Smearing of angular asymmetry of promt neutrons emitted by fission fragments created by linearly polarized photons

- Composition of depleted uranium (fraction by mass):

U-238 -- 99.8%

U-235 -- 0.2%

U-234 -- 0.001%

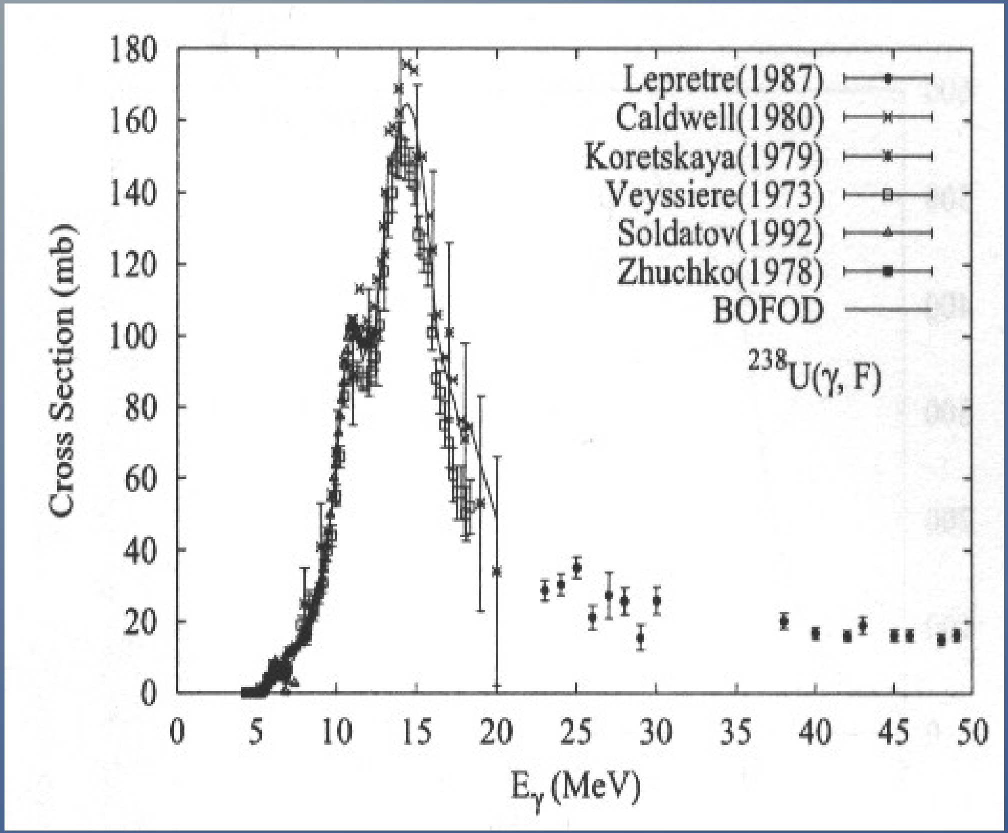
- Notation used:

σ(γ,F) is total photofission cross section;

σ(γ,*x*n) is photoneutron yield or production cross section;

σ(γ,1n*x*) is the sum of cross sections that have a single in the final state (1n + 1np + 1nα + 1n +...).

