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NUCLEAR DATA EVALUATION FOR Th-232

George Vasiliu, Silvia Mateescu, Dan Gheorghe, Michaela Ciodaru, Elisabeta Badescu*, Nicolae Dragan, Oana Bujoreanu, Cornelia Craciun, Liviu Pintiliescu, Marius Zaharcu, Dumitru Popescu, Tatiana Statnicov, Vlad Avrigeanu

INSTITUTE FOR NUCLEAR POWER REACTORS PITESTI - ROMANIA

* INSTITUTE OF NUCLEAR PHYSICS AND ENGINEERING BUCHAREST

work performed in the framework of the IAEA-NDS Coordinated Research Programme on the Intercomparison of Evaluations of Actinide Neutron Nuclear Data

under IAEA-INPR Contract 2061/RB

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FINAL REPORT

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In this evaluation have contributed the following scientists:

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* *from Institute of Nuclear Physics and Engineering Bucharest*

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Abstract

In this report the methods, the analysis, and the results of the main neutron nuclear data regarding ^{232}Th are presented, and an evaluated file in ENDF/B-IV format covering the energy range between 10^{-5} eV and 20 MeV is supplied.

This file contains evaluated data for total, elastic, inelastic, radiative capture, fission, (n,2n) and (n,3n) cross sections. In addition, the elastic angular distributions, as Legendre coefficients, the average cosine of the scattering angle (laboratory system) ($\bar{\mu}_L$), and the average logarithmic energy decrement (ξ) for elastic scattering, the prompt, delayed and total average numbers of neutrons per fission, as well as the decay data and the fission yields are included.

The data are presented in appropiate forms accepted by the format, namely point-wise or parametric representation.

Breit-Wigner Single Level formalism for resonance treatment, optical and coupled channel models for elastic processes and double humped fission model as well as evaporation model have been also used in the data analysis.

The largest part of the data are based on experimental measurements, except (n,3n) cross section.

The final evaluated data set was checked against format correctness and physical consistency.

I. Introduction

This evaluation has been performed in the framework of the IAEA-NDS Coordinated Research Programme on the Intercomparison of Evaluations of Actinide Neutron Nuclear Data.

The purpose of this programme is to improve the available evaluated data files for actinide isotopes existing at IAEA for their use in "classical" reactor calculations, as well as in preparing the U-Th reactor alternative.

This work is mainly based on the existing experimental data, most of them being supplied by IAEA-NDS from EXFOR data base. The experimental information had been completed to a certain extent using the CINDA-index [I.1]. A survey of all used experimental data had already benn reported [I.2].

The covered energy ranges between 10^{-5} eV and 20 MeV.

The evaluated cross sections have been: the total cross section, the elastic and inelastic scattering cross section, the radiative capture cross section, the fission cross section, the (n,2n) and (n,3n) cross sections.

The average number of prompt and respectively delayed neutrons emitted per fission, elastic angular distributions (as Legendre coefficients), as well as the average cosine of the scattering angle and the average logarithmic energy decrement have been evaluated also. In the resonance region the BWSL parameters have been estimated; these last ones have benn previously reported [I.3].

To estimate quantities such as the total and the radiative capture cross sections, the fission cross section, the (n,2n) and (n,3n) cross sections, $\bar{\nu}$, the elastic angular distributions, $\bar{\mu}_L$, $\bar{\xi}$, etc., theoretical calculations have been also performed. Some of these results were included in the final evaluation.

Comparisons of our evaluated data to other evaluations have been done whenever these were possible.

The evaluated file also includes both, decay data and fission product yields, based on the newest available references.

The evaluated data are finally presented in the ENDF/B-IV format [I.4], including the resonance range under parametric form.

Usual data format and data consistency tests have been performed using the programmes CHECK-4, and SUMUP, and some other physical tests have been also done.

The evaluated file is presented together with both a brief description of the main evaluation methods used, and bibliography (MT = 451, MF = 1).

References

I.1. CINDA 76/77 and Supplements 1, 2, 3, 4.

I.2. Status Report, 17-19 April (1978).

I.3. Progress Report, August (1978).

I.4. D.Garber, C.Dunford, S.Pearlstein (ENDF 102), BNL-NCS-50496 (1975).

II. General Information on 232-Th

II.1. The 232-Th Evaluated Data Importance

Taking into account the growing efforts for a more efficient utilization of low-cost nuclear fuel reserves and the reduction of power costs from nuclear system [II.1] the importance of thorium for nuclear power systems has become obvious.

Indeed, 232-Th by neutron capture turns to 233-Th; it is unstable nucleus and decays by beta emission with a half-life of 22.3 min. into 233-Pa. This nucleus by another β-decay (and a half-life of 27 days) forms 233-U [II.2].

The 233-U nucleus is fissile by thermal neutrons and has an average number of neutrons emitted per absorbed neutron (η) higher than 235-U;for energies less than 40 KeV its value is even higher than for 239-Pu.

The complete transmutation chain is shown in Fig.II.1.

II.2. The 232-Th Main Nuclear Characteristics

To generate an evaluated data file, ENDF/B type, besides the reaction cross sections,the knowledge of some fundamental nuclear characteristics such as the atomic mass, the reaction Q-values, the reaction thresholds, the level scheme including the excitation energies, the spins and the associated parities, etc., is necessary.

So, one can specify that 232-Th is a deformed nucleus with the fundamental rotational band including the ground state (0^+) as well as the first three excited states: 49.37 KeV (2^+), 162.12 KeV (4^+) and 333.7 KeV (6^+).[II.3],[II.4]

The atomic mass of 232-Th has been taken as 232.038053805 a.m.u.;in neutronic mass the same quantity has a value of 230.0447163 (the neutron mass was taken 1.008665 a.m.u.)[II.5].

The Q-values of some neutronic processes and the associated reaction thresholds are listed in Table II.1.

The decay data have been taken from the ENDSF library (1978).

Using these data, the $\overline{E}_\alpha$ and $\overline{E}_\gamma$ mean energies have been calculated [II.6]. The $\overline{E}_\gamma$ value includes $\overline{E}_{icc}$ too.

The atomic masses from the reference [II.5] have been used.

The 232-Th decay scheme is shown in Fig.II.2.

The decay data were included in the file 1, MT = 457.

The 232-Th independent fission yields have been taken from the reference [II.7]. Each fission product is identified by a ZA = 1000.0·Z+A number and by its state (0.0 for the stable state and 1.0 for the first excited state). The independent yields less than 1% were reported with errors laying between 45% and 64%; for the remainded data the associated errors are between 11% and 45%.

The independent yield sum is about 2.0:

$$\sum_{i=1}^{N} y_i = 2.$$

These data have been included in the file 1, MT = 454.

References

II.1. Thorium fuel cycle, B.S.No.39, IAEA, (1970).

II.2. W.Seelmann-Eggebert, G.Pfennig, H.Münzel, Chart of the Nuclides , Karlsruhe, (1974)

II.3. C.M.Lederer, V.S.Shirley, Table of isotopes, 7th ed.,(1978).

II.4. Nuclear Data Sheets, vol.20, No.2, (1977).

II.5. A.H.Wapstra, K.Bos, Atomic Data and Nuclear Data Tables, 19,175,(1977).

II.6. T.R.England, R.E.Schenter, LA-6116-MS (ENDF-223), (1975).

II.7. M.E.Meek, B.F.Rider, NEDO-12154-2, (1977).

Table I

$_{88}Ra^{228}$

Level	Spin/Parity	$t_{1/2}$	Energy (MeV)	α-group intensity (%)	α decay hindrance factor
ground	0^+	5.76 y	0	77±3	1.0
first	2^+	0.55ns	0.059	23±3	1.0
second	4^+	-	0.185	0.20±0.08	8.1

Compare Fig.II.2. on page 7

Table II.1

Processes, Q-Values and Threshold Energies Adopted in this Evaluation

Reaction	Q-Value (MeV)	Threshold energy (MeV)
$^{232}Th(n,2n)^{231}Th$	-6.4364	6.4643789
$^{232}Th(n,3n)^{230}Th$	-11.5569	11.60713762
$^{232}Th(n,4n)^{229}Th$	-18.3479	18.42765797
$^{232}Th(n,p)\ ^{232}Ac$	-2.9204	2.933094923
$^{232}Th(n,np)^{231}Ac$	-7.7518	7.785496927
$^{232}Th(n,d)\ ^{231}Ac$	-5.5272	5.551226633
$^{232}Th(n,\alpha)\ ^{229}Ra$	8.3737	-
$^{232}Th(n,n\alpha)^{228}Ra$	4.0813	-
$^{232}Th(n,\gamma)\ ^{233}Th$	4.7863	-
$^{232}Th(n,f)$	175.86	1.11

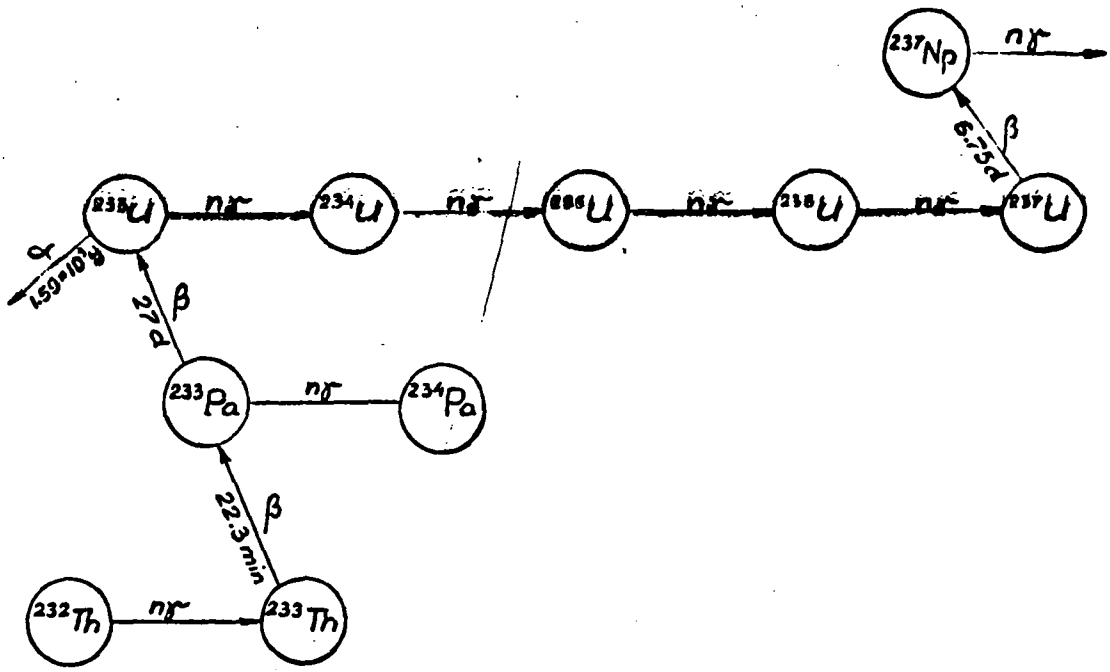


Fig.II.1. Nuclear reactions for the ^{232}Th - ^{233}U *fuel cycle.*

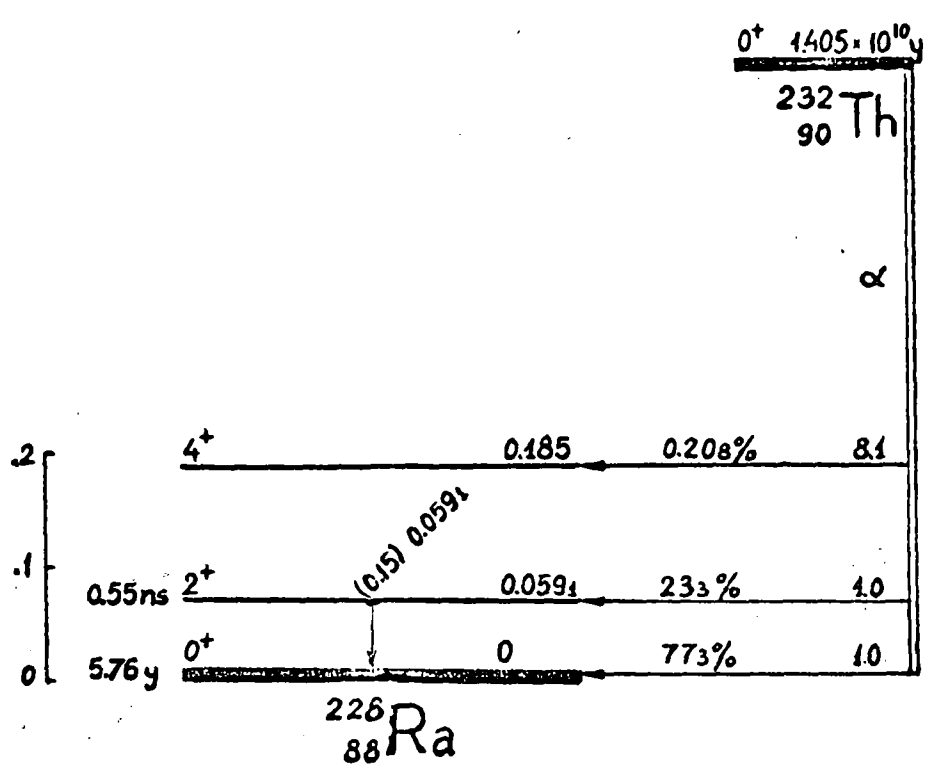


Fig.II.2. Decay scheme for ^{232}Th
Compare Table I on page ~~6~~ 5

III. Cross Section Evaluation in the Thermal Energy Range (10^{-5}eV - 10eV)

The elastic scattering and radiative capture are the only significant processes in the thermal region.

III.1. The Elastic Cross Section

Because of the lack of experimental data the elastic cross section has been calculated.

Taking into account the resolved resonance contribution in the thermal range Cooper's formula [III.1] was used:

$$\sigma_{el}(E) = \sigma_p + \sum_i \frac{0.66 g \Gamma_{ni}^{o\,2}}{(E-E_{Ri})^2 + (\frac{\Gamma_i}{2000})^2} + \sum_i \frac{c\sigma_p^{\frac{1}{2}} g \Gamma_{ni}^{o} (E-E_{Ri})}{(E-E_{Ri})^2 + (\frac{\Gamma_i}{2000})^2} \qquad (III.1)$$

where g is (Westcott's nomenclature):

$$g = (1 - \frac{3E_T}{E_r})(1 + \frac{E_o}{E_r})^2 \qquad (III.2)$$

and: E_T is the energy at the neutron temperature T (eV),
E_o is the energy for 2200 m/s neutrons (eV),
E_r is the numerical value of the negative resonance energy (eV),
$\sigma_p = 4\pi\hat{a}^2$ is the potential cross section,
$\hat{a}$ is the effective scattering radius,
Γ_{ni}^o is the reduced neutron width (meV),
$\Gamma_i = \Gamma_{\gamma i} + \Gamma_{ni}^o \sqrt{E_{Ri}}$ (III.3)
is the total width (meV),
$\Gamma_{\gamma i}$ is the radiative width (meV),
E_{Ri} is the resonance energy (eV).

The first 45 s-wave resonances up to 804.17 eV have been taken into account, together with a negative resonance at $E_r = -5.1$eV with $\Gamma_n = 2.07$ meV and $\Gamma_\gamma = 24$ meV. The scattering radius was taken 9.72 fm, reported by Camarda in 1974 (see Ch.IV).

III.2. The Radiative Capture Cross Section

There are very few available data for this kind of reaction in thermal energy range, most of the authors giving $\sigma_{n\gamma}$ at E_o = 0.0253 eV [III.2 - III.12], while only one author reports cross sections at several energies [III.13].

That's why 232-Th radiative capture cross section has been calculated by Lundgren's formula [III.13], which takes into account the lowest positive and the negative resonance contributions:

$$\sigma_\gamma(E) = \frac{p}{\sqrt{E}\ \{(E-E_r)^2 + (\frac{\Gamma}{2000})^2\}} + \frac{k_1}{\sqrt{E}} \qquad (III.4)$$

where E_r is the negative resonance energy, and Γ is the total width; "p" and "k" are some coefficients which have been derived.

At E_o energy, one can write the positive resonance contribution:

$$\frac{k_1}{\sqrt{E_o}} = \sum_i \frac{0.66 g \Gamma^o_{ni} \Gamma_{\gamma i}}{\sqrt{E_o}\ [(E-E_{Ri})^2 + (\Gamma_i/2000)^2]} \qquad (III.5)$$

We have assigned at E_o a value of 7.388 b to σ_γ, obtained as a weighted average over experimental data (Table III.1)

Thus, the negative resonance contribution has been deduced as:

$$7.388 - \frac{k_1}{\sqrt{E_o}} = \frac{p}{\sqrt{E_o}\ \{(E_o-E_r)^2 + (\frac{\Gamma}{2000})^2\}} \qquad (III.6)$$

and further, the coefficient "p" was obtained. The formula (III.4) is valid for energies ranging between $5 \cdot 10^{-4}$ eV and 2.5 eV; the calculated curve has been extrapolated to 10 eV to fit a value of 0.095 b, obtained from resonance parameter calculations.

III.3. The Total Cross Section

Although there are available experimental data for this cross section [III.14 - III.18], the evaluated total cross section was obtained as a sum of the computed elastic and radiative capture cross sections.

Over the energy range $5 \cdot 10^{-4}$ - 10 eV a good agreement with the experimental data was found.

A very good agreement at 10 eV, the energy limit between the thermal and resonance ranges was also found; thus, σ_{tot} is 11.58 b from resonance calculations and σ_{tot} is 11.53 b from calculations in thermal range.

To obtain the total and capture cross sections, between 10^{-5} eV and $5 \cdot 10^{-4}$ eV, resonance calculations were done. The elastic *cross section resulted as difference between the total and capture cross sections.*

Their values at E_o = 0.0253 eV are the following:

$$\sigma_{tot} = 21.418 \text{ b}$$
$$\sigma_{el} = 14.03 \text{ b}$$
$$\sigma_{n\gamma} = 7.388 \text{ b.}$$

The evaluated cross sections are shown in Fig.III.1.

References

III.1. G.S.Cooper, J.D.Garrison, Trans.Amer.Nuc.Soc.4,271(1961).

III.2. J.Gueron, W.E.Grummitt, MC-70(1944).

III.3. L.Seren, S.H.Turkel, H.N.Friedlander, R-CP-2376(1944).

III.4. H.Pomerance, Phys.Rev.88,412(1952).

III.5. P.E.Egelstaff, B.T.Taylor, AERE-NRDC-84,10(1955).

III.6. V.S.Crocker, J.Nucl.Energ.1,234(1955).

III.7. V.G.Small, J.Nucl.Energ.1,319(1955).

III.8. G.G.Myasishcheva, M.P.Anikina, L.L.Gildin, At.Energ. 2,22(1957).

III.9. J.W.Wade, DP-207(1957).

III.10. P.Hubert, R.Joly, G.Signarbieux, TID-7547(1957).

III.11. R.B.Tattersall, H.Rose, S.K.Pattenden, D.Jowitt, J.Nucl.Energ.12,32(1960).

III.12. J.Hardy Jr., Nucl.Sci.Eng.22,121(1965).

III.13. G.Lundgren, Nukleonok, 11,61(1968).

III.14. P.A.Egelstaff (1954).

III.15. K.K.Seth et al. Phys.Rev.110,692(1958).

III.16. F.G.P.Seidl et al., Phys.Rev.95,476(1954).

III.17. L.A.Rayburn et al., Nucl.Phys., 61,381(1965).

III.18. Havens, AECD-3288(1951).

Table III.1

(n,γ) Cross Section at 0.0253 eV

Authors	Institute	Year	σ(b)
J.Gueron [III.2]	USAANL	1944	7.75±0.30
L.Seren [III.3]	CANMON	1944	7.58±0.76
H.Pomerance [III.4]	USAORL	1952	7.30±0.40
P.E.Egelstaff [III.5]	UK HAR	1955	7.20±0.20
V.S.Crocker [III.6]	UK HAR	1955	7.31±0.12
V.G.Small [III.7]	UK HAR	1955	7.57±0.17
G.G.Myasishcheva [III.8]	CCPCCP	1957	7.31±0.10
J.W.Wade [III.9]	USASRL	1957	7.55±0.25
P.Hubert [III.10]	FR SAC	1957	7.60±0.16
R.B.Tattersall [III.11]	UK HAR	1960	7.50±0.30
J.Hardy, Jr. [III.12]	USAWAP	1965	7.33±0.117

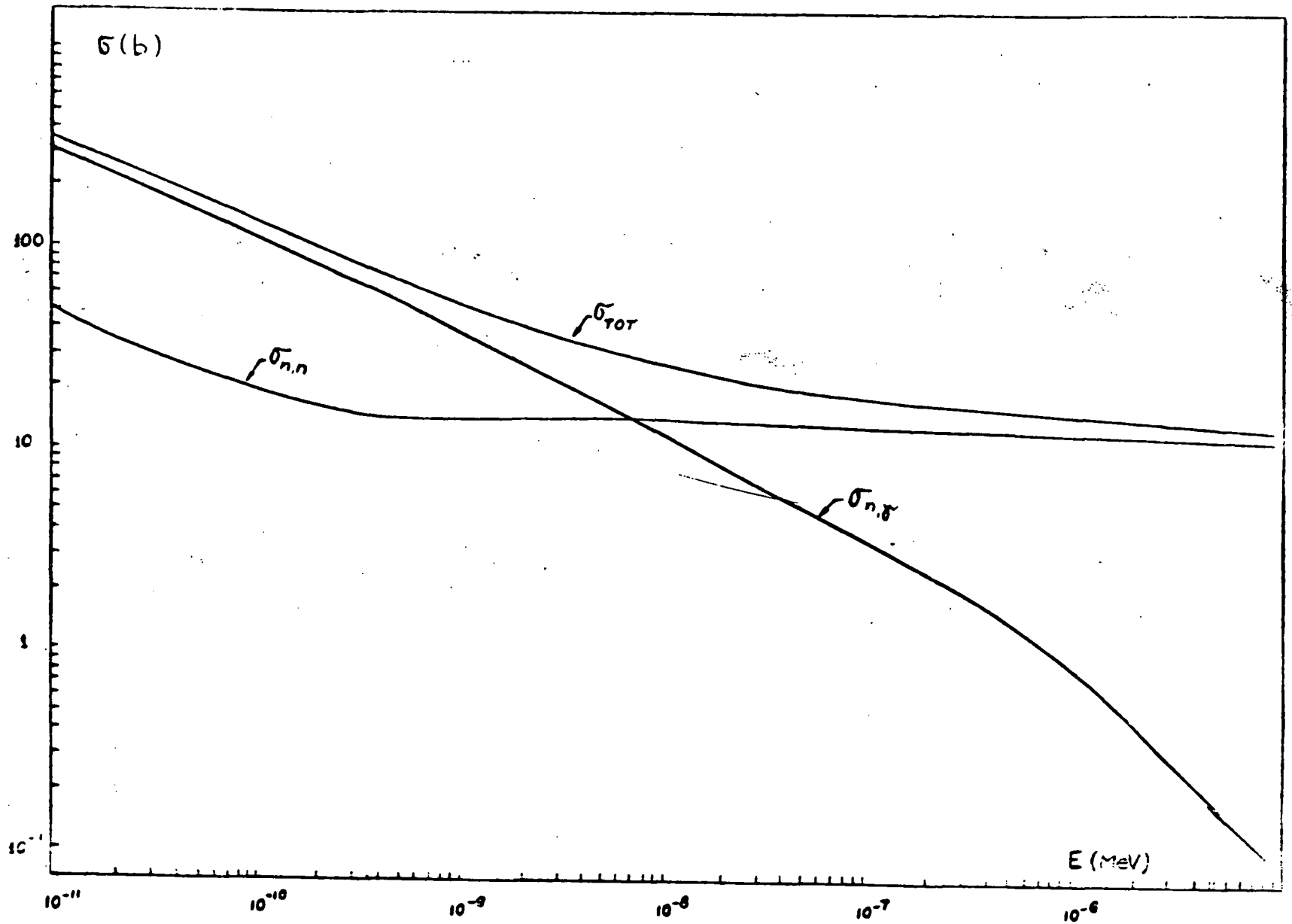


Fig.III.1. Evaluated total, elastic and radiative capture cross sections for thermal energy range

IV. The Cross Section Evaluation in the Resonance Energy Range

A. The Evaluation of the Breit-Wigner Single Level Parameters of the Resolved Resonances

For the resonance energy range (10eV - 4KeV), the available references contain both cross sections and resonance parameter data, as well as strength functions.

These contain about 4300 typical BW resonance parameters as: E_R, l, Γ_n, Γ_n^o, $g_J\Gamma_n^o$, $g_J\Gamma_n$, Γ_γ, Γ_t.

After an analysis of the 24 references containing experimental data the references [IV.1 - IV.10] were finally selected. A detailed description of the selection criteria is presented in Status Report-1978. In addition, the reference [IV.10], which contains significant information and has a good accuracy for the neutron and capture widths of 111 resonances, between 2.6 KeV and 4 KeV, was included also. The final recommended set of parameters is given for 403 resolved resonances.

IV.1. The Resonance Energies, E_R

For the evaluation of the resonance energies we had usually more than one experimental data set, and more than one value reported for each resonance. To assign the energy to each resonance E_R, we have computed the arithmetical mean of those close values, which, in the limits of errors, we suppose to describe the same resonance. We had not the possibility to performe the weighted mean, because there are not energy errors assigned to the measurements. Generally, we avoided to take into account those resonances reported by only one author, except those from references [IV.1], [IV.2], [IV.10], more recently reported and having a good precision. Some of the resonances reported in reference [IV.9] as probable, have benn included in the final recommended set, only if they have been quoted by at least one more author.

It is to be pointed out that most of the resonances which are given in only one reference are small resonances, having at least for reactor point of view, an insignificant contribution to the cross sections.

IV.2. The Neutron Widths, Γ_n

We performed the evaluation of neutron widths by weighted averaging of all experimental Γ_n values, assigned to each resonance. The references supply neutron widths in different forms: standard width Γ_n, reduced width Γ_n^o (for s-wave resonances, $\ell = 0$) or $g_J\Gamma_n$, $g_J\Gamma_n^o$, where g_J is the statistical weight factor.

Since we assumed $J = 1/2$ for all resonances, we have $g_J = 1$, and standard width has been obtained by well known formula: $\Gamma_n = \Gamma_n^o\sqrt{E}$ for s-wave resonances and $\Gamma_n \approx \Gamma_n^o E^{3/2}$ for p-wave resonances *and similary* $(\Delta\Gamma_n) = (\Delta\Gamma_n^o)\sqrt{E}$, *assuming* $\Delta E=0$.

Using the Γ_n and $\Delta\Gamma_n$ computed in this way we performed the weighted mean for each resonance, obtaining the recommended Γ_n values.

IV.3. The Gamma Widths, Γ_γ

The capture widths for 232-Th are reported for relatively small number of resonances. Taking into account the results from reference [IV.10] the number of resonances having experimental Γ_γ given, increased from 110 (reported in our Status Report) to 147 resonances. It is to be pointed out that often the values reported for the same resonance are very discrepant. In this case, we performed the weighted average of experimental values for each resonance for 98 resonances between 0.0 and 2600 eV, obtaining the recommended Γ_γ values.

Above 2600 eV we chose the Γ_γ values reported in reference [IV.10] for 49 resonances. A profound analysis shows average values of Γ_γ as follows: 21.2meV [IV.1], 20.5meV [IV.2], 20.9meV [IV.3], 21.6meV [IV.9], 19.8meV [IV.10]. In the same time, as it is mentioned, there is a weak dependence of the average Γ_γ on energy.

Taking into account our Γ_γ values for 147 resonances, we recommend below 2000eV an average value Γ_γ of 22meV and between 2000eV and 4000eV an average Γ_γ value of 20meV. These values are in very good agreement to the other references, except reference [IV.8].

IV.4. The Total Widths, Γ_t

The evaluated total widths have been taken as the sum of partial widths, Γ_γ an Γ_n, for the consistency of the data set.

The sum of evaluated Γ_γ and Γ_n for each resonance is in good agreement to each associated experimental Γ_t, within the experimental errors, as well as to the weighted mean of different Γ_t values from all references.

IV.5. The Orbital Angular Momentum (ℓ) and the Spin (J)

To compute the cross sections from resonance parameters the orbital angular momentum of the incoming neutron, ℓ , as well as the I and J spins of the target and compound nucleus are to be assigned [IV.12].

The spin I is zero for 232-Th. The values for orbital angular momentum are well known for 270 resonances, 235 being s-wave type (ℓ = 0), and the others 35 being p-wave type (ℓ = 1). For the other resonances we have assigned the "ℓ" values taking into account the recommended or suggested trends from BNL-325 [IV.11].

Regarding J values for s-wave resonances we have assigned, of course, 1/2 value. For p-wave resonances J can be 1/2 as well as 3/2 (see also Ch.IV.B). The analysed references have no indications on J-values, except for $g_J\Gamma_n$, allowing J = 1/2 and g_J = 1. The computed cross sections using J = 1/2 for all resonances are in good agreement with the experimental values.

IV.6. The Effective Scattering Radius, a

The evaluation of this quantity was done to obtain a maximum agreement between the experimental cross sections and those calculated from resonance parameters over the whole resonance range.

Using the radius given in ENDF/B-IV [IV.13] - 8.987 fm - a systematic difference of 3.5 b between the calculated total cross sections and the experimental ones was obtained. After some succesive attempts we obtained a very good fit with the value of 9.72 fm reported by Camarda [IV.14].

Therefore, the effective scattering radius indicated in our evaluation is 9.72 fm.

IV.7. The Negative Resonance Parameters.

The negative resonance parameter fit was done so that the calculated and the experimental cross section values at 10eV (the lower energy limit of resonance region) should be the same.

The parameters given in references [IV.13] and [IV.15] which indicate the same energy of -5.1eV and the same radiative width of 24meV were used as starting parameters. It is to be noted that using the parameters from [IV.11], [IV.16], [IV.17], [IV.18] to calculate the cross sections over the energy range 0-10eV, we obtained considerable different values against the experimental ones, while the parameters from [IV.13] and [IV.15] led to relative small differences between the calculated and the experimental data.

The Table IV.1 contains the parameters quoted in literature as well as those evaluated by us.

We have mentained in our evaluation the energy of -5.1eV and the radiation width of 24meV and we have modified the neutron width so that to obtain at 10eV a total cross section of 11.58 b - the average of the experimental total cross section values at this energy.

The final obtained data are Γ_n = 4.675meV and Γ_t =28.675meV

IV.8. Checks of Evaluated Resonance Parameters

We performed two types of comparisons:the computed strength functions and cross sections from our resonance parameters have been compared with the available experimental data.

IV.8.1. The s-Wave Strength Function

We computed the s-wave neutron strength function using the formula $S_o = \langle g\Gamma_n^o\rangle/\langle D^o\rangle$, where the mean level spacing $\langle D^o\rangle$ and $\langle g\Gamma_n^o\rangle$ are obtained from our resonance parameters. The results are presented comparatively with the available experimental values from [IV.1] and [IV.2] references in Table[IV.2].

The computed s-wave neutron strength functions differ with no more than 4 percents from those reported in experimental works and in the same time, they are in the limits of experimental errors. It is to be noted the very good agreement to the last reported data [IV.14], [IV.23].

A good agreement is also obtained between the computed and experimental values for $\langle D^0 \rangle$: for instance between 8eV and 3000eV, the computed value is 16.57±0.9eV and the experimental value is 17±1eV reported in reference [IV.9].

IV.8.2. The Resonance Cross Section Calculation

The calculations were performed with ETRES code [IV.19].

Finally, the total, capture, and elastic cross sections over the whole resonance region (10eV - 4000eV) were calculated using the formalism from [IV.12],[IV.20]. The ETRES code calculates the Doppler broadened cross sections.

Also, SIGMA1 code [IV.21] have bees used. It is to be noticed a very good agreement with the experimental data and the errors (≤1%) are much smaller than the experimental ones.

The evaluated total cross section is shown in Fig.IV.1.

The resolved resonance parameters are included in the file 2, MT = 151.

B. The Evaluation of the Unresolved Resonance Parameters.

The unresolved resonance region was taken between the upper limit of the resolved resonance region, 3.9958KeV and the threshold energy for the inelastic scattering, 49.5KeV.

The unresolved resonance parameters, the average level spacing, the mean reduced neutron widths for $\ell = 0$ and $\ell=1$, the mean radiative capture width, and the number of degrees of freedom of the neutron level width distribution, are derived by analysing the resolved resonance parameters for s and p waves, and using the Gyulassy's formalism [IV.22].

IV.9. The s-Wave Parameters ($\ell=0$)

The cumulative number of s-wave resonances versus energy is presented in Fig.IV.2.

It is easy to see that the plot of the level position vs. level number is linear up to 3 KeV.

In the energy range 3KeV- 4KeV, there are some resonances with small neutron widths, and reported only by one author [IV.16]: 3.0069KeV, 3.168KeV, 3.2165KeV, 3.2379KeV, 3.3623KeV, 3.2379KeV, 3.3623KeV, 3.4586KeV, 3.5023KeV, 3.5522KeV, 3.6665KeV, 3.779KeV, 3.8124KeV, 3.836KeV, 3.861KeV, 3.917KeV, which can be p-wave resonances.

For safety, the average level spacing $\langle D(0)\rangle$ was computed only up to 3KeV, where there are 179 resonances. The obtained value for $\langle D(0)\rangle = \langle D(0,\frac{1}{2})\rangle$ is 16.57±0.9eV which agrees well with experimental value of 17±1eV reported in reference [IV.9], as well as to that adopted by Camarda, of 16.8eV [IV.14]. The error has been determined using the formula $\sigma^2 = 0.54\langle D(0)\rangle^2/n$, where n is the number of levels.

Taking this value for $\langle D(0)\rangle$ as an average over the whole resolved s-wave resonance range, it can be assumed that the number of s-wave resonances is slightly overestimated, between 3KeV and 4KeV.

The histogram plot of observed distribution of nearest-neighbour level spacing is shown in Fig.IV.3., in comparison with Wigner distribution:

$$P(x) = \frac{\pi}{2} \exp(-\frac{\pi}{4} x^2), \qquad (IV.1)$$

where:

$$x = D(0)/\langle D(0)\rangle.$$

The mean reduced neutron widths for s-wave resonances up to 3KeV

$$\langle \Gamma_n^o(\tfrac{1}{2})\rangle = \frac{\sum_{i=1}^{n} \Gamma_{n_i}^o(\tfrac{1}{2})}{n} \qquad (IV.2)$$

with:

$$\Gamma_n^o(\tfrac{1}{2}) = \Gamma_n(\tfrac{1}{2})/\sqrt{E} \qquad \text{is } 1.419\pm0.08\text{meV}. \qquad (IV.3)$$

The reduced neutron widths seem to be distributed according to a chi-squared distribution with one degree of freedom, $\nu=1$, Porter-Thomas (Fig.IV.4).

Using the obtained values for $\langle D(0)\rangle$ and $\langle \Gamma_n^o(\tfrac{1}{2})\rangle$ the s-wave strength function becomes:

$$S_o = S(0) = \frac{\langle g\Gamma_n^o(\tfrac{1}{2})\rangle}{\langle D(0)\rangle} = (0.8559\pm0.09)\cdot 10^{-4} \qquad (IV.4)$$

with $g=1$.

The error has been computed as: $(2/n)^{\frac{1}{2}}\cdot S(0)$.

IV.10. <u>The p-Wave Parameters ($\ell=1$)</u>

The p-wave resonances for Th^{232} should be with both $J=1/2$, $J=3/2$ spin states.

We had available 144 experimental resonances in the energy range up to 3 KeV, unseparated yet by their J values.

The histogram of the cumulative number of p-wave resonances $N(\ell)$ versus neutron energy is shown in Fig.IV.5.

In the same figure $N(\ell,J) = f(E)$ for $J=1/2$ and $N(\ell,All) = f(E)$ are also presented, where "All" means p-wave resonances with $J=1/2$ or $J=3/2$.

The slopes of these lines are: $1/\langle D(0)\rangle$ and $3/\langle D(0)\rangle$, calculated using the Gyulassy's formalism[IV.22].

We can anticipate that, up to 3 KeV a number of $179 \cdot 3 = 537$ resonances are expected (179 resonances with $J=1/2$ and $179 \cdot 2 = 358$ resonances with $J=3/2$). From Fig.IV.5 it is obvious a lack of levels, even for low energies, and that available experimental p-wave resonances are a mixture of both spin states, at least up to 1.7 KeV.

It is clear that, from Fig.IV.5, we cannot estimate $\langle D(1,\frac{1}{2})\rangle$ and $\langle D(1,3/2)\rangle$ from experimental data. In these circumstances these were determined as:

$$\langle D(1,\tfrac{1}{2})\rangle = \langle D(0)\rangle = 16.57 \pm 0.9 \text{ eV}$$
$$\langle D(1,3/2)\rangle = \frac{\langle D(0)\rangle}{2} = 8.285 \text{ eV}. \qquad (IV.5)$$

It seems to be impossible to estimate $\langle \Gamma_n^1(J)\rangle$ from experimental data as long as the p-wave resonances are not well separated according to their J states.

In this case, an estimation of $\langle \Gamma_n^1(J)\rangle$ using the p-wave strength function and $\langle D(\ell,J)\rangle$ values, is only way to be followed. On the other hand, an estimation of $S(1)$ from the dependence of $\sum g\Gamma_n^1$ versus energy (Fig.IV.6) appears to have less confidence even if we use only the lower energy range (for instance, 0 - 500 eV).

