2 %	Error in relative value
84 GEL, WEIGMANN	16	0.1-10 MeV	$^{235}\text{U}, \sigma_f$	3 %	



<sup>241</sup>Am

## NUCLEAR PROPERTIES

Spin and parity of ground state:  $5/2^-$ 

Ground state decay:

Alpha to <sup>237</sup>Np: 100%,  $Q_\alpha = 5.638$ 

Half-life: 432.2 yr

 $1.15 \cdot 10^{14}$  yr - spontaneous fission

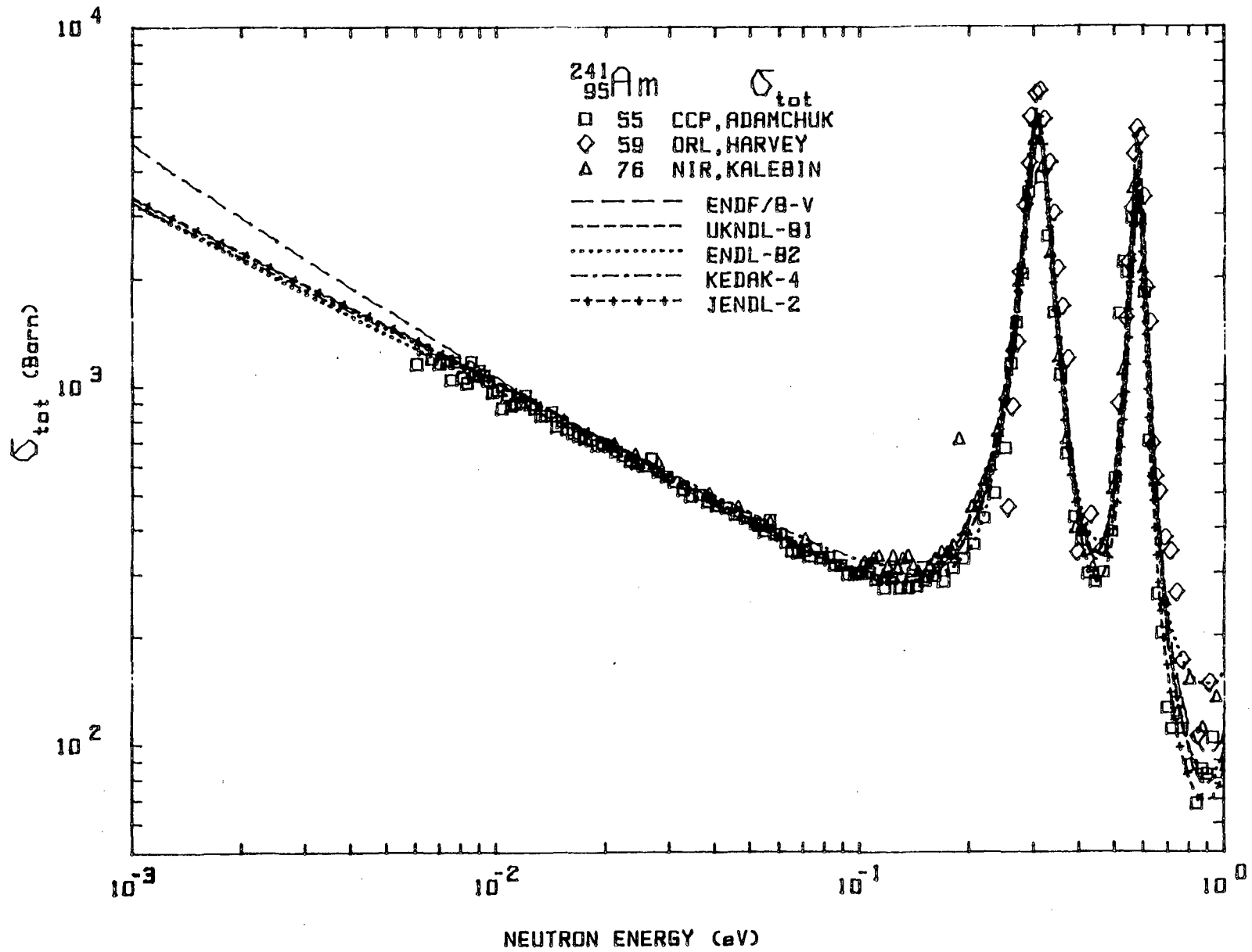
## THERMAL CROSS SECTIONS (2200 m/s)

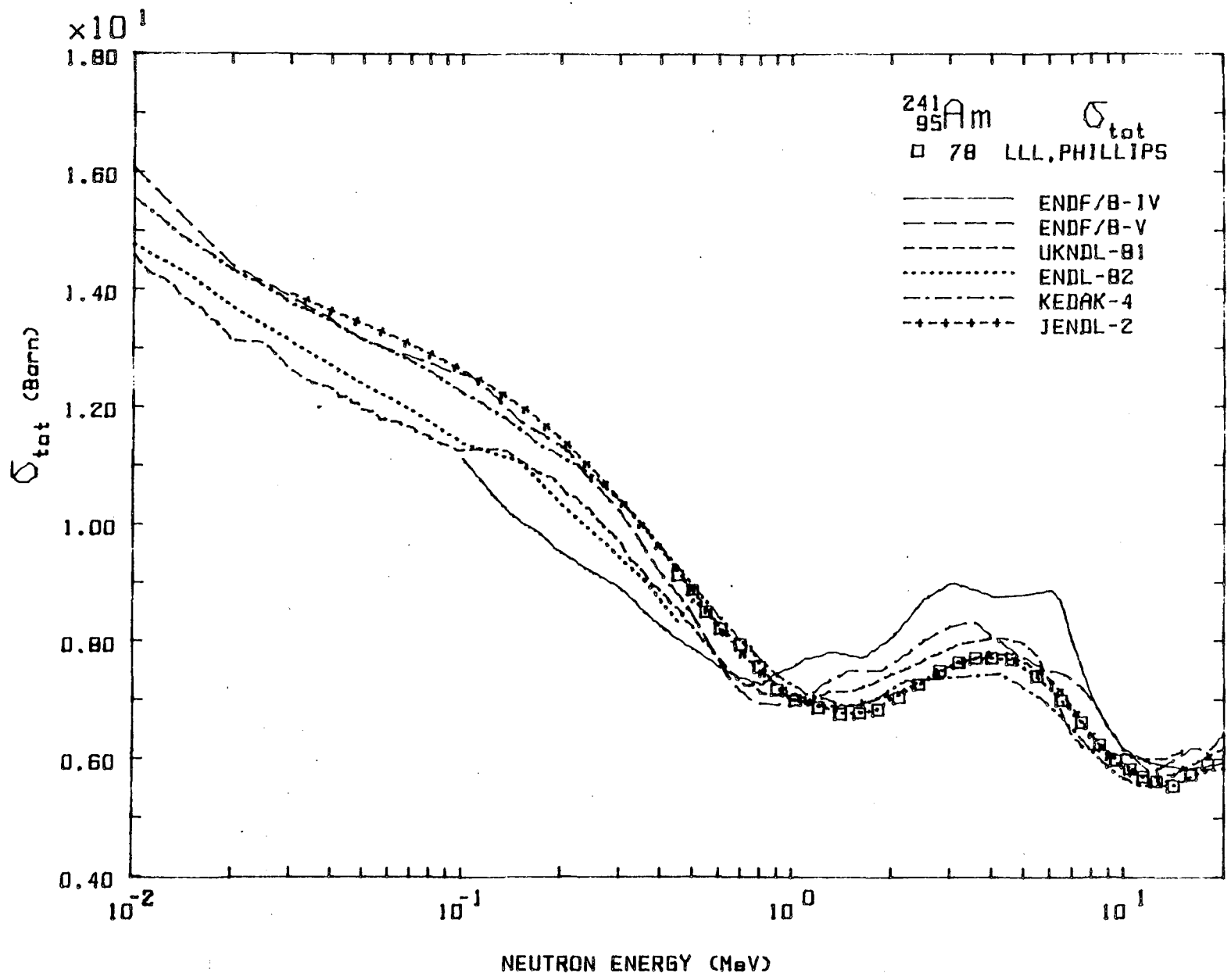
Reference	$\sigma_\gamma$	$\sigma_f$	$\sigma_t$	$\bar{\nu}_p$	(barns)
ENDF/B - IV	581.5	3.3	594.8		
ENDF/B - V	576.5	3.274	589.8	3.09	
UKNDL -81	600.0	3.100	615.0		
ENDL -82	583.9	3.282	600.5		
KEDAK-4	609.9	3.150	625.1		
JENDL-2	600.3	3.018	614.6		
BNL 325 (1984)	587	3.20		3.213	
BNL 325 (1984)(152 yr- <sup>242m</sup> Am)	54				

## RESONANCE INTEGRALS

Reference	RI <sub><math>\gamma</math></sub>	RI <sub>f</sub>	(barns)
ENDF/B - IV	1623	14.7	
ENDF/B - V	1424	13.43	
UKNDL -81	1417	15.03	
ENDL -82	1674	16.62	
KEDAK-4	1452	15.71	
JENDL-2	1299	14.69	
BNL 325 (1984)	1425	14.4	
BNL 325 (1984)(152 yr- <sup>242m</sup> Am)	195		

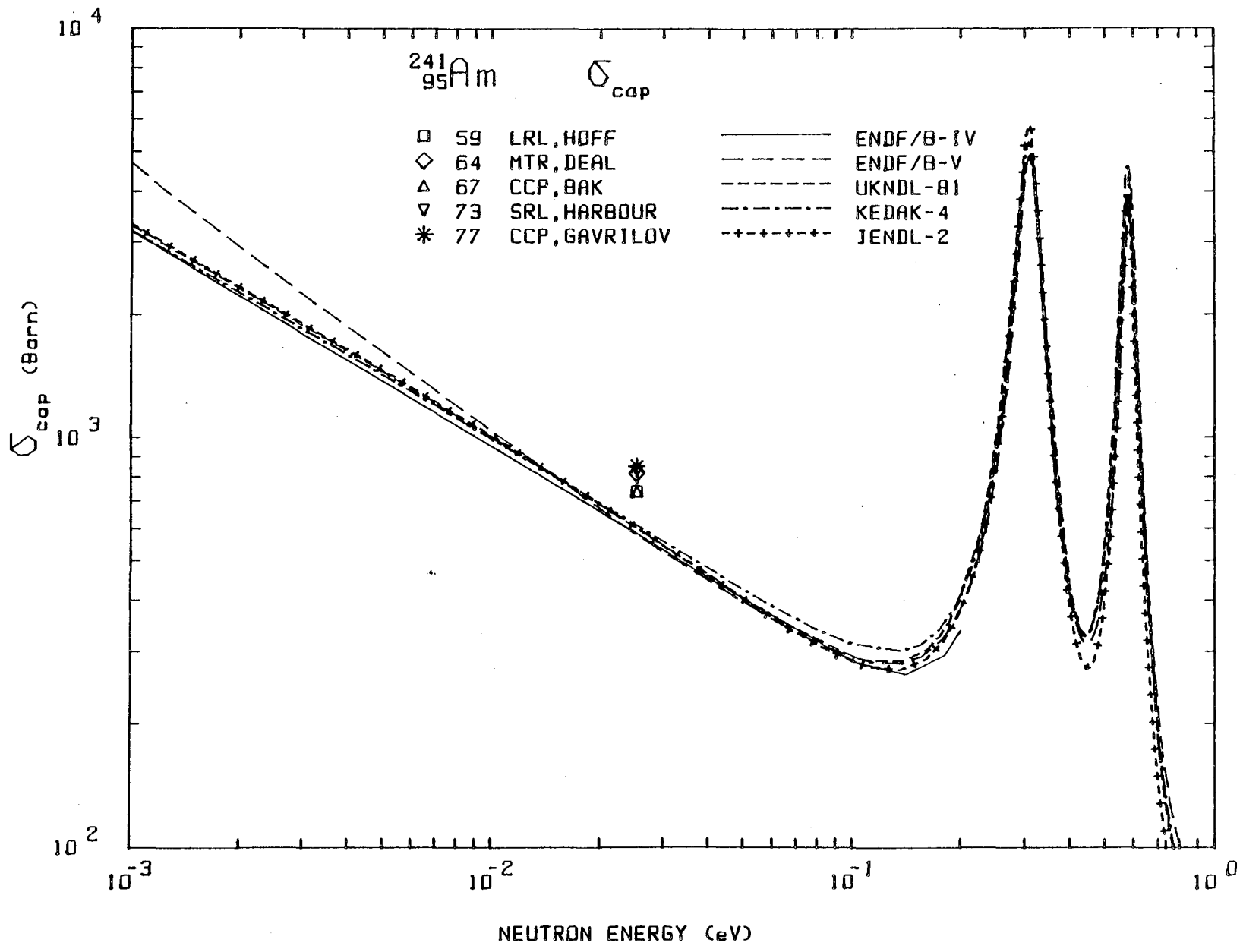


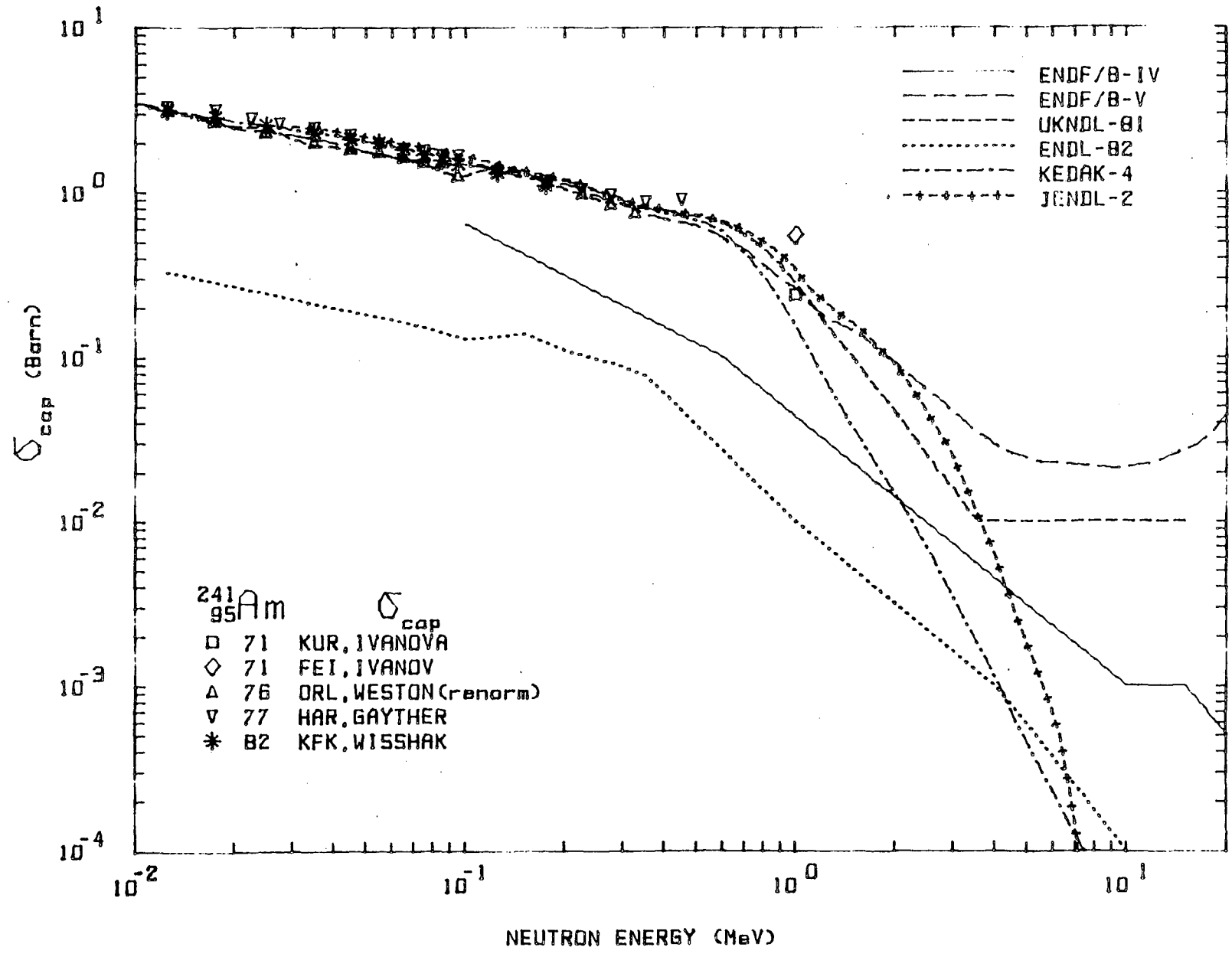




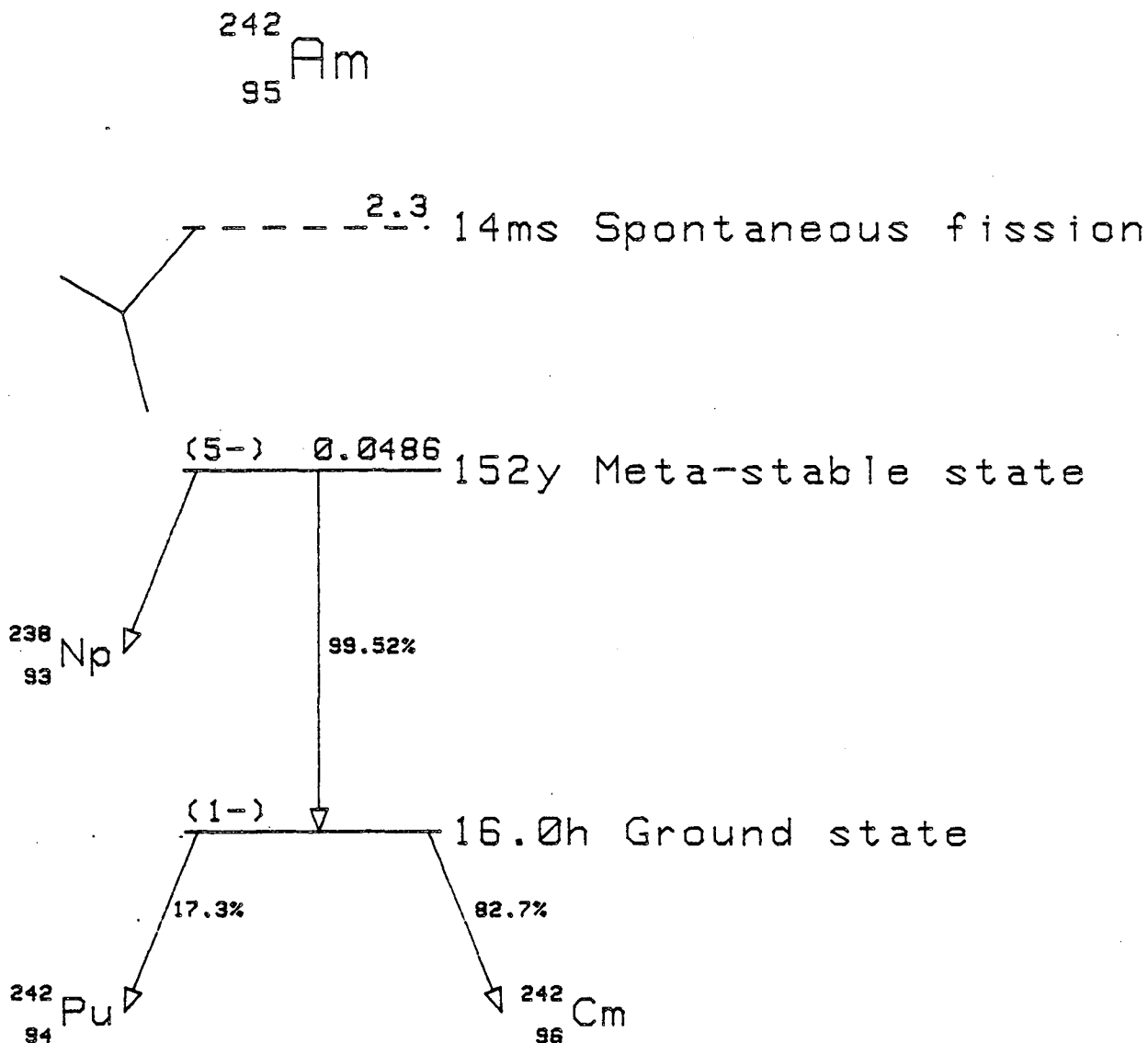
Experimental information  $^{241}\text{Am}, \sigma_{\text{tot}}$ 

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
55 CCP, ADAMCHUK	198	0.006-82 eV	ABS.		
59 ORL, HARVEY	454	0.25-42 eV	ABS.		
76 NIR, KALEBIN	2 985	0.021-398 eV	ABS.		Selected every tenth point
78 LLL, PHILLIPS	32	0.45-25 MeV	$^{12}\text{C}$	$\leq 1.5 \%$	





NUCLEAR DECAY SCHEME FOR <sup>242</sup><sub>95</sub>Am

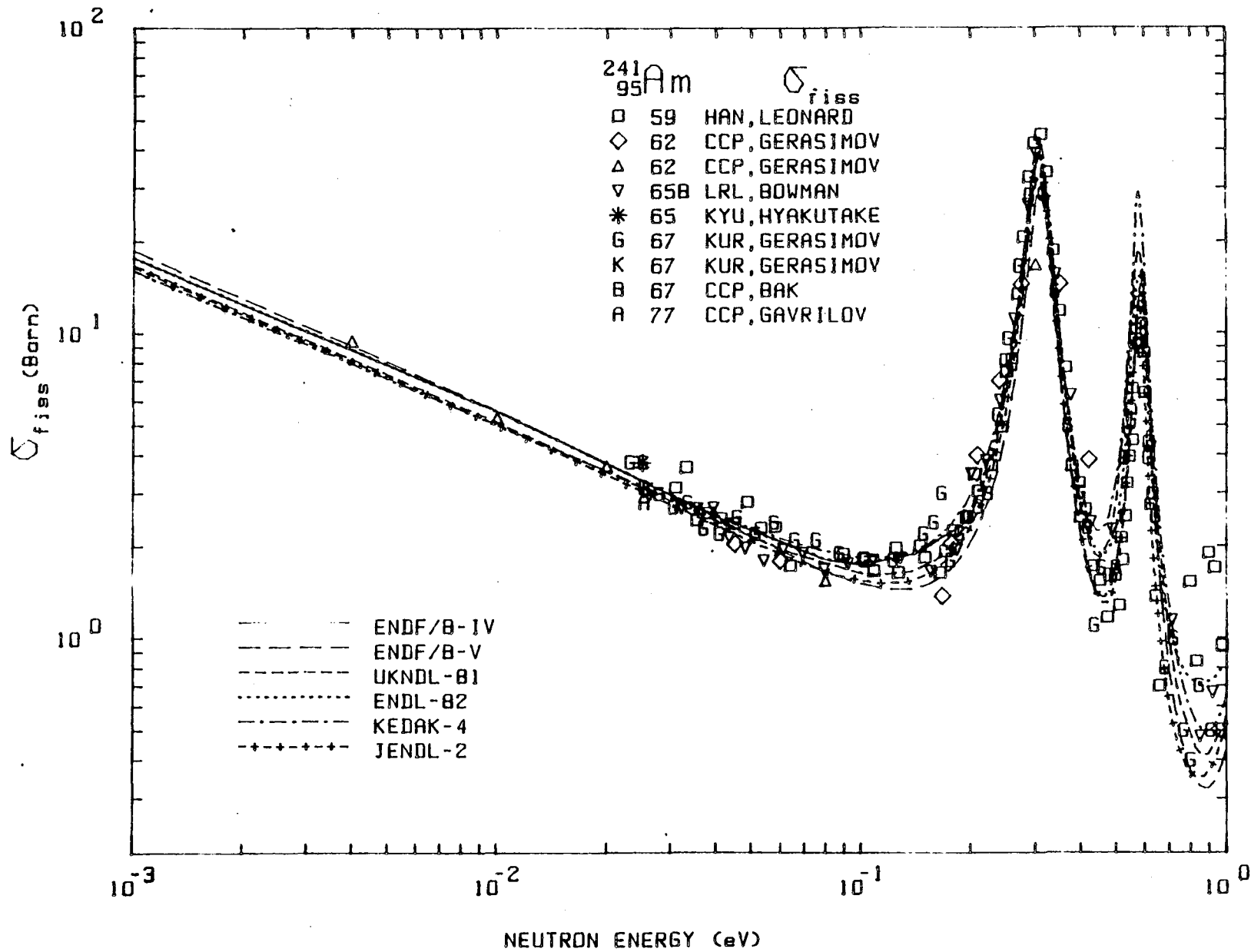


Experimental information  $^{241}\text{Am}, \sigma_{\gamma}$ 

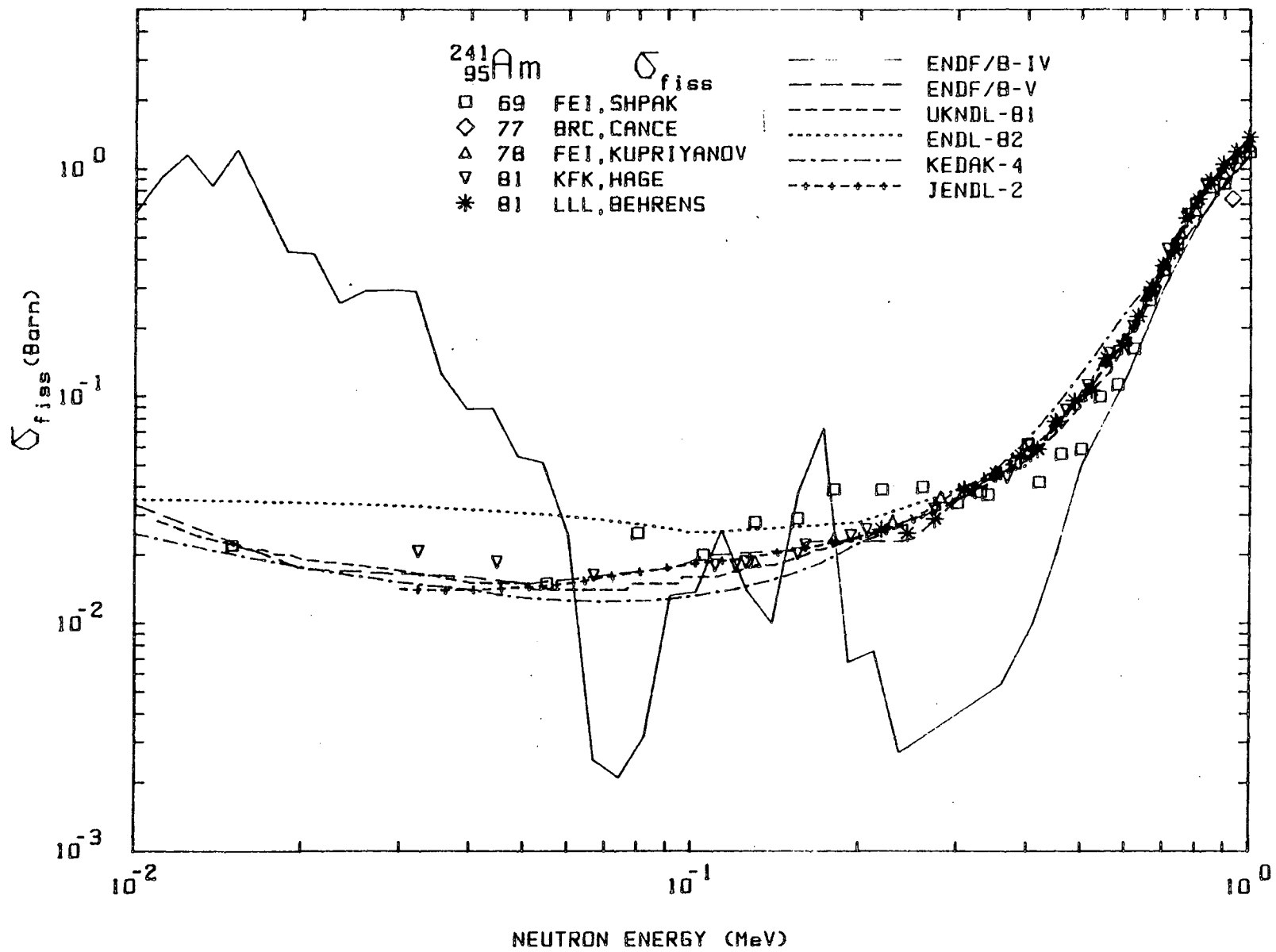
<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
59 LRL, HOFF	1	0.0253 eV	Activation	10.5 %	
64 MTR, DEAL	1	0.0253 eV	Activation		
67 CCP, BAK	1	0.0253 eV	$^{197}\text{Au}, \sigma_{\gamma}$	9 %	
71 FEI, IVANOV	1	1.0 MeV	$^{238}\text{U}$	3 %	
71 KUR, IVANOVA	1	1.0 MeV	ABS.	12.5 %	
73 SRL, HARBOUR	1	0.0253 eV	$^{59}\text{Co}$	3 %	
76 ORL, WESTON	44	10 eV-350 keV	Activation		Renormalized. Normalization factor 1.036
77 CCP, GAVRILOV	1	0.0253 eV	$^{197}\text{Au}, \sigma_{\gamma}$ and $^{59}\text{Co}, \sigma_{\gamma}$	7.5 %	
77 HAR, GAYTHER	39	0.1-500 keV	Activation	12 %	
82 KFK, WISSHAK	12	10-200 keV	$^{197}\text{Au}, \sigma_{\gamma}$	5-15 %	

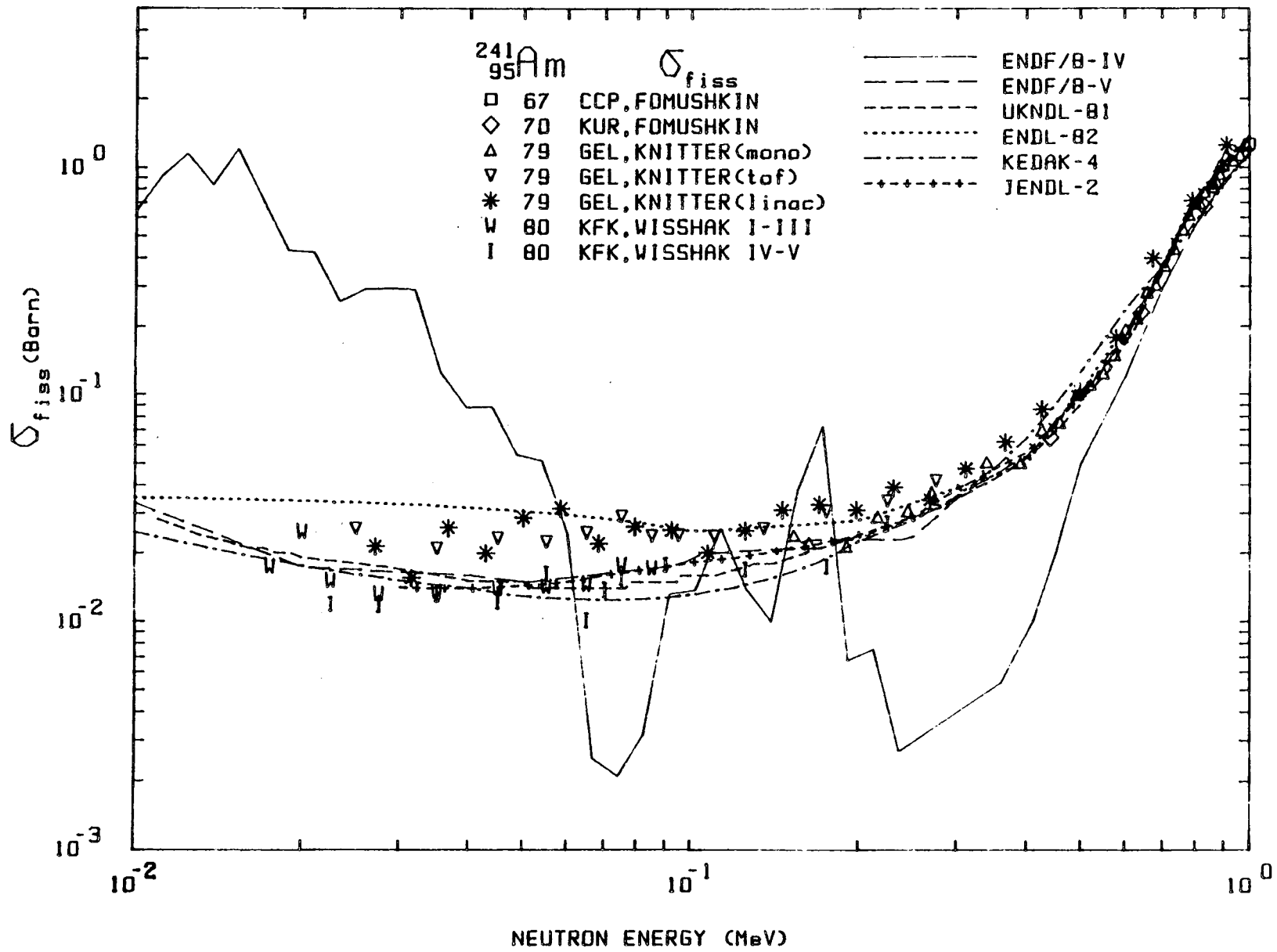
General comments:

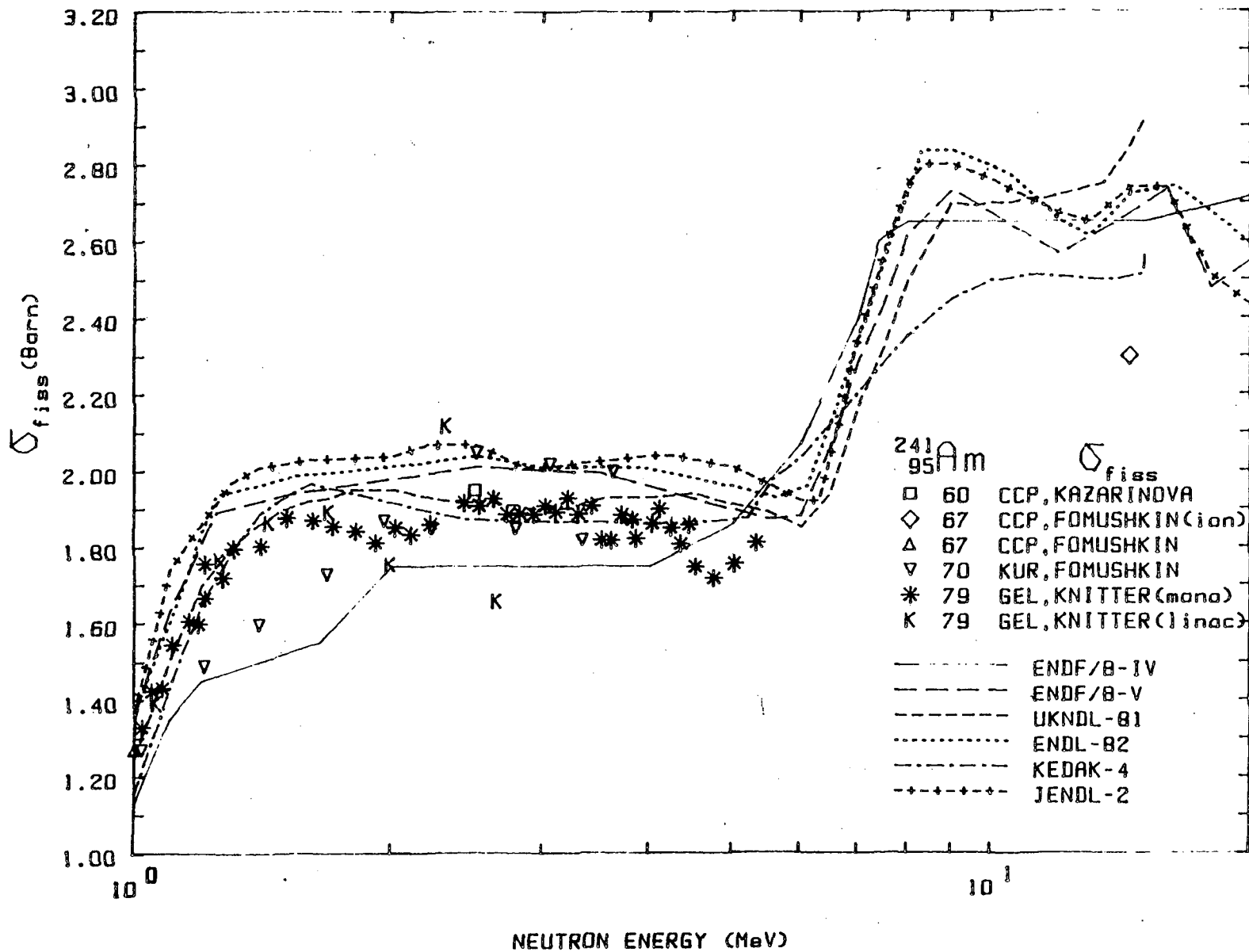
The experimental data of Hoff, Bak and Harbour for the 0.0253 eV cross section in the figure are given as the sum of the contribution from the ground state and the metastable state. Deal only gives the cross section to the ground state. By using his assumption for the branching ratio (1:15) we have calculated the sum.

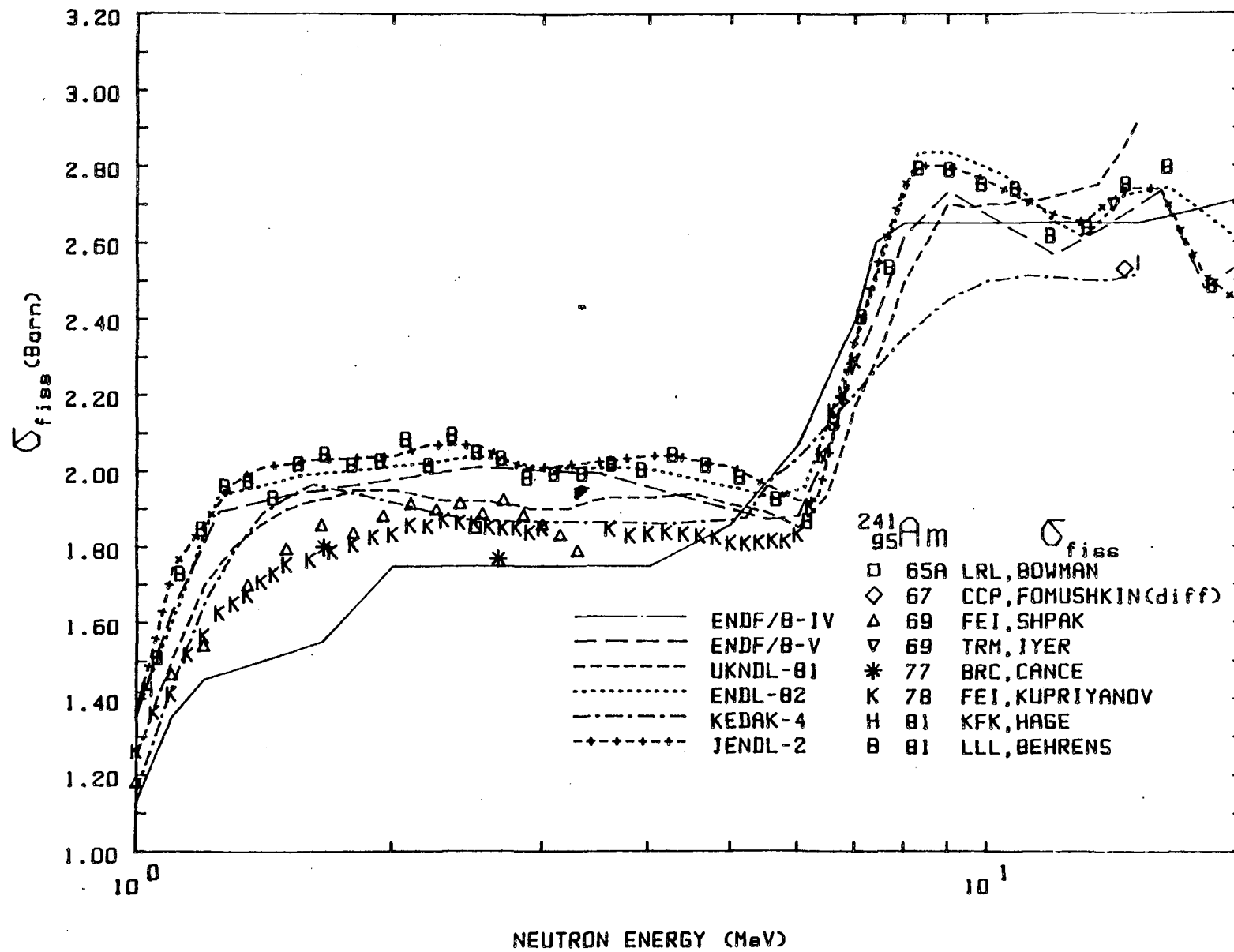












Experimental information  $^{241}\text{Am}, \sigma_{\text{fiss}}$

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
59 HAN, LEONARD	109	0.03-5.3 keV	ABS.	5-70 %	
60 CCP, KAZARINOVA	2	2.5 & 14,6 MeV	$^{238}\text{U}$	6.4 %	
60 CCP, PROTOPOV	1	14.6 MeV	ABS.	6.4 %	
62 CCP, GERASIMOV	9	0.045-0.42 eV	ABS.		
62 CCP, GERASIMOV	6	0.004-0.3 eV	ABS.	9-58 %	
65A LRL, BOWMAN	1	2.5 MeV	$^{239}\text{Pu}$	11 %	
65B LRL, BOWMAN	486	0.03 eV-5 keV	ABS.		Selected every fifth point
65 KYU, HYAKUTAKE	1	0.0235 eV	$^{235}\text{U}, \sigma_{\text{f}}$	5.3 %	
67 CCP, BAK	1	0.0253 eV	$^{197}\text{Au}, \sigma_{\gamma}$	3.2 %	
67 CCP, FOMUSHKIN(ion)	1	14.5 MeV	$^{238}\text{U}, \sigma_{\text{f}}$	6.5 %	Ion chamber
67 CCP, FOMUSHKIN(diff)	1	14.5 MeV	$^{238}\text{U}$	4.7 %	Diff. Sig. Int.
67 CCP, FOMUSHKIN	1	1.0 MeV	$^{238}\text{U}$	6.3 %	
67 KUR, GERASIMOV	583	0.023-50 eV	$^{241}\text{Am}, \sigma_{\text{f}}^{\text{th}}$		Selected every fifth point
67 KUR, GERASIMOV	5	0.025-15 eV	$^{241}\text{Am}, \sigma_{\text{f}}^{\text{th}}$	13 %	
69 FEI, SHPAK	43	8 keV-3.3 MeV	$^{239}\text{Pu}$	5-27 %	
69 TRM, IYER	1	14.1 MeV	$^{238}\text{U}$	17 %	

Experimental information  $^{241}\text{Am}$ ,  $\sigma_{\text{fiss}}$  (cont.)

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
70 KUR, FOMUSHKIN	14	0.44-3.6 MeV	$^{235}\text{U}$	3-5 %	
77 BRC, CANCE	3	0.93-2.66 MeV	$^{235}\text{U}$ , $\sigma_{\text{f}}$	2-7 %	
77 CCP, GAVRILOV	1	0.0253 eV	$^{197}\text{Au}$ , $\sigma_{\text{Y}}$ and $^{59}\text{Co}$ , $\sigma_{\text{Y}}$	8.9 %	
77 HAR, GAYTHER	23	0.05-10 keV	$^{235}\text{U}$ , $\sigma_{\text{f}}$		
78 FEI, KUPRIYANOV	61	0.13-7 MeV	$^{239}\text{Pu}$ , $\sigma_{\text{f}}$	2.2-4.5 %	Error in relative value
79 GEL, KNITTER(linac)	59	0.15 keV-2.7 MeV	$^{235}\text{U}$ , $\sigma_{\text{f}}$	9-20 %	Linac - tof, error in relative value
79 GEL, KNITTER(tof)	17	6-275 keV	$^{235}\text{U}$ , $\sigma_{\text{f}}$	8-35 %	VdG - tof, error in relative value
79 GEL, KNITTER(mono)	79	0.15-5.3 MeV	$^{235}\text{U}$ , $\sigma_{\text{f}}$	3-15 %	VdG - monoenergetic neutr. error in relative value
80 KFK, WISSHAK(I-III)	10	10-90 keV	$^{235}\text{U}$ , $\sigma_{\text{f}}$	13-27 %	Averaged, Run I-III
80 KFK, WISSHAK(IV)	7	20-80 keV	$^{235}\text{U}$ , $\sigma_{\text{f}}$	12-25 %	Run IV
80 KFK, WISSHAK(V)	5	60-250 keV	$^{235}\text{U}$ , $\sigma_{\text{f}}$	14-25 %	Run V
81 KFK, HAGE	25	20 keV-1 MeV	-	5-10 %	
81 LLL, BEHRENS	63	200 keV-30 MeV	$^{235}\text{U}$ , $\sigma_{\text{f}}$	1-38 %	Stat. error in relative value



<sup>242g</sup>Am

## NUCLEAR PROPERTIES

Spin and parity of ground state:  $1^-$ 

Ground state decay:

Beta ( $\beta^-$ ) to <sup>242</sup>Cm: 82.7%Beta ( $\beta^+$ ) to <sup>242</sup>Pu: 17.3%

Half life: 16.0 hr

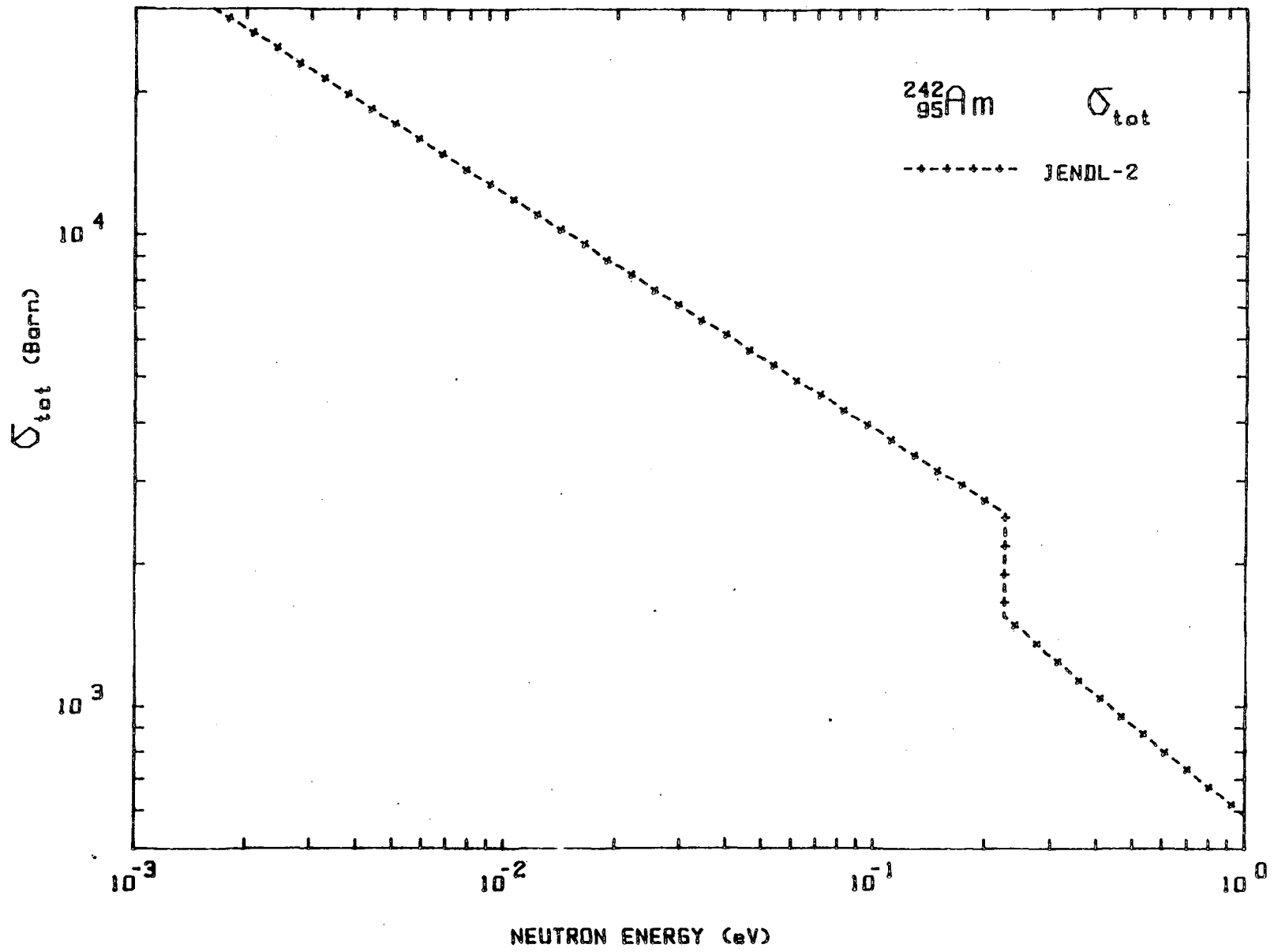
## THERMAL CROSS SECTIONS (2200 m/s)

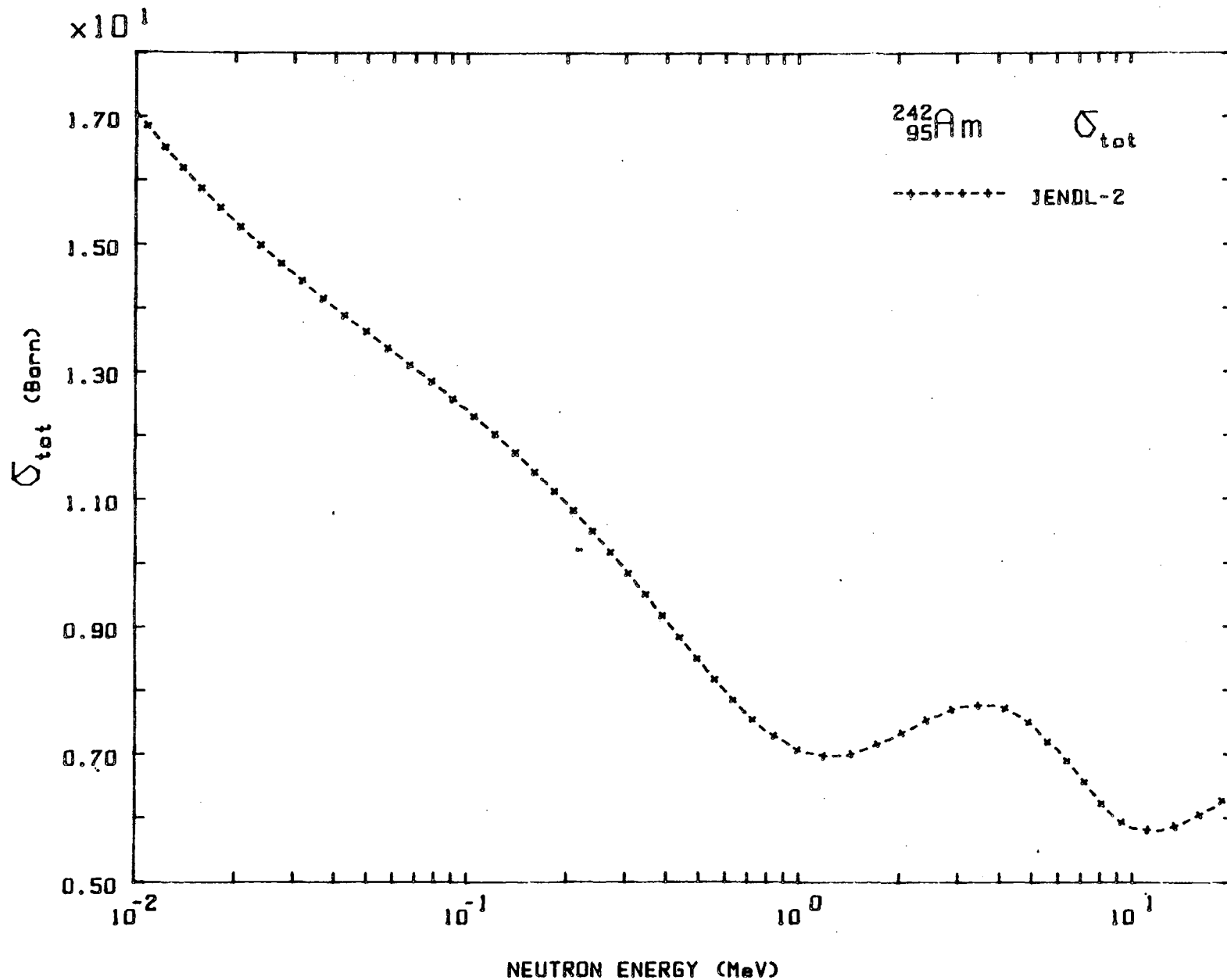
Reference	$\sigma_\gamma$	$\sigma_f$	$\sigma_t$	(barns)
BNL 325 (1984) JENDL-2	5500	2100 2100	7611	

