^{238}U Capture and Inelastic Scattering Cross Sections

Progress report of the sub-group 1.4
Third meeting of the NEACRP/NEANDC Working Group on International
Evaluation Cooperation
ECN Petten,Holland on 21st and 22nd May 1991

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1.^{238}U(n,γ) Cross Section
   The report titled "A report on Evaluated ^{238}U(n,γ) Cross Section" was presented at Jülich Conference 13-18 May 1991. The study about this cross section was finished. The working group concluded that the evaluated values in ENDF/B- ,JEF-2 and JENDL-3 were reasonable.
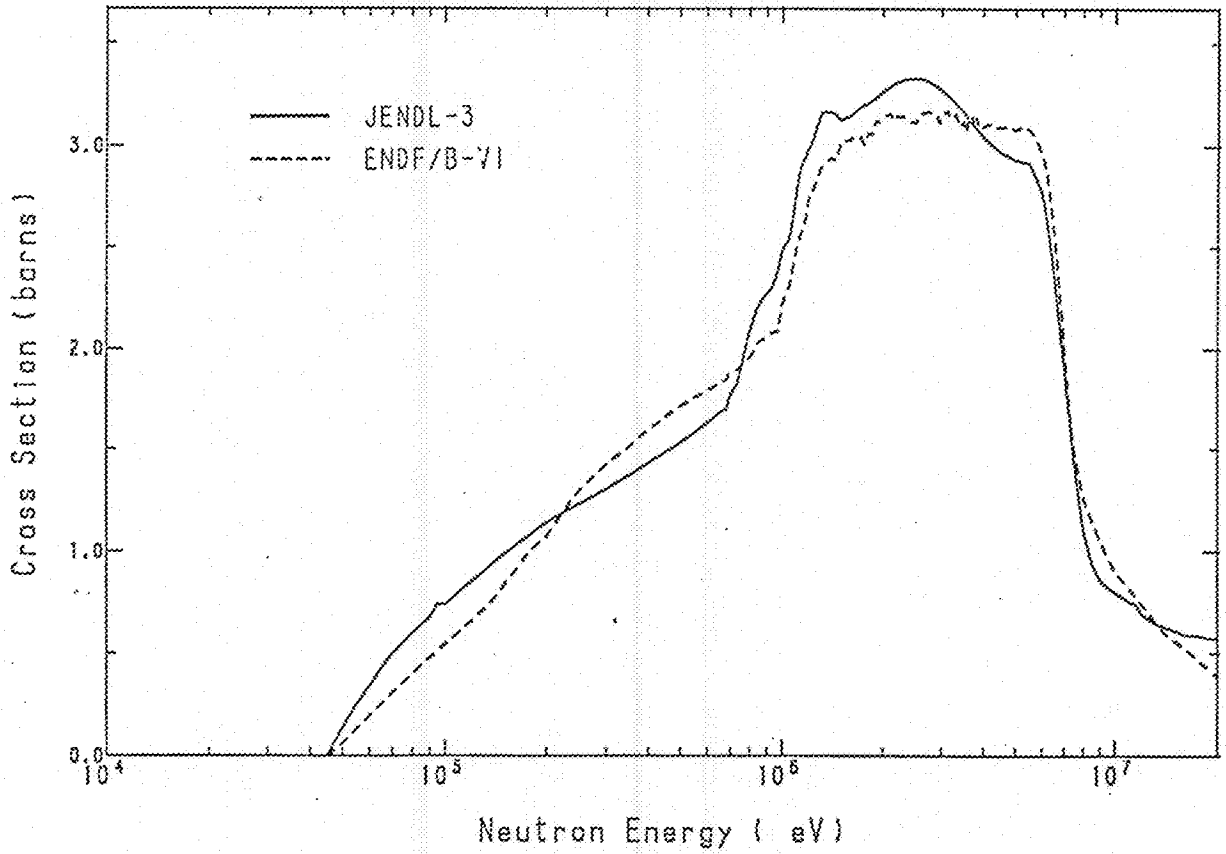
2.^{238}U(n,n') Cross Section
   Comparisons of the ^{238}U(n,n') cross section in ENDF/B- ,JENDLE-3 and CENDL-2 are shown in Figs.1 and 2.