We adopted for $S(1)$ the more recent reported value, $(1.5 \pm 0.4) \cdot 10^{-4}$, from reference [IV.14], and consequently,

$$\langle \Gamma_n^1(1/2)\rangle = S(1) \cdot \langle D(0)\rangle = 2.4855 \text{ meV}$$
$$\langle \Gamma_n^1(3/2)\rangle = S(1) \cdot \langle D(0)\rangle/2 = 1.24275 \text{ meV}. \qquad (IV.6)$$

The reduced neutron widths of the all p-wave experimental resonances ($J=1/2$ plus $J=3/2$) are still distributed in a

in a chi-squared distribution with three degrees of freedom, $\nu=3$, as has been previously reported by Steen [IV.24] in 1970.

This situation confirms once more the lack of a large number of weak resonances.

Since $\langle\Gamma_n^1(J)\rangle$ and $\langle D(\ell)\rangle$ have been theoretically estimated, $\nu=1$, for number of degrees of freedom has been assumed. The average capture width has been computed from experimental data as: $\langle\Gamma_\gamma\rangle = 21.0 \pm 0.77$ meV.

The unresolved resonance parameters for ^{232}Th are comprehensive given in Table IV.3 which contains comparatively two others recent sets.

The typical ENDF/B unresolved resonance parameters from this table have been included in the final data set for MF=2, MT=151.

IV.11. Elastic and Capture Cross Sections for Unresolved Resonance Energy Range

Between 4 KeV and 50 KeV we have computed the elastic and capture cross sections using several sets of unresolved parameters (Table IV.3) by AVERAGE-3 programme [IV.25]. The results are comparatively presented in Table IV.4.

C. The Radiative Capture Resonance Integral

To verify the correctness of radiative capture resonance parameters, we have analysed the corresponding resonance integrals, both from experimental measurements and computed from our resonance parameters.

In this report we had available 14 references [IV.15], [IV.17], [IV.26 - IV.37]. Those chosen for analysis are presented in Table IV.5.

The reported values have been renormalized according to the newest available standards:

$$I_\gamma^{197}Au = 1560 \pm 40 \text{ b}$$

$$I_\gamma^{197}Au(>1/v) = 1515.5 \text{ b}^* \qquad [IV.11]$$

---

* Derived as $I_\gamma^{197}Au - 0.45\cdot\sigma_\gamma^{197}Au(0.0253)$ [IV.11].

$$\sigma_\gamma^{197}Au(0.0253) = 98.8 \pm 0.3\ b \qquad [IV.11]$$

$$\sigma_\gamma^{232}Th(0.0253) = 7.388\ b\ (See\ Ch.III.3).$$

From this table, a value of 85 b for radiative capture resonance integral of ^{232}Th should be a resonable estimation. Using RESEND programme [IV.38] with an accuracy criterion of 10%, the radiative capture cross section from resonance parameters was computed.

A value of 81.81 ± 8 b, using INTER programme [IV.38], with a Cadmium cutoff energy of 0.5eV, has been obtained for the radiative capture resonance integral for ^{232}Th.

Even if this value in the limits of error, seems to be in agreement to the experimental ones, as well as to the recommended value of 85 ± 3 b from BNL-325 [IV.11], it appears to be slightly smaller. This fact can be attributed to the accuracy of radiative capture experimental widths, which are reported with errors between 5% and 60%. Since most of them are reported with errors around 10%, this was the reason to take the same accuracy criterion for $\sigma_\gamma(E)$ calculations with RESEND code. For an accuracy criterion of 5% for σ_γ cross section calculation, a value of 80.22 ± 4 b was obtained for I_γ.

References

IV.1. F.Rahn et al., Phys.Rev.C5,1854(1972).

IV.2. L.Forman et al., 3rd Conf.on Neutron Cross Sections and Technology, Knoxville (1971).

IV.3. M.Asghar et al., Nucl.Phys.76,196(1966).

IV.4. N.Palevski (1965).

IV.5. L.M.Bollinger, Phys.Lett.8,45(1964).

IV.6. J.B.Garg et al., Phys.Rev.134,B985(1964).

IV.7. E.Haddad et al., Phys.Rev.140,B50(1965).

IV.8. C.A.Uttley et al., AERE-PR/NP-2.1(1962).

IV.9. P.Ribon (1970).

IV.10. R.L.Macklin, J.Halperin, Nucl.Sci.Eng.64,849(1977).

IV.11. S.F.Mughabghab, D.I.Garber, BNL-325,3rd ed.vol.1(1973).

IV.12. M.K.Drake, BNL-50274,ENDF-102,vol.1(1970).

IV.13. B.A.Magurno, BNL-NCS-50446(1975).

IV.14. H.S.Camarda, Phys.Rev.C9,1,28(1974).

IV.15. G.Lundgren, Nukleonik,11,61(1968).

IV.16. K.K.Seth et al., Phys.Rev.110,692(1958).

IV.17. L.F.Tiren, J.M.Jenkins, AEEW-R-163(1962).

IV.18. A.B.Smith, P.T.Gunther, EANDC(US)62(1965).

IV.19. D.Gheorghe, Priv.Comm.

IV.20. D.Garber, C.Dunford, S.Pearlstein (ENDF-102), BNL-NCS-50496(1975).

IV.21. D.E.Cullen, UCRL-50400, vol.17,PartB(1977).

IV.22. M.Gyulassy, S.T.Perkins, Nucl.Sci.Eng.53,482(1974).

IV.23. A.R.de L.Musgrove, AAEC/E-277(1973).

IV.24. N.M.Steen et al., WAPD-TM-971(1970).

IV.25. M.R.Bhat, BNL-50296(1973).

IV.26. J.Hardy Jr., WAPD-T-1748(1964).

IV.27. L.Seren et al., CP-2376(1944).

IV.28. R.Vidal, CA-2486(1964).

IV.29. M.Brose, Nucl.Sci.Eng.19,244(1964).

IV.30. G.G.Myasishcheva et al., At.Energ.2,22(1957).

IV.31. L.Breitenhuber et al., Atomkernenergie 15,83(1970).

IV.32. E.Steinnes, J.Inorg.Nucl.Chem.34,2699(1972).

IV.33. J.B.Sampson, GA-3069(1962).

IV.34. R.L.Macklin et al., J.Inorg.Nucl.Chem.2,243(1955).
IV.35. F.J.Johnston et al., J.Nucl.Energ.11,95(1960).
IV.36. W.K.Foell et al., Nucl.Sci.Eng.21,406(1965).
IV.37. J.Hardy Jr., Nucl.Sci.Eng.22,121(1965).
IV.38. O.Ozer, BNL-17134(1973).

Table IV.1

The negative resonance parameters

Reference	Year	E (eV)	J	ℓ	Γ (meV)	Γ_n (meV)	Γ_n^o (meV)	$g\Gamma_n^o$ (meV)	Γ_γ (meV)
Seth [IV.16]	1958	-7					5.5		30
Lundgren [IV.15]	1968	-5.1±0.5		0		4.06497	1.8±0.4		24
Tiren [IV.17]	1962	-4.3				1.4598	0.704		40
Smith [IV.18]	1965	-3.5				1.1898	0.636		30
Mughabghab [IV.11]	1973	-4.4	½	0		1.699	0.81	0.81	21.2
Magurno [IV.13]	1975	-5.1	½	0	28.204	4.204	1.862		24.0
This evaluation	1978	-5.1	½	0	28.675	4.675	2.0701		24.0

Table IV.2

Strength functions for s-wave resonances

Energy range (eV)	Computed $S_o \cdot 10^4$	Experimental $S_o \cdot 10^4$	Reference Year	Relative error(%)
0 - 1000	0.7897	0.8 ±0.14	[IV.1]1972	1.3
1000 - 2000	0.9070	0.88±0.16	[IV.1]1972	3.1
2000 - 3000	0.8428	0.82±0.15	[IV.1]1972	2.8
3000 - 4000	0.5754	0.56±0.12	[IV.1]1972	2.7
		0.89±0.11	[IV.9] 1970	3.8
8 - 3000	0.8559±0.09	0.85±0.08	[IV.23]1973	0.7
		0.86	[IV.14]1974	0.48

Table IV.3.

The unresolved resonance parameters for ^{232}Th

Quantity / Data set	$\hat{a}$ (fm)	$\langle D(0,\frac{1}{2})\rangle$ (eV)	$\langle D(1,\frac{1}{2})\rangle$ (eV)	$\langle D(1,\frac{3}{2})\rangle$ (eV)	$\langle \Gamma_n^0(\frac{1}{2})\rangle$ (meV)	$\langle \Gamma_n^1(\frac{1}{2})\rangle$ (meV)	$\langle \Gamma_n^1(\frac{3}{2})\rangle$ (meV)	$\langle \Gamma_\gamma\rangle$ (meV)	$S_0 \cdot 10^4$	$S_1 \cdot 10^4$
Wittkopf [IV.13]	8.9874	17	17	8.5	1.2417	2.04	1.02	25.9	0.73	1.2
Camarda [IV.14]	9.72±0.3	16.8	16.8	8.4	1.4448	2.52	1.26	21.2	0.86	1.5±0.4
This evaluation	9.72±0.3	16.57±0.9	16.57±0.9	8.285	1.419± 0.08	2.4855	1.24275	21.± 0.77	0.8559 ±0.09	1.5±0.4

Table IV.4

The computed elastic and capture cross sections between 4 KeV and 50 KeV

Energy (KeV)	Elastic cross section (b)			Capture cross section (b)		
	I	II	III	I	II	III
4	13.93	16.51	16.49	1.1301	1.0816	1.0834
6	13.28	15.68	15.66	0.9276	0.8912	0.8927
8	12.87	15.17	15.15	0.8201	0.7877	0.7891
10	12.59	14.82	14.80	0.7499	0.7185	0.7198
12	12.39	14.55	14.54	0.6981	0.6665	0.6678
14	12.22	14.34	14.33	0.6570	0.6247	0.6260
16	12.09	14.17	14.16	0.6227	0.5896	0.5909
18	11.98	14.03	14.02	0.5931	0.5594	0.5607
20	11.89	13.91	13.90	0.5672	0.5329	0.5341
22	11.81	13.80	13.79	0.5439	0.5092	0.5104
24	11.73	13.70	13.69	0.5230	0.4879	0.4891
26	11.67	13.62	13.61	0.5039	0.4685	0.4697
28	11.61	13.54	13.53	0.4863	0.4508	0.4520
30	11.56	13.47	13.46	0.4701	0.4346	0.4357
32	11.51	13.40	13.39	0.4551	0.4196	0.4207
34	11.46	13.34	13.33	0.4411	0.4056	0.4067
36	11.42	13.28	13.27	0.4280	0.3927	0.3937
38	11.38	13.22	13.22	0.4158	0.3806	0.3816
40	11.34	13.17	13.17	0.4043	0.3693	0.3703
45	11.25	13.05	13.05	0.3783	0.3439	0.3448
50	11.18	12.95	12.94	0.3556	0.3219	0.3228

Legendum

I - *Wittkopf* [IV.13]

II - *Camarda* [IV.14]

III - *This evaluation*

Table IV.5

The experimental and renormalized values for radiative capture resonance integral for ^{232}Th.

Reference	Comments	Standards				Experimental values		Renormalized values	
		^{197}Au I_γ >1/v	^{197}Au I_γ total	^{197}Au $\sigma_\gamma(0.0253)$	^{232}Th $\sigma_\gamma(0.0253)$	I_γ >1/v	I_γ total	I_γ>1/v	I_γ total
Tiren[IV.17] 1962	RI Activation >0.5eV	1510	-	-	-	83±6	-	83.27±6	80.7 ±6
Hardy[IV.26] 1964	RI Activation >0.5eV	-	1555	98.8	7.33	-	82.5±3	-	82.85±3
Vidal[IV.28] 1[illegible]	RI pile osci. >0.[illegible]eV	1540	-	98.9	7.5	97±4	-	93.74±4	87.[illegible] ±4
Prose[IV.29] 1964	RI Activation >0.5eV	-	1535.8 1461.8	99.3 99.3	7.45 7.45	-	87[illegible] ±2 82.7±1.8	-	87.53±2 87.56±1.8
Breitenhuber [IV.31]1970	RI Abs.Activ. 0.4-10 eV	-	1509±45	98.5	7.4±0.1	-	89.8±4	-	-
Steinnes [IV.32]1972	I_γ Activation >0.5eV	-	1550	-	7.4±0.1	-	88 ±3	-	88.4 ±3
Sampson [IV.33]1962	RI Activation >0.5eV	-	-	-	-	80±5	83 ±5	-	-
Johnston [IV.35]1960	RI Activation >0.5eV	-	1565	98.8	7.6	-	85 ±8	-	82.36±8
Bell[IV.36] 1965	RI React.Coeff >0.5eV	-	- 1535	-	-	-	81.2±3.4 79.3±4	-	- 80.6 ±4
Adopted standards		1515	1560±40	98.8±0.3	7.388				

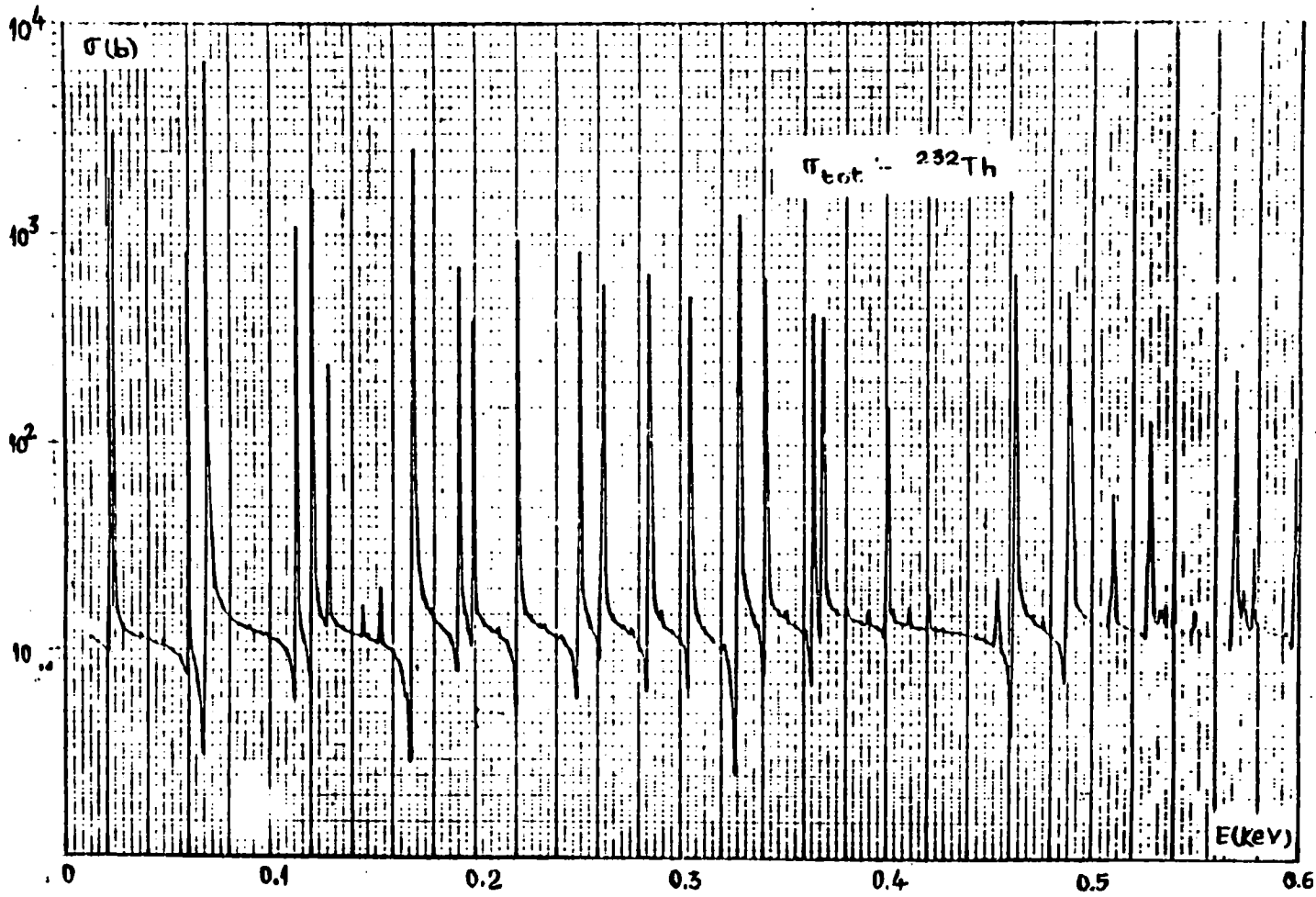


Fig.IV.1. Total cross section computed from resolved resonance parameters.

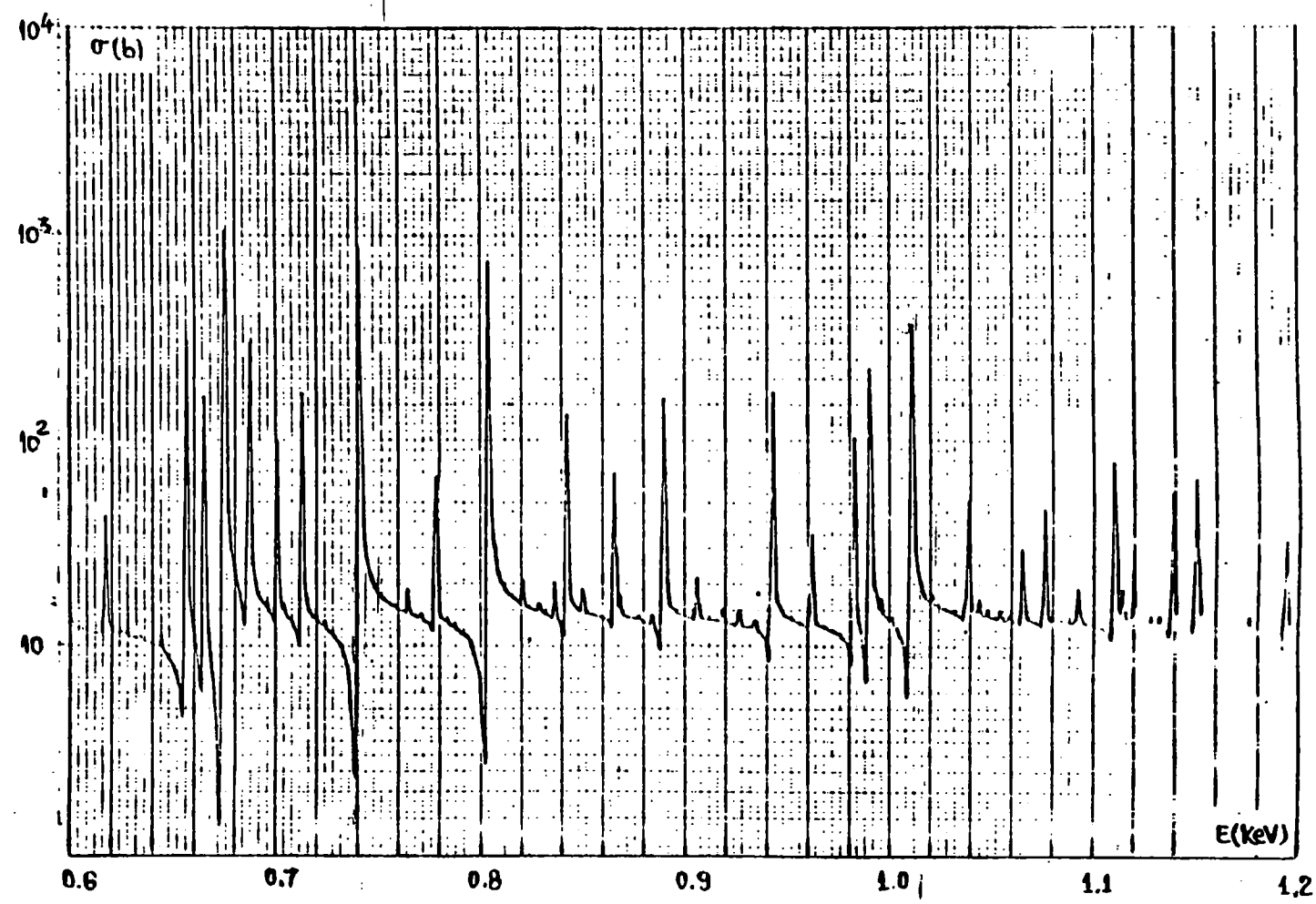
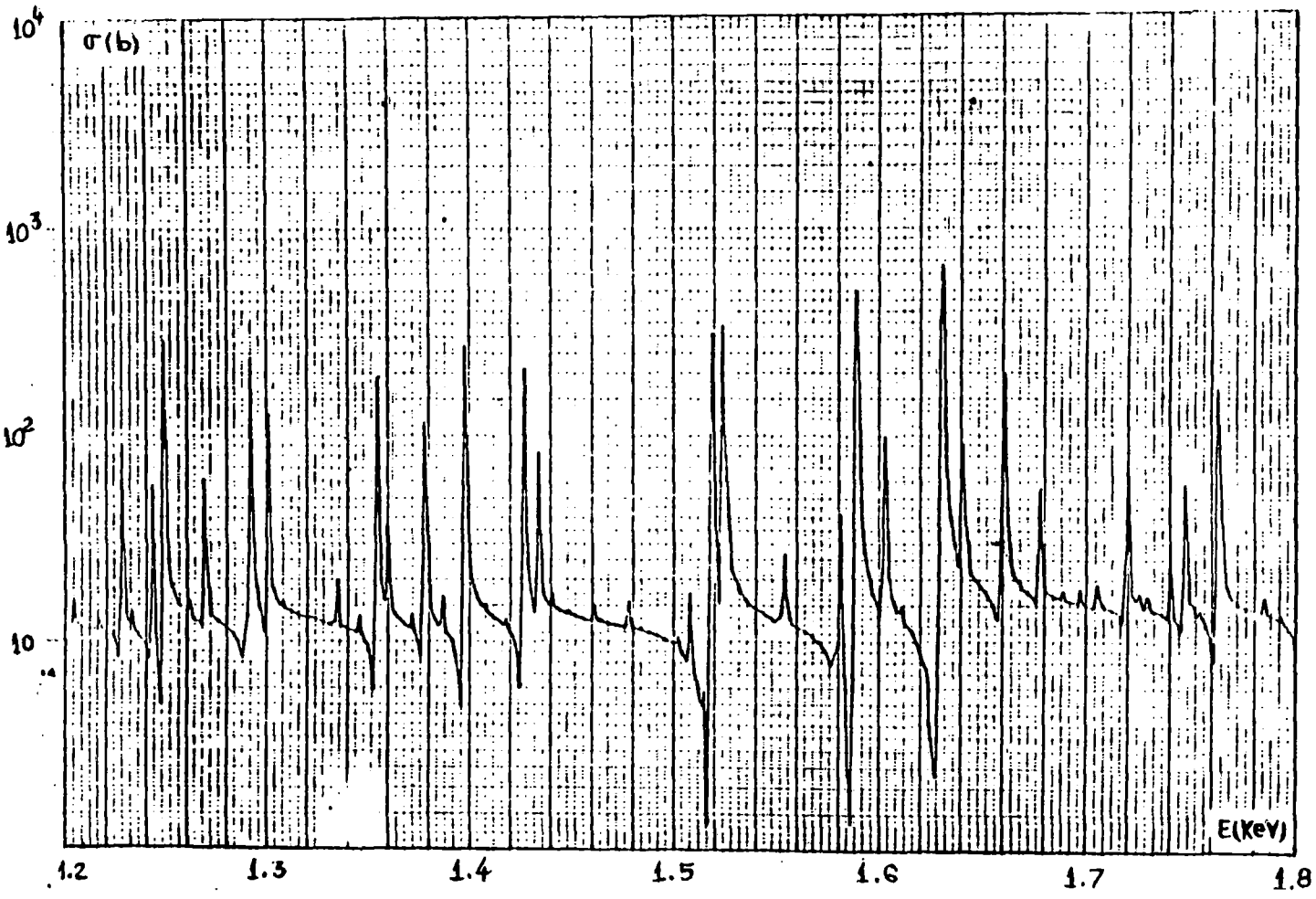


Fig.IV.1. (cont.)



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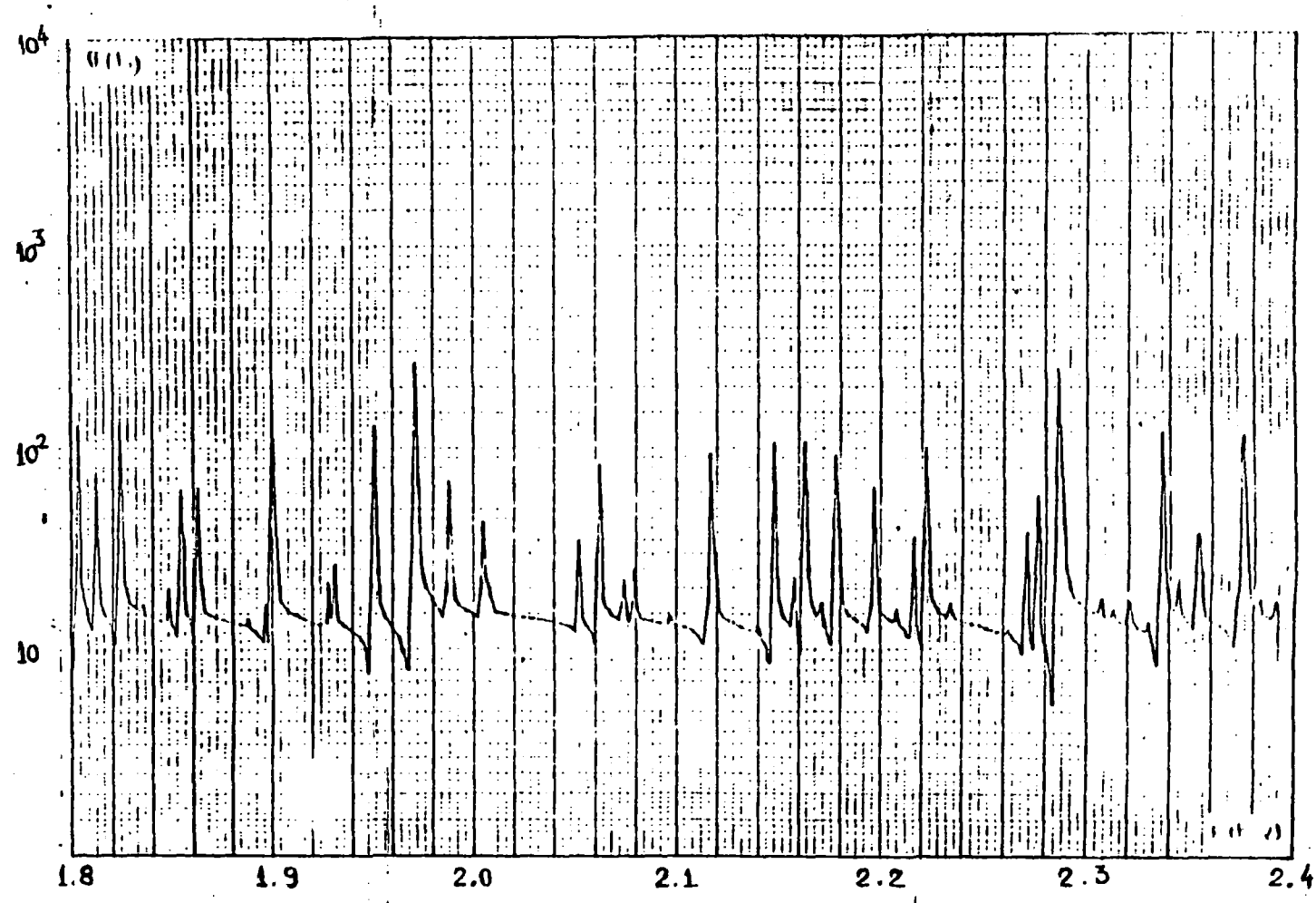
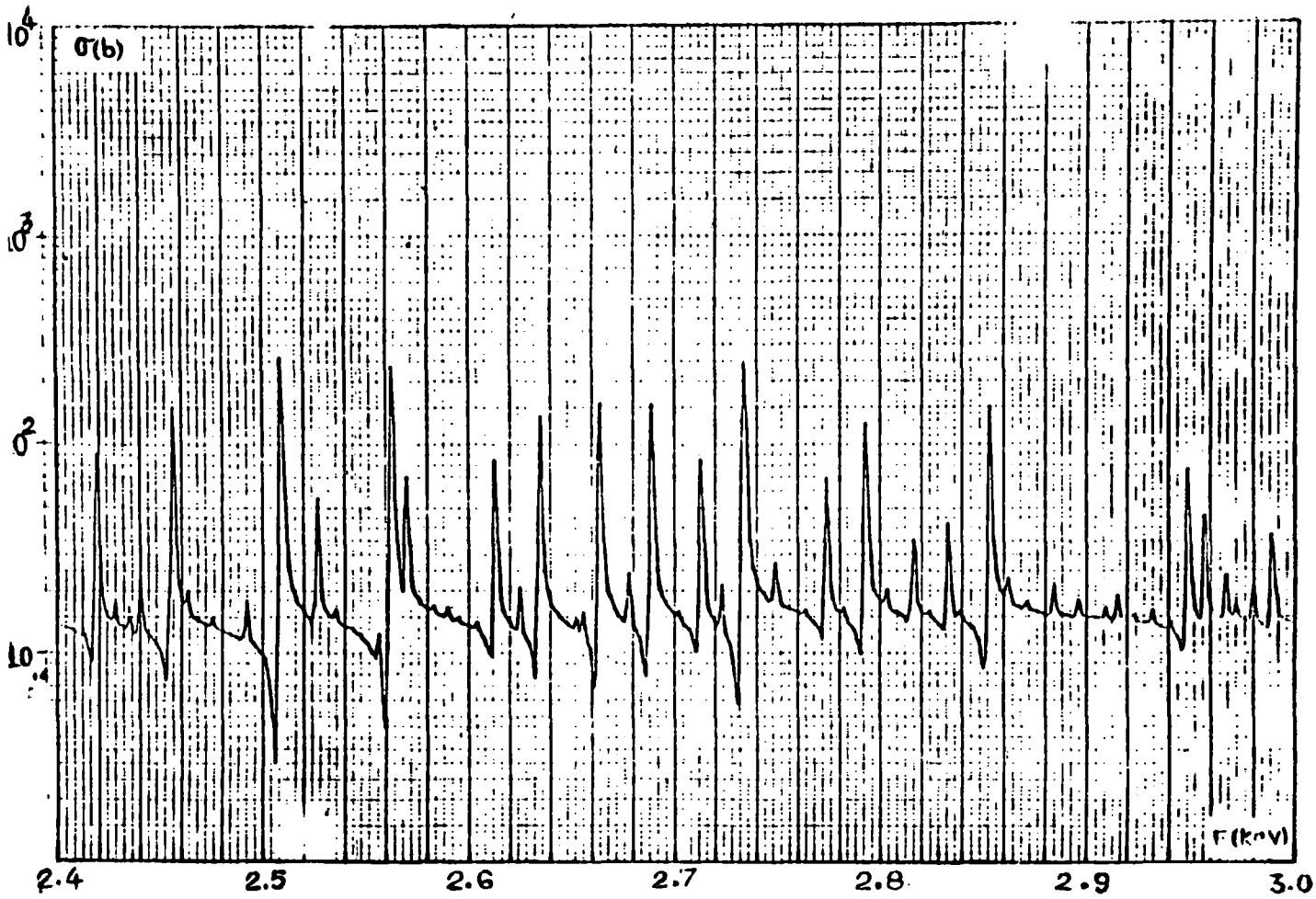


Fig.IV.1.(cont.)



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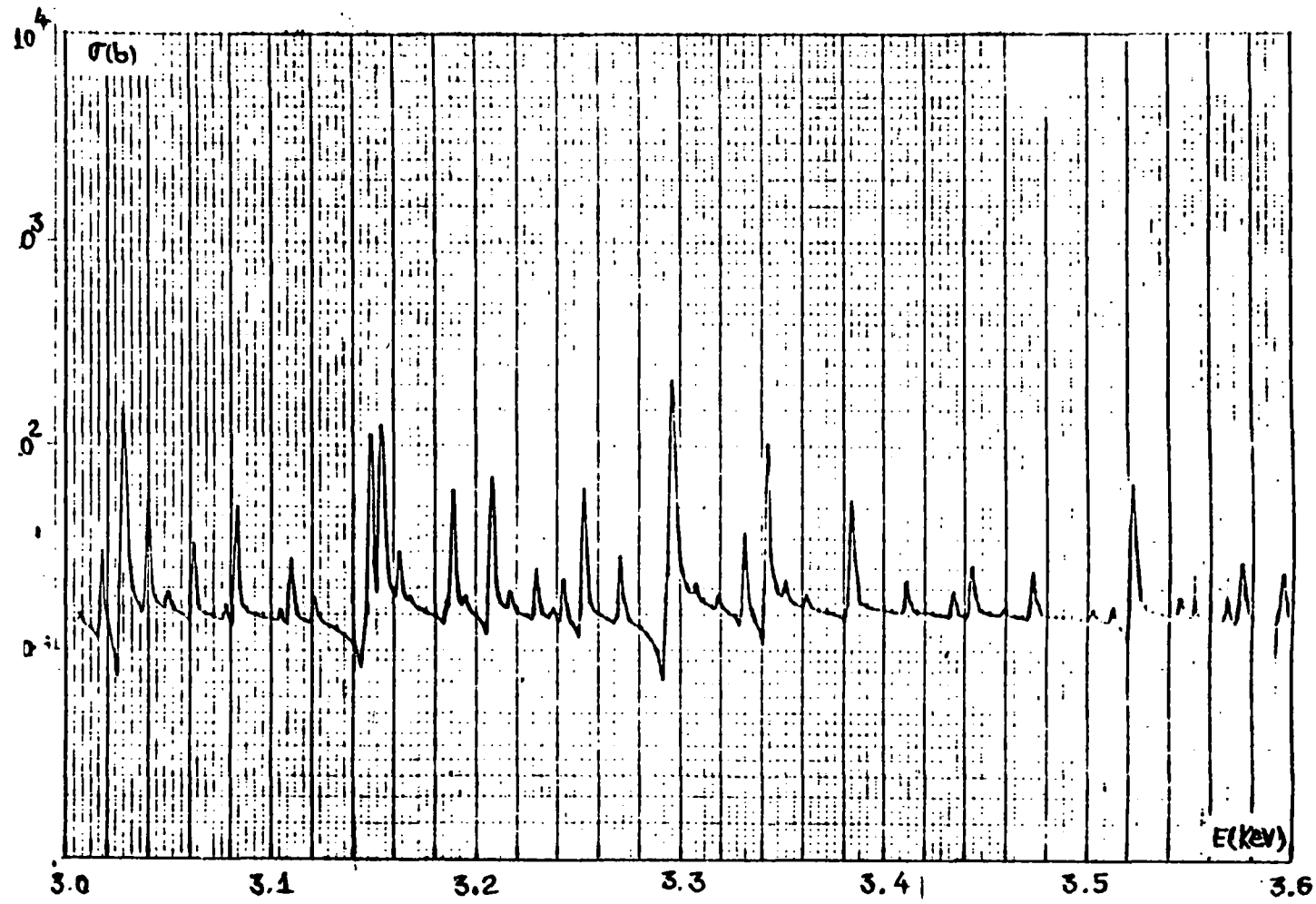

Fig. IV. 1. (cont.)

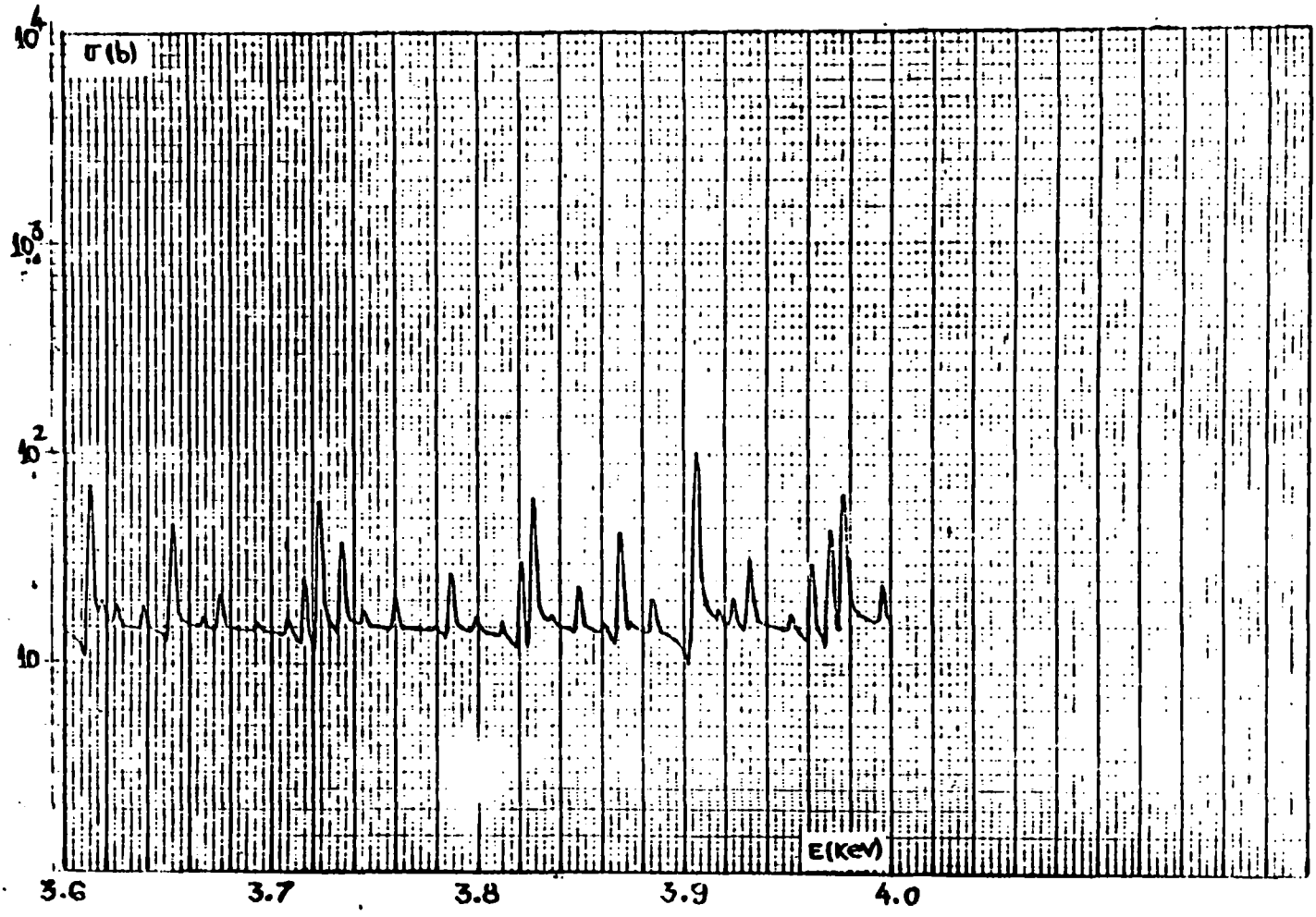

Fig. IV. 1. (cont.)