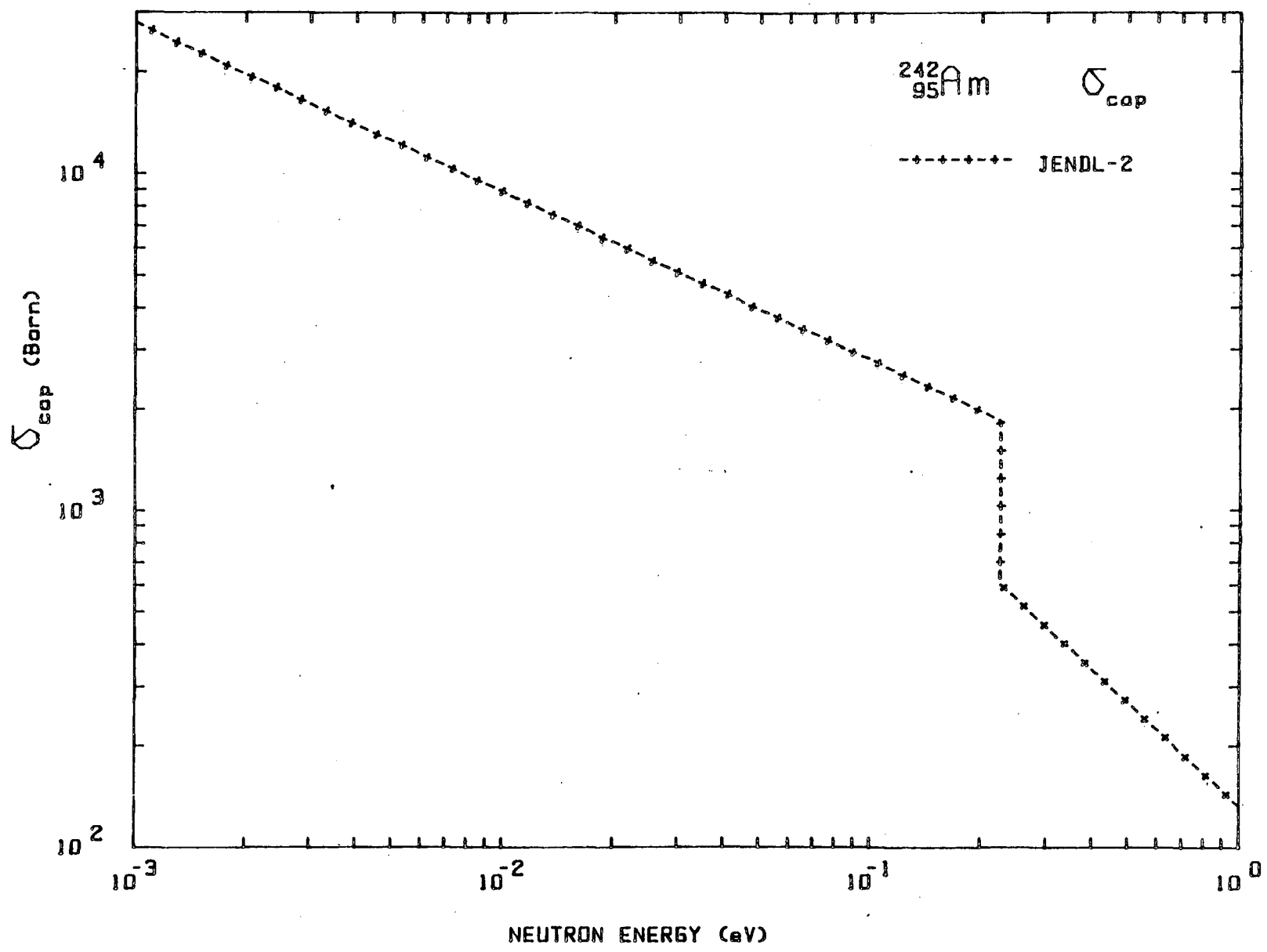
## RESONANCE INTEGRALS

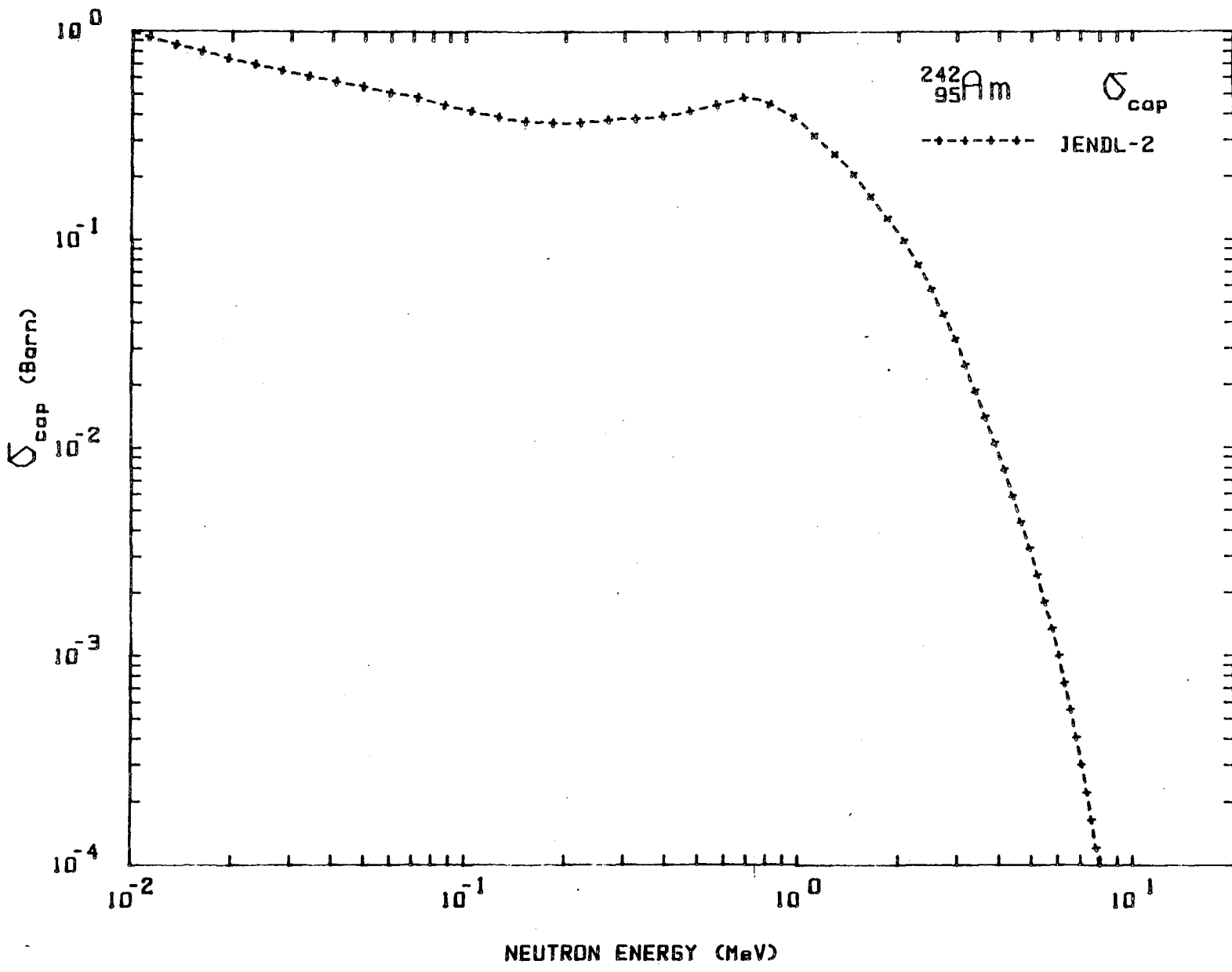
Reference	RI <sub><math>\gamma</math></sub>	RI <sub>f</sub>	(barns)
JENDL-2	390.4	1258	

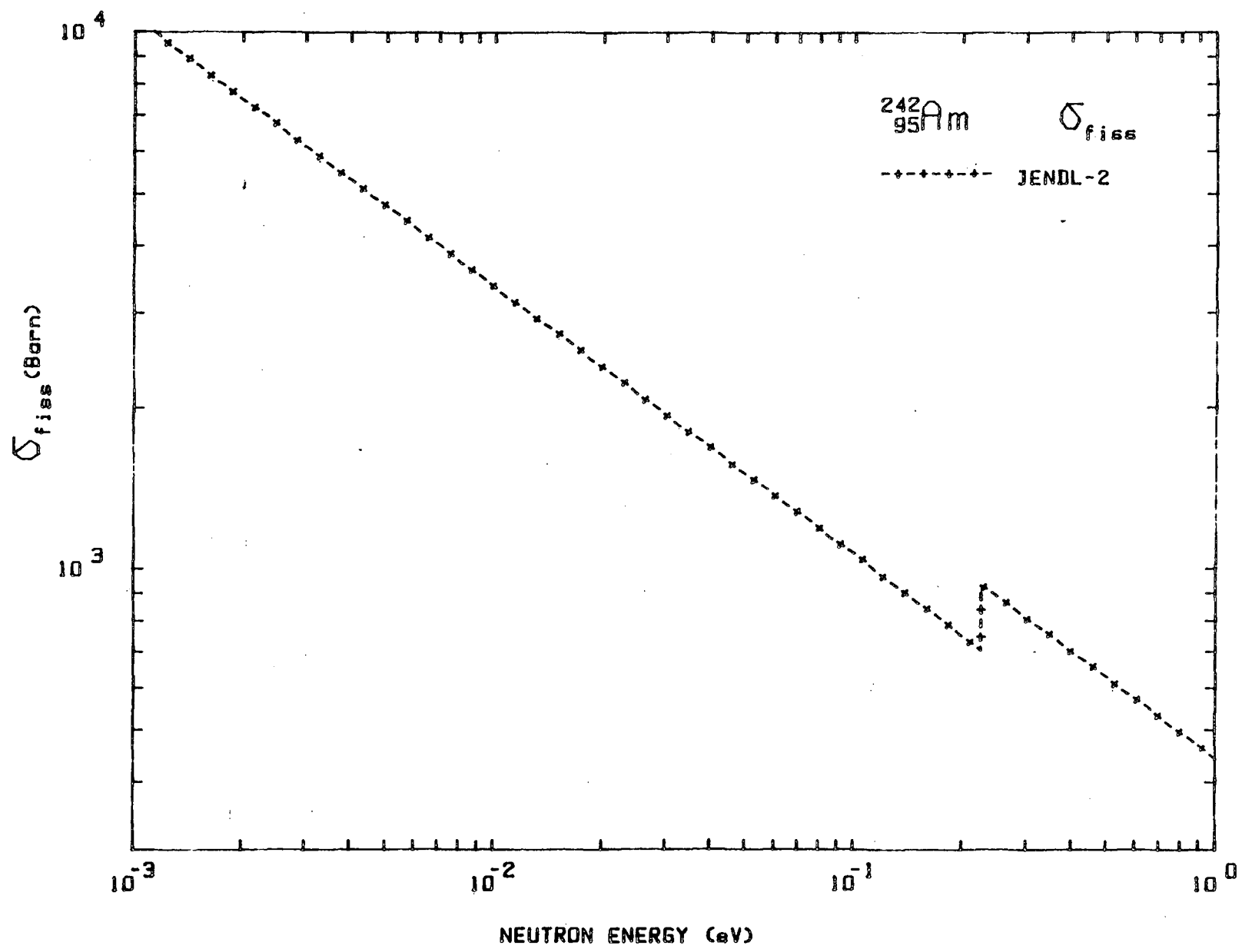


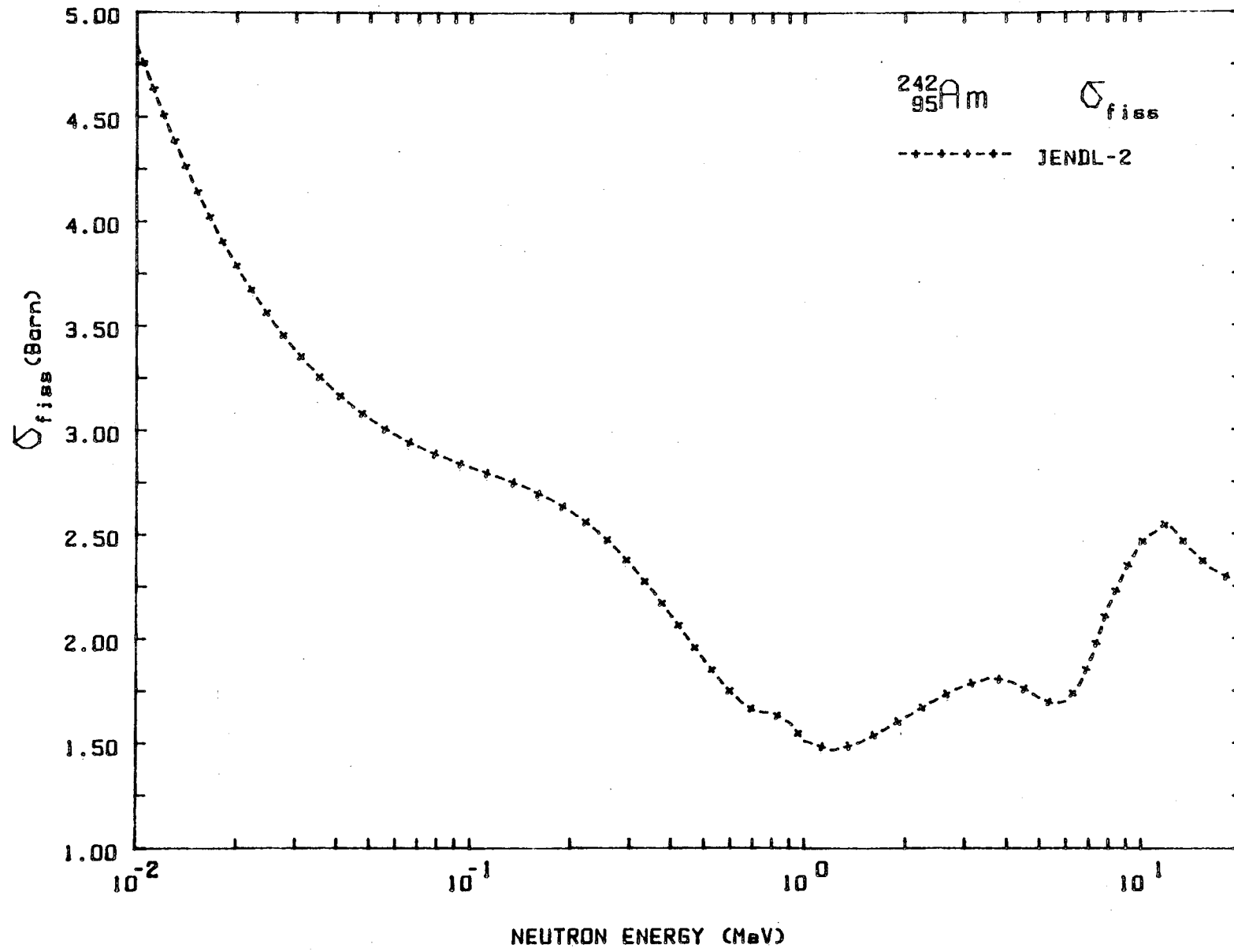














<sup>242m</sup>Am

NUCLEAR PROPERTIES

Spin and parity of metastable state: 5<sup>-</sup>

Metastable state decay:

Gamma to ground state (IT): 99.5%, E<sub>γ</sub> = 48.6 keV

Alpha to <sup>238</sup>Np: 0.5%

Half life: 152 yr

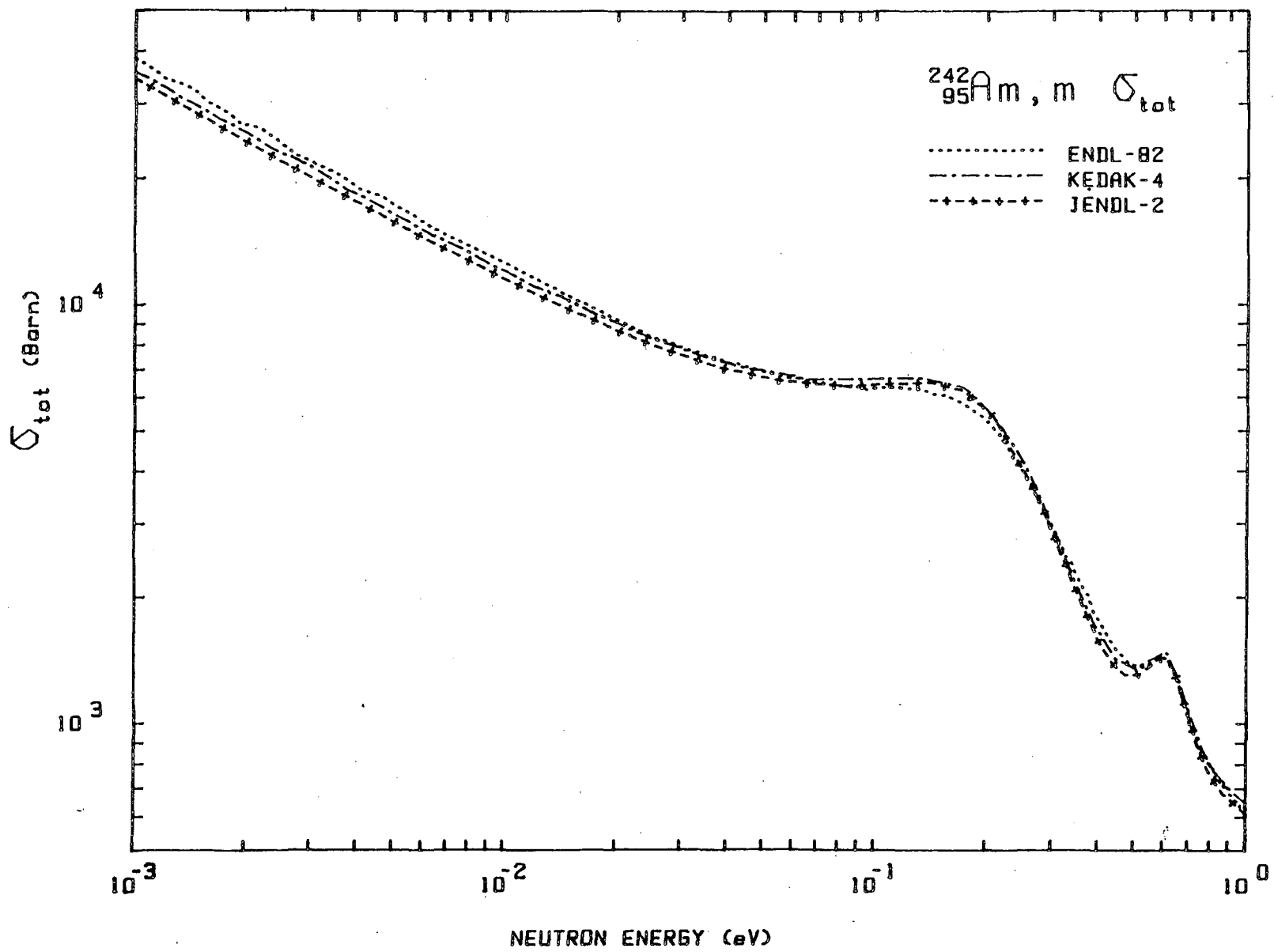
THERMAL CROSS SECTIONS (2200 m/s)

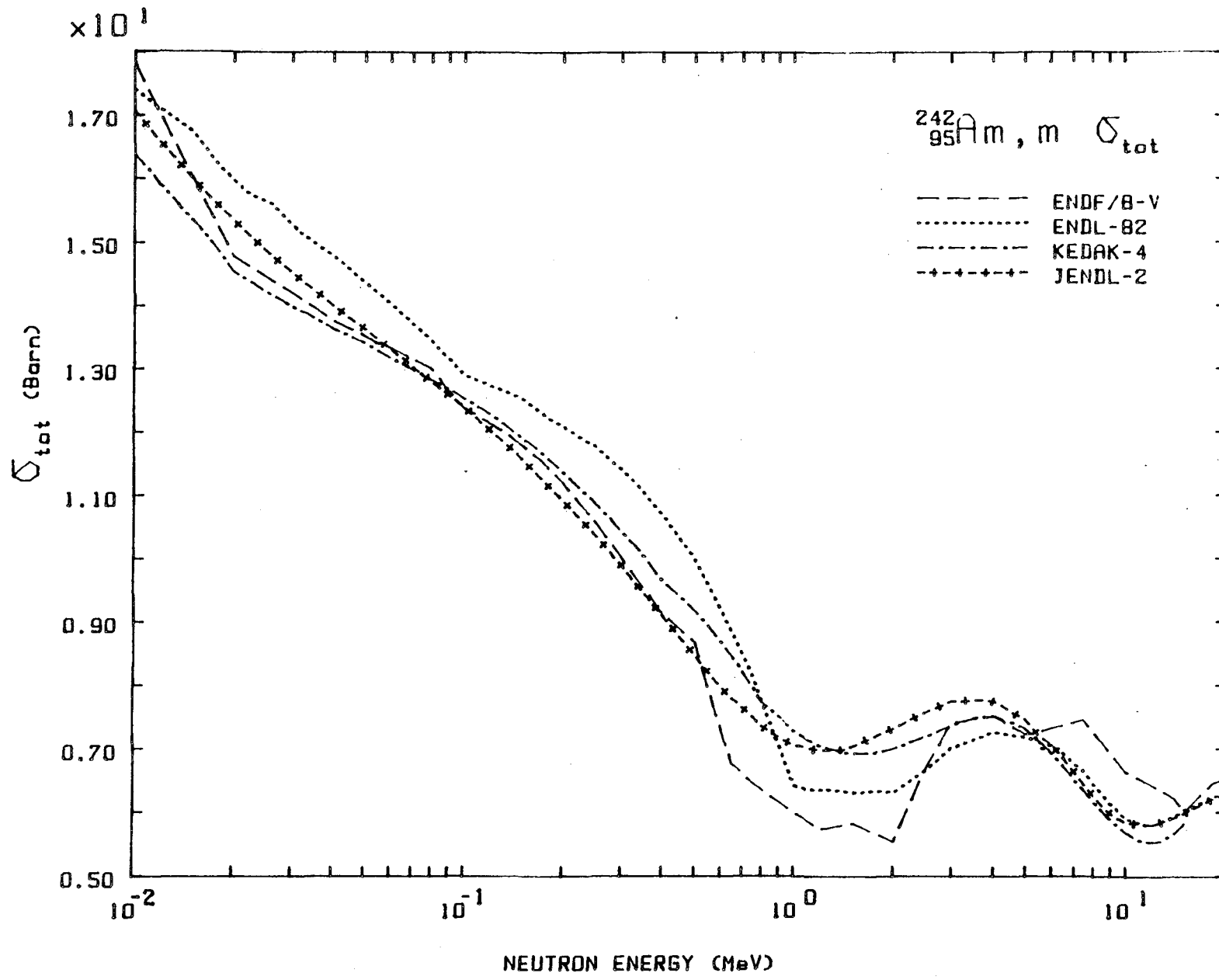
Reference	σ <sub>γ</sub>	σ <sub>f</sub>	σ <sub>t</sub>	$\bar{\nu}_p$	(barns)
ENDF/B - V	1344	6625	7974		
ENDL -82	1994	6328	8335		
KEDAK-4	1400	6840	8250		
JENDL-2	1342	6620	7969		
BNL 325 (1984)		6950		3.260	

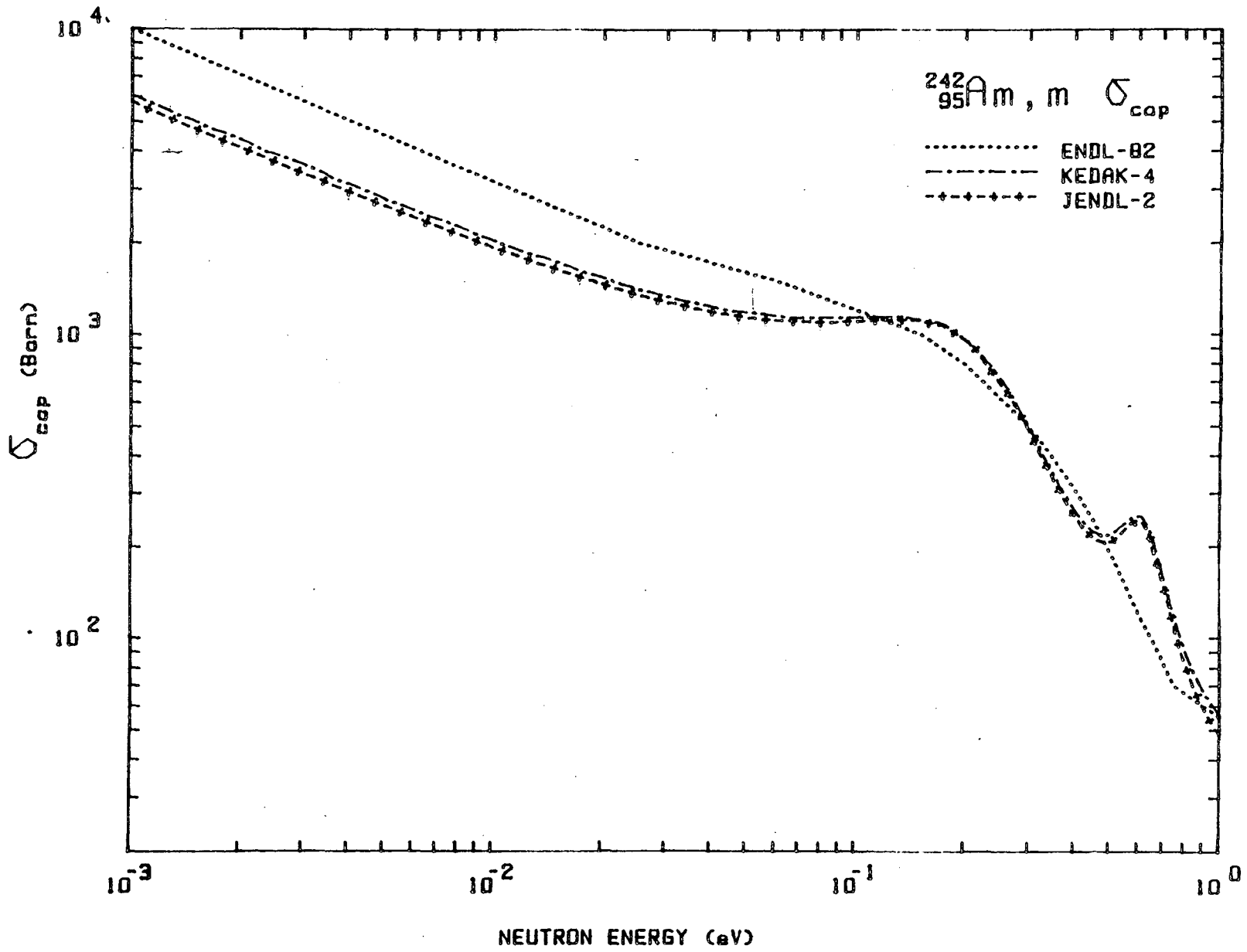
RESONANCE INTEGRALS

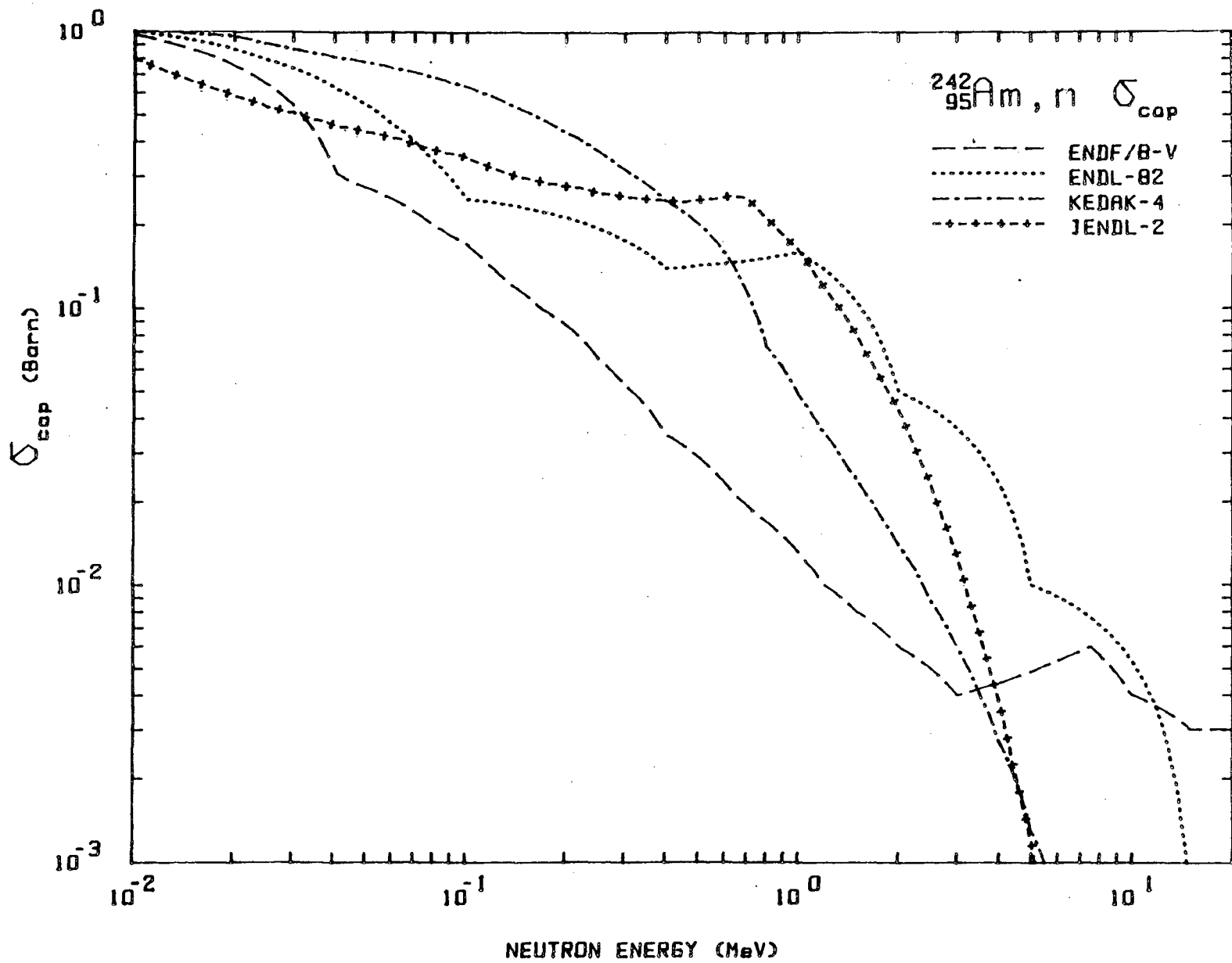
Reference	RI <sub>γ</sub>	RI <sub>f</sub>	(barns)
ENDF/B - V	286.3	1883	
ENDL -82	164.4	1542	
KEDAK-4	279.7	1630	
JENDL-2	206.8	1528	
BNL 325 (1984)		1800	

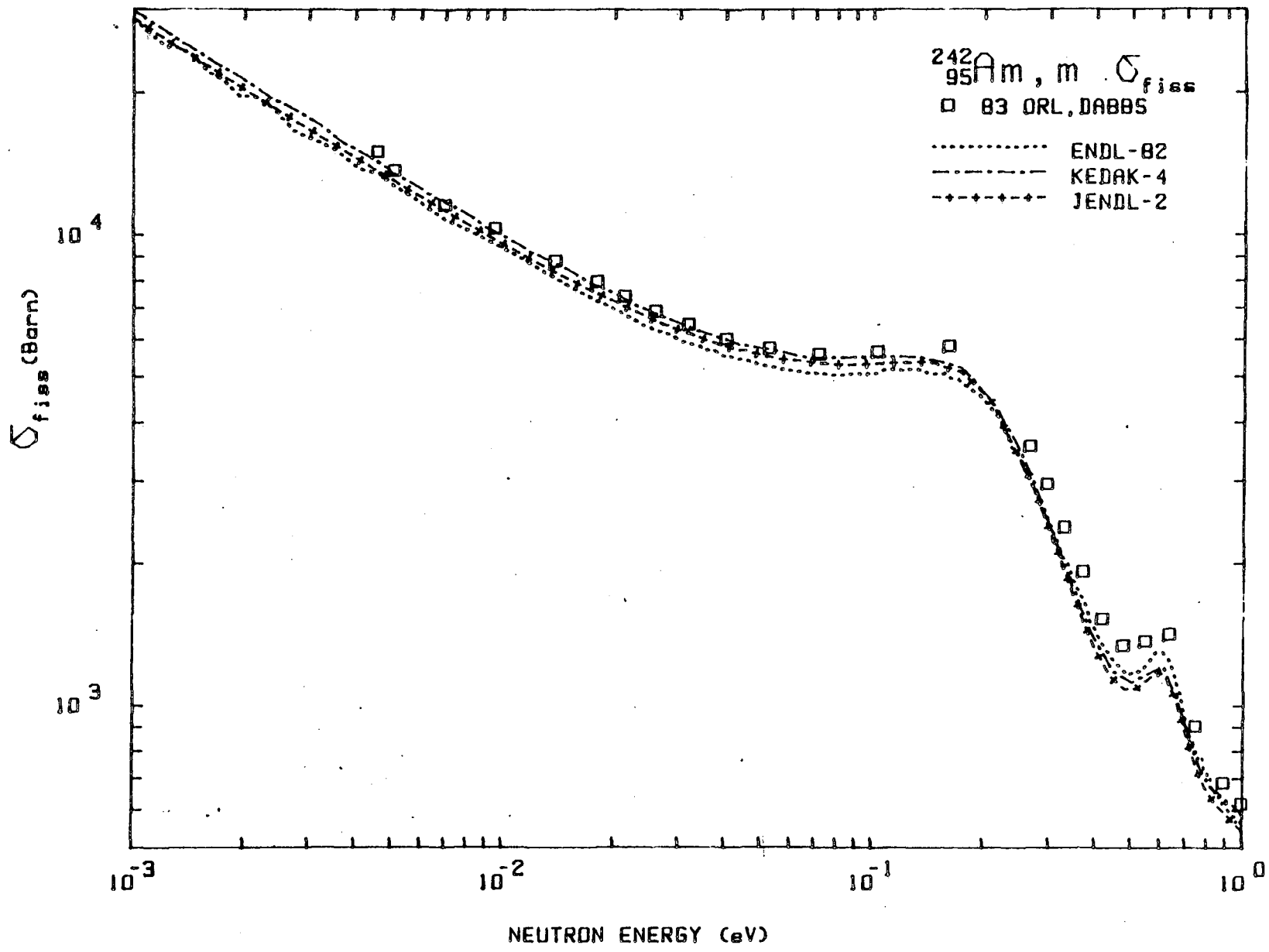


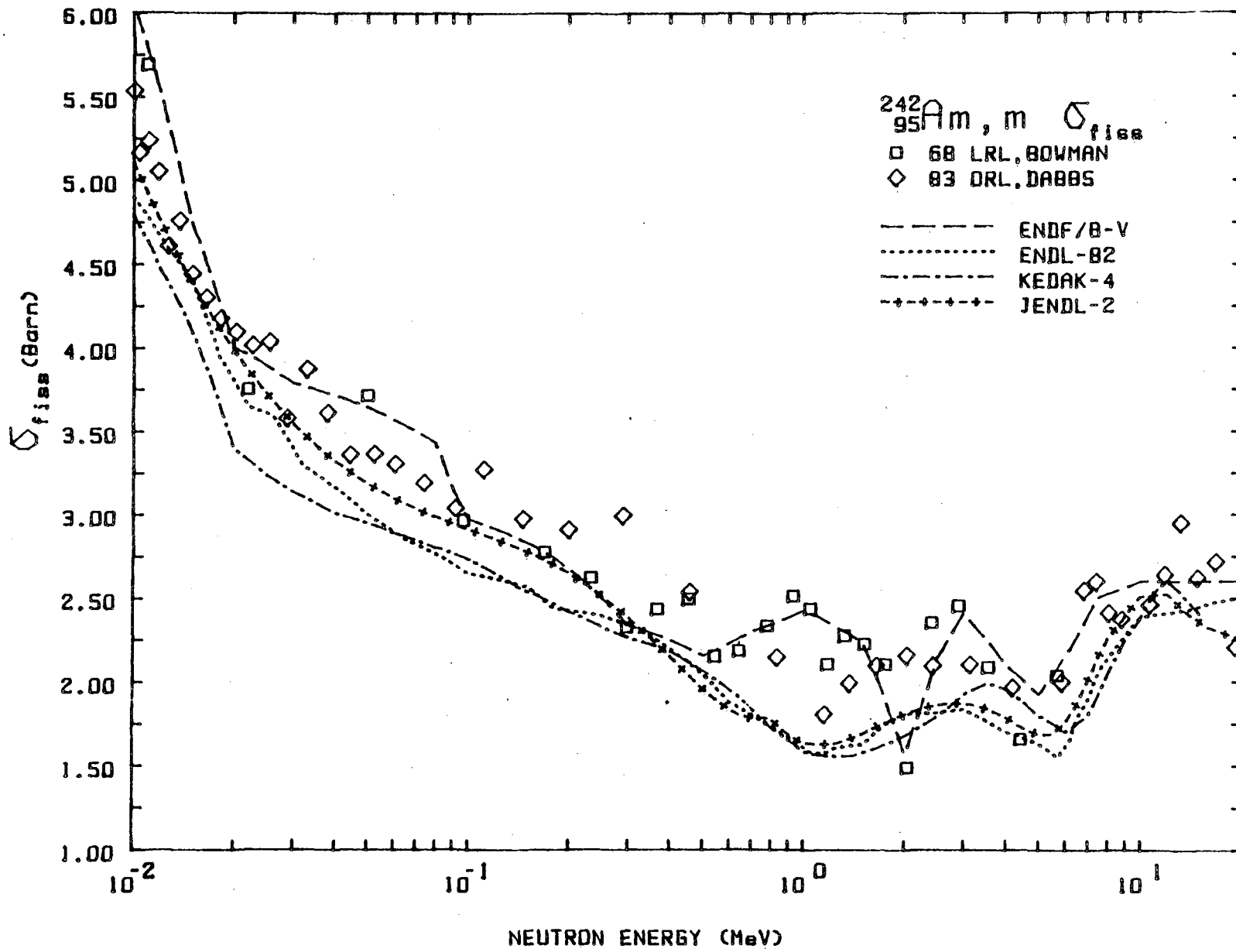












Experimental information  $^{242m}\text{Am}, \sigma_{\text{fiss}}$

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
67 LAS, SEEGER	1860	2 eV-930 keV	$^6\text{Li}, \sigma_{n,\alpha} < 10 \text{ keV}$ $^{235}\text{U}, \sigma_f > 10 \text{ keV}$	20-90 %	Underground nucl. expl., Petrel
68 LRL, BOWMAN	1091	20 meV-5.7 MeV	$^{239}\text{Pu}, \sigma_f$ $^{10}\text{B}, \sigma_{n,\alpha}$		
83 ORL, DABBS	14620	4.5 meV-20 MeV	$^{235}\text{U}, \sigma_f$ $^6\text{Li}, \sigma_{n,\alpha}$	1-8 %	Normalized to $^{235}\text{U}(n,f)$ integral from 7.8 to 11 eV

<sup>243</sup>Am

## NUCLEAR PROPERTIES

Spin and parity of ground state:  $5/2^-$ 

Ground state decay:

Alpha to <sup>231</sup>Np: 100%,  $Q_\alpha = 5.439$  MeVHalf-life:  $7.38 \cdot 10^3$  yr $2 \cdot 10^{14}$  yr - spontaneous fission

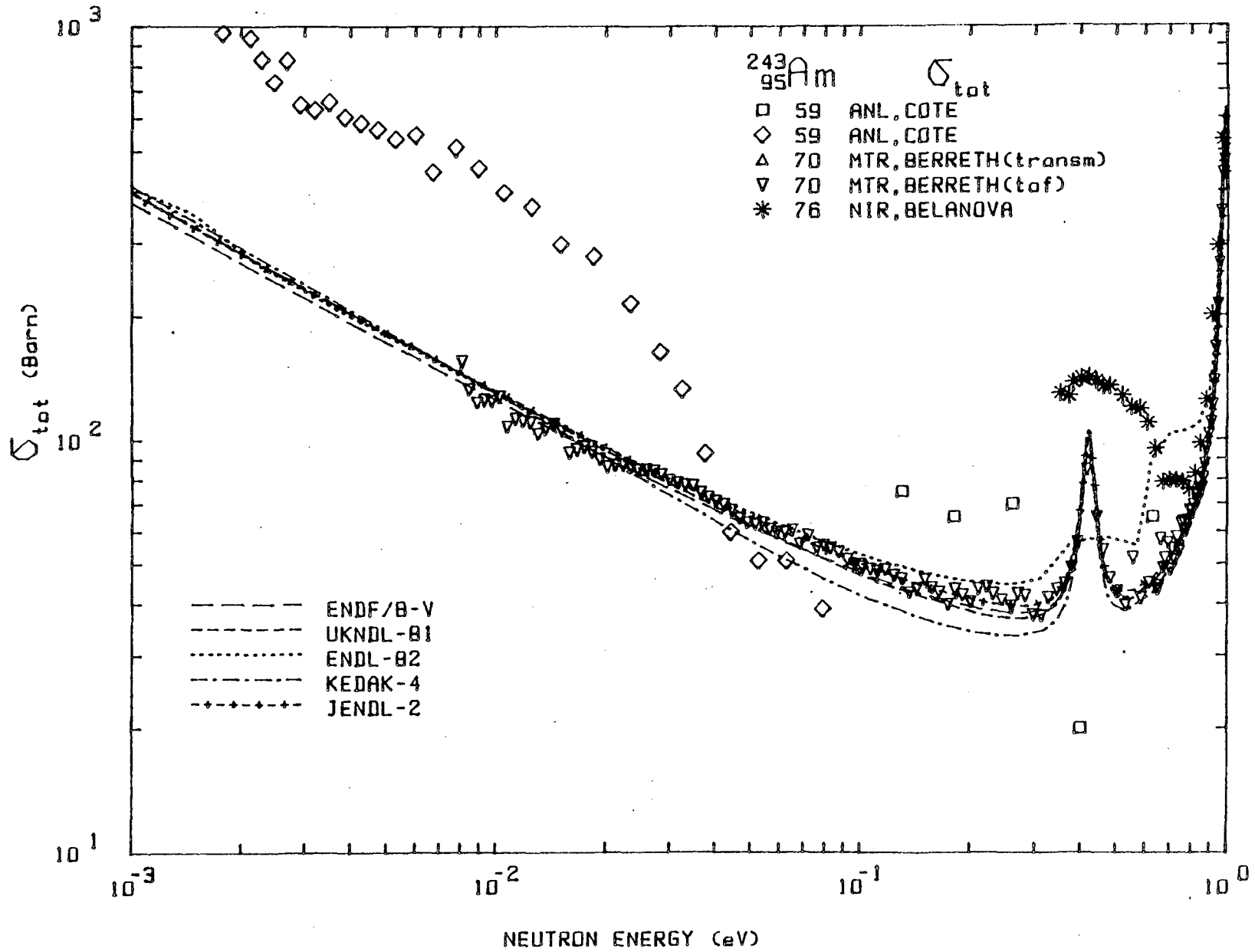
## THERMAL CROSS SECTIONS (2200 m/s)

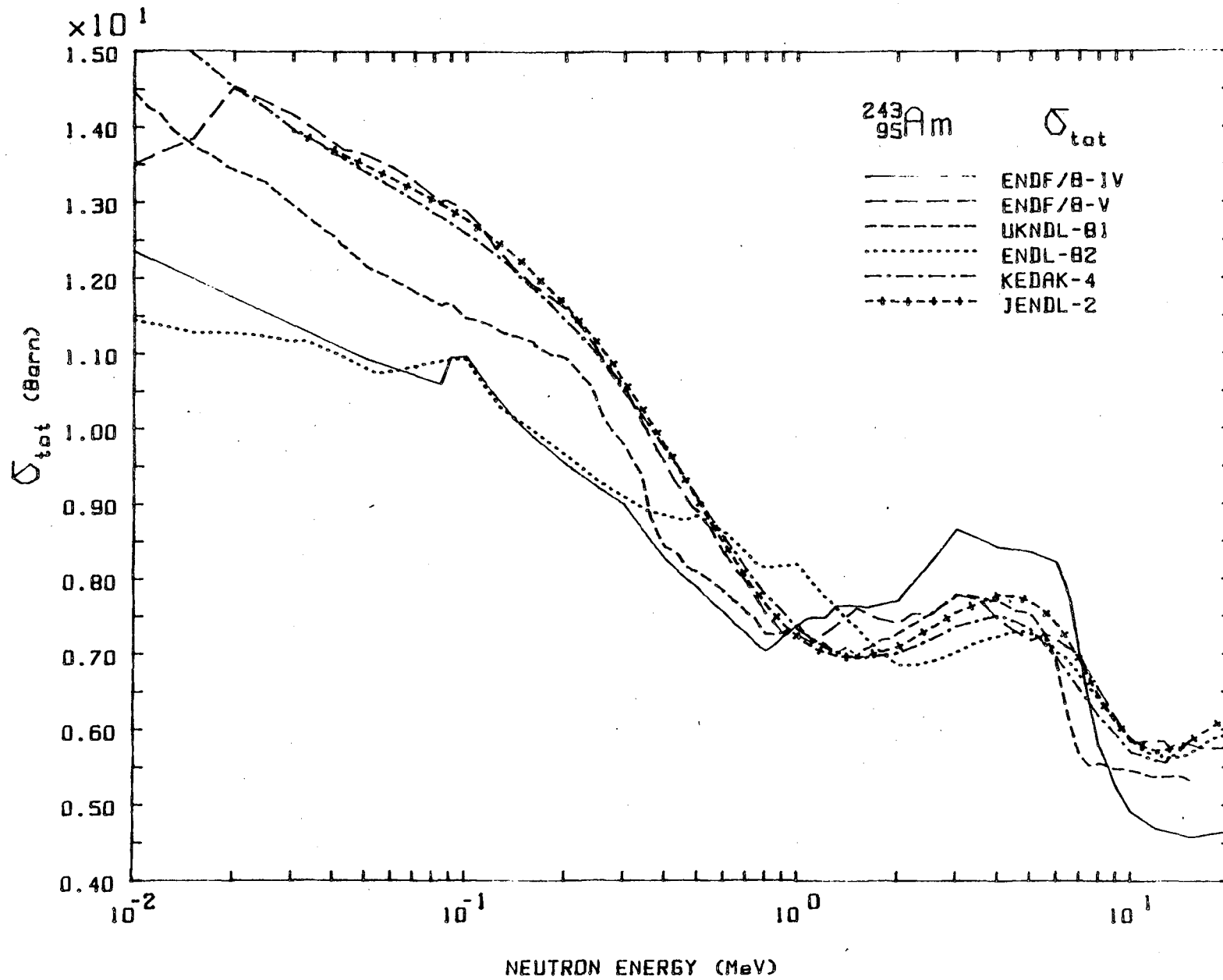
Reference	$\sigma_\gamma$	$\sigma_f$	$\sigma_t$	$\bar{\nu}_p$	(barns)
ENDF/B - IV	122.3	0.0			
ENDF/B - V	74.77		81.74		
UKNDL -81	77.00	0.050	84.18		
ENDL -82	74.62	0.8939	86.86		
KEDAK-4	74.74	$3.011 \cdot 10^{-3}$	80.41		
JENDL-2	78.50	0.2290	86.26		
BNL 325 (1984)	75.1		84.0	3.214	
BNL 325 (1984)( $10.1 \text{ hr-}^{244}\text{gAm}$ )	3.8				

## RESONANCE INTEGRALS

Reference	$RI_\gamma$	$RI_f$	(barns)
ENDF/B - IV	1235	0.0	
ENDF/B - V	1818	6.151	
UKNDL -81	1850	5.957	
ENDL -82	1822	9.018	
KEDAK-4	1848	5.694	
JENDL-2	1818	11.37	
BNL 325 (1984)	1820	9	
BNL 325 (1984)( $10.1 \text{ hr-}^{244}\text{gAm}$ )	94		

