

Status and Prospects of Studies of (γ , f) Reactions at MT-25 Microtron

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The experiments were performed at the beam of the MT-25 microtron, FLNR, JINR, using the VEGA (V-E Guide based Array) setup. Fission fragments (FFs) from the $^{235,238}\text{U}$ (γ , f) and ^{232}Th (γ , f) reactions were captured by an electrostatic guide system (EGS). The guide is a cylindrical capacitor of four meters long with a thin wire as a central electrode. Some part of the ions emitted from the target at one end of the guide become involved in the spiral-like movement along the guide axis [1]. By this way the FFs are transported to the time-of-flight mass-spectrometer that consists of a microchannel-plates based timing detector and a mosaic of four PIN diodes. The mean time-of-flight of the FFs in the EGS exceeds 400 ns. The peculiarities of the experimental two dimensional FFs mass correlation distributions allowed us to suggest the following nature of such peculiarities (linear structures) [2]: due to inelastic Coulomb scattering, a very deformed FF from binary (γ , f) reaction undergoes a break-up while crossing a Lexan foil of the time detector. It is possible if the fragment is born in the shape isomer state with a typical life time of more than 400 ns. The experimental data at the MT-25 microtrone suffer from an intensive noise generated by the accelerator. In order to improve the experimental conditions, we are upgrading the VEGA setup by moving the detector module into the noise protected chamber six meters away from the target.

References

1. N.C. Oakey, P.D. McFarlane, NIM. 49, 220 (1967).
2. Yu.V. Pyatkov, D.V. Kamanin, A.A. Alexandrov, et al., Proceedings of the 27th International Seminar on Interaction of Neutrons with Nuclei, Dubna, Russia, 10-14 June 2019. Dubna 2020, p. 249.