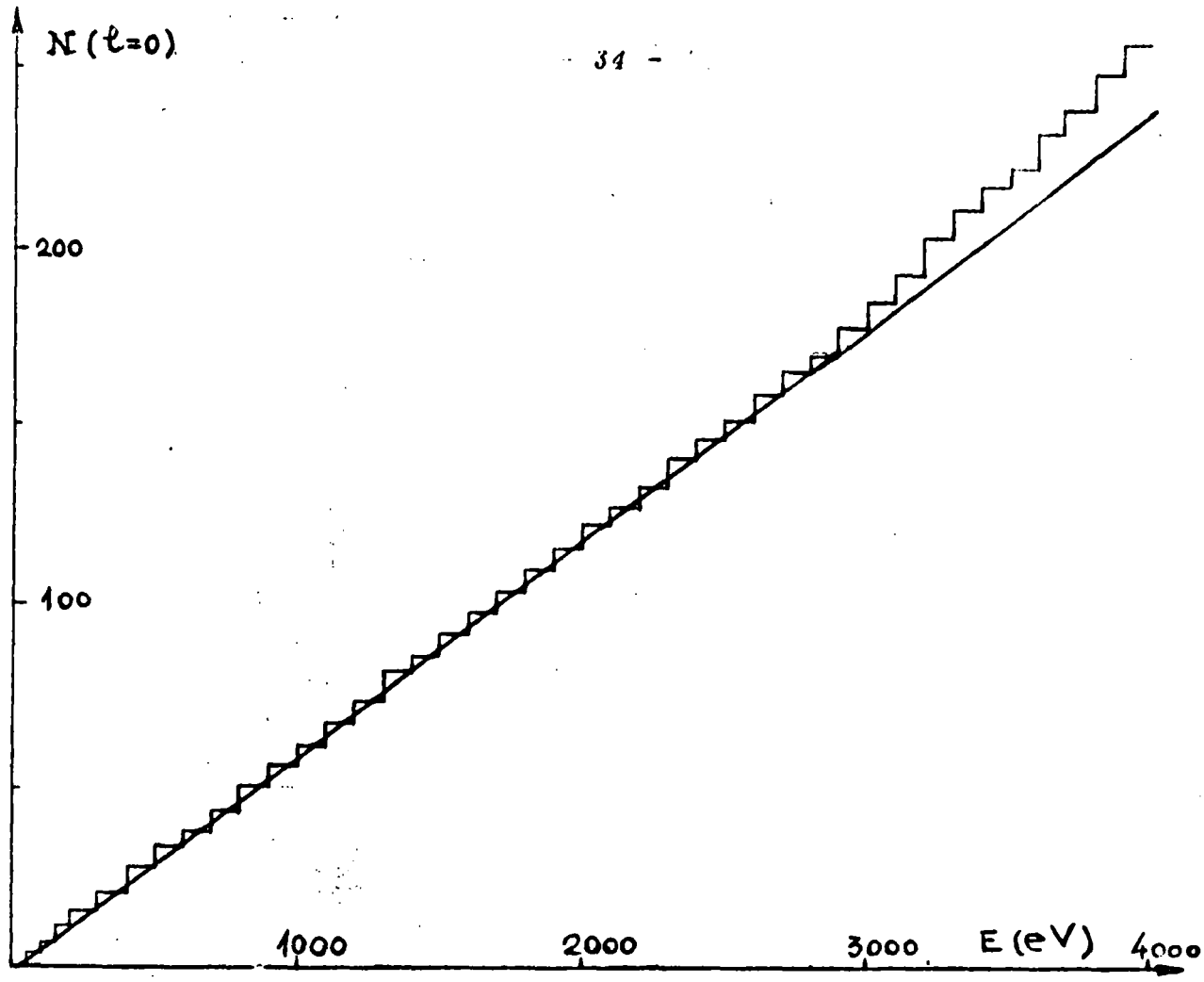

Fig. IV. 2. Cumulative number of s-wave resonances vs. energy.

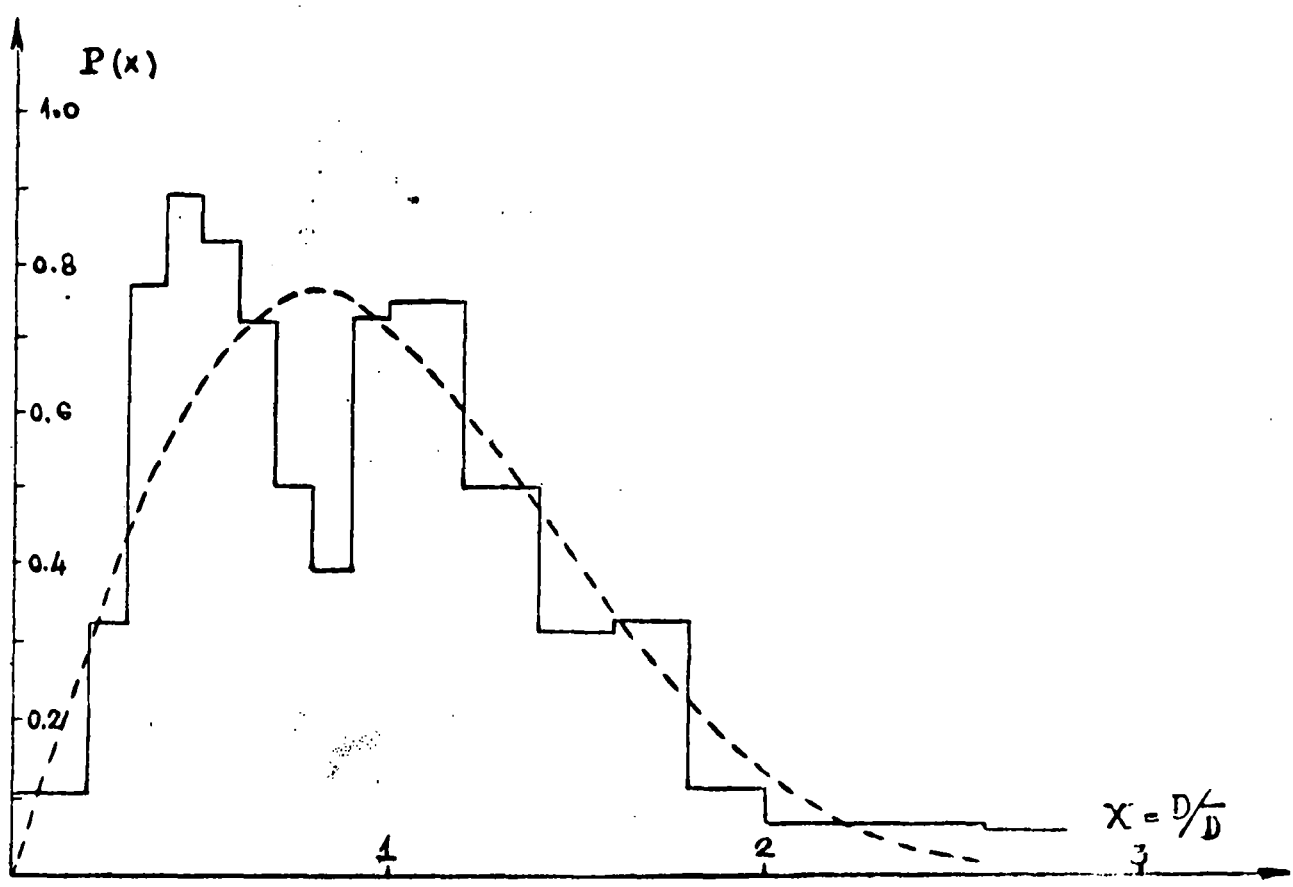

Fig. IV. 3. Wigner distribution for nearest-neighbour level spacing for s-wave resonances.

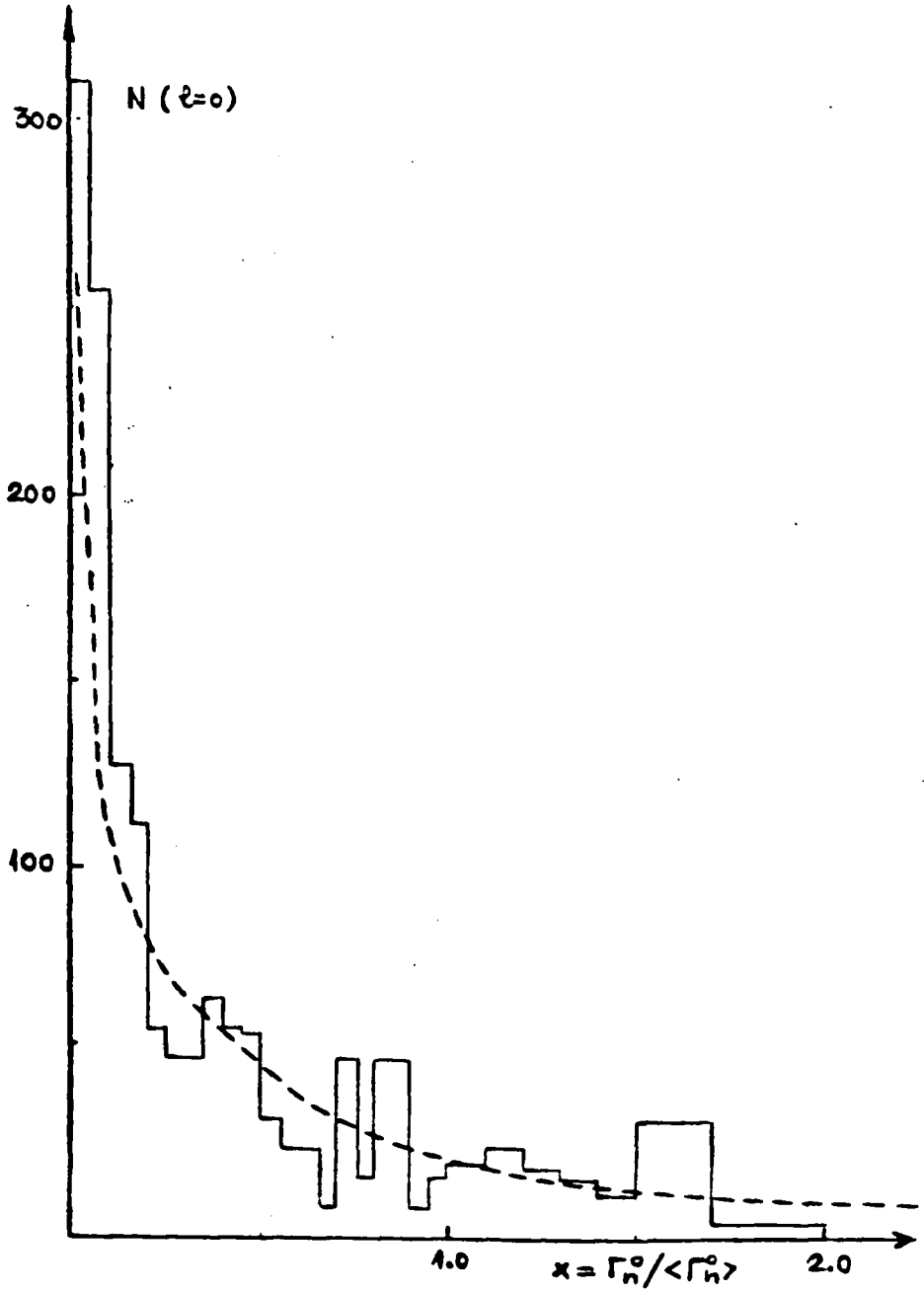

Fig.IV.4. Chi-squared distribution of the reduced neutron widths for s-wave resonances.

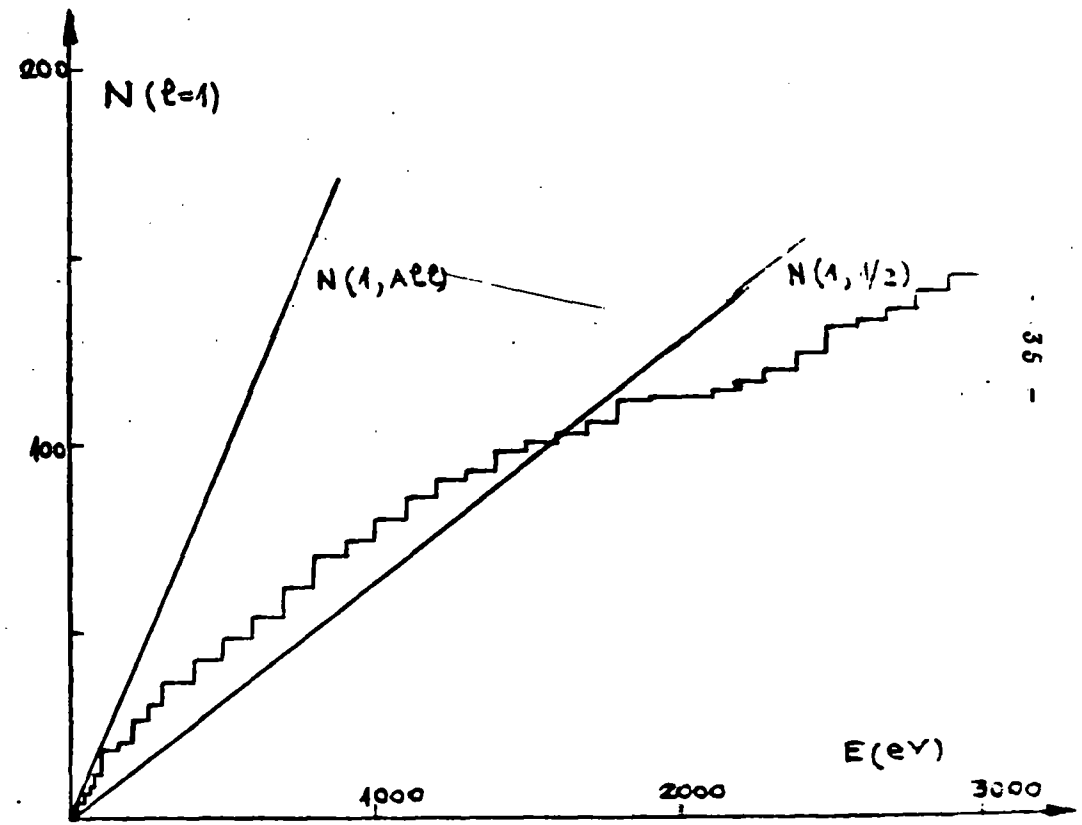

Fig.IV.5. Cumulative number of p-wave resonances vs. energy.

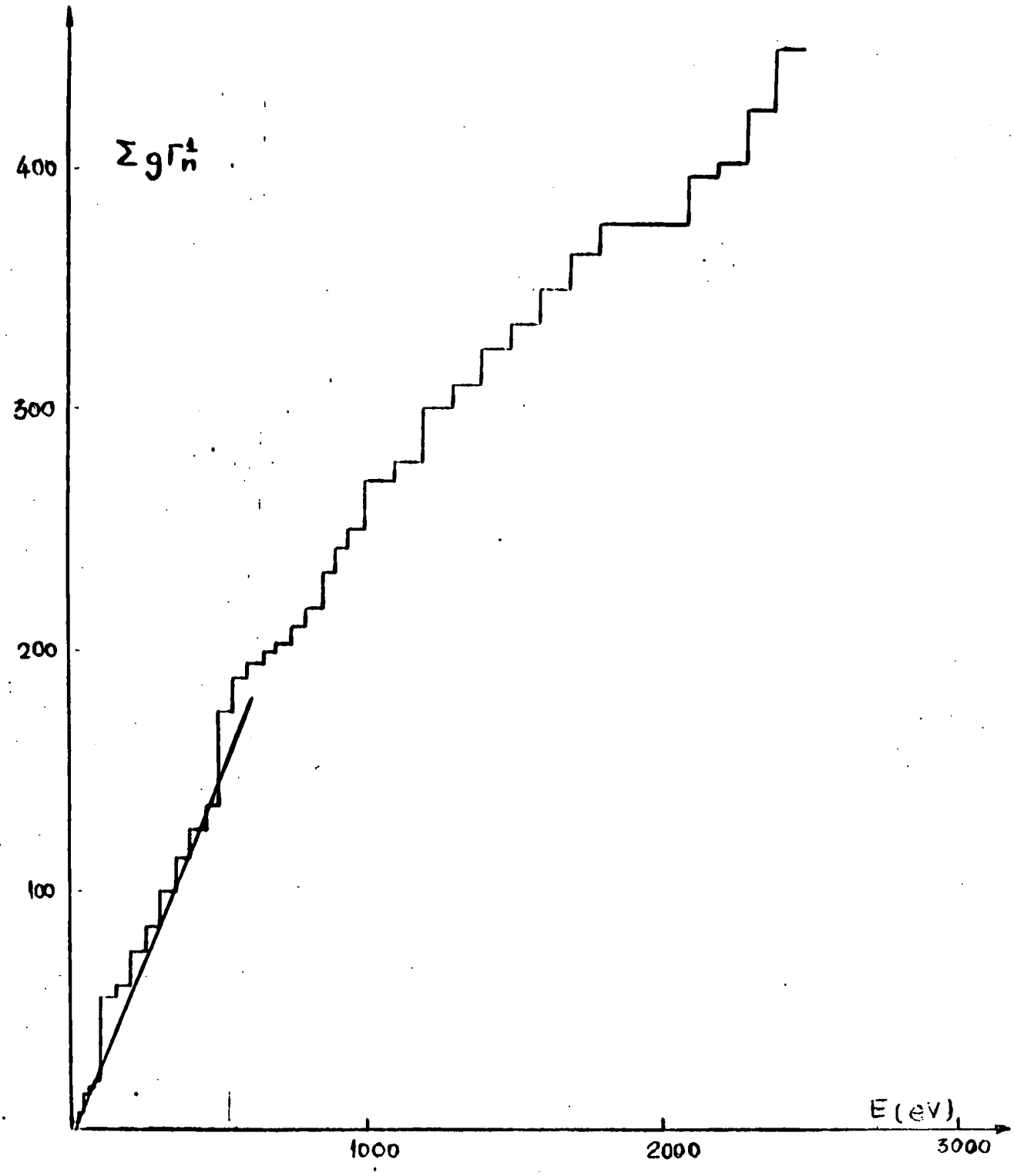

Fig. IV.6. Dependence of $\sum g\Gamma_n^1$ vs. energy.

V. Cross Section Evaluations in the Fast Energy Range (50 KeV - 20 MeV)

V.1. The Total Cross Section

For energies between 50 KeV and 15 MeV, 19 experimental references have been available; the total cross section was as usual the best represented one in literature [V.1.1 - V.1.19].

Analysing the data, it is to be noticed that TOF method was used by most of the authors and that errors lies between 1% and 3% in more recent references; thus a good enough confidence of the data was assured.

Some of data [V.1.7] have been eliminated because of discrepancies, the too high errors, and because the experimental details have been insufficiently explained.

The remainded points were weighted according to the errors reported by authors or estimated using a procedure, shortly described in the reference [V.1.20].

The used programmes were PREG1, PREG2, FILTRU. Plots of $\sigma_{tot} = f(E)$, $\sigma_{tot} = \Delta f(E)$, and $\Delta E = f(E)$ have been generated using LISTPLOT programme.

On the other hand, the computed total cross section obtained during the evaluation of elastic angular distributions is in good agreement with the experimental data up to 15 MeV. (see Ch.VI).

The final recommended σ_{tot} curve is shown in Fig.V.1.1.

A comparison with the most recently reported total cross section evaluation [V.1.22] shows a good agreement with our data.

References

V.1.1. J.H.Coon, Phys.Rev.88,562(1952).

V.1.2. M.Walt et al., Phys.Rev.89,1271(1953).

V.1.3. C.T.Hibdon et al., ANL-5175(1953).

V.1.4. K.Tsukada et al., J.Phys.Jap.15,1994(1960).

V.1.5. C.A.Uttley et al., EANDC Conf.on TOF Methods, Saclay, 109(1961).

V.1.6. V.Y.Averchenkov et al., Sov.Prog.in Neut.Phys. 191(1961).

V.1.7. G.Deconnick, J.Phys.Rad.22,652(1961).

V.1.8. J.I.Leroy et al., J.Phys.Rad.24,826(1963).

V.1.9. K.K.Seth et al., Data obtained from NDS-IAEA (1964).

V.1.10. R.Batchelor, Nucl.Phys.65,236(1965).

V.1.11. C.A.Uttley et al., Proc.Conf.on Nucl.Data, Paris, vol.I,165(1966).

V.1.12. G.Zago, Data obtained from NDS.IAEA (1966).

V.1.13. F.Manero, An.Real Soc.Espan.Fis.Quim.64,373(1968).

V.1.14. P.Ribon (1970), Data obtained from NDS-IAEA.

V.1.15. U.Fasoli et al., Nucl.Phys.A151,369(1970).

V.1.16. L.Green, Proc.Conf.on Nucl.Cross Sections and Tech., Knoxville, vol.I,325(1971).

V.1.17. D.G.Foster Jr., Phys.Rev.C3,576(1971).

V.1.18. A.B.Smith (1974), Data obtained from NDS-IAEA.

V.1.19. M.Divadeenam (1975), Data obtained from NDS-IAEA.

V.1.20. S.Rapeanu, INDC(RUM)6/L (1975).

V.1.21. D.E.Cullen, UCRL-50400, vol.17,Part B (1977).

V.1.22. J.Meadows et al., ANL/NDM-35(1978).

V.2. The Elastic Scattering Cross Section

The experimental data for the elastic scattering cross section are very few in the fast energy region [V.2.1 - V.2.8]. Most of them are reported as integrated differential data [V.2.1., V.2.3, V.2.4, V.2.6]; the associated errors are between 1.1% and 30%.

The experimental data analysis shows that most of them are suspected to include also some inelastic components, excepting Haouat's data at 2.5 MeV [V.2.7], which gives the elastic cross section and the inelastic components for the first two excited states.

From 50 KeV up to 0.3 MeV the elastic cross section has been obtained by extrapolation and between 0.3 MeV and 0.5 MeV it has been evaluated from the experimental data.

Since most of the experimental data above 0.5 MeV are suspected to contain inelastic components, the integrated angular distributions computed by optical model (see Ch.VI) have been adopted up to 5 MeV.

The values from the ENDL-library were taken above 5 MeV.

The evaluated curve for the elastic scattering cross section is plotted in Fig.V.2.1. A comparison with ENDF/B-IV and ENDF/B-V libraries is shown in Fig.V.2.2. A good agreement with the ENDF/B-V data is noticed.

References

V.2.1. M.Walt, Phys.Rev.93,1062(1954).

V.2.2. A.B.Smith et al., EANDC(US)62(1965) Data obtained from NDS-IAEA.

V.2.3. Hudson, Phys.Rev.128,1271(1962).

V.2.4. R.Batchelor et al., Nucl.Phys.65,236(1965).

V.2.5. L.Yd.Kasakova et al., Proc.Conf.on the Study of Nucl. Struct.with Neutrons, Antwerp (1965).

V.2.6. V.I.Popov, Sov.Progr. in Neutron Phys.224 (1961).

V.2.7. G.Haouat et al., INDC(FR) 13/L (1977).

V.2.8. J.Meadows et al., ANL/NDM-35 (1978).

V.3. The Inelastic Cross Section

The experimental information available for this cross section [V.3.1 - V.3.2] is very poor, (12 experimental points) only for total inelastic cross section.

In this situation the inelastic cross section has been estimated by difference between the evaluated total cross section and the other components (elastic, capture, fission, (n,2n) and (n,3n) cross sections).

The evaluated curve is presented in Fig.V.3.1. The comparison with the ENDF/B-V library data shows a good agreement. It is also to be noticed the good agreement with the experimental data.

According to ENDF/B format this cross section has been included in the file MF = 3, MT = 4 and MT = 91 (inelastic cross section to continuum).

A theoretical estimation of the inelastic cross section has also been performed (see Ch.V.7).

References

V.3.1. R.Batchelor, Nucl.Phys.65,236(1965).
V.3.2. N.P.Glazkov, At.Energ.14,400 (1963).

V.4. The Radiative Capture Cross Section

The evaluated data set relies on 21 references [V.4.1 - V.4.21] containing 457 experimental points. The last reported measurements are from march 1978 [V.4.21].

Earlier data replaced by the same authors with new ones, have been eliminated from the begining.

The capture cross section evaluation was performed by applying a weighted averaging to the experimental data.

From 14.5 MeV up to 20 MeV the evaluated curve has been extrapolated obtaining a value of 0.003 b at 20 MeV [V.4.22], [V.4.23].

The evaluated radiative capture cross section is plotted in Fig.V.4.1, and a comparison with the evaluated data from [V.4.21] shows a good agreement.

The (n,γ) cross section has been theoretical estimated also. (see Ch.V.7).

References

V.4.1. R.L.Macklin et al., Phys.Rev.107,504(1957).

V.4.2. J.L.Perkin et al., Proc.Phys.Soc.(London), 72,505(1958).

V.4.3. A.I.Leipunsky et al., Soc.Proc.Conf.on Peaceful Uses of Atomic Energy, Geneva, 16,136(1958).

V.4.4. T.S.Belanova, J.Eksp.Teor.Fiz.34,574(1958).

V.4.5. R.C.Hanna et al., J.Nucl.Energ.8,197(1959).

V.4.6. J.F.Barry et al., Proc.Phys.Soc.(London), 74,685(1959).

V.4.7. T.S.Belanova, At.Energ.8,549(1960).

V.4.8. Y.Y.Stavisskii et al., At.Energ.10,508(1961).

V.4.9. J.A.Miskel et al., Phys.Rev.128,2717(1962).

V.4.10. D.C.Stupegia et al., J.Inorg.Nucl.Chem.25,627(1963).

V.4.11. M.C.Moxon et al., (1963) Data obtained from NDS-IAEA.

V.4.12. V.A.Tolstikov et al., At.Energ.15,414(1963)

V.4.13. Gibbons (1964) Data obtained from NDS-IAEA.

V.4.14. R.T.Batchelor et al., Nucl.Phys.65,236(1965).

V.4.15. A.K.Chaubey et al., Nucl.Phys.66,267(1965).

V.4.16. T.S.Belanova et al., FEI-3(1965).

V.4.17. T.S.Belanova et al., At.Energ.19,3(1965).

V.4.18. V.P.Koroleva et al., AtEnerg.20,431(1966).

V.4.19. R.J.Nagle et al., Conf.on Neutron Cross Sections and Techn., Knoxville, 2,259(1971).

V.4.20. V.B.Chelnikov et al., Yad.Fiz.Issled. 13,6(1972).

V.4.21. W.P.Poenitz et al., ANL/NDM-12(1978).

V.4.22. B.A.Magurno, BNL-NCS-50446 (1975).

V.4.23. D.I.Garber, R.R.Kinsey, BNL-325, vol.II(1973).

V.5. The Fission Cross Section

A total of 16 references [V.5.1 - V.5.16], containing 1031 experimental points up to 20 MeV, have been available for 232-Th fission cross section evaluation.

Since the references [V.5.4], [V.5.6], [V.5.9] belong to the same author and deal with the same measurements, we kept for the evaluation procedure only the latest one, the other two being eliminated.

Finally, 14 papers with 983 experimental points, covering an energy range between 0.6 and 20 MeV have been kept for our purpose.

The relation (V.5.1) gives for the reaction threshold a value of 1.11 MeV:

$$E_f = B_f^* - S_n^* - P_z^* - P_N^* \qquad (V.5.1)$$

where:

B_f^* is the fission barrier of the compound nucleus;
S_n^* is the separation energy of the compound nucleus,
P_z^*, P_N^* are the pairing energies for protons and neutrons in the compound nucleus,

and:

$B_f^* = 6.68$ MeV [V.5.17]
$S_n^* = 4.787$ MeV [V.5.18]
$P_z^* = 0.78$ MeV [V.5.19]
$P_N^* = 0.0$ MeV [V.5.19]

In the evaluation process, when several values from different references were available at the same energy point, a weighted average was applied to those data.

The evaluated cross section is plotted in Fig.V.5.1.

The fission cross section has been theoretically estimated also (see Ch.V.7).

References

V.5.1. C.A.Uttley et al., AERE-NP/R-1996(1956).
V.5.2. R.L.Henkel, LA-2122(1957).
V.5.3. A.N.Protopopov et al., A.Energ.4,190(1958).

V.5.4. S.P.Kalinin et al., Sec.Int.Conf.on Peaceful Uses of Atomic Energy, Geneva, 16,136(1958).

V.5.5. A.A.Berezin, At.Energ.5,659(1958).

V.5.6. V.M.Pankratov et al., At.Energ.9,399(1960).

V.5.7. Babcock (1961), Data obtained from NDS-IAEA.

V.5.8. A.Katase (1961). Data obtained from NDS-IAEA.

V.5.9. V.M.Pankratov, At.Energ.14,177(1963).

V.5.10. R.Batchelor et al., Nucl.Phys.65,236(1965).

V.5.11. P.F.Rago et al., Health Phys.13,654(1967).

V.5.12. A.N.Behkami et al., Nucl.Phys.A118,65(1968).

V.5.13. R.H.Iyer et al., Nucl.Phys.and Solid State Phys.Symp. Roorkee,2,289(1969).

V.5.14. D.W.Muir et al., LA-4648-MS(1971).

V.5.15. E.Konecny et al., Z.Phys.251,400(1972).

V.5.16. J.Blons et al., Phys.Rev.Lett.35,1749(1975).

V.5.17. V.E.Viola et al., Nucl.Phys.82,1(1966).

V.5.18. A.H.Wapstra et al., Atomic Data and Nucl.Data Tables, 19(3)175(1977).

V.5.19. A.Gilbert et al., Can.J.Phys.43,1446(1965).

V.6. The (n,2n) and (n,3n) Cross Sections

The (n,2n) cross section evaluation is based on 10 references [V.6.1 - V.6.10], containing 51 experimental points, from threshold up to 20 MeV. The (n,2n) reaction threshold was calculated as being 6.46438 [V.6.11].

Three papers only [V.6.1],[V.6.6],[V.6.7] contain points covering a larger energy range, each of others providing one or two experimental points.

The data errors vary between 3.7% and 46%.

Since Batchelor gives $\sigma_{n,2n}$ values for energies much lower than the reaction threshold [V.6.8] and no other author confirms Batchelor's results, these data have been eliminated.

After analysis of the remainded available references, other two experimental points have been excluded too [V.6.5], [V.6.10].

A weighted average was then applied to the selected data.

The evaluated curve is shown in Fig.V.6.1.

The (n,2n) cross section has also been theoretically estimated (see Ch.V.7).

The (n,3n) reaction has its threshold at 11.60712 MeV [V.6.11]. There were no available experimental data for this cross section.

(n,3n) cross section evaluation was performed by theoretical calculation (see Ch.V.7).

The evaluated (n,3n) curve is shown in Fig.V.6.1 too.

References

V.6.1. --- Phys.Rev.121,1438(1961).

V.6.2. D.R.F.Cochran et al., Proc.Conf., Washington, 1013, 34(1958).

V.6.3. J.L.Perkin et al., J.Nucl.Energ.14,69(1961).

V.6.4. J.A.Phillips, AERE-NP/R-2033(1956).

V.6.5. Yu.A.Zysin et al., At.Energ.8,360(1960).

V.6.6. H.A.Tewes et al., Bull.Am.Phys.Soc.4,445(C16)(1959).

V.6.7. J.P.Butler et al., Can.J.Chem.34,689(1961).

V.6.8. R.Batchelor et al., Nucl.Phys.65,236(1965).

V.6.9. K.Kobayashi et al., J.Nucl.Sci.Tech.(Japan),8,492(1971).

V.6.10. Yu.P.Gangrskij et al., At.Energ.31,156(1971).

V.6.11. A.H.Wapstra et al., Atomic Data and Nucl.Data Tables 19(3)175(1977).

V.7. Theoretical Estimations of Some Cross Sections

Some interesting theoretical results have been obtained for the fission, radiative capture, (n,2n), (n,3n) and inelastic cross sections, at the same time with experimental data evaluation.

From 1.1 MeV up to 4.4 MeV Lynn' systematics [V.7.1] was used, while above these energies Jary's evaporation model [V.7.2.] was more suitable.

A modified version of FISINGA code [V.7.4] , namely MASTER code [V.7.3] , and STATMOD code [V.7.5] , respectively have been used.

V.7.1. The Fission Cross Section

a) Double humped fission model

The actinide nuclei from Th-Pa region show some well known fission cross section anomalies, in comparison with heavier isotopes, which from the point of view of a systematics (even-odd for compound nucleus) must have similar behaviours.

For all the fissile nuclei, except those even-even, Lynn' systematics assumes the continuum region begining at the fission barrier peaks. The nuclear temperatures for these two barriers have the same values ($\theta_{A,B}$ = 0.48 MeV), as well as the spin cut-off factors ($\sigma_{A,B}$ = 6.4). This leads to the following ratio for the level densities at these two barries: C_{fA}/C_{fB} = 6.8/3.4 = 2 . Taking the above parameters and B_{fA} = 6.55 MeV, B_{fB} = 6.64 MeV, the computed fission cross section was 0.38 b for the energy range 3 - 4 MeV. The experimental data evaluation gives a value of 0.144 b for the same energy range.

We used MASTER code with a special subroutine for the transmission coefficients for the fission model with two barriers [V.7.1],[V.7.6],[V.7.12].
By diminution only of B_{fA} and B_{fB} values with about 0.5 MeV to obtain the Back values [V.7.6] , no satisfactory agreement between the calculated and the evaluated cross section values has been obtained.

For 233-Th compound nucleus which is a fissile nucleus, the difference between the barrier B_{fA} and the binding energy

B_N^{NC} is about 1.14 MeV (in incident energy), while the σ_f value is about 0.4 b [V.7.1].

As a comparison we give now same parameters for $^{245}_{94}Pu$: the difference $(B_{fA} - B_N^{NC})$ is about 1.1 MeV and the corresponding σ_f is about 1.4 b [V.7.1].

Consequently, the differences between barriers (in incident energy) cannot explain by themselves, the existing discrepancies between the calculated and the experimental fission cross section values. This means that when Z number decreases, the outer barrier B increases (Th-Pa area), and C_{fB} (proportional to level density at fission barrier B_{fB}) is several times smaller than C_{fA} (proportional to level density at fission barrier B_{fA}).

Finally we have considered:

$$C_{fA}/C_{fB} = 4.4/0.52 = 8.4 \qquad (V.7.1)$$

Taking into account Back's parameters [V.7.6] for fission barriers:

$$\begin{aligned} B_{fA} &= 6.02 \text{ MeV} \\ B_{fB} &= 6.28 \text{ MeV} \\ \hbar\omega_A &= 0.9 \text{ MeV} \\ \hbar\omega_B &= 0.45 \text{ MeV} \end{aligned} \qquad (V.7.2)$$

(the continuum regions begin at the two barrier peaks), we obtained a good agreement with the evaluated σ_{fis} from experimental data (2 MeV - 4.4 MeV).

Because the agreement was not good enough Bolsterli's rotational or vibrational band heads were included in discret area [V.7.7]. We have considered the continuum above 0.5 MeV. The discret levels for the two barriers have been obtained by:

$$E_{J\pi K}^{(A,B)} = E_{K\pi}^{(A,B)} + 0.005[J(J+1) - K^2] \quad (MeV) \qquad (V.7.3)$$

$E_{K\pi}^{(A,B)}$ is the rotational or vibrational band head. Using (V.7.3) formula, with $\frac{1}{2} \leq J \leq 11/2$ we have obtained a first resonance much higher than the evaluated one, and a second resonance very wide. According to the above remarks and reducing the level number of the barrier B band heads, two different resonances has been obtained. This confirms the assumptions made on level

densities for the two barriers. However the calculated minimum between the two resonances is higher than the evaluated one.

It is noticeable that these parameters were established without taking into account the third barrier (probably higher than the two others) [V.7.8], which should lead to a decrease of the effective number of fission channels, using a similar model (the "uniform picket-fence").

b) Evaporation model

For energies between 5 MeV and 18.5 MeV evaporation model [V.7.2] and STATMOD code were used. Gilbert and Cameron's parameters [V.7.9], Wapstra's binding energies [V.7.10] and Viola's fission barrier parameters [V.7.11] have been used.

The level density parameter a_f in a Fermi-gas formula was considered as [V.7.5]:

$$a_f = a_n + \frac{C}{U} \qquad (V.7.4)$$

where: a_n is the level density parameter for deformed compound nucleus in equilibrium [V.7.9].

U is the effective excitation energy [V.7.9].

C is a constant.

The constant C was derived to fit the two σ_f values calculated by the two different models at the joining energy point. Thus, $C \approx 10$ and $a_f/a_n = 1.011$.

The second- and the third-chance fission thresholds have been deduced as 5.949 MeV and 12.87 MeV, respectively.

The calculated data are in good agreement with the σ_f cross section evaluated from experimental data (Fig.V.7.1 and Table V.7.1).

