# The Entrance Channel Effects in Fusion-fission and Quasi-fission

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The existence of the island of stability in the region of nuclei with Z=114 and N=184 predicted theoretically has induced an extensive experimental investigation in the field of superheavy element synthesis. A considerable success was achieved in reactions of actinides with a double magic $^{48}$Ca beam at FLNR where the synthesis of with atomic number z up to 118 has been claimed. Experimental data confirm the theoretical prediction of the increase of the half-lives following the increase of the neutron number of the compound nucleus. Unfortunately, the isotopes of superheavy elements formed these $^{48}$Ca induced reactions cannot reach the neutron closed shell with N=184 due to the lack of 7-9 neutrons.

Nuclei with Z>118 cannot be synthesized in $^{48}$Ca induced reactions since $^{249}$Cf is the heaviest target material available for these purposes. A possible alternative pathway is represented by the complete fusion of actinide nuclei with heavier projectiles such as $^{58}$Fe or $^{64}$Ni leading to the formation of compound nuclei with Z=118-124 and N=178-188.

Since at energies near the Coulomb barrier the fusion reactions between two heavy nuclei are strongly hindered by the competing quasi-fission and deep-inelastic reactions, more detailed experimental studies of the reaction mechanism are required to provide realistic estimates of the probability of producing compound nuclei in such reactions, especially in connection with the entrance channel properties.

Mass-energy distributions as well as capture cross sections of fission-like fragments have been measured for a wide range of composite systems with Z=82-122 formed in the reactions with $^{22}$Ne, $^{26}$Mg, $^{48}$Ca, $^{58}$Fe and $^{86}$Kr ions at energies around the Coulomb barrier. The experiments were carried out using a double-arm time-of-flight spectrometer of binary reaction products CORSET. The main peculiarities of mass and energy distributions of fusion-fission and quasi-fission fragments will be discussed. The results of the experimental investigations of the influence of the entrance channel properties on the competition between fusion-fission and quasi-fission for the “warm” and “cold” fusion reactions will be reported.