MEASUREMENT OF FISSION NEUTRON SPECTRA

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A high-sensitive neutron spectrometer described in ref. 1 is used for the determination of fission neutron spectra in a wide energy range by the two-dimensional measurement of neutron time of flight and scintillator proton recoil energy. In this way, one is able to select the optimum (regarding background conditions) proton threshold energy for a given time of flight channel resp. channel range. The suppression of the experiment-specific and the cosmic background is realized by the use of a heavy shielding and the electronic n/γ- resp. n/μ-discrimination method.

The 4096 channel analyser working two-dimensionally is coupled to the minicomputer KRS 4200 via SI 1.2 and CAMAC. A FORTRAN 4000/4200 program system including CAMAC application (control and data processing) arranges the data transfer as well as the check, correction, concentration and analysis of the measured spectra.

The detector efficiency as a function of neutron energy and proton recoil energy bias was calculated by the use of the Monte-Carlo-code NEUCEF /2/ acceptin the light output data of Verbinski et al. /3/. Fig. 1 shows the spontaneous fission neutron spectrum of Cf-252 (preliminary results). This measurement was an excellent confirmation of the calculated absolute detector efficiency (spectrum of comparison from ref. 4).
Furtheron, the spectrometer is used for the determination of fast fission neutron spectra /5/.

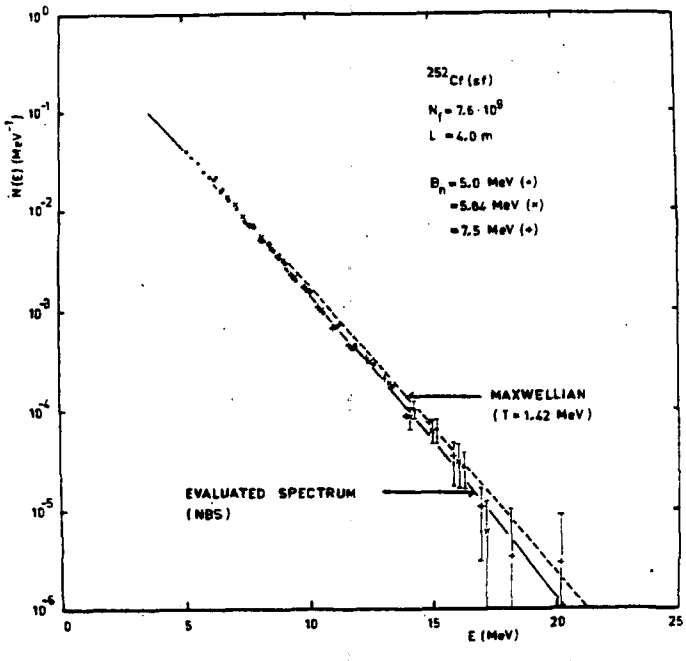

Fig. 1
Cf-252(sf) fission neutron spectrum (preliminary res.)

[1] W. Grimm, et al., 5th Conf. on Neutron Physics, Kiev 1980, part 3, 3

[2] D. Hermsdorf, rep. ZfK-315(1977)192,
Stanton, N.R., rep. COO-1545-92(1971)

[3] V.V. Verbinski, et al., Nuc. Instr. Meth. 65(1968)8

[4] J.A. Grundl, Evaluation of Fission Neutron Spectra (unpubl.)

[5] H. Märten and D. Seeliger, Proc. Int. Symp., Gaußig (GDR), 1980, in print