Comparison of Experimental and Calculated Mass Distributions of Fission Fragments in Proton-Induced Fission of ^{232}Th, ^{235}U, ^{238}U and ^{237}Np in the Intermediate Energy Region.

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Mass distributions of fragments produced by proton-induced fission of ^{232}Th, ^{235}U, ^{238}U and ^{237}Np at the proton energies 50 and 96 MeV are presented. The measurements were carried out at The Svedberg Laboratory, Uppsala, Sweden, with the use of a high-precision spectrometer for fission fragments and fission neutrons [1]. The spectrometer includes a scattering chamber containing the targets and six detector telescopes. Each telescope arm consists of two thin Al_2O_3 foils, two microchannel plates (MCP), and a surface barrier detector (SBD). The telescope arms were adjusted to be perpendicular to the direction of the moving compound nucleus centre-of-mass system, so as to compensate for the momentum transferred to the compound nucleus by the impinging projectile. Successive pulses from the two MCPs gave the fragment flight time over a variable flight path. The directions of the fission fragments were also obtained with the MCPs, while the fragment kinetic energies were determined using the SBDs, or in some cases by using the TOF information from the MCPs.

In addition, energy distributions of neutrons emitted at different angles with respect to the fragment emission directions were measured. This has allowed to obtain an important for a comparison with the theory [2] information about number and average energy of pre-fission (pre-equilibrium and equilibrium) and post-fission (emitted from totally accelerated fragments) neutrons.

The fission of ^{237}Np is of particular interest, because the composite and intermediate nuclei formed as a result of the direct processes have high parameters of fissility (Z^2/A) and therefore major Γ_f/Γ_n, which results in short chains of fission chances, that is essential for a comparison with calculations.

The calculations were carried out in the framework of the TALYS code [3]. Results of such comparisons are discussed, as well as the possibilities to predict the outcome of the considerably more difficult measurements using neutron beams.

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2. M.C. Duijvestin, A.J. Koning and F.-J. Hambsh, PRC 64, 01467.
3. A.J. Koning, S. Hilaire, M.C. Duijvestijn, this conference.

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