V.7.2. The Radiative Capture Cross Section

The giant resonance model, with a Γ_G of about 5 MeV and E_G about $80/A^{1/3}$ MeV have been used for these calculations (A being the compound nucleus mass), with the Moldauer correction between 10 KeV and 500 KeV. We used MASTER code to perform calculations over the energy range between 0.01 and 4.4 MeV.

Table V.7.1 and Fig.V.7.2 show the results.

One can see, the general shape of the calculated curve is similar to the evaluated curve shape, but the values are

higher over almost entire energy range. The wide resonance arround 0.7 MeV energy is well enough reproduced.

It is to be pointed out that considerable changes of both fission and neutronic transmission coefficients do not lead to significant changes in capture cross section.

V.7.3. The (n,2n) and (n,3n) Cross Sections

For (n,2n), (n,3n) and fission cross sections quite a number of experimental references are available. This was useful for us to obtain by fitting the necessary parameters for STATMOD code so that all these cross sections were simultaneously calculated; the ambiguities which generally appear when one operates with several parameters were therefore diminished.

The input data supplied us the following thresholds: 6.434 MeV for (n,2n) reaction and 11.61 MeV for (n,3n) reaction.

The used parameters are those from references [V.7.9], [V.7.10] and [V.7.11]. Comparing the calculated cross sections with the evaluated ones (fig.V.7.3 and Table V.7.1) a good enough agreement is to be noticed, although the calculated maximum value for (n,2n) is sligtly higher than the evaluated ones. The (n,3n) cross section thus calculated has been included in the evaluated data set.

V.7.4. The Inelastic Scattering Cross Section

For energies between 0.01 MeV and 4.4 MeV the same parameters as in fission cross section calculations and MASTER code have been used to estimate the inelastic cross sections for 232-Th. The target is an even-even nucleus and its levels are rather rare because such a nucleus is more stable than an even-odd or an odd-odd one. The ground state spin is $I_o = 0^+$ [V.7.1] and the first excited level is considered to be $E_1(2^+) = 0.049$ MeV.

Up to 1 MeV incident energy, 16 discret levels, including the ground state were taken into account, the continuum was considered above 1 MeV.

The neutron channel transmission coefficients were calculated for discret levels, using the strength functions up to $\ell_{max} = 6$, where for an even ℓ, $S_\ell \approx 1.0 \cdot 10^{-4}$ and $F_\ell^\infty = -0.039$ while for an odd ℓ, $S_\ell \approx 2.0 \cdot 10^{-4}$ and $F_\ell^\infty = 0.0$.

Between 0.01 and 0.5 MeV, the inelastic scattering cross section was calculated taking into account the Moldauer's correction too.

The calculation results, together with the evaluated cross section are shown in Fig.V.7.4 and Table V.7.1.

References

V.7.1. J.E.Lynn, Systematics for neutron reactions of the actinide nuclei, AERE-R-7468 (1974).

V.7.2. J.Jary, Proc.of the EANDC topical discussion on critique of nuclear models and their validity in the evaluation of nuclear data, JAERI-M-5984 (1975).

V.7.3. N.Dragan, L.Pintiliescu, MASTER code (to be published).

V.7.4. J.Krebs et al., Program FISINGA, DRP/SMPNF,832(1970).

V.7.5. N.Dragan, L.Pintiliescu, Program STATMOD (to be published)

V.7.6. B.B.Back et al., Phys.Rev.C10,5,1948(1974).

V.7.7. M.Bolstreli et al., Phys.Rev.C5,1050(1972).

V.7.8. P.Möler et al., Proc.3rd IAEA Int.Symp.on the Physics and Chemistry of Fission, Rochester (1973).

V.7.9. A.Gilbert et al., Can.J.Phys.43.1446(1965).

V.7.10. A.H.Wapstra et al., Atomic Data and Nucl.Data Tables, 9, 4+5(1971).

V.7.11. V.E.Viola et al., Nucl.Phys.82,No.1(1966).

V.7.12. B.B.Back et al., Phys.Rev.C9,5,1924(1974).

Table V.7.1

Theoretical estimated values for some ^{232}Th cross sections

E (MeV)	$\sigma_{n\gamma}$ (b)	$\sigma_{nn'}$ (b)	σ_{nf} (b)	σ_{n2n} (b)	σ_{n3n} (b)
1	2	3	4	5	6
0.01	1.017	0.0	0.0	0.0	0.0
0.03	0.673	0.0	0.0	0.0	0.0
0.05	0.540	0.005	0.0	0.0	0.0
0.07	0.411	0.163	0.0	0.0	0.0
0.09	0.335	0.291	0.0	0.0	0.0
0.1	0.309	0.341	0.0	0.0	0.0
0.3	0.184	0.717	0.0	0.0	0.0
0.5	0.178	0.845	0.0	0.0	0.0
0.7	0.199	1.425	0.0	0.0	0.0
0.9	0.152	1.802	0.0	0.0	0.0
1.0	0.142	1.897	0.001	0.0	0.0
1.1	0.136	1.964	0.004	0.0	0.0
1.2	0.130	2.021	0.011	0.0	0.0
1.3	0.122	2.062	0.031	0.0	0.0
1.4	0.113	2.079	0.069	0.0	0.0
1.5	0.106	2.088	0.107	0.0	0.0
1.6	0.100	2.115	0.117	0.0	0.0
1.7	0.096	2.154	0.107	0.0	0.0
1.8	0.091	2.166	0.121	0.0	0.0
1.9	0.088	2.189	0.118	0.0	0.0
2.0	0.085	2.220	0.103	0.0	0.0
2.1	0.083	2.233	0.104	0.0	0.0
2.2	0.080	2.240	0.109	0.0	0.0
2.3	0.078	2.244	0.114	0.0	0.0
2.4	0.076	2.248	0.118	0.0	0.0
2.5	0.075	2.250	0.122	0.0	0.0
2.6	0.074	2.252	0.125	0.0	0.0
2.7	0.072	2.253	0.127	0.0	0.0
2.8	0.071	2.254	0.129	0.0	0.0
2.9	0.071	2.255	0.131	0.0	0.0
3.0	0.070	2.254	0.133	0.0	0.0
3.2	0.068	2.254	0.135	0.0	0.0
3.4	0.067	2.253	0.138	0.0	0.0

Table V.7.1. (cont.)

1	2	3	4	5	6
3.6	0.066	2.252	0.140	0.0	0.0
3.8	0.064	2.251	0.142	0.0	0.0
4.0	0.063	2.249	0.144	0.0	0.0
4.2	0.061	2.248	0.146	0.0	0.0
4.4	0.059	2.246	0.148	0.0	0.0
5.0	-	-	0.145	0.0	0.0
5.5	-	-	0.136	0.0	0.0
6.0	-	-	0.143	0.0	0.0
6.5	-	-	0.215	0.000133	0.0
7.0	-	-	0.316	0.182	0.0
7.5	-	-	0.346	0.691	0.0
8.0	-	-	0.340	1.179	0.0
8.5	-	-	0.326	1.520	0.0
9.0	-	-	0.314	1.738	0.0
9.5	-	-	0.306	1.881	0.0
10.0	-	-	0.302	1.981	0.0
10.5	-	-	0.298	2.058	0.0
11.0	-	-	0.307	2.091	0.0
11.5	-	-	0.318	2.117	0.0
12.0	-	-	0.318	2.159	0.00220
12.5	-	-	0.320	2.152	0.0554
13.0	-	-	0.319	2.018	0.219
13.5	-	-	0.323	1.801	0.460
14.0	-	-	0.338	1.551	0.709
14.5	-	-	0.371	1.316	0.925
15.0	-	-	0.411	1.111	1.096
15.5	-	-	0.449	0.936	1.232
16.0	-	-	0.481	0.788	1.342
16.5	-	-	0.504	0.662	1.435
17.0	-	-	0.521	0.554	1.513
17.5	-	-	0.534	0.462	1.575
18.0	-	-	0.545	0.383	1.628
18.5	-	-	0.549	0.314	1.676

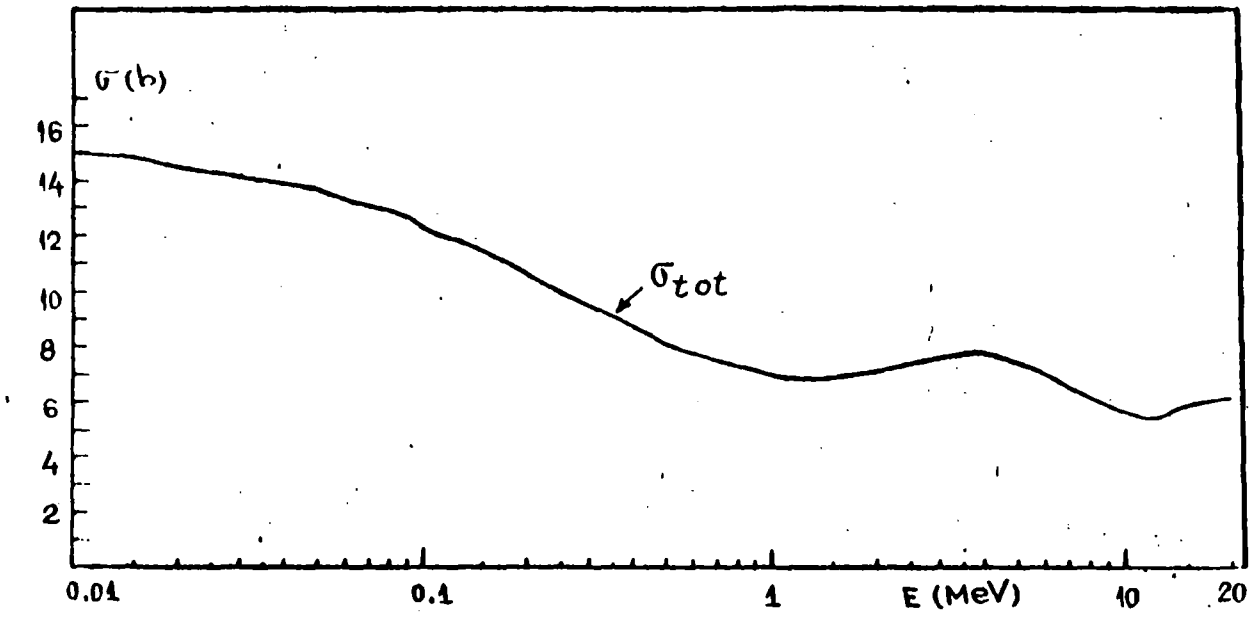

Fig.V.1.1. Evaluated total cross section for fast energy range.

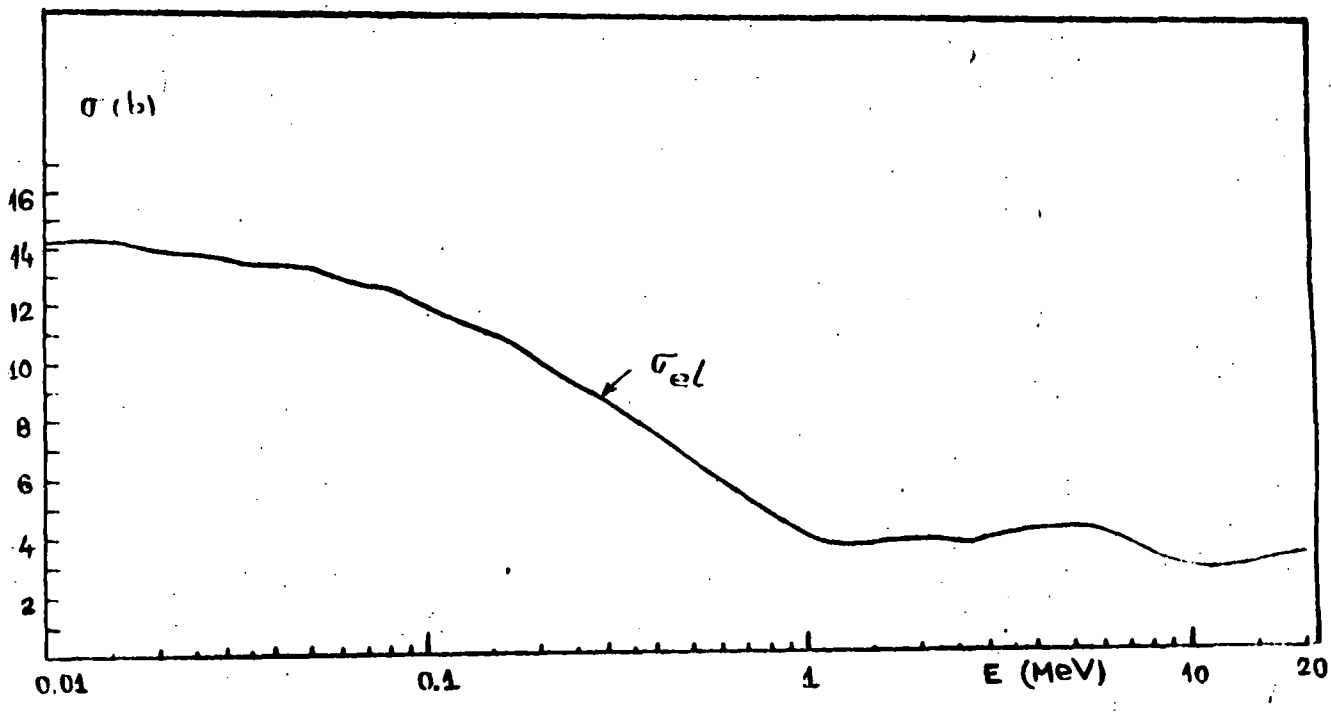

Fig.V.2.1. Evaluated elastic cross section for fast energy range.

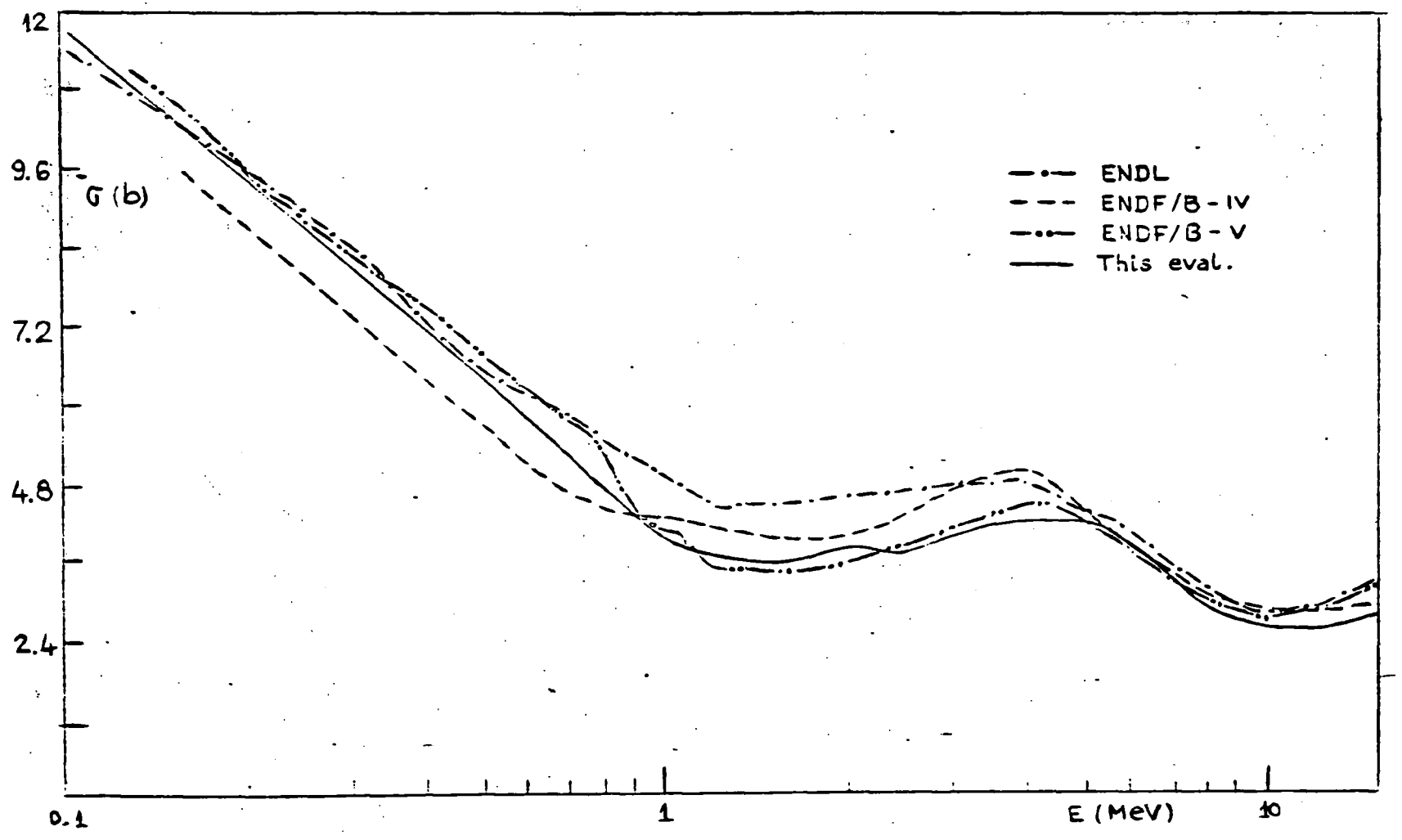

Fig. V. 2. 2. Comparison to some evaluated elastic cross sections for fast energy range.

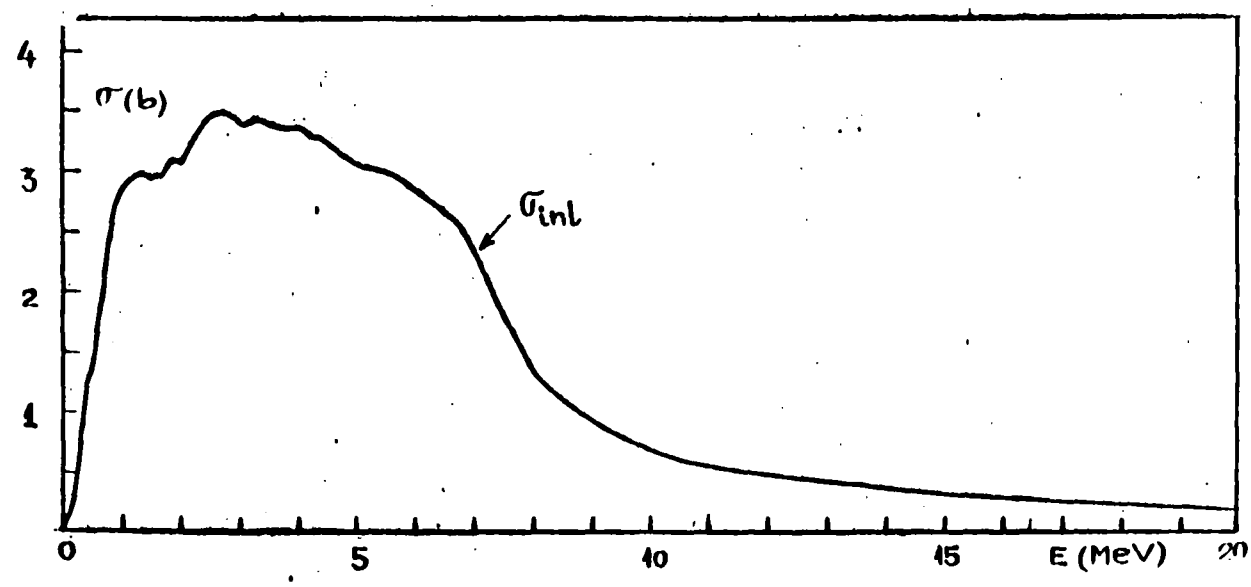

Fig. V. 3. 1. Evaluated inelastic total cross section versus energy

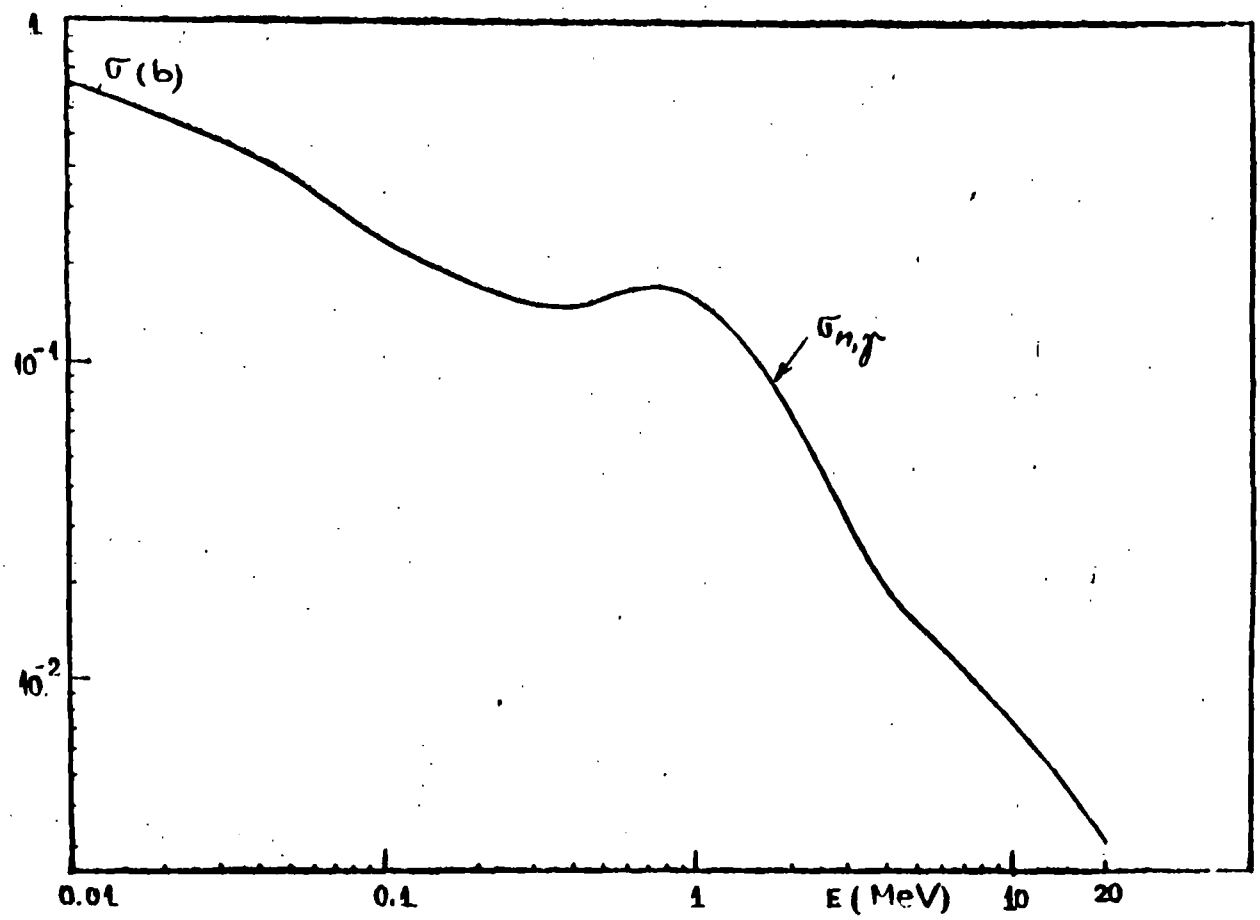

Fig. V. 4. 1. Evaluated radiative capture cross section for fast energy range.

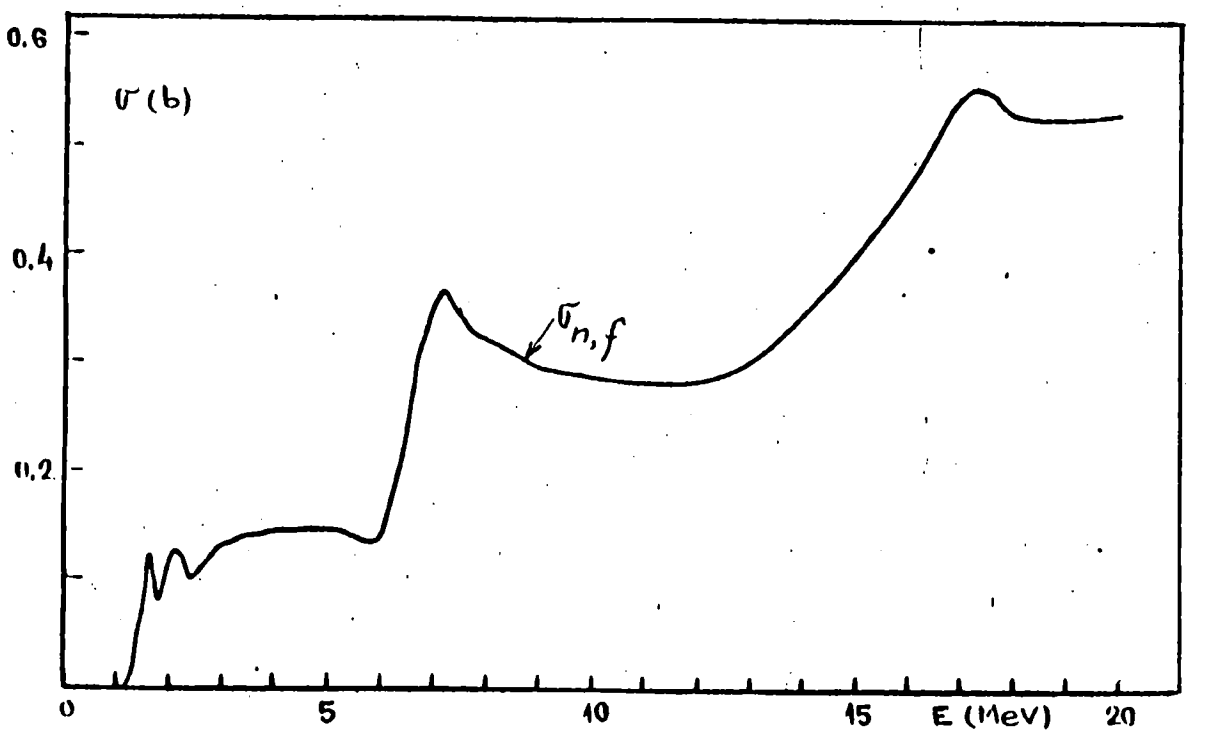

Fig.V.5.1. Evaluated fission cross section versus energy

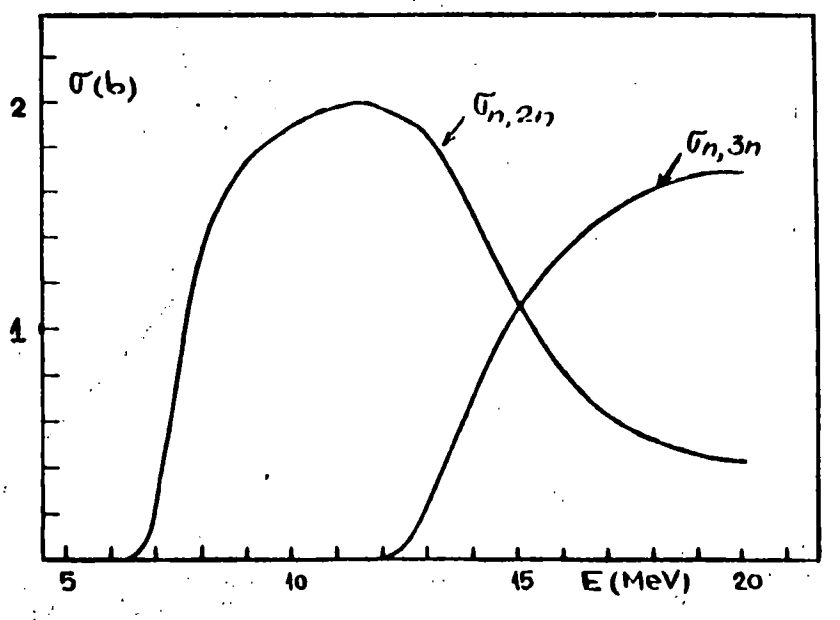

Fig.V.6.1. Evaluated (n,2n) and (n,3n) cross sections vs. energy.

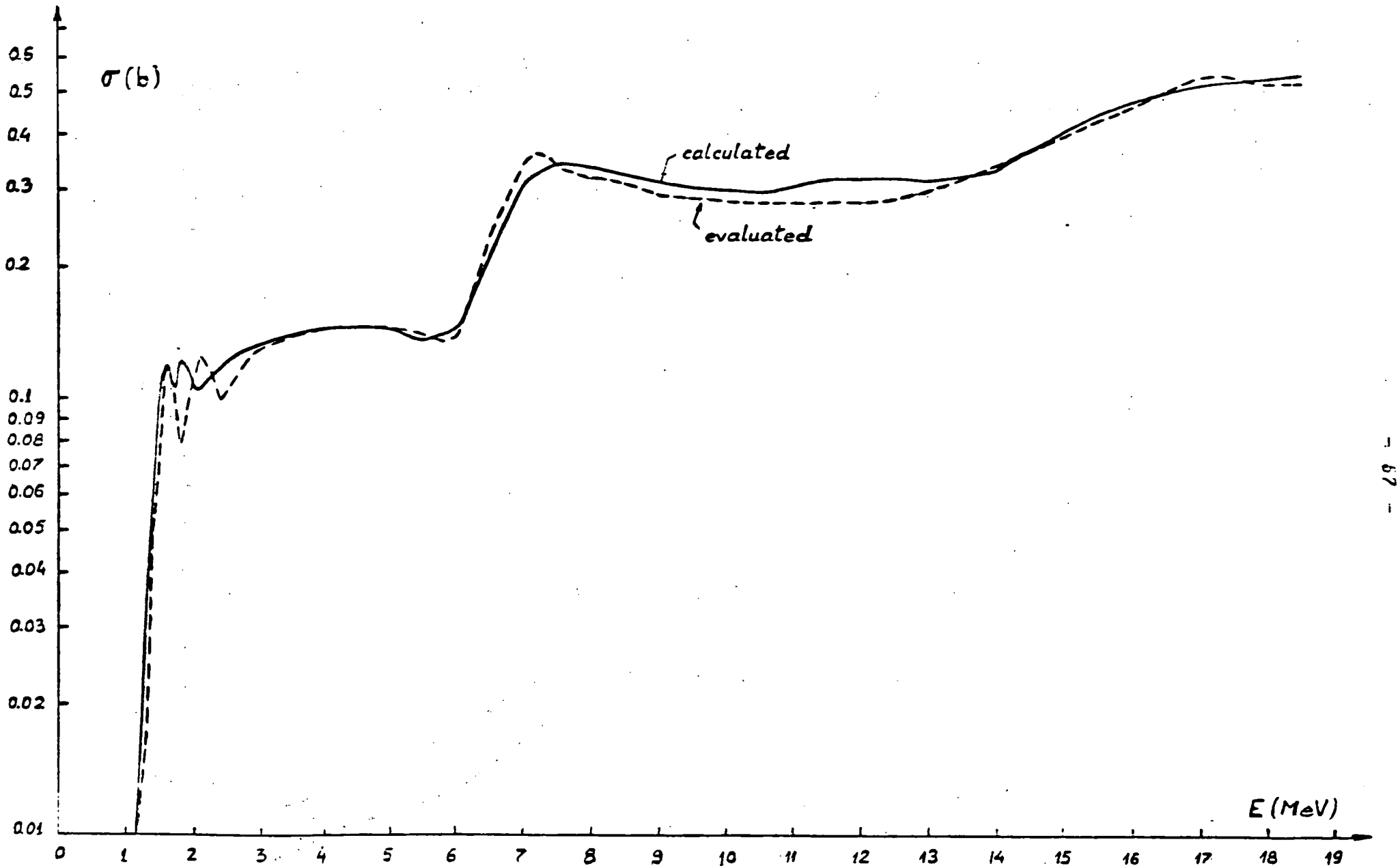

Fig.V.7.1. Evaluated and computed fission cross section vs. energy.

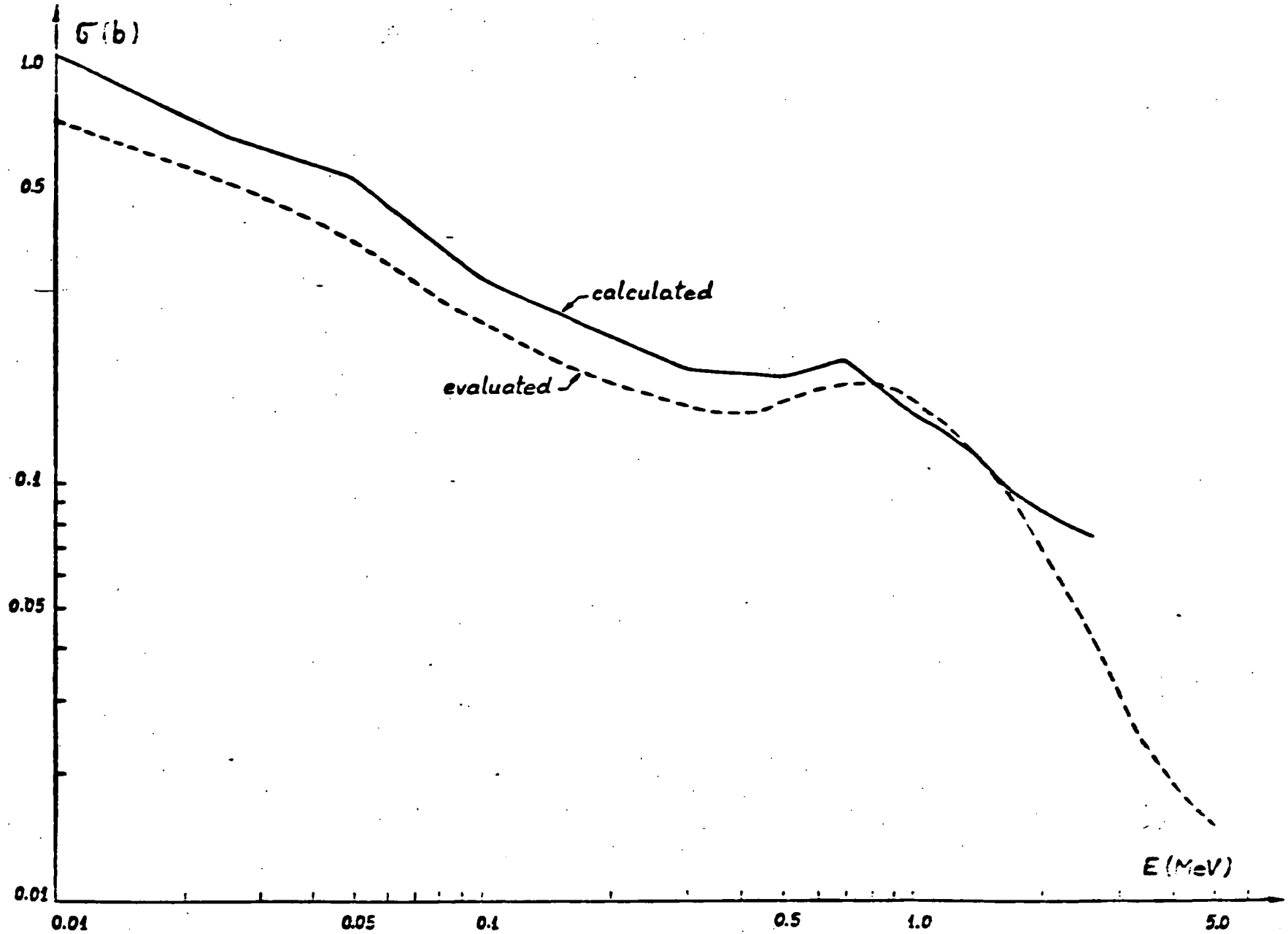

Fig. V.7.2. Evaluated and computed radiative capture cross sections for fast energy range.