   The coordinator received the preliminary ^{238}U neutron scattering data from A.B.Smith(October 31, 1990). Part of the data are presented Figs.3 and 4.
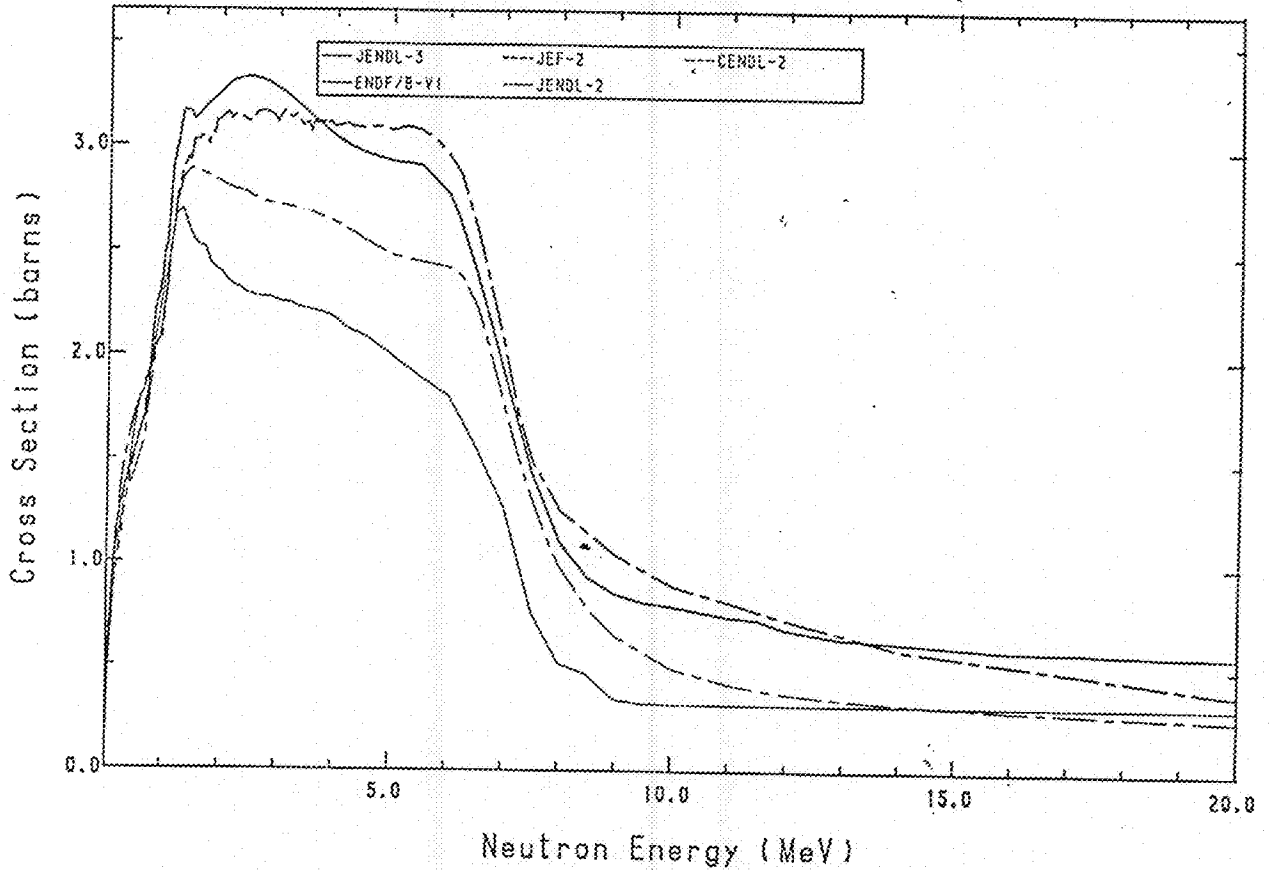
   The working group will start the studies on ^{238}U(n,n') cross section.
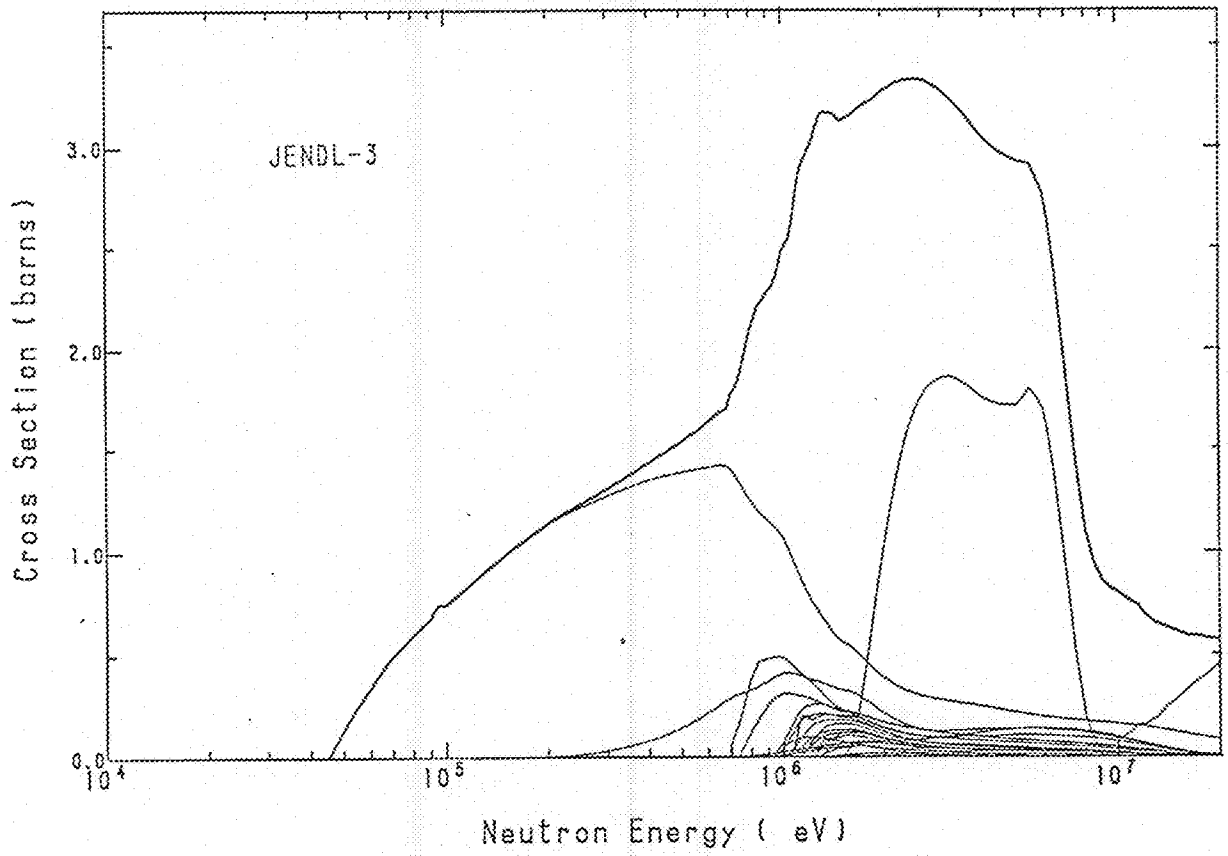
²³⁸U INELASTIC CROSS SECTION