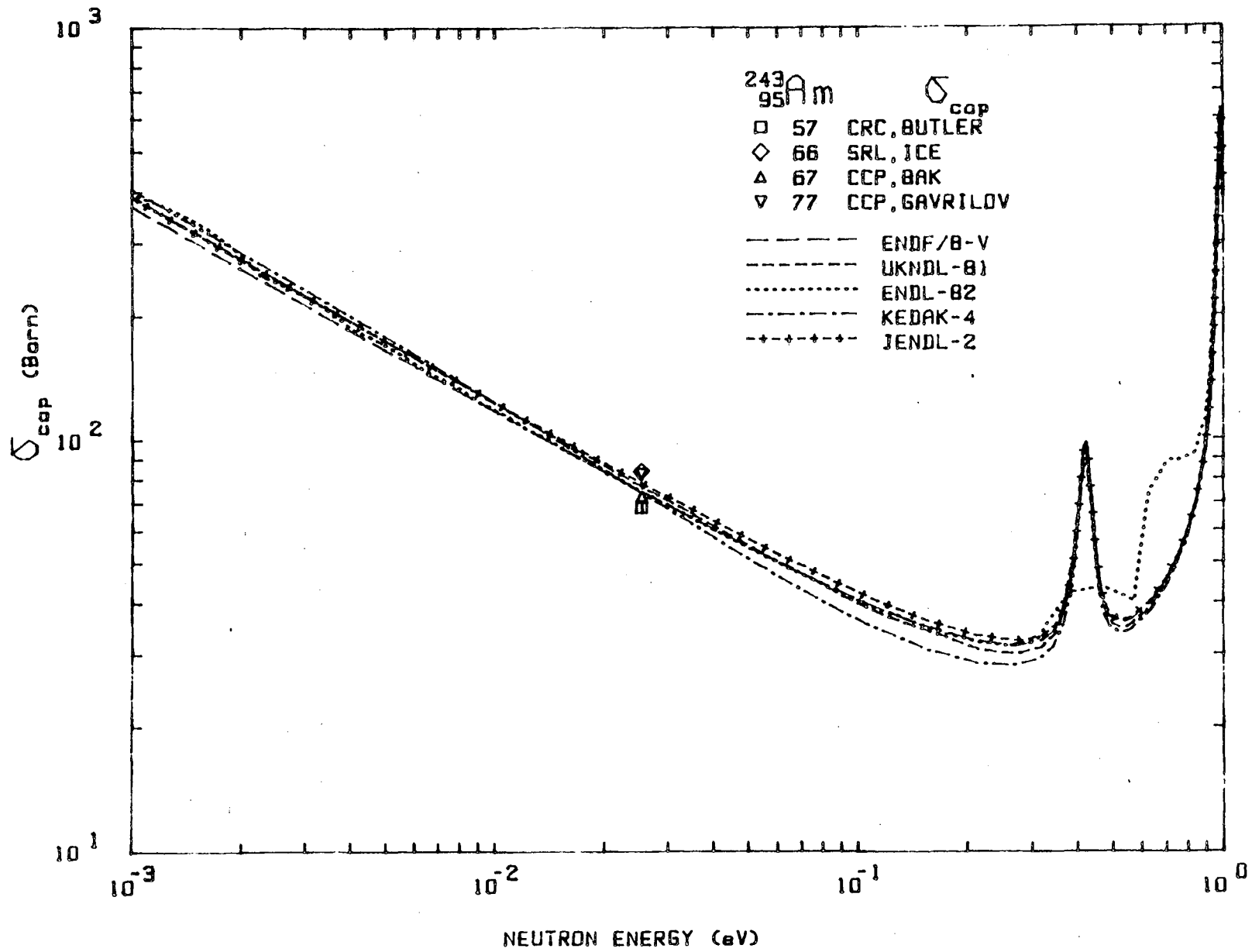


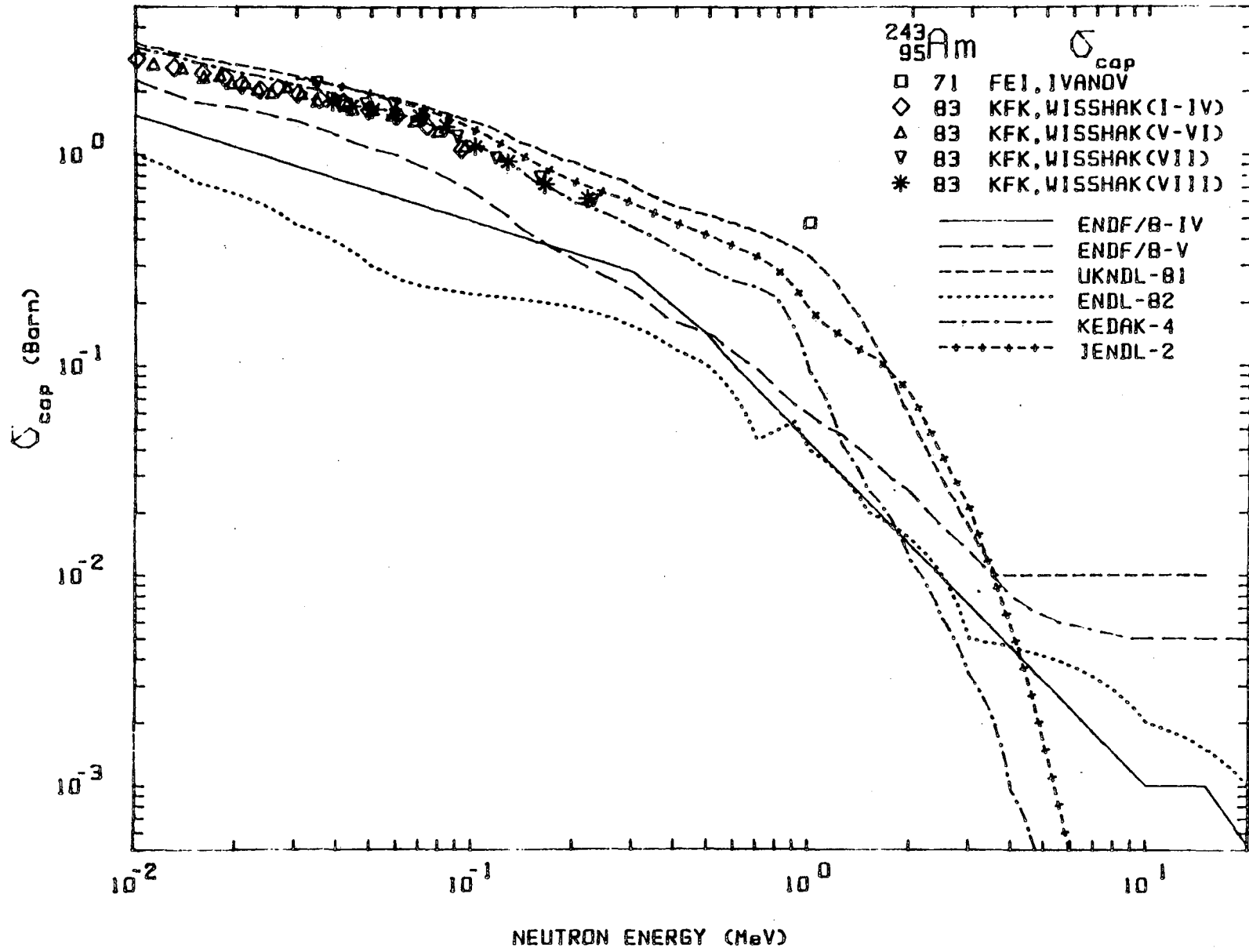




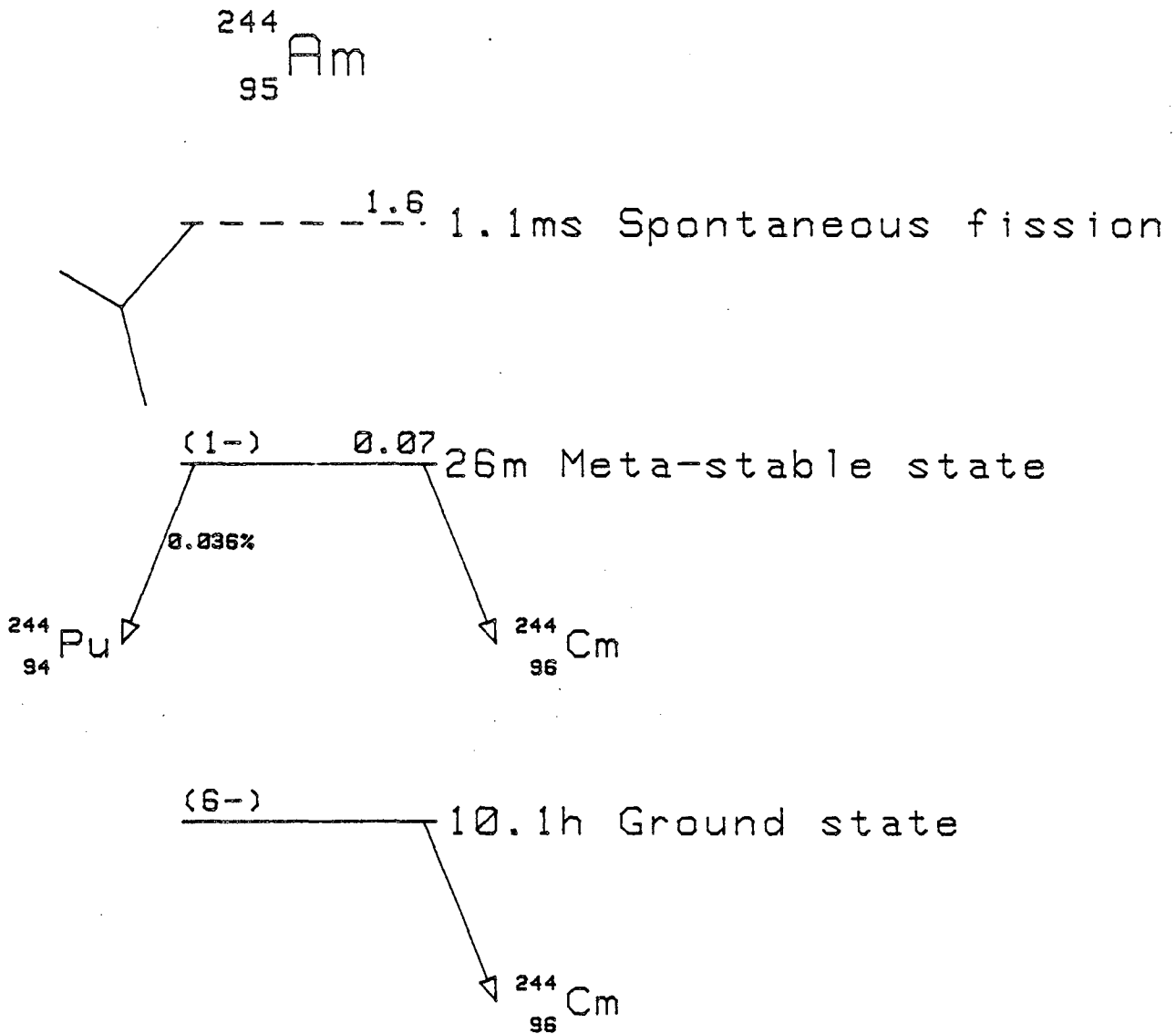
Experimental information  $^{243}\text{Am}, \sigma_{\text{tot}}$ 

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
59 ANL, COTÉ	6	0.1-0.63 eV	ABS.	14-54 %	
59 ANL, COTÉ	31	0.0014-15 eV	ABS.		
70 MTR, BERRETH(tof)	922	0.008-26 eV	ABS.		Selected every third point between 0.5-1 eV
70 MTR, BERRETH(transm.)	1	0.0253 eV	ABS.	5 %	
76 NIR, BELANOVA	1 972	0.4-35 eV	ABS.		Selected every third point





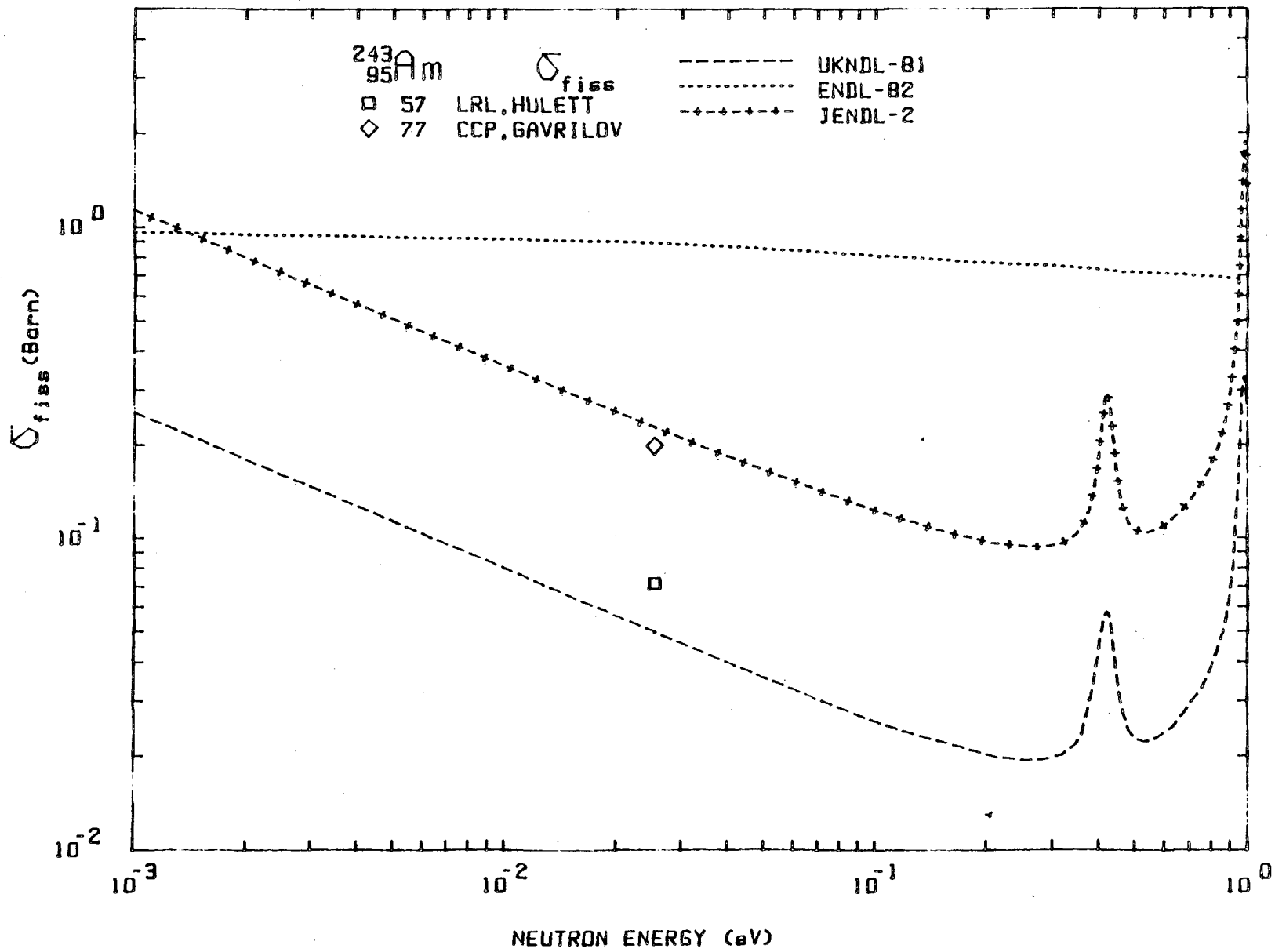
NUCLEAR DECAY SCHEME FOR <sup>244</sup><sub>95</sub>Am



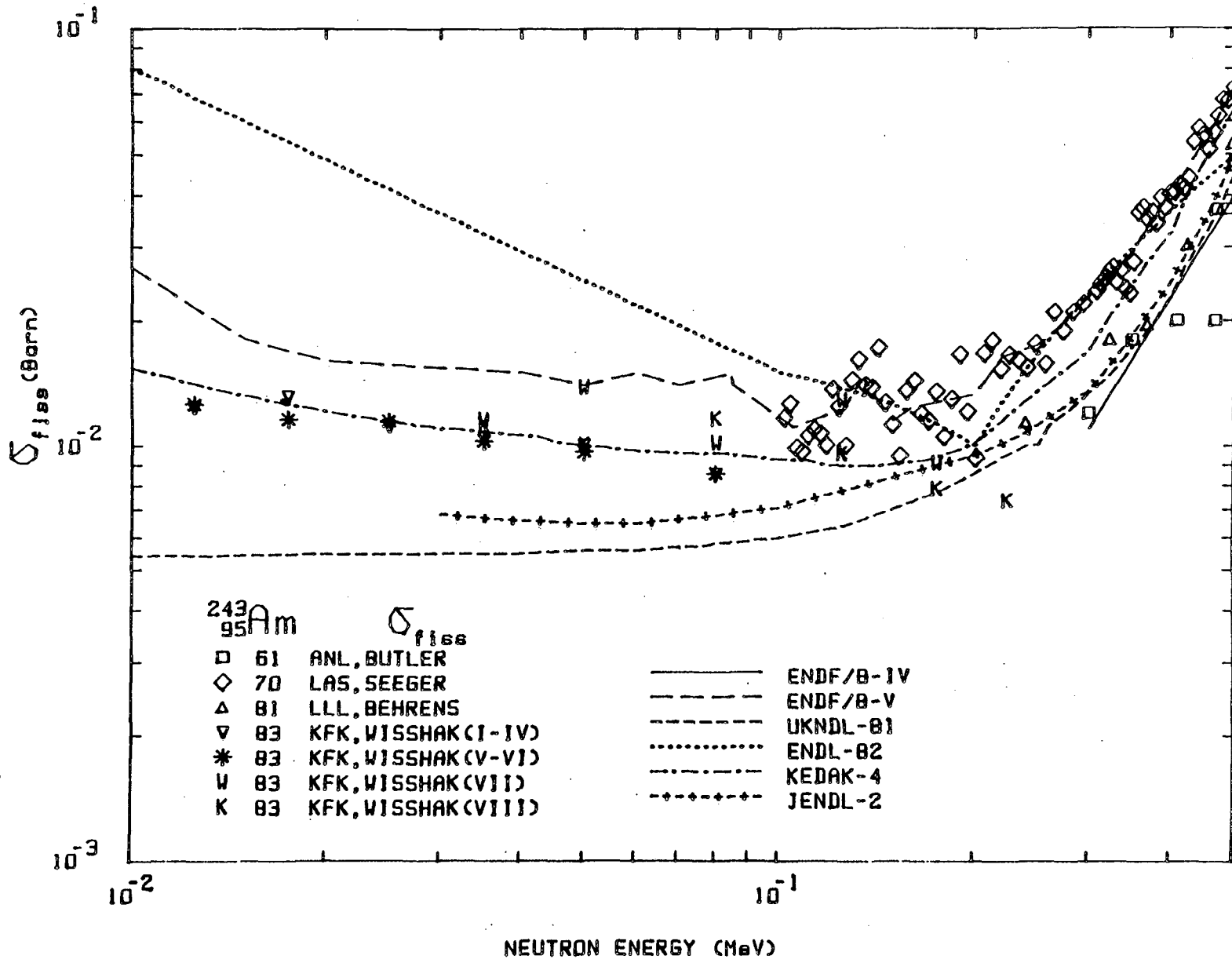
Experimental information  $^{243}\text{Am}, \sigma_{\gamma}$ 

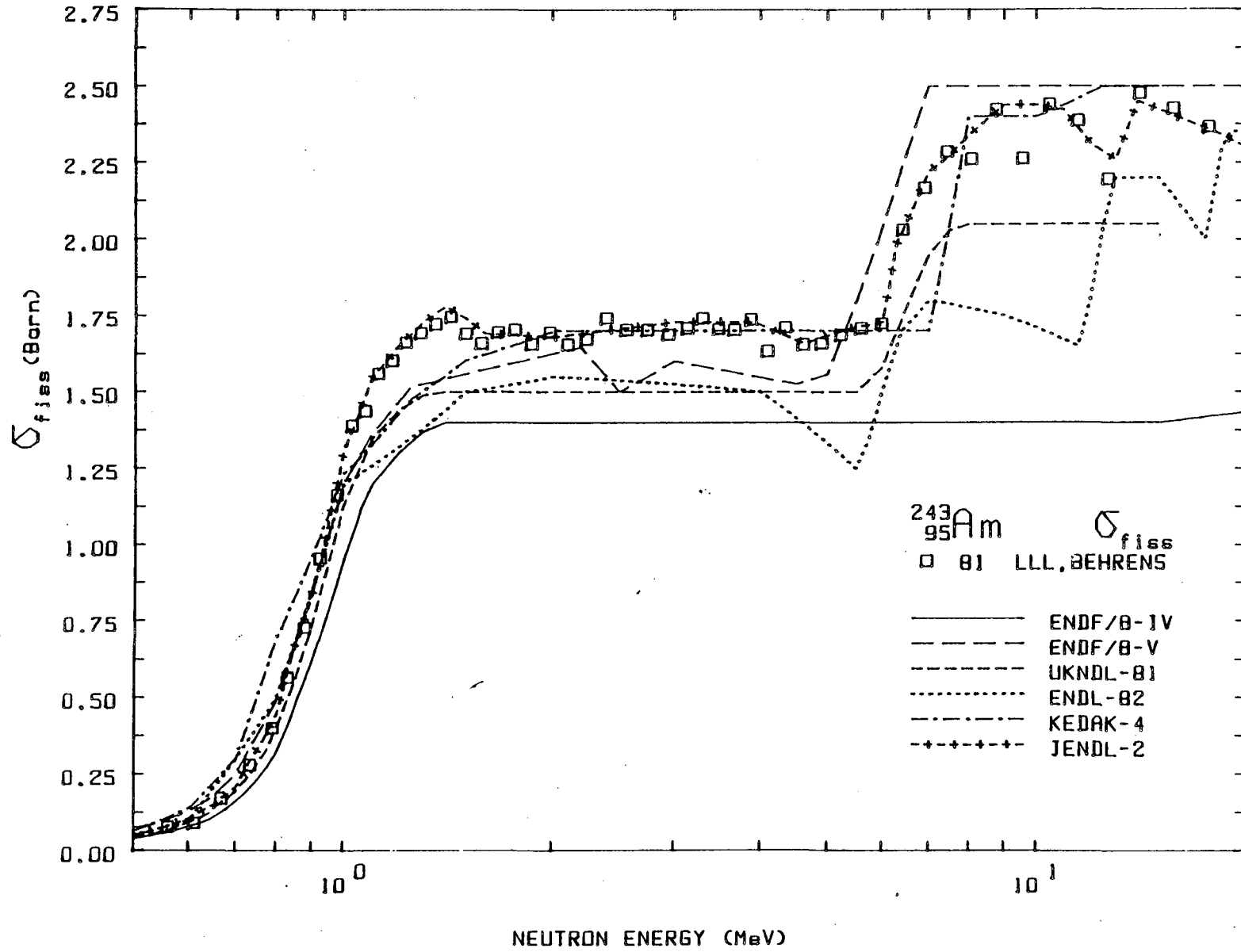
	<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
57	CRC, BUTLER	1	0.0253 eV	$^{59}\text{Co}, \sigma_{\gamma}$	3 %	
66	SRL, ICE	1	0,0253 eV	Activation		
67	CCP, BAK	1	0.0253 eV	$^{197}\text{Au}, \sigma_{\gamma}$	20 %	
71	FEI, IVANOV	1	1.0 MeV	$^{238}\text{U}, \sigma_{\gamma}$	4 %	
77	CCP, GAVRILOV	1	0.0253 eV	$^{197}\text{Au}, \sigma_{\gamma}$ and $^{59}\text{Co}, \sigma_{\gamma}$	7.2 %	
83	KFK, WISSHAK(I-IV)	16	5.7-100 keV	$^{197}\text{Au}, \sigma_{\gamma}$	3-16 %	Flight path 52 mm,
83	KFK, WISSHAK(V-VI)	20	7-100 keV	$^{197}\text{Au}, \sigma_{\gamma}$	3-15 %	"- 71 mm
83	KFK, WISSHAK(VII)	9	30-225 keV	$^{197}\text{Au}, \sigma_{\gamma}$	4-13 %	"- 65 mm (leadshield of Moxon-Ray det. 2 cm)
83	KFK, WISSHAK(VIII)	10	38-220 keV	$^{197}\text{Au}, \sigma_{\gamma}$	5-18 %	"- 65 mm (leadshield of Moxon-Ray det. 1 cm)

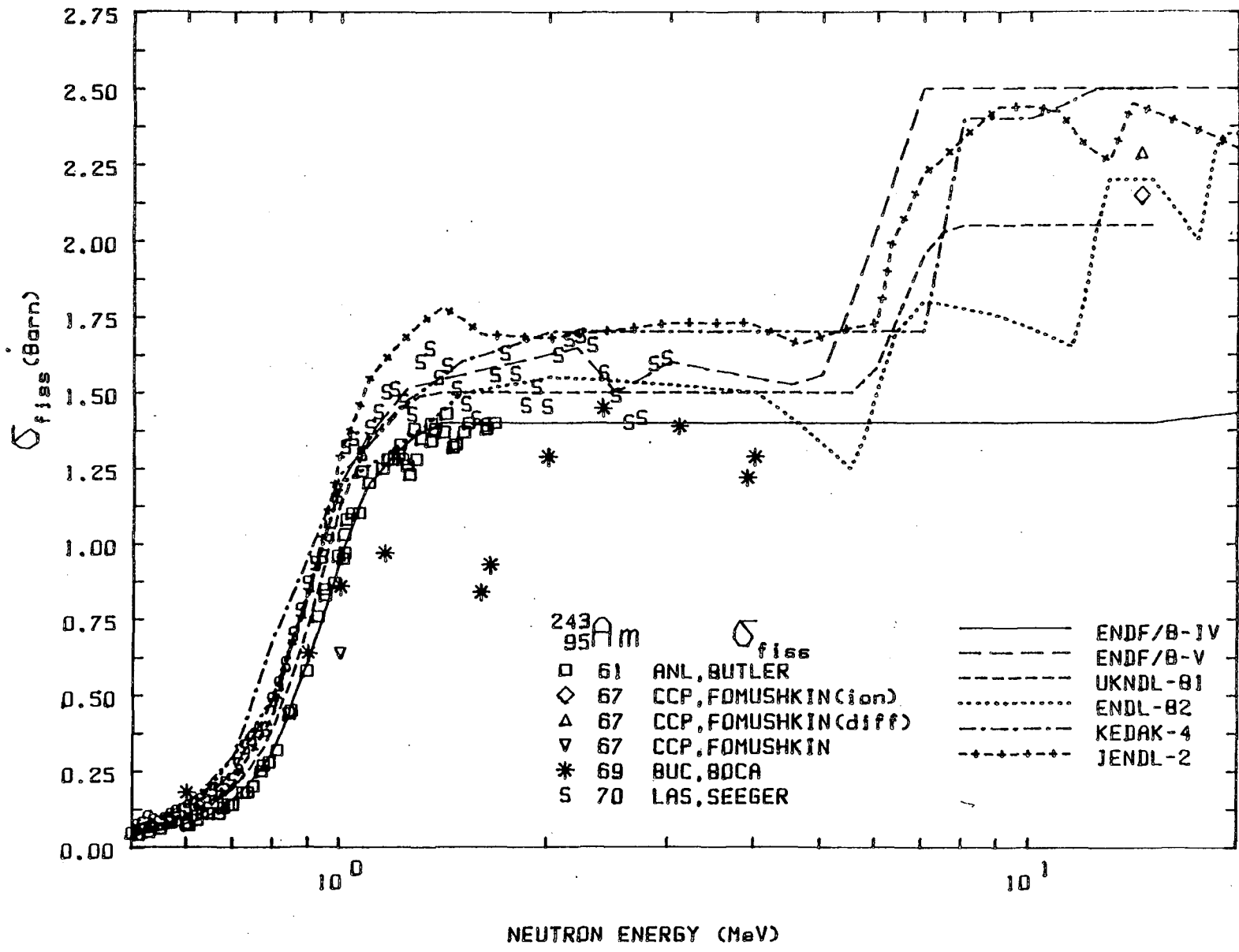
General comments: The experimental data point of Ice is the sum of the metastable and the ground state contribution











Experimental information  $^{243}\text{Am}, \sigma_{\text{fiss}}$

	<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
57	LRL, HULETT	1	0.0253 eV	$^{239}\text{Pu}, \sigma_{\text{f}}$		Based on $T_{1/2}(^{243}\text{Am}) = 8200 \text{ y}$
61	ANL, BUTLER	65	0.3-1.67 MeV	$^{235}\text{U}, \sigma_{\text{f}}$		
67	CCP, FOMUSHKIN(ion)	1	14.5 MeV	$^{238}\text{U}, \sigma_{\text{f}}$	6 %	Ion chamber
67	CCP, FOMUSHKIN(Diff)	1	14.5 MeV	$^{238}\text{U}, \sigma_{\text{f}}$	5 %	Diff. Sig. Int.
67	CCP, FOMUSHKIN	1	1.0 MeV	$^{238}\text{U}, \sigma_{\text{f}}$	8 %	
69	BUC, BOCA	11	0.6-4 MeV		$\leq 20 \%$	
70	LAS, SEEGER	2199	48 eV-3 MeV	$^{235}\text{U}, \sigma_{\text{f}}$		
77	CCP, GAVRILOV	1	0.0253 eV	$^{197}\text{Au}, \sigma_{\gamma}$ and $^{59}\text{Co}, \sigma_{\gamma}$	55 %	
81	LLL, BEHRENS	63	0.1-30 MeV	$^{235}\text{U}, \sigma_{\text{f}}$	1.5-48 %	
83	KFK, WISSHAK(I-IV)	6	10-100 keV	$^{235}\text{U}, \sigma_{\text{f}}$	7-8 %	Flight Path 53 mm
83	KFK, WISSHAK(V-VI)	6	10-100 keV	$^{235}\text{U}, \sigma_{\text{f}}$	9-13 %	"- 71 mm
83	KFK, WISSHAK(VII)	5	30-250 keV	$^{235}\text{U}, \sigma_{\text{f}}$	10-30 %	"- 52 mm
83	KFK, WISSHAK(VIII)	6	30-250 keV	$^{235}\text{U}, \sigma_{\text{f}}$	10-35 %	"- 65 mm



242  
Cm

## NUCLEAR PROPERTIES

Spin and parity of ground state:  $0^+$ 

Ground state decay:

Alpha to  $^{238}\text{Pu}$ 

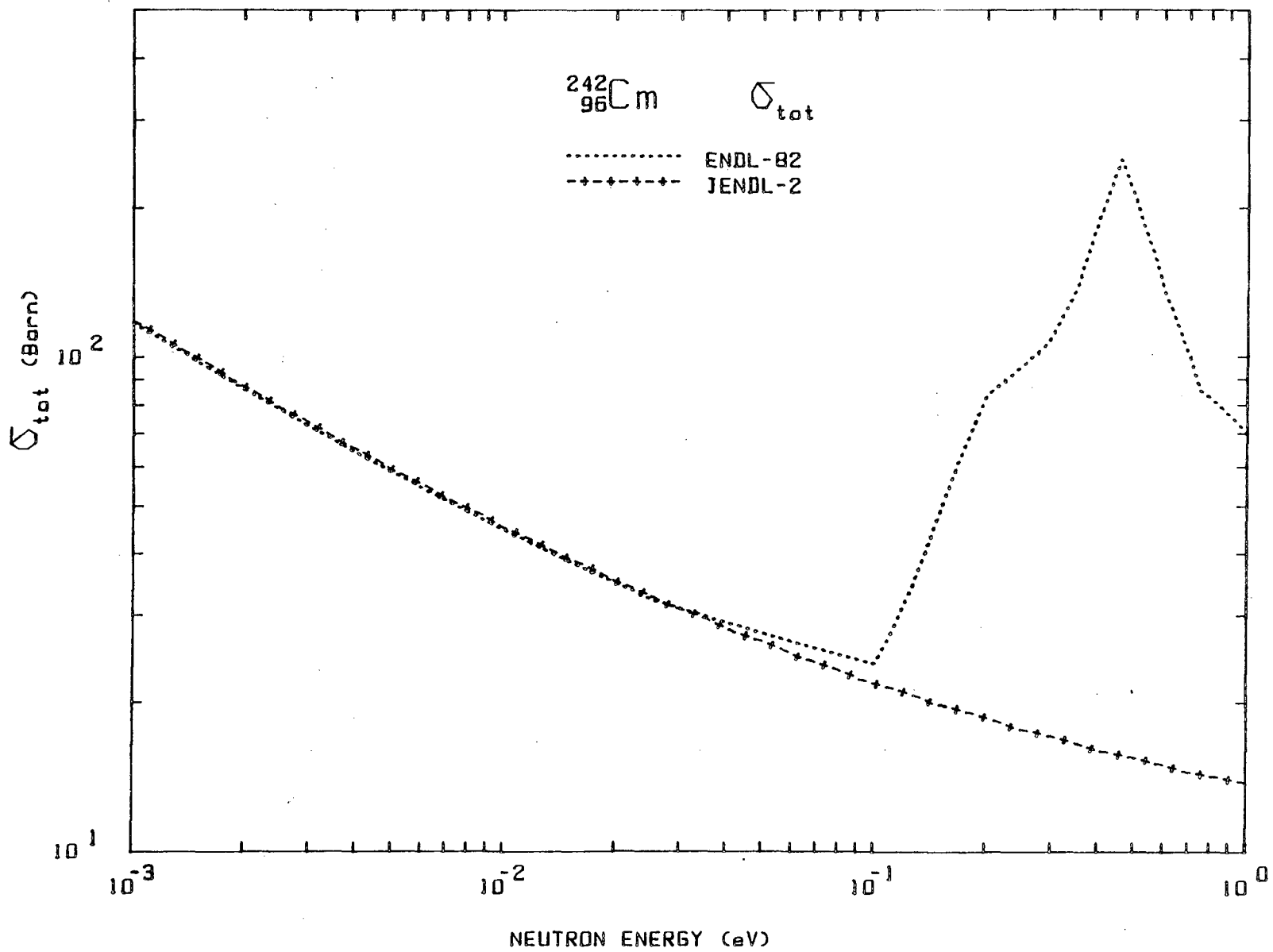
Half-life: 162.8 d

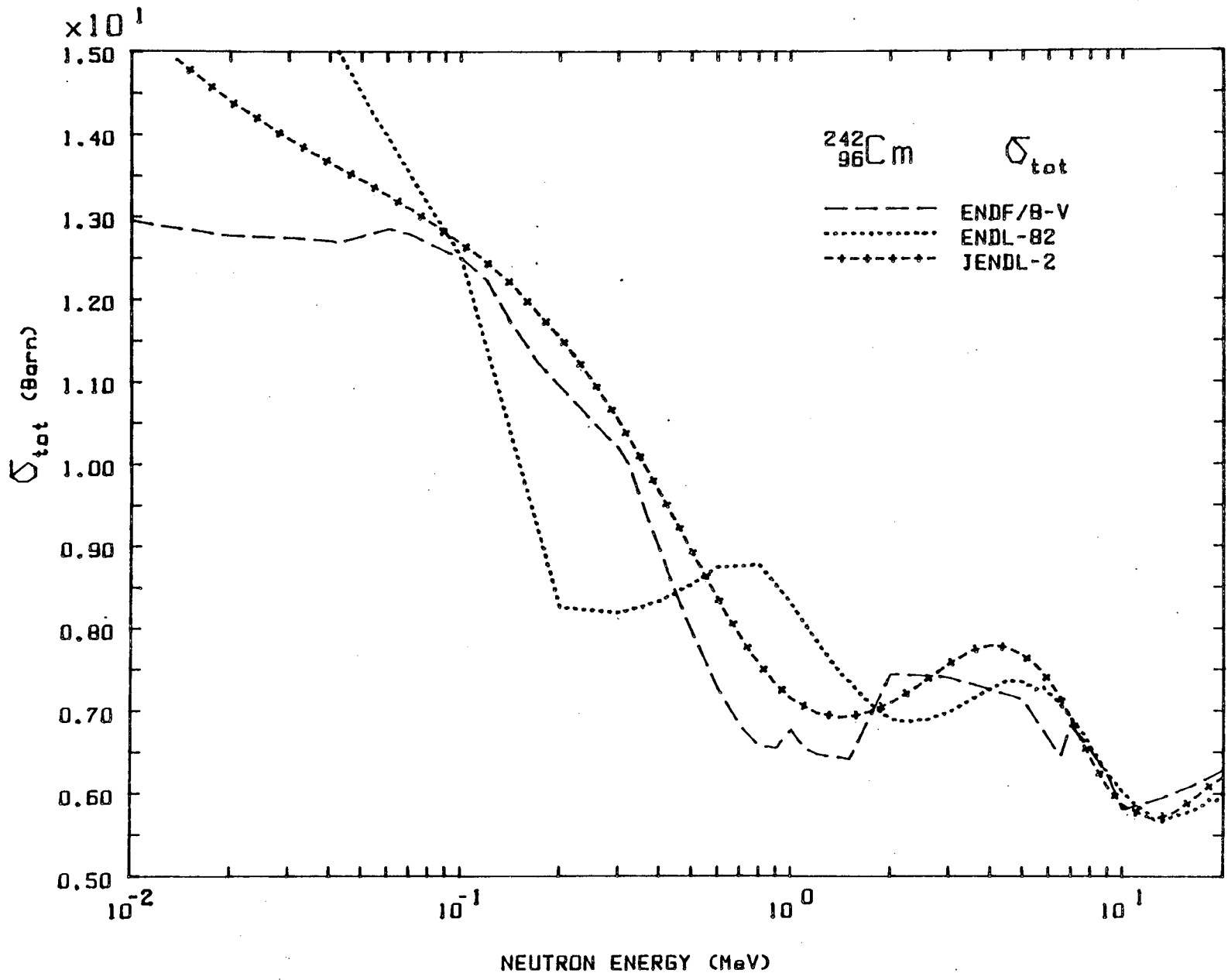
## THERMAL CROSS SECTIONS (2200 m/s)

Reference	$\sigma_{\gamma}$	$\sigma_f$	$\sigma_t$	$\bar{v}_{sp}$	(barns)
ENDL -82	16.00	5.010	32.35		
JENDL-2	15.92	5.000	32.53		
BNL 325 (1984)	16	<5		2.538	

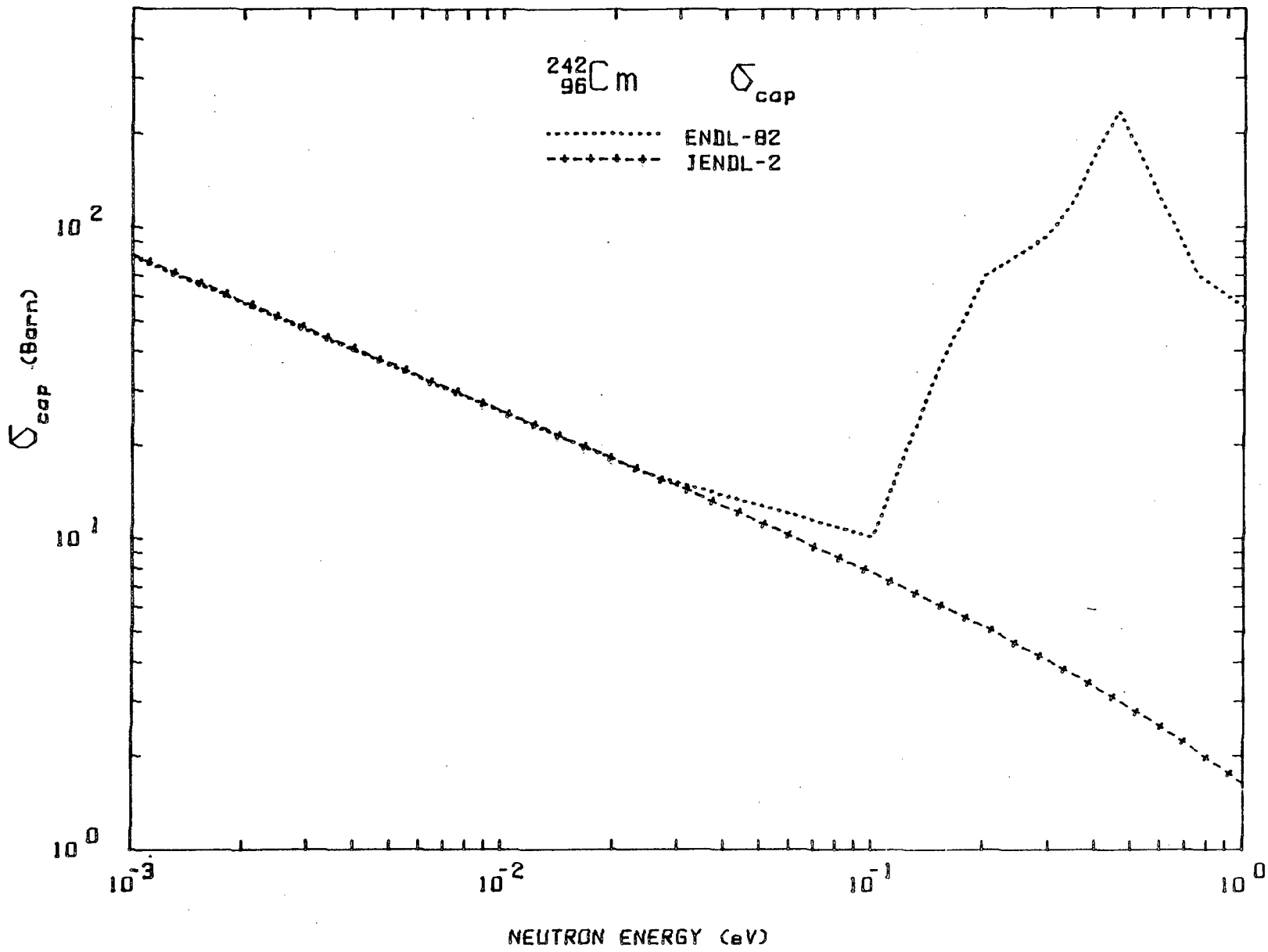
## RESONANCE INTEGRALS

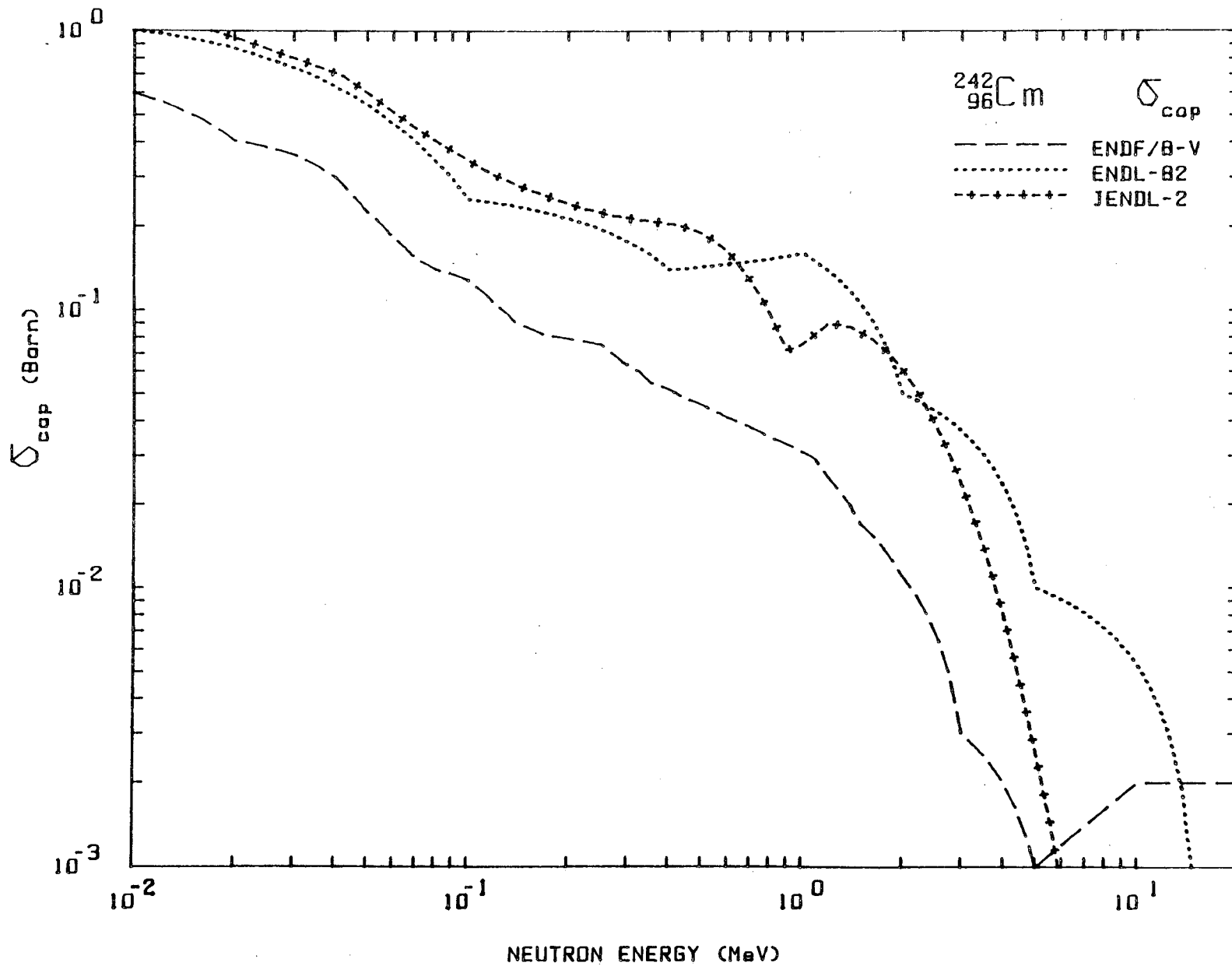
Reference	$RI_{\gamma}$	$RI_f$	(barns)
ENDL -82	164.4	36.37	
JENDL-2	116.2	11.10	
BNL 325 (1984)	110		

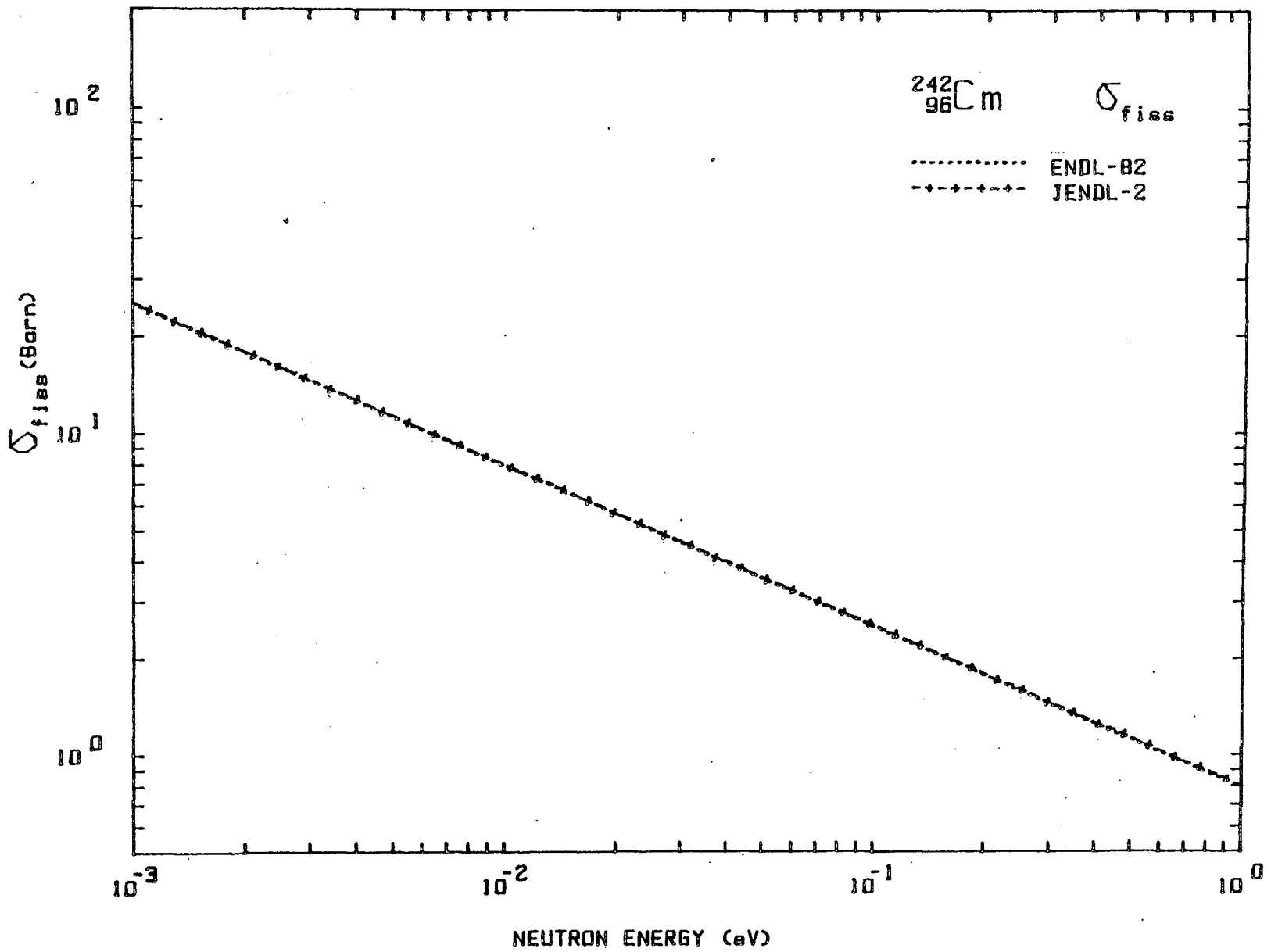


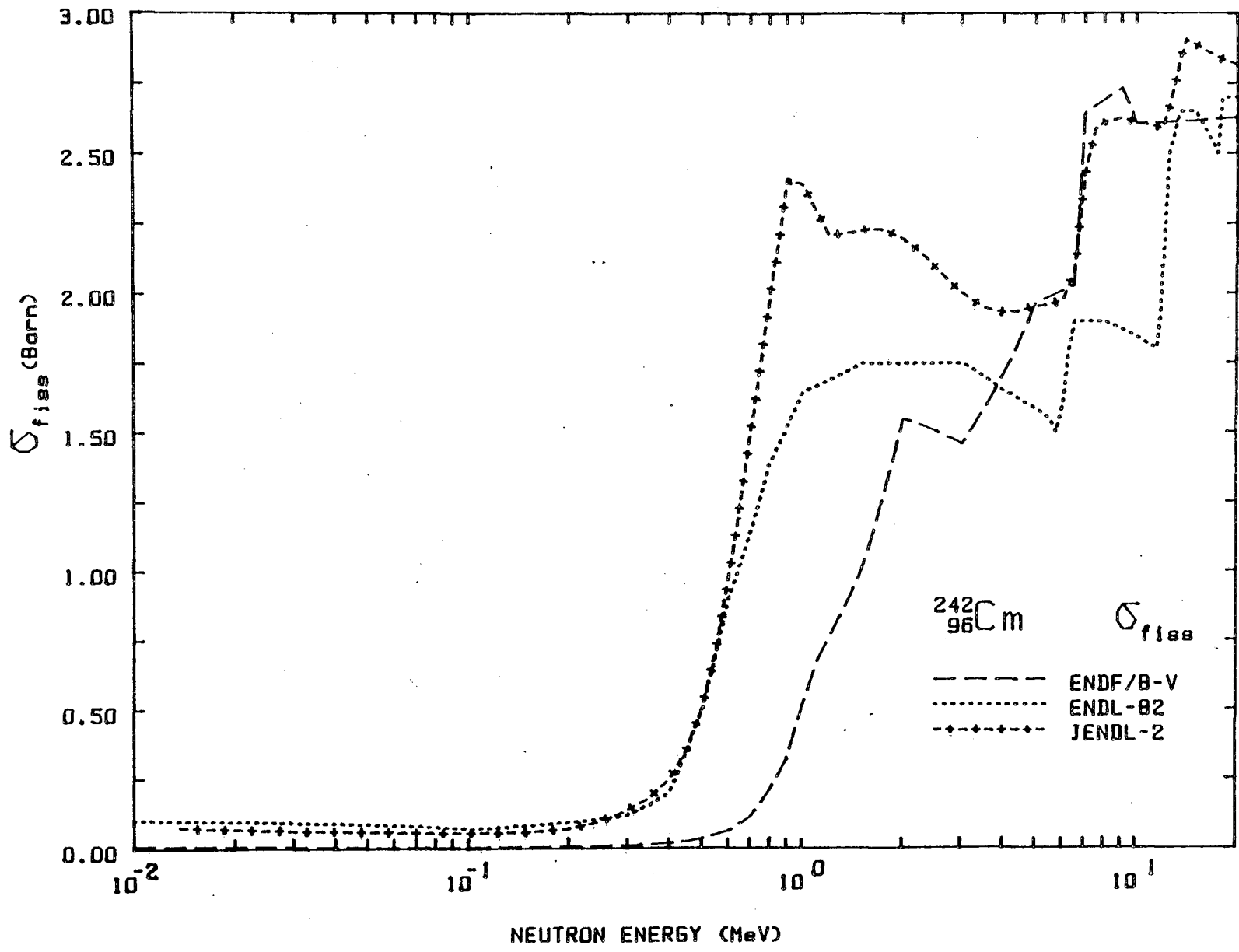














<sup>243</sup>Cm

## NUCLEAR PROPERTIES

Spin and parity of ground state:  $5/2^+$ 

Ground state decay:

