

EXPERIMENTAL STUDY OF MODAL FISSION OF EXCITED HEAVY NUCLEI

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Recent observation of mass-asymmetric fission in neutron-deficient Hg and Pt nuclei has reignited interest in studying the fission properties of heavy nuclei both theoretically and experimentally.

To study the multimodal fission of excited preactinide (Pt, Hg, Pb) and heavy actinide (Fm, Cf, No) nuclei formed in reactions with O, Ar and Ca ions at various excitation energies a series of experiments was conducted.

The measurements were carried out at the U400 cyclotron of the Flerov Laboratory of Nuclear Reactions (JINR, Dubna, Russia) using the double-arm time-of-flight spectrometer CORSET [1].

The observed peculiarities in the fission fragment mass-energy distributions for all studied nuclei may be explained by the presence of a symmetric fission mode and asymmetric fission modes, manifested by the different total kinetic energies and fragment mass splits. The yield of symmetric mode grows with increasing excitation energy of compound nucleus. The stabilization role of proton numbers at $Z \approx 36, 38, Z \approx 45, 46$, and $Z = 28/50$ in asymmetric fission of excited preactinide nuclei was observed [2, 3]. It was also shown that in the fission of heavy actinides, the increased yield of fragments in the mass region ~ 100 u is associated with the influence of the deformed proton shell $Z \approx 38$.

References:

- [1] E. M. Kozulin et al., Instrum. Exp. Tech. 51, 44 (2008).
- [2] A. A. Bogachev et al., Phys. Rev. C 104, 024623 (2021).
- [3] E. M. Kozulin et al., Phys. Rev. C 105, 014607 (2022).

Section

Experimental and theoretical studies of nuclear reactions

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