²³⁸U INELASTIC CROSS SECTION

F i g. 1

²³⁸U INELASTIC CROSS SECTION

JENDL-3

Cross Section (barns)

Neutron Energy (eV)

²³⁸U INELASTIC CROSS SECTION

ENDF/B-VI

Cross Section (barns)

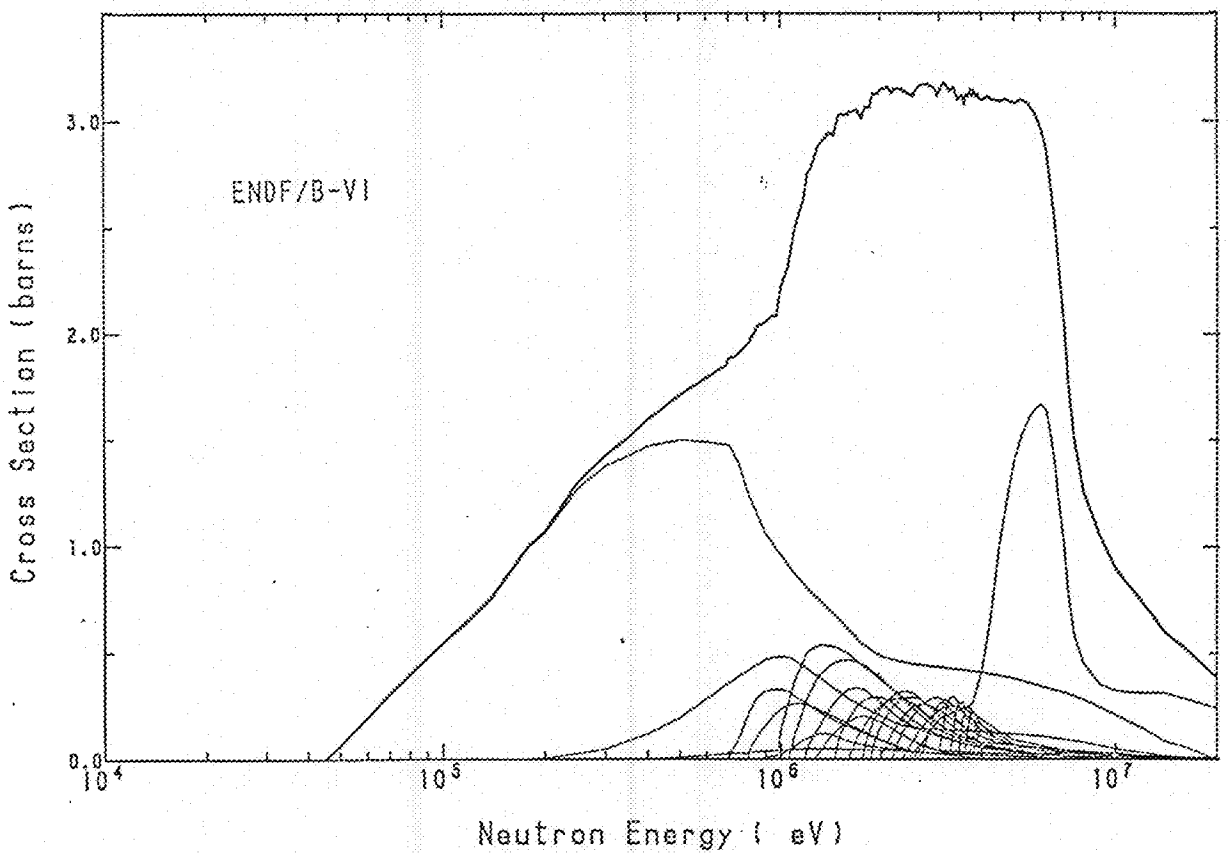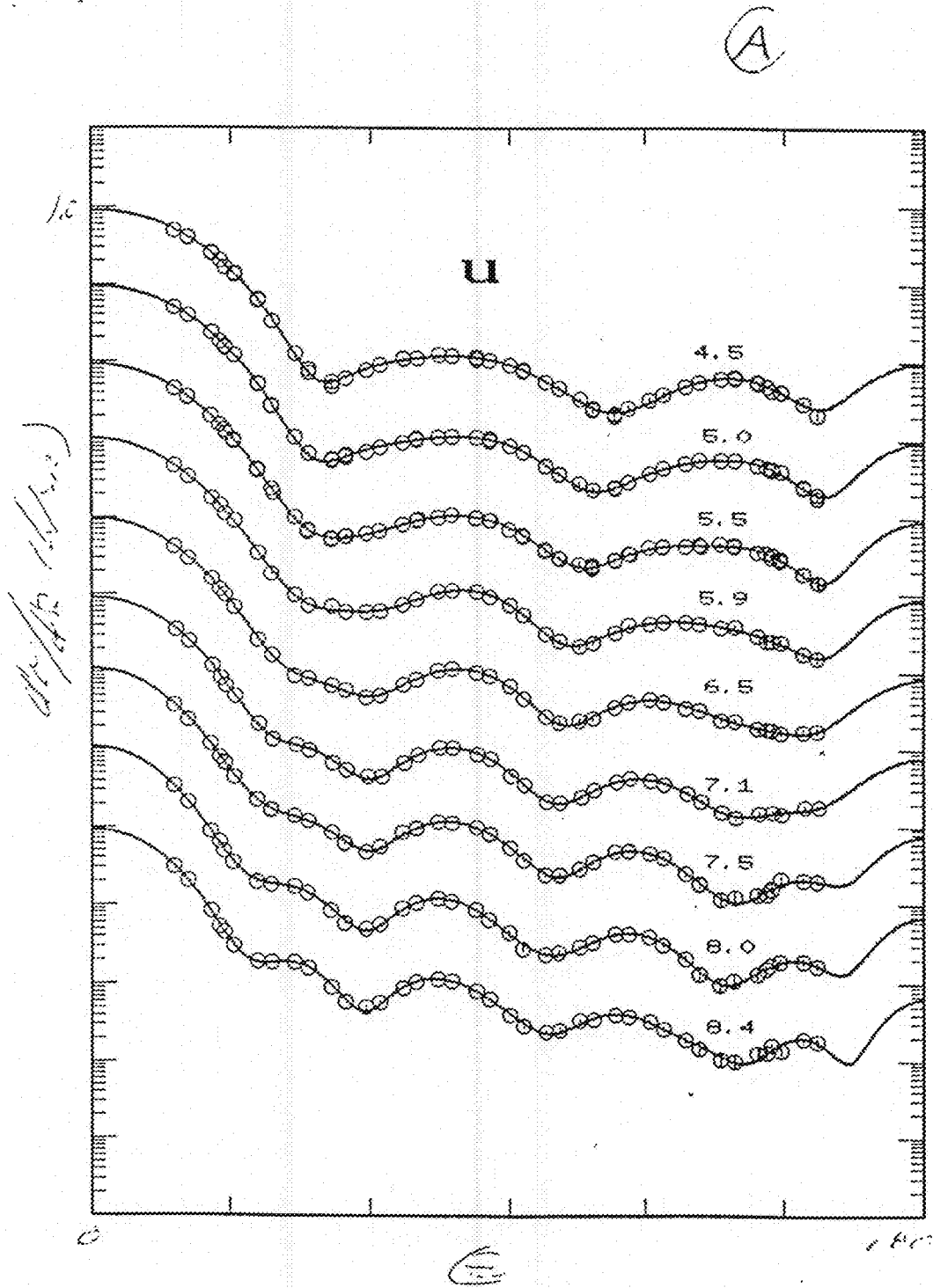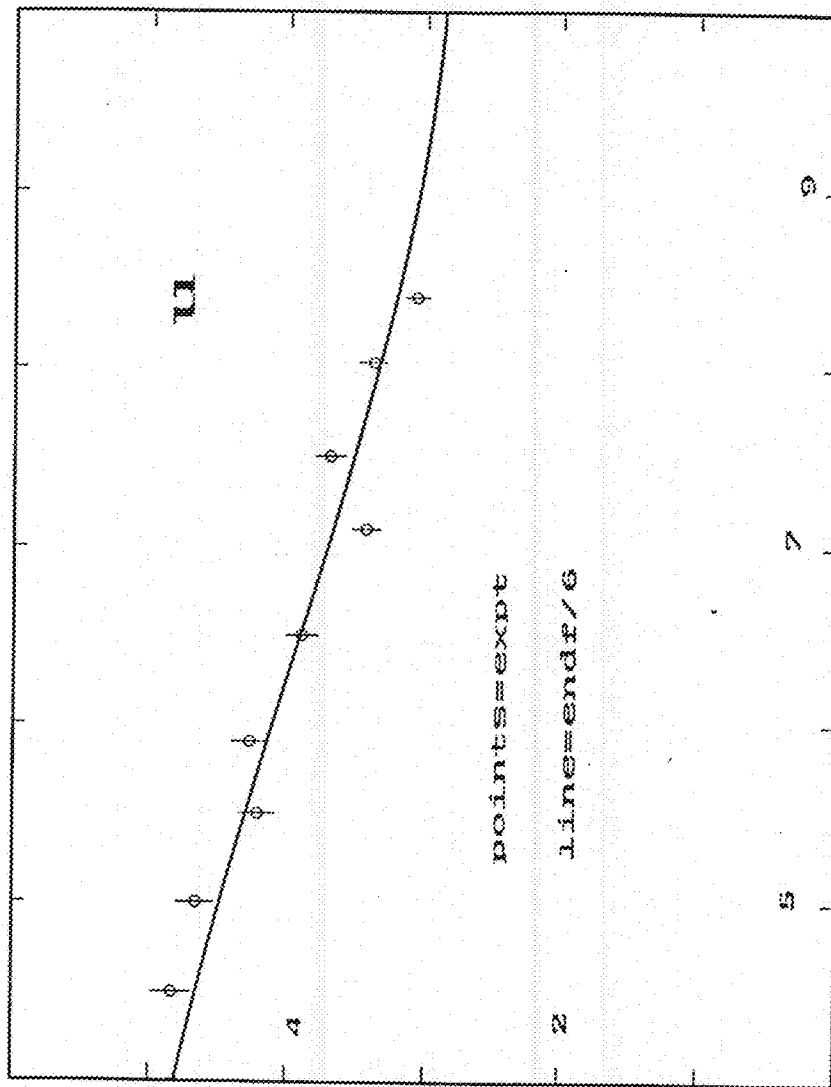Neutron Energy (eV)