Alpha to <sup>239</sup>Pu: 99.7%Beta ( $\beta^+$ ) to <sup>243</sup>Am: 0.26%

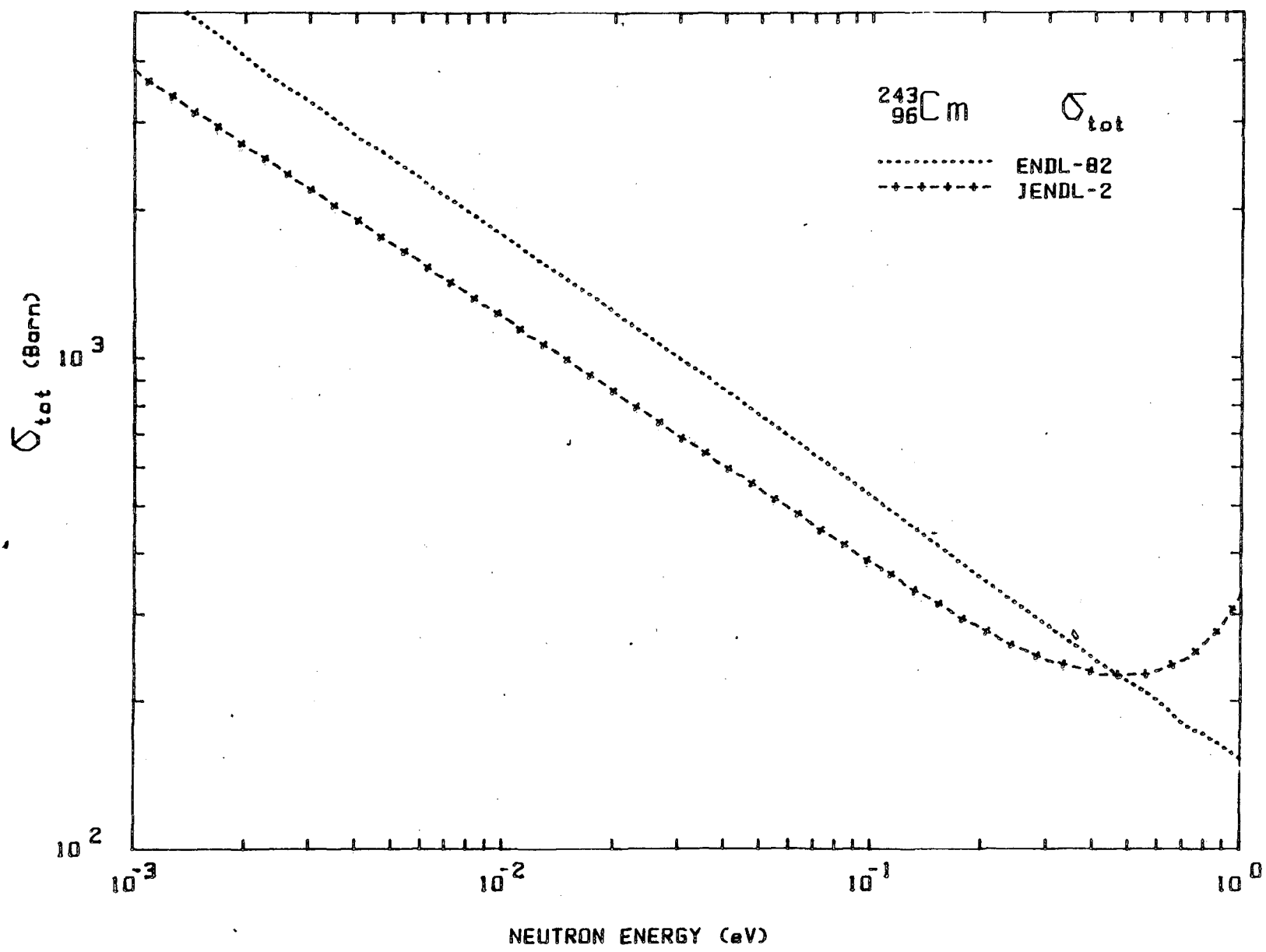
Half-life: 28.5 yr

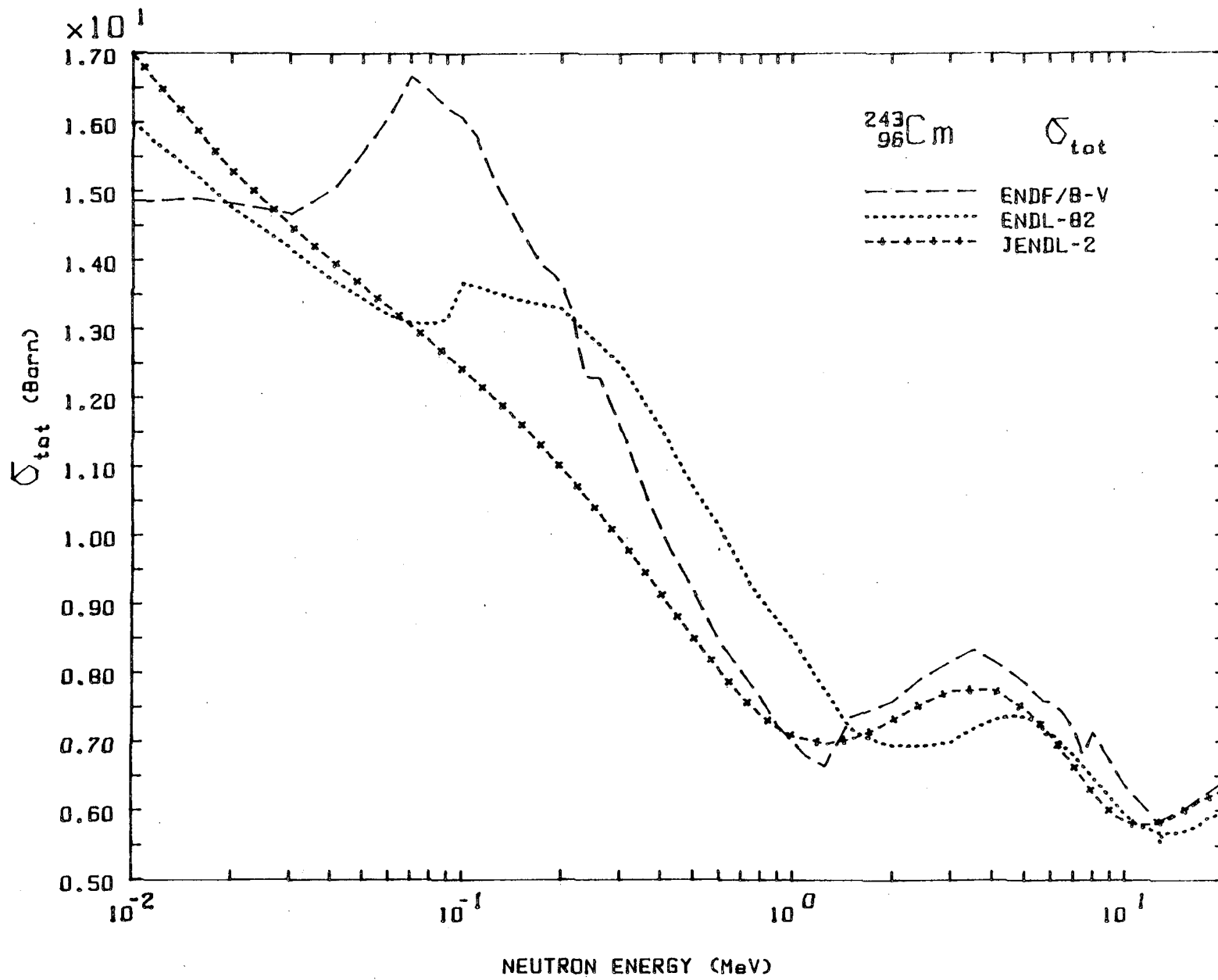
## THERMAL CROSS SECTIONS (2200 m/s)

Reference	$\sigma_{\gamma}$	$\sigma_f$	$\sigma_t$	$\bar{\nu}_p$	(barns)
ENDF/B - V	58.03	691.5	756.2		
ENDL -82	391.1	690.8	1093		
JENDL-2	131.3	612.3	753.3	3.43	
BNL 325 (1984)	130	617		3.430	

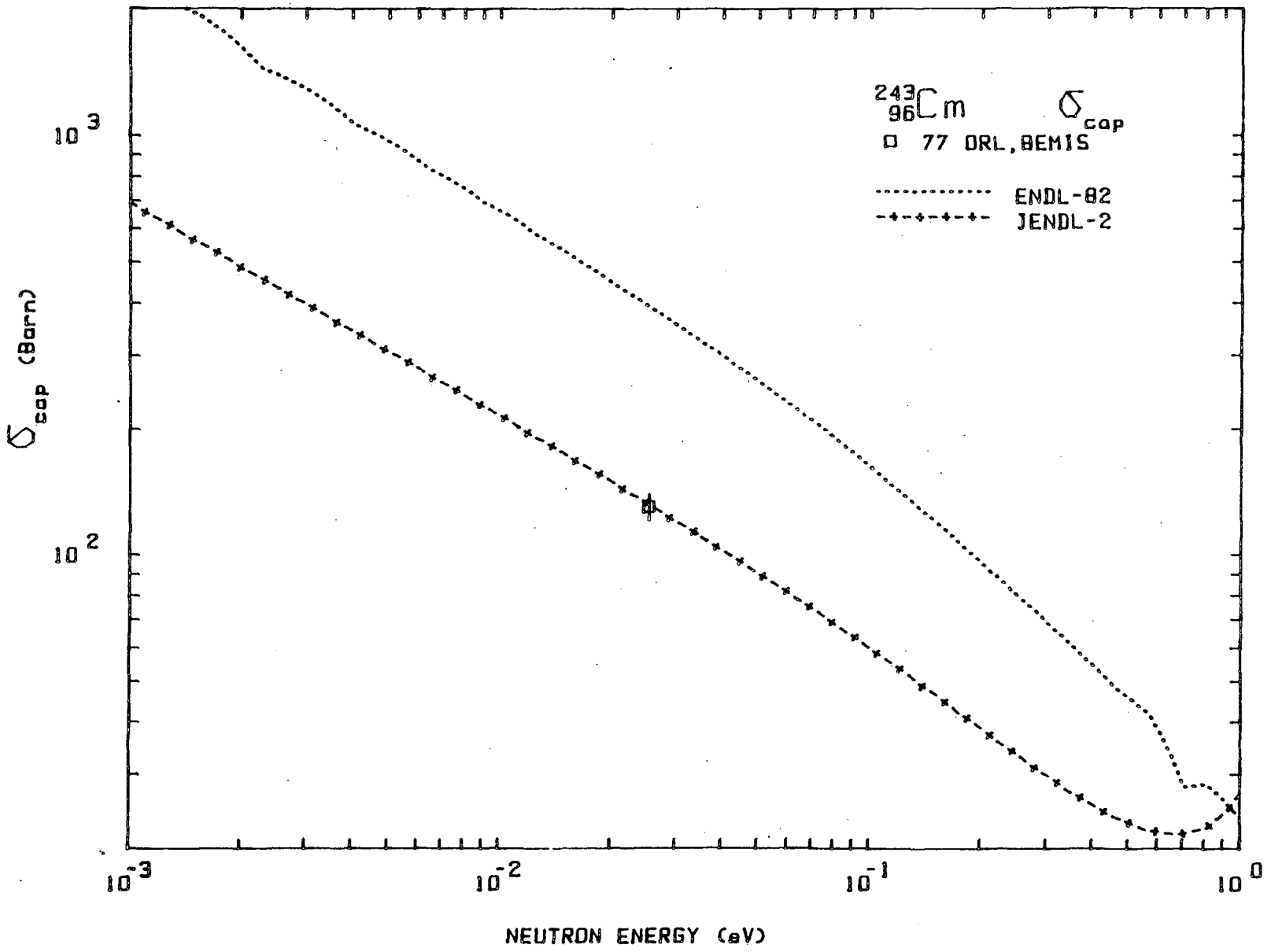
## RESONANCE INTEGRALS

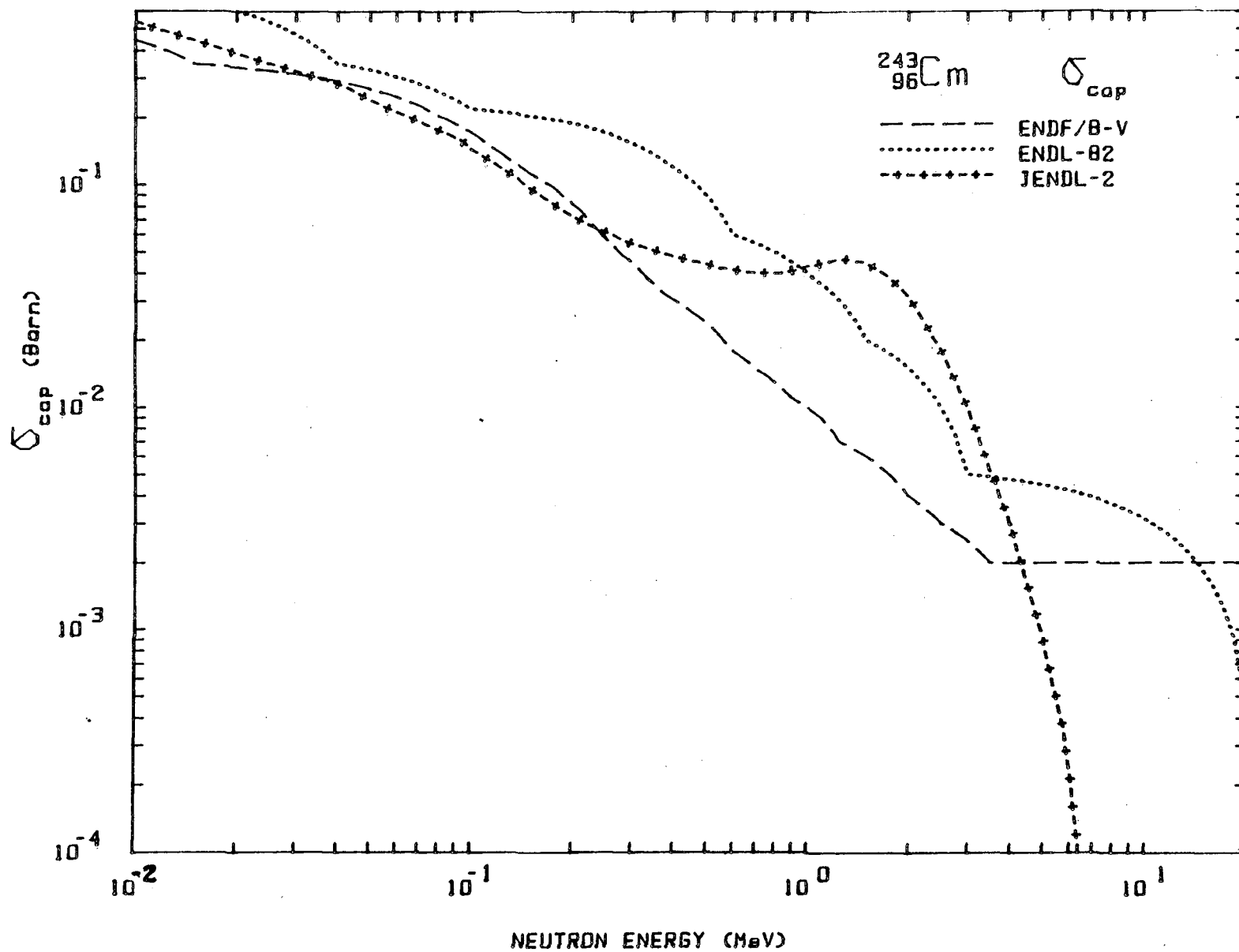
Reference	$RI_{\gamma}$	$RI_f$	(barns)
ENDF/B - V	248.4	1952	
ENDL -82	121.4	777.2	
JENDL-2	404.4	1751	
BNL 325 (1984)	215	1570	





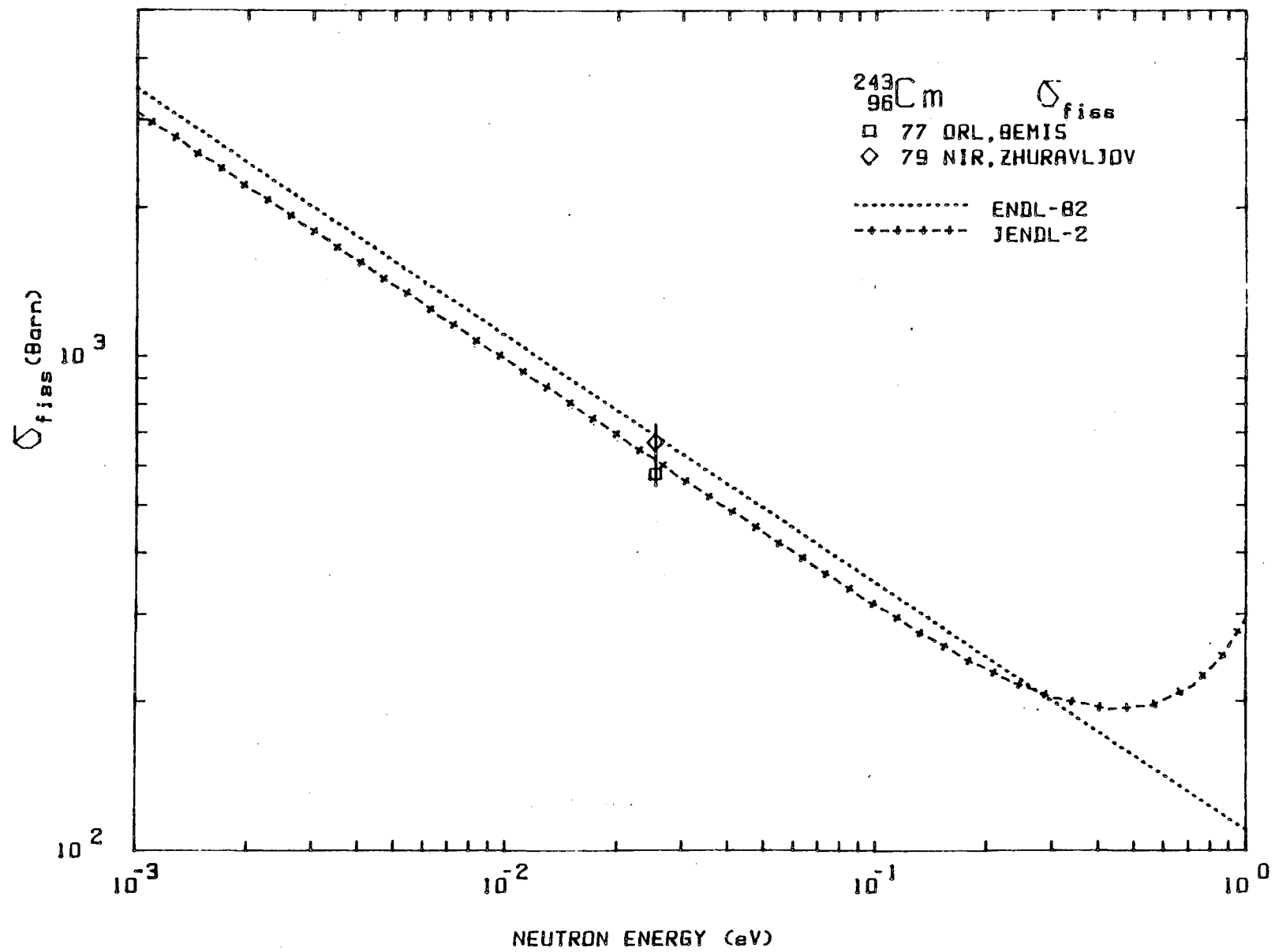


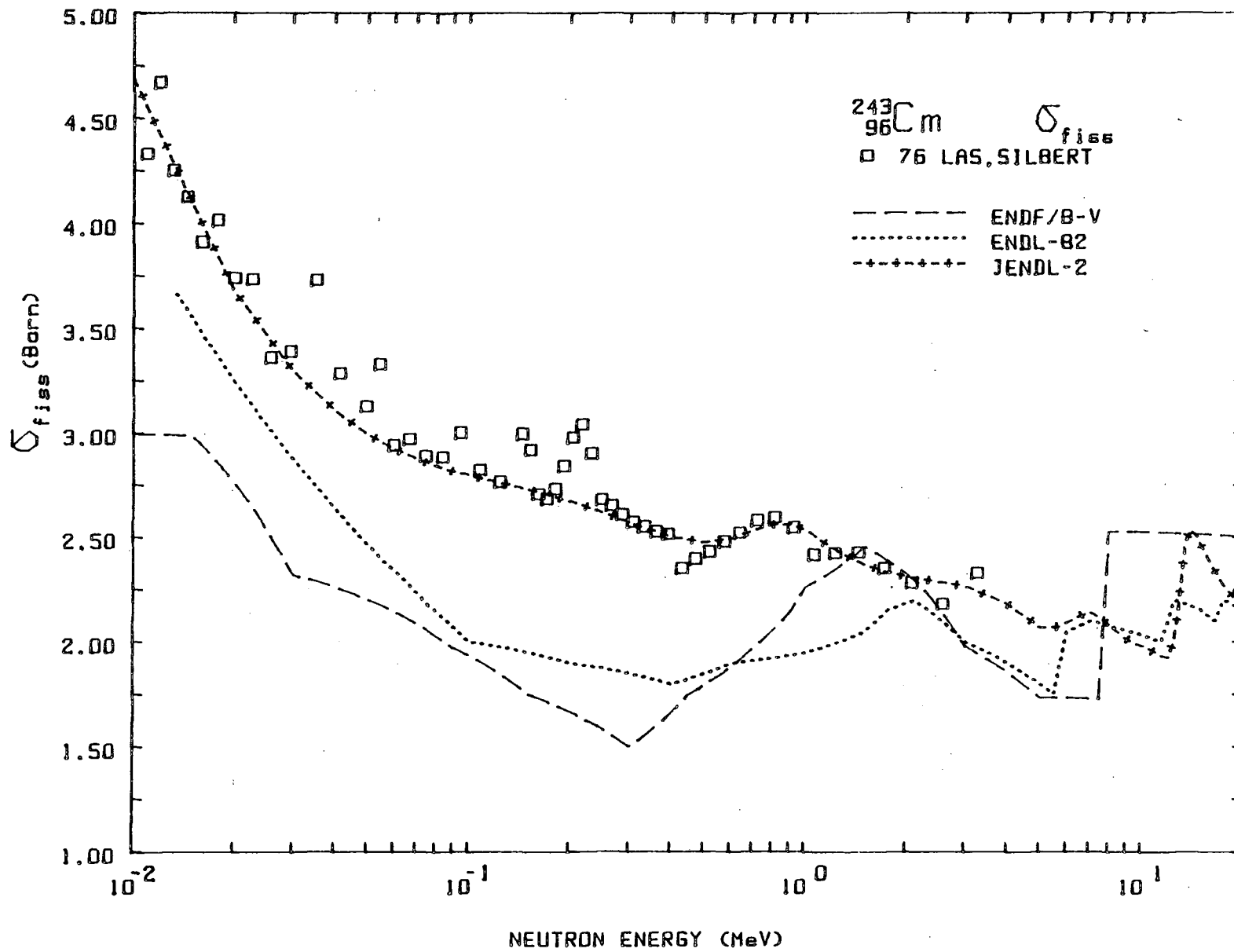




Experimental information  $^{243}\text{Cm}, \sigma_{\gamma}$ 

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
77 ORL, BEMIS	1	0.00253 eV	$^{59}\text{Co}, \sigma_{n,\gamma}$	< 5 %	Mass Spectrometry





Experimental information  $^{243}\text{Cm}, \sigma_{\text{fiss}}$

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
76 LAS, SILBERT	136	15 eV-3 MeV	$^6\text{Li}, \sigma_{n,\alpha}$ $^{235}\text{U}, \sigma_{n,f}$	$\pm 10 \%$	Neutron source, underground nuclear explosion (Physics-8)
77 ORL, BEMIS	1	0.00253 eV	$^{59}\text{Co}, \sigma_{n,\gamma}$	25 %	Mass spectrometry
79 NIR, ZHURAVLJOV	1	0.00253 eV	$^{235}\text{U}, \sigma_f$	10 %	



<sup>244</sup>Cm

## NUCLEAR PROPERTIES

Spin and parity of ground state: 0<sup>+</sup>

Ground state decay:

Alpha to <sup>240</sup>Pu

Half-life: 18.11 yr

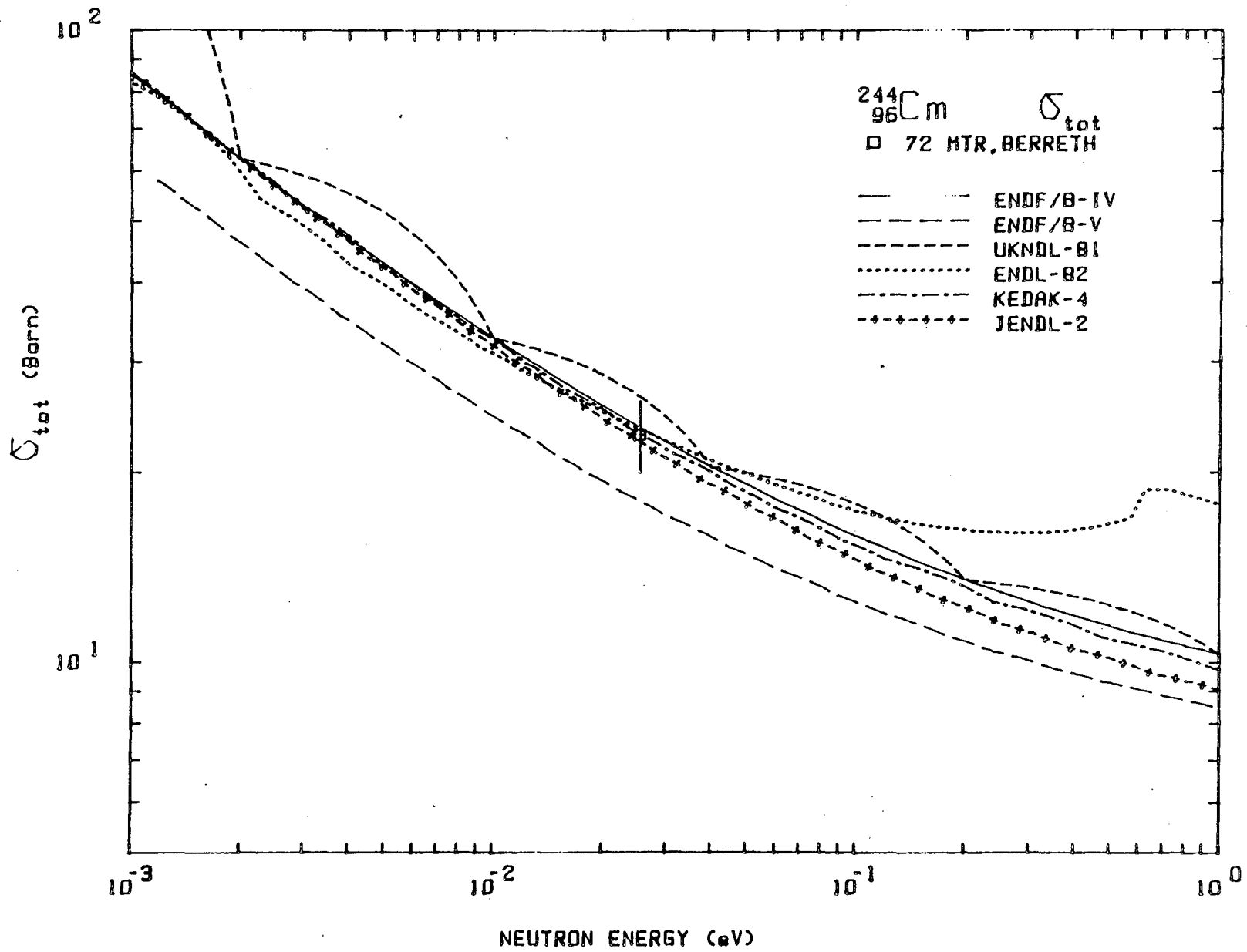
## THERMAL CROSS SECTIONS (2200 m/s)

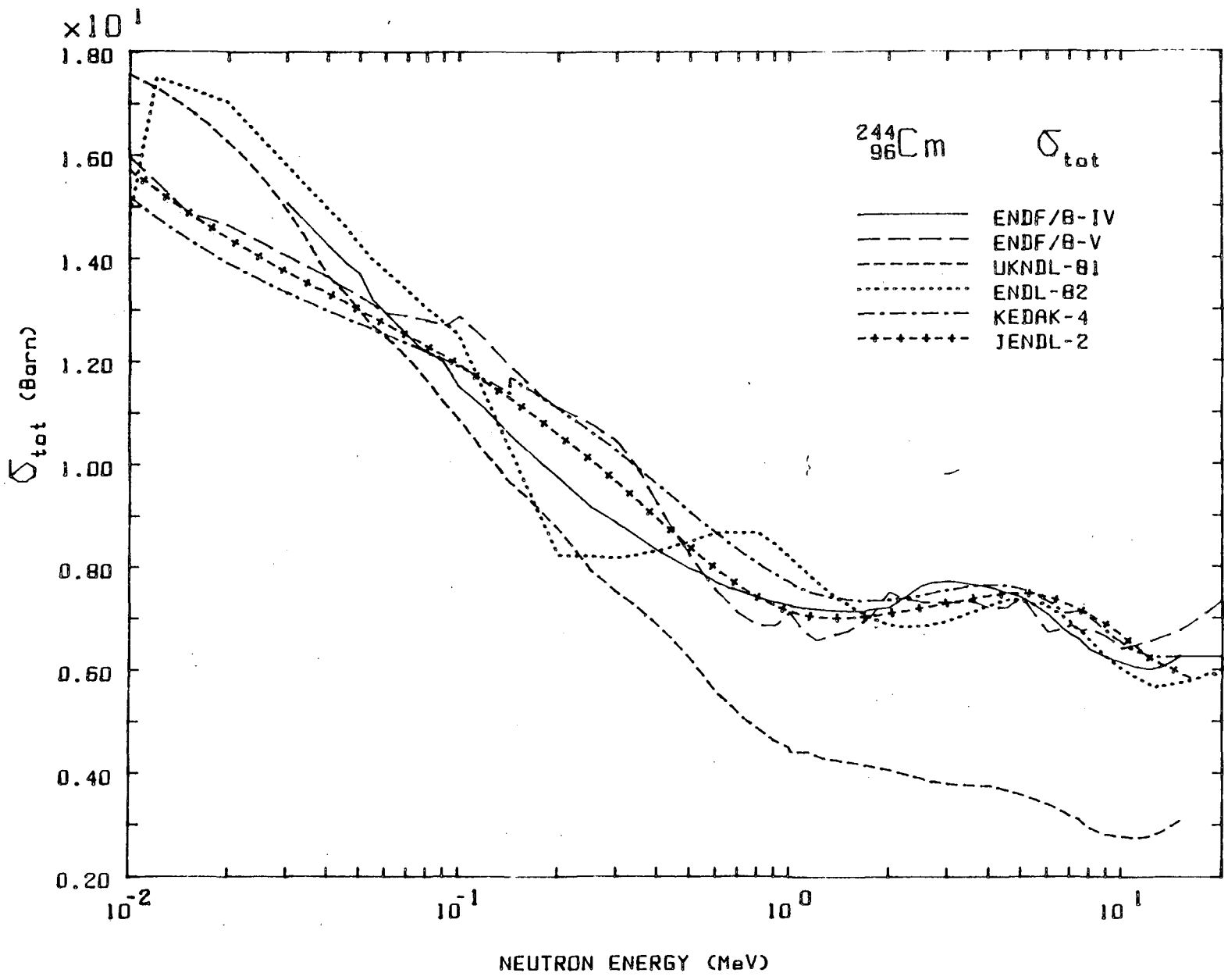
Reference	$\sigma_{\gamma}$	$\sigma_f$	$\sigma_t$	$\bar{\nu}_{sp}$	(barns)
ENDF/B - IV	13.4	0.88	23.6		
ENDF/B - V	10.37	0.6037	17.95		
UKNDL -81	14.26	0.8785	23.82		
ENDL -82	10.98	1.102	23.42		
KEDAK-4	14.40	1.030	23.00		
JENDL-2	14.41	1.180	22.24		
72 SRL, BENJAMIN		1.1			
BNL 325 (1984)	15.2	1.04	27.6	2.696	

## RESONANCE INTEGRALS

Reference	RI <sub><math>\gamma</math></sub>	RI <sub>f</sub>	(barns)
ENDF/B - IV	558.5	34.1	
ENDF/B - V	593.5	18.70	
UKNDL -81	593.0	44.18	
ENDL -82	610.8	35.06	
KEDAK-4	637.3	19.05	
JENDL-2	593.5	18.39	
72 SRL, BENJAMIN		18	
72 MTR, BERRETH	587		
BNL 325 (1984)	650	12.5	



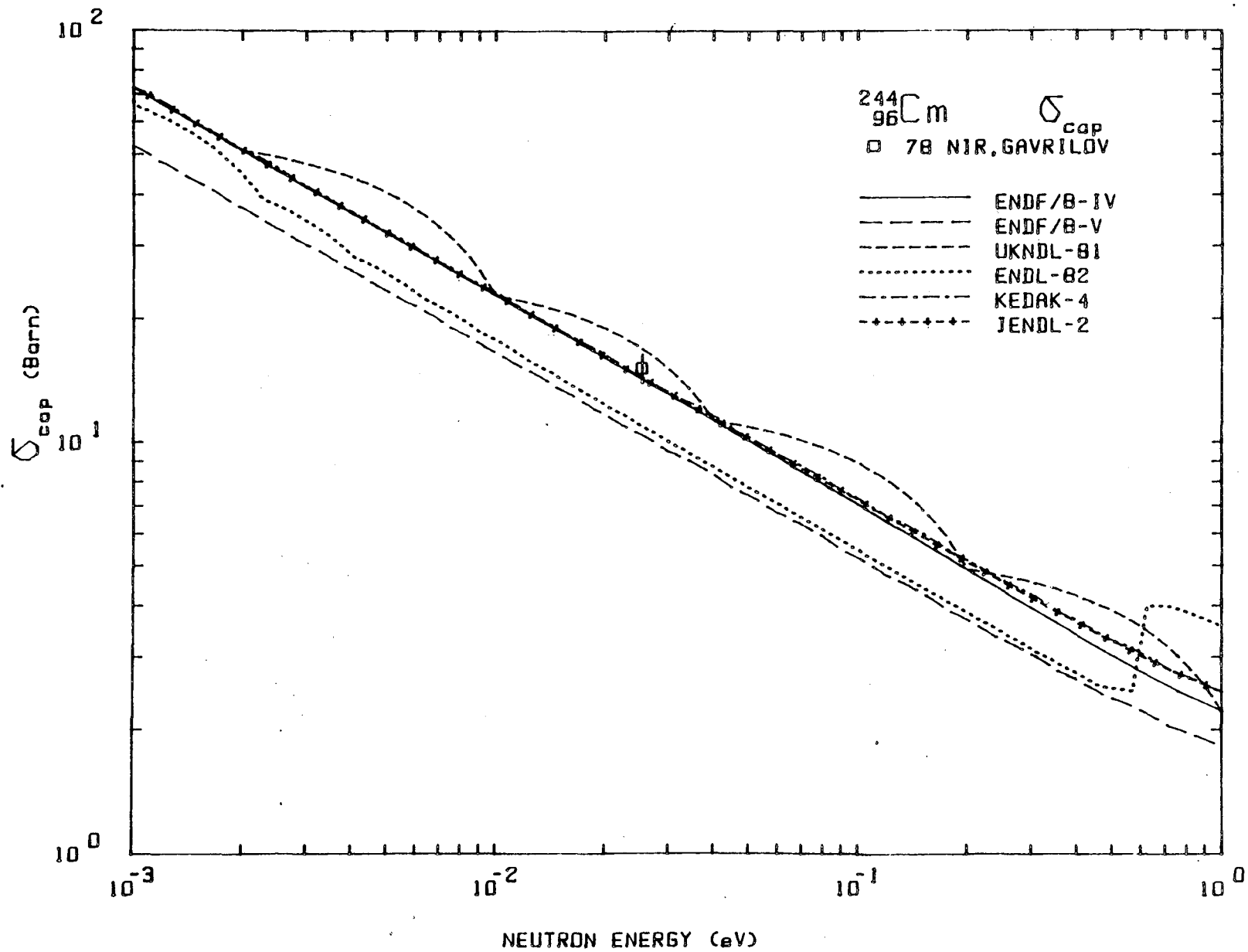


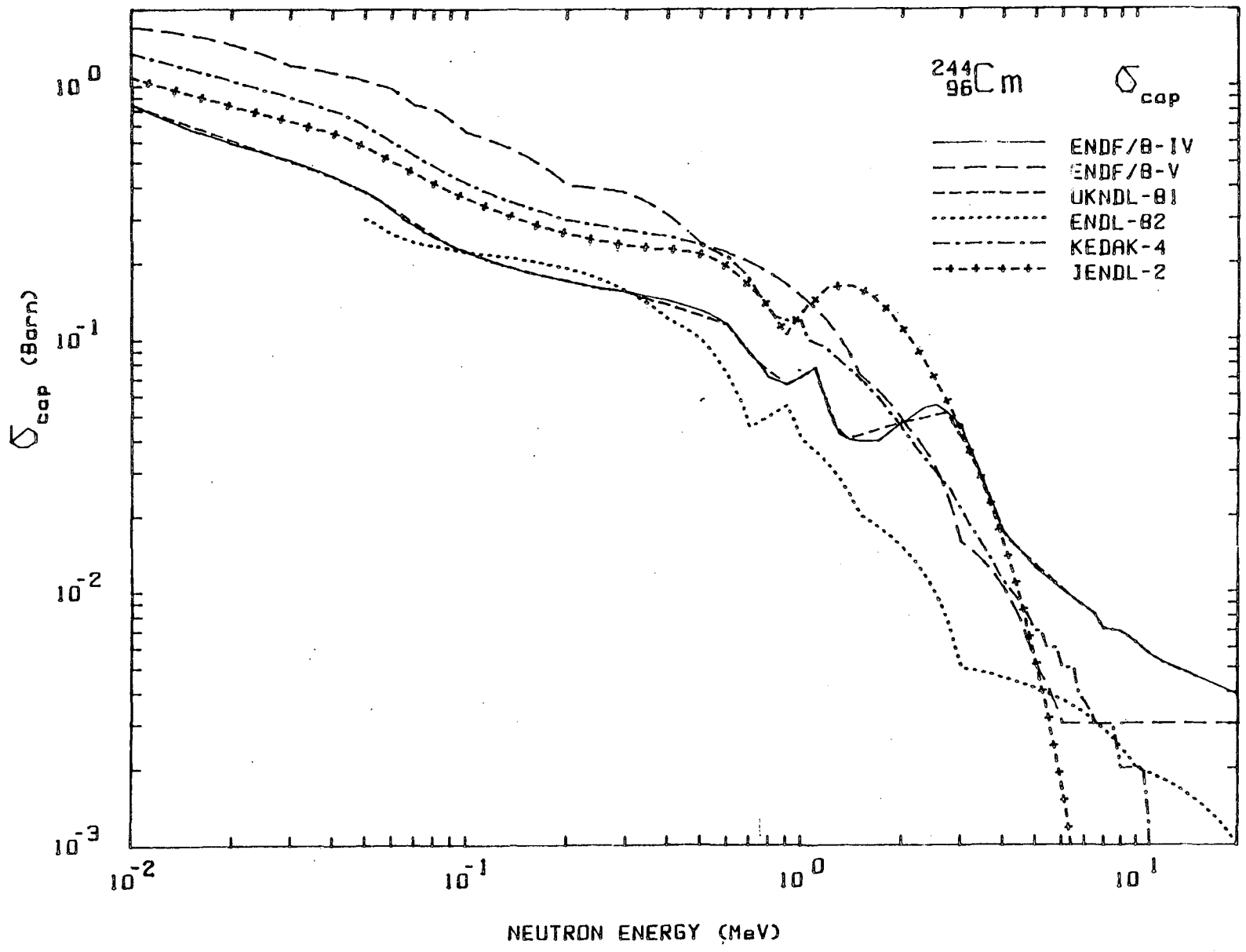


Experimental information  $^{244}\text{Cm}, \sigma_{\text{tot}}$ 

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
72 MTR, BERRETH	1	0.0253 eV	ABS.	13 %	

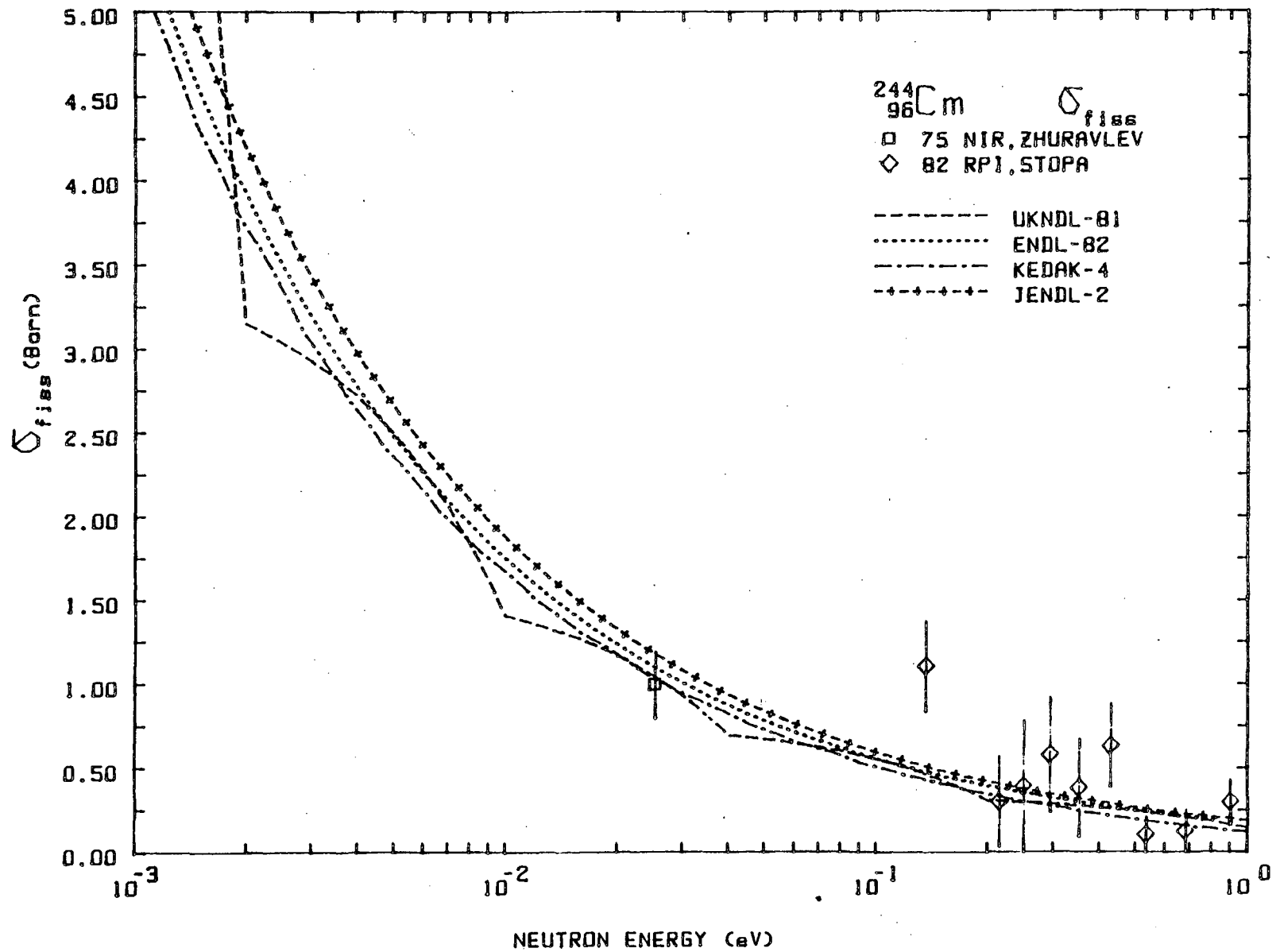
General comments: ENDF/B-V total cross section evaluation in the thermal energy range has been calculated from resonance parameters using the computer code RESEND (NEA Nuclear Data Bank)

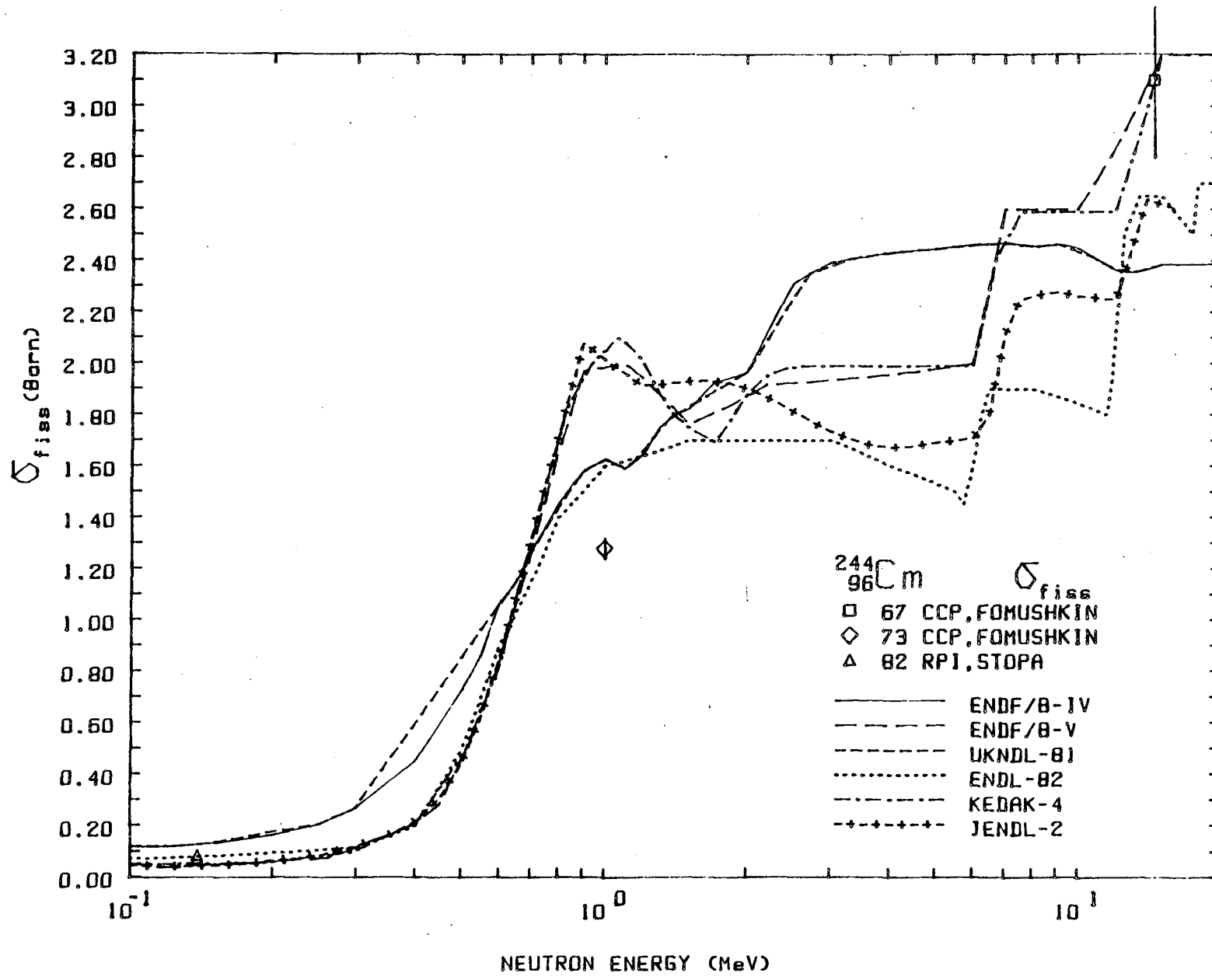




Experimental information  $^{244}\text{Cm}, \sigma_{\gamma}$ 

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
78 NIR, GAVRILOV	1	0.0253 eV	$^{245}\text{Cm}, \sigma_{\text{f}}$ $^{247}\text{Cm}, \sigma_{\text{f}}$	8 %	







Experimental information  $^{244}\text{Cm}, \sigma_f$ 

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
67 CCP, FOMUSHKIN	2	14.5 MeV	$^{238}\text{U}, \sigma_f$	9 %	Independent meas. made with glass-plate fragment detectors and ionization chamber
73 CCP, FOMUSHKIN	1	1 MeV	$^{235}\text{U}, \sigma_f$	3 %	
75 NIR, ZHURAVLEV	1	0.0253 eV	$^{235}\text{U}, \sigma_f$	20 %	$\sigma_f = 577.1 \pm 0.9 \text{ b}$
81 CCP, VOROTNIKOV	8	0.4-1.3 MeV	---	14-28 %	Neutron flux measured with long counter calibrated with Pu-Be source
82 RPI, STOPA	155	0.14 eV-80 keV	$^{235}\text{U}, \sigma_f$	30-100 %	Lead slowing down spectrometer

General comments: Experimental data shown in the figure are calculated using cross sections from ENDF/B-V as standard

<sup>245</sup>Cm

## NUCLEAR PROPERTIES

Spin and parity of ground state:  $7/2^+$ 

Ground state decay:

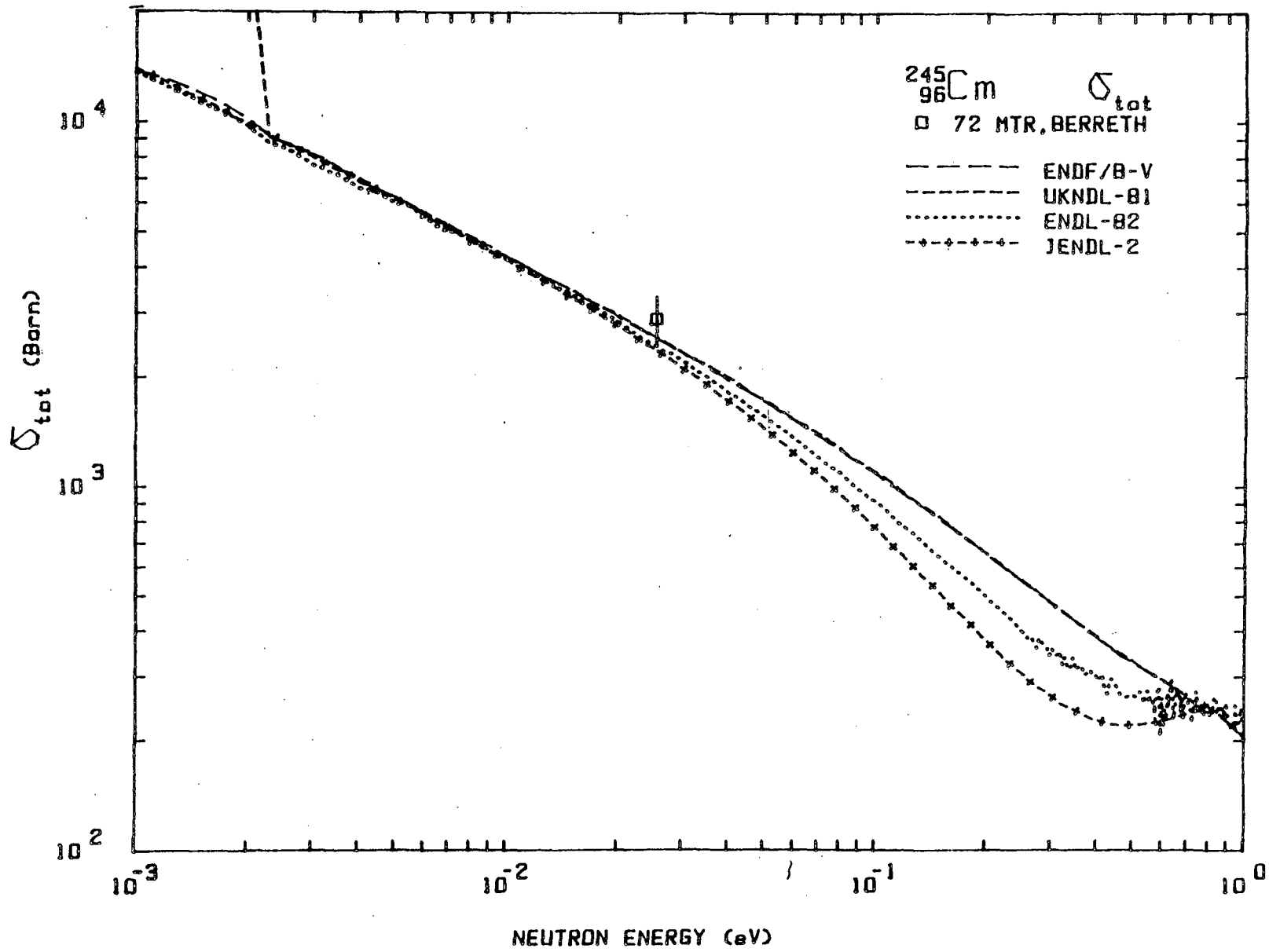
Alpha to <sup>241</sup>Pu,  $Q_\alpha = 5.623$ Half-life:  $8.500 \cdot 10^3$  yr