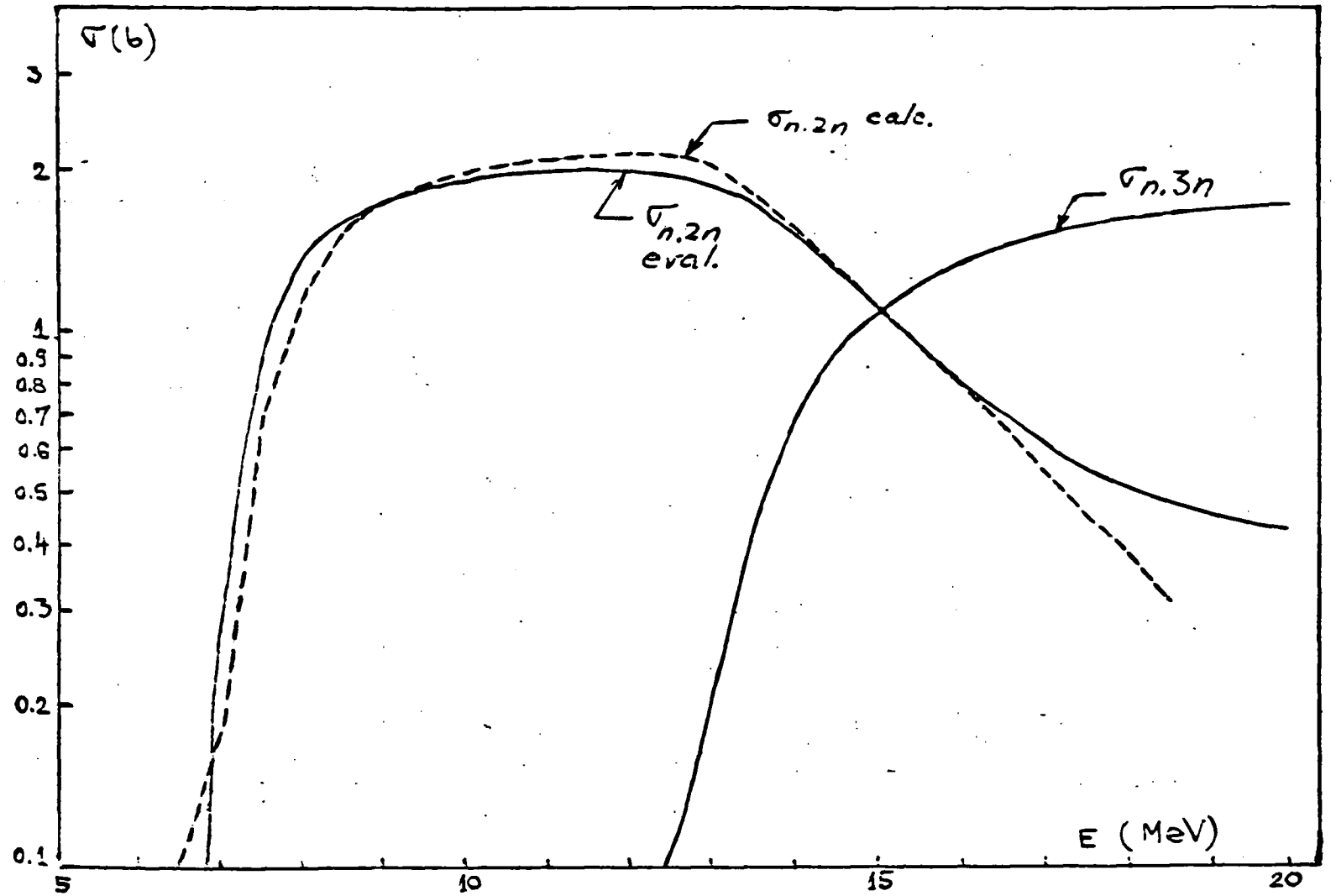

Fig.V.7.3. Evaluated and computed (n,2n) and (n,3n) cross sections vs. energy

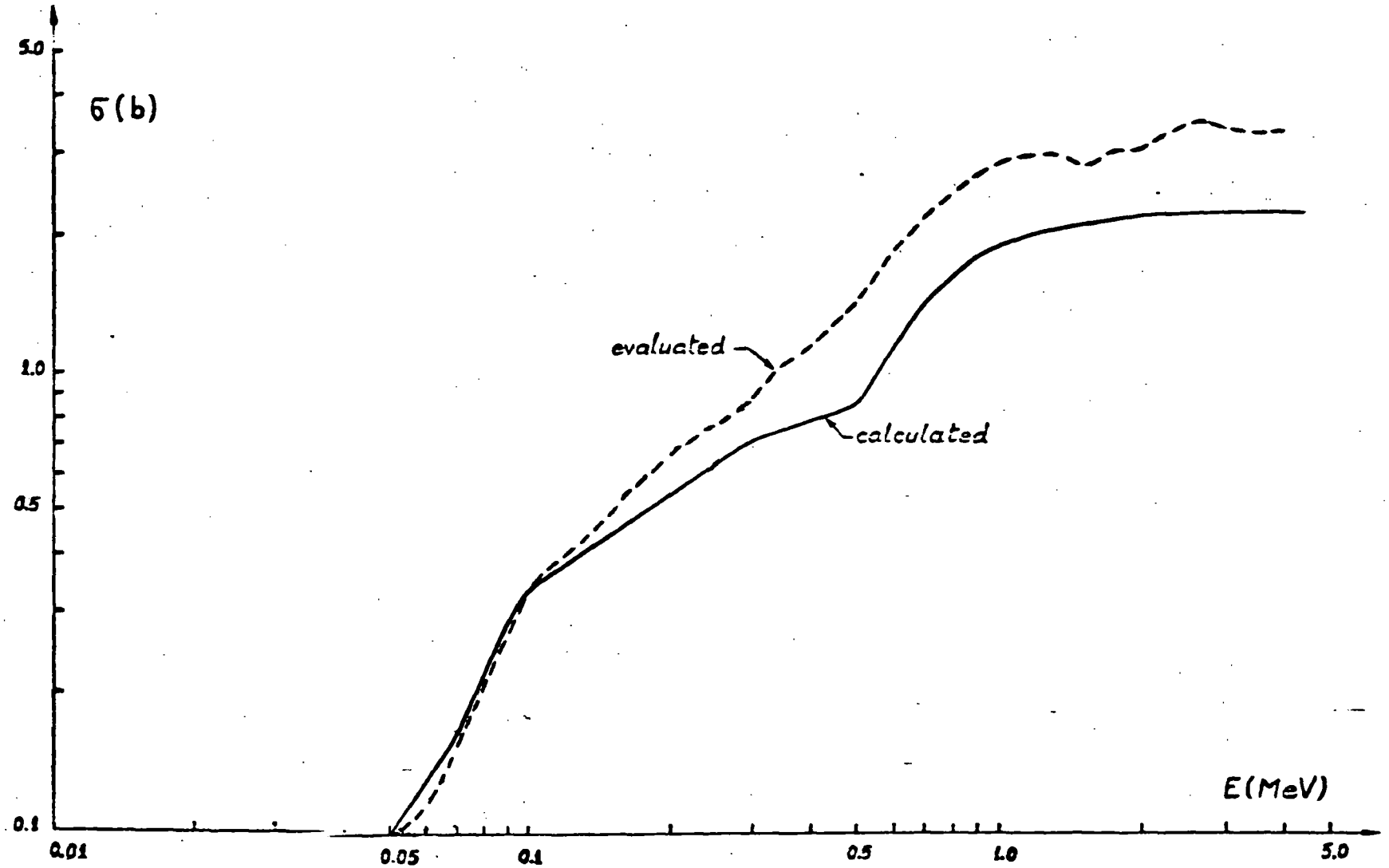

Fig. V.7.4. Evaluated and computed inelastic cross section up to 5 MeV.

VI. Elastic Angular Distribution Evaluation

The available experimental data for 232-Th elastic angular distributions [VI.1 - VI.10] have in many cases resolutions which did not allow the inelastic component separation.

As it can be seen in Table VI.1, pure elastic angular distributions are available for three energies only: at 0.7 MeV 1.5 MeV and 2.5 MeV. Experimental numerical values are given for 2.5 MeV only [VI.7]; for the other two energies only graphs are presented [VI.2].

Using an adjusted optical model parameter set, including the deformation paramaters Haouat [VI.7] reported also an excelent fit of angular elastic distributions at 2.5 MeV.

Most of known experimental angular distributions (the total and the elastic cross sections also) have been resonable described by optical model calculations, using Haouat's parameters.

Up to 1.25 MeV, a spherical optical model have been used, as in reference [VI.11], although 232-Th is a permanent deformed nucleus with axial symmetry. Shape elastic components (SE) have been obtained with ELIESE-3 code [VI.12]. The compound elastic contribution (CE) by Hauser-Feshbach theory were calculated also. Above 1.25 MeV, the calculations were performed by coupled channels theory [VI.13] using JUPITOR code [VI.14]. The used parameters were the followings [VI.7]:

V_R = 46.2 - 0.3 E (MeV)
r_R = 1.26 fm
a_R = 0.63 fm
W_s = 3.6+0.4E(MeV)
r_s = 1.26 fm
a_s = 0.52 fm
V_{so} = 6.2 MeV
r_{so} = 1.12 fm
a_{so} = 0.47 fm

and the deformation parameters were:

β_2 = 0.19
β_4 = 0.071
β_6 = 0.0

The real potential was assumed to be of Woods-Saxon type, the imaginary potential has for the nuclear surface part a derivative Woods-Saxon form and the spin-orbit potential was a Thomas-Fermi type.

Up to 7 MeV the nonadiabatic approximation has been used, in a coupling of the first three excited states 49.37 KeV(2^+), 162.12 KeV(4^+), 333.7 KeV(6^+) to the ground state 0^+ (the ground rotational band). Above 7 MeV, the same coupling was used, but in adiabatic approximation.

In Figs.VI.1 -VI.7 the experimental data together with the computed ones are shown.

It is to be noticed a general good agreement with experimental data,except for the energies of 1.25 MeV and 15.2 MeV. In the first case the existing discrepancies are not imortant, because the data seem to be obsolete; this fact is confirmed at 1.5 MeV where the same author [VI.2] supplied recently a new set of data, quite different from the earlier ones. For 15.2 MeV the discrepancies can be explained by the poor resolution existing in 1962, year when the paper was reported. Besides, the discrepancies especially appear for large scattering angles, where the differential cross section has a small value and hence its contribution to the total elastic cross section is not very important.

The final data set for elastic angular distributions is given for the following energies: 0.5, 0.6, 0.7, 0.8, 1.0, 1.25, 1.5, 2.0, 2.5, 3.0, 4.0, 5.0, 6.0, 8.0, 10.0, 12.0, 14.0, 16.0, 18.0, and 20.0 MeV. These distibutions have been calculated for 37 angles between 0° and 180°.

SAD code [VI.15] has been used to compute the corrresponding Legendre coefficients a_ℓ:

$$\frac{d\sigma}{d\Omega} = \sum_{\ell=0}^{L-1} a_\ell P_\ell(\cos\theta) \qquad (VI.1)$$

Finally, the Legendre coefficients have been stored in file MF = 4, MT = 2, normalized in CMS, according to the following expansion:

$$\frac{d\sigma}{d\Omega} = \frac{\sigma_{el}}{4\pi} \sum_{\ell=0}^{L-1} (2\ell+1) f_\ell P_\ell(\cos\theta) \qquad (VI.2)$$

with $f_o = 1$.

Up to 0.4 MeV the distributions were considered to be isotrope.

File 4 contains also the transformation matrix from CMS to LS.

References

VI.1. A.Smith, Phys.Rev.126,718(1962).

VI.2. J.Meadows et al., ANL/NDM-35(1978).

VI.3. M.Walt et al., Phys.Rev.93,1062(1954).

VI.4. S.E.Darden et al., Phys.Rev.96,836(1954).

VI.5. F.T.Kuchnir et al., Phys.Rev.176,1405(1968).

VI.6. R.Batchelor et al., Nucl.Phys.65,236(1965).

VI.7. G.Haouat et al., INDC(FR)13/L(1977).

VI.8. V.I.Popov, Sov.Progr.in Neutron Phys. 224(1961).

VI.9. S.Buccino et al., Z.Phys.196,103(1966).

VI.10. Hudson, Phys.Rev.128,1271(1962).

VI.11. R.J.Howerton et al., UCRL-50400, vol.15,Part D, Rev.1(1978).

VI.12. S.Igarasi, JAERI-1224(1972).

VI.13. T.Tamura, Rev.Mod.Phys.37,679(1965).

VI.14. T.Tamura, ORNL-4152(1967).

VI.15. E.M.Pennington et al., ANL-7306(1967).

Table VI.1.

The Experimental Elastic Angular Distribution for ^{232}Th

Energy (MeV)	Nr. of points	Inelastic contribution	Author Reference	Year	Model*
0.56	8	-	Smith [VI.1]	1962	SOM
0.7	10	No	Smith [VI.1]	1962	SOM
	12	No	Smith [VI.2]	1967	SOM
1.0	6	Yes	Smith [VI.1]	1962	SOM
	9	Yes	Walt [VI.3]	1954	SOM
	5	Yes	Darden [VI.4]	1954	SOM
	4	Yes	Kuchnir [VI.5]	1968	SOM
1.25	9	Yes	Smith [VI.1]	1962	SOM
1.5	8	Yes	Smith [VI.1]	1962	NACC
	20	No	Smith [VI.2]	1977	NACC
2.0	11	Yes	Batchelor [VI.6]	1965	NACC
2.5	19	No	Haouat [VI.7]	1977	NACC
3.0	11	Yes	Batchelor [VI.6]	1965	NACC
	18	Yes	Quoted in [VI.2]	1978	NACC
3.1	10	Yes	Popov [VI.8]	1961	NACC
4.0	16	Yes	Batchelor [VI.6]	1965	NACC
	20	Yes	Quoted in [VI.2]	1978	NACC
5.0	12	Yes	Buccino [VI.9]	1966	NACC
7.0	12	Yes	Batchelor [VI.6]	1965	ACC
15.2	32	Yes	Hudson [VI.10]	1962	ACC

* SOM - Spherical optical model
NACC - Nonadiabatic approximation of coupled channel model
ACC - Adiabatic approximation of coupled channel model.

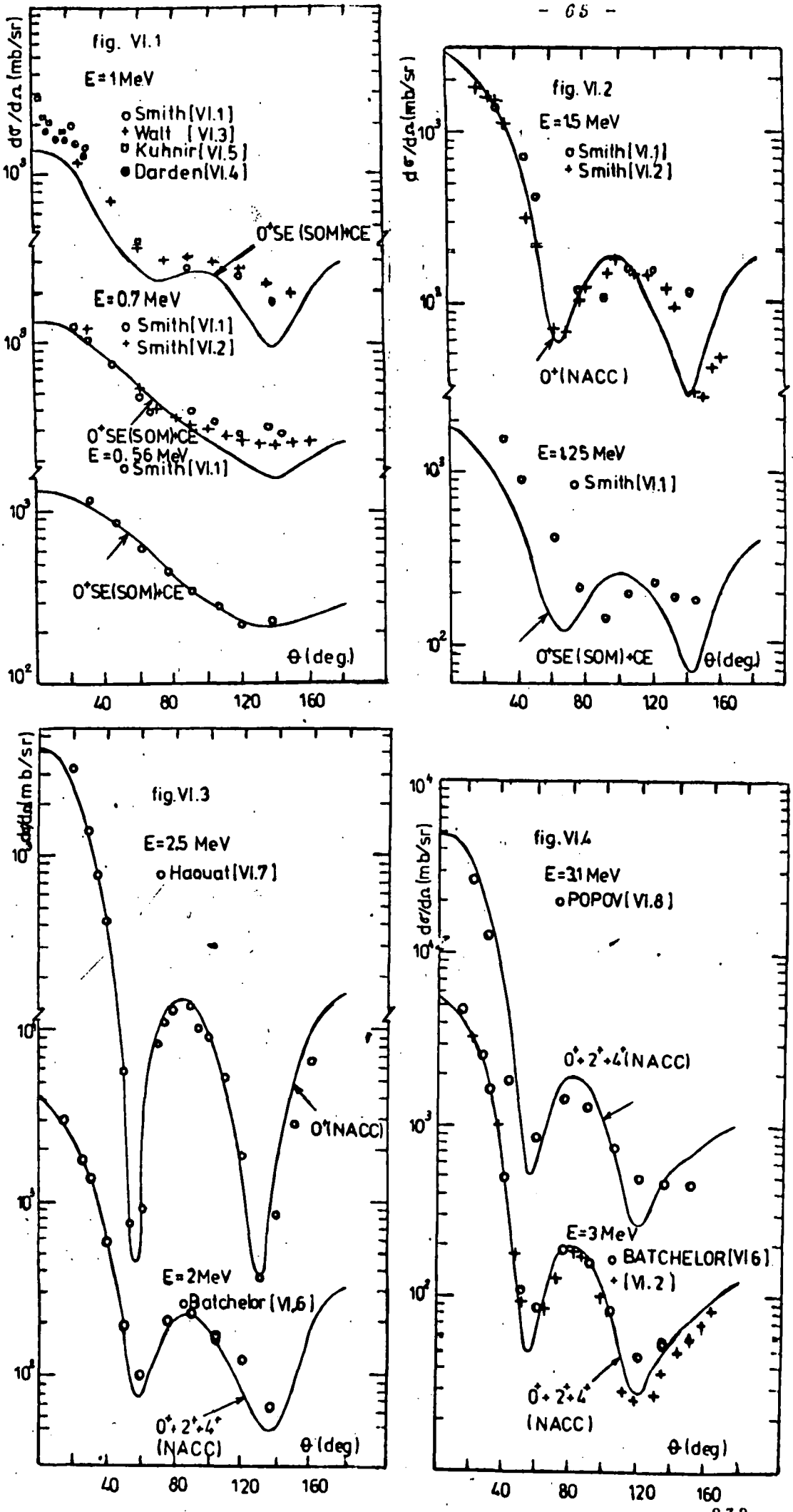

Fig. IV.1-IV.4. Elastic angular distributions for ^{232}Th

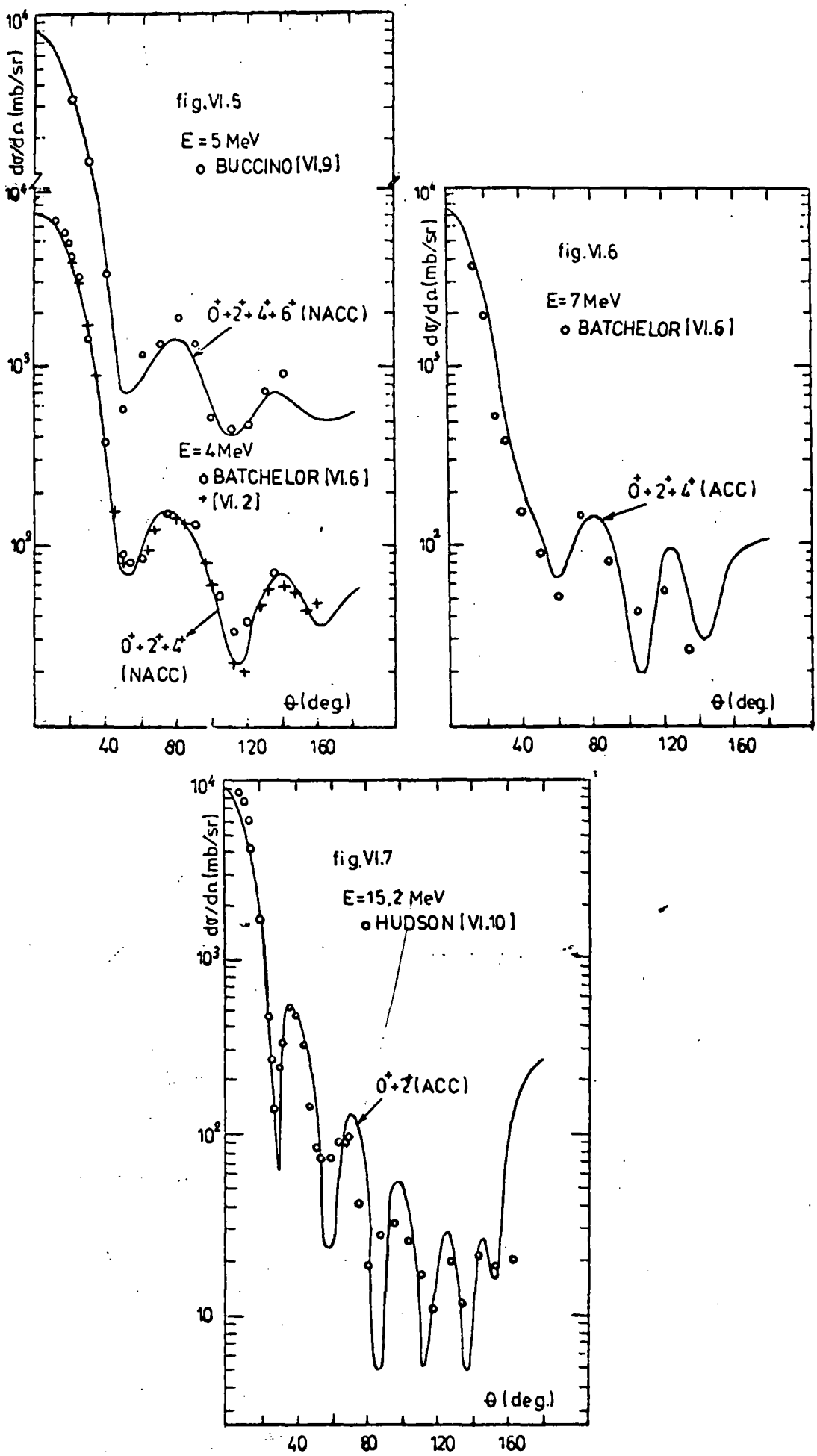

Fig.IV.5-IV.7. Elastic angular distributions for ^{232}Th

VII. The Average Number of Neutrons per Fission

VII.1. The Average Number of Prompt Neutrons per Fission, $\bar{\nu}_p$

Information about the dependence of $\bar{\nu}_p$ on incident neutron energy for ^{232}Th are based on a few measurements [VII.1 - VII.8]. Since all these are relative measurements a renormalization of all the experimental values to the newest standards was necessary.

In most of the experiments, $\bar{\nu}_p$ for ^{235}U thermal fission and $\bar{\nu}_p$ for ^{252}Cf spontaneous fission have been used as standards. Two other measurements were based on $\bar{\nu}_p$ for ^{238}U at 1.4 MeV [VII.2] and on $\bar{\nu}_p$ for ^{235}U at 0.37 MeV [VII.8].

The latest recommended values as standards used for renormalization are the followings:

$$\bar{\nu}_p^{SF}(^{252}Cf) = 3.731 \pm 0.008 \qquad [VII.9]$$

$$\bar{\nu}_p^{th}(^{235}U) = 2.383 \qquad [VII.10]$$

$$\bar{\nu}_p^{1.4MeV}(^{238}U) = 2.503 \qquad [VII.10]$$

$$\bar{\nu}_p^{0.37MeV}(^{235}U) = 2.431 \qquad [VII.10]$$

The available references and the experimental data, original and renormalized, are listed in Table VII.1.

Most of the data are below 4 MeV and there is a large gap between 4 and 14 MeV where only one point was reported, at 7.45 MeV. The poor precision of the measurements in the 14 - 15 MeV area is also noticeable.

From energies near the threshold up to 15 MeV, there is a steady increase of $\bar{\nu}_p$, so that a linear fit of data is justified. However, ^{232}Th shows a well known anomaly for $\bar{\nu}_p(E)$ behaviour consisting in the rise of $\bar{\nu}_p$ with decreasing energy as the threshold approaches. The experimental errors of those points near threshold are comparable to the deviation from linearity, but the observation of that rise in three different experiments makes it probably real.

Linear least-square fits were made to the available data, so that an adequate description of the energy dependence of $\bar{\nu}_p$ for ^{232}Th, is given by the following two equations:

$$\bar{\nu}_p(E_n) = 3.7315 - 1.0652 \cdot E_n \; ; \; Thr. - 1.572 \; MeV$$
$$\bar{\nu}_p(E_n) = 1.8092 + 0.1573 \cdot E_n \; ; \; 1.572 - 15 \; MeV \qquad (VII.1)$$

However the linear fit between 1.572 and 15 MeV is not clarifying, as the possible influences due to the second and the third-chance fission cannot be pointed out. These influences on $\bar{\nu}_p(E)$ behaviour should appear just in the gap mentioned above, as the incident energy reaches the threshold values of (n,n'f) and (n,2nf) processes. So a dependence otherwise than linear is presumed to be more suitable for this energy range.

To take into account the multiple chance fission influences, we used the Howerton's [VII.11] systematics giving a $\bar{\nu}_p$ dependence on incident neutron energy as follows:

$$\bar{\nu}_p(E_n, Z, A) = \sum_{n=0}^{M} R_n \{ n + \bar{\nu}_{th}(A-n, Z) + \bar{\nu}_1(A-n) \cdot [E_n - E_B(A) + E_B(A-n) - n\bar{E}_T(n) - E_{th}(Z, A-n)] \} \qquad (VII.2)$$

where:

$$\bar{\nu}_{th}(Z,A) = 2.33 + 0.06[2 - (-1)^{A+1-Z} - (-1)^Z] + 0.15(Z - 92) + 0.02(A - 235)$$

$$\bar{\nu}_1(A) = 0.130 + 0.006(A - 235) \qquad (VII.3)$$

$$E_{th}(Z,A) = 18.6 - 0.36Z^2/(A+1) + 0.2[2 - (-1)^{A+1-Z} - (-1)^Z] - E_n$$

and:

$$R_o(E_n) = \frac{\sigma_{direct\ fiss.}(E_n)}{\sigma_{total\ fiss.}(E_n)}$$

$$R_1(E_n) = \frac{\sigma_{nn'f}(E_n)}{\sigma_{total\ fiss.}(E_n)} \qquad (VII.4)$$

$$R_2(E_n) = \frac{\sigma_{n,2nf}(E_n)}{\sigma_{total\ fiss.}(E_n)}$$

$E_B(A)$ = total binding energy of the nucleus with charge Z and mass A,

$\bar{E}_T(n)$ = mean energy of pre-scission neutrons,

$E_{th}(Z,A-n)$ = threshold energy of the fission process for the nucleus with charge Z and mass (A-n),

M = the degree of multiple chance fission to be taken into account.

The recommended data set results from both linear fit (for lower energy region) and Howerton's systematics (for higher energies).

The renormalized experimental data, together with the linear fits (the dashed curves) and the recommended values (the solid curve) are shown in Fig.VII.1.

VII.2. The Average Number of Delayed Neutrons per Fission, $\bar{\nu}_{dl}$

The experimental data for ^{232}Th delayed fission neutrons are few and rather discrepant [VII.12 - VII.17]. The available references and the experimental data original and renormalized ones are shown in Table VII.2. The information on some of the experiments is very poor, so that an estimation of their reliability cannot be made. No information on standards used in measurements is given, except for Maksyutenko's data [VII.12]; the used value for that purpose was thermal $\bar{\nu}_{dl}(^{235}U) = 0.0155$ recommended in the latest ENDL evaluation [VII.10].

The most reliable paper is that of Masters et al.[VII.14]; the authors describe in detail the experimental conditions and give a theoretical (qualitative) description of the process. Their data are in agreement with theoretical predictions, showing a decrease of delayed neutron production with increasing incident energy.

A linear least-square fit was made to the available experimental data obtaining for the energy dependence of the evaluated $\bar{\nu}_{dl}$ the following equation:

$$\bar{\nu}_{dl}(E_n) = 0.05566 - 0.00064\ E_n$$

VII.3. The Total Number of Neutrons per Fission, $\bar{\nu}_t$

The total number of neutrons per fission $\bar{\nu}_t(E_n) = \bar{\nu}_p(E_n) + \bar{\nu}_{dl}(E_n)$ was obtained as a sum of corresponding values of the two components for the same energy grid.

The evaluated data for $\bar{\nu}_t$, $\bar{\nu}_{dl}$ and $\bar{\nu}_p$ were included in the file 1, MT = 452, 455, 456, tabulated as functions of incident neutron energy.

References

VII.1. I.I.Bondarenko, 58Geneva,15,353(1958).

VII.2. A.B.Smith, Phys.Rev.115,1242(1959).

VII.3. J.Leroy, J.Phys.(Paris), 21,617(1960).

VII.4. B.D.Kuzminov, Sov.Prog.Neut.Phys.,177(1961).

VII.5. H.Conde, Nucl.Sci.Eng.11,397(1961).

VII.6. D.S.Mather, Nucl.Phys.66,149(1965).

VII.7. H.Conde, Arkiv for Fysik, 29,33(1965).

VII.8. L.I.Prokhorova, FEI-107(1967).

VII.9. J.Schmidt, NEANDC-105/L(1976).

VII.10.ENDL Eval.Nucl.Data Library, UCRL-50400.

VII.11. R.J.Howerton, Nucl.Sci.Eng.62,438(1977).

VII.12. B.P.Maksyutenko, At.Energ.7,474(1959).

VII.13.V.I.Shpakov, At.Energ.11,539(1961).

VII.14.G.Herrmann, 67Vienna,147(1967).

VII.15. C.F.Masters et al., Nucl.Sci.Eng.36,202(1969).

VII.16.L.V.East, 69Vienna, 647(1969).

VII.17.M.G.Brown, Radiochim.Acta, 15,109(1971).

VII.18.G.Benedict, Radiochim.Acta, 17,161(1972).

Table VII.1

$\bar{\nu}_p$ experimental data for ^{232}Th

Author/Reference	Energy (MeV)	$\bar{\nu}_p$	
		original	renormalized
I.I.Bondarenko [VII.1]	4.00	2.70 ±0.10	2.60 ±0.10
A.B.Smith [VII.2]	1.40±0.08	2.58 ±0.20	2.46 ±0.20
J.Leroy [VII.3]	14.20	4.64 ±0.21	4.48 ±0.21
B.D.Kuzminov [VII.4]	2.30±0.10	2.22 ±0.22	2.18 ±0.22
	3.75±0.15	2.39 ±0.21	2.35 ±0.21
	15.70±0.50	4.17 ±0.54	4.10 ±0.54
H.Conde [VII.5]	3.60±0.30	2.42 ±0.10	2.38 ±0.10
(superseded)	14.90±0.30	4.43 ±0.13	4.36 ±0.13
D.S.Mather [VII.6]	1.39±0.16	2.319±0.078	2.288±0.078
	1.98±0.15	2.211±0.038	2.181±0.038
	3.00±0.12	2.286±0.096	2.255±0.096
	4.02±0.10	2.411±0.069	2.378±0.069
H.Conde [VII.7]	1.42±0.02	2.205±0.060	2.179±0.060
	1.61±0.01	2.048±0.037	2.024±0.037
	1.80±0.01	2.119±0.055	2.094±0.055
	2.23±0.01	2.180±0.049	2.154±0.049
	2.64±0.01	2.273±0.052	2.246±0.052
	3.60±0.01	2.410±0.090	2.382±0.090
	7.45±0.05	3.028±0.060	2.993±0.060
	14.80±0.20	4.065±0.060	4.017±0.060
	14.90±0.30	4.320±0.130	4.269±0.130
L.I.Prokhorova [VII.8]	1.48±0.03	2.179±0.096	2.152±0.096
	1.56±0.05	2.096±0.073	2.069±0.073
	1.64±0.07	2.132±0.072	2.105±0.072
	2.05±0.06	2.142±0.069	2.115±0.069
	2.46±0.06	2.221±0.052	2.193±0.052
	2.86±0.05	2.213±0.054	2.185±0.054
	3.27±0.04	2.416±0.074	2.385±0.074

Table VII.2

$\bar{\nu}_{dl}$ *experimental data for* ^{232}Th

Author/Reference	Energy (MeV)	$\bar{\nu}_p$	
		original	renormalized
B.P.Maksyutenko [VII.12]	2.4	*3.4 ±0.003	0.052±0.003
	3.3	*3.18 ±0.002	0.051±0.002
	15.0	*5.11 ±0.004	0.079±0.004
V.I.Shpakov [VII.13]	14.5	0.075±0.07	
G.Herrmann [VII.14]	14.0	0.019±0.005	
C.F.Masters [VII.15]	3.1	0.06 ±0.006	
	14.9	0.031±0.003	
L.V.East [VII.16]	14.9	0.031±0.003	
M.G.Brown [VII.17]	14.8	0.0269	
G.Benedict [VII.18]	14.8	0.023±0.008	

* *Maksyutenko's original data are the ratio of* $\bar{\nu}_{dl}(^{232}Th)$ *and* $\bar{\nu}_{dl}(^{235}U)$ *values.*

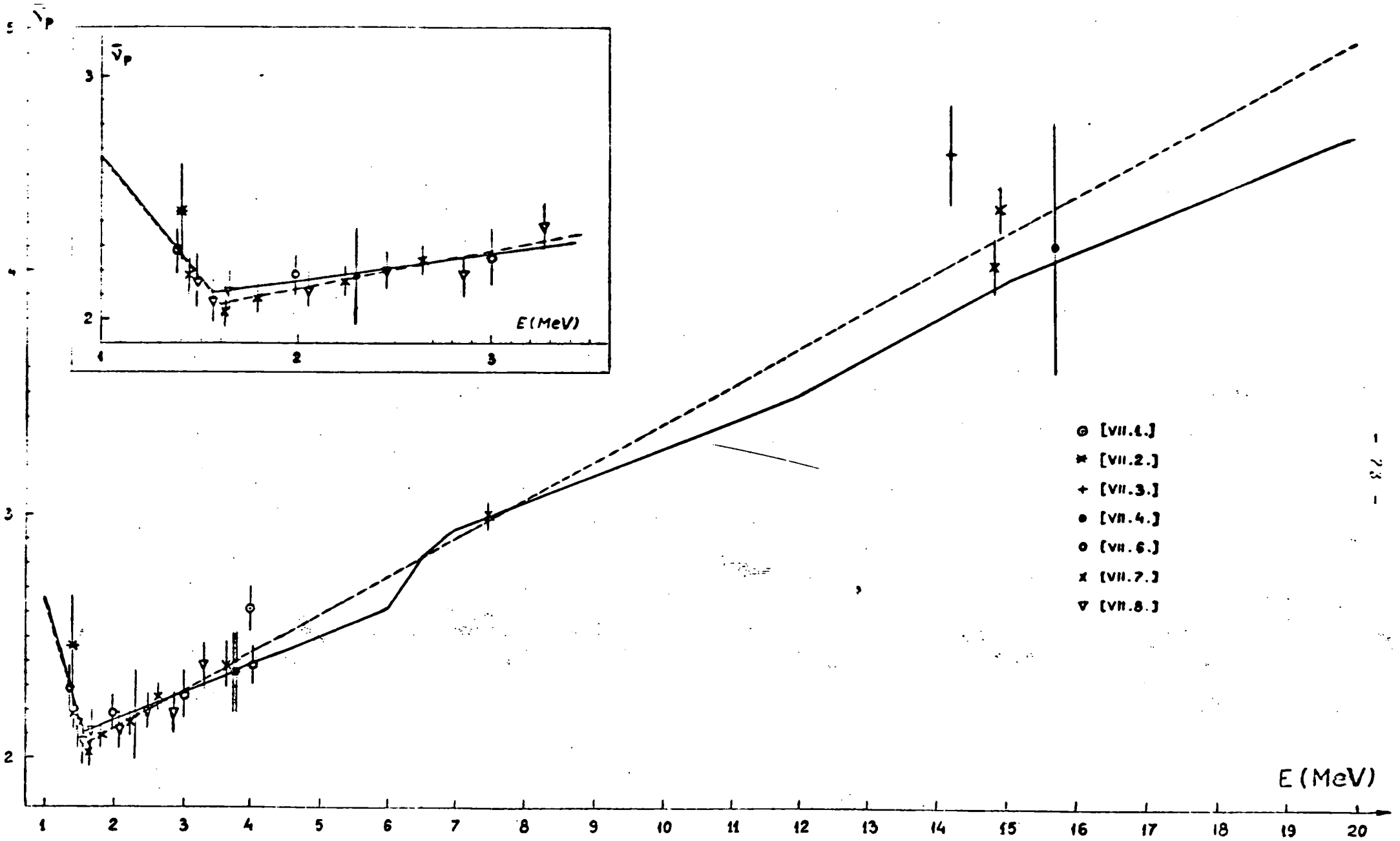

Fig.VII.1. Average prompt neutrons per fission $\bar{\nu}_p$ vs. energy for ^{232}Th.

VIII. The Average Cosine of the Scattering Angle (Laboratory System) for Elastic Scattering, $\bar{\mu}_L$, and the Average Logarithmic Energy Decrement for Elastic Scattering, ξ

The average cosine of the scattering angle (in LS) has been calculated for each energy, where the elastic angular distributions were given, as usual. Since the file 4 contains Legendre polynomial coefficients (in CMS), the (CMS) to (LS) transformation matrix have been used to compute $\bar{\mu}_L$ by (VIII.1):

$$\bar{\mu}_L(E) = f_1^L(E) = \sum_{m=0}^{NM} f_m^{CM}(E)\ U_{1,m} \qquad \text{(VIII.1)}$$

where f_m^{CM} are the Legendre coefficients (in CMS) and $U_{1,m}$ are the transformation matrix elements; NM is the maximum order of the Legendre polynomials.

To compute ξ , the following relations (VIII.2) were used:

$$\xi = \xi_o - 3\bar{\mu}_{CM}\left[\frac{1}{1-\alpha} - \frac{1}{2} + \frac{\alpha}{(1-\alpha)^2}\ ln\ \alpha\right] \qquad \text{(VIII.2)}$$

where:

$$\alpha = \left(\frac{AWR-1}{AWR+1}\right)^2 \qquad \text{(VIII.3)}$$

and:

$$\xi_o = 1 + \frac{\alpha}{1-\alpha}\ ln\ \alpha \qquad \text{(VIII.4)}$$

$$\bar{\mu}_{CM} = (\bar{\mu}_L - \bar{\mu}_L^o)/(1 - \frac{3}{5AWR^2}) \qquad \text{(VIII.5)}$$

$$AWR = \frac{A}{m_n}$$

(A is the atomic mass and m_n the neutronic mass).

$\bar{\mu}_L^o$ is the average cosine for the isotrope scattering ($E < 0.4$ MeV for 232-Th).

The data thus calculated are stored in file 3, MT = 251 ($\bar{\mu}_L$) and MT = 252 (ξ) respectivelly.

References

VIII.1. D.Garber, C.Dunford, S.Pearlstein (ENDF 102), BNL-NCS-50496(1975).

VIII.2. A.Berinde "Elemente de fizica si calculul reactorilor nucleari", Ed.Tech.(1978) Bucuresti.

IX. Checks of the Evaluated Data

In addition to the checks specified in different sections of this report, the final evaluated data set have been verified for physical consistency and format correctness as follows:

a) - The fission product yields (y_i) from file 1 (MF=1, MT=454) have been tested against normalization rule, obtaining:

$$\sum_i y_i = 1.997831 \qquad (IX.1)$$

b) - The partial resolved resonance widths from file 2 (MF=2, MT=251) have been tested to be consistent with the total ones.

c) - The cross section data from file 3 (MF=3, MT=1÷102) have been tested against deviant points, and regarding the consistency of the partial data to the total ones.

d) - The Wick's limit for elastic angular distribution data as well as the positivity of elastic angular distributions computed from the evaluated Legendre coefficients, have been checked for file 4 (MF=4, MT=2).

These checks (except Wick's limit) have been performed using CHECK4 programme [IX.1]. In addition the checks mentioned at c) have been performed using also SUMUP programme [IX.2].

The format correctness has been assured by CHECK4 programme, and for dictionary (file 1) DICTION programme [IX.3] was used.

The evaluated fast energy range cross sections are presented in Fig.IX.1.

The evaluated data file for ^{232}Th in ENDF/B format is attached in Appendix.