U-238



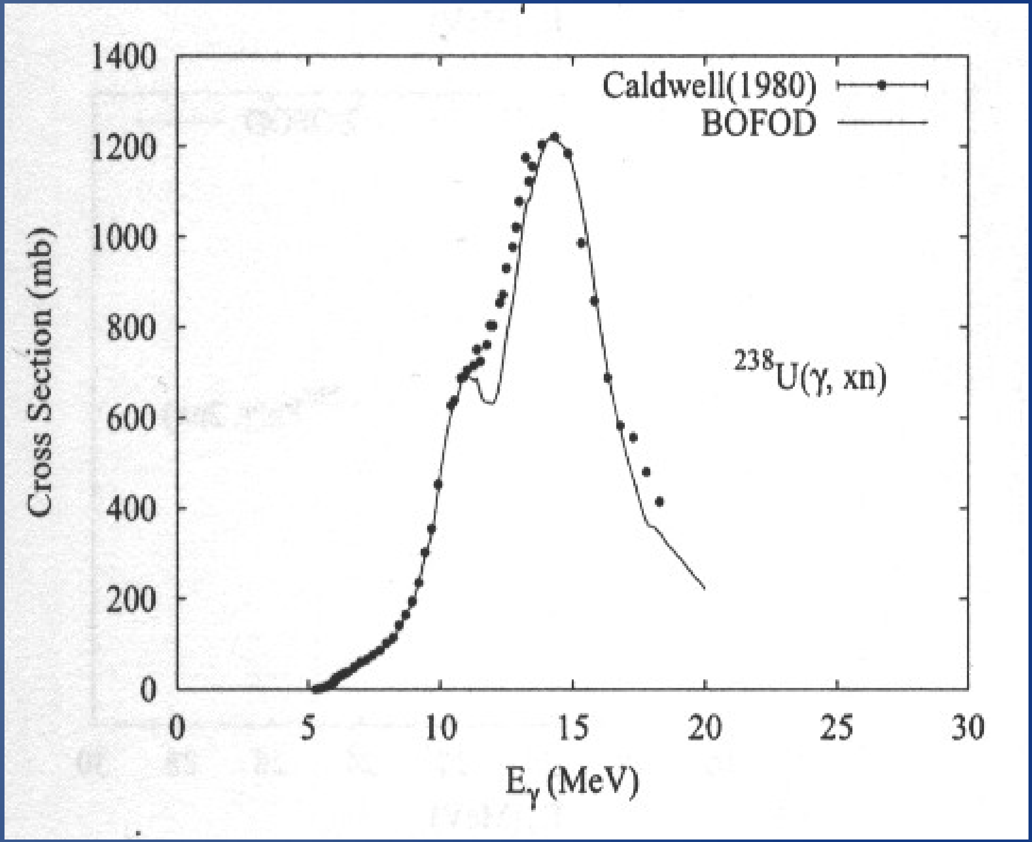


Fig. 1. Photofission cross section for U-238.

Fig. 2. Neutron photoproduction cross section for U-238.

U-235

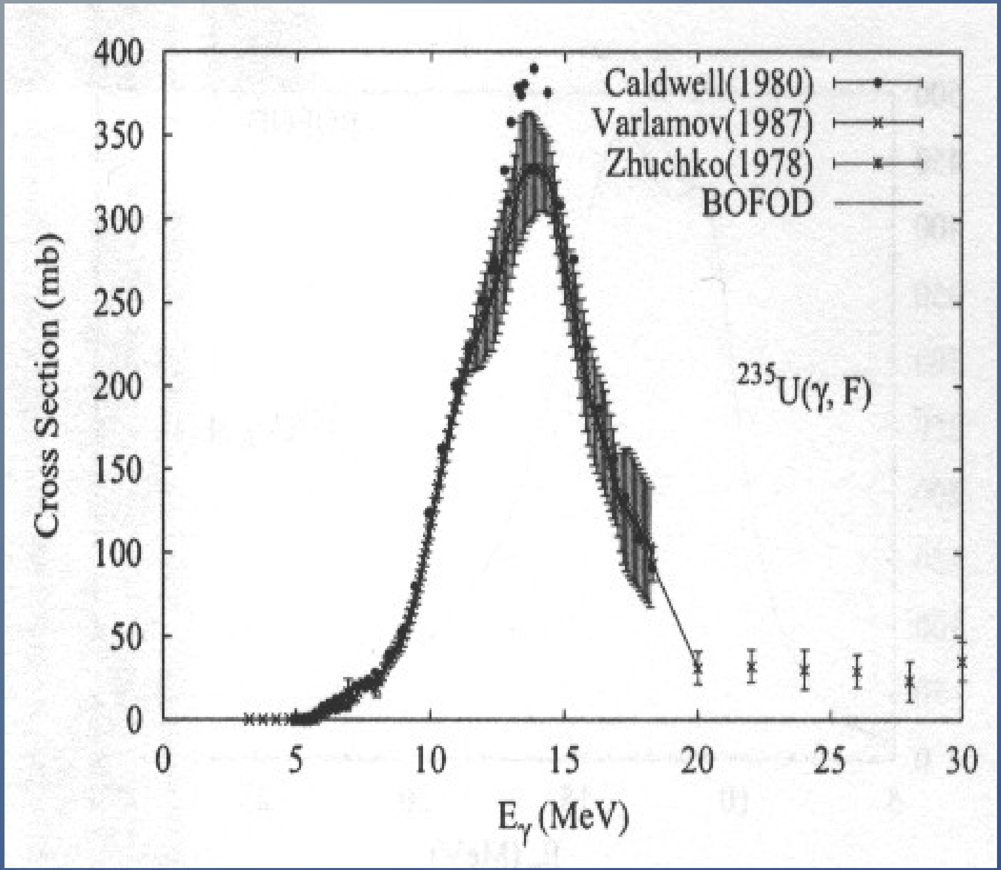


Fig. 3. Photofission cross section for U-235.