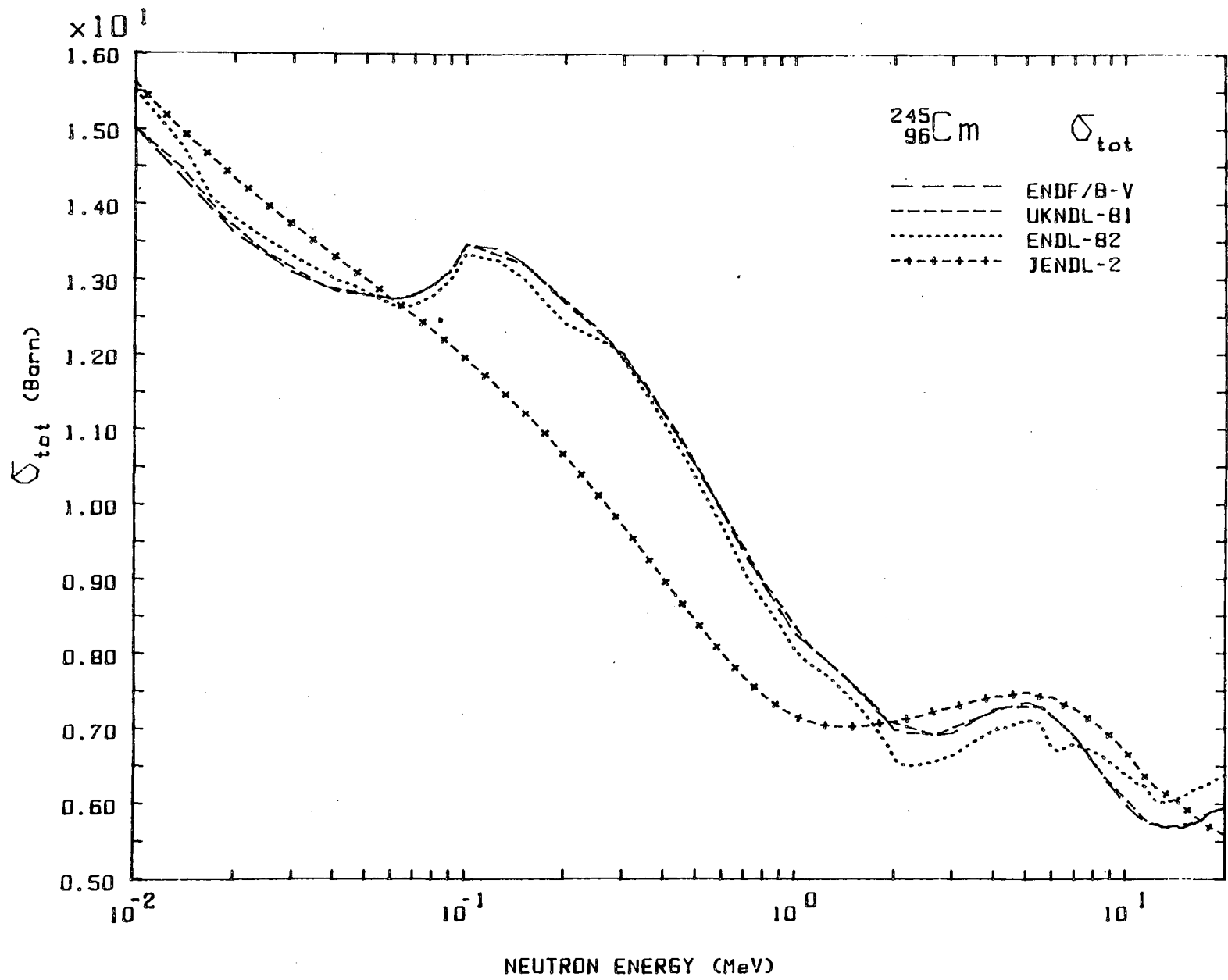
## THERMAL CROSS SECTIONS (2200 m/s)

Reference	$\sigma_\gamma$	$\sigma_f$	$\sigma_t$	$\bar{\nu}_+$	(barns)
ENDF/B - V	342.1	2219	2570	3.83	
UKNDL -81	384.1	2166	2562		
ENDL -82	391.1	2020	2432		
JENDL-2	346.3	2001	2359	3.83	
72 SRL, BENJAMIN		2018			
78 LLL, BROWN		2143			
BNL 325 (1984)	369	2145		3.717	

## RESONANCE INTEGRALS

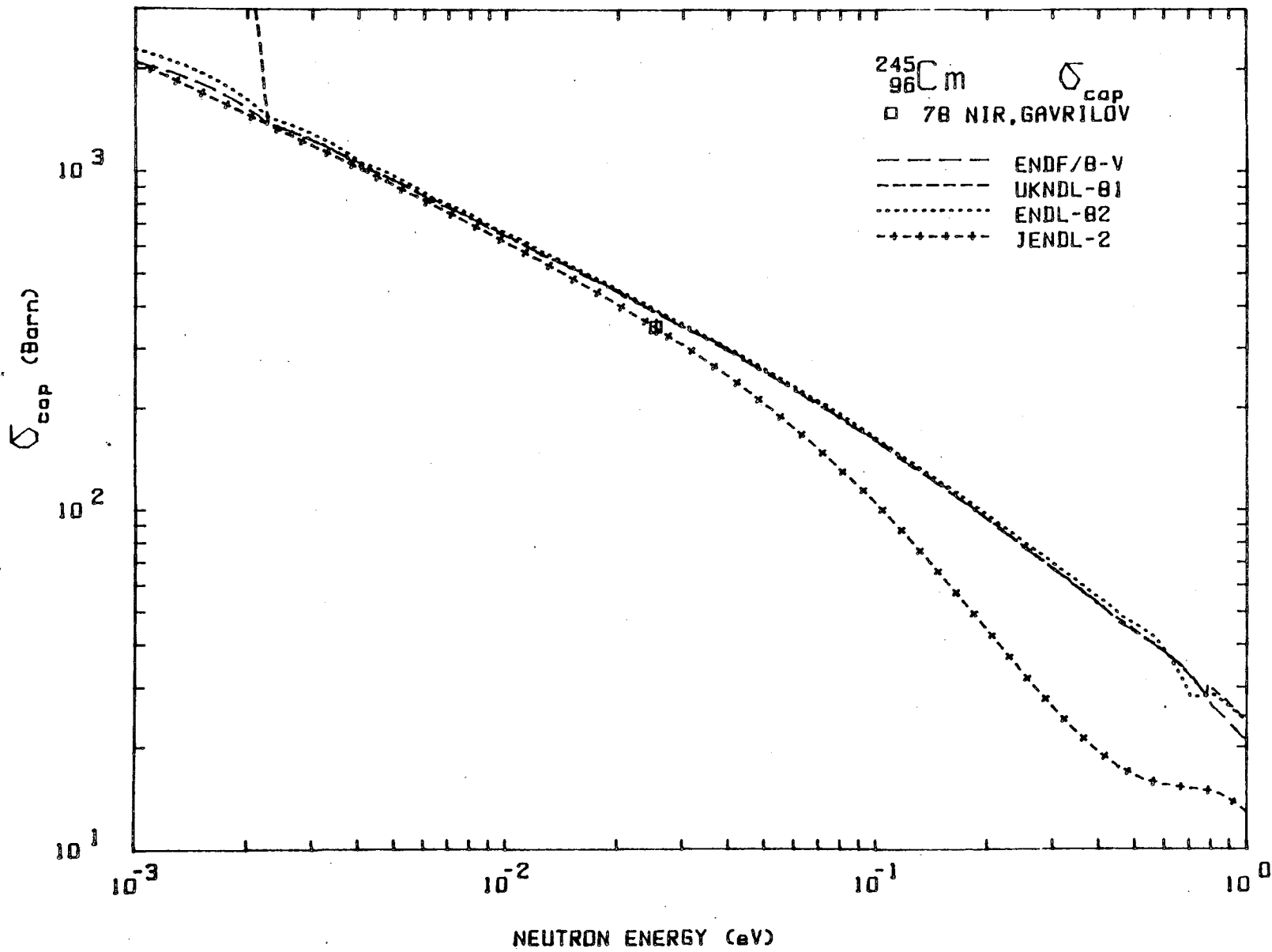
Reference	RI <sub>γ</sub>	RI <sub>f</sub>	(barns)
ENDF/B - V	108.6	837.0	
UKNDL -81	118.0	836.4	
ENDL -82	121.4	832.7	
JENDL-2	107.7	799.4	
72 SRL, BENJAMIN		772	
72 MTR, BERRETH	125		
BNL 325 (1984)	101	840	

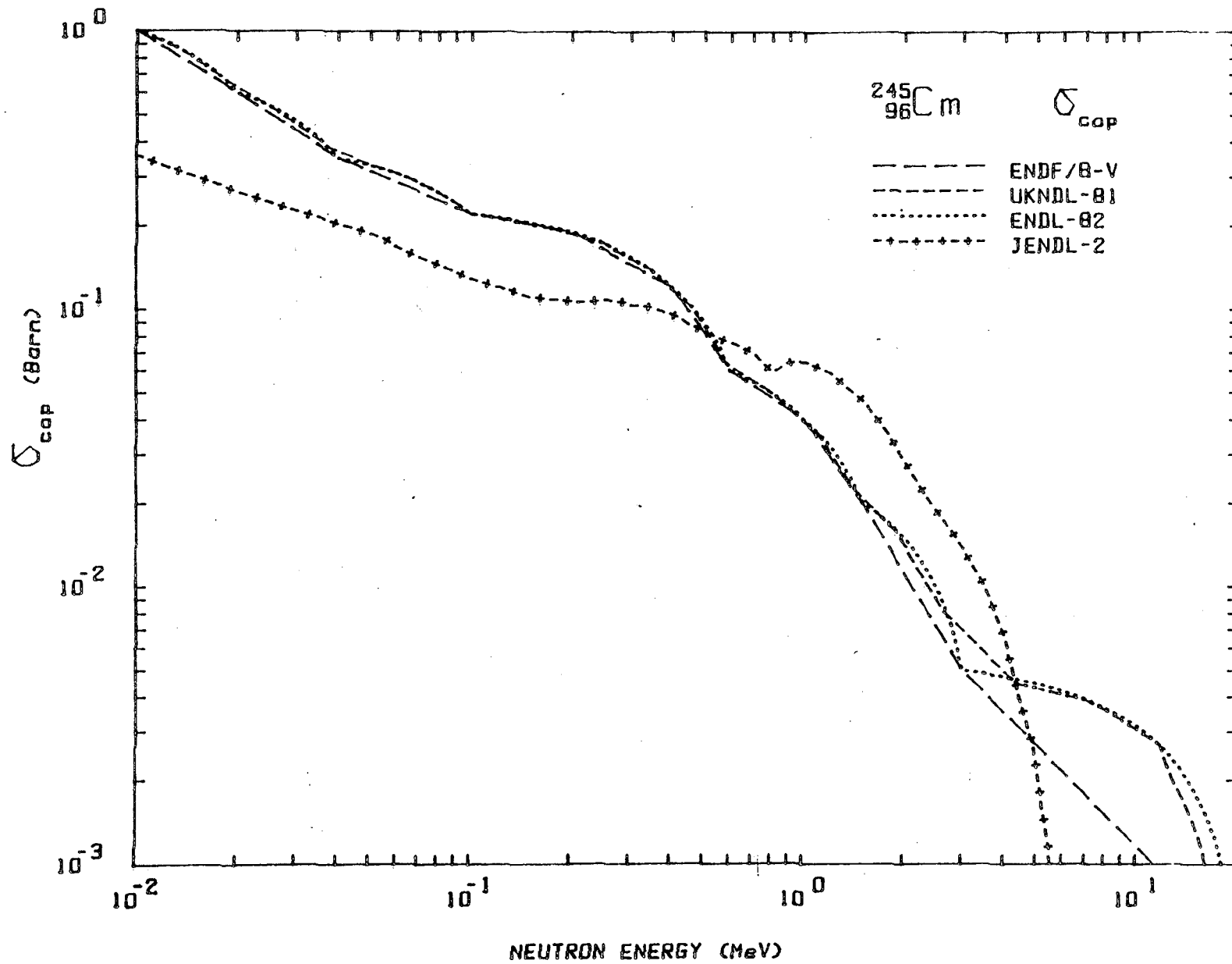




Experimental information  $^{245}\text{Cm}, \sigma_{\text{tot}}$ 

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
72 MTR, BERRETH	1	0.0253 eV	ABS.	16 %	

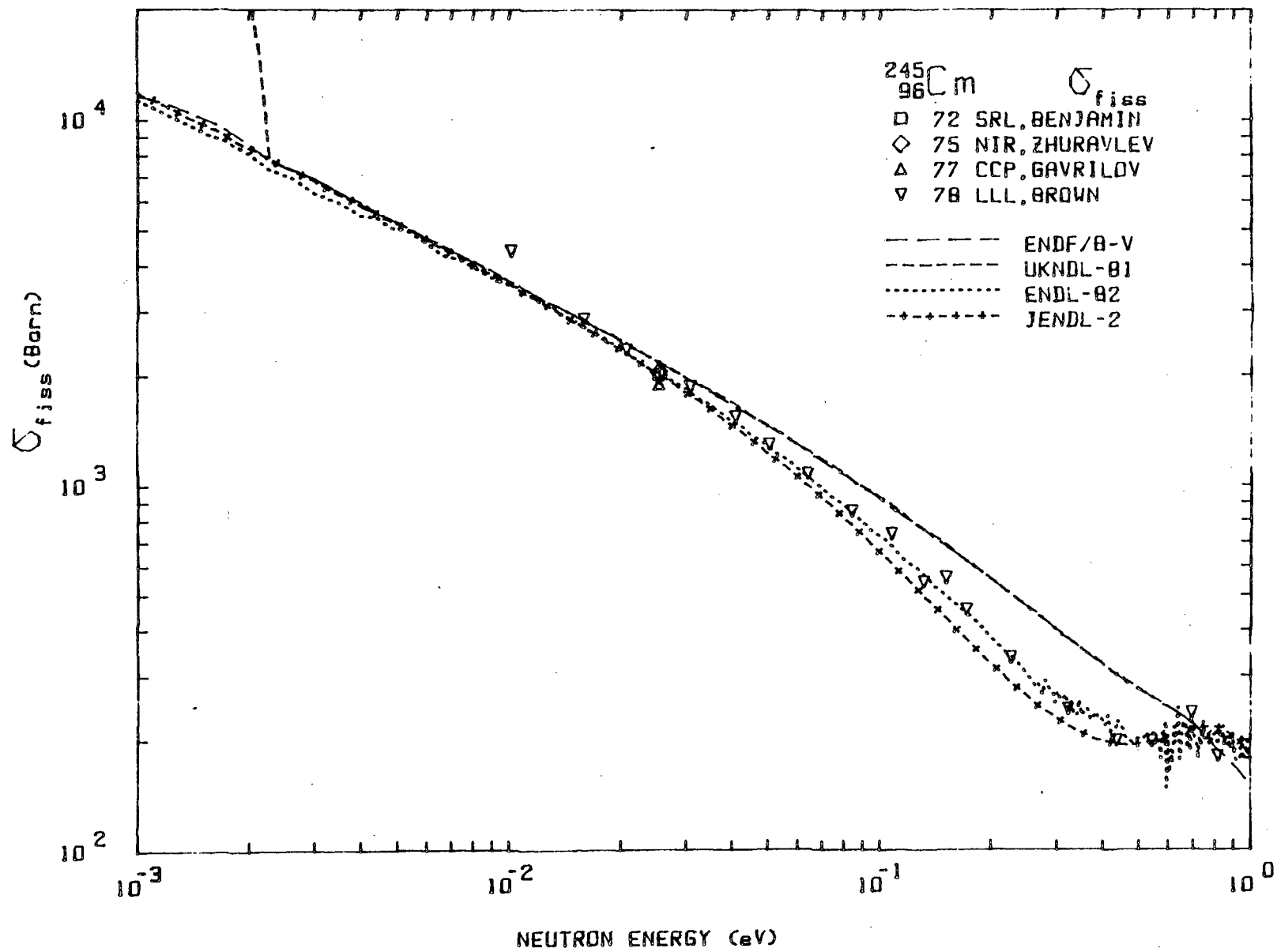


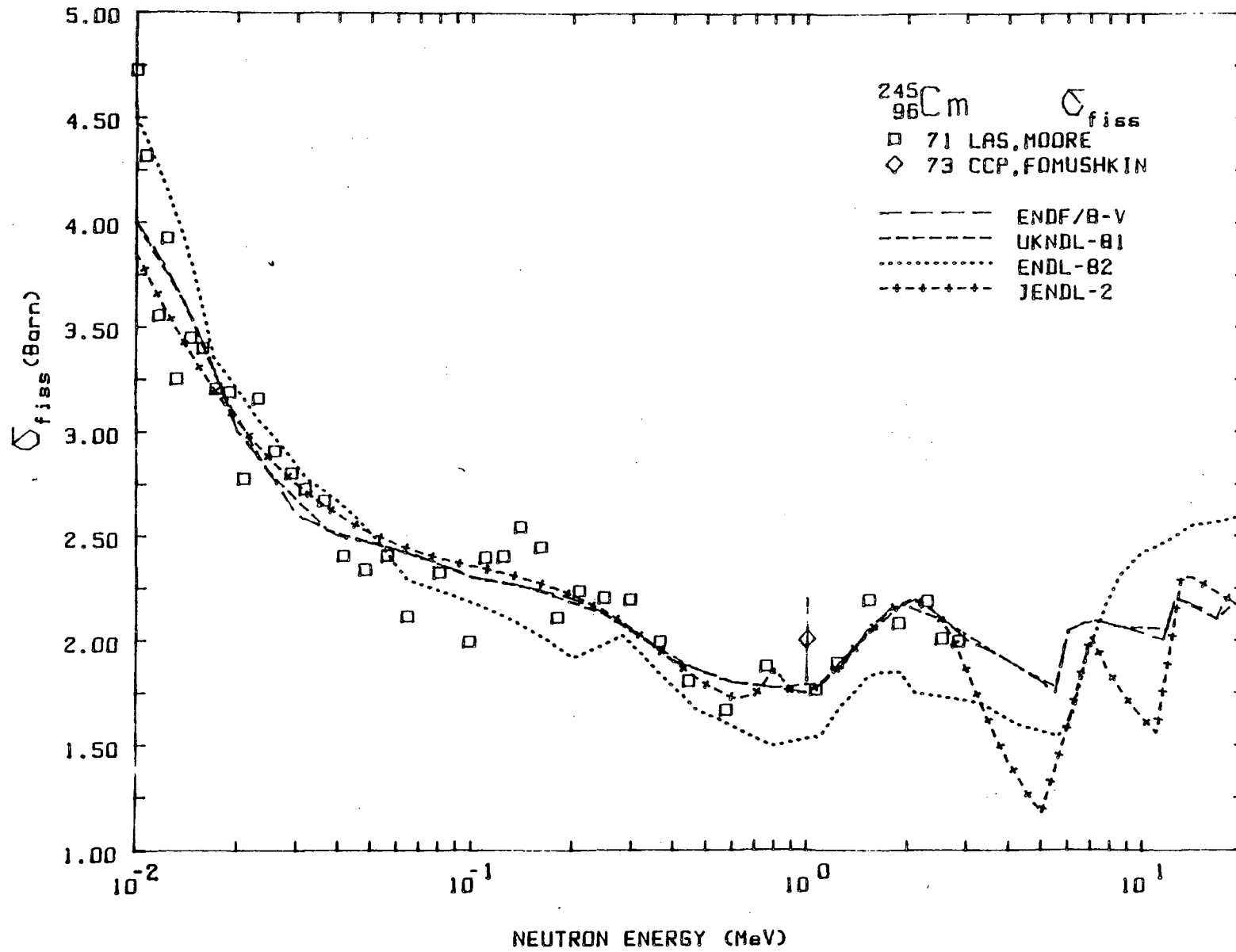


Experimental information  $^{245}\text{Cm}, \sigma_{\gamma}$

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
78 NIR, GAVRILOV	1	0.0253 eV	$^{245}\text{Cm}, \sigma_f$ $^{247}\text{Cm}, \sigma_f$	5 %	







Experimental information  $^{245}\text{Cm}, \sigma_f$

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
71 LAS, MOORE	174	20 eV-2.8 MeV	$^6\text{Li}, \sigma_{n,\alpha} < 100 \text{ keV}$ $^{235}\text{U}, \sigma_f$	10-35 %	Underground nuclear expl., Physics 8
72 SRL, BENJAMIN	1	0.0253 eV	$^{235}\text{U}, \sigma_f$	10 %	
73 CCP, FOMUSHKIN	1	1 MeV	$^{235}\text{U}, \sigma_f$	10 %	
75 NIR, ZHURAVLEV	1	0.0253 eV	$^{235}\text{U}, \sigma_f$	7.5 %	$\sigma_f = 577.1 \pm 0.9 \text{ b}$
77 CCP, GAVRILOV	1	0.0253 eV		5 %	
78 LLL, BROWN	271	0.01-35 eV	$^6\text{Li}, \sigma_{n,\alpha}$	2-7 %	

246  
Cm

## NUCLEAR PROPERTIES

Spin and parity of ground state:  $0^+$ 

Ground state decay:

Alpha to  $^{242}\text{Pu}$ : 99.97%,  $Q_\alpha = 5.476$  MeV

Spontaneous fission: 0.02614 %

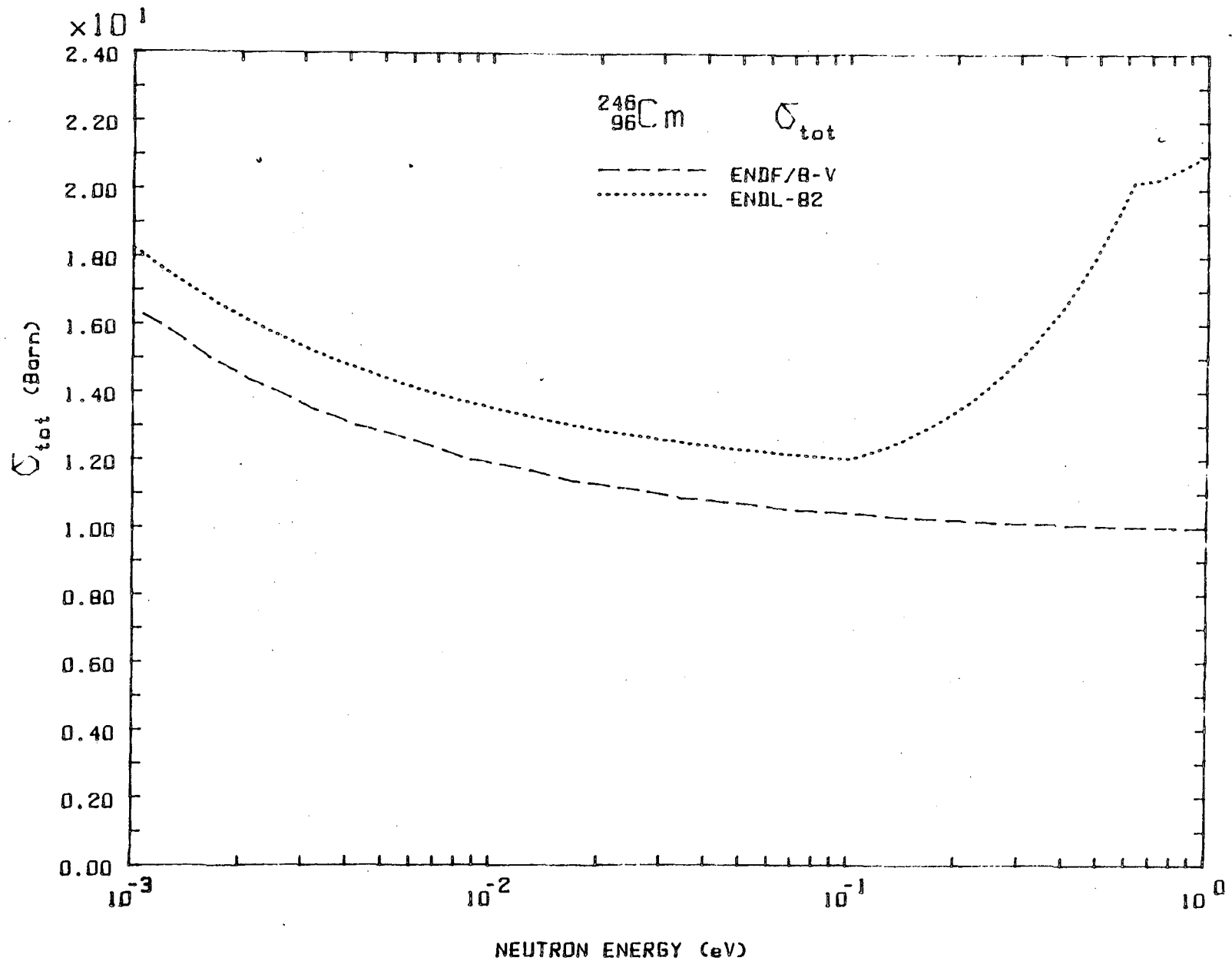
Half-life:  $4.730 \cdot 10^3$  yr  
 $1.8 \cdot 10^7$  yr - spontaneous fission

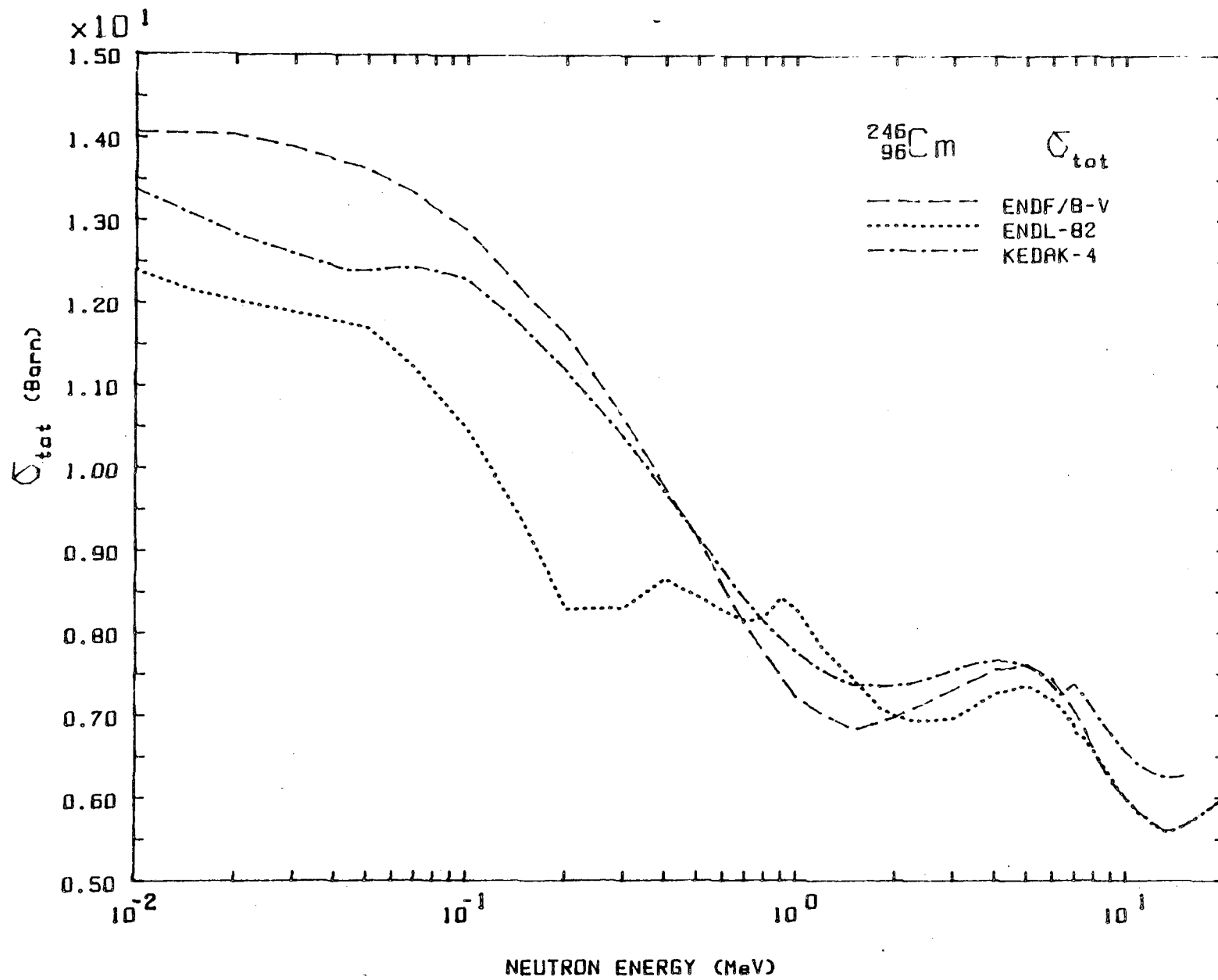
## THERMAL CROSS SECTIONS (2200 m/s)

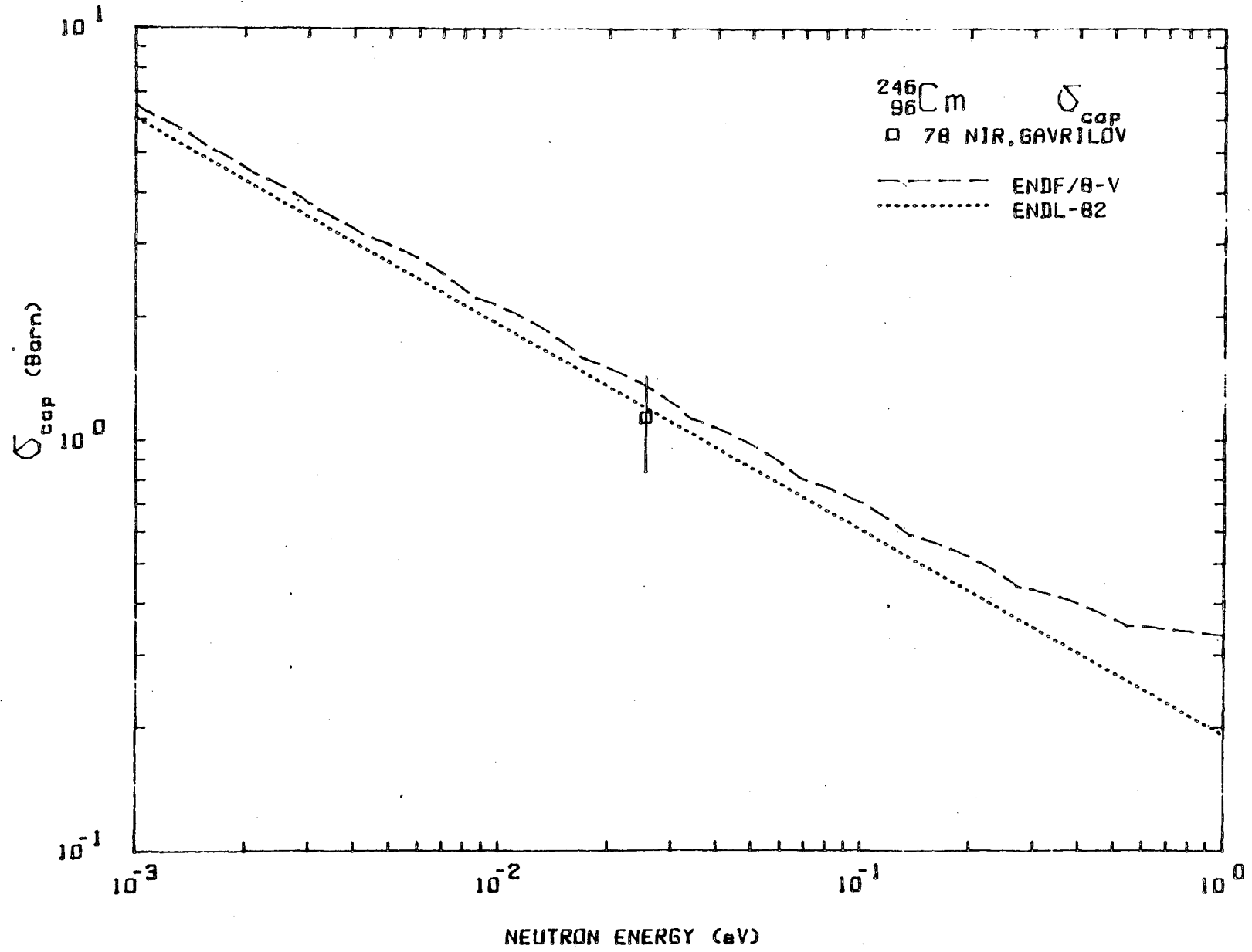
Reference	$\sigma_\gamma$	$\sigma_f$	$\sigma_t$	$\bar{\nu}_{sp}$	(barns)
ENDF/B - V	1.298	0.06322	11.05		
ENDL -82	1.201	0.1703	12.71		
BNL 325 (1984)	1.22	0.14		2.950	

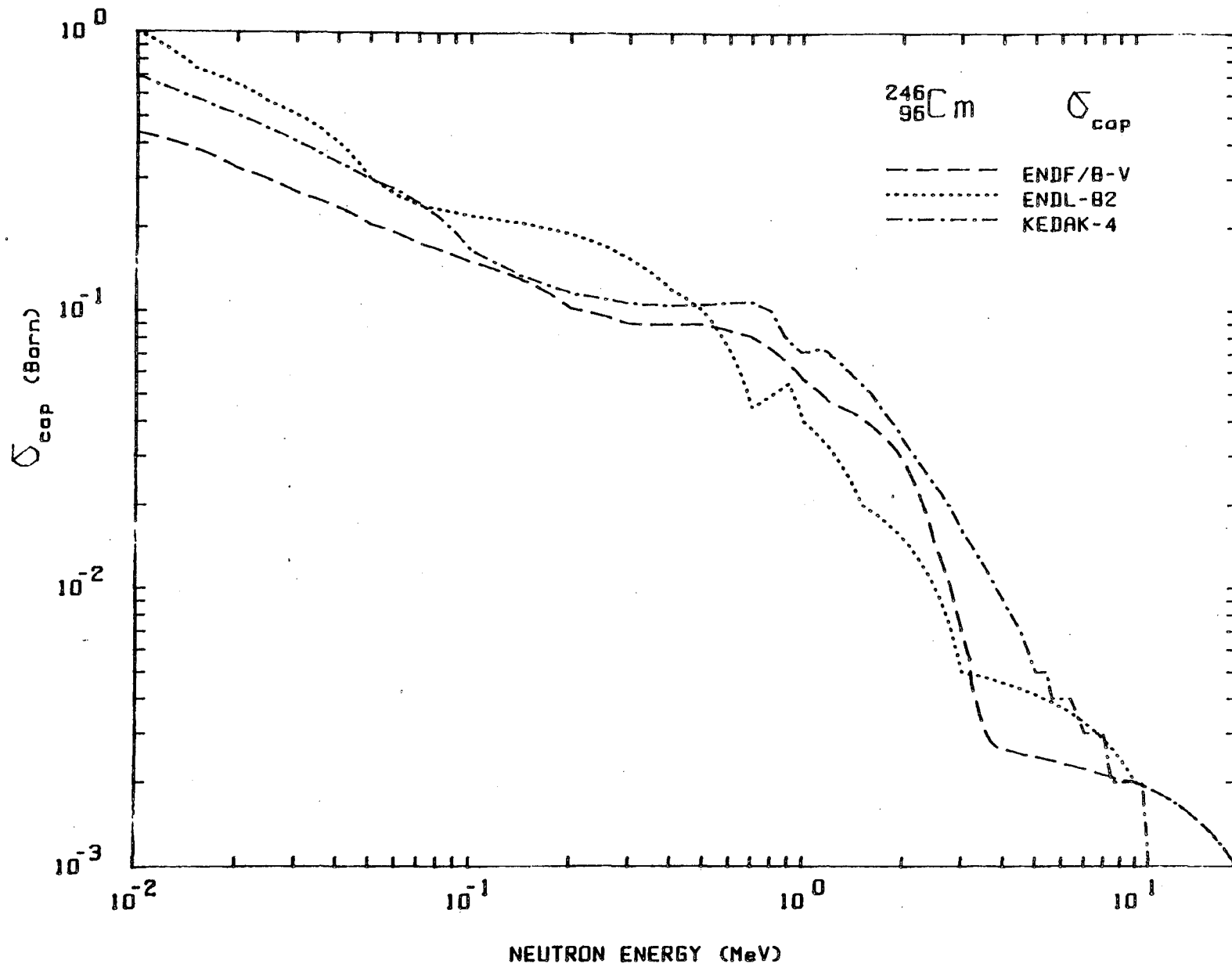
## RESONANCE INTEGRALS

Reference	$RI_\gamma$	$RI_f$	(barns)
ENDF/B - V	103.8	10.42	
ENDL -82	139.0	7.649	
KEDAK-4	10.23	5.992	
68 SRL, FOGLER	260		
BNL 325 (1984)	121	10.2	





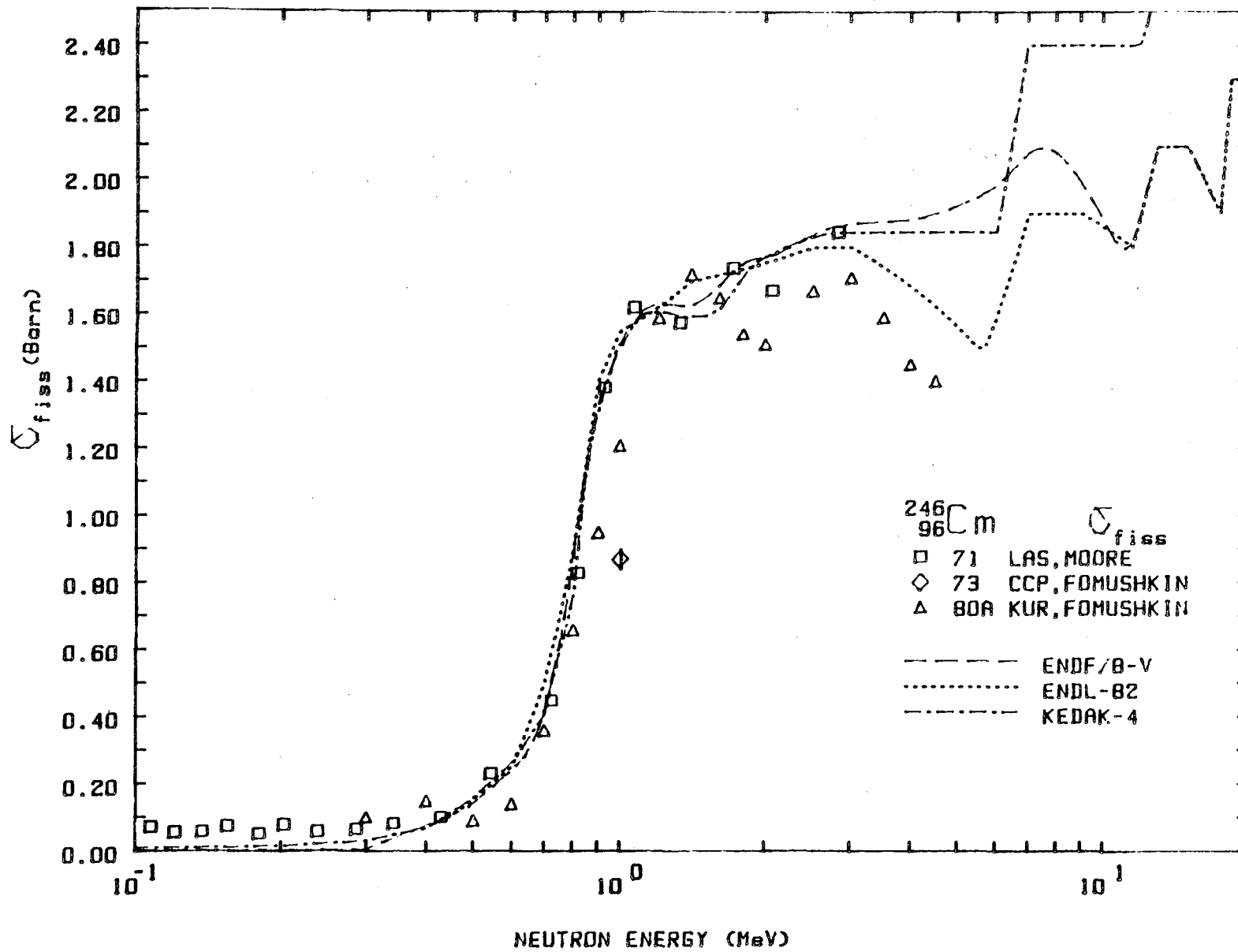






Experimental information  $^{246}\text{Cm}, \sigma_{\gamma}$

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
78 NIR, GAVRILOV	1	0.0253 eV	$^{245}\text{Cm}, \sigma_f$ $^{247}\text{Cm}, \sigma_f$	25 %	



Experimental information  $^{246}\text{Cm}, \sigma_f$ 

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
71 LAS, MOORE	174	20 eV-2.8 MeV	$^6\text{Li}, \sigma_{n,\alpha} < 100 \text{ keV}$ $^{235}\text{U}, \sigma_f$	3-10 %	Underground nucl. expl., Physics 8
73 CCP, FOMUSHKIN	1	1 MeV	$^{235}\text{U}, \sigma_f$	3.5 %	
80A KUR, FOMUSHKIN	18	0.3-45 MeV	$^{235}\text{U}, \sigma_f$	5-50 %	Underground nucl. expl.
82 RPI, STOPA	176	0.14 eV-80 keV	$^{235}\text{U}, \sigma_f$	5-50 %	Lead slowing down spectro- meter

<sup>247</sup>Cm

## NUCLEAR PROPERTIES

Spin and parity of ground state:  $9/2^-$ 

Ground state decay:

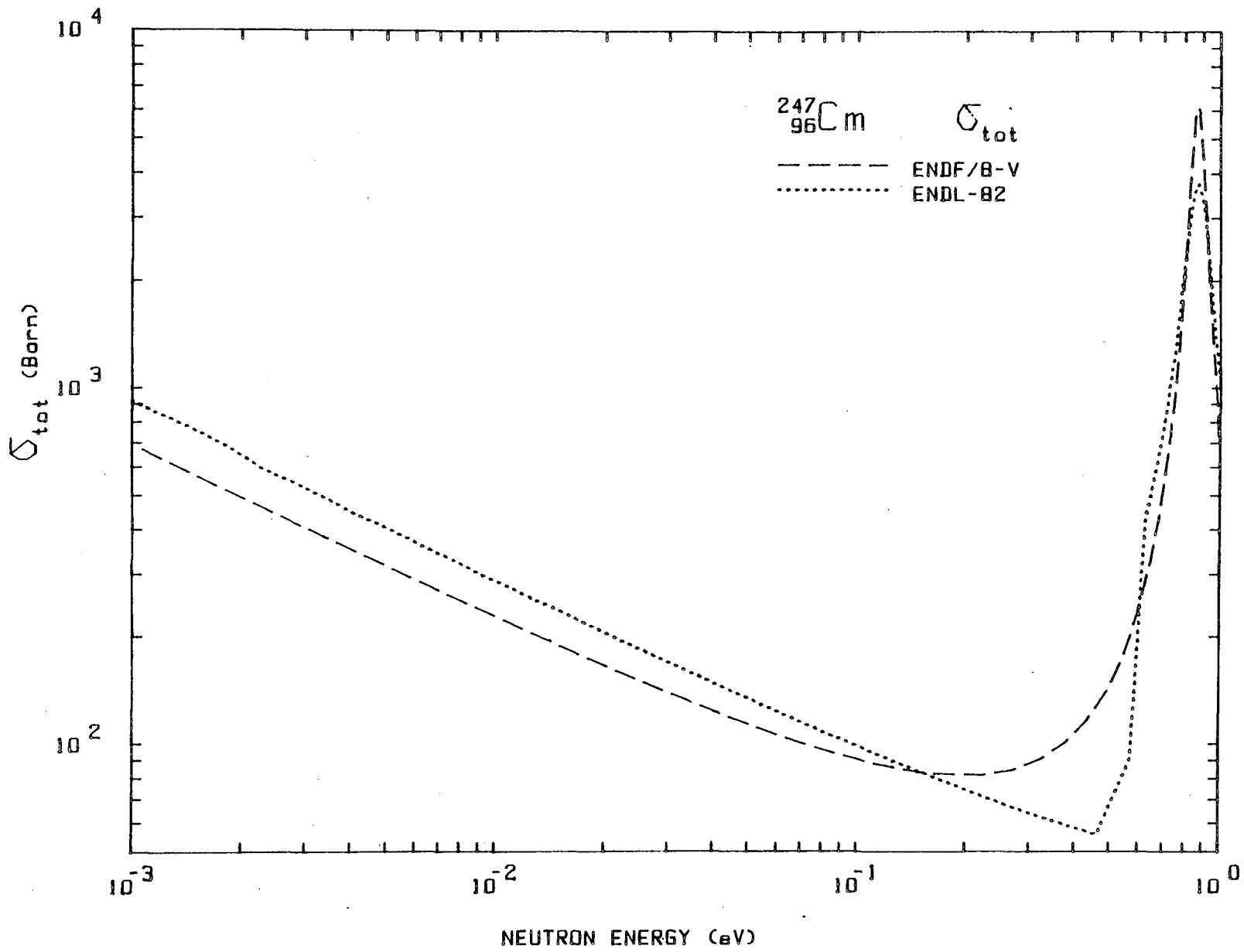
Alpha to <sup>243</sup>Pu: 100%,  $Q_\alpha = 5.353$ Half-life:  $1.56 \cdot 10^7$  yr

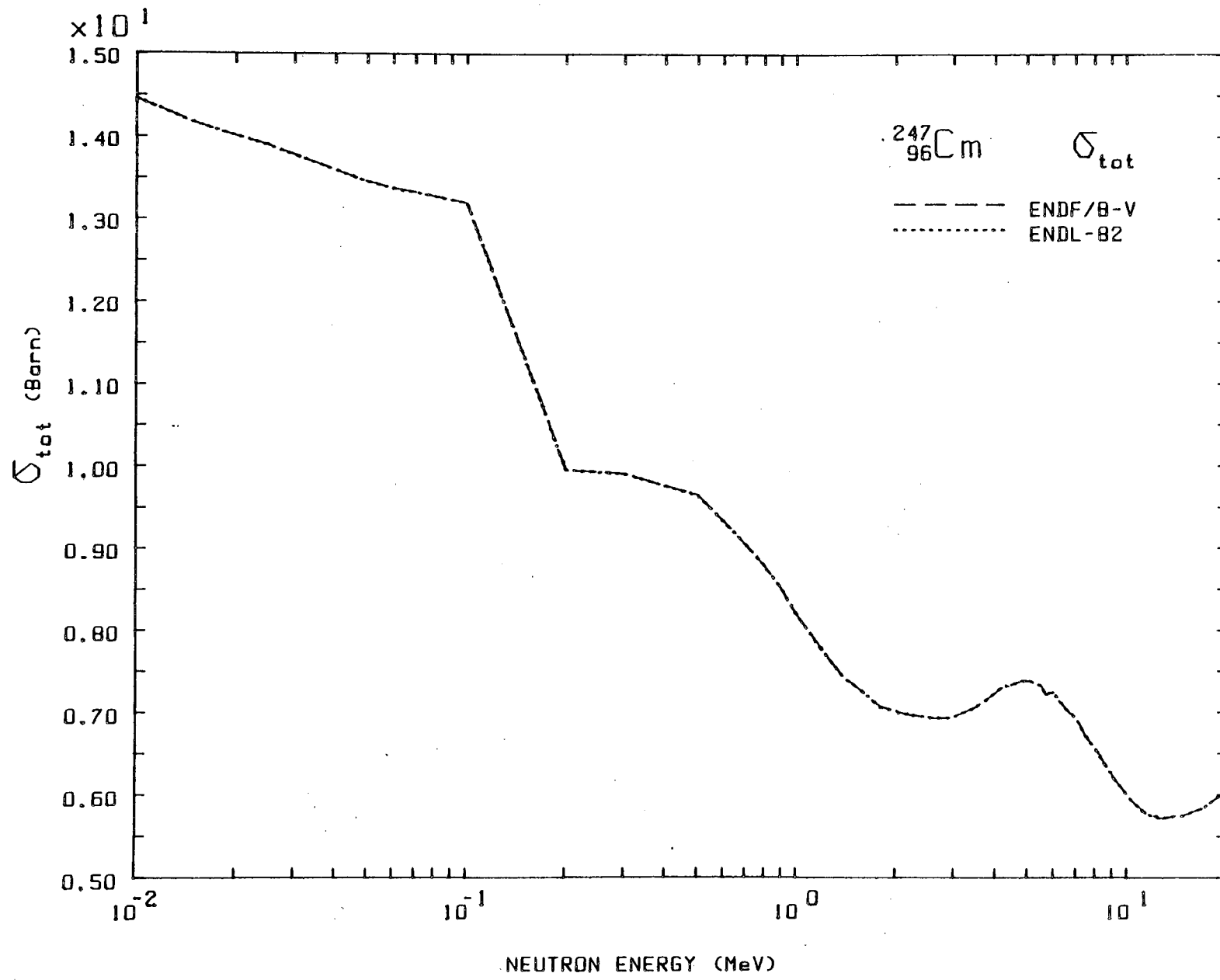
## THERMAL CROSS SECTIONS (2200 m/s)

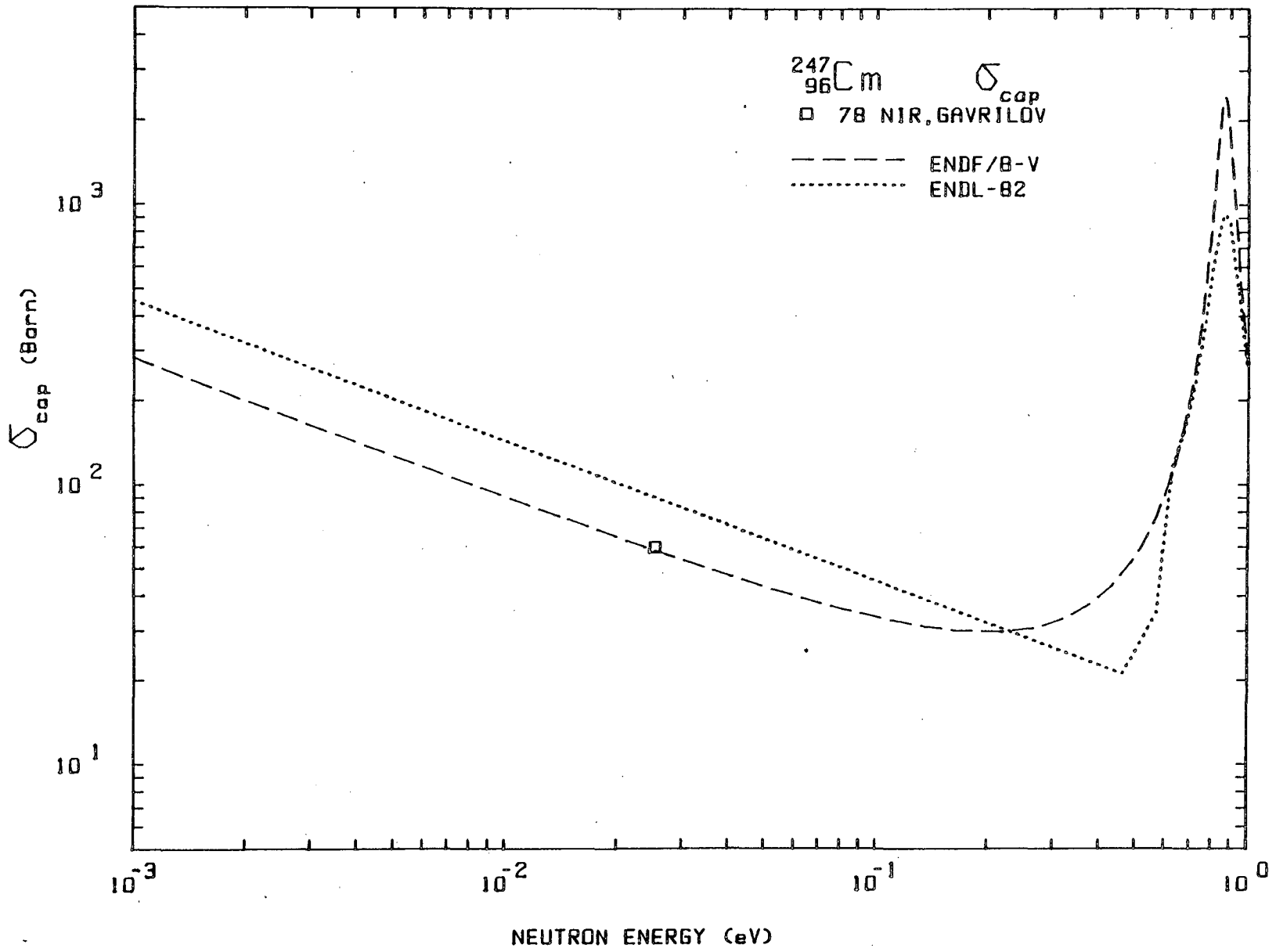
Reference	$\sigma_\gamma$	$\sigma_f$	$\sigma_t$	$\bar{\nu}_p$	(barns)
ENDL -82	90.09	82.53	184.0		
68 SRL, SMITH	48	409			
BNL 325 (1984)	57	81.8(Maxw)		3.79	

