Dynamics of Fusion-Fission in Heavy and Superheavy Nuclei

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Heavy ion fusion-fission reactions studies using fission angular distribution, mass distribution, total kinetic energy distribution, neutron, charged particle emission and fission probability have provided a better understanding of the reaction mechanism and dynamics. The neutron clock in particular was extensively used as a sensitive probe to deduce total dynamical time in fusion-fission process and some of these studies have pointed out importance of compound nucleus formation time in total dynamical time and this time was determined for the first time to the order of 10-20 s. A simultaneous measurement of pre-scission neutron and alpha particle emission multiplicities was used to deduce the contribution of the saddle-to-scission time to the total fission time. The measurements of fission fragment mass, total kinetic energy, neutron and charged particle multiplicities, fission probability in superheavy region have pointed out importance of entrance channel conditions in formation of compound nuclear systems in this region. From an extrapolation of the measured total neutron multiplicities for the mass symmetric region to zero compound nucleus excitation energy, the average number of prompt neutrons expected to be emitted in the spontaneous fission of the superheavy nuclei were determined for Z=104, 116 and Z=124 for the first time. In this talk, these results will be summarized, bringing out some of the highlights.