F i g . 2

u

4.5

5.0

5.5

5.9

6.5

7.1

7.5

8.0

8.4

Fig. A: These are the fully corrected ²³⁸U results to date. I am reasonably pleased, although perhaps the 7.1 and 8.4 MeV distributions should be rechecked. The curves are simple "first-cut" Legendre fits to the measured values with no attention to "Wick's Limit", etc. Proper coupled-channel fitting, as per our plan, should do much better. We hope to complete this set with 9.0, 9.5 and 10.0 MeV measurements before Christmas. We should all reflect on the desirability of extending the work to lower energies, say 2, 3, and 4 MeV. If that is done, we will have to use the Li(p,n) target, and that will take another setup which cannot be completed before Christmas. I do not think there is any point to starting coupled-channels fitting until we get the whole set in final form.

F i g . 3

Li

points=expt

line=endf/6

2. Fig. B: We used the Legendre fits of Fig. A to determine the angle-integrated cross sections, with the results shown on this figure. The illustrated errors are subjective estimates of 3%. I constructed the equivalent information every MeV from ENDF/B-VI and fitted it with a simple cubic, with the result shown by the curve. The fit agrees with the individual evaluation-derived values to within 1% or less. In this context, the evaluation seems to be the old ANL version used for ENDF/B-V. The agreement is surprisingly good, and consistent with the error estimate used for the experimental points. Of course, the coupled-channel interpretations should give guidance as to how these results break down into the various components, including the angular distributions.

Fig. 4