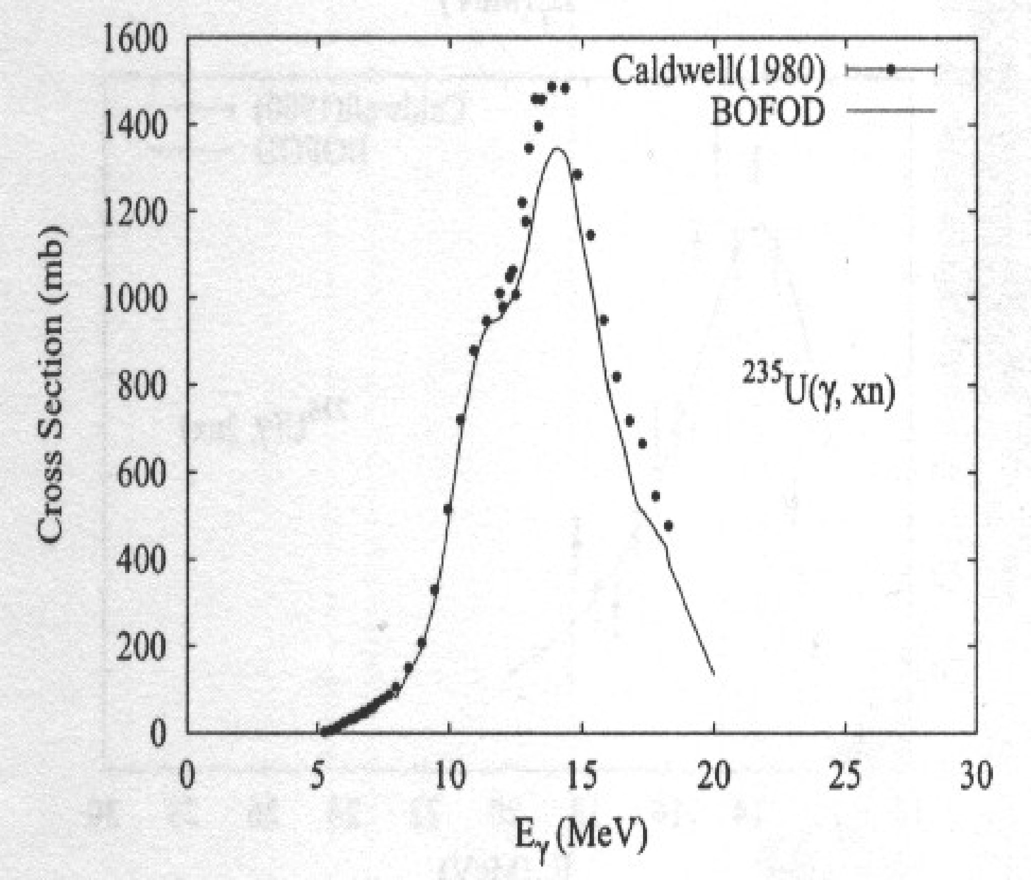


Fig. 4. Neutron photoproduction cross section for U-235.

