IMPROVEMENT OF THE EXPERIMENTAL CAPABILITY IN STUDIES OF THE CLUSTER EFFECTS IN HEAVY NUCLEI

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In accordance with our previous experiments [1–3], at least some of the fragments of binary fission of low excited actinides are born in the state of shape isomers. A strongly deformed fragment is a weakly bound binary system (shape isomer) which breaks up with a certain probability in an inelastic scattering in a solid foil. Both decay products fly in the same direction, with a very small angle between them, in the range of 0.3^0-2^0 (experimental estimate). Moreover, one of them has an energy of several MeV or less, which makes it extremely difficult to separately detect them with the measurement of the mass of each of the products.

To construct an adequate model of the observed effects, *a kinematically complete experiment* with the measurement of masses, energies, and velocity vectors of all nuclei involved in the process is required. For this purpose, joint work with a group from the Czech Republic has begun on the use of Timepix3 two-coordinate pixel detector with 55μ spatial resolution in studies of multibody decays. Heavy ion mass spectrometry using this detector is a non-trivial methodological problem. The results already obtained are presented.

New experimental approach which allows to estimate the life time of the shape isomer states in fission fragments is based on use of the electrostatic guide system at the beam of the MT-25 microtrone in FLNR. A current status of the experiments is discussed.

Special attention in the presentation is also paid to the new off-line timestamp algorithm which allows to obtain the unbiased values of time-of-flights in the wide range of heavy ions masses and velocities.

References

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