References

IX.1. O.Ozer et al., Program CHECK4 (Version 1974-1) BNL.
IX.2. O.Ozer, Program SUMUP4 (Version 1974-1) BNL.
IX.3. D.E.Cullen, Prodgram DICTION (Version 1971-1) BNL.

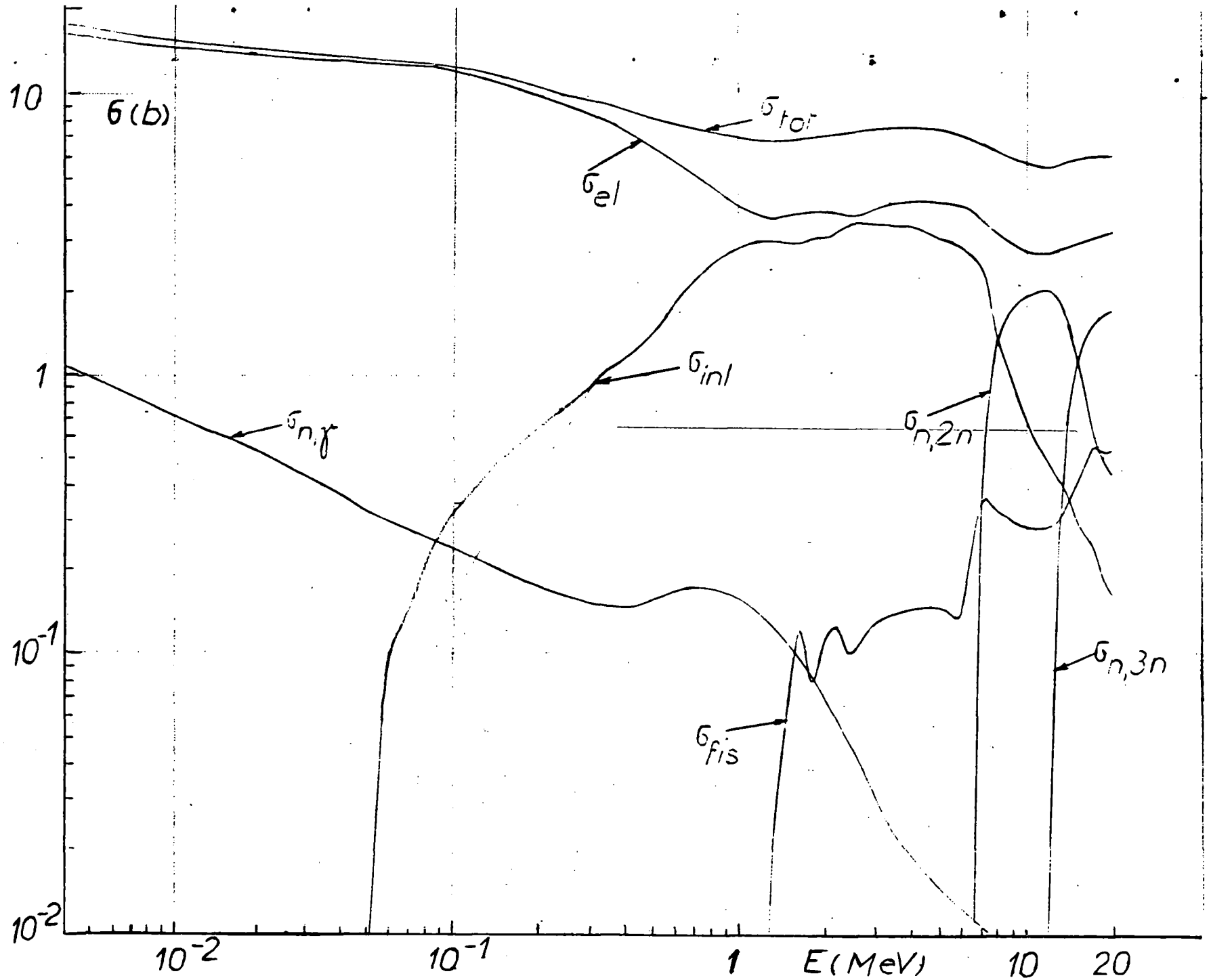

Fig. IX.1. Evaluated cross sections of ^{232}Th for fast energy range.

X. Conclusions

The evaluated data file supplied as a result of this evaluation contains most of the important neutron data of interest in $^{232}Th/^{233}U$ reactor calculations, within the limits of experimental data available at the moment.

During the analysis of the experimental data and of the nuclear theories appropiate for ^{232}Th the authors of this report felt that the accuracy of the final evaluated file can be improved esspecially by the experimentalists. In this respect:

- new measurements of radiative capture widths would be desirable ,
- spin assignements of p-wave resonances above 3 KeV are to be reanalysed,
- p-wave experimental strength functions are still discrepant,
- it is to be pointed out the lack of a quite large number of p-wave resonances,
- fission product yields are still affected by large errors and new measurements would be helpful.

For fast energy range, the needs regarding a better assignement of neutron data on Thorium are extensively considered by Meadows et al., in their recent report [X.1].

The new measurements required are:

- total cross section up to 5 MeV (accuracy 1-2%),
- elastic neutron angular distributions from 0.25-3 MeV (accuracy <10%),
- inelastic neutron scattering cross sections from 0.25 to 3 MeV (accuracy 10%),
- fission cross section from threshold to 20 MeV (accuracy ≤5%),
- radiative capture cross section from 0.025 to 2 MeV (accuracy 5%),
- (n,2n) cross section from threshold to 20 MeV (accuracy 5-10%),
- (n,3n) cross section from threshold to 20 MeV (accuracy 10-20%),
- $\bar{\nu}$ with accuracy 5%,

- total delayed neutron yields (accuracy 5%),
- differential energy spectrum of delayed neutrons (accuracy 20%).

As a result of above conclusions it seems that experimental measurements and consequently an reevaluation process are to be performed.

References

X.1. J.Meadows et al., ANL/NDM-35 (1978).

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A P P E N D I X

The numerical data in ENDF/B format.

This data file is included in the IAEA Nuclear Data Library for Actinides under the accession-number INDL/A-9999. The contents of this library is summarized in the document IAEA-NDS-12.

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     *                          BY                             *  9999 1451
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     *      G.VASILIU,S.MATEESCU,O.GHEORGHE,M.CIODARU,         *  9999 1451
     *      N.DRAGAN,O.BUJOREANU,C.CRACIUN,L.PINTILIESCU,      *  9999 1451
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     *      AND ENGINEERING-BUCHAREST.                         *  9999 1451
     *                                                         *  9999 1451
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     *                      FEBRUARY 1979                      *  9999 1451
     *                                                         *  9999 1451
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                                                                  9999 1451
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*****   FISSION YIELD DATA FOR FISSION SPECTRUM NEUTRONS ADOPTED  9999 1451
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        TOTAL AND CAPTURE C.S. FROM EXPERIMENTAL DATA FITTED      9999 1451
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        TOTAL AND THE CAPTURE C.S. BELOW 0.0052EV ALL C.S.        9999 1451
        HAVE BEEN EXTRAPOLATED.                                   9999 1451
        THE 2200M/SEC CAPTURE C.S. IS 7.3881 B.                   9999 1451
                                                                  9999 1451
*****   RESOLVED RESONANCE ENERGY RANGE (10EV - 4KEV)             9999 1451
        403 RESOLVED RESONANCES (S AND P WAVES) BETWEEN 6EV       9999 1451
        AND 4KEV. AND A SINGLE NEGATIVE RESONANCE AT -5.1EV       9999 1451
        ARE USED IN THE BREIT-WIGNER SINGLE LEVEL FORMALISM       9999 1451
        TO DESCRIBE THE TOTAL, ELASTIC AND CAPTURE C.S.           9999 1451
        THE POTENTIAL SCATTERING RADIUS WAS TAKEN 0.972*E-12CM 9999 1451
                                                                  9999 1451
*****   UNRESOLVED RESONANCES ENERGY RANGE (4KEV-50KEV).          9999 1451
        PARAMETERS DERIVED FROM RESOLVED RESONANCES,EXCEPT        9999 1451
        REDUCED NEUTRON WIDTHS FOR P-WAVE,WHICH ARE COMPUTED      9999 1451
        FROM CORRESPONDING STRENGTH FUNCTION AND ASSOCIATED       9999 1451
        LEVEL SPACINGS.                                           9999 1451
                                                                  9999 1451
*****   RADIATIVE CAPTURE RESONANCE INTEGRAL COMPUTED AND COMPA-  9999 1451
        RED WITH EXPERIMENTAL VALUES.                             9999 1451
                                                                  9999 1451
*****   FAST ENERGY RANGE (50KEV - 20MEV)                         9999 1451
          1. TOTAL CROSS SECTION EVALUATED FROM EXPERIMENTAL DATA9999 1451
          2. ELASTIC C.S. BETWEEN 50KEV - 0.5MEV, EVALUATED FROM 9999 1451
             EXPERIMENTAL DATA, BETWEEN 0.5MEV - 4MEV DERIVED AS 9999 1451
             THE INTEGRATED C.S. FROM COMPUTED ELASTIC ANGULAR  9999 1451
             DISTRIBUTIONS, ABOVE 4MEV, WAS TAKEN FROM ENDL     9999 1451
             LIBRARY (1976).                                    9999 1451
          3. INELASTIC C.S., FROM 6.462MEV - 20MEV, ESTIMATED   9999 1451
             AS THE DIFFERENCE BETWEEN TOTAL AND ALL THE OTHERS 9999 1451
             CROSS SECTIONS.                                    9999 1451
          4. CAPTURE, (N,2N), AND FISSION C.S. EVALUATED FROM   9999 1451
             EXPERIMENTAL DATA.                                 9999 1451
          6. (N,3N) CROSS SECTION WAS COMPUTED USING THE        9999 1451
             EVAPORATION MODEL.                                 9999 1451
                                                                9999 1451
*****   THE NUMBER OF NEUTRONS PER FISSION WAS EVALUATED USING  9999 1451
        THE EXPERIMENTAL DATA AND HOWERTON'S SYSTEMATICS.       9999 1451
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*****   THE ELASTIC ANGULAR DISTRIBUTIONS HAVE BEEN COMPUTED    9999 1451
        BETWEEN 0.5MEV AND 1.25MEV USING A SPHERICAL OPTICAL    9999 1451
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   2  - D.E.CULLEN, UCRL - 50400, VOL.17, PART A (1977).          9999 1451
   3  - D.E.CULLEN, UCRL - 50400, VOL.17, PART B (1977).          9999 1451
   4  - N.DRAGAN, L.PINTILIESCU - TO BE PUBLISHED.                9999 1451
   5  - D.GARBER, C.DUNFORD, S.PEARLSTEIN (ENDF 102),             9999 1451
          BNL-NCS-50496 (1975).                                   9999 1451
   6  - D.GHEORGHE - (PRIVATE COMMUNICATION).                     9999 1451
   7  - G.HAOUAT, J.SIGAUD, J.LACHKAR, CH.LAGRANGE, B.DUCHEMIN    9999 1451
          Y.PATIN, INDC(FR) 13/L, NEANDC(E) 180,L (1977).         9999 1451
   8  - H.C.HONECK, J.FELDERBAUM, O.OZER - PRIV.COMM. (1970)      9999 1451
   9  - R.J.HOWERTON, D.E.CULLEN, R.C.HAIGHT, M.H.MACGREGOR,      9999 1451
          S.T.PERKINS, E.F.PLECHATY - UCRL - 50400, VOL.15,       9999 1451
          PART A (1975).                                          9999 1451
  10  - R.J.HOWERTON - NUCL.SCI.ENG.62,438(1977).                 9999 1451
  11  - R.J.HOWERTON, M.H.MACGREGOR, UCRL -50400, VOL.15,         9999 1451
          PART D, REV.1 (1978).                                   9999 1451
  12  - S.IGARASI - JAERI - 1224 (1972).                          9999 1451
  13  - J.JARY, JAERI-M-5984 (1975).                              9999 1451
  14  -C.M.LEDERER ET AL.,TABLE OF ISOTOPES,7-TH.ED.(1978)        9999 1451
  15  - G.LUNDGREN, NUKLEONIK,11,61 (1968).                       9999 1451
  16  - J.E.LYNN - AERE-R-7468 (1974).                            9999 1451
  17  - R.L.MACKLIN, J.HALPERIN, NUCL.SCI.ENG.64,849 (1977).      9999 1451
  18  - J.MEADOWS, W.POENITZ, A.SMITH, D.SMITH, J.WHALEN,         9999 1451
          R.HOWERTON, ANL/NDM-35 (1978).                          9999 1451
  19  - S.F.MUGHABGHAB, D.I.GARBER, BNL-325,3-RD ED.,VOL 1,(1973)9999 1451
  20  - M.N.NICOLAEV, N.O.BAZAZIANTS - INDC(CCP)-71/U.            9999 1451
  21  - O.OZER - PRIVATE COMMUNICATION (1972).                    9999 1451
  22  - O.OZER - BNL-17134 (1973).                                9999 1451
  23  - S.PEARLSTEIN, ADVANCES IN NUCL.SCIEN.AND TECH. (1974).    9999 1451
  24  - E.M.PENINGTON, J.C.GAJNIAK, R.A.MEWALDT - ANL-7306(1967).9999 1451
  25  - A.PRINCE - WINTER COURSES ON NUCLEAR PHYSICS AND REACTORS9999 1451
          PART 1, TRIESTE (1978).                                 9999 1451
  26  - J.J.SCHMIDT, WINTER COURSES ON NUCLEAR PHYSICS AND        9999 1451
          REACTORS, PART 1, TRIESTE (1978).                       9999 1451
  27  - T.TAMURA - REVS.MOD.PHYS.37,679 (1965).                   9999 1451
  28  - T.TAMURA - ORNL-4152 (1967).                              9999 1451
  29  - G.VASILIU, S.MATEESCU, S.RAPEANU, M.MATEESCU -            9999 1451
          INDC(RUM)-6/L.                                          9999 1451
  30  - A.H.WAPSTRA, K.BOS - ADNDT 19,175 (1977).                 9999 1451
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3.40910+	4	0.00000+	0	2.06710- 4	3.40920+	4	0.00000+	0	1.91300- 59999	1454

3.50940+	4	0.00000+	0	2.67000-	8	3.50960+	4	0.00000+	0	4.01000-	129999	1454
3.50790+	4	1.00000+	0	7.16000-13		3.50790+	4	0.00000+	0	1.90000-	139999	1454
3.50800+	4	1.00000+	0	7.24000-11		3.50800+	4	0.00000+	0	2.04000-	119999	1454
3.50810+	4	0.00000+	0	9.06000-	9	3.50820+	4	1.00000+	0	1.22000-	79999	1454
3.50820+	4	0.00000+	0	3.31000-	7	3.50830+	4	0.00000+	0	1.80500-	59999	1454
3.50840+	4	1.00000+	0	1.29460-	4	3.50840+	4	0.00000+	0	1.29460-	49999	1454
3.50850+	4	0.00000+	0	1.60639-	3	3.50860+	4	1.00000+	0	3.48395-	39999	1454
3.50880+	4	0.00000+	0	3.48422-	3	3.50870+	4	0.00000+	0	2.19429-	29999	1454
3.50890+	4	0.00000+	0	3.06125-	2	3.50890+	4	0.00000+	0	3.23965-	29999	1454
3.50900+	4	0.00000+	0	1.59546-	2	3.50910+	4	0.00000+	0	7.45224-	39999	1454
3.50920+	4	0.00000+	0	1.64873-	3	3.50930+	4	0.00000+	0	3.82350-	49999	1454
3.50940+	4	0.00000+	0	2.60100-	5	3.50960+	4	0.00000+	0	4.58000-	69999	1454
3.60810+	4	1.00000+	0	3.62000-14		3.60810+	4	0.00000+	0	6.32000-	139999	1454
3.60820+	4	0.00000+	0	1.64000-10		3.60830+	4	1.00000+	0	3.01000-	99999	1454
3.60830+	4	0.00000+	0	1.47000-	8	3.60840+	4	0.00000+	0	1.13000-	69999	1454
3.60850+	4	1.00000+	0	3.02000-	6	3.60850+	4	0.00000+	0	1.47600-	59999	1454
3.60860+	4	0.00000+	0	3.38940-	4	3.60870+	4	0.00000+	0	2.52914-	39999	1454
3.60880+	4	0.00000+	0	1.45322-	2	3.60890+	4	0.00000+	0	3.23502-	29999	1454
3.60900+	4	0.00000+	0	5.85055-	2	3.60910+	4	0.00000+	0	5.38899-	29999	1454
3.60920+	4	0.00000+	0	4.46869-	2	3.60930+	4	0.00000+	0	2.38336-	29999	1454
3.60940+	4	0.00000+	0	6.69441-	3	3.60950+	4	0.00000+	0	1.03868-	39999	1454
3.60960+	4	0.00000+	0	1.26070-	4	3.60970+	4	0.00000+	0	1.06600-	59999	1454
3.60980+	4	0.00000+	0	6.16000-	7	3.61000+	4	0.00000+	0	2.11000-	109999	1454
3.70830+	4	0.00000+	0	2.64000-13		3.70840+	4	1.00000+	0	3.07000-	119999	1454
3.70840+	4	0.00000+	0	1.44000-11		3.70850+	4	0.00000+	0	3.32000-	99999	1454
3.70860+	4	1.00000+	0	1.16000-	7	3.70860+	4	0.00000+	0	5.46000-	89999	1454
3.70870+	4	0.00000+	0	5.94000-	6	3.70880+	4	0.00000+	0	8.98200-	59999	1454
3.70890+	4	0.00000+	0	8.26630-	4	3.70900+	4	1.00000+	0	2.62637-	39999	1454
3.70900+	4	0.00000+	0	5.38060-	4	3.70910+	4	0.00000+	0	1.10923-	29999	1454
3.70920+	4	0.00000+	0	1.85232-	2	3.70930+	4	0.00000+	0	3.62723-	29999	1454
3.70940+	4	0.00000+	0	2.12171-	2	3.70950+	4	0.00000+	0	1.30047-	29999	1454
3.70960+	4	0.00000+	0	3.52413-	3	3.70970+	4	0.00000+	0	1.25485-	39999	1454
3.70980+	4	0.00000+	0	1.73630-	4	3.71000+	4	0.00000+	0	5.82000-	79999	1454
3.80850+	4	1.00000+	0	1.42000-14		3.80850+	4	0.00000+	0	6.92000-	149999	1454
3.80860+	4	0.00000+	0	2.10000-11		3.80870+	4	1.00000+	0	3.41000-	109999	1454
3.80870+	4	0.00000+	0	1.67000-	9	3.80880+	4	0.00000+	0	1.49000-	79999	1454
3.80890+	4	0.00000+	0	3.55000-	6	3.80900+	4	0.00000+	0	5.83300-	59999	1454
3.80910+	4	0.00000+	0	4.32030-	4	3.80920+	4	0.00000+	0	3.23047-	39999	1454
3.80930+	4	0.00000+	0	1.36126-	2	3.80940+	4	0.00000+	0	2.88129-	29999	1454
3.80950+	4	0.00000+	0	3.63526-	2	3.80960+	4	0.00000+	0	3.47120-	29999	1454
3.80970+	4	0.00000+	0	2.63237-	2	3.80980+	4	0.00000+	0	1.39658-	29999	1454
3.80990+	4	0.00000+	0	3.23809-	3	3.81000+	4	0.00000+	0	4.05250-	49999	1454
3.81010+	4	0.00000+	0	3.23800-	5	3.81020+	4	0.00000+	0	2.10000-	69999	1454
3.81040+	4	0.00000+	0	2.59000-	9	3.90880+	4	0.00000+	0	2.22000-	129999	1454
3.90890+	4	1.00000+	0	2.06000-10		3.90890+	4	0.00000+	0	4.23000-	119999	1454
3.90900+	4	1.00000+	0	6.60000-	9	3.90900+	4	0.00000+	0	3.87000-	99999	1454
3.90910+	4	1.00000+	0	3.25000-	7	3.90910+	4	0.00000+	0	6.66000-	89999	1454
3.90920+	4	0.00000+	0	6.27000-	6	3.90930+	4	0.00000+	0	1.17530-	49999	1454
3.90940+	4	0.00000+	0	5.70250-	4	3.90950+	4	0.00000+	0	2.83839-	39999	1454
3.90960+	4	1.00000+	0	5.02954-	3	3.90960+	4	0.00000+	0	4.97430-	49999	1454
3.90970+	4	1.00000+	0	7.46686-	3	3.90970+	4	0.00000+	0	7.08094-	39999	1454
3.90980+	4	0.00000+	0	1.56246-	2	3.90990+	4	0.00000+	0	1.29289-	29999	1454
3.91000+	4	0.00000+	0	3.16206-	3	3.91010+	4	0.00000+	0	9.31020-	49999	1454
3.91020+	4	0.00000+	0	1.31460-	4	3.91030+	4	0.00000+	0	1.73800-	59999	1454
3.91040+	4	0.00000+	0	1.38000-	6	4.00900+	4	1.00000+	0	3.72000-	139999	1454
4.00900+	4	0.00000+	0	7.61000-14		4.00910+	4	0.00000+	0	4.19000-	119999	1454
4.00920+	4	0.00000+	0	3.18000-	9	4.00930+	4	0.00000+	0	1.54000-	79999	1454
4.00940+	4	0.00000+	0	3.35000-	6	4.00950+	4	0.00000+	0	4.20200-	59999	1454
4.00960+	4	0.00000+	0	3.27060-	4	4.00970+	4	0.00000+	0	2.21483-	39999	1454
4.00980+	4	0.00000+	0	7.61006-	3	4.00990+	4	0.00000+	0	1.26296-	29999	1454
4.01000+	4	0.00000+	0	9.90068-	3	4.01010+	4	0.00000+	0	5.50489-	39999	1454
4.01020+	4	0.00000+	0	2.66550-	3	4.01030+	4	0.00000+	0	6.96780-	49999	1454
4.01040+	4	0.00000+	0	1.99760-	4	4.01050+	4	0.00000+	0	1.73500-	59999	1454
4.01060+	4	0.00000+	0	4.07000-	6	4.01080+	4	0.00000+	0	1.20000-	89999	1454
4.01100+	4	0.00000+	0	1.49000-11		4.10930+	4	1.00000+	0	5.51000-	139999	1454
4.10930+	4	0.00000+	0	2.69000-12		4.10940+	4	1.00000+	0	6.74000-	119999	1454
4.10940+	4	0.00000+	0	1.15000-10		4.10950+	4	1.00000+	0	1.80000-	99999	1454
4.10950+	4	0.00000+	0	8.78000-	9	4.10960+	4	0.00000+	0	2.03000-	79999	1454
4.10970+	4	1.00000+	0	8.77000-	7	4.10970+	4	0.00000+	0	4.28000-	69999	1454
4.10980+	4	1.00000+	0	2.39800-	5	4.10980+	4	0.00000+	0	2.39800-	59999	1454
4.10990+	4	1.00000+	0	1.56590-	4	4.10990+	4	0.00000+	0	1.56590-	49999	1454
4.11000+	4	1.00000+	0	2.43350-	4	4.11000+	4	0.00000+	0	2.43350-	49999	1454
4.11010+	4	0.00000+	0	9.28170-	4	4.11020+	4	0.00000+	0	8.48760-	49999	1454
4.11030+	4	0.00000+	0	7.13150-	4	4.11040+	4	0.00000+	0	3.78390-	49999	1454
4.11050+	4	0.00000+	0	1.20190-	4	4.11060+	4	0.00000+	0	6.12600-	59999	1454
4.11070+	4	0.00000+	0	2.99400-	5	4.11080+	4	0.00000+	0	3.19000-	69999	1454
4.11090+	4	0.00000+	0	3.57000-	7	4.11100+	4	0.00000+	0	3.74000-	89999	1454
4.20950+	4	0.00000+	0	3.63000-13		4.20960+	4	0.00000+	0	3.10000-	119999	1454
4.20970+	4	0.00000+	0	2.00000-	9	4.20980+	4	0.00000+	0	8.22000-	89999	1454
4.20990+	4	0.00000+	0	1.30000-	6	4.21000+	4	0.00000+	0	7.76000-	69999	1454

4.21010+	4	0.00000+	0	3.21700-	5	4.21020+	4	0.00000+	0	1.08420-	49999	1454
4.21030+	4	0.00000+	0	1.78050-	4	4.21040+	4	0.00000+	0	3.13290-	49999	1454
4.21050+	4	0.00000+	0	1.92300-	4	4.21060+	4	0.00000+	0	3.47120-	49999	1454
4.21070+	4	0.00000+	0	3.61860-	4	4.21080+	4	0.00000+	0	2.42510-	49999	1454
4.21090+	4	0.00000+	0	6.54500-	5	4.21100+	4	0.00000+	0	2.37900-	59999	1454
4.21110+	4	0.00000+	0	4.62000-	6	4.21120+	4	0.00000+	0	9.50000-	79999	1454
4.21140+	4	0.00000+	0	1.85000-	8	4.21160+	4	0.00000+	0	3.56000-119999		1454
4.30980+	4	0.00000+	0	1.26000-12		4.30990+	4	1.00000+	0	1.51000-119999		1454
4.30990+	4	0.00000+	0	7.39000-11		4.31000+	4	0.00000+	0	1.20000- 99999		1454
4.31010+	4	0.00000+	0	2.02000- 8		4.31020+	4	1.00000+	0	7.76000- 89999		1454
4.31020+	4	0.00000+	0	7.76000- 8		4.31050+	4	0.00000+	0	9.69000- 79999		1454
4.31040+	4	0.00000+	0	3.57000- 6		4.31050+	4	0.00000+	0	8.61000- 69999		1454
4.31060+	4	0.00000+	0	3.17400- 5		4.31070+	4	0.00000+	0	1.22500- 49999		1454
4.31080+	4	0.00000+	0	2.58140- 4		4.31090+	4	0.00000+	0	2.61330- 49999		1454
4.31100+	4	0.00000+	0	1.71210- 4		4.31110+	4	0.00000+	0	1.06140- 49999		1454
4.31120+	4	0.00000+	0	3.65100- 5		4.31130+	4	0.00000+	0	1.72800- 59999		1454
4.31140+	4	0.00000+	0	4.49000- 6		4.31160+	4	0.00000+	0	6.99000- 89999		1454
4.41000+	4	0.00000+	0	4.38000-14		4.41010+	4	0.00000+	0	1.76000-129999		1454
4.41020+	4	0.00000+	0	5.61000-11		4.41030+	4	0.00000+	0	7.94000-109999		1454
4.41040+	4	0.00000+	0	1.15000- 8		4.41050+	4	0.00000+	0	6.67000- 89999		1454
4.41060+	4	0.00000+	0	1.01000- 6		4.41070+	4	0.00000+	0	9.23000- 69999		1454
4.41080+	4	0.00000+	0	1.19460- 4		4.41090+	4	0.00000+	0	2.54560- 49999		1454
4.41100+	4	0.00000+	0	4.97940- 4		4.41110+	4	0.00000+	0	5.13470- 49999		1454
4.41120+	4	0.00000+	0	5.28840- 4		4.41130+	4	0.00000+	0	4.03320- 49999		1454
4.41140+	4	0.00000+	0	3.14490- 4		4.41150+	4	0.00000+	0	1.27760- 49999		1454
4.41160+	4	0.00000+	0	3.51800- 5		4.41170+	4	0.00000+	0	5.45000- 69999		1454
4.41180+	4	0.00000+	0	9.43000- 7		4.41190+	4	0.00000+	0	1.24000- 79999		1454
4.41200+	4	0.00000+	0	1.46000- 8		4.41220+	4	0.00000+	0	5.52000-119999		1454
4.41240+	4	0.00000+	0	1.59000-13		4.51040+	4	1.00000+	0	2.64000-139999		1454
4.51040+	4	0.00000+	0	7.45000-14		4.51050+	4	1.00000+	0	1.04000-129999		1454
4.51050+	4	0.00000+	0	7.60000-12		4.51060+	4	1.00000+	0	1.63000-109999		1454
4.51060+	4	0.00000+	0	1.63000-10		4.51070+	4	0.00000+	0	1.34000- 89999		1454
4.51060+	4	1.00000+	0	3.56000- 7		4.51080+	4	0.00000+	0	3.56000- 79999		1454
4.51090+	4	1.00000+	0	3.17000- 6		4.51090+	4	0.00000+	0	3.17000- 69999		1454
4.51100+	4	1.00000+	0	1.13100- 5		4.51100+	4	0.00000+	0	1.13100- 59999		1454
4.51110+	4	0.00000+	0	7.07300- 5		4.51120+	4	0.00000+	0	1.16340- 49999		1454
4.51130+	4	0.00000+	0	2.52410- 4		4.51140+	4	0.00000+	0	3.10710- 49999		1454
4.51150+	4	0.00000+	0	4.04520- 4		4.51160+	4	0.00000+	0	2.04290- 49999		1454
4.51170+	4	0.00000+	0	1.05920- 4		4.51180+	4	0.00000+	0	3.71400- 59999		1454
4.51190+	4	0.00000+	0	1.54300- 5		4.51200+	4	0.00000+	0	3.44000- 69999		1454
4.51210+	4	0.00000+	0	7.93000- 7		4.51220+	4	0.00000+	0	7.75000- 89999		1454
4.51230+	4	0.00000+	0	5.12000- 9		4.51240+	4	0.00000+	0	1.10000- 99999		1454
4.61060+	4	0.00000+	0	2.52000-14		4.61070+	4	1.00000+	0	1.92000-129999		1454
4.61070+	4	0.00000+	0	8.61000-13		4.61080+	4	0.00000+	0	1.15000- 99999		1454
4.61090+	4	1.00000+	0	1.82000- 8		4.61090+	4	0.00000+	0	8.18000- 99999		1454
4.61100+	4	0.00000+	0	3.31000- 7		4.61110+	4	1.00000+	0	1.35000- 69999		1454
4.61110+	4	0.00000+	0	6.06000- 7		4.61120+	4	0.00000+	0	9.87000- 69999		1454
4.61130+	4	0.00000+	0	3.73000- 5		4.61140+	4	0.00000+	0	1.33160- 49999		1454
4.61150+	4	0.00000+	0	3.15390- 4		4.61160+	4	0.00000+	0	4.88000- 49999		1454
4.61170+	4	0.00000+	0	4.41200- 4		4.61180+	4	0.00000+	0	4.97090- 49999		1454
4.61190+	4	0.00000+	0	3.41470- 4		4.61200+	4	0.00000+	0	2.34630- 49999		1454
4.61210+	4	0.00000+	0	9.44900- 5		4.61220+	4	0.00000+	0	2.82500- 59999		1454
4.61230+	4	0.00000+	0	4.19000- 6		4.61240+	4	0.00000+	0	1.88000- 69999		1454
4.61250+	4	0.00000+	0	4.35000- 7		4.61260+	4	0.00000+	0	1.26000- 79999		1454
4.61260+	4	0.00000+	0	3.23000- 9		4.61300+	4	0.00000+	0	8.42000-129999		1454
4.71080+	4	0.00000+	0	1.21000-14		4.71090+	4	1.00000+	0	1.56000-129999		1454
4.71090+	4	0.00000+	0	2.13000-13		4.71100+	4	1.00000+	0	3.40000-119999		1454
4.71100+	4	0.00000+	0	1.26000-11		4.71110+	4	1.00000+	0	6.51000-109999		1454
4.71110+	4	0.00000+	0	1.16000-10		4.71120+	4	0.00000+	0	9.34000- 99999		1454
4.71130+	4	1.00000+	0	9.99000- 8		4.71130+	4	0.00000+	0	1.36000- 89999		1454
4.71140+	4	0.00000+	0	7.28000- 7		4.71150+	4	1.00000+	0	3.06000- 69999		1454
4.71150+	4	0.00000+	0	3.06000- 6		4.71160+	4	1.00000+	0	8.98000- 69999		1454
4.71160+	4	0.00000+	0	8.98000- 6		4.71170+	4	1.00000+	0	2.60900- 59999		1454
4.71170+	4	0.00000+	0	2.60900- 5		4.71180+	4	1.00000+	0	5.33400- 59999		1454
4.71180+	4	0.00000+	0	5.33400- 5		4.71190+	4	0.00000+	0	2.03460- 49999		1454
4.71200+	4	0.00000+	0	2.26120- 4		4.71210+	4	0.00000+	0	2.56660- 49999		1454
4.71220+	4	0.00000+	0	1.22530- 4		4.71230+	4	0.00000+	0	6.52700- 59999		1454
4.71240+	4	0.00000+	0	3.34000- 5		4.71250+	4	0.00000+	0	2.27500- 59999		1454
4.71260+	4	0.00000+	0	1.14900- 5		4.71270+	4	0.00000+	0	6.92000- 69999		1454
4.71280+	4	0.00000+	0	2.05000- 6		4.71300+	4	0.00000+	0	5.01000- 89999		1454
4.81110+	4	1.00000+	0	5.19000-14		4.81110+	4	0.00000+	0	1.38000-149999		1454
4.81120+	4	0.00000+	0	2.13000-12		4.81130+	4	1.00000+	0	3.99000-119999		1454
4.81130+	4	0.00000+	0	1.06000-11		4.81140+	4	0.00000+	0	1.07000- 99999		1454
4.81150+	4	1.00000+	0	1.54000- 8		4.81150+	4	0.00000+	0	4.10000- 99999		1454
4.81160+	4	0.00000+	0	2.08000- 7		4.81170+	4	1.00000+	0	9.60000- 79999		1454
4.81170+	4	0.00000+	0	2.55000- 7		4.81180+	4	0.00000+	0	8.80000- 69999		1454
4.81190+	4	1.00000+	0	1.42600- 5		4.81190+	4	0.00000+	0	1.42600- 59999		1454
4.81200+	4	0.00000+	0	9.44600- 5		4.81210+	4	0.00000+	0	1.72380- 49999		1454
4.81220+	4	0.00000+	0	2.23510- 4		4.81230+	4	0.00000+	0	2.22940- 49999		1454
4.81240+	4	0.00000+	0	2.19810- 4		4.81250+	4	0.00000+	0	2.29460- 49999		1454