U-234

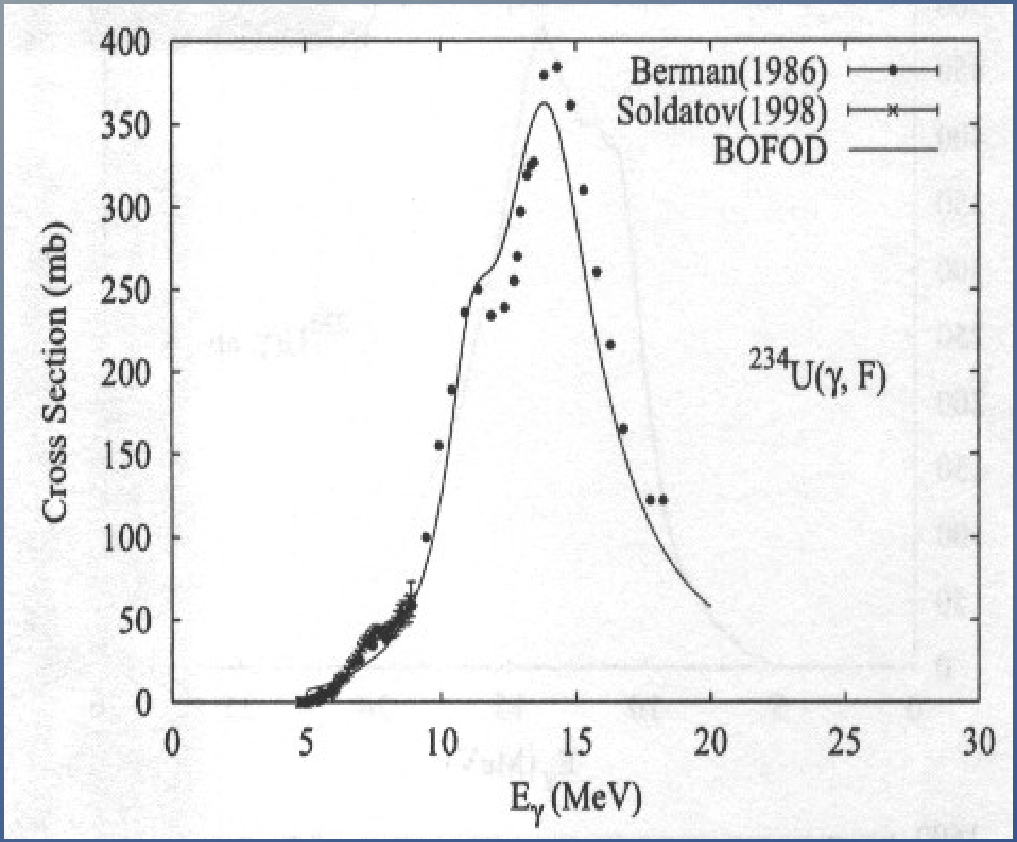


Fig. 5. Photofission cross section for U-234.

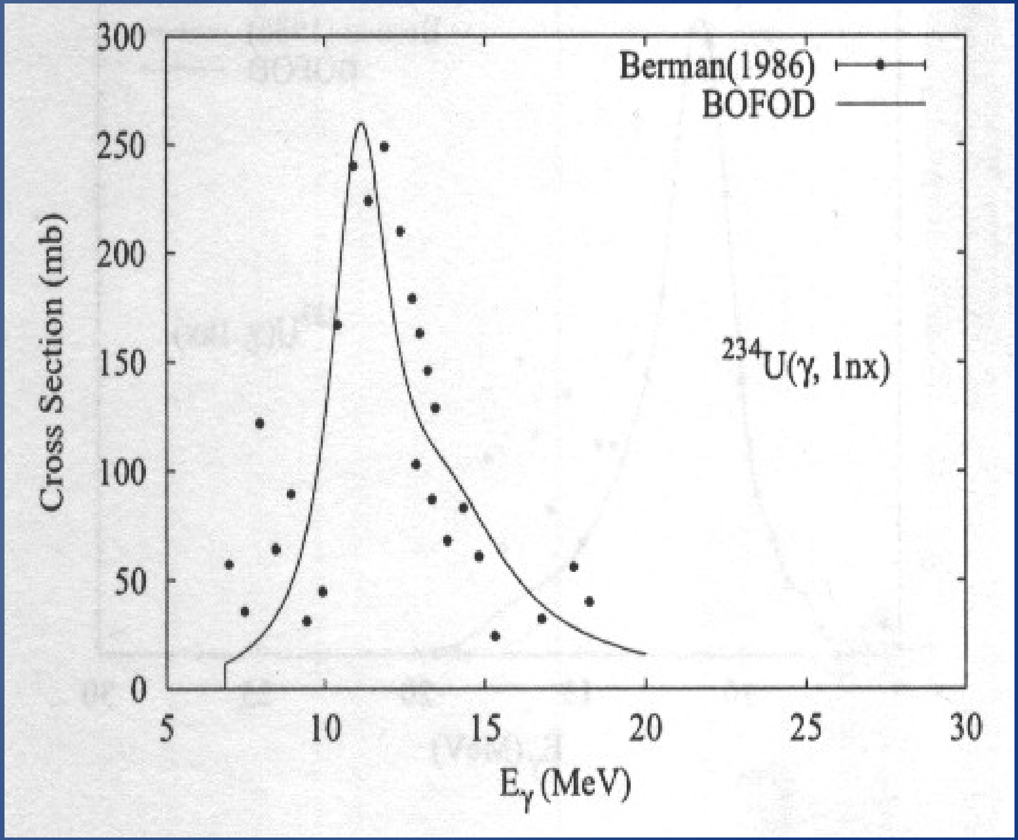


Fig. 6. Neutron photoproduction cross section for U-234.

