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Clustering effect in Ternary fission of super-heavy nuclear systems

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Summary

Clusterization, i.e., the process of forming compact pieces of nuclear matter due to the shell effect inside the nucleus, plays an important role in true ternary fission of super-heavy nuclear systems [1]. Experimental investigations show that during the reaction between medium mass nuclei and heavy mass target, three body clusterization (ternary fission) occurs where preferable fragments are two heavy nuclei (doubly magic nuclei, i.e., 132Sn, 208Pb, etc.) and one light nucleus [2]. In 238U + 238U composite nuclear system, it is expected that triple cluster decay may occur possibly creating two Pb-like fragments (Z = 82 and N = 126) and a 60Ca which is highly exotic. Using this concept, we have carried out a test experiment with the reaction between 238U (with incident beam energy 6.2 MeV/u) and 238U (target), in GANIL with the CORSET [3] setup by an international collaborations. The aim was to measure the mass and energy distributions of the fragments and their angular correlations by a TOF-TOF-E technique. The data indicate mainly binary decay of fission fragments. Besides, there are many events that can indicate ternary decays. For the confirmation of two Pb-like and one 60Ca nuclei, we need more investigations that we are going to finalize soon.

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