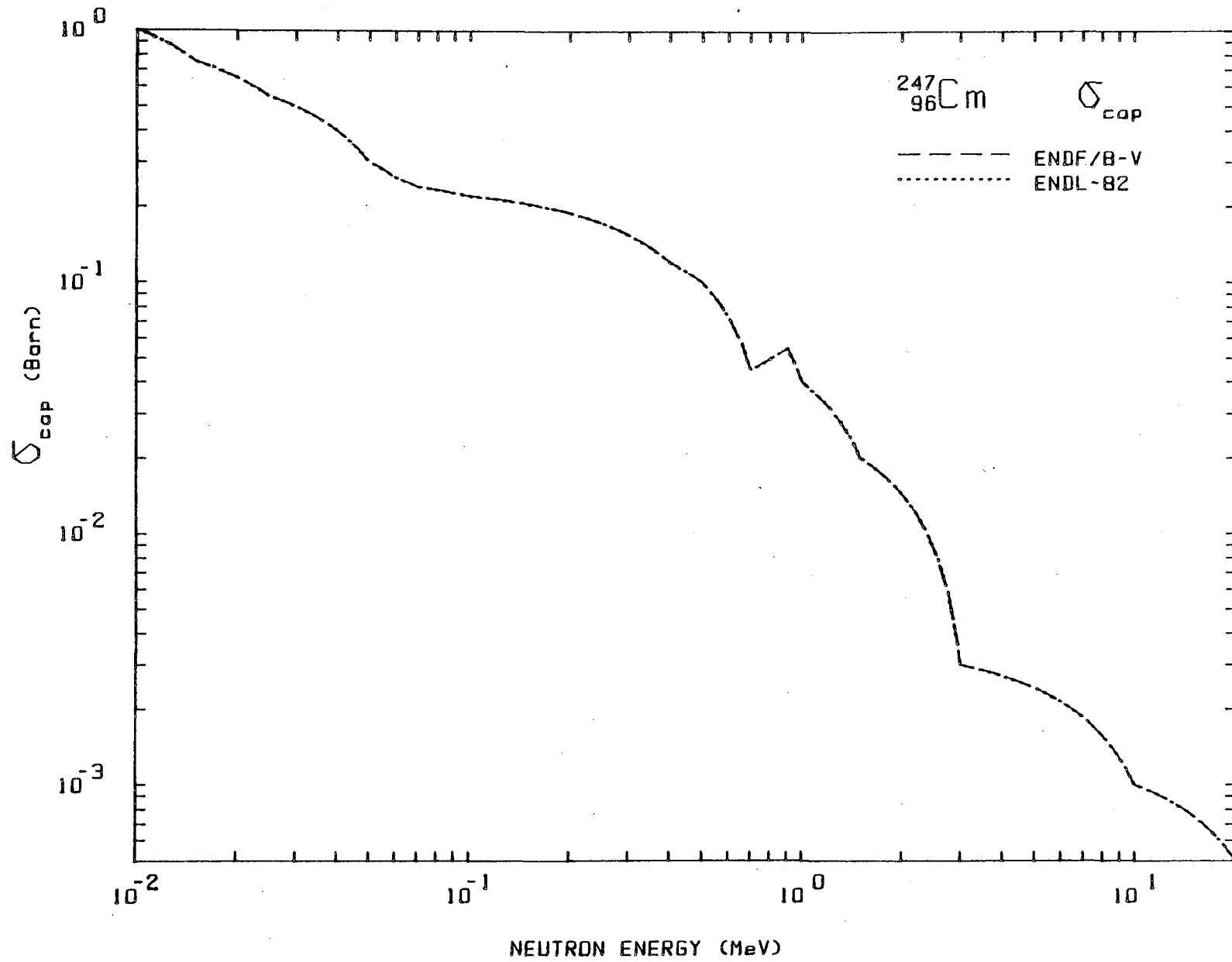
## RESONANCE INTEGRALS

Reference	$RI_\gamma$	$RI_f$	(barns)
ENDL -82	364.0	918.8	
72 SRL, BENJAMIN		778	
BNL 325 (1984)	530	760	





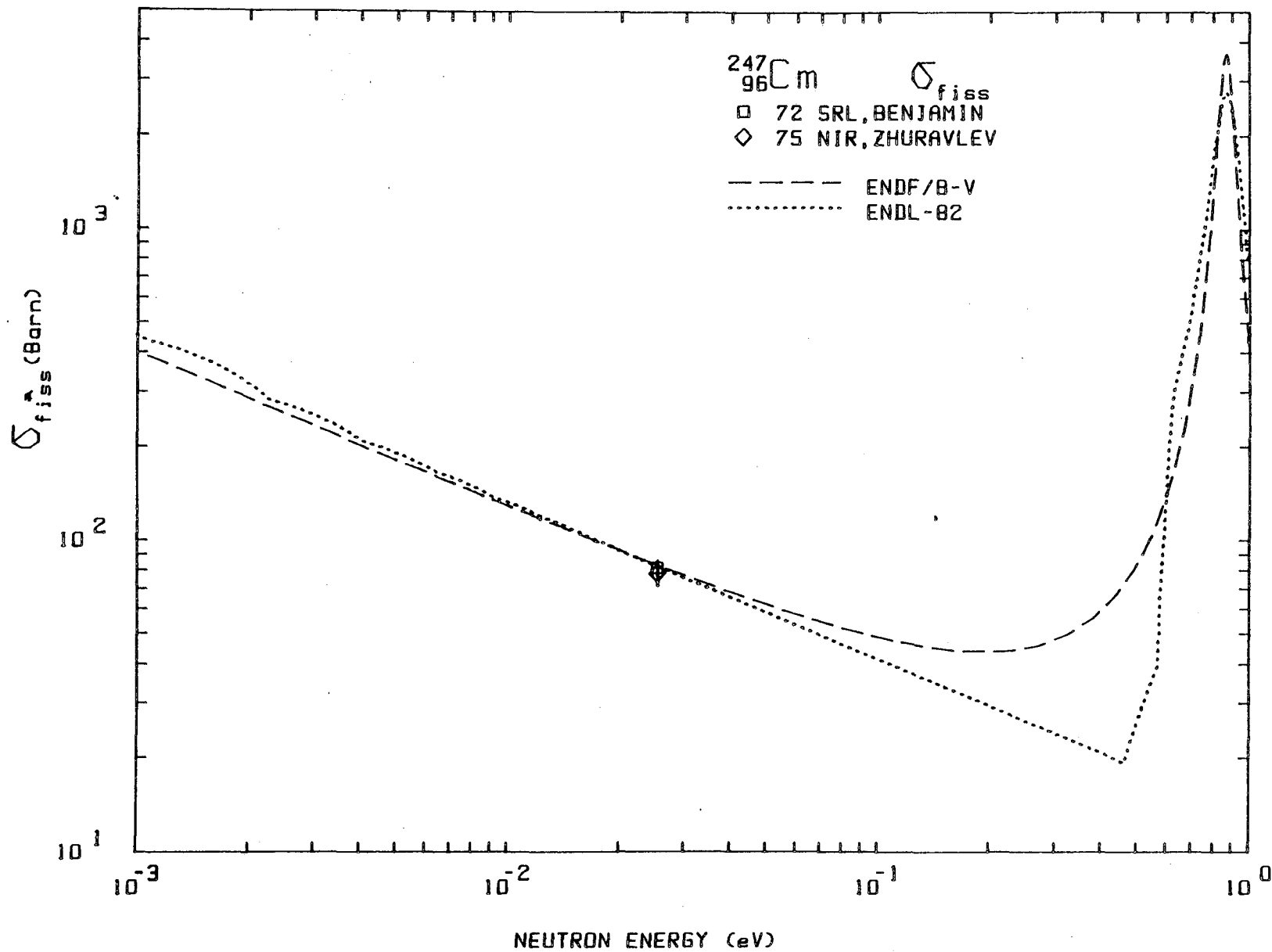


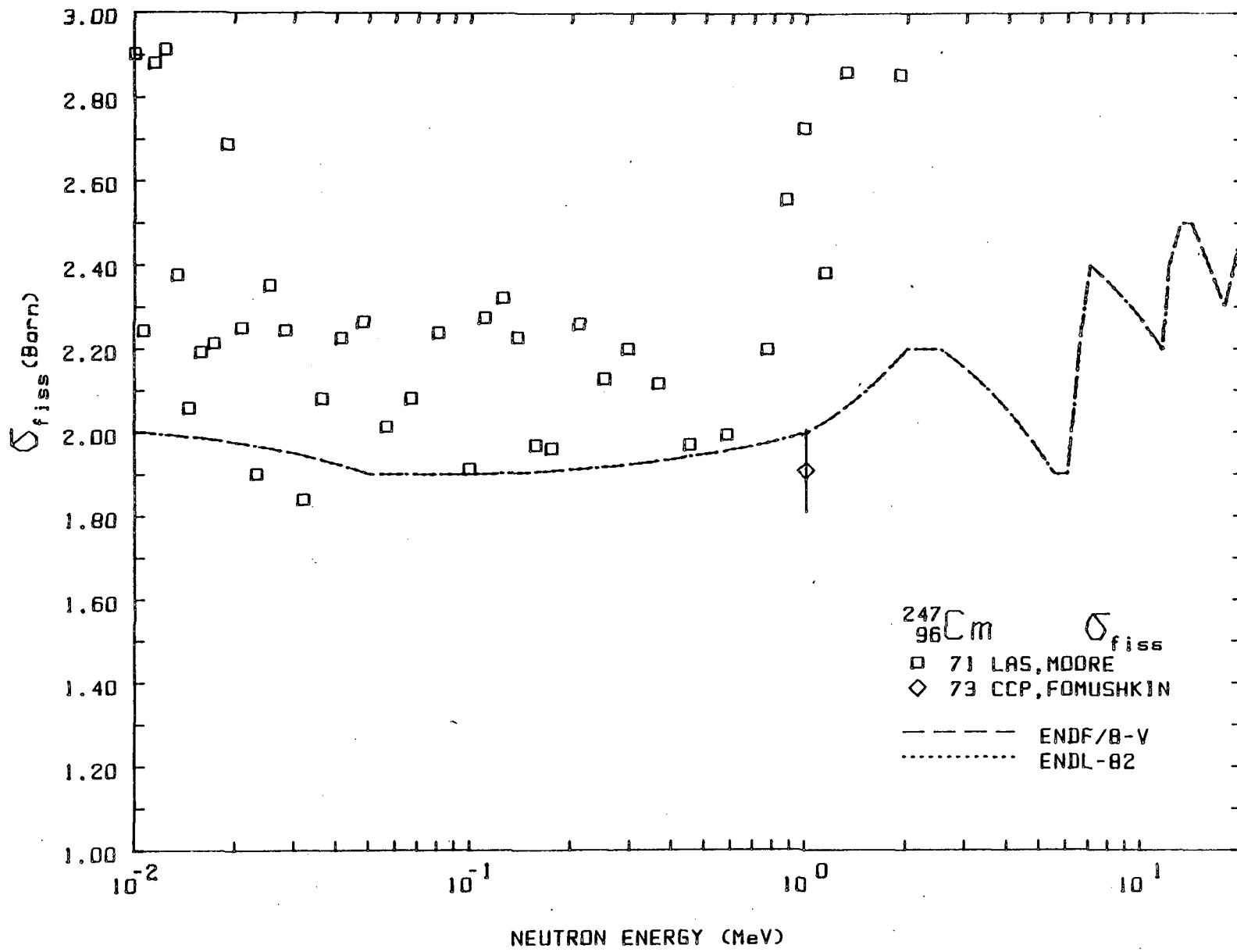




Experimental information  $^{247}\text{Cm}, \sigma_{\gamma}$ 

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
78 NIR, GAVRILOV	1	0.0253 eV	$^{245}\text{Cm}, \sigma_{\text{f}}$ $^{247}\text{Cm}, \sigma_{\text{f}}$	--	





Experimental information  $^{247}\text{Cm}, \sigma_f$

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
71 LAS, MOORE	170	20 eV-1.9 MeV	$^6\text{Li}, \sigma_{n,\alpha} < 100 \text{ keV}$ $^{235}\text{U}, \sigma_f$	3-10 %	Underground nucl. expl., Physics 8
72 SRL, BENJAMIN	1	0.0253 eV	$^{235}\text{U}, \sigma_f$	6 %	
73 CCP, FOMUSHKIN	1	1 MeV	$^{235}\text{U}, \sigma_f$	5 %	
75 NIR, ZAURAVLEV	1	0.0253 eV	$^{235}\text{U}, \sigma_f$	10 %	$\sigma_f = 577.1 \pm 0.9 \text{ b}$

General comments: ENDF/B-V fission cross section evaluation in the thermal energy range has been calculated from resonance parameters using the computer code RESEND (NEA Nuclear Data Bank)



248<sub>Cm</sub>

## NUCLEAR PROPERTIES

Spin and parity of ground state:  $0^+$ 

Ground state decay:

Alpha to  $^{244}\text{Pu}$ : 91.74%,  $Q_\alpha = 5.161$  MeV

Spontaneous fission: 8.26%

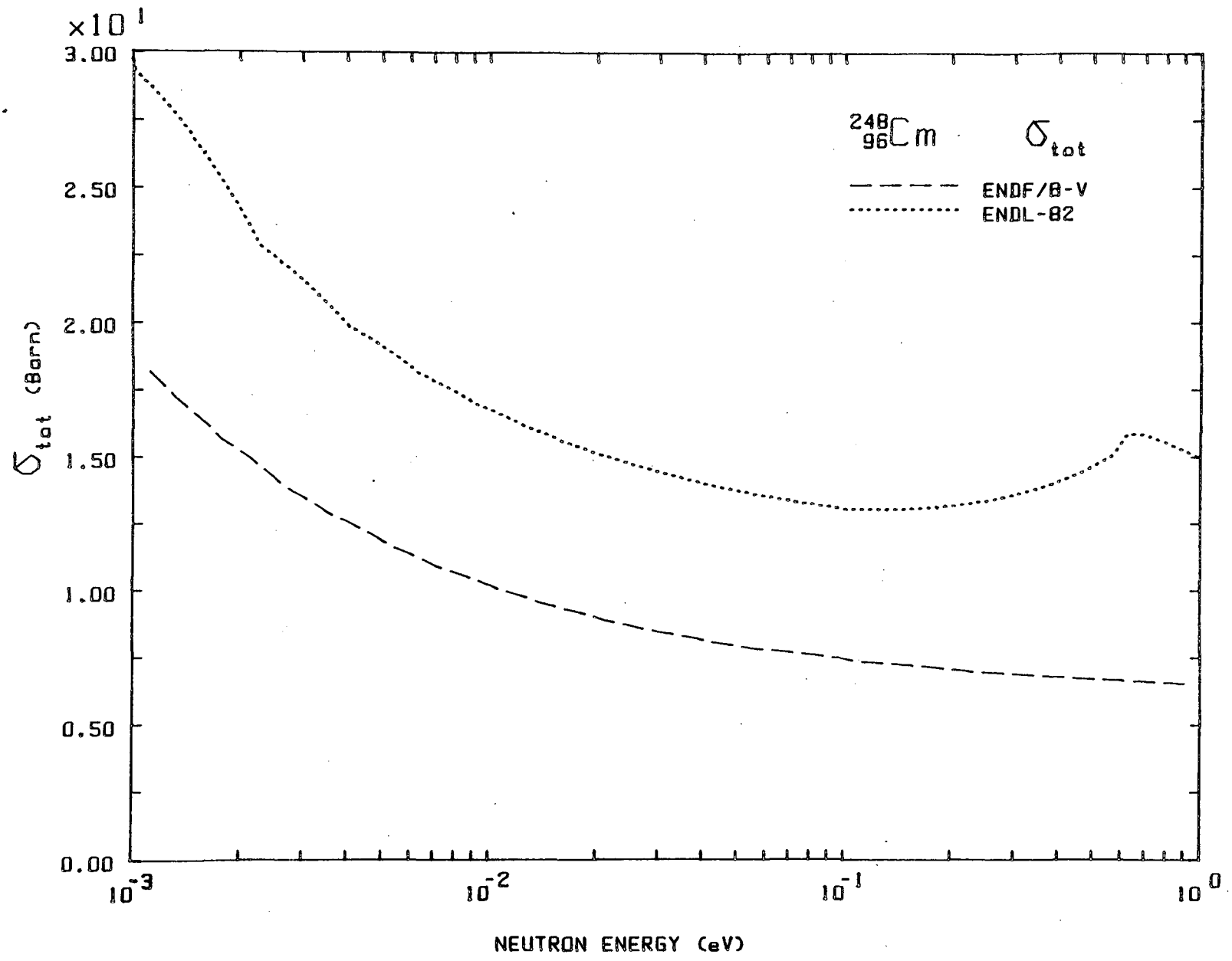
Half-life:  $3.40 \cdot 10^5$  yr $4.1 \cdot 10^6$  yr - spontaneous fission

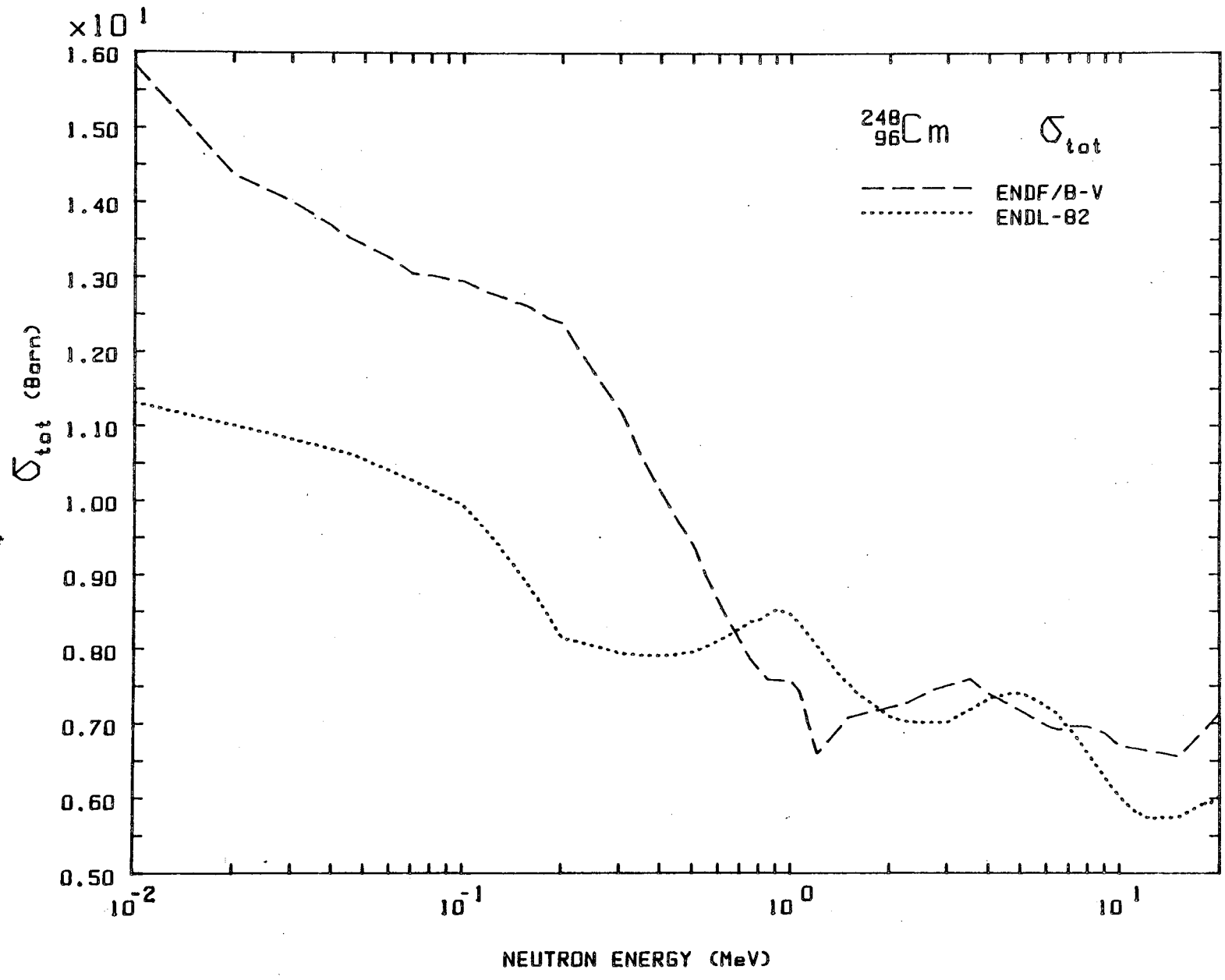
## THERMAL CROSS SECTIONS (2200 m/s)

Reference	$\sigma_\gamma$	$\sigma_f$	$\sigma_t$	$\bar{\nu}_{sp}$	(barns)
ENDL -82	3.034	0.3407	14.71		
68 SRL, SMITH	5.1				
72 SRL, BENJAMIN		0.34			
BNL 325 (1984)	2.63	0.37(Maxw)		3.157	

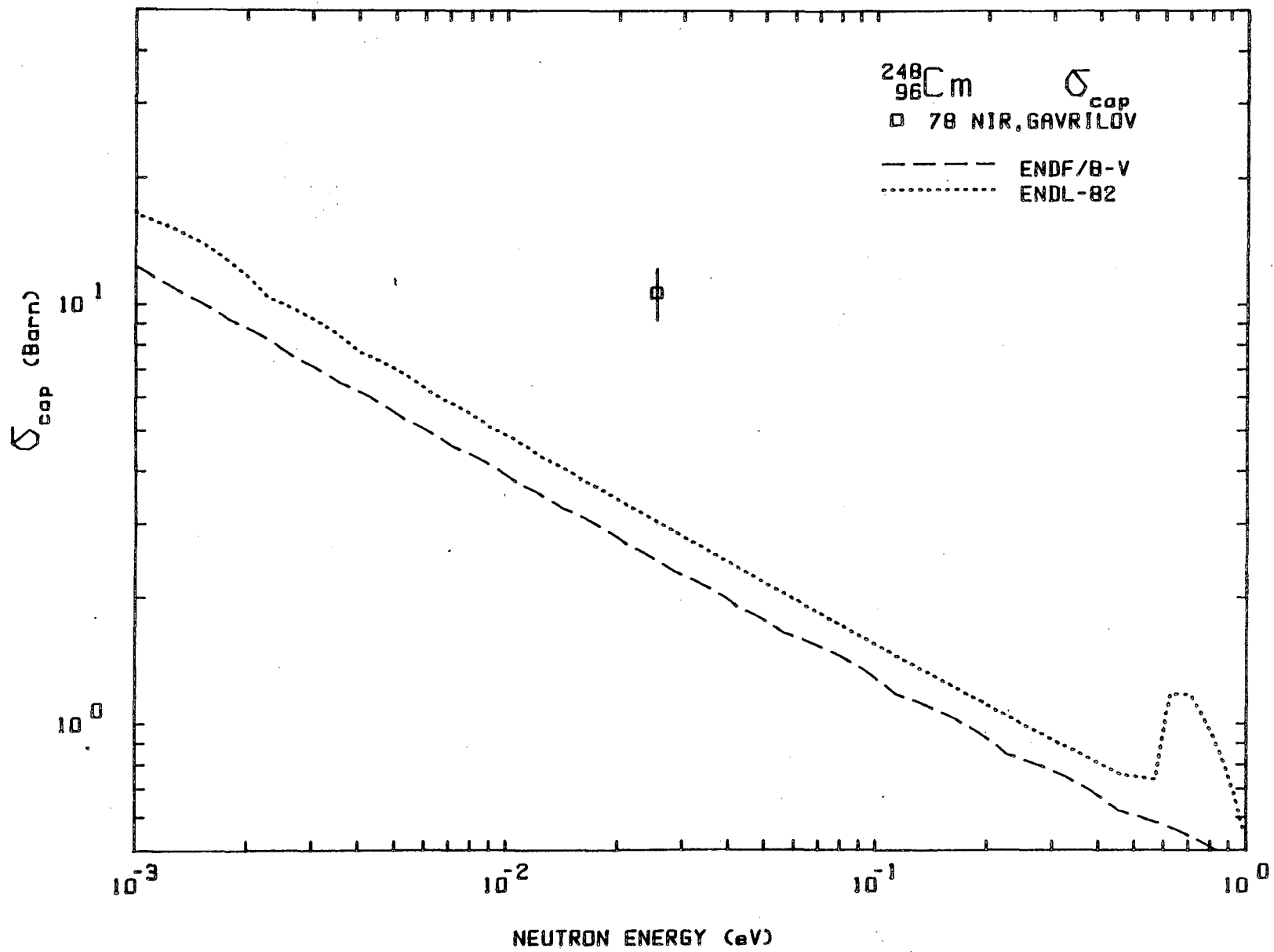
## RESONANCE INTEGRALS

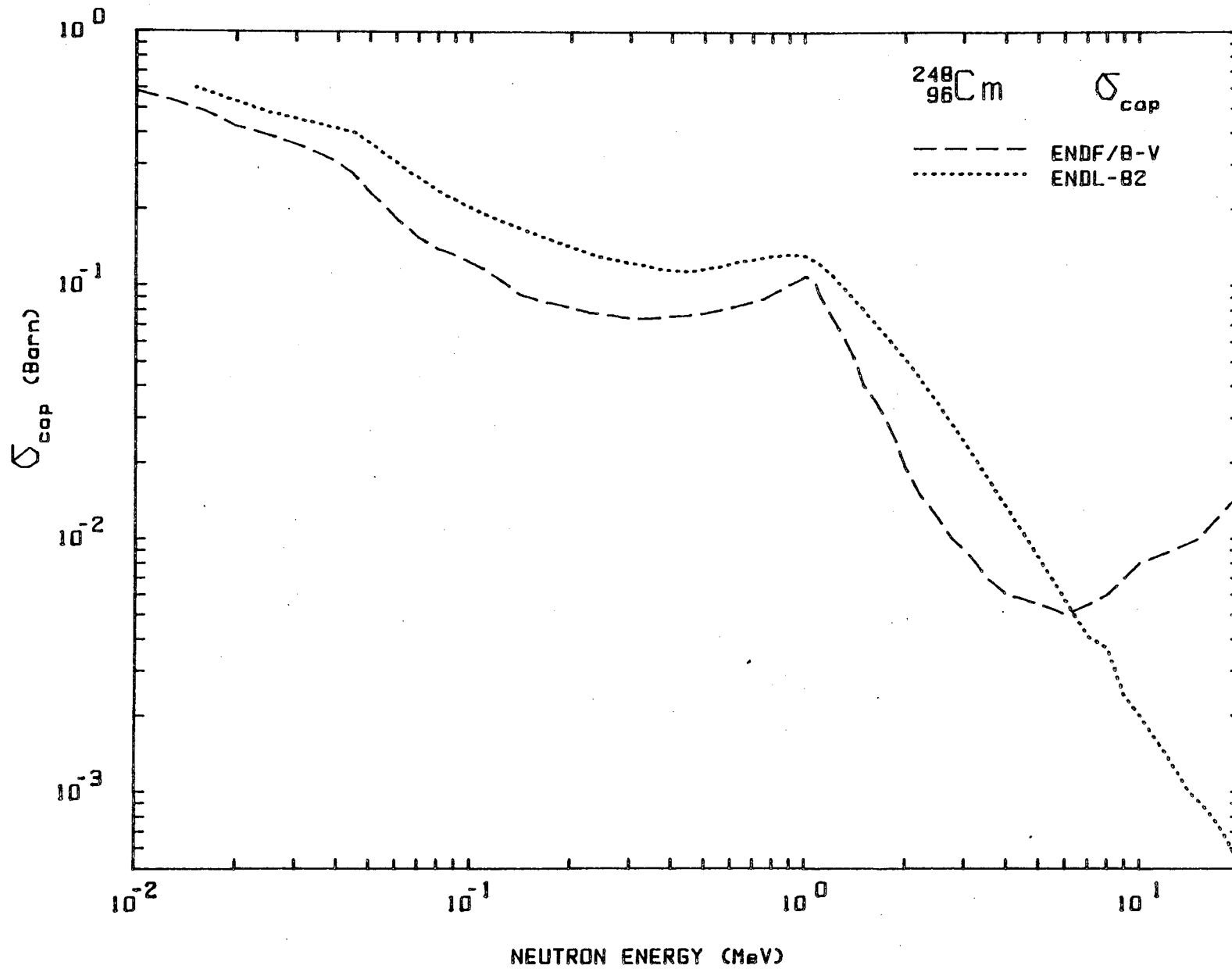
Reference	$RI_\gamma$	$RI_f$	(barns)
ENDL -82	282.8	15.56	
72 SRL, BENJAMIN		13.2	
BNL 325 (1984)	270	15	





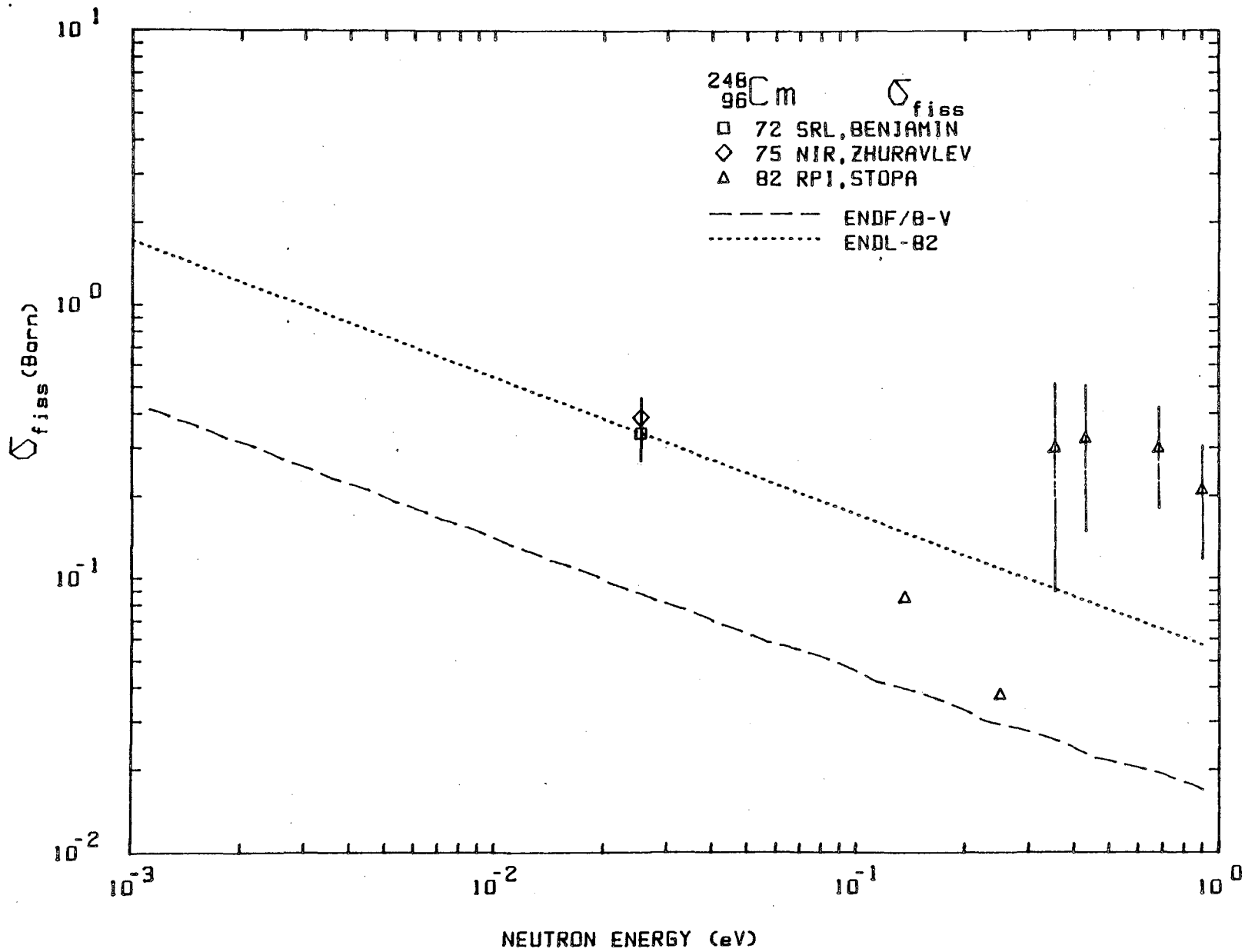


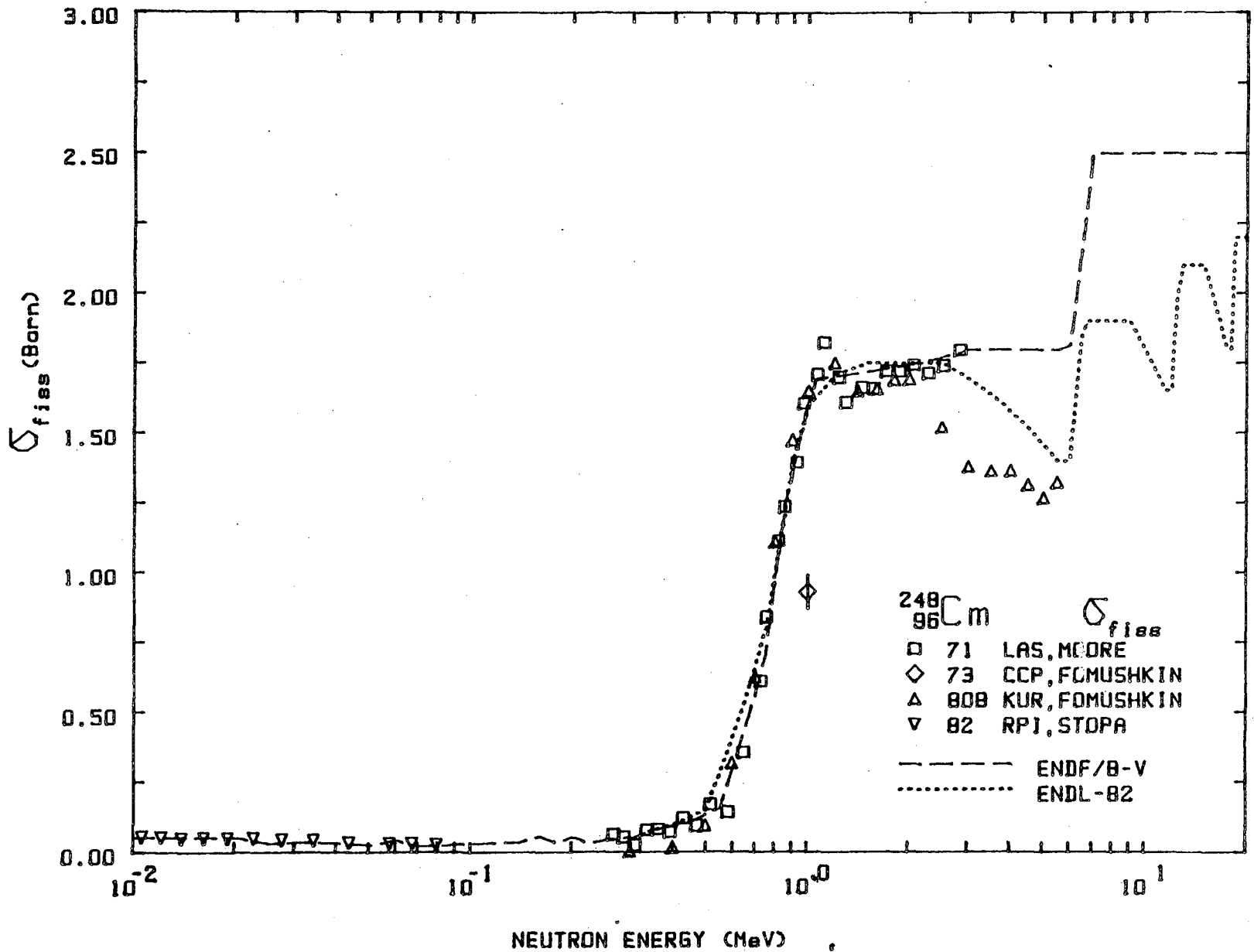




Experimental information  $^{248}\text{Cm}, \sigma_{\gamma}$ 

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
78 NIR, GAVRILOV	1	0.0253 eV	$^{245}\text{Cm}, \sigma_{\text{f}}$ $^{247}\text{Cm}, \sigma_{\text{f}}$	15 %	





Experimental information  $^{248}\text{Cm}, \sigma_f$

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
71 LAS, MOORE	174	20 eV-2.8 MeV	$^6\text{Li}, \sigma_{n,\alpha} < 100 \text{ keV}$ $^{235}\text{U}, \sigma_f$		Underground nucl. expl. (Physics 8)
72 SRL, BENJAMIN	1	0.0253 eV	$^{235}\text{U}, \sigma_f$	21 %	
73 CCP, FOMUSHKIN	1	1 MeV	$^{235}\text{U}, \sigma_f$	6.5 %	
75 NIR, ZHURAVLEV	1	0.0253 eV	$^{235}\text{U}, \sigma_f$		$\sigma_f = 577.1 \pm 0.9 \text{ b}$
80B KUR, FOMUSHKIN	20	0.3-5.5 MeV	$^{235}\text{U}, \sigma_f$		
82 RPI, STOPA	155	0.14 eV-80 keV	$^{235}\text{U}, \sigma_f$		Lead slowing down spectrometer

General comments: ENDF/B-V fission cross section evaluation in the thermal energy range has been calculated from resonance parameters using the computer code RESEND (NEA Nuclear Data Bank)



249  
Bk

## NUCLEAR PROPERTIES

Spin and parity of ground state:  $7/2^+$ 

Ground state decay:

Beta ( $\beta^-$ ) to  $^{249}\text{Cf}$ : 99%Alpha to  $^{245}\text{Am}$ :  $1.5 \cdot 10^{-3}\%$ 

Half-life: 320 d

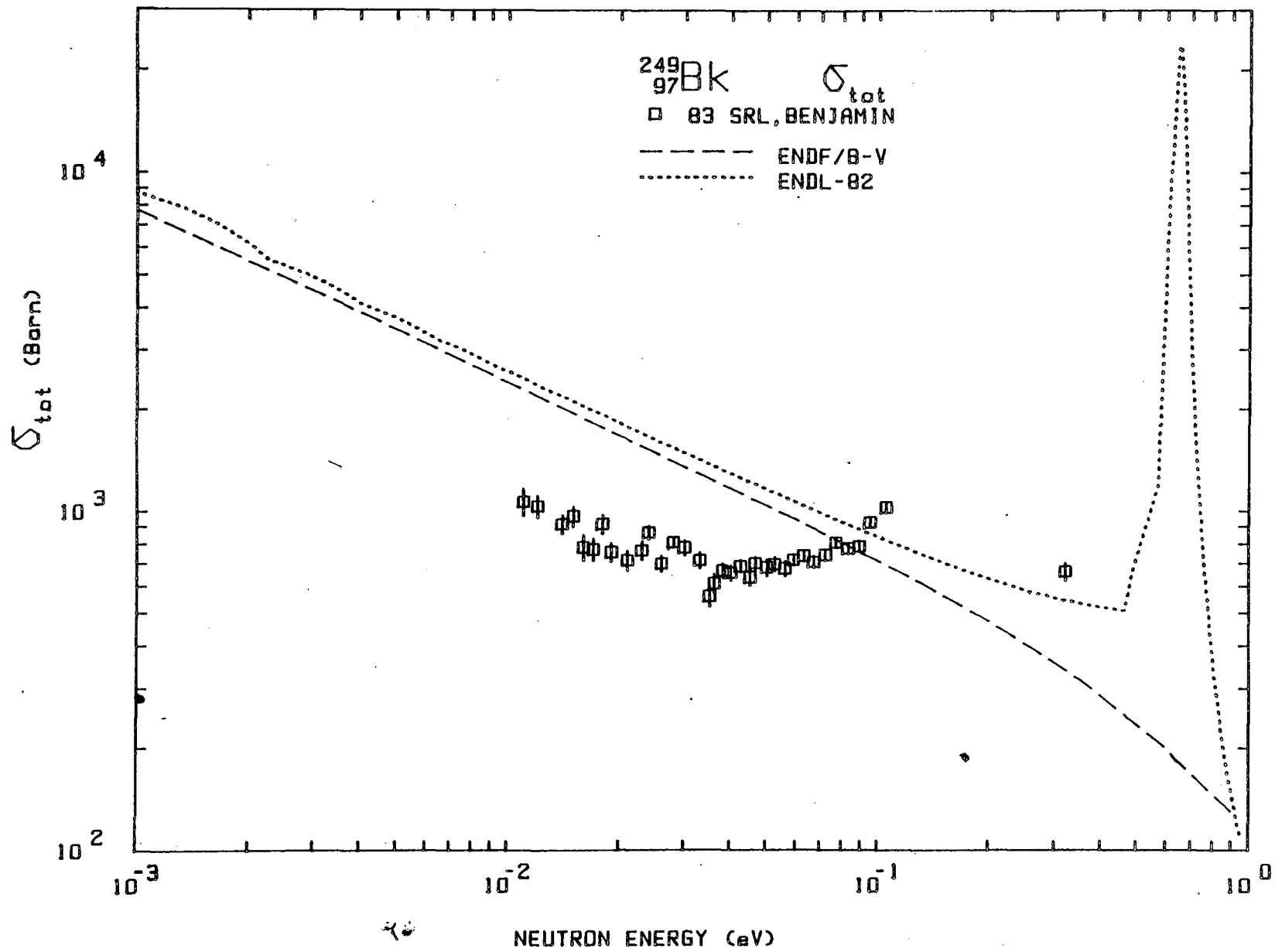
## THERMAL CROSS SECTIONS (2200 m/s)

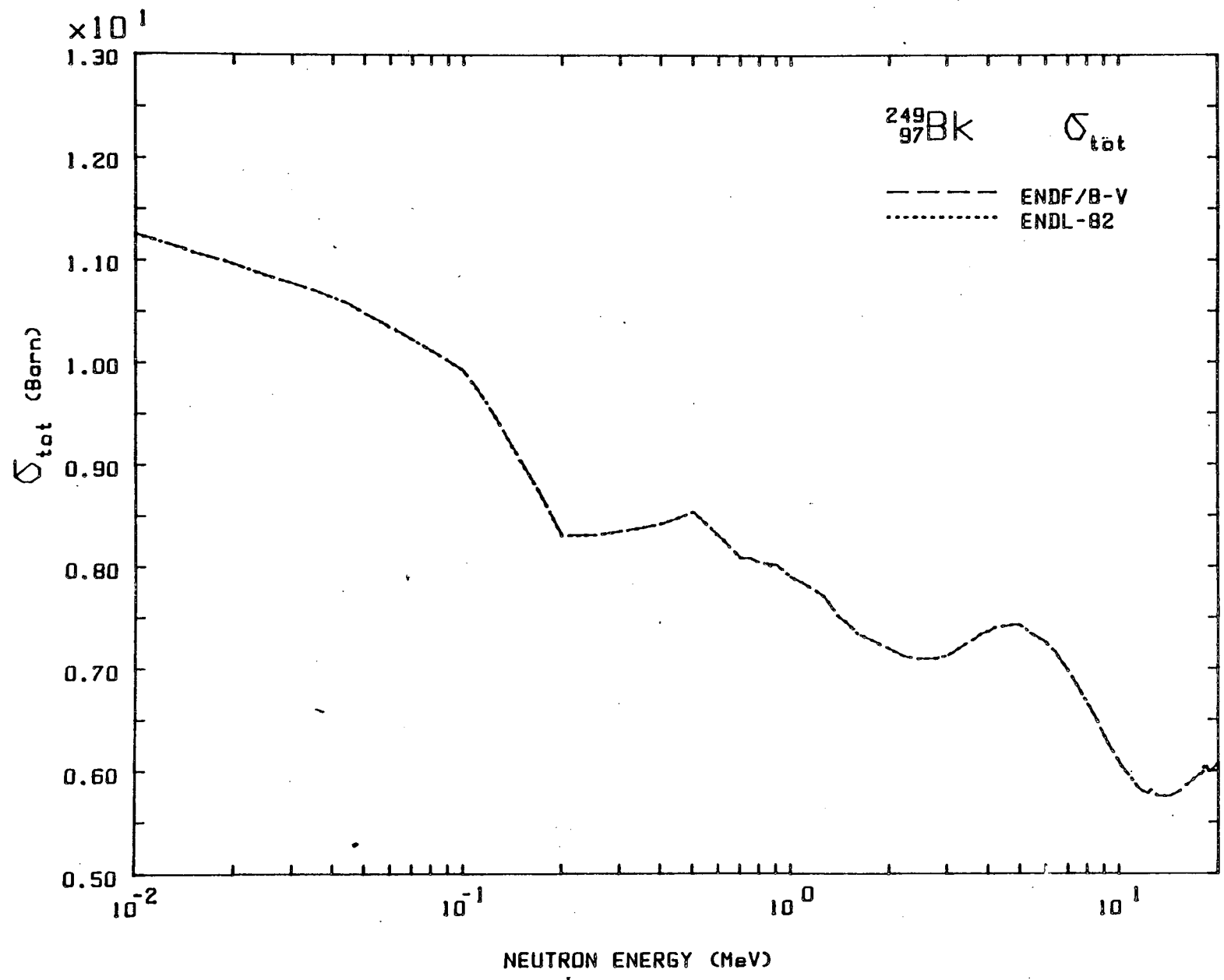
Reference	$\sigma_\gamma$	$\sigma_f$	$\sigma_t$	$\bar{\nu}_{sp}$	(barns)
ENDL -82 BNL 325 (1984)	1604 746	1.002	1616	3.395	

## RESONANCE INTEGRALS

Reference	$RI_\gamma$	$RI_f$	(barns)
ENDL -82 BNL 325 (1984)	3938 1100	4.900	

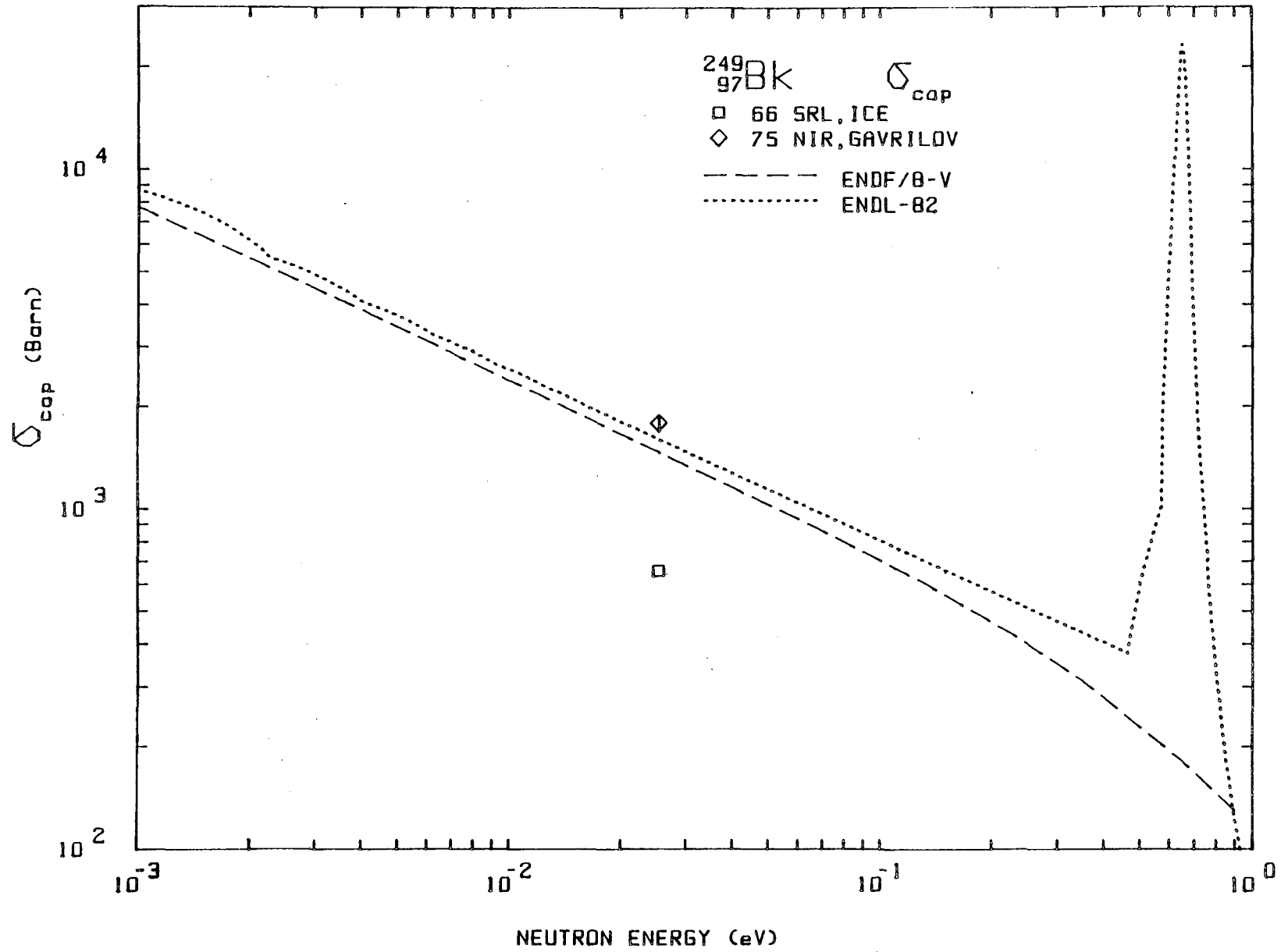


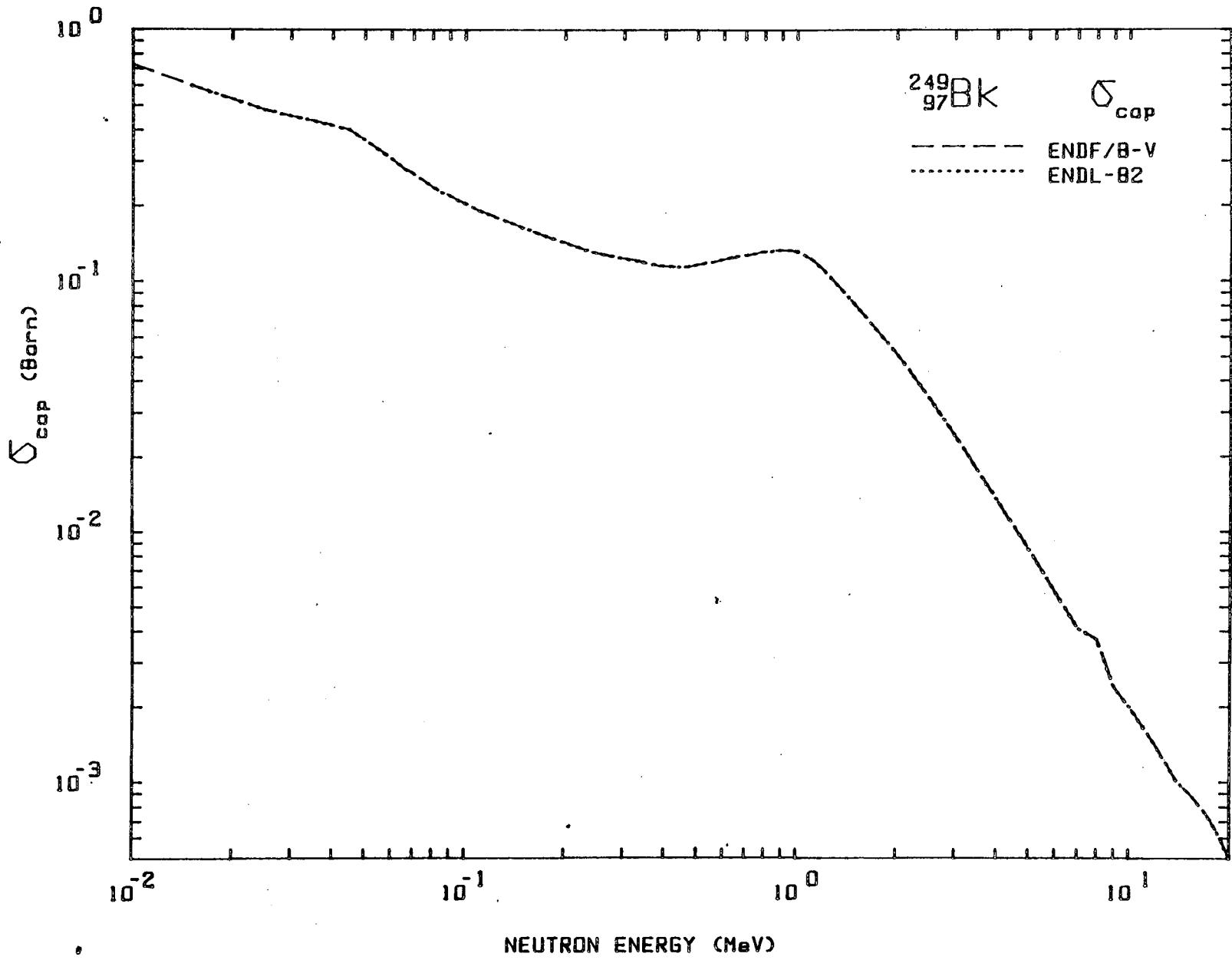




Experimental information  $^{249}\text{Bk}, \sigma_{\text{tot}}$ 

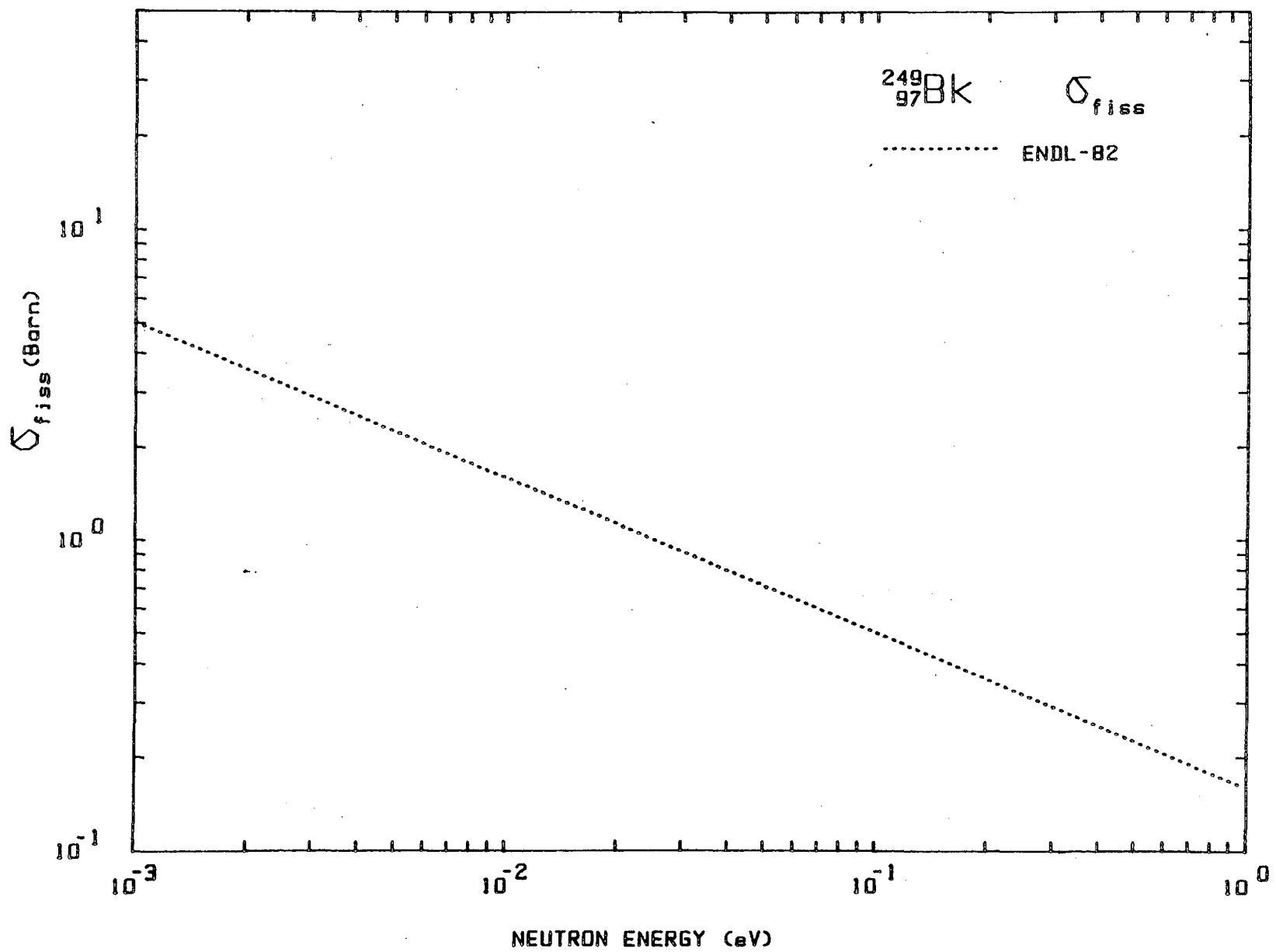
<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
83 SRL, BENJAMIN	-	0.01-100 eV	ABS	5-10 %	Transm. meas.