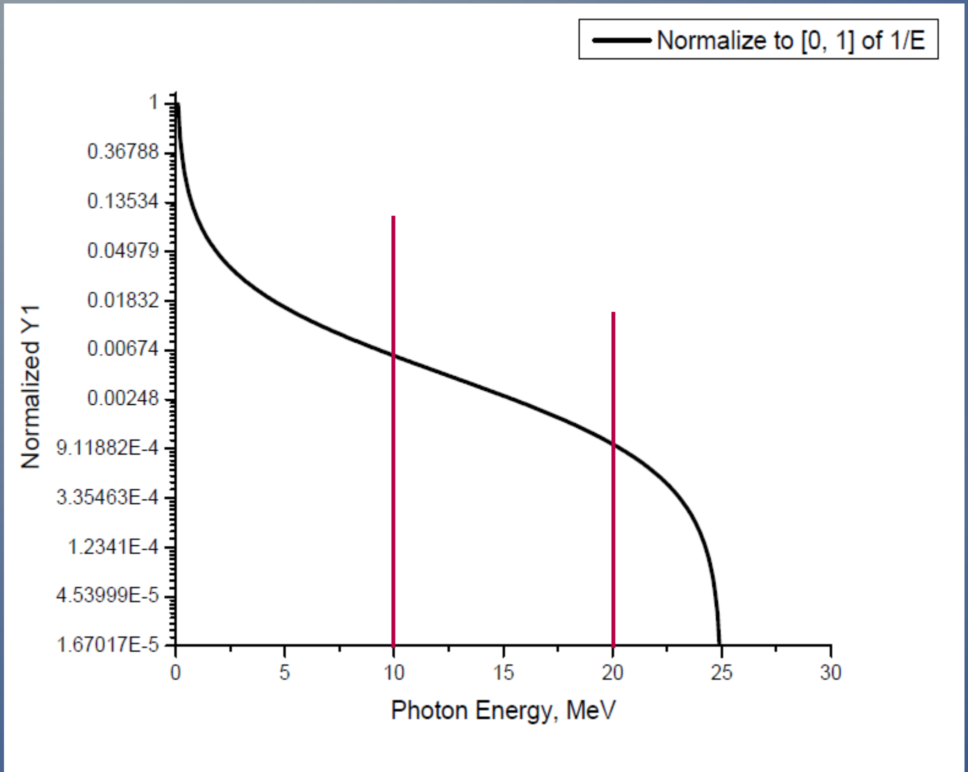


Fig. 7. Bremsstrahlung spectrum with 25 MeV end-point.

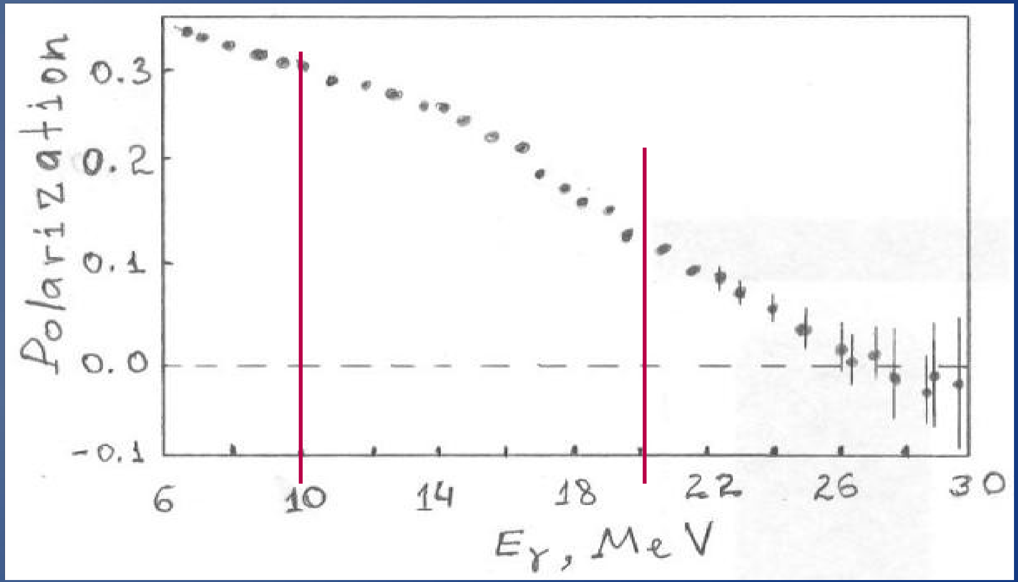


Fig. 8. Polarization of photons VS photon energy.

Conclusions:

- Neutron yield from σ(γ,*x*n) reaction is ~10 times higher than σ(γ,F) reaction for all the components of DU;

- The neutrons from σ(γ,*x*n) reaction do not carry the information on the pfoton polarization;

- Hence, our neutron angular asymmetry may not show visible asymmetry;

- Polarization degree changes in the whole range of photon energies which may lead to smearing the asymmetry;

- One of the possible ways to overcome the problem is to use fission chamber and trigger the DAQ system on the event of photofission.