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Study of the competition between fusion-fission and quasifission processes in reactions 40,42,44,48Ca+ 208Pb.

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One of the actual problems of modern nuclear physics is the study of the interaction mechanism of nuclei and the study of competing processes in their interaction. Study of competition between compound nucleus fission and quasifission in heavy-ion-induced reactions and its dependence on the reaction entrance channel are important for picking up the right target-projectile combination for the synthesis of heavy elements.

In order to investigate the impact of structural peculiarities of the projectiles near 48Ca in the fusion reactions on the capture process and the further evolution of the formed dinuclear system, the capture cross sections and mass-energy distributions of binary fragments formed in the reactions 40Ca, 42Ca, 44Ca, 48Ca+ 208Pb at interaction energies above and well below the Coulomb barrier have been measured. The separation of fusion-fission component from the quasifission one is based on the analysis of the properties of measured mass-energy distributions for fission-like fragments. The work also estimates the cross section of the fusion-fission process in the presented reactions.

All experiments were carried out at the U-400 accelerator FLNR JINR, Dubna. The CORSET [1] double-arm time-of-flight spectrometer was used to measure mass and energy distributions of the reaction products.

[1] E. M. Kozulin et al., Instrum. Exp. Tech. 51, 44 (2008).

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