4.81260+	4	0.00000+	0	3.28530-	4	4.81270+	4	0.00000+	0	3.45450-	49999	1454
4.81280+	4	0.00000+	0	3.53730-	4	4.81290+	4	0.00000+	0	1.77670-	49999	1454
4.81300+	4	0.00000+	0	7.33900-	5	4.81310+	4	0.00000+	0	1.36200-	59999	1454
4.81320+	4	0.00000+	0	1.83000-	6	4.81340+	4	0.00000+	0	1.01000-	99999	1454
4.81360+	4	0.00000+	0	5.18000-14		4.91150+	4	1.00000+	0	1.59000-139999		1454
4.91150+	4	0.00000+	0	7.74000-13		4.91160+	4	1.00000+	0	1.15000-119999		1454
4.91160+	4	0.00000+	0	1.15000-11		4.91170+	4	1.00000+	0	8.52000-119999		1454
4.91170+	4	0.00000+	0	4.16000-10		4.91180+	4	1.00000+	0	3.92000- 99999		1454
4.91180+	4	0.00000+	0	3.29000- 9		4.91190+	4	1.00000+	0	1.39000- 89999		1454
4.91190+	4	0.00000+	0	6.79000- 8		4.91200+	4	1.00000+	0	2.51000- 79999		1454
4.91200+	4	0.00000+	0	2.51000- 7		4.91210+	4	1.00000+	0	4.82000- 79999		1454
4.91210+	4	0.00000+	0	2.35000- 6		4.91220+	4	1.00000+	0	3.06000- 69999		1454
4.91220+	4	0.00000+	0	3.06000- 6		4.91230+	4	1.00000+	0	3.65000- 69999		1454
4.91230+	4	0.00000+	0	1.78200- 5		4.91240+	4	0.00000+	0	2.34100- 59999		1454
4.91250+	4	1.00000+	0	3.26700- 5		4.91250+	4	0.00000+	0	1.26700- 59999		1454
4.91260+	4	0.00000+	0	1.43960- 4		4.91270+	4	1.00000+	0	2.15460- 49999		1454
4.91270+	4	0.00000+	0	2.15460- 4		4.91280+	4	0.00000+	0	7.81840- 49999		1454
4.91290+	4	0.00000+	0	1.33282- 3		4.91300+	4	0.00000+	0	1.13690- 39999		1454
4.91310+	4	0.00000+	0	8.95980- 4		4.91320+	4	0.00000+	0	3.01520- 49999		1454
4.91330+	4	0.00000+	0	5.00700- 5		4.91340+	4	0.00000+	0	2.61000- 69999		1454
4.91360+	4	0.00000+	0	1.93000- 9		5.01170+	4	0.00000+	0	2.83000-149999		1454
5.01180+	4	0.00000+	0	1.73000-12		5.01190+	4	1.00000+	0	2.71000-119999		1454
5.01190+	4	0.00000+	0	7.20000-12		5.01200+	4	0.00000+	0	7.17000-109999		1454
5.01210+	4	1.00000+	0	5.58000- 9		5.01210+	4	0.00000+	0	1.96000- 99999		1454
5.01220+	4	0.00000+	0	5.13000- 8		5.01230+	4	1.00000+	0	1.03000- 79999		1454
5.01230+	4	0.00000+	0	2.94000- 7		5.01240+	4	0.00000+	0	8.83000- 79999		1454
5.01250+	4	1.00000+	0	1.06000- 6		5.01250+	4	0.00000+	0	3.01000- 69999		1454
5.01260+	4	0.00000+	0	2.60700- 5		5.01270+	4	1.00000+	0	3.63800- 59999		1454
5.01270+	4	0.00000+	0	9.78600- 5		5.01280+	4	0.00000+	0	7.50710- 49999		1454
5.01290+	4	1.00000+	0	1.17117- 3		5.01290+	4	0.00000+	0	1.17117- 39999		1454
5.01300+	4	0.00000+	0	6.60478- 3		5.01310+	4	0.00000+	0	1.11129- 29999		1454
5.01320+	4	0.00000+	0	1.47736- 2		5.01330+	4	0.00000+	0	6.31461- 39999		1454
5.01340+	4	0.00000+	0	1.71482- 3		5.01350+	4	0.00000+	0	1.82970- 49999		1454
5.01360+	4	0.00000+	0	1.68700- 5		5.01370+	4	0.00000+	0	9.40000- 79999		1454
5.01380+	4	0.00000+	0	3.64000- 8		5.11210+	4	0.00000+	0	3.23000-139999		1454
5.11220+	4	1.00000+	0	2.30000-12		5.11220+	4	0.00000+	0	1.74000-129999		1454
5.11230+	4	0.00000+	0	1.29000-10		5.11240+	4	1.00000+	0	1.70000-109999		1454
5.11240+	4	0.00000+	0	1.70000-10		5.11250+	4	0.00000+	0	4.80000- 99999		1454
5.11260+	4	1.00000+	0	3.18000- 8		5.11260+	4	0.00000+	0	2.30000- 89999		1454
5.11270+	4	0.00000+	0	9.06000- 7		5.11280+	4	1.00000+	0	5.86000- 69999		1454
5.11280+	4	0.00000+	0	4.25000- 6		5.11290+	4	0.00000+	0	1.11300- 49999		1454
5.11300+	4	1.00000+	0	3.59240- 4		5.11300+	4	0.00000+	0	2.60140- 49999		1454
5.11310+	4	0.00000+	0	3.85593- 3		5.11320+	4	1.00000+	0	4.97413- 39999		1454
5.11320+	4	0.00000+	0	5.60912- 3		5.11330+	4	0.00000+	0	1.80492- 29999		1454
5.11340+	4	1.00000+	0	6.33840- 3		5.11340+	4	0.00000+	0	6.33840- 39999		1454
5.11350+	4	0.00000+	0	6.05908- 3		5.11360+	4	0.00000+	0	1.41204- 39999		1454
5.11370+	4	0.00000+	0	3.51610- 4		5.11380+	4	0.00000+	0	3.44200- 59999		1454
5.11390+	4	0.00000+	0	2.51000- 6		5.21240+	4	0.00000+	0	3.15000-149999		1454
5.21250+	4	1.00000+	0	6.32000-13		5.21250+	4	0.00000+	0	1.68000-139999		1454
5.21260+	4	0.00000+	0	2.95000-11		5.21270+	4	1.00000+	0	7.39000-109999		1454
5.21270+	4	0.00000+	0	2.60000-10		5.21280+	4	0.00000+	0	3.91000- 89999		1454
5.21290+	4	1.00000+	0	6.97000- 7		5.21290+	4	0.00000+	0	2.45000- 79999		1454
5.21300+	4	0.00000+	0	2.02700- 5		5.21310+	4	1.00000+	0	2.21030- 49999		1454
5.21310+	4	0.00000+	0	7.76600- 5		5.21320+	4	0.00000+	0	3.24323- 39999		1454
5.21330+	4	1.00000+	0	9.42827- 3		5.21330+	4	0.00000+	0	3.31264- 39999		1454
5.21340+	4	0.00000+	0	3.77858- 2		5.21350+	4	0.00000+	0	4.06404- 29999		1454
5.21350+	4	0.00000+	0	3.72684- 2		5.21370+	4	0.00000+	0	2.13154- 29999		1454
5.21380+	4	0.00000+	0	8.60673- 3		5.21390+	4	0.00000+	0	1.52445- 39999		1454
5.21400+	4	0.00000+	0	2.33140- 4		5.21420+	4	0.00000+	0	1.02000- 69999		1454
5.31270+	4	0.00000+	0	1.64000-14		5.31280+	4	0.00000+	0	1.38000-129999		1454
5.31290+	4	0.00000+	0	1.34000-10		5.31300+	4	1.00000+	0	1.81000- 99999		1454
5.31300+	4	0.00000+	0	4.89000- 9		5.31310+	4	0.00000+	0	6.52000- 79999		1454
5.31320+	4	0.00000+	0	1.20300- 5		5.31330+	4	1.00000+	0	4.07430- 49999		1454
5.31330+	4	0.00000+	0	5.40080- 4		5.31340+	4	1.00000+	0	8.97880- 49999		1454
5.31340+	4	0.00000+	0	8.64720- 4		5.31350+	4	0.00000+	0	6.91441- 39999		1454
5.31360+	4	1.00000+	0	7.58561- 3		5.31360+	4	0.00000+	0	7.58561- 39999		1454
5.31370+	4	0.00000+	0	3.16413- 2		5.31380+	4	0.00000+	0	2.65794- 29999		1454
5.31390+	4	0.00000+	0	1.80749- 2		5.31400+	4	0.00000+	0	6.33478- 39999		1454
5.31410+	4	0.00000+	0	2.12958- 3		5.31420+	4	0.00000+	0	2.87640- 49999		1454
5.41300+	4	0.00000+	0	5.33000-13		5.41310+	4	1.00000+	0	1.31000-109999		1454
5.41310+	4	0.00000+	0	4.60000-11		5.41320+	4	0.00000+	0	1.19000- 89999		1454
5.41330+	4	1.00000+	0	4.84000- 7		5.41330+	4	0.00000+	0	1.70000- 79999		1454
5.41340+	4	1.00000+	0	1.48200- 5		5.41340+	4	0.00000+	0	5.48000- 69999		1454
5.41350+	4	1.00000+	0	2.09390- 4		5.41350+	4	0.00000+	0	7.35700- 59999		1454
5.41360+	4	0.00000+	0	2.53561- 3		5.41370+	4	0.00000+	0	1.30771- 29999		1454
5.41380+	4	0.00000+	0	3.52113- 2		5.41390+	4	0.00000+	0	4.71654- 29999		1454
5.41400+	4	0.00000+	0	6.10528- 2		5.41410+	4	0.00000+	0	4.35024- 29999		1454
5.41420+	4	0.00000+	0	2.31366- 2		5.41430+	4	0.00000+	0	7.51505- 39999		1454
5.41440+	4	0.00000+	0	1.90513- 3		5.41450+	4	0.00000+	0	1.61220- 49999		1454
5.41460+	4	0.00000+	0	1.21200- 5		5.41480+	4	0.00000+	0	4.35000- 99999		1454

5.41500+	4	0.00000+	0	9.60000-14	5.51320+	4	0.00000+	0	1.05000-	139999	1454
5.51330+	4	0.00000+	0	2.92000-11	5.51340+	4	0.00000+	0	2.95000-	99999	1454
5.51350+	4	1.00000+	0	8.31000- 3	5.51350+	4	0.00000+	0	1.10000-	79999	1454
5.51360+	4	0.00000+	0	3.19100- 5	5.51370+	4	0.00000+	0	1.03420-	49999	1454
5.51380+	4	1.00000+	0	3.39090- 4	5.51380+	4	0.00000+	0	3.39090-	49999	1454
5.51390+	4	0.00000+	0	3.53400- 3	5.51400+	4	0.00000+	0	9.54235-	39999	1454
5.51410+	4	0.00000+	0	2.39579- 2	5.51420+	4	0.00000+	0	2.56847-	29999	1454
5.51430+	4	0.00000+	0	3.00058- 2	5.51440+	4	0.00000+	0	1.65679-	29999	1454
5.51450+	4	0.00000+	0	5.64990- 3	5.51460+	4	0.00000+	0	1.07537-	39999	1454
5.51460+	4	0.00000+	0	5.41000- 6	5.51500+	4	0.00000+	0	1.49000-	99999	1454
5.51540+	4	0.00000+	0	1.01000-13	5.61350+	4	1.00000+	0	1.45000-119999		1454
5.51550+	4	0.00000+	0	5.10000-12	5.61360+	4	0.00000+	0	2.40000-	99999	1454
5.61370+	4	1.00000+	0	9.79000- 8	5.61370+	4	0.00000+	0	3.44000-	89999	1454
5.61380+	4	0.00000+	0	3.86000- 6	5.61390+	4	0.00000+	0	4.98000-	59999	1454
5.61400+	4	0.00000+	0	5.43670- 4	5.61410+	4	0.00000+	0	3.08338-	39999	1454
5.61420+	4	0.00000+	0	1.21757- 2	5.61430+	4	0.00000+	0	2.48282-	29999	1454
5.61440+	4	0.00000+	0	5.06508- 2	5.61450+	4	0.00000+	0	3.98644-	29999	1454
5.61460+	4	0.00000+	0	2.99310- 2	5.61470+	4	0.00000+	0	8.71630-	39999	1454
5.61480+	4	0.00000+	0	1.75574- 3	5.61490+	4	0.00000+	0	1.19420-	49999	1454
5.61500+	4	0.00000+	0	5.57000- 6	5.61520+	4	0.00000+	0	5.60000-	99999	1454
5.61540+	4	0.00000+	0	2.89000-13	5.71370+	4	0.00000+	0	2.69000-129999		1454
5.71380+	4	0.00000+	0	2.04000-10	5.71390+	4	0.00000+	0	1.14000-	89999	1454
5.71400+	4	0.00000+	0	3.32000- 7	5.71410+	4	0.00000+	0	8.19000-	69999	1454
5.71420+	4	0.00000+	0	7.94600- 5	5.71430+	4	0.00000+	0	7.26840-	49999	1454
5.71440+	4	0.00000+	0	3.10713- 3	5.71450+	4	0.00000+	0	8.01279-	39999	1454
5.71460+	4	0.00000+	0	1.27978- 2	5.71470+	4	0.00000+	0	1.54115-	29999	1454
5.71480+	4	0.00000+	0	6.85597- 3	5.71490+	4	0.00000+	0	1.86140-	39999	1454
5.71500+	4	0.00000+	0	2.07140- 4	5.71510+	4	0.00000+	0	3.51000-	59999	1454
5.71520+	4	0.00000+	0	2.13000- 6	5.71530+	4	0.00000+	0	1.05000-	79999	1454
5.71540+	4	0.00000+	0	1.19000- 9	5.81390+	4	1.00000+	0	2.72000-139999		1454
5.81390+	4	0.00000+	0	9.56000-14	5.81400+	4	0.00000+	0	4.91000-119999		1454
5.81410+	4	0.00000+	0	3.13000- 9	5.81420+	4	0.00000+	0	1.26000-	79999	1454
5.81430+	4	0.00000+	0	2.98000- 6	5.81440+	4	0.00000+	0	5.59400-	59999	1454
5.81450+	4	0.00000+	0	3.37930- 3	5.81460+	4	0.00000+	0	2.25634-	39999	1454
5.81470+	4	0.00000+	0	6.70500- 3	5.81480+	4	0.00000+	0	1.13365-	29999	1454
5.81490+	4	0.00000+	0	6.34882- 3	5.81500+	4	0.00000+	0	2.63349-	39999	1454
5.81510+	4	0.00000+	0	9.36670- 4	5.81520+	4	0.00000+	0	2.26790-	49999	1454
5.81530+	4	0.00000+	0	2.56600- 5	5.81540+	4	0.00000+	0	1.22000-	69999	1454
5.81550+	4	0.00000+	0	9.16000- 8	5.81560+	4	0.00000+	0	8.77000-	99999	1454
5.81570+	4	0.00000+	0	2.65000-10	5.81580+	4	0.00000+	0	7.02000-129999		1454
5.91410+	4	0.00000+	0	1.80000-14	5.91420+	4	1.00000+	0	1.41000-129999		1454
5.91420+	4	0.00000+	0	5.22000-13	5.91430+	4	0.00000+	0	2.11000-109999		1454
5.91440+	4	1.00000+	0	8.74000- 9	5.91440+	4	0.00000+	0	8.65000-109999		1454
5.91450+	4	0.00000+	0	2.63000- 7	5.91460+	4	0.00000+	0	4.60000-	69999	1454
5.91470+	4	0.00000+	0	6.89400- 5	5.91480+	4	0.00000+	0	2.78860-	49999	1454
5.91490+	4	0.00000+	0	6.12400- 4	5.91500+	4	0.00000+	0	5.37780-	39999	1454
5.91510+	4	0.00000+	0	6.62760- 4	5.91520+	4	0.00000+	0	3.25830-	49999	1454
5.91530+	4	0.00000+	0	1.32960- 4	5.91540+	4	0.00000+	0	1.35100-	59999	1454
5.91550+	4	0.00000+	0	3.70000- 6	5.91560+	4	0.00000+	0	6.92000-	79999	1454
5.91570+	4	0.00000+	0	7.80000- 8	5.91580+	4	0.00000+	0	4.89000-	99999	1454
5.91590+	4	0.00000+	0	9.02000-11	5.91600+	4	0.00000+	0	2.49000-129999		1454
6.01440+	4	0.00000+	0	3.98000-13	6.01450+	4	0.00000+	0	2.84000-119999		1454
6.01460+	4	0.00000+	0	2.40000- 9	6.01470+	4	0.00000+	0	1.10000-	79999	1454
6.01480+	4	0.00000+	0	2.07000- 6	6.01490+	4	0.00000+	0	1.13500-	59999	1454
6.01500+	4	0.00000+	0	4.20000- 5	6.01510+	4	0.00000+	0	1.11800-	49999	1454
6.01520+	4	0.00000+	0	2.04440- 4	6.01530+	4	0.00000+	0	1.65690-	49999	1454
6.01540+	4	0.00000+	0	5.82800- 5	6.01550+	4	0.00000+	0	2.96300-	59999	1454
6.01560+	4	0.00000+	0	1.73300- 5	6.01570+	4	0.00000+	0	3.79000-	69999	1454
6.01580+	4	0.00000+	0	9.17000- 7	6.01590+	4	0.00000+	0	3.96000-	89999	1454
6.01500+	4	0.00000+	0	4.63000- 9	6.01610+	4	0.00000+	0	1.18000-109999		1454
6.01520+	4	0.00000+	0	4.41000-12	6.01630+	4	0.00000+	0	9.67000-149999		1454
6.11460+	4	0.00000+	0	1.10000-14	6.11470+	4	0.00000+	0	2.76000-129999		1454
6.11480+	4	1.00000+	0	1.05000-10	6.11480+	4	0.00000+	0	3.90000-119999		1454
6.11490+	4	0.00000+	0	3.67000- 9	6.11500+	4	0.00000+	0	3.52000-	89999	1454
6.11510+	4	0.00000+	0	3.94000- 7	6.11520+	4	1.00000+	0	8.56000-	79999	1454
6.11520+	4	0.00000+	0	8.56000- 9	6.11530+	4	0.00000+	0	5.41000-	69999	1454
6.11540+	4	1.00000+	0	2.01000- 6	6.11540+	4	0.00000+	0	2.01000-	69999	1454
6.11550+	4	0.00000+	0	6.75000- 6	6.11560+	4	0.00000+	0	6.72000-	69999	1454
6.11570+	4	0.00000+	0	4.61000- 6	6.11580+	4	0.00000+	0	2.19000-	69999	1454
6.11590+	4	0.00000+	0	3.40000- 7	6.11600+	4	0.00000+	0	8.97000-	89999	1454
6.11510+	4	0.00000+	0	9.22000- 9	6.11620+	4	0.00000+	0	8.19000-109999		1454
6.11630+	4	0.00000+	0	7.68000-11	6.11640+	4	0.00000+	0	2.22000-129999		1454
6.11550+	4	0.00000+	0	2.28000-14	6.21490+	4	0.00000+	0	1.60000-139999		1454
6.21500+	4	0.00000+	0	7.32000-12	6.21510+	4	0.00000+	0	2.04000-109999		1454
6.21520+	4	0.00000+	0	3.97000- 9	6.21530+	4	0.00000+	0	3.03000-	89999	1454
6.21540+	4	0.00000+	0	9.33000- 8	6.21550+	4	0.00000+	0	3.27000-	79999	1454
6.21560+	4	0.00000+	0	1.06000- 6	6.21570+	4	0.00000+	0	1.38000-	69999	1454
6.21580+	4	0.00000+	0	2.26000- 6	6.21590+	4	0.00000+	0	7.10000-	79999	1454
6.21600+	4	0.00000+	0	6.36000- 7	6.21610+	4	0.00000+	0	1.34000-	79999	1454
6.21620+	4	0.00000+	0	4.47000- 8	6.21630+	4	0.00000+	0	9.42000-	99999	1454

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6.21540+ 4 0.00000+ 0 1.12000- 9 6.21550+ 4 0.00000+ 0 2.76000-119999 1454
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9.02320+04 2.30045+02                     2                     9999 1455
                                                      1          9999 1455
0.00000+00                                                       9999 1455
                                                      1        109999 1455
        10          2                                            9999 1455
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3.00000+06 5.38000-02 6.00000+06 5.19000-02 6.50000+06 5.15000-029999 1455
7.00000+06 5.12000-02 1.20000+07 4.80000-02 1.50000+07 4.61000-029999 1455
2.00000+07 4.29000-02                                            9999 1455
                                                                 9999 1  0
9.02320+04 2.30045+02                     2                     9999 1456
                                                      1        109999 1456
        10          2                                            9999 1456
1.00000+06 2.66600+00 1.11300+06 2.54600+00 1.52800+06 2.10400+009999 1456
3.00000+06 2.26900+00 6.00000+06 2.61500+00 6.50000+06 2.82300+009999 1456
7.00000+06 2.94100+00 1.20000+07 3.49800+00 1.50000+07 3.95600+009999 1456
2.00000+07 4.55900+00                                            9999 1456
                                                                 9999 1  0
9.02320+ 4 2.30045+ 2          0                                29999 1457
4.43584+17 1.89346+15                                     6      39999 1457
0.00000+ 0 0.00000+ 0 1.07085+ 5 1.81500+ 2 4.07484+ 6 2.50116+ 59999 1457
9.02320+ 4 2.30045+ 2                                    12      29999 1457
4.00000+ 0 0.00000+ 0 4.08000+ 6 5.00000+ 3 1.00000+ 0 0.00000+ 09999 1457
6.00000+ 0 0.00000+ 0 0.00000+ 0 0.00000+ 0 1.00000- 9 0.00000+ 09999 1457
4.00000+ 0                                               24      39999 1457
1.00000+ 0 0.00000+ 0                                            9999 1457
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4.01000+ 6 5.00000+ 3 7.70000+ 1 3.00000+ 0 0.00000+ 0 0.00000+ 09999 1457
0.00000+ 0                                               12      19999 1457
1.00000+ 0 0.00000+ 0                                            9999 1457
5.90000+ 4 1.00000+ 3 1.50000- 1 0.00000+ 0 1.20000+ 2 0.00000+ 09999 1457
                                                                 9999 1  0
                                                                 9999 0  0
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9.02320+04 1.00000+00          0          0          2          09999 2151
1.00000+01 4.00000+03          1          1          0          09999 2151
0.00000+00 0.97200+00          0          0          2          09999 2151
2.30045+02 0.00000+00          0          0       1560        2609999 2151
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1.98803+03	0.50000+00	0.62200-01	0.43830-01	0.18370-01	0.00000+009999	2151
2.00507+03	0.50000+00	0.45670-01	0.23470-01	0.22200-01	0.00000+009999	2151
2.05155+03	0.50000+00	0.38680-01	0.18680-01	0.20000-01	0.00000+009999	2151
2.06202+03	0.50000+00	0.79600-01	0.62180-01	0.17420-01	0.00000+009999	2151
2.07369+03	0.50000+00	0.26940-01	0.69400-02	0.20000-01	0.00000+009999	2151
2.07899+03	0.50000+00	0.29260-01	0.92600-02	0.20000-01	0.00000+009999	2151
2.09715+03	0.50000+00	0.21200-01	0.12000-02	0.20000-01	0.00000+009999	2151
2.11725+03	0.50000+00	0.95820-01	0.75820-01	0.20000-01	0.00000+009999	2151
2.14756+03	0.50000+00	0.10520-00	0.90200-01	0.15000-01	0.00000+009999	2151
2.16266+03	0.50000+00	0.11914-00	0.92740-01	0.26400-01	0.00000+009999	2151
2.17792+03	0.50000+00	0.93930-01	0.76470-01	0.17460-01	0.00000+009999	2151
2.19712+03	0.50000+00	0.69400-01	0.49400-01	0.20000-01	0.00000+009999	2151
2.21623+03	0.50000+00	0.43640-01	0.23640-01	0.20000-01	0.00000+009999	2151
2.22200+03	0.50000+00	0.11561-00	0.88610-01	0.27000-01	0.00000+009999	2151
2.23378+03	0.50000+00	0.22500-01	0.25000-02	0.20000-01	0.00000+009999	2151
2.27098+03	0.50000+00	0.48110-01	0.28110-01	0.20000-01	0.00000+009999	2151
2.27527+03	0.50000+00	0.72290-01	0.48290-01	0.24000-01	0.00000+009999	2151
2.28643+03	0.50000+00	0.29002-00	0.27069-00	0.19330-01	0.00000+009999	2151
2.32111+03	0.50000+00	0.24170-01	0.41700-02	0.20000-01	0.00000+009999	2151
2.33586+03	0.50000+00	0.13782-00	0.11782-00	0.20000-01	0.00000+009999	2151
2.34456+03	0.50000+00	0.26600-01	0.66000-02	0.20000-01	0.00000+009999	2151
2.35262+03	0.50000+00	0.37900-01	0.17900-01	0.20000-01	0.00000+009999	2151
2.35370+03	0.50000+00	0.34060-01	0.14060-01	0.20000-01	0.00000+009999	2151
2.37509+03	0.50000+00	0.13485-00	0.11805-00	0.16800-01	0.00000+009999	2151
2.38272+03	0.50000+00	0.22520-01	0.25200-02	0.20000-01	0.00000+009999	2151
2.39126+03	0.50000+00	0.23600-01	0.36000-02	0.20000-01	0.00000+009999	2151
2.41857+03	0.50000+00	0.10496-00	0.90060-01	0.14900-01	0.00000+009999	2151
2.44022+03	0.50000+00	0.30430-01	0.10430-01	0.20000-01	0.00000+009999	2151
2.45579+03	0.50000+00	0.19067-00	0.17067-00	0.20000-01	0.00000+009999	2151
2.47460+03	0.50000+00	0.21250-01	0.12500-02	0.20000-01	0.00000+009999	2151
2.49171+03	0.50000+00	0.27000-01	0.70000-02	0.20000-01	0.00000+009999	2151
2.50915+03	0.50000+00	0.34468-00	0.33768-00	0.07000-01	0.00000+009999	2151
2.52712+03	0.50000+00	0.68390-01	0.48390-01	0.20000-01	0.00000+009999	2151
2.55713+03	0.50000+00	0.25000-01	0.50000-02	0.20000-01	0.00000+009999	2151
2.56319+03	0.50000+00	0.33698-00	0.31698-00	0.20000-01	0.00000+009999	2151
2.56950+03	0.50000+00	0.83330-01	0.63330-01	0.20000-01	0.00000+009999	2151
2.61290+03	0.50000+00	0.11271-00	0.92010-01	0.20700-01	0.00000+009999	2151
2.62484+03	0.50000+00	0.29940-01	0.99400-02	0.20000-01	0.00000+009999	2151
2.63545+03	0.50000+00	0.18699-00	0.16799-00	0.19000-01	0.00000+009999	2151
2.65595+03	0.50000+00	0.25430-01	0.54300-02	0.20000-01	0.00000+009999	2151
2.66384+03	0.50000+00	0.22096-00	0.20296-00	0.18100-01	0.00000+009999	2151
2.66900+03	0.50000+00	0.20700-01	0.70000-03	0.20000-01	0.00000+009999	2151
2.67760+03	0.50000+00	0.33900-01	0.13900-01	0.20000-01	0.00000+009999	2151
2.68378+03	0.50000+00	0.21954-00	0.20124-00	0.18300-01	0.00000+009999	2151

2.71345+03	0.50000+00	0.11717-00	0.97670-01	0.19500-01	0.00000+009999	2151
2.72315+03	0.50000+00	0.31310-01	0.11310-01	0.20000-01	0.00000+009999	2151
2.73351+03	0.50000+00	0.38232-00	0.36392-00	0.18400-01	0.00000+009999	2151
2.74365+03	0.50000+00	0.33130-01	0.13130-01	0.20000-01	0.00000+009999	2151
2.77360+03	0.50000+00	0.92150-01	0.75950-01	0.16200-01	0.00000+009999	2151
2.79325+03	0.50000+00	0.18075-00	0.16195-00	0.18500-01	0.00000+009999	2151
2.81590+03	0.50000+00	0.46510-01	0.28310-01	0.18200-01	0.00000+009999	2151
2.83326+03	0.50000+00	0.59630-01	0.40130-01	0.19500-01	0.00000+009999	2151
2.85935+03	0.50000+00	0.22050-01	0.20500-02	0.20000-01	0.00000+009999	2151
2.85260+03	0.50000+00	0.23212-00	0.21302-00	0.19100-01	0.00000+009999	2151
2.88422+03	0.50000+00	0.28490-01	0.84900-02	0.20000-01	0.00000+009999	2151
2.89582+03	0.50000+00	0.23990-01	0.39900-02	0.20000-01	0.00000+009999	2151
2.91503+03	0.50000+00	0.26430-01	0.64300-02	0.20000-01	0.00000+009999	2151
2.94065+03	0.50000+00	0.21980-01	0.19800-02	0.20000-01	0.00000+009999	2151
2.94571+03	0.50000+00	0.12201-00	0.98610-01	0.23400-01	0.00000+009999	2151
2.95702+03	0.50000+00	0.62470-01	0.46470-01	0.16000-01	0.00000+009999	2151
2.96553+03	0.50000+00	0.33220-01	0.13220-01	0.20000-01	0.00000+009999	2151
2.97230+03	0.50000+00	0.23000-01	0.30000-02	0.20000-01	0.00000+009999	2151
2.97972+03	0.50000+00	0.29190-01	0.91900-02	0.20000-01	0.00000+009999	2151
2.98566+03	0.50000+00	0.55620-01	0.35620-01	0.20000-01	0.00000+009999	2151
3.00575+03	0.50000+00	0.22230-01	0.22300-02	0.20000-01	0.00000+009999	2151
3.01510+03	0.50000+00	0.43600-01	0.28000-01	0.15600-01	0.00000+009999	2151
3.02785+03	0.50000+00	0.24770-00	0.23000-00	0.17700-01	0.00000+009999	2151
3.04035+03	0.50000+00	0.81300-01	0.59000-01	0.22300-01	0.00000+009999	2151
3.05020+03	0.50000+00	0.24950-01	0.49500-02	0.20000-01	0.00000+009999	2151
3.06165+03	0.50000+00	0.53677-01	0.28877-01	0.25000-01	0.00000+009999	2151
3.07770+03	0.50000+00	0.24400-01	0.44000-02	0.20000-01	0.00000+009999	2151
3.08315+03	0.50000+00	0.75784-01	0.54984-01	0.20800-01	0.00000+009999	2151
3.10475+03	0.50000+00	0.23000-01	0.30000-02	0.20000-01	0.00000+009999	2151
3.11010+03	0.50000+00	0.43006-01	0.21806-01	0.21200-01	0.00000+009999	2151
3.12070+03	0.50000+00	0.27262-01	0.72620-02	0.20000-01	0.00000+009999	2151
3.14930+03	0.50000+00	2.06983-01	1.85083-01	0.21900-01	0.00000+009999	2151
3.15590+03	0.50000+00	2.12857-01	1.97457-01	0.15400-01	0.00000+009999	2151
3.16300+03	0.50000+00	0.40809-01	0.20809-01	0.20000-01	0.00000+009999	2151
3.16800+03	0.50000+00	0.22200-01	0.22000-02	0.20000-01	0.00000+009999	2151
3.18520+03	0.50000+00	0.28200-01	0.82000-02	0.20000-01	0.00000+009999	2151
3.18925+03	0.50000+00	0.90053-01	0.75053-01	0.15000-01	0.00000+009999	2151
3.19450+03	0.50000+00	0.23956-01	0.39560-02	0.20000-01	0.00000+009999	2151
3.20830+03	0.50000+00	1.23772-01	0.92572-01	0.31200-01	0.00000+009999	2151
3.21550+03	0.50000+00	0.26000-01	0.60000-02	0.20000-01	0.00000+009999	2151
3.22980+03	0.50000+00	0.32725-01	0.17025-01	0.15700-01	0.00000+009999	2151
3.23790+03	0.50000+00	0.23500-01	0.35000-02	0.20000-01	0.00000+009999	2151
3.24330+03	0.50000+00	0.32824-01	0.14124-01	0.18700-01	0.00000+009999	2151
3.25345+03	0.50000+00	1.01534-01	0.83134-01	0.18400-01	0.00000+009999	2151
3.27055+03	0.50000+00	0.49667-01	0.25867-01	0.23800-01	0.00000+009999	2151
3.29595+03	0.50000+00	4.33686-01	4.08086-01	0.25600-01	0.00000+009999	2151
3.30760+03	0.50000+00	0.24030-01	0.40300-02	0.20000-01	0.00000+009999	2151
3.31650+03	0.50000+00	0.24241-01	0.42410-02	0.20000-01	0.00000+009999	2151
3.33245+03	0.50000+00	0.64691-01	0.40991-01	0.23700-01	0.00000+009999	2151
3.34340+03	0.50000+00	1.89892-01	1.69992-01	0.19900-01	0.00000+009999	2151
3.35225+03	0.50000+00	0.26544-01	0.65440-02	0.20000-01	0.00000+009999	2151
3.36230+03	0.50000+00	0.24000-01	0.40000-02	0.20000-01	0.00000+009999	2151
3.38440+03	0.50000+00	0.97348-01	0.72048-01	0.25300-01	0.00000+009999	2151
3.41070+03	0.50000+00	0.31397-01	0.11397-01	0.20000-01	0.00000+009999	2151
3.43370+03	0.50000+00	0.28000-01	0.80000-02	0.20000-01	0.00000+009999	2151
3.44635+03	0.50000+00	0.44674-01	0.19974-01	0.24700-01	0.00000+009999	2151
3.45860+03	0.50000+00	0.21800-01	0.18000-02	0.20000-01	0.00000+009999	2151
3.47275+03	0.50000+00	0.38635-01	0.18135-01	0.20500-01	0.00000+009999	2151
3.50230+03	0.50000+00	0.23100-01	0.31000-02	0.20000-01	0.00000+009999	2151
3.51195+03	0.50000+00	0.24701-01	0.47010-02	0.20000-01	0.00000+009999	2151
3.52210+03	0.50000+00	1.26715-01	1.06115-01	0.20600-01	0.00000+009999	2151
3.54435+03	0.50000+00	0.26333-01	0.63330-02	0.20000-01	0.00000+009999	2151
3.55220+03	0.50000+00	0.23000-01	0.30000-02	0.20000-01	0.00000+009999	2151
3.56840+03	0.50000+00	0.25200-01	0.52000-02	0.20000-01	0.00000+009999	2151
3.57525+03	0.50000+00	0.45389-01	0.25389-01	0.20000-01	0.00000+009999	2151
3.59300+03	0.50000+00	0.39868-01	0.20468-01	0.19400-01	0.00000+009999	2151
3.61205+03	0.50000+00	1.39996-01	1.20096-01	0.19900-01	0.00000+009999	2151
3.61610+03	0.50000+00	0.26500-01	0.65000-02	0.20000-01	0.00000+009999	2151
3.62460+03	0.50000+00	0.26865-01	0.68650-02	0.20000-01	0.00000+009999	2151
3.63630+03	0.50000+00	0.28721-01	0.87210-02	0.20000-01	0.00000+009999	2151
3.65185+03	0.50000+00	0.86388-01	0.67088-01	0.19300-01	0.00000+009999	2151
3.66650+03	0.50000+00	0.23300-01	0.33000-02	0.20000-01	0.00000+009999	2151
3.67475+03	0.50000+00	0.36076-01	0.13576-01	0.22500-01	0.00000+009999	2151
3.69530+03	0.50000+00	0.22549-01	0.25490-02	0.20000-01	0.00000+009999	2151
3.70340+03	0.50000+00	0.25553-01	0.55530-02	0.20000-01	0.00000+009999	2151
3.71530+03	0.50000+00	0.47809-01	0.26099-01	0.21800-01	0.00000+009999	2151
3.72330+03	0.50000+00	1.20023-01	0.99123-01	0.20900-01	0.00000+009999	2151
3.73355+03	0.50000+00	0.66398-01	0.49098-01	0.17300-01	0.00000+009999	2151
3.74520+03	0.50000+00	0.24896-01	0.48960-02	0.20000-01	0.00000+009999	2151
3.75560+03	0.50000+00	0.32534-01	0.12534-01	0.20000-01	0.00000+009999	2151

3.77900+03	0.50000+00	0.21500-01	0.15000-02	0.20000-01	0.00000+009999	2151
3.78710+03	0.50000+00	0.49318-01	0.28018-01	0.21300-01	0.00000+009999	2151
3.79940+03	0.50000+00	0.24931-01	0.49310-02	0.20000-01	0.00000+009999	2151
3.81240+03	0.50000+00	0.24400-01	0.44000-02	0.20000-01	0.00000+009999	2151
3.82100+03	0.50000+00	0.59586-01	0.40096-01	0.19500-01	0.00000+009999	2151
3.82740+03	0.50000+00	1.27329-01	1.09429-01	0.17900-01	0.00000+009999	2151
3.83500+03	0.50000+00	0.22500-01	0.25000-02	0.20000-01	0.00000+009999	2151
3.84920+03	0.50000+00	0.39651-01	0.19651-01	0.20000-01	0.00000+009999	2151
3.86100+03	0.50000+00	0.23400-01	0.34000-02	0.20000-01	0.00000+009999	2151
3.86935+03	0.50000+00	0.85005-01	0.65305-01	0.19700-01	0.00000+009999	2151
3.88+50+03	0.50000+00	0.33815-01	0.13815-01	0.20000-01	0.00000+009999	2151
3.90500+03	0.50000+00	2.39993-01	2.19993-01	0.20000-01	0.00000+009999	2151
3.91700+03	0.50000+00	0.24400-01	0.44000-02	0.20000-01	0.00000+009999	2151
3.92430+03	0.50000+00	0.31200-01	0.11200-01	0.20000-01	0.00000+009999	2151
3.93240+03	0.50000+00	0.57119-01	0.37519-01	0.19600-01	0.00000+009999	2151
3.95230+03	0.50000+00	0.26393-01	0.63930-02	0.20000-01	0.00000+009999	2151
3.96205+03	0.50000+00	0.64458-01	0.40958-01	0.23500-01	0.00000+009999	2151
3.97095+03	0.50000+00	0.93614-01	0.71914-01	0.21700-01	0.00000+009999	2151
3.97730+03	0.50000+00	1.43707-01	1.19907-01	0.23800-01	0.00000+009999	2151
3.99580+03	0.50000+00	0.37686-01	0.17686-01	0.20000-01	0.00000+009999	2151
2.30045+02	0.00000+00	1	0	864	1449999	2151
0.83000+01	0.50000+00	2.90002-02	0.23000-06	0.29000-01	0.00000+009999	2151
0.13100+02	0.50000+00	2.20002-02	0.21000-06	0.22000-01	0.00000+009999	2151
0.35900+02	0.50000+00	2.20010-02	0.10500-05	0.22000-01	0.00000+009999	2151
0.38150+02	0.50000+00	2.20006-02	0.64000-06	0.22000-01	0.00000+009999	2151
0.40990+02	0.50000+00	2.20006-02	0.59000-06	0.22000-01	0.00000+009999	2151
0.47020+02	0.50000+00	2.20015-02	0.16000-05	0.22000-01	0.00000+009999	2151
0.49810+02	0.50000+00	2.20005-02	0.48000-06	0.22000-01	0.00000+009999	2151
0.54550+02	0.50000+00	2.20011-02	0.11000-05	0.22000-01	0.00000+009999	2151
0.56750+02	0.50000+00	2.20096-02	0.96000-05	0.22000-01	0.00000+009999	2151
0.78100+02	0.50000+00	2.20011-02	0.11000-05	0.22000-01	0.00000+009999	2151
0.90090+02	0.50000+00	2.20042-02	0.42500-05	0.22000-01	0.00000+009999	2151
0.96000+02	0.50000+00	2.20013-02	0.13000-05	0.22000-01	0.00000+009999	2151
0.98000+02	0.50000+00	2.20040-02	0.40000-05	0.22000-01	0.00000+009999	2151
0.10357+03	0.50000+00	2.20046-02	0.46000-05	0.22000-01	0.00000+009999	2151
0.12516+03	0.50000+00	0.22073-01	0.73000-04	0.22000-01	0.00000+009999	2151
0.14565+03	0.50000+00	2.20895-02	0.89500-04	0.22000-01	0.00000+009999	2151
0.14730+03	0.50000+00	2.20078-02	0.78000-05	0.22000-01	0.00000+009999	2151
0.14804+03	0.50000+00	0.22012-01	0.12000-04	0.22000-01	0.00000+009999	2151
0.16700+03	0.50000+00	0.22016-01	0.16000-04	0.22000-01	0.00000+009999	2151
0.17580+03	0.50000+00	0.22025-01	0.25000-04	0.22000-01	0.00000+009999	2151
0.20264+03	0.50000+00	0.22028-01	0.28000-04	0.22000-01	0.00000+009999	2151
0.21096+03	0.50000+00	0.22016-01	0.16000-04	0.22000-01	0.00000+009999	2151
0.21953+03	0.50000+00	0.22051-01	0.51000-04	0.22000-01	0.00000+009999	2151
0.23200+03	0.50000+00	0.22013-01	0.13000-04	0.22000-01	0.00000+009999	2151
0.23420+03	0.50000+00	0.22020-01	0.20000-04	0.22000-01	0.00000+009999	2151
0.24245+03	0.50000+00	0.22048-01	0.48000-04	0.22000-01	0.00000+009999	2151
0.27260+03	0.50000+00	0.22019-01	0.19000-04	0.22000-01	0.00000+009999	2151
0.27560+03	0.50000+00	0.22035-01	0.35000-04	0.22000-01	0.00000+009999	2151
0.29039+03	0.50000+00	2.20714-02	0.71400-04	0.22000-01	0.00000+009999	2151
0.29956+03	0.50000+00	0.22042-01	0.42000-04	0.22000-01	0.00000+009999	2151
0.30255+03	0.50000+00	0.22128-01	0.12800-03	0.22000-01	0.00000+009999	2151
0.30940+03	0.50000+00	0.22058-01	0.58000-04	0.22000-01	0.00000+009999	2151
0.32184+03	0.50000+00	0.22060-01	0.60000-04	0.22000-01	0.00000+009999	2151
0.33503+03	0.50000+00	0.22050-01	0.50000-04	0.22000-01	0.00000+009999	2151
0.35180+03	0.50000+00	0.22077-01	0.77000-04	0.22000-01	0.00000+009999	2151
0.36121+03	0.50000+00	0.22100-01	0.10000-03	0.22000-01	0.00000+009999	2151
0.38069+03	0.50000+00	0.22120-01	0.12000-03	0.22000-01	0.00000+009999	2151
0.40300+03	0.50000+00	0.22104-01	0.10400-03	0.22000-01	0.00000+009999	2151
0.41180+03	0.50000+00	0.22240-01	0.24000-03	0.22000-01	0.00000+009999	2151
0.42710+03	0.50000+00	0.22019-01	0.19000-04	0.22000-01	0.00000+009999	2151
0.45088+03	0.50000+00	0.22063-01	0.63000-04	0.22000-01	0.00000+009999	2151
0.46045+03	0.50000+00	0.22100-01	0.10000-03	0.22000-01	0.00000+009999	2151
0.47056+03	0.50000+00	0.22044-01	0.44000-04	0.22000-01	0.00000+009999	2151
0.53331+03	0.50000+00	0.22290-01	0.29000-03	0.22000-01	0.00000+009999	2151
0.53555+03	0.50000+00	0.22360-01	0.36000-03	0.22000-01	0.00000+009999	2151
0.54016+03	0.50000+00	0.23010-01	0.10100-02	0.22000-01	0.00000+009999	2151
0.55010+03	0.50000+00	0.22410-01	0.41000-03	0.22000-01	0.00000+009999	2151
0.58370+03	0.50000+00	0.22085-01	0.85000-04	0.22000-01	0.00000+009999	2151
0.59400+03	0.50000+00	0.22110-01	0.11000-03	0.22000-01	0.00000+009999	2151
0.62505+03	0.50000+00	0.22053-01	0.53000-04	0.22000-01	0.00000+009999	2151
0.62770+03	0.50000+00	0.22055-01	0.55000-04	0.22000-01	0.00000+009999	2151
0.63390+03	0.50000+00	0.22073-01	0.73000-04	0.22000-01	0.00000+009999	2151
0.64420+03	0.50000+00	0.22130-01	0.13000-03	0.22000-01	0.00000+009999	2151
0.69570+03	0.50000+00	0.22170-01	0.17000-03	0.22000-01	0.00000+009999	2151
0.70432+03	0.50000+00	0.22200-01	0.20000-03	0.22000-01	0.00000+009999	2151
0.71970+03	0.50000+00	0.22093-01	0.93000-04	0.22000-01	0.00000+009999	2151
0.72395+03	0.50000+00	0.22130-01	0.13000-03	0.22000-01	0.00000+009999	2151
0.74380+03	0.50000+00	0.22034-01	0.34000-04	0.22000-01	0.00000+009999	2151
0.75830+03	0.50000+00	0.22072-01	0.72000-04	0.22000-01	0.00000+009999	2151