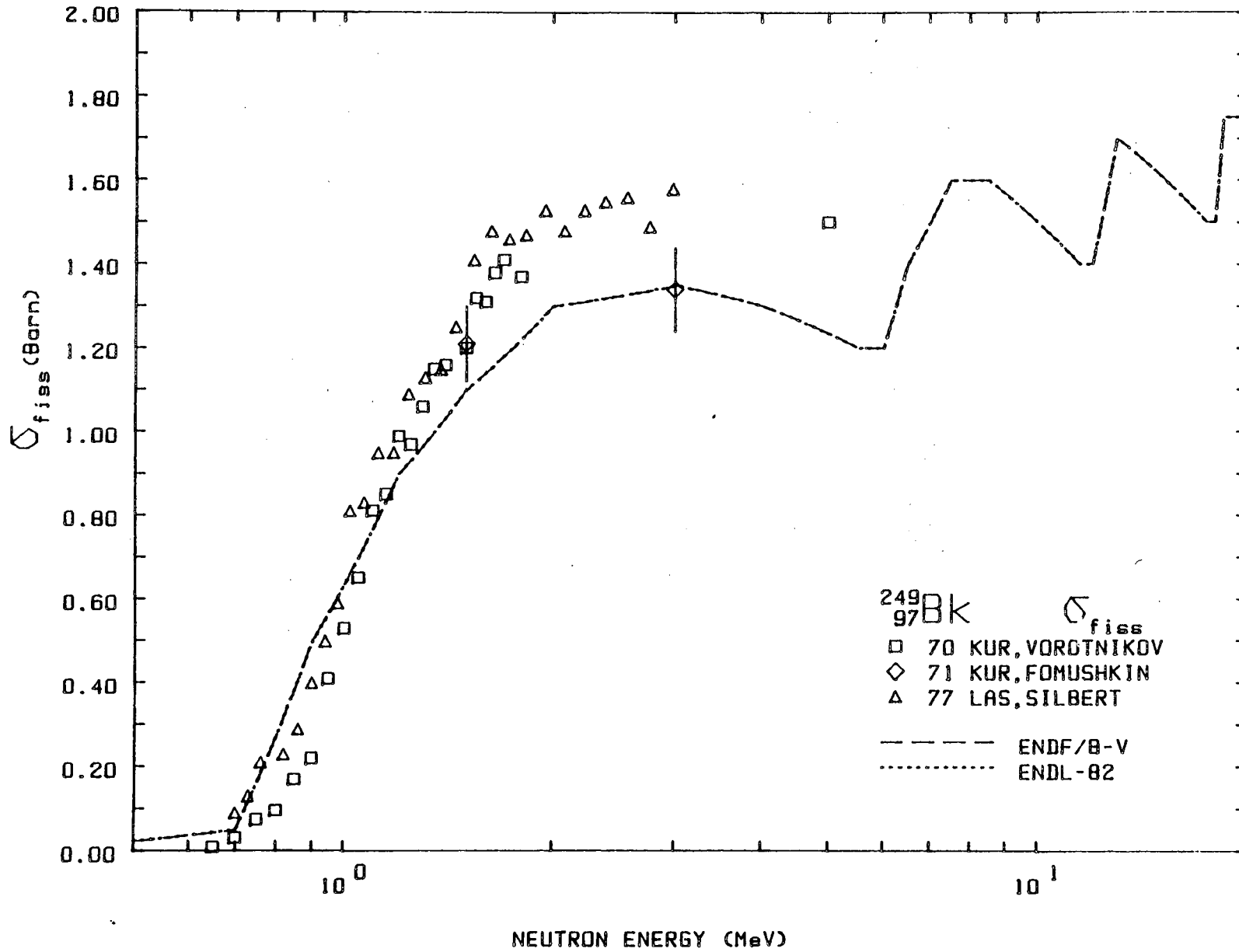




Experimental information  $^{249}\text{Bk}, \sigma_{\gamma}$

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
66 SRL, ICE	1	0.0253 eV			Activation
75 NIR, GAVRILOV	1	0.0253 eV		$\approx 5 \%$	Activation







Experimental information  $^{249}\text{Bk}, \sigma_{\text{fiss}}$ 

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
70 KUR, VOROTNIKOV	23	0.6-5 MeV	ABS	1-4 %	
71 KUR, FOMUSHKIN	3	1.5-14.5 MeV	$^{235}\text{U}, \sigma_{\text{f}}$	8 %	
77 LAS, SILBERT	28	0.7-3 MeV	$^{235}\text{U}, \sigma_{\text{f}}$	8-15 %	N-source, underground explosion, Physics 8

249Cf

NUCLEAR PROPERTIES

Spin and parity of ground state:  $9/2^-$

Ground state decay:

Alpha to  $^{245}\text{Cm}$

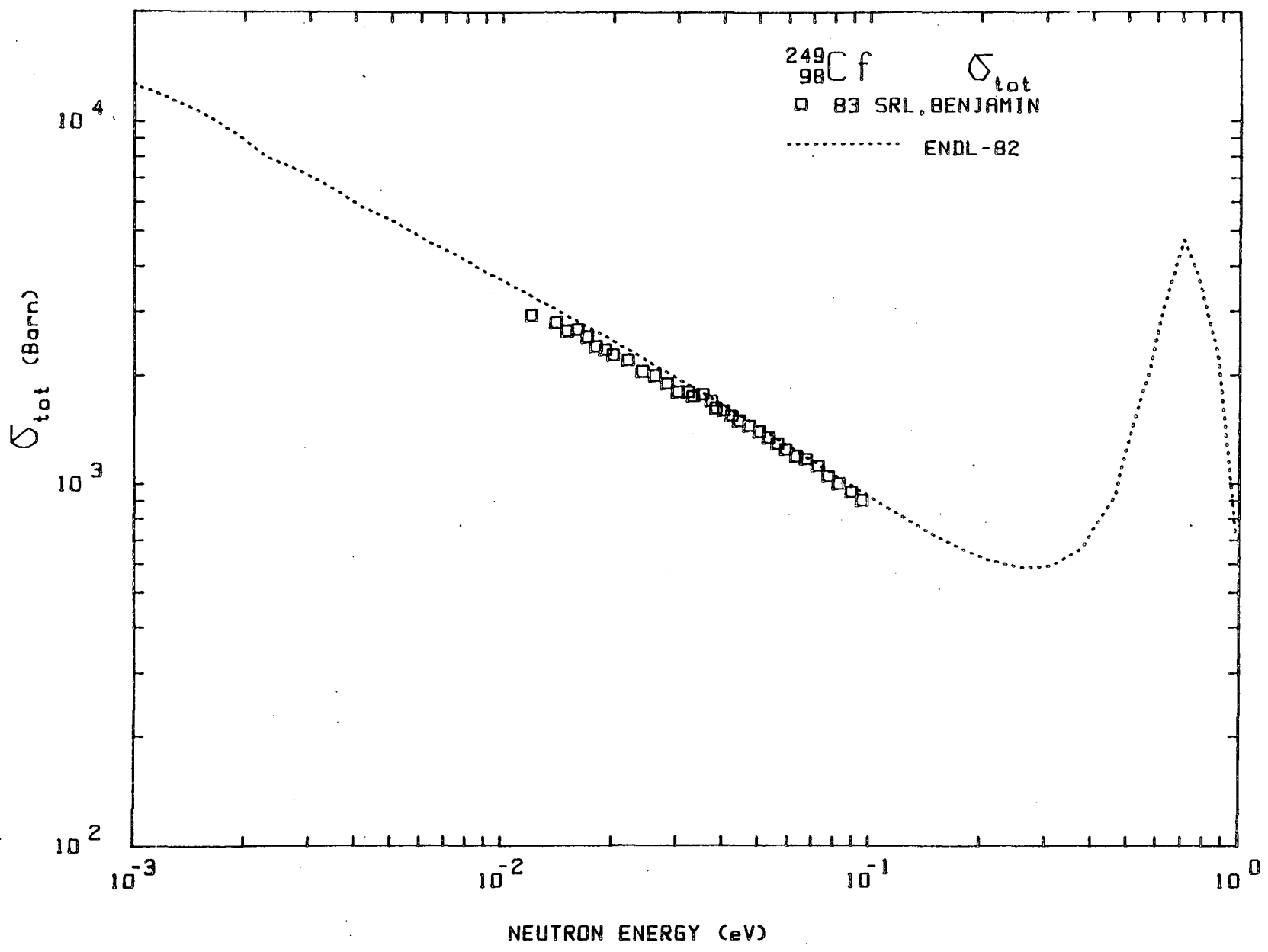
Half-life: 350.6 yr

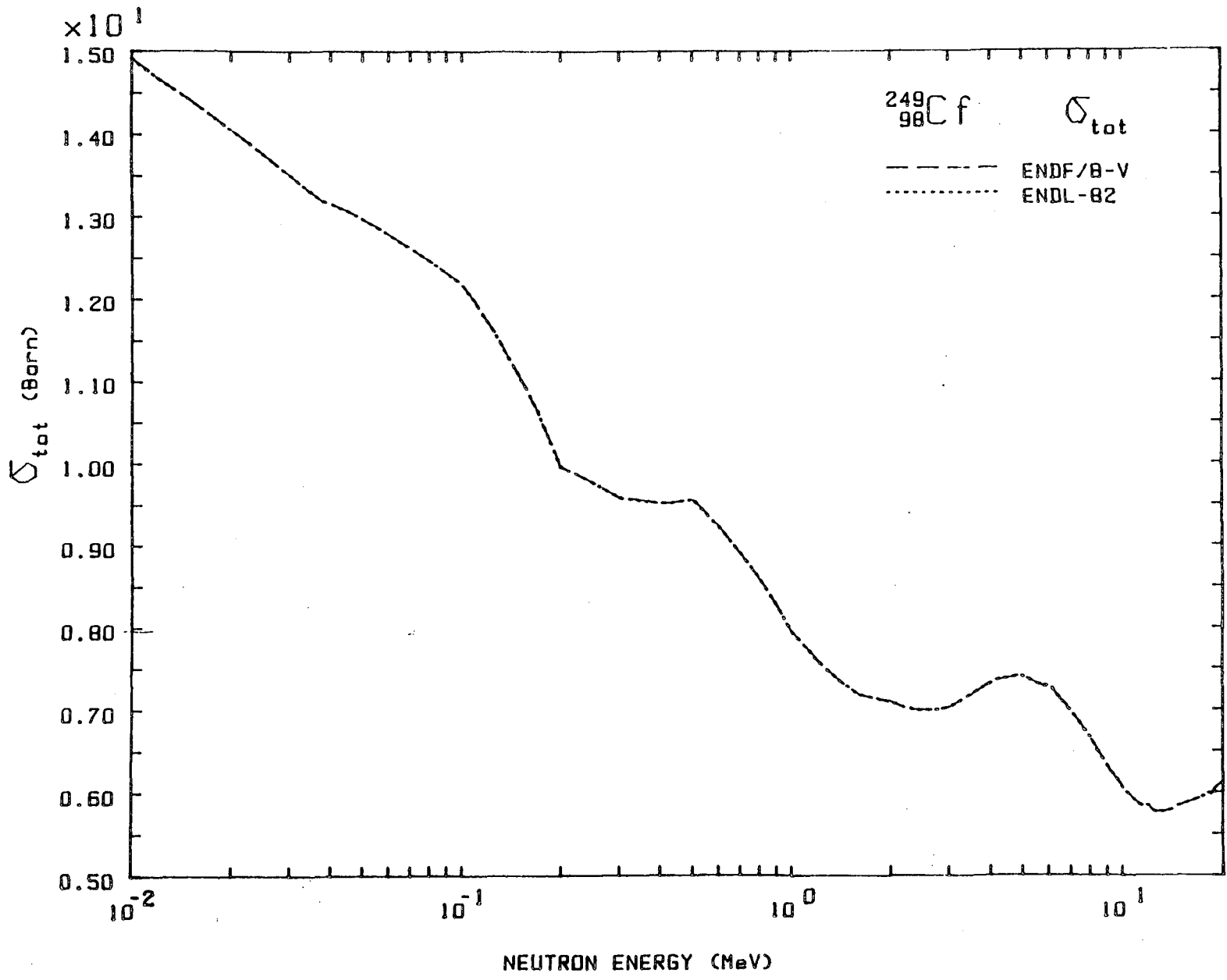
THERMAL CROSS SECTIONS (2200 m/s)

Reference	$\sigma_{\gamma}$	$\sigma_f$	$\sigma_t$	$\bar{\nu}_p$	(barns)
ENDL -82	478.4	1669	2159		
BNL 325 (1984)	497(Maxw)	1642		4.06	

RESONANCE INTEGRALS

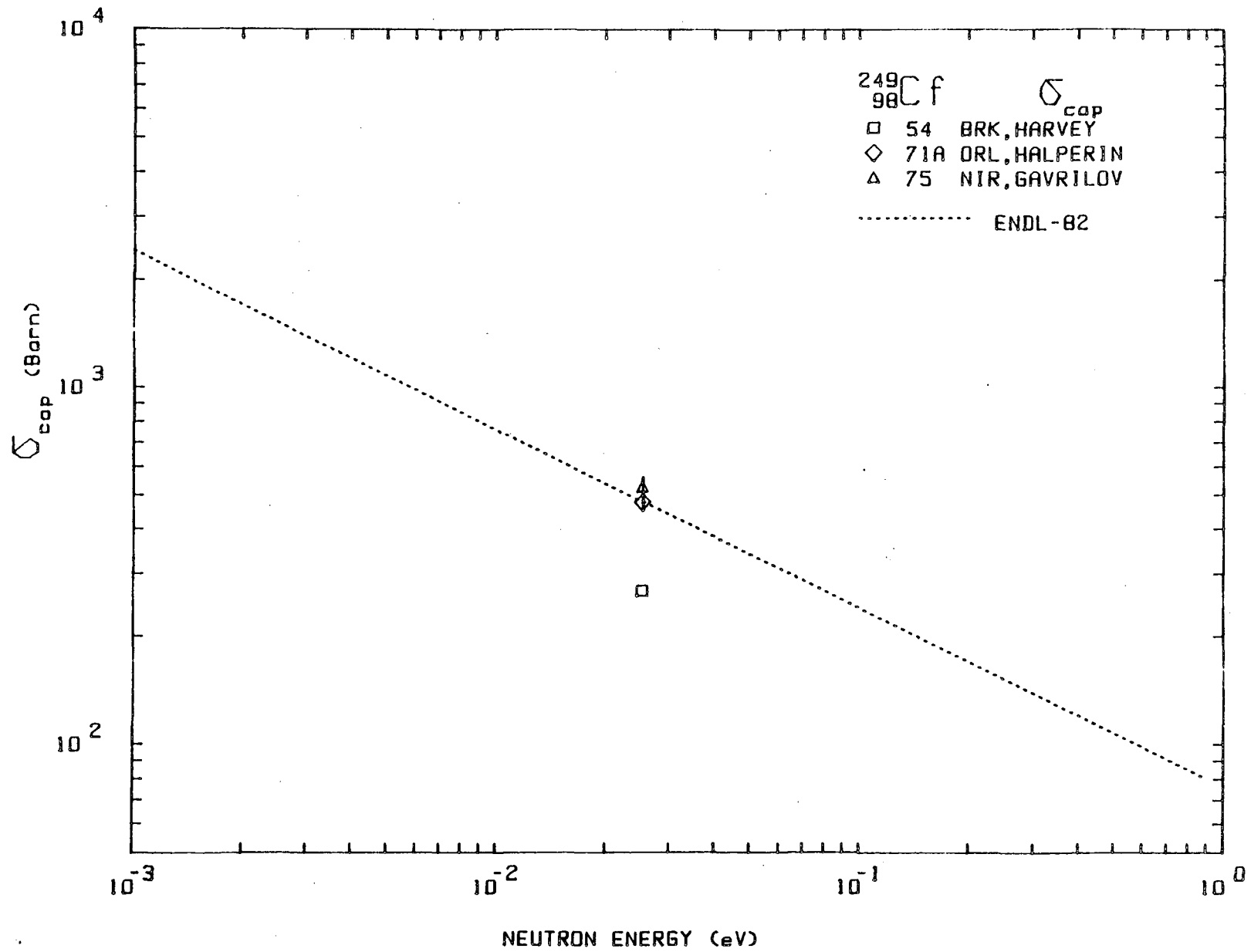
Reference	$RI_{\gamma}$	$RI_f$	(barns)
ENDL -82	266.8	2222	
BNL 325 (1984)	765	2380	

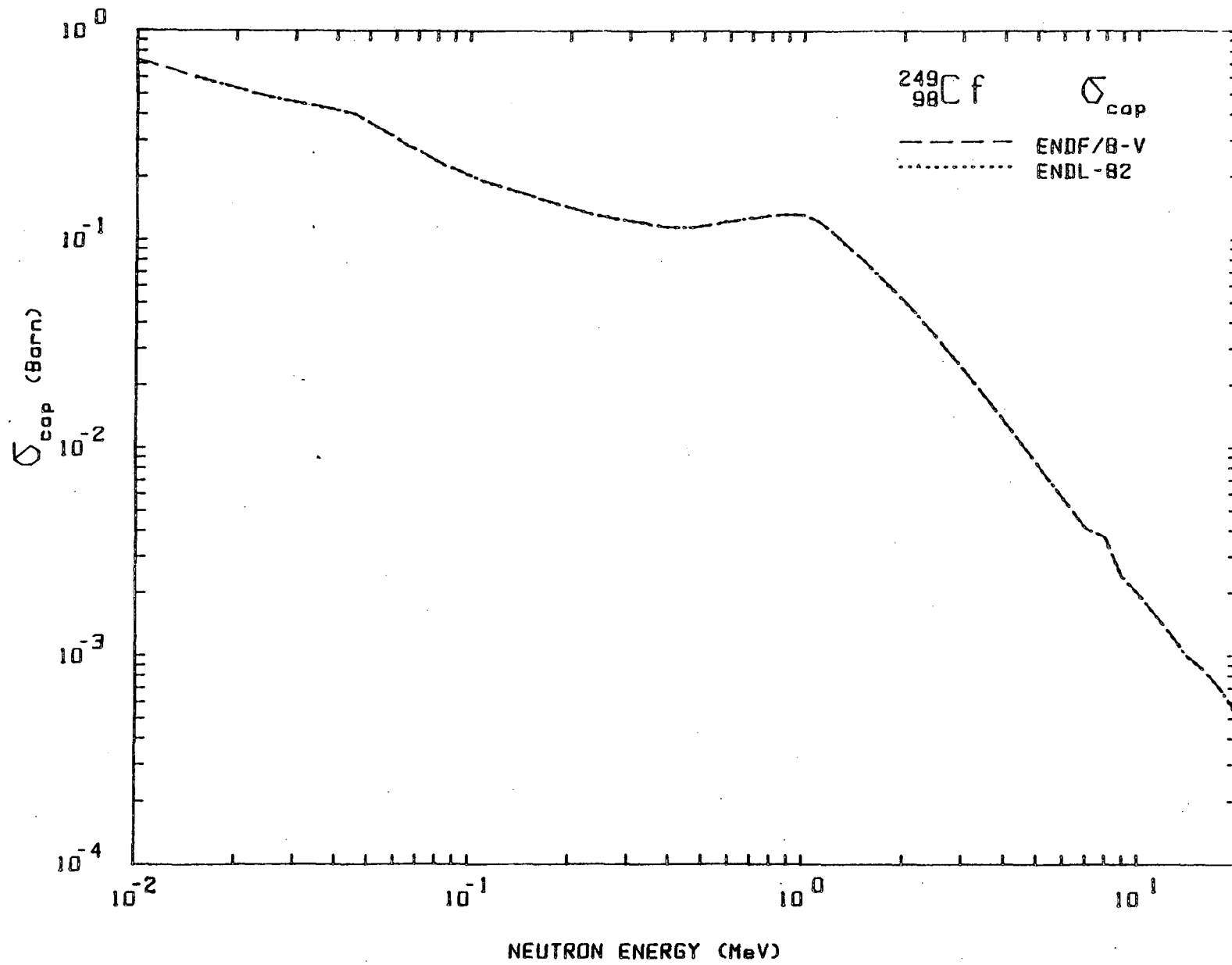




Experimental information  $^{249}\text{Cf}, \sigma_{\text{tot}}$ 

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
83 SRL, BENJAMIN	-	0.01-100 eV	abs.	-	Transm. meas.

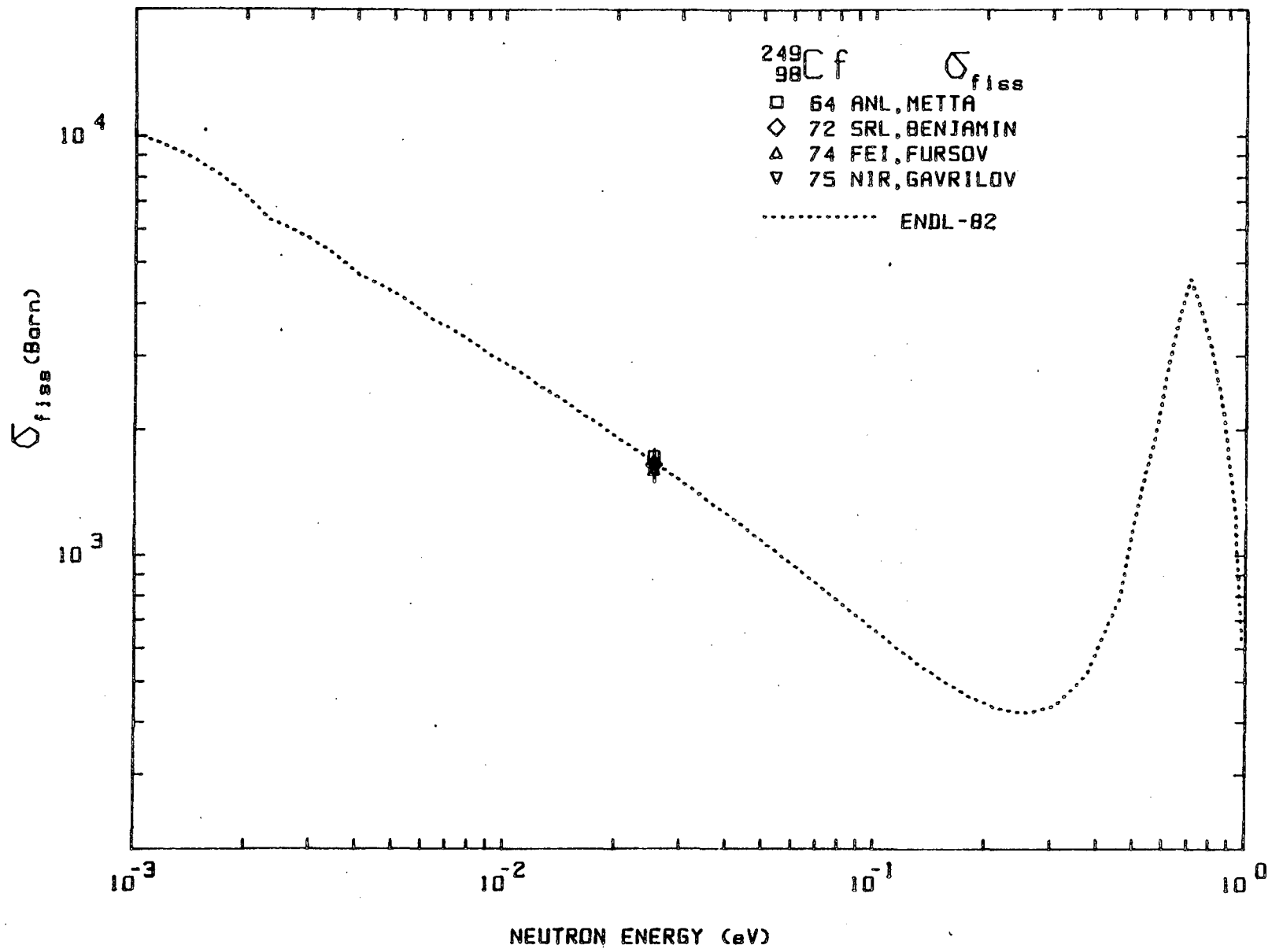


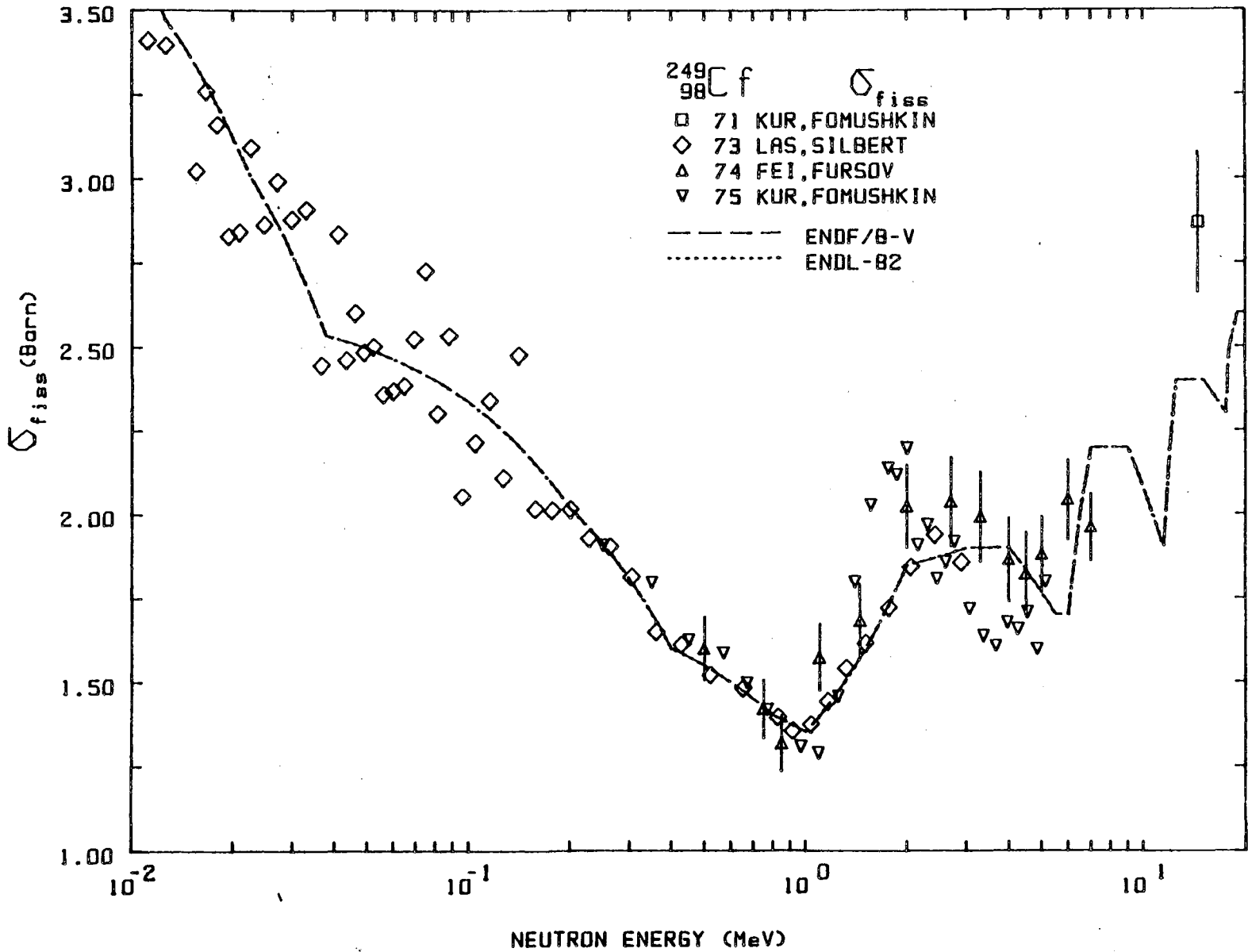


Experimental information  $^{249}\text{Cf}, \sigma_{\gamma}$

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
54 BRK, HARVEY	1	$2.53 \cdot 10^{-2}$ eV			Activation
71A ORL, HALPERIN	1	$2.53 \cdot 10^{-2}$ eV	$^{59}\text{Co}, \sigma_{\gamma}$	5 %	
75 NIR, GAVRILOV	1	$2.53 \cdot 10^{-2}$ eV	$^{197}\text{Au}, \sigma_{\gamma}$ $^{59}\text{Co}, \sigma_{\gamma}$	6 %	







Experimental information  $^{249}\text{Cf}, \sigma_{\text{fiss}}$ 

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
64 ANL, METTA	1	$2.530 \cdot 10^{-2}$ eV MXW	$^{233}\text{U}, \sigma_{\text{f}}$ 526 b	4 %	
71 KUR, FOMUSHKIN	1	14.5 MeV	$^{235}\text{U}, \sigma_{\text{f}}$	7 %	
72 FEI, FURSOV	1	0.0253 eV	$^{239}\text{Pu}, \sigma_{\text{f}}$	3 %	
72 SRL, BENJAMIN	1	0.0253 eV	-	3 %	Mass spectrometry
73 LAS, SILBERT	332	13 eV-2.9 MeV	$^6\text{Li}, \sigma_{\text{n},\alpha}$ $^{235}\text{U}, \sigma_{\text{f}}$	10-20 %	Underground nuclear explosion, Physics 8
74 FEI, FURSOV	13	0.5-7 MeV	$^{239}\text{Pu}, \sigma_{\text{f}}$	7 %	Van de Graaff acc.
75 KUR, FOMUSHKIN	27	0.25-5.15 MeV	$^{235}\text{U}, \sigma_{\text{f}}$	4-6 %	
75 NIR, GAVRILOV	1	0.0253 eV	$^{197}\text{Au}, \sigma_{\gamma}$ $^{59}\text{Co}, \sigma_{\gamma}$	7 %	

<sup>250</sup>Cf

## NUCLEAR PROPERTIES

Spin and parity of ground state:  $0^+$ 

Ground state decay:

Alpha to <sup>246</sup>Cm.

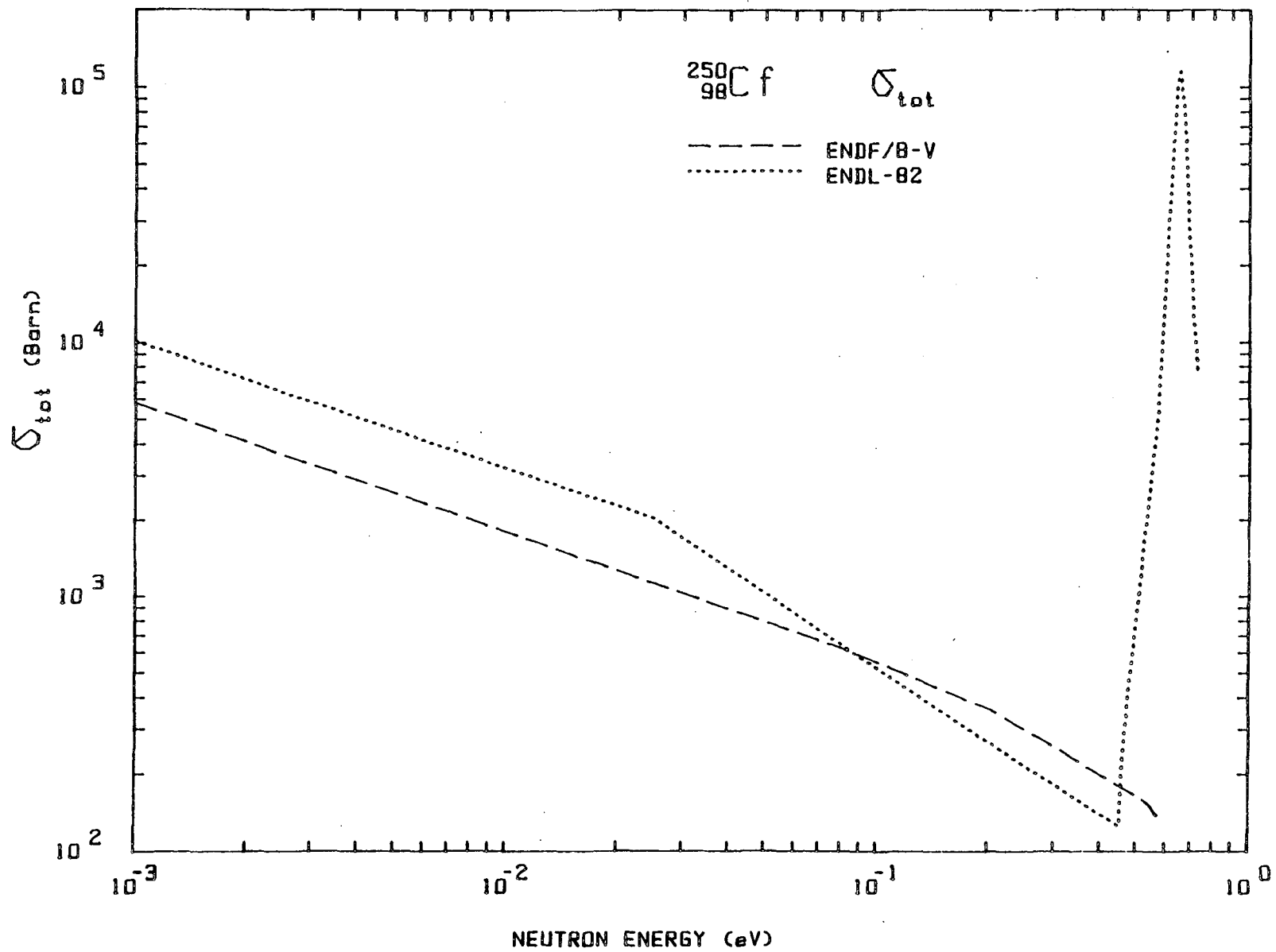
Half-life: 13.08 yr

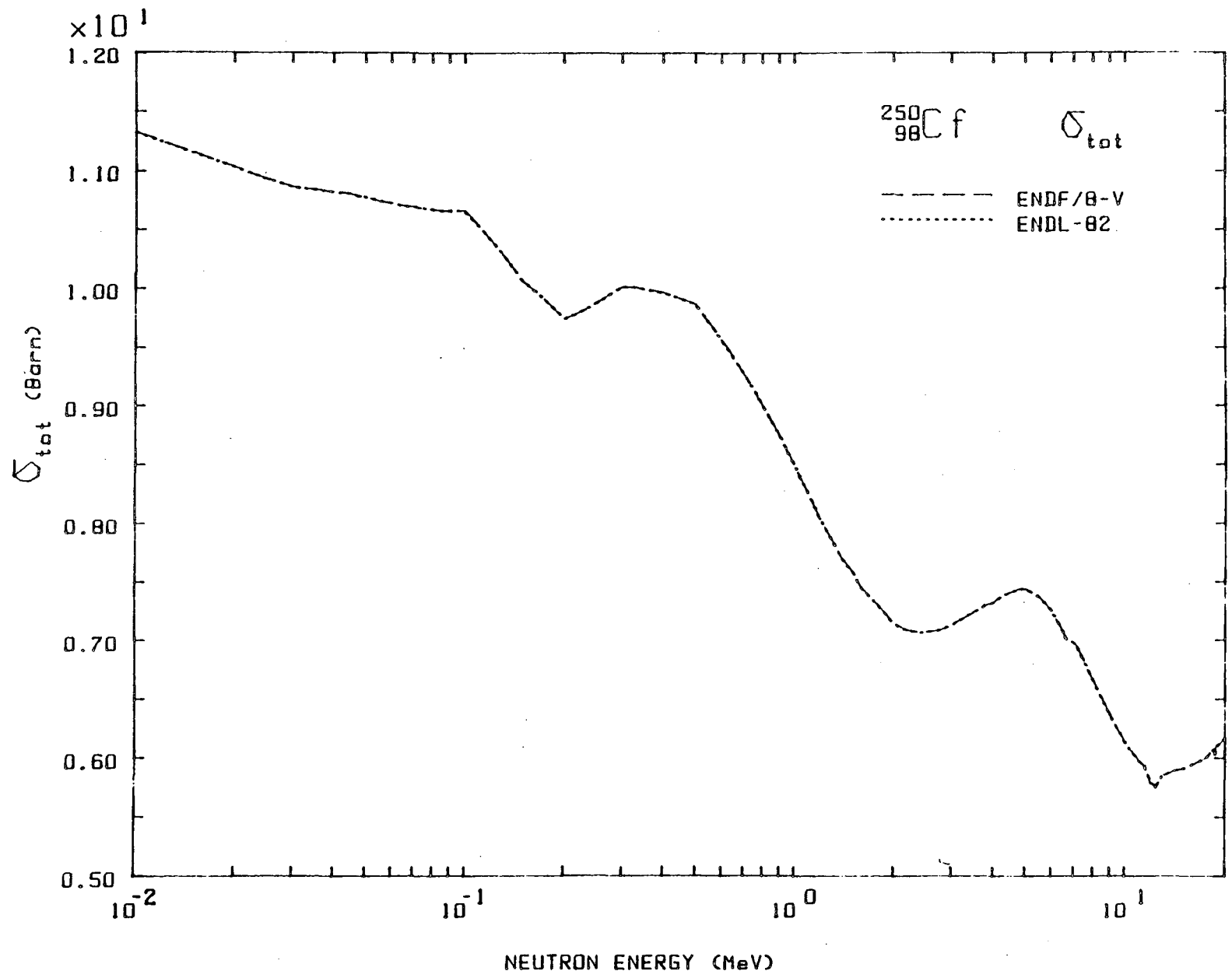
## THERMAL CROSS SECTIONS (2200 m/s)

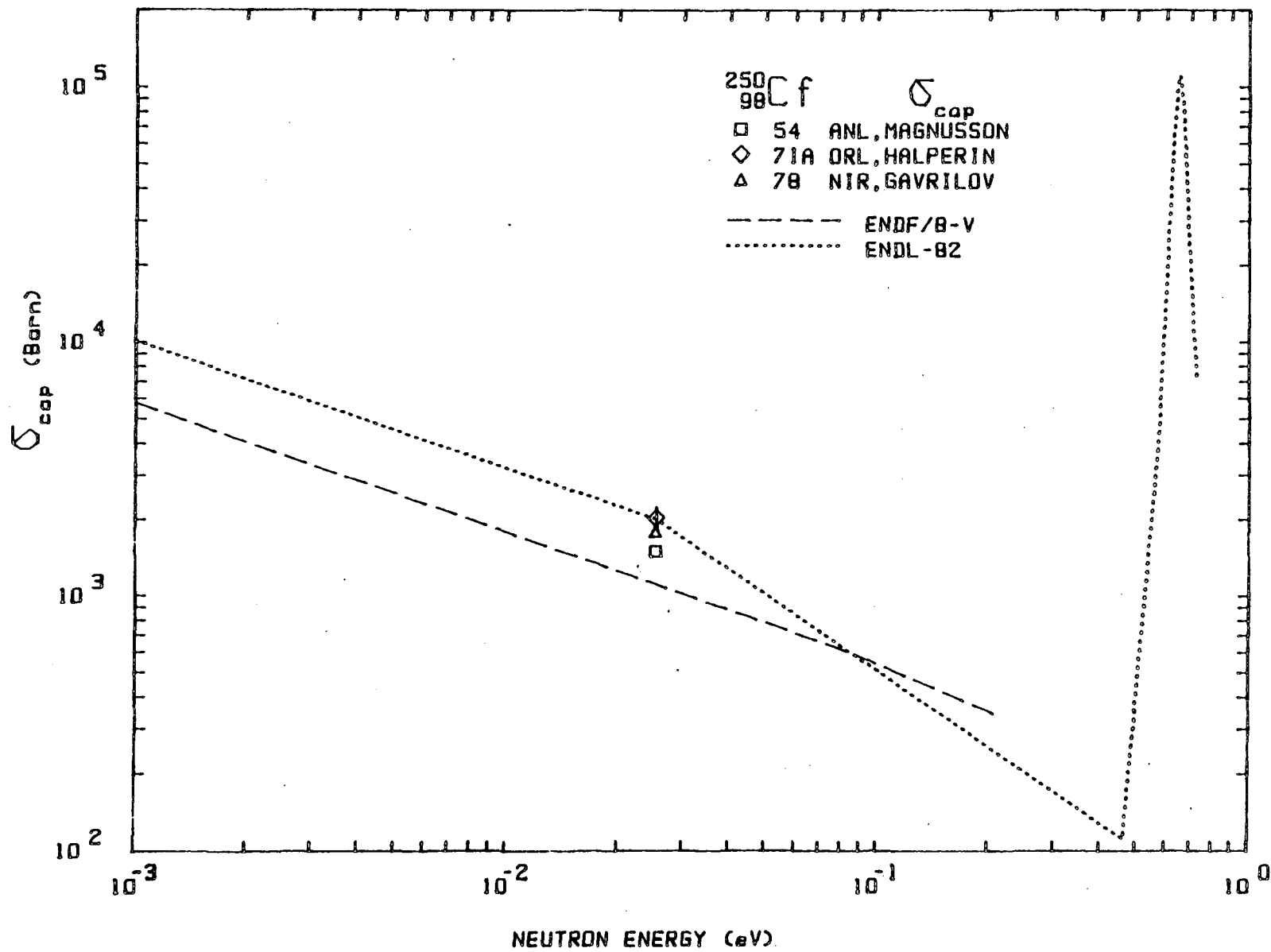
Reference	$\sigma_\gamma$	$\sigma_f$	$\sigma_t$	$\bar{v}_{sp}$	(barns)
ENDL -82	2003	0.100	2015		
BNL 325 (1984)	2034(Maxw)			3.51	

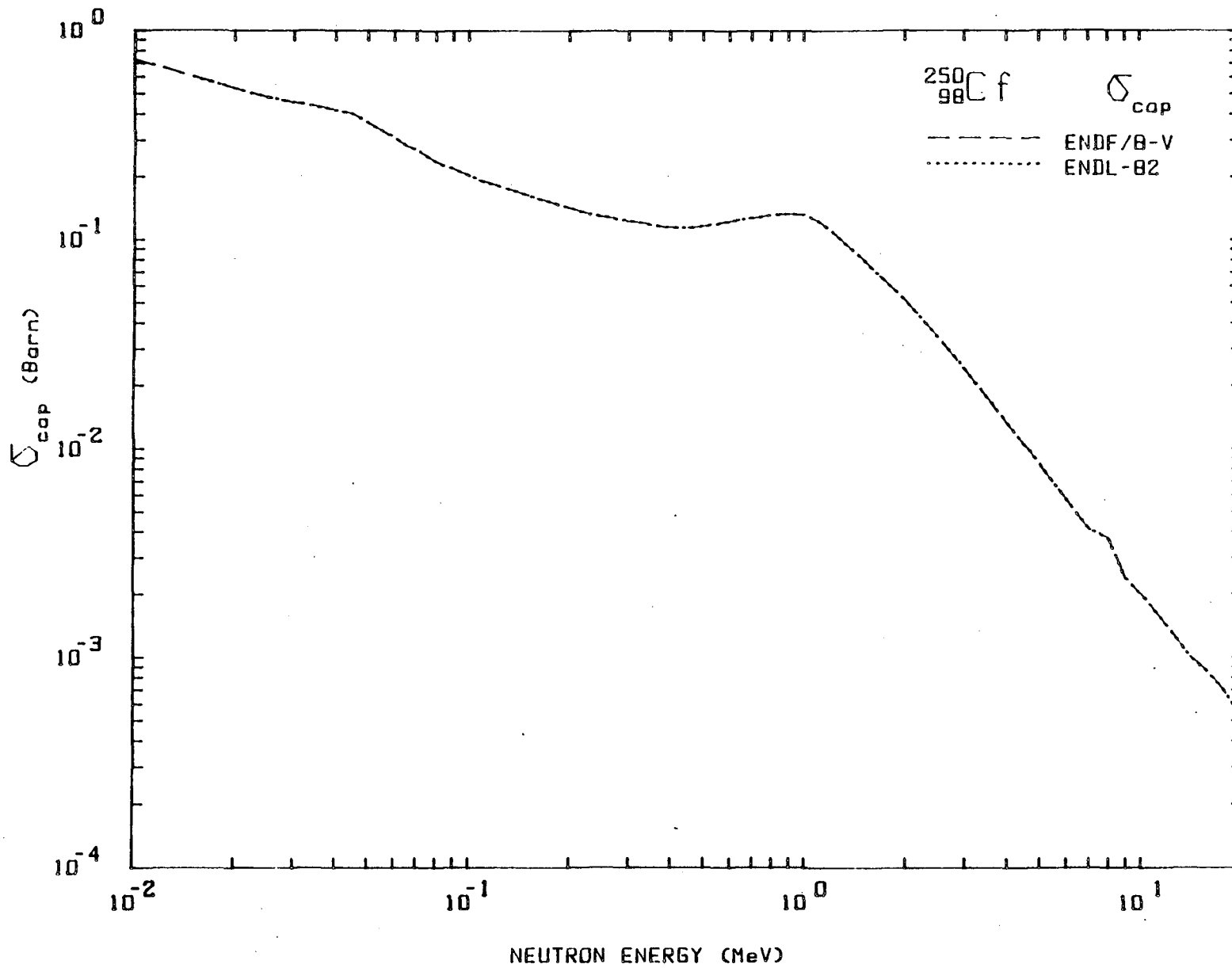
## RESONANCE INTEGRALS

Reference	$RI_\gamma$	$RI_f$	(barns)
ENDL -82	14610	11.69	
BNL 325 (1984)	11600		





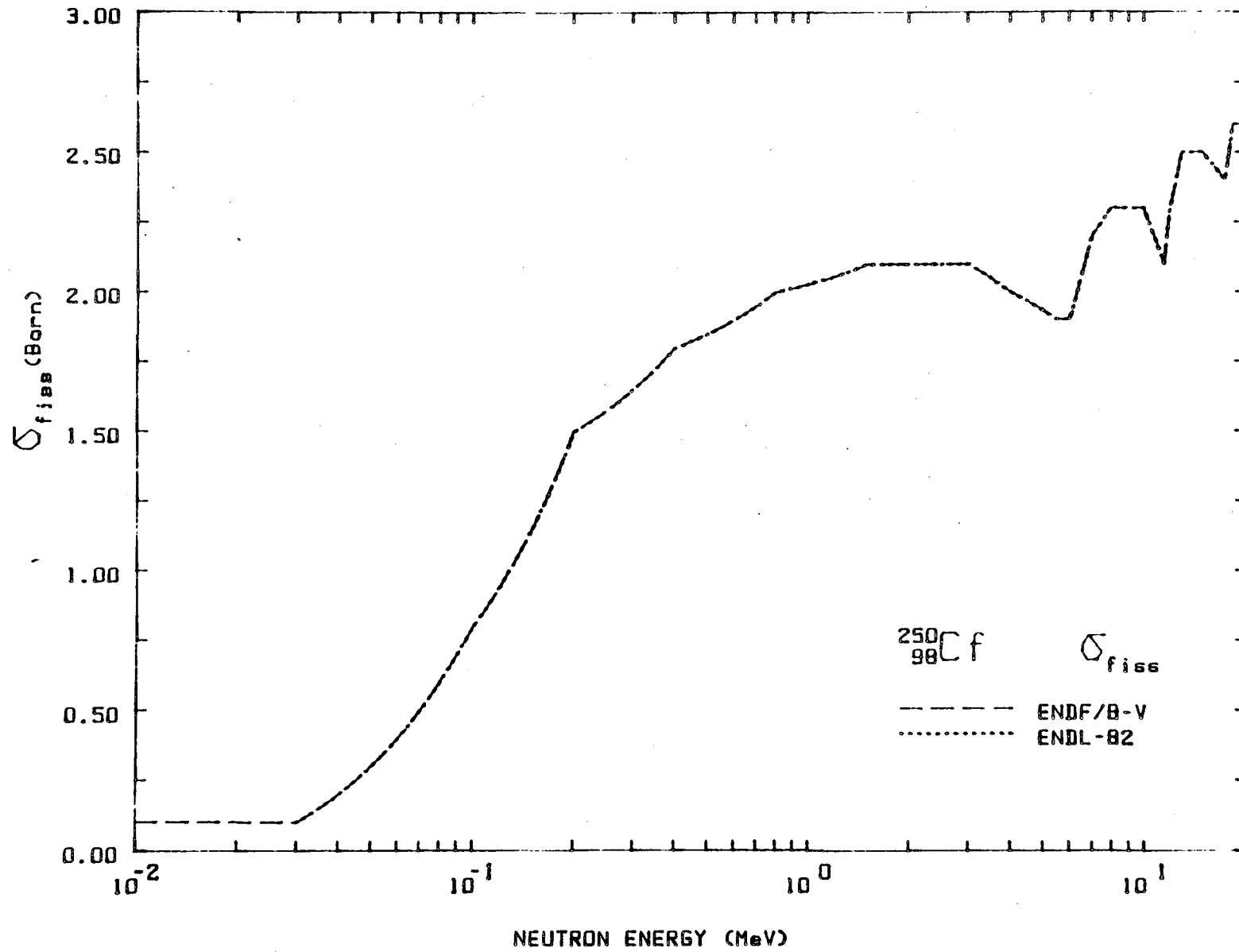






Experimental information  $^{250}\text{Cf}, \sigma_{\gamma}$ 

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
54 ANL, MAGNUSSON	1	$2.53 \cdot 10^{-2}$ eV	---	---	Mass spect.
71A ORL, HALPERIN	1	$2.53 \cdot 10^{-2}$ eV	$^{59}\text{Co}, \sigma_{\gamma}$	10 %	
78 NIR, GAVRILOV	1	$2.53 \cdot 10^{-2}$ eV	$^{197}\text{Au}, \sigma_{\gamma}$ $^{59}\text{Co}, \sigma_{\gamma}$	---	





