# Investigation of heavy ion-induced reaction mechanisms at energies near the coulomb barrier

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The collision of two massive nuclei takes a special place in nuclear reactions studies due to the large number of interacting nucleons. In this type of reactions a drastic change of the reaction partners may occur and many different reaction mechanisms take place. The competition between reaction channels is strongly dependent on the contact configuration of the interacting nuclei. The properties of the entrance channel, such as mass asymmetry, energy, angular momentum introduced into the system, as well as shell structure and deformation of interacting nuclei have a dominant role. Furthermore, the potential energy surface which is engaged in the evolution of the intermediate nuclear system is strongly modulated by shell effects and leads to the appearance of deep valleys corresponding to the formation of well bound magic nuclei.

Special attention was paid to the questions connected with influence of the entrance channel, energy of excitation, shell effects, etc. parameters on characteristics of processes of fission and quasifission in reactions $^{22}Ne+^{249}Cf$, $^{26}Mg+^{248}Cm$, $^{36}S+^{238}U$, $^{58}Fe+^{208}Pb$, leading to the same compound system Hs are most in details considered. Mass and energy distributions of fission-like fragments obtained in this reactions leading to the formation of $^{266,274}Hs$ are reported. From the analysis of TKE distributions for symmetric fragment it was found that at energies below the Coulomb barrier the bimodal fission of $^{274}Hs$, formed in the reaction $^{26}Mg+^{248}Cm$, is observed, while in the reaction $^{36}S+^{238}U$ at these energies the main part of the symmetric fragments arises from the quasi-fission process. In the case of $^{58}Fe+^{208}Pb$ reaction the quasi-fission process is the main reaction mechanism at all measured energies.

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