0.77100+03	0.50000+00	0.22104-01	0.10400-03	0.22000-01	0.00000+009999	2151
0.76400+03	0.50000+00	0.22077-01	0.77000-04	0.22000-01	0.00000+009999	2151
0.78700+03	0.50000+00	0.22078-01	0.78000-04	0.22000-01	0.00000+009999	2151
0.79267+03	0.50000+00	0.22085-01	0.83000-04	0.22000-01	0.00000+009999	2151
0.80835+03	0.50000+00	0.22135-01	0.13500-03	0.22000-01	0.00000+009999	2151
0.81490+03	0.50000+00	0.22074-01	0.74000-04	0.22000-01	0.00000+009999	2151
0.81865+03	0.50000+00	0.22160-01	0.18000-03	0.22000-01	0.00000+009999	2151
0.82589+03	0.50000+00	0.22250-01	0.25000-03	0.22000-01	0.00000+009999	2151
0.83905+03	0.50000+00	0.22670-01	0.67000-03	0.22000-01	0.00000+009999	2151
0.87750+03	0.50000+00	0.22190-01	0.19000-03	0.22000-01	0.00000+009999	2151
0.88464+03	0.50000+00	0.22350-01	0.35000-03	0.22000-01	0.00000+009999	2151
0.89980+03	0.50000+00	0.22082-01	0.82000-04	0.22000-01	0.00000+009999	2151
0.91376+03	0.50000+00	0.22520-01	0.52000-03	0.22000-01	0.00000+009999	2151
0.93444+03	0.50000+00	0.22310-01	0.31000-03	0.22000-01	0.00000+009999	2151
0.97409+03	0.50000+00	0.22260-01	0.26000-03	0.22000-01	0.00000+009999	2151
0.99577+03	0.50000+00	0.22440-01	0.44000-03	0.22000-01	0.00000+009999	2151
1.00103+03	0.50000+00	0.22250-01	0.25000-03	0.22000-01	0.00000+009999	2151
1.02121+03	0.50000+00	0.22480-01	0.48000-03	0.22000-01	0.00000+009999	2151
1.04571+03	0.50000+00	0.22630-01	0.63000-03	0.22000-01	0.00000+009999	2151
1.04830+03	0.50000+00	0.22260-01	0.26000-03	0.22000-01	0.00000+009999	2151
1.05560+03	0.50000+00	0.22340-01	0.34000-03	0.22000-01	0.00000+009999	2151
1.05930+03	0.50000+00	0.22260-01	0.26000-03	0.22000-01	0.00000+009999	2151
1.12756+03	0.50000+00	0.22230-01	0.23000-03	0.22000-01	0.00000+009999	2151
1.13254+03	0.50000+00	0.22410-01	0.41000-03	0.22000-01	0.00000+009999	2151
1.15520+03	0.50000+00	0.22100-01	0.10000-03	0.22000-01	0.00000+009999	2151
1.17571+03	0.50000+00	0.22340-01	0.34000-03	0.22000-01	0.00000+009999	2151
1.18390+03	0.50000+00	0.22100-01	0.10000-03	0.22000-01	0.00000+009999	2151
1.21577+03	0.50000+00	0.22570-01	0.57000-03	0.22000-01	0.00000+009999	2151
1.22412+03	0.50000+00	0.22420-01	0.42000-03	0.22000-01	0.00000+009999	2151
1.25520+03	0.50000+00	0.22940-01	0.94000-03	0.22000-01	0.00000+009999	2151
1.25136+03	0.50000+00	0.23010-01	0.10100-02	0.22000-01	0.00000+009999	2151
1.25538+03	0.50000+00	0.22280-01	0.28000-03	0.22000-01	0.00000+009999	2151
1.30750+03	0.50000+00	0.22350-01	0.35000-03	0.22000-01	0.00000+009999	2151
1.34512+03	0.50000+00	0.23130-01	0.11300-02	0.22000-01	0.00000+009999	2151
1.40795+03	0.50000+00	0.22410-01	0.41000-03	0.22000-01	0.00000+009999	2151
1.41305+03	0.50000+00	0.22560-01	0.56000-03	0.22000-01	0.00000+009999	2151
1.44120+03	0.50000+00	0.23160-01	0.11600-02	0.22000-01	0.00000+009999	2151
1.44910+03	0.50000+00	0.22280-01	0.23000-03	0.22000-01	0.00000+009999	2151
1.46490+03	0.50000+00	0.22150-01	0.15000-03	0.22000-01	0.00000+009999	2151
1.48370+03	0.50000+00	0.22150-01	0.15000-03	0.22000-01	0.00000+009999	2151
1.50207+03	0.50000+00	0.22640-01	0.64000-03	0.22000-01	0.00000+009999	2151
1.51534+03	0.50000+00	0.23600-01	0.16000-02	0.22000-01	0.00000+009999	2151
1.51153+03	0.50000+00	0.23040-01	0.10400-02	0.22000-01	0.00000+009999	2151
1.62529+03	0.50000+00	0.22440-01	0.44000-03	0.22000-01	0.00000+009999	2151
1.66540+03	0.50000+00	0.22500-01	0.50000-03	0.22000-01	0.00000+009999	2151
1.68941+03	0.50000+00	0.23070-01	0.10700-02	0.22000-01	0.00000+009999	2151
1.72481+03	0.50000+00	0.23220-01	0.12200-02	0.22000-01	0.00000+009999	2151
1.72936+03	0.50000+00	0.23510-01	0.15100-02	0.22000-01	0.00000+009999	2151
1.75369+03	0.50000+00	0.22700-01	0.70000-03	0.22000-01	0.00000+009999	2151
1.79328+03	0.50000+00	0.22480-01	0.48000-03	0.22000-01	0.00000+009999	2151
1.83509+03	0.50000+00	0.22980-01	0.98000-03	0.22000-01	0.00000+009999	2151
1.88825+03	0.50000+00	0.22870-01	0.87000-03	0.22000-01	0.00000+009999	2151
1.89560+03	0.50000+00	0.24000-01	0.20000-02	0.22000-01	0.00000+009999	2151
2.13951+03	0.50000+00	0.21000-01	0.10000-02	0.20000-01	0.00000+009999	2151
2.15772+03	0.50000+00	0.22000-01	0.02000-01	0.20000-01	0.00000+009999	2151
2.17073+03	0.50000+00	0.22800-01	0.28000-02	0.20000-01	0.00000+009999	2151
2.20815+03	0.50000+00	0.22200-01	0.22000-02	0.20000-01	0.00000+009999	2151
2.25218+03	0.50000+00	0.20600-01	0.60000-03	0.20000-01	0.00000+009999	2151
2.30580+03	0.50000+00	0.23200-01	0.32000-02	0.20000-01	0.00000+009999	2151
2.31301+03	0.50000+00	0.21600-01	0.16000-02	0.20000-01	0.00000+009999	2151
2.32991+03	0.50000+00	0.22200-01	0.22000-02	0.20000-01	0.00000+009999	2151
2.41306+03	0.50000+00	0.20600-01	0.60000-03	0.20000-01	0.00000+009999	2151
2.42757+03	0.50000+00	0.23000-01	0.30000-02	0.20000-01	0.00000+009999	2151
2.43517+03	0.50000+00	0.22000-01	0.20000-02	0.20000-01	0.00000+009999	2151
2.45270+03	0.50000+00	0.24000-01	0.40000-02	0.20000-01	0.00000+009999	2151
2.50111+03	0.50000+00	0.20600-01	0.60000-03	0.20000-01	0.00000+009999	2151
2.53593+03	0.50000+00	0.22200-01	0.22000-02	0.20000-01	0.00000+009999	2151
2.54384+03	0.50000+00	0.20400-01	0.40000-03	0.20000-01	0.00000+009999	2151
2.54814+03	0.50000+00	0.20400-01	0.40000-03	0.20000-01	0.00000+009999	2151
2.58276+03	0.50000+00	0.21100-01	0.11000-02	0.20000-01	0.00000+009999	2151
2.56977+03	0.50000+00	0.22000-01	0.20000-02	0.20000-01	0.00000+009999	2151
2.59537+03	0.50000+00	0.20800-01	0.80000-03	0.20000-01	0.00000+009999	2151
2.60394+03	0.50000+00	0.21500-01	0.15000-02	0.20000-01	0.00000+009999	2151
2.63321+03	0.50000+00	0.22500-01	0.25000-02	0.20000-01	0.00000+009999	2151
2.70192+03	0.50000+00	0.21400-01	0.14000-02	0.20000-01	0.00000+009999	2151
2.76714+03	0.50000+00	0.21610-01	0.16100-02	0.20000-01	0.00000+009999	2151
2.73255+03	0.50000+00	0.21970-01	0.19700-02	0.20000-01	0.00000+009999	2151
2.80305+03	0.50000+00	0.24810-01	0.48100-02	0.20000-01	0.00000+009999	2151
2.82432+03	0.50000+00	0.21400-01	0.14000-02	0.20000-01	0.00000+009999	2151
2.84466+03	0.50000+00	0.20520-01	0.52000-03	0.20000-01	0.00000+009999	2151

2.86167+03	0.50000+00	0.27200-01	0.72000-02	0.20000-01	0.00000+009999	2151	
2.87072+03	0.50000+00	0.21640-01	0.16400-02	0.20000-01	0.00000+009999	2151	
2.90869+03	0.50000+00	0.22820-01	0.28200-02	0.20000-01	0.00000+009999	2151	
2.92290+03	0.50000+00	0.21400-01	0.14000-02	0.20000-01	0.00000+009999	2151	
2.95247+03	0.50000+00	0.22540-01	0.25400-02	0.20000-01	0.00000+009999	2151	
4.00000+03	5.00000+04	2	1	0	09999	2151	
0.00000+00	0.97200+00	0	0	2	09999	2151	
2.30045+02	0.00000+00	0	0	6	19999	2151	
1.65700+01	5.00000-01	1.00000+00	1.41900-03	2.10000-02	0.00000+009999	2151	
2.30045+02	0.00000+00	1	0	12	29999	2151	
1.65700+01	5.00000-01	1.00000+00	2.48550-03	2.10000-02	0.00000+009999	2151	
8.23500+00	1.50000+00	1.00000+00	1.24275-03	2.10000-02	0.00000+009999	2151	
					9999	2	0
					9999	0	0
9.02320+04	2.30045+02	0	0		9999	3	1
0.00000+00	0.00000+00	0		2	2989999	3	1
129	5	298	2		9999	3	1
1.00000-05	3.50000+02	1.00000-04	1.29800+02	2.00000-04	9.80000+019999	3	1
3.00000-04	8.28000+01	4.00000-04	7.40000+01	0.52000-03	6.60430+019999	3	1
0.15500-02	4.38600+01	0.31000-02	3.53150+01	0.51200-02	3.05810+019999	3	1
0.75500-02	2.75580+01	0.10700-01	2.54550+01	0.14230-01	2.39240+019999	3	1
0.16280-01	2.27460+01	0.22830-01	2.18150+01	0.26000-01	2.10450+019999	3	1
0.33450-01	2.04330+01	0.39530-01	1.99070+01	0.46110-01	1.94550+019999	3	1
0.53190-01	1.90670+01	0.60230-01	1.87430+01	0.69220-01	1.84160+019999	3	1
0.80150-01	1.80860+01	0.92300-01	1.77900+01	1.06320-01	1.75110+019999	3	1
1.21900-01	1.72580+01	1.40910-01	1.70060+01	1.64510-01	1.67540+019999	3	1
1.79990-01	1.66150+01	2.31520-01	1.62530+01	2.78870-01	1.60080+019999	3	1
3.38910-01	1.57690+01	4.14980-01	1.55380+01	5.11180-01	1.53170+019999	3	1
6.32500-01	1.51060+01	6.83000-01	1.50340+01	7.00000-01	1.50110+019999	3	1
8.00000-01	1.48890+01	9.00000-01	1.47860+01	1.00000+00	1.46960+019999	3	1
1.10000+00	1.46170+01	1.20000+00	1.45470+01	1.30000+00	1.44840+019999	3	1
1.40000+00	1.44260+01	1.50000+00	1.43740+01	1.60000+00	1.43260+019999	3	1
1.70000+00	1.42820+01	1.80000+00	1.42410+01	1.90000+00	1.42030+019999	3	1
2.00000+00	1.41670+01	2.10000+00	1.41330+01	2.20000+00	1.41020+019999	3	1
2.30000+00	1.40720+01	2.40000+00	1.40440+01	2.50000+00	1.40180+019999	3	1
2.60000+00	1.39930+01	2.70000+00	1.39690+01	2.80000+00	1.38800+019999	3	1
2.90000+00	1.38220+01	3.00000+00	1.37660+01	3.10000+00	1.37120+019999	3	1
3.20000+00	1.36590+01	3.30000+00	1.36070+01	3.40000+00	1.35570+019999	3	1
3.50000+00	1.35080+01	3.60000+00	1.34600+01	3.70000+00	1.34140+019999	3	1
3.80000+00	1.33680+01	3.90000+00	1.33240+01	4.00000+00	1.32810+019999	3	1
4.10000+00	1.32380+01	4.20000+00	1.31980+01	4.30000+00	1.31560+019999	3	1
4.40000+00	1.31160+01	4.50000+00	1.30770+01	4.60000+00	1.30390+019999	3	1
4.70000+00	1.30010+01	4.80000+00	1.29640+01	4.90000+00	1.29280+019999	3	1
5.00000+00	1.28920+01	5.10000+00	1.28570+01	5.20000+00	1.28230+019999	3	1
5.30000+00	1.27890+01	5.40000+00	1.27560+01	5.50000+00	1.27230+019999	3	1
5.60000+00	1.26900+01	5.70000+00	1.26590+01	5.80000+00	1.26270+019999	3	1
5.90000+00	1.25960+01	6.00000+00	1.25660+01	6.10000+00	1.25360+019999	3	1
6.20000+00	1.25060+01	6.30000+00	1.24770+01	6.40000+00	1.24480+019999	3	1
6.50000+00	1.24190+01	6.60000+00	1.23910+01	6.70000+00	1.23630+019999	3	1
6.80000+00	1.23350+01	6.90000+00	1.23070+01	7.00000+00	1.22800+019999	3	1
7.10000+00	1.22530+01	7.20000+00	1.22270+01	7.30000+00	1.22000+019999	3	1
7.40000+00	1.21740+01	7.50000+00	1.21480+01	7.60000+00	1.21230+019999	3	1
7.70000+00	1.20970+01	7.80000+00	1.20710+01	7.90000+00	1.20460+019999	3	1
8.00000+00	1.20200+01	8.10000+00	1.19940+01	8.20000+00	1.19650+019999	3	1
8.30000+00	1.19500+01	8.40000+00	1.19350+01	8.50000+00	1.19060+019999	3	1
8.60000+00	1.18810+01	8.70000+00	1.18560+01	8.80000+00	1.18320+019999	3	1
8.90000+00	1.18080+01	9.00000+00	1.17850+01	9.10000+00	1.17610+019999	3	1
9.20000+00	1.17380+01	9.30000+00	1.17140+01	9.40000+00	1.16910+019999	3	1
9.50000+00	1.16680+01	9.60000+00	1.16450+01	9.70000+00	1.16220+019999	3	1
9.80000+00	1.15990+01	9.90000+00	1.15760+01	1.00000+01	1.15800+019999	3	1
1.00000+01	0.00000+00	4.00000+03	0.00000+00	5.00000+04	0.00000+009999	3	1
5.00000+04	1.32600+01	6.00000+04	1.31150+01	7.00000+04	1.29180+019999	3	1
8.00000+04	1.28180+01	9.00000+04	1.28310+01	1.00000+05	1.22900+019999	3	1
1.50000+05	1.17350+01	2.00000+05	1.07720+01	2.50000+05	9.04200+009999	3	1
3.00000+05	9.54900+00	3.50000+05	9.17400+00	4.00000+05	8.70000+009999	3	1
4.40000+05	8.45000+00	5.00000+05	8.02600+00	6.00000+05	7.73800+009999	3	1
7.00000+05	7.50800+00	8.00000+05	7.35100+00	9.00000+05	7.16350+009999	3	1
1.00000+06	6.97600+00	1.15000+06	6.85320+00	1.20000+06	6.78560+009999	3	1
1.25000+06	6.73800+00	1.30000+06	6.76070+00	1.35000+06	6.78340+009999	3	1
1.40000+06	6.80610+00	1.45000+06	6.82880+00	1.50000+06	6.85150+009999	3	1
1.55000+06	6.88574+00	1.60000+06	6.91998+00	1.65000+06	6.95422+009999	3	1
1.70000+06	6.98846+00	1.75000+06	7.01323+00	1.80000+06	7.03800+009999	3	1
1.85000+06	7.06900+00	1.90000+06	7.10000+00	1.95000+06	7.10000+009999	3	1
2.00000+06	7.10000+00	2.05000+06	7.12000+00	2.10000+06	7.14000+009999	3	1
2.15000+06	7.16000+00	2.20000+06	7.18000+00	2.25000+06	7.20000+009999	3	1
2.30000+06	7.22000+00	2.35000+06	7.24000+00	2.40000+06	7.26000+009999	3	1
2.42000+06	7.26800+00	2.45000+06	7.28000+00	2.50000+06	7.30000+009999	3	1
2.60000+06	7.34000+00	2.70000+06	7.38000+00	2.75000+06	7.40000+009999	3	1
2.80000+06	7.41000+00	2.85000+06	7.42000+00	2.90000+06	7.43000+009999	3	1
3.00000+06	7.45000+00	3.10000+06	7.50000+00	3.20000+06	7.55000+009999	3	1

3.30000+06	7.56170+00	3.40000+06	7.58330+00	3.50000+06	7.60000+009999	3	1
3.60000+06	7.61000+00	3.70000+06	7.62000+00	3.80000+06	7.63000+009999	3	1
3.90000+06	7.64000+00	4.00000+06	7.65000+00	4.10000+06	7.62000+009999	3	1
4.20000+06	7.59000+00	4.30000+06	7.56000+00	4.40000+06	7.53000+009999	3	1
4.50000+06	7.50000+00	4.60000+06	7.47000+00	4.70000+06	7.44000+009999	3	1
4.80000+06	7.41000+00	4.90000+06	7.38000+00	5.00000+06	7.35000+009999	3	1
5.10000+06	7.33000+00	5.20000+06	7.31000+00	5.30000+06	7.29000+009999	3	1
5.40000+06	7.27000+00	5.50000+06	7.25000+00	5.60000+06	7.21000+009999	3	1
5.70000+06	7.17000+00	5.75000+06	7.15000+00	5.80000+06	7.12974+009999	3	1
5.85000+06	7.10948+00	5.90000+06	7.08922+00	5.95000+06	7.06896+009999	3	1
6.00000+06	7.04870+00	6.05000+06	7.01334+00	6.10000+06	6.97797+009999	3	1
6.20000+06	6.90725+00	6.30000+06	6.83653+00	6.40000+06	6.76580+009999	3	1
6.45000+06	6.74540+00	6.50000+06	6.72500+00	6.60000+06	6.68000+009999	3	1
6.65000+06	6.66500+00	6.70000+06	6.65000+00	6.75000+06	6.63500+009999	3	1
6.80000+06	6.62000+00	6.90000+06	6.58000+00	7.00000+06	6.55000+009999	3	1
7.10000+06	6.50000+00	7.15000+06	6.48700+00	7.20000+06	6.47500+009999	3	1
7.25000+06	6.45300+00	7.30000+06	6.43000+00	7.35000+06	6.41500+009999	3	1
7.40000+06	6.40000+00	7.50000+06	6.35000+00	7.60000+06	6.32500+009999	3	1
7.70000+06	6.28000+00	7.80000+06	6.25000+00	7.90000+06	6.20000+009999	3	1
8.00000+06	6.15000+00	8.10000+06	6.12000+00	8.20000+06	6.10000+009999	3	1
8.30000+06	6.05000+00	8.40000+06	6.03000+00	8.50000+06	5.99392+009999	3	1
8.60000+06	5.97175+00	8.70000+06	5.94538+00	8.80000+06	5.91900+009999	3	1
8.90000+06	5.89265+00	9.00000+06	5.86628+00	9.40000+06	5.77149+009999	3	1
9.80000+06	5.71526+00	1.00000+07	5.68710+00	1.02000+07	5.66172+009999	3	1
1.06000+07	5.57395+00	1.10000+07	5.52629+00	1.14000+07	5.52826+009999	3	1
1.15000+07	5.52437+00	1.18000+07	5.47330+00	1.20000+07	5.44587+009999	3	1
1.22000+07	5.45448+00	1.24000+07	5.46314+00	1.26000+07	5.49967+009999	3	1
1.28000+07	5.55551+00	1.30000+07	5.58227+00	1.34000+07	5.66995+009999	3	1
1.38000+07	5.71152+00	1.40000+07	5.77533+00	1.42000+07	5.78534+009999	3	1
1.45000+07	5.79846+00	1.50000+07	5.80060+00	1.54000+07	5.83012+009999	3	1
1.58000+07	5.86243+00	1.60000+07	5.87898+00	1.62000+07	5.90069+009999	3	1
1.66000+07	5.94800+00	1.68000+07	5.96400+00	1.70000+07	5.96819+009999	3	1
1.72000+07	5.98200+00	1.73000+07	5.98300+00	1.74000+07	5.98400+009999	3	1
1.75000+07	5.98793+00	1.78000+07	5.97658+00	1.80000+07	5.99000+009999	3	1
1.82000+07	5.99200+00	1.86000+07	5.99600+00	1.88000+07	5.99594+009999	3	1
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2.00000+07	6.03000+00				9999	3	1
					9999	3	0
9.02320+04	2.30045+02	0	0		9999	3	2
0.00000+00	0.00000+00	0		2	2989999	3	2
129	5	298	2		9999	3	2
1.00000-05	5.00000+01	1.00000-04	1.98000+01	2.00000-04	1.60000+019999	3	2
3.00000-04	1.48000+01	4.00000-04	1.40000+01	5.20000-04	1.40360+019999	3	2
1.58000-03	1.40360+01	0.31000-02	1.40350+01	0.51200-02	1.40350+019999	3	2
0.76500-02	1.40340+01	0.10700-01	1.40340+01	0.14230-01	1.40330+019999	3	2
0.18280-01	1.40320+01	0.22830-01	1.40310+01	0.28000-01	1.40300+019999	3	2
0.33460-01	1.40280+01	0.39530-01	1.40270+01	0.46110-01	1.40260+019999	3	2
0.53190-01	1.40240+01	0.60280-01	1.40220+01	0.69220-01	1.40210+019999	3	2
0.80160-01	1.40180+01	0.92300-01	1.40150+01	0.10632+00	1.40120+019999	3	2
0.12190+00	1.40090+01	0.14091+00	1.40050+01	0.16451+00	1.40000+019999	3	2
0.17999+00	1.39970+01	0.23152+00	1.39860+01	0.27887+00	1.39760+019999	3	2
0.33891+00	1.39640+01	0.41498+00	1.39490+01	0.51118+00	1.39310+019999	3	2
0.63250+00	1.39090+01	0.68300+00	1.39000+01	0.70000+00	1.38970+019999	3	2
0.80000+00	1.38800+01	0.90000+00	1.38630+01	0.10000+01	1.38470+019999	3	2
0.11000+01	1.38320+01	0.12000+01	1.38170+01	0.13000+01	1.38020+019999	3	2
0.14000+01	1.37880+01	0.15000+01	1.37740+01	0.16000+01	1.37610+019999	3	2
0.17000+01	1.37480+01	0.18000+01	1.37360+01	0.19000+01	1.37240+019999	3	2
0.20000+01	1.37120+01	0.21000+01	1.37000+01	0.22000+01	1.36890+019999	3	2
0.23000+01	1.36780+01	0.24000+01	1.36680+01	0.25000+01	1.36570+019999	3	2
0.26000+01	1.36480+01	0.27000+01	1.36340+01	0.28000+01	1.35600+019999	3	2
0.29000+01	1.35120+01	0.30000+01	1.34560+01	0.31000+01	1.34220+019999	3	2
0.32000+01	1.33790+01	0.33000+01	1.33320+01	0.34000+01	1.32870+019999	3	2
0.35000+01	1.32480+01	0.36000+01	1.32050+01	0.37000+01	1.31640+019999	3	2
0.38000+01	1.31280+01	0.39000+01	1.30870+01	0.40000+01	1.30510+019999	3	2
0.41000+01	1.30130+01	0.42000+01	1.29770+01	0.43000+01	1.29410+019999	3	2
0.44000+01	1.29060+01	0.45000+01	1.28720+01	0.46000+01	1.28390+019999	3	2
0.47000+01	1.28045+01	0.48000+01	1.27710+01	0.49000+01	1.27390+019999	3	2
0.50000+01	1.27070+01	0.51000+01	1.26745+01	0.52000+01	1.26430+019999	3	2
0.53000+01	1.26130+01	0.54000+01	1.25840+01	0.55000+01	1.25530+019999	3	2
0.56000+01	1.25220+01	0.57000+01	1.24950+01	0.58000+01	1.24670+019999	3	2
0.59000+01	1.24375+01	0.60000+01	1.24090+01	0.61000+01	1.23825+019999	3	2
0.62000+01	1.23560+01	0.63000+01	1.23280+01	0.64000+01	1.23000+019999	3	2
0.65000+01	1.22730+01	0.66000+01	1.22490+01	0.67000+01	1.22215+019999	3	2
0.68000+01	1.21960+01	0.69000+01	1.21700+01	0.70000+01	1.21450+019999	3	2
0.71000+01	1.21205+01	0.72000+01	1.20970+01	0.73000+01	1.20710+019999	3	2
0.74000+01	1.20460+01	0.75000+01	1.20220+01	0.76000+01	1.19990+019999	3	2
0.77000+01	1.19740+01	0.78000+01	1.19490+01	0.79000+01	1.19250+019999	3	2
0.80000+01	1.19000+01	0.81000+01	1.18760+01	0.82000+01	1.18490+019999	3	2
0.83000+01	1.18355+01	0.84000+01	1.18220+01	0.85000+01	1.17945+019999	3	2
0.86000+01	1.17710+01	0.87000+01	1.17470+01	0.88000+01	1.17240+019999	3	2

0.89000+01	1.17015+01	0.90000+01	1.16800+01	0.91000+01	1.16570+019999	3	2
0.92000+01	1.16350+01	0.93000+01	1.16115+01	0.94000+01	1.15890+019999	3	2
0.95000+01	1.15670+01	0.96000+01	1.15450+01	0.97000+01	1.15220+019999	3	2
0.98000+01	1.15010+01	0.99000+01	1.14795+01	0.10000+02	1.14850+019999	3	2
0.10000+02	0.00000+00	0.40000+04	0.00000+00	0.50000+05	0.00000+009999	3	2
5.00000+04	1.29450+01	6.00000+04	1.28200+01	7.00000+04	1.26950+019999	3	2
8.00000+04	1.26500+01	9.00000+04	1.23300+01	1.00000+05	1.18100+019999	3	2
1.50000+05	1.10000+01	2.00000+05	9.90000+00	2.50000+05	9.15000+009999	3	2
3.00000+05	8.50000+00	3.50000+05	7.96000+00	4.00000+05	7.42000+009999	3	2
4.40000+05	7.03200+00	5.00000+05	6.44920+00	6.00000+05	5.73852+009999	3	2
7.00000+05	5.14123+00	8.00000+05	4.65104+00	9.00000+05	4.31016+009999	3	2
1.00000+06	3.96928+00	1.15000+06	3.74860+00	1.20000+06	3.67510+009999	3	2
1.25000+06	3.60150+00	1.30000+06	3.62400+00	1.35000+06	3.64650+009999	3	2
1.40000+06	3.66900+00	1.45000+06	3.69150+00	1.50000+06	3.71400+009999	3	2
1.55000+06	3.72000+00	1.60000+06	3.74000+00	1.65000+06	3.75000+009999	3	2
1.70000+06	3.76000+00	1.75000+06	3.78000+00	1.80000+06	3.80000+009999	3	2
1.85000+06	3.81000+00	1.90000+06	3.82000+00	1.95000+06	3.82750+009999	3	2
2.00000+06	3.83508+00	2.05000+06	3.80750+00	2.10000+06	3.78000+009999	3	2
2.15000+06	3.76500+00	2.20000+06	3.75000+00	2.25000+06	3.72500+009999	3	2
2.30000+06	3.70000+00	2.35000+06	3.69250+00	2.40000+06	3.68500+009999	3	2
2.42000+06	3.68325+00	2.45000+06	3.68065+00	2.50000+06	3.67632+009999	3	2
2.60000+06	3.70000+00	2.70000+06	3.75000+00	2.75000+06	3.77000+009999	3	2
2.80000+06	3.79000+00	2.85000+06	3.81500+00	2.90000+06	3.84000+009999	3	2
3.00000+06	3.90200+00	3.10000+06	3.94190+00	3.20000+06	3.96000+009999	3	2
3.30000+06	4.00000+00	3.40000+06	4.03000+00	3.50000+06	4.05000+009999	3	2
3.60000+06	4.08000+00	3.70000+06	4.10000+00	3.80000+06	4.11000+009999	3	2
3.90000+06	4.12000+00	4.00000+06	4.12664+00	4.10000+06	4.12746+009999	3	2
4.20000+06	4.12827+00	4.30000+06	4.12909+00	4.40000+06	4.12990+009999	3	2
4.50000+06	4.13072+00	4.60000+06	4.13153+00	4.70000+06	4.13230+009999	3	2
4.80000+06	4.13320+00	4.90000+06	4.13398+00	5.00000+06	4.13480+009999	3	2
5.10000+06	4.12632+00	5.20000+06	4.11780+00	5.30000+06	4.10940+009999	3	2
5.40000+06	4.10088+00	5.50000+06	4.09240+00	5.60000+06	4.08390+009999	3	2
5.70000+06	4.07540+00	5.75000+06	4.07115+00	5.80000+06	4.06690+009999	3	2
5.85000+06	4.06270+00	5.90000+06	4.05848+00	5.95000+06	4.05420+009999	3	2
6.00000+06	4.05000+00	6.05000+06	4.02500+00	6.10000+06	4.00000+009999	3	2
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6.80000+06	3.65000+00	6.90000+06	3.60000+00	7.00000+06	3.55000+009999	3	2
7.10000+06	3.51000+00	7.15000+06	3.49000+00	7.20000+06	3.47000+009999	3	2
7.25000+06	3.45000+00	7.30000+06	3.43000+00	7.35000+06	3.41000+009999	3	2
7.40000+06	3.39000+00	7.50000+06	3.35000+00	7.60000+06	3.31000+009999	3	2
7.70000+06	3.27000+00	7.80000+06	3.23000+00	7.90000+06	3.19000+009999	3	2
8.00000+06	3.15000+00	8.10000+06	3.12500+00	8.20000+06	3.10000+009999	3	2
8.30000+06	3.07500+00	8.40000+06	3.05000+00	8.50000+06	3.02500+009999	3	2
8.60000+06	3.00000+00	8.70000+06	2.97500+00	8.80000+06	2.95000+009999	3	2
8.90000+06	2.92500+00	9.00000+06	2.90000+00	9.40000+06	2.86000+009999	3	2
9.80000+06	2.82000+00	1.00000+07	2.80000+00	1.02000+07	2.78000+009999	3	2
1.06000+07	2.74000+00	1.10000+07	2.70000+00	1.14000+07	2.70000+009999	3	2
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1.28000+07	2.76000+00	1.30000+07	2.77500+00	1.34000+07	2.80500+009999	3	2
1.38000+07	2.83500+00	1.40000+07	2.85000+00	1.42000+07	2.85330+009999	3	2
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1.66000+07	3.03000+00	1.68000+07	3.04000+00	1.70000+07	3.05000+009999	3	2
1.72000+07	3.06000+00	1.73000+07	3.06500+00	1.74000+07	3.07000+009999	3	2
1.75000+07	3.07500+00	1.78000+07	3.08000+00	1.80000+07	3.10000+009999	3	2
1.82000+07	3.11000+00	1.86000+07	3.13000+00	1.88000+07	3.14000+009999	3	2
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2.00000+07	3.20000+00				9999	3	2
					9999	3	0
9.02320+04	2.30045+02	0	0		9999	3	4
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8.00000+04	1.28000-01	9.00000+04	2.95000-01	1.00000+05	3.40000-019999	3	4
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3.00000+05	8.98000-01	3.50000+05	1.06600+00	4.00000+05	1.13300+009999	3	4
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7.00000+05	2.19677+00	8.00000+05	2.52996+00	9.00000+05	2.69034+009999	3	4
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1.25000+06	2.99950+00	1.30000+06	2.99670+00	1.35000+06	2.98890+009999	3	4
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1.55000+06	2.97174+00	1.60000+06	2.96248+00	1.65000+06	2.99422+009999	3	4
1.70000+06	3.03846+00	1.75000+06	3.06423+00	1.80000+06	3.07750+009999	3	4
1.85000+06	3.09400+00	1.90000+06	3.10700+00	1.95000+06	3.09250+009999	3	4
2.00000+06	3.08092+00	2.05000+06	3.12650+00	2.10000+06	3.17450+009999	3	4
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3.30000+06 3.40020+00 3.40000+06 3.39080+00 3.50000+06 3.38800+009999 3  4
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3.90000+06 3.35720+00 4.00000+06 3.36036+00 4.10000+06 3.32984+009999 3  4
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        73         2                                            9999 3 16
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        33         2                                            9999 3 17
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                                                                 9999 3  0

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       113          2                                         9999 3 18
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0.19800+08 0.53000+00 0.20000+08 0.53200+00                     9999 3 18
                                                                 9999 3  0

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       166          2                                         9999 3 91
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5.10000+06 3.04498+00 5.20000+06 3.03390+00 5.30000+06 3.02360+009999 3 91
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7.40000+06	1.92075+00	7.50000+06	1.79450+00	7.60000+06	1.69230+009999	3	91
7.70000+06	1.60280+00	7.80000+06	1.52830+00	7.90000+06	1.43660+009999	3	91
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8.90000+06	9.53850-01	9.00000+06	9.23080-01	9.40000+06	8.07690-019999	3	91
9.60000+06	7.30760-01	1.00000+07	6.92300-01	1.02000+07	6.60250-019999	3	91
1.06000+07	5.96150-01	1.10000+07	5.57690-01	1.14000+07	5.38460-019999	3	91
1.16000+07	5.28800-01	1.18000+07	5.00000-01	1.20000+07	4.84600-019999	3	91
1.22000+07	4.73080-01	1.24000+07	4.61540-01	1.26000+07	4.53385-019999	3	91
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1.58000+07	2.69230-01	1.60000+07	2.57280-01	1.62000+07	2.65340-019999	3	91
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