Nuclear Theory

Stability of fragments and study of participant-spectator matter at peak center-of-mass energy

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We simulate the central reactions of nearly symmetric, and asymmetric systems, for the energies at which the maximum production of IMFs occurs (E$_{c.m.}^{peak}$).This study is carried out by using hard EOS along with cugnon cross section and employing MSTB method for clusterization. We study the various properties of fragments. The stability of fragments is checked through persistence coefficient, gain term and binding energy. The information about the thermalization and stopping in heavy-ion collisions is obtained via relative momentum, anisotropy ratio, and rapidity distribution. We find that for a complete stopping of incoming nuclei very heavy systems are required. The mass dependence of various quantities (such as average and maximum central density, collision dynamics as well as the time zone for hot and dense nuclear matter) is also presented. In all cases (i.e., average and maximum central density, collision dynamics as well as the time zone for hot and dense nuclear matter) a power law dependence is obtained.

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