Energieonderzoek Centrum Nederland
ECN

Afdeling : Fysica

Memo No. : FYS-STEK-89-03

Titel

STATUS OF JEF-2 FISSION-PRODUCT FILE

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Dit blad niet verwijderen.

Petten, April, 1989

1. Report of a meeting at the NDB on Febr. 6,7, 1989

(C. Nordborg, I. Forest, H. Gruppelaar)

The list of fission products given in STEK-memo-146 was considered and the actions on ECN and the NEA Data Bank were checked.
For the list of Heyboer with missing evaluations (Se-79, Ag110m, Cd-115, Sb-127, Xe-133m, I-133) no solution has been found as yet (no data avialable).
The remaining work for the NEA Data Bank (Dr. I. Forest) was as follows:

1. Prepare a magnetic tape with the most recent cross-sections for which still canges are needed. This action has been completed during the meeting; a tape was transported to Petten.
2. Check the value of E_H for Mo-98 (completed; value is 12.214 keV).
3. Perform a check on random spin assignments for Ru-100, Ru-102, Pd-104,-105,-106,-108,-110, Cd-111,In-115, Xe-135,Ba-138, Ce-140,-142. (partially completed during meeting, except for Pd-104, Ce-140; see listing).
4. Check if neutron width of a resonance in I-127 has been corrected.
5. Add (n,p), (n,α), (n,d), (n,t) and (n, He-3) cross-sections from REAC-ECN-4 for all fission products (Z=31 through 70), except if data are already available. Make corresponding corrections in elastic and non-elastic cross-sections. Note that in REAC-ECN-4 the cross-sections for the excitation of ground and metastable states are given separately (summation necessary before including in JEF-2).
6. Prepare, before the next JEF working group meeting a JEF-2 f.p. file in ENDF-VI format as a first step to complete the f.p. work.

For ECN the following actions have been defined:

7. Apply corrections to RCN-4 evaluations for I-129, Ru-101 (output from CHECKR code received; data available on tape received from NDB on 7/2/1989; main problem: MT22,28 energy distributions).
8. Apply a correction for Sm-154 (adjust negative resonance parameters). (data are available on tape received from NDB on 7/2/1989)

9. Add background to Mo-98, Tc-99, Pd-107, Nd-143, Pm-147 (data are available on tape received from NDB on 7/2/1989).
10. Check report JEF-DOC-249 (are changes necessary?). Give also comments to the results of random spin-assignments to fission products.
11. Add resonance parameters to Zr-93.
12. Finish RCN-4 evaluations (in particular Ru-102).
13. Send data file with REAC-ECN-4 to NEA Data Bank (only for use in JEF-2; send letter on use; probably only addition of (n,p) and (n,α) and compensation by reducing elastic scattering cross-section).
14. Add comments to JEF-2 preliminary fission-product file, describing the changes made during the past few years (after receiving a tape with these data).

2. Present status (april 1989)

Actions 1,2,3,4,8,9,13 have been completed. With respect to action 4 it is noted that no random spin assignments are necessary for Ce-140 and for Xe-135 (in the last-mentoned case there are no resolved resonance parameters known.

The major action completed by ECN is point 9. All cases mentioned have been inspected. However, corrections were only necessary for Pd-107, Nd-143 and Pm-147, see figures 1 to 3.

It is noted that there are still a number of nuclides missing in the JEF-2 fission-product data file. It has been checked that these evaluations are also not available from other sources available at the NEA Data Bank. A possible solution could be to check what is given in REAC-ECN-4 (to be done).

No work has been done on the inelastic scattering cross-sections during the past period. Priority has been given to finish the updating of the thermal and resolved-resonance ranges of the fission-product file.

3. Actions defined at the meeting in april

It was decided to give prioriy to finish a preliminary JEF-2 fission-product data file in ENDF/B-VI format before june 1989 (action 6, NDB), if possible with the addition of the revised data from ECN (actions 7 to 12, ECN). It is also desired to produce graphs of the elastic and capture cross-sections for all nuclides (action NDB).

The next step would be the addition of cross-sections from REAC-ECN-4 (action 5, NDB). Also some remainig actions could be completed at this stage.