251  
Cf

## NUCLEAR PROPERTIES

Spin and parity of ground state:  $1/2^+$ 

Ground state decay:

Alpha to  $^{247}\text{Cm}$ 

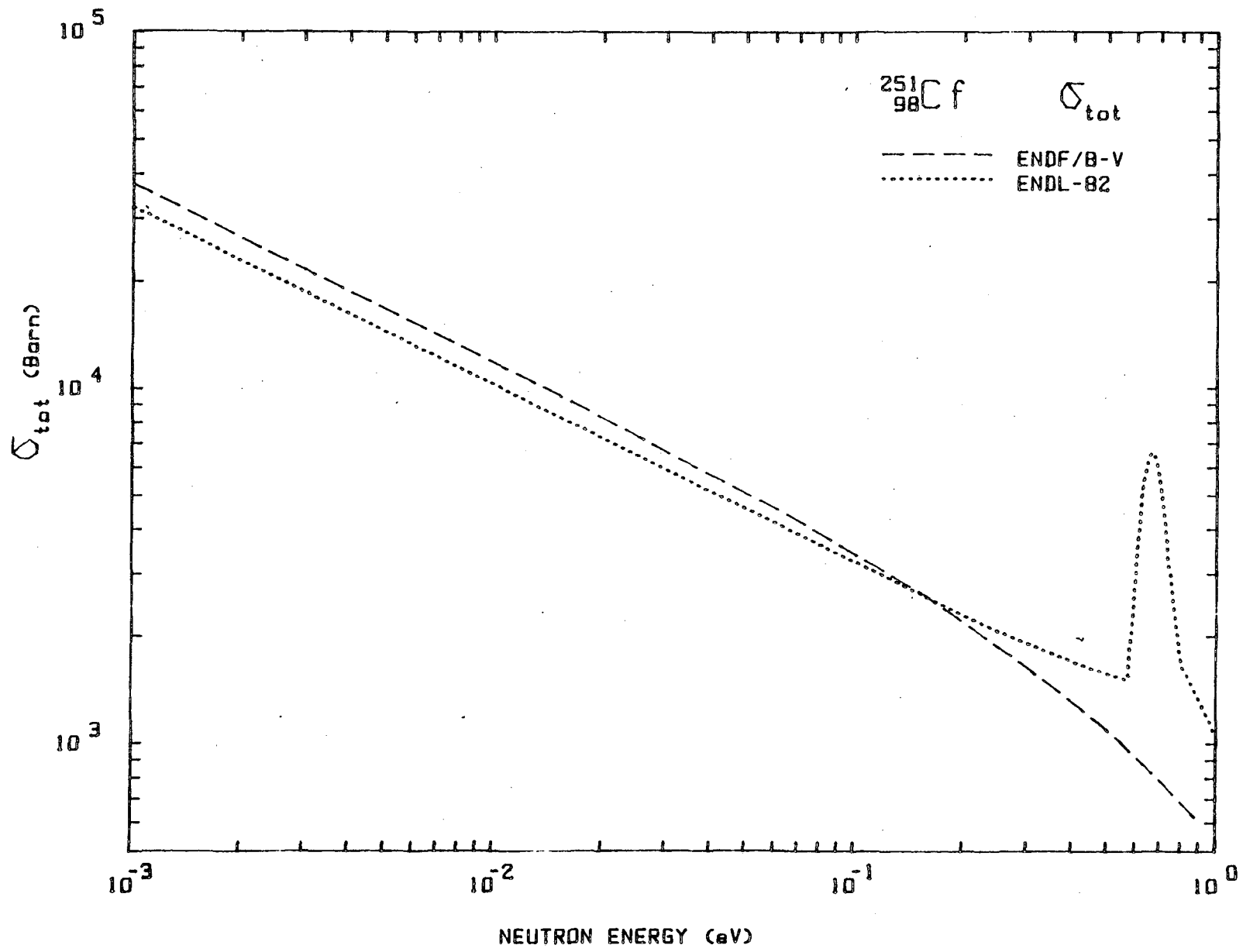
Half-life: 898 yr

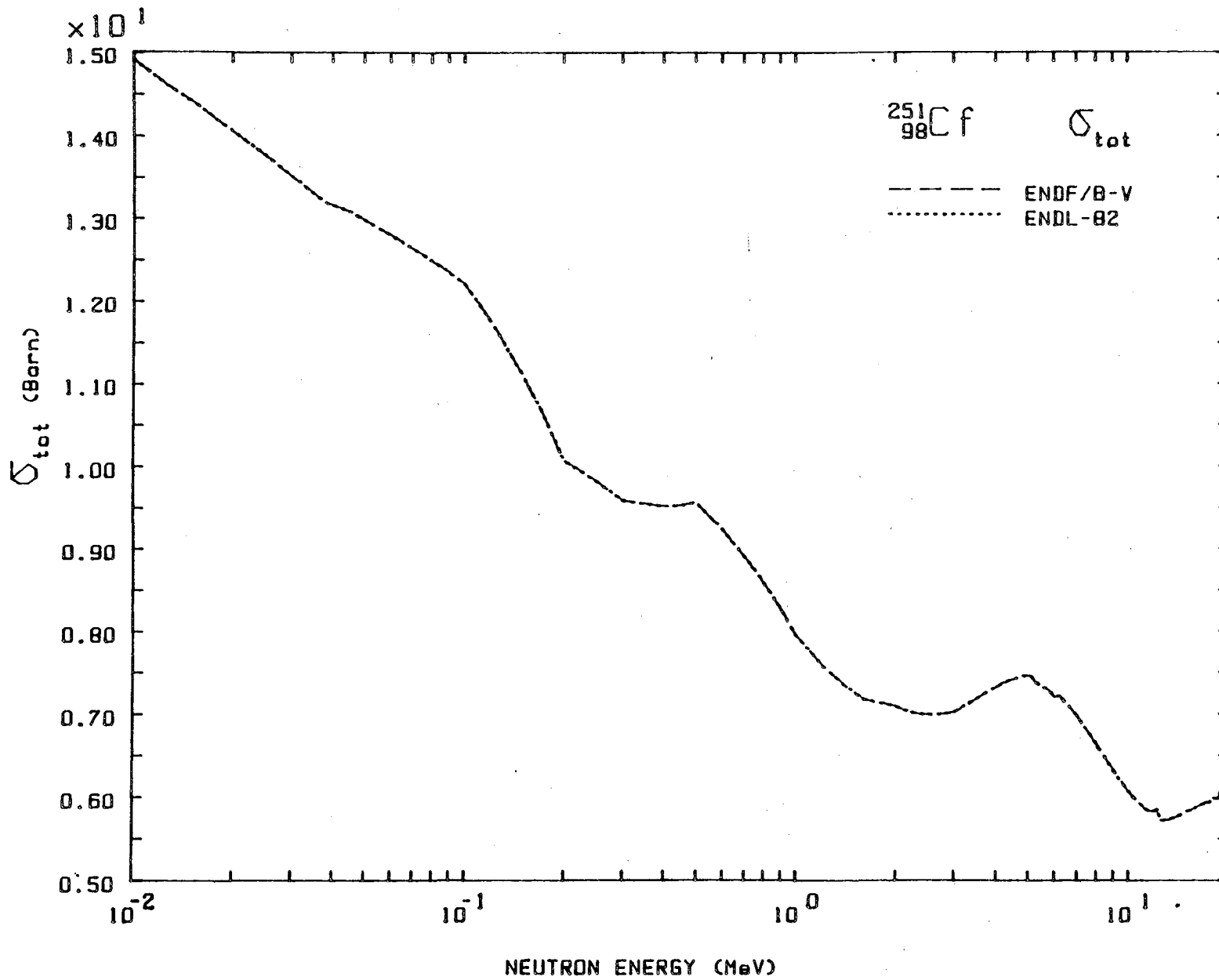
## THERMAL CROSS SECTIONS (2200 m/s)

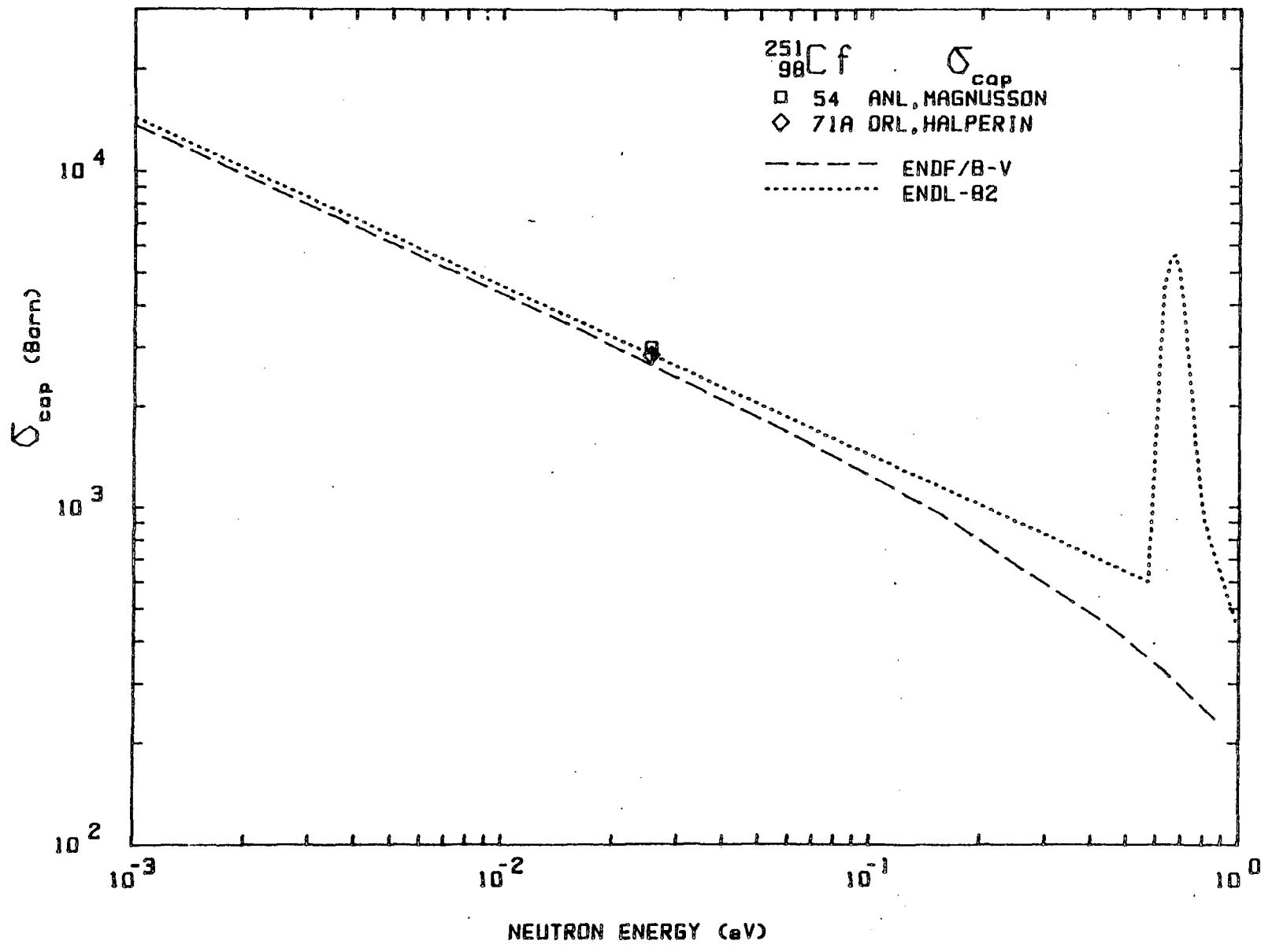
Reference	$\sigma_{\gamma}$	$\sigma_f$	$\sigma_t$	(barns)
ENDL -82	2854	3562	6427	
BNL 325 (1984)	2850(Maxw)	4895(Maxw)		

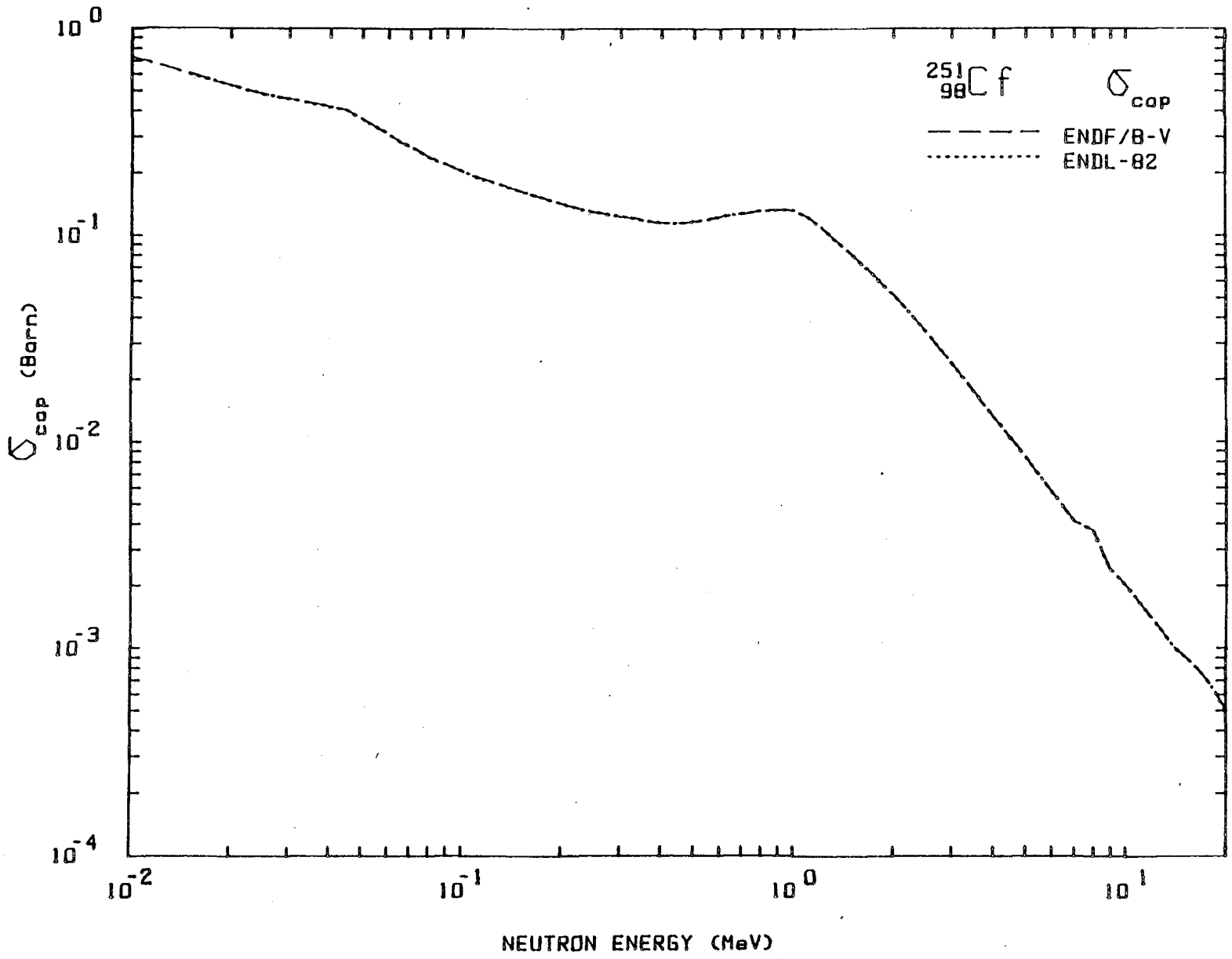
## RESONANCE INTEGRALS

Reference	$RI_{\gamma}$	$RI_f$	(barns)
ENDL -82	2408	1744	
BNL 325 (1984)	1600	5900	





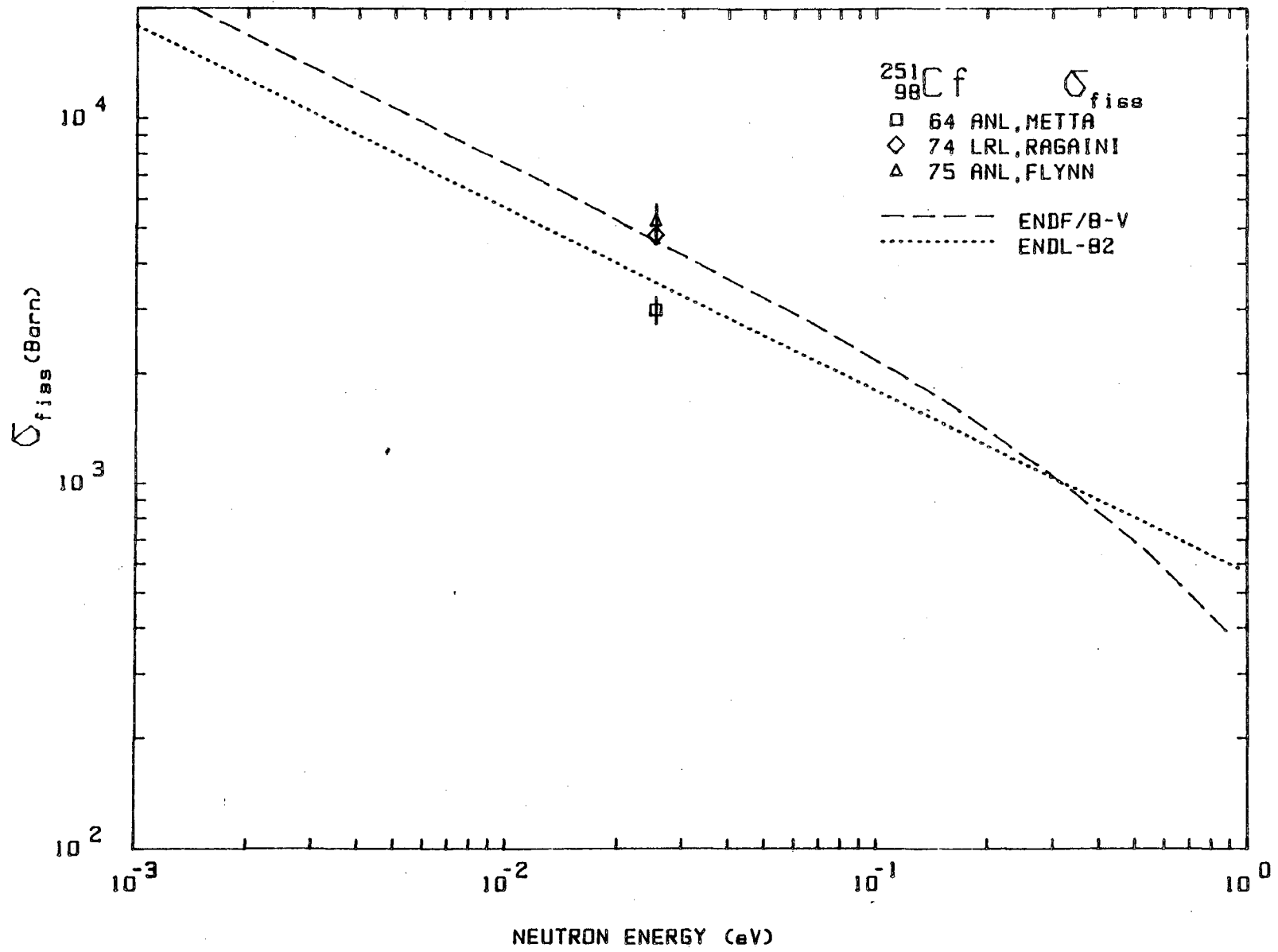


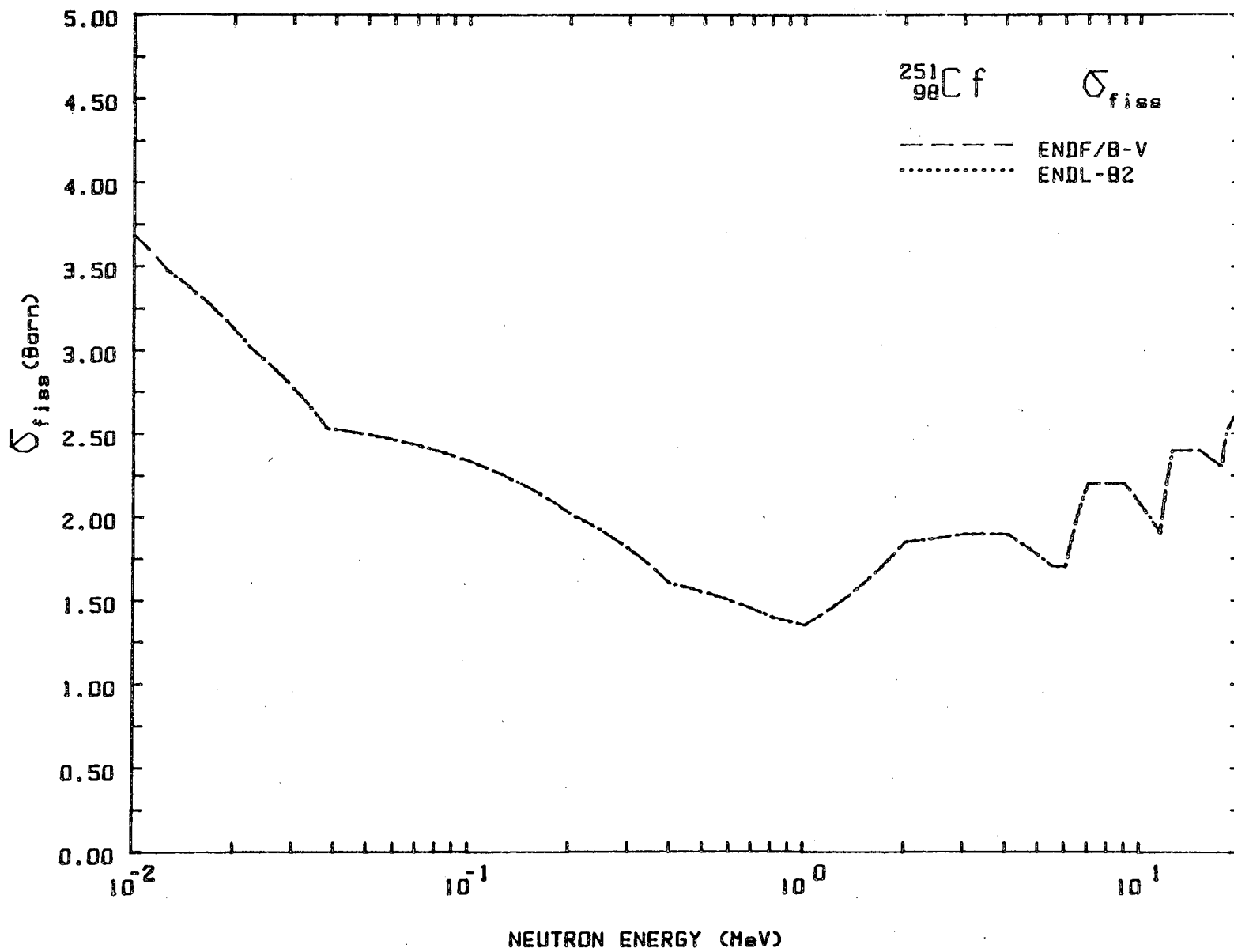




Experimental information  $^{251}\text{Cf}, \sigma_{\gamma}$ 

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
54 ANL, MAGNUSSON	1	$2.53 \cdot 10^{-2}$ eV	---	---	Mass spectr.
71A ORL, HALPERIN	1	$2.53 \cdot 10^{-2}$	$^{59}\text{Co}, \sigma_{\gamma}$	5 %	





Experimental information  $^{251}\text{Cf}, \sigma_{\text{fiss}}$

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
64 ANL, METTA	1	$2.530 \cdot 10^{-2}$ eV MXW	$^{239}\text{Pu}, \sigma_{\text{f}}$ 803 b	9 %	
74 LRL, RAGAINI	1	$2.530 \cdot 10^{-2}$ eV MXW	$^{233}\text{U}, \sigma_{\text{f}}$ 531 b	5 %	
75 ANL, FLYNN	1	$2.530 \cdot 10^{-2}$ eV	$^{59}\text{Co}, \sigma_{\text{f}}$ 37.0 b	10 %	



252Cf

## NUCLEAR PROPERTIES

Spin and parity of ground state:  $0^+$ 

Ground state decay:

Alpha to  $^{248}\text{Cm}$ : 96.91%

Spontaneous fission: 3.09%

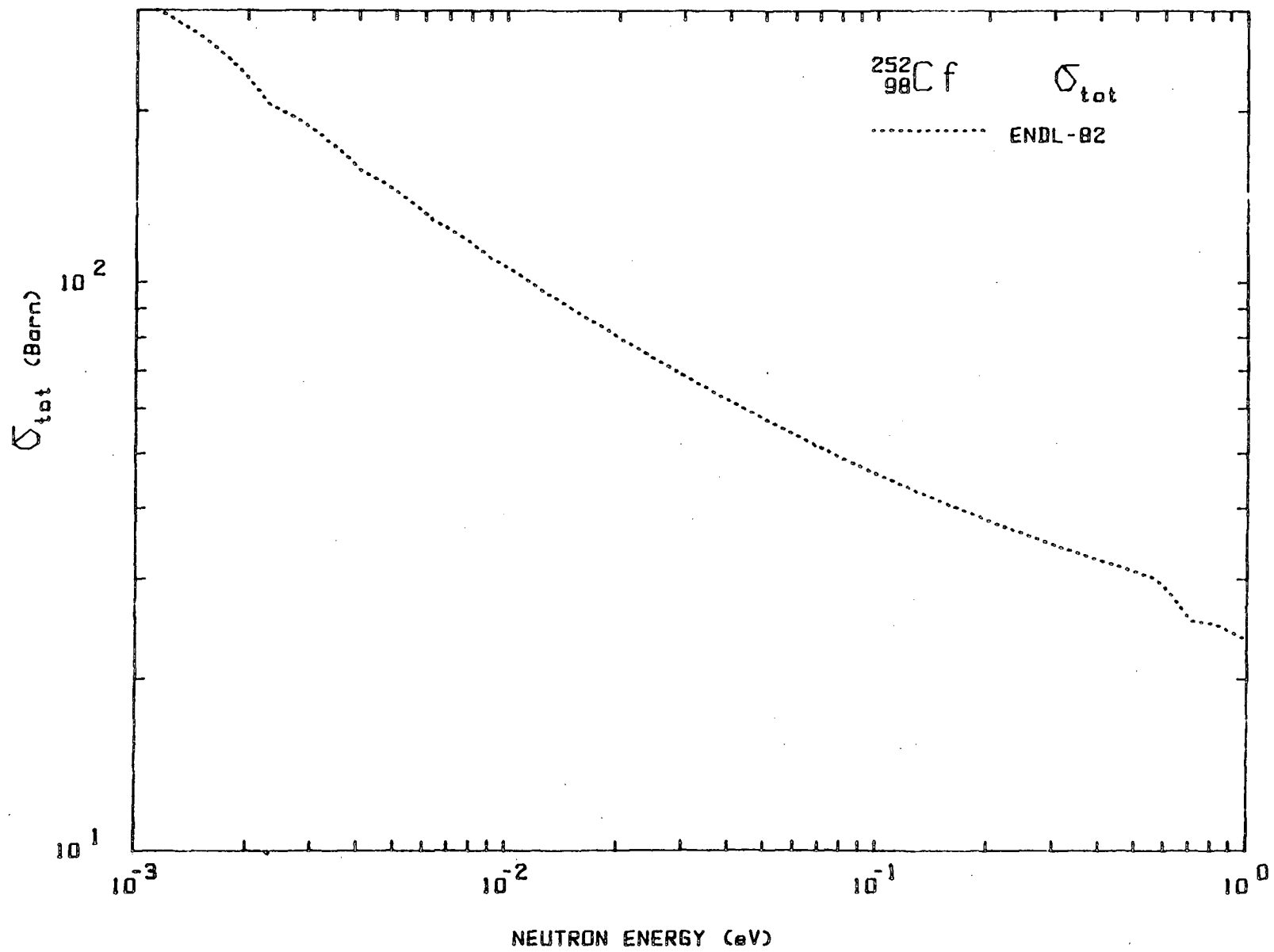
Half-life: 2.638 yr

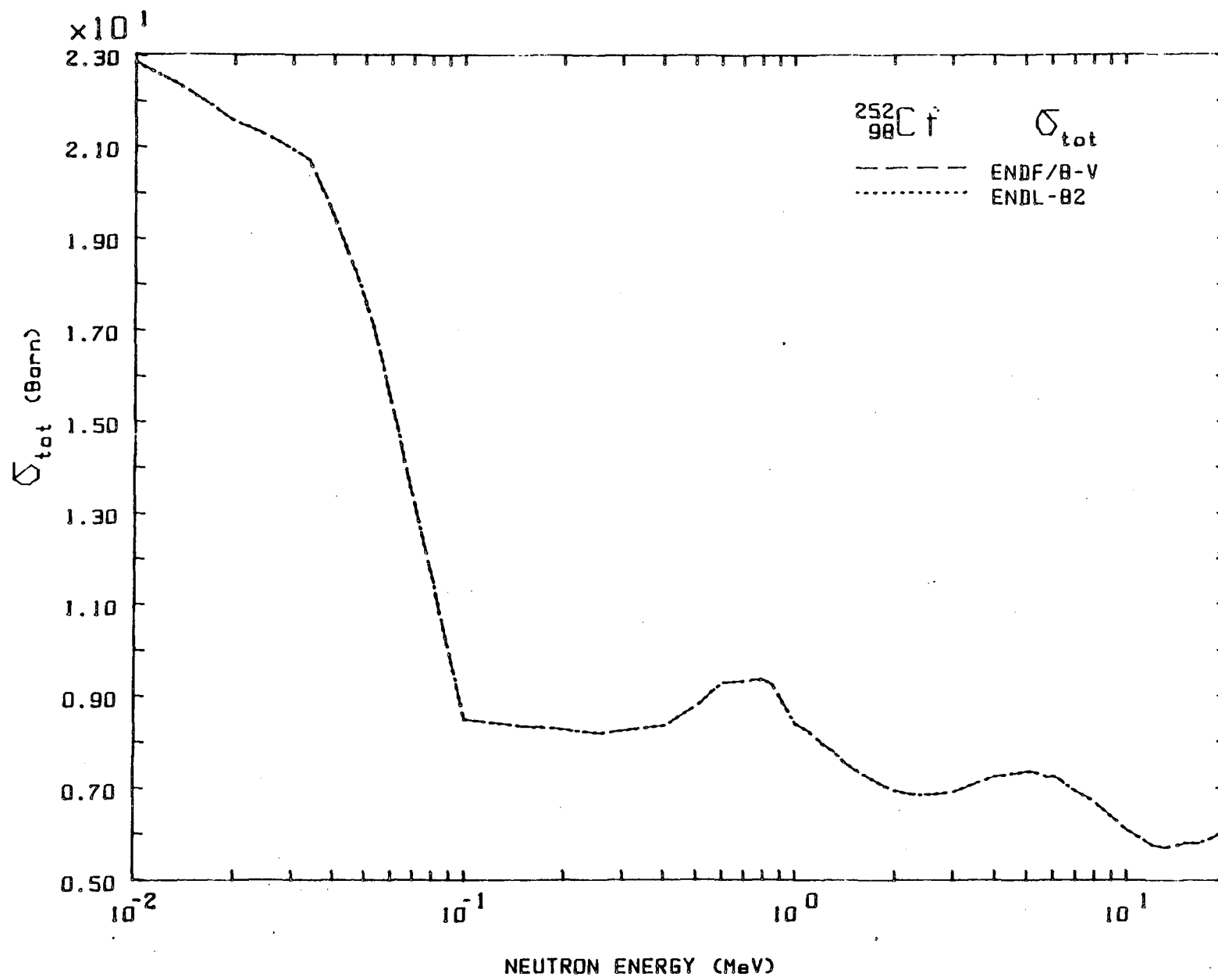
## THERMAL CROSS SECTIONS (2200 m/s)

Reference	$\sigma_{\gamma}$ barns	$\sigma_f$ barns	$\sigma_t$ barns	$\bar{\nu}_{sp}$
ENDF/B - V				3.766
ENDL -82	20.65	33.67	73.04	
BNL 325 (1984)	20.4	32		3.7675
NNDC (1983)				3.7661
84 NPL, AXTON				3.766

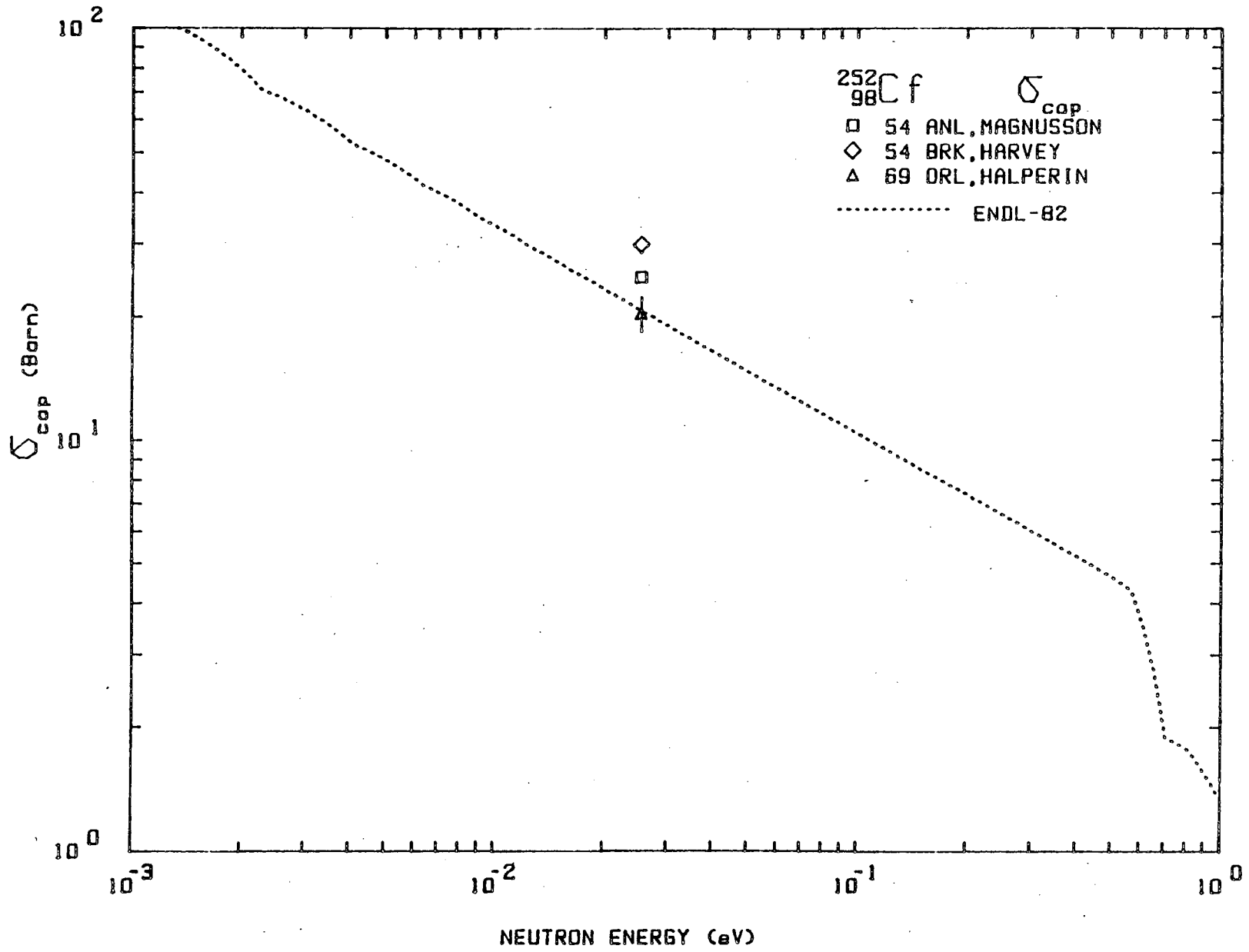
## RESONANCE INTEGRALS

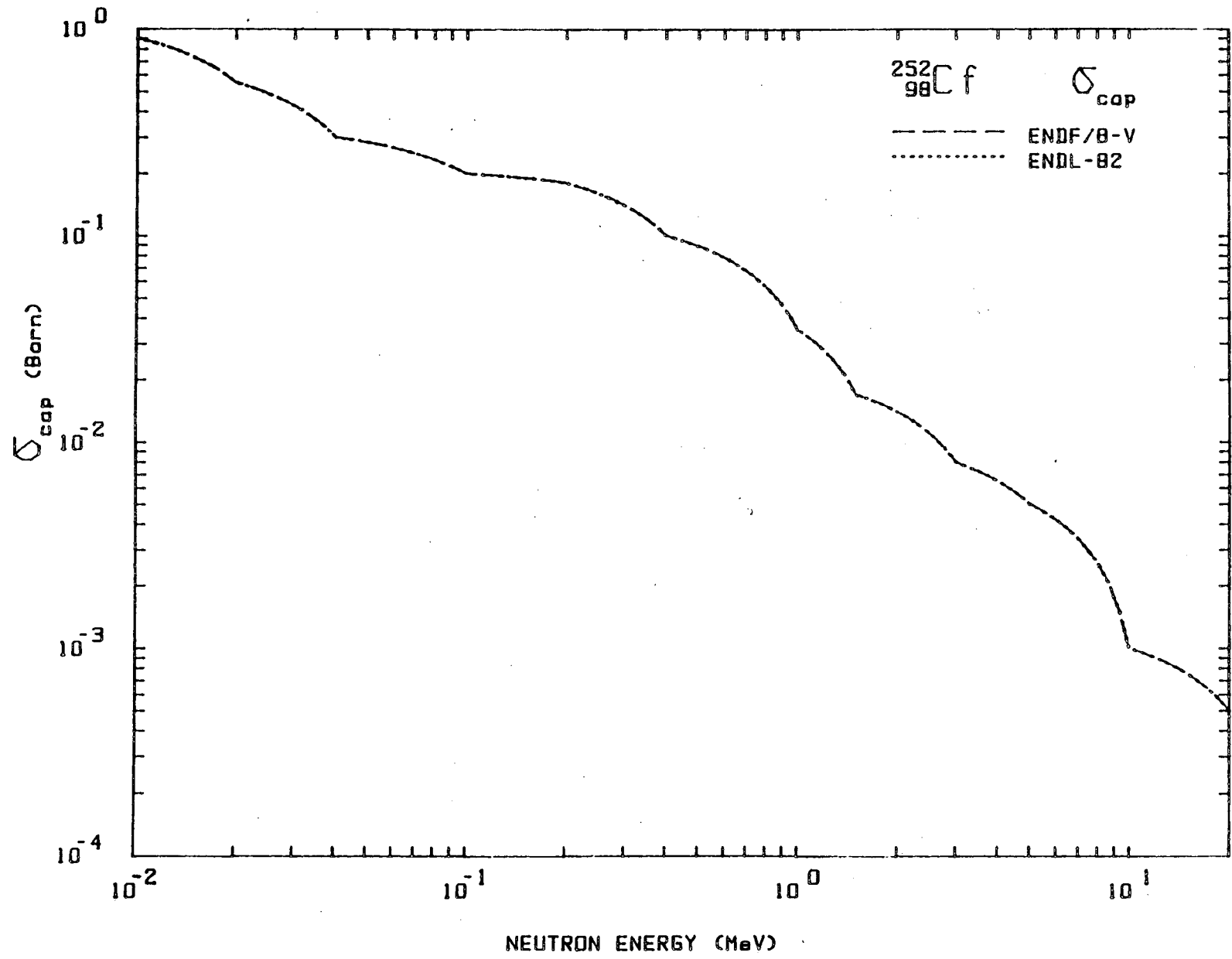
Reference	$RI_{\gamma}$ barns	$RI_f$ barns
ENDL -82	50.22	113.7
BNL 325 (1984)	43.5	110





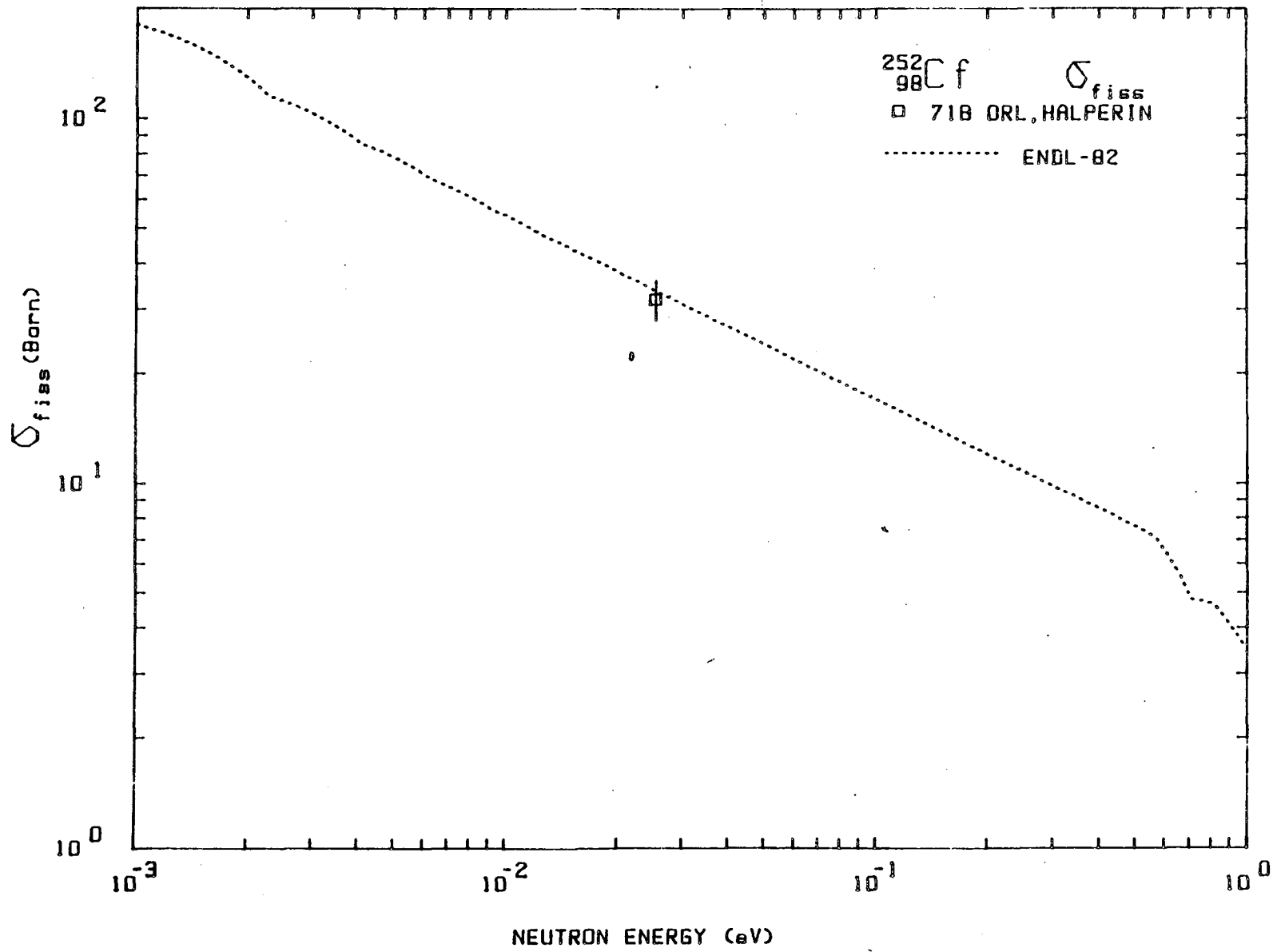


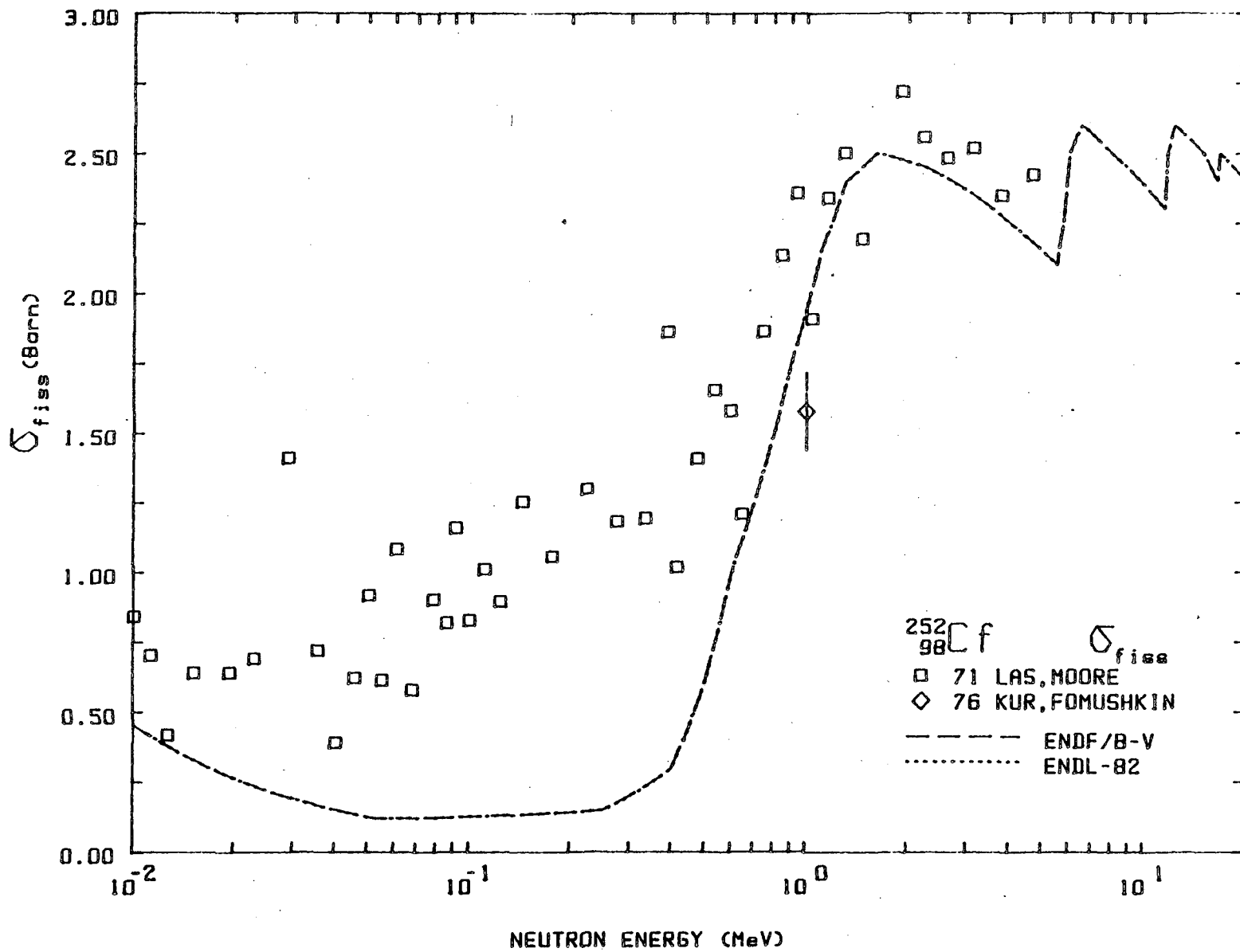




Experimental information  $^{252}\text{Cf}, \sigma_{\gamma}$ 

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
54 ANL, MAGNUSSON	1	$2.53 \cdot 10^{-2}$ eV	---	---	Mass spectrometry
54 BRK, HARVEY	1	$2.53 \cdot 10^{-2}$ eV	---	---	$^{253}\text{Es}$ activity
69 ORL, HALPERIN	1	$2.53 \cdot 10^{-2}$ eV	$^{59}\text{Co}, \sigma_{\gamma}$ 37 b	10 %	





Experimental information  $^{252}\text{Cf}, \sigma_{\text{fiss}}$

<u>Reference</u>	<u>Points</u>	<u>Range</u>	<u>Standard</u>	<u>Error</u>	<u>Comments</u>
71 LAS, MOORE	175	24 eV-4.7 MeV	$^6\text{Li}, \sigma_{n,\alpha} < 100 \text{ keV}$ $^{235}\text{U}, \sigma_f > 100 \text{ keV}$	<100 %	Underground nuclear expl., Physics 8
71B ORL, HALPERIN	1	$2.53 \cdot 10^{-2} \text{ eV}$ MXW	---	13 %	Fission track counting
76 KUR, FOMUSHKIN	1	1.0 Mev	$^{237}\text{Np}, \sigma_f$	9 %	



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