A new action results from a discrepancy noted by Dr M. Mattes for the resonance integral of Gd-155, cf. Table 1 and Fig. 4 (action ECN).

Finally, some work is desired on the improvement of the inelastic scattering cross-sections (excitation of low-lying collective states). So far only calculations have been performed (at ECN) with the HETEROCLITE code of Lagrange (BRC). These calculations have been questioned by A.B. Smith (ANL). New calculations with the ECIS-87 code were scheduled at ECN (including width-fluctuation correcetions in the presence of direct reactions). C. Nordborg reported that A.B. Smith has made new measurements with natural Pd, indicating that the collective excitation of low-lying levels in the even-mass Pd isotopes is less strong than expected on the basis of the Russian experimental data. When this information is received, the need for updating has to be judged again (action ECN).

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Table 1

$^{155}_{64}$Gd

Thermal Capture Cross Section and Resonance Integral
(in barns)

Library	MAT	σ_γ	$\mathbf{I}_\gamma$
JEF - 1 (JENDL-1)	4645	61130	2589
JENDL-2	2641	60745	1547
ENDF/B-V	1365	60930	1555
BNL-325 4rd ed.		60900 ± 500	1447 ± 100

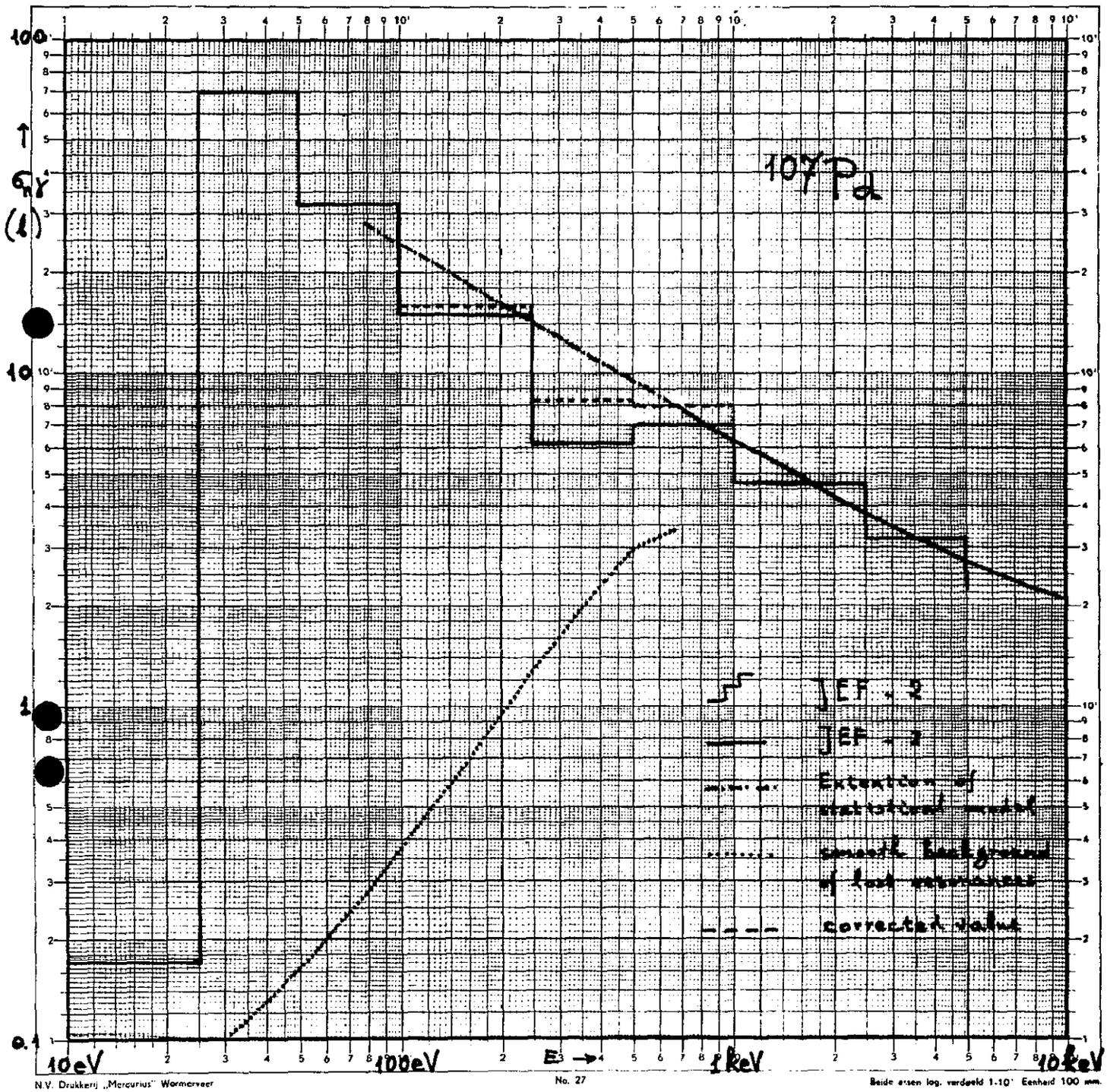

Fig. 1

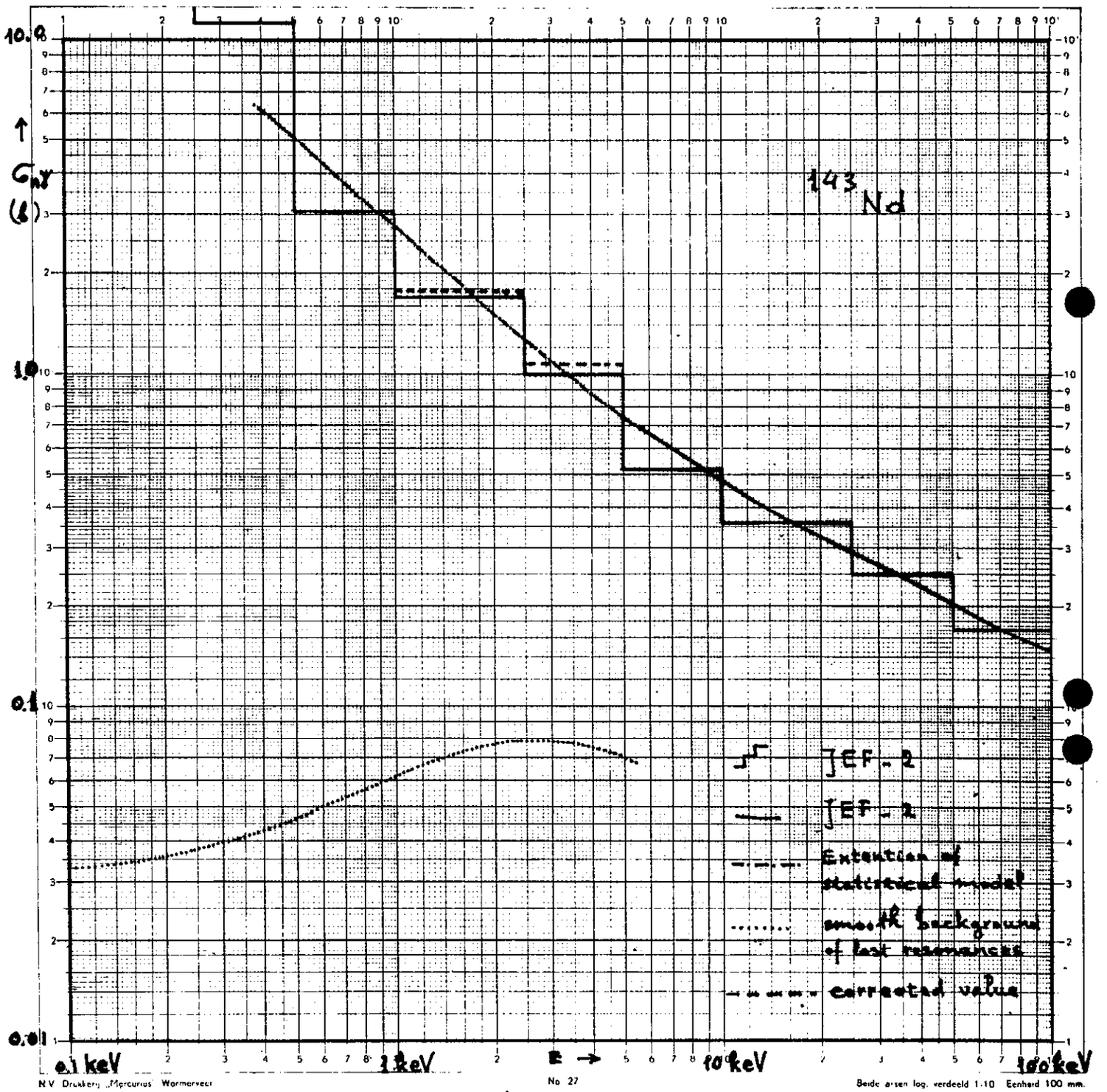

Fig. 2

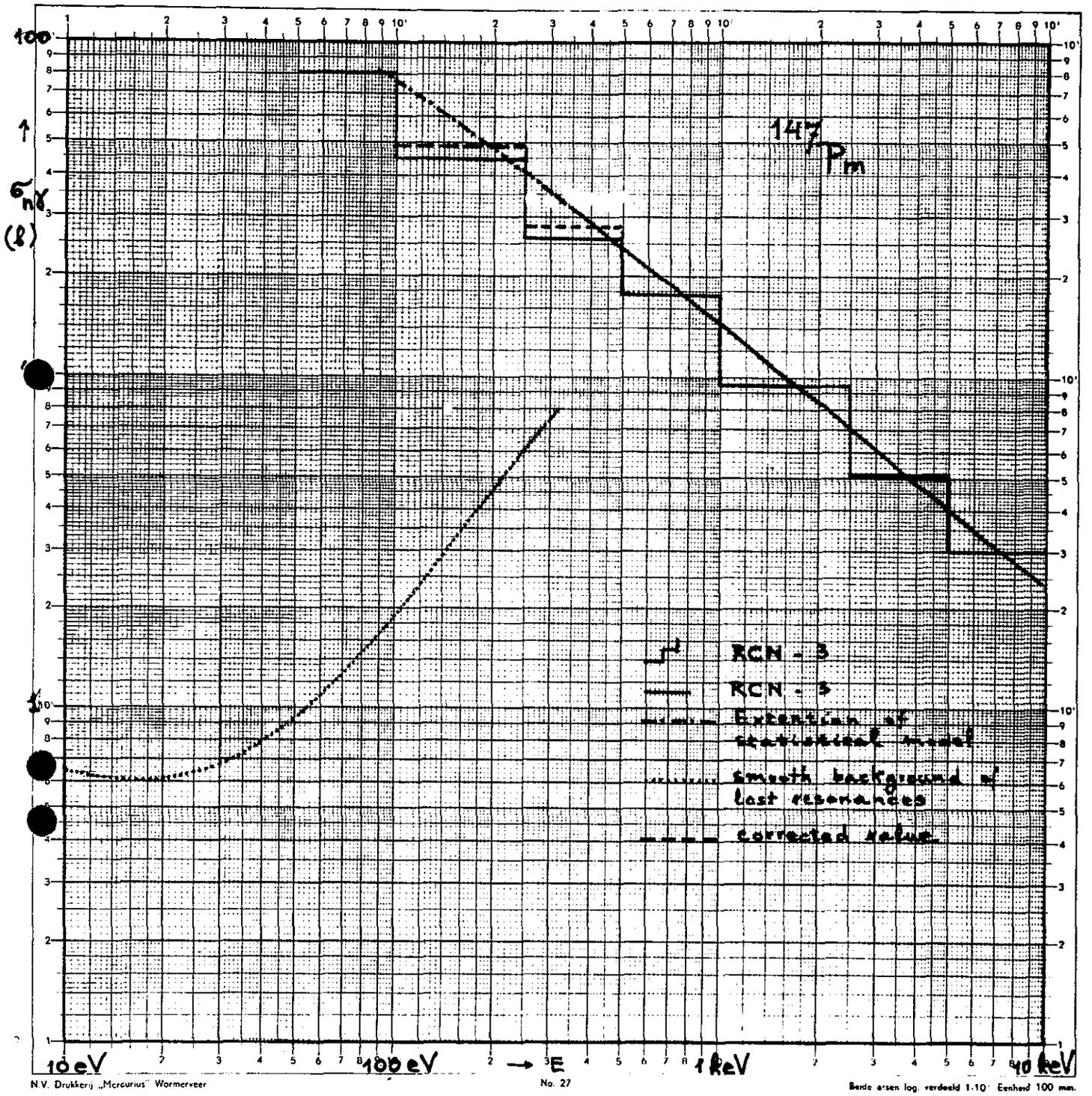

Fig. 3

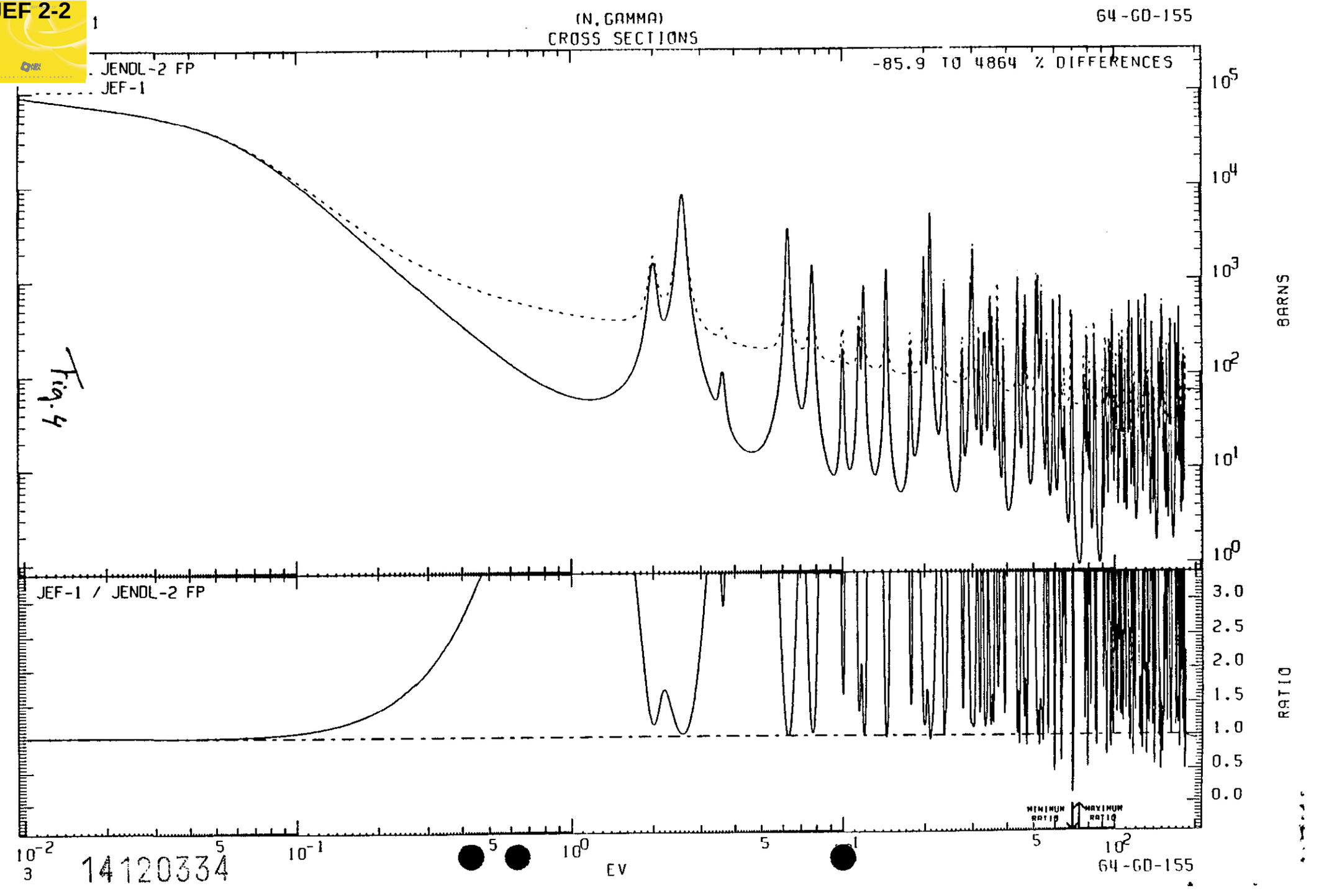

Fig. 4