Fragmentation analysis of ^{88}Mo* compound nucleus in view of different decay mechanisms

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In reference to the experimental data [1], the decay mechanism of ^{88}Mo* compound system formed in ^{48}Ti+^{40}Ca reaction is investigated at three beam energies (E$_{beam}$=300, 450, and 600 MeV) using the collective clusterization approach of Dynamical Cluster decay Model (DCM) [2, 3]. The calculations are done for spherical choice of fragmentation and with the inclusion of quadrupole (β_2) deformations having optimum orientations (θ_i^{opt}). According to the experimental evidence [1] ^{88}Mo* decays via fusion-evaporation (FE) and fusion-fission (FF) processes, thus the decay cross-sections of this hot and rotating compound system are calculated for both FE and FF channels. In FF decay mode, the explicit contribution of intermediate mass fragments (IMF), heavy mass fragments (HMF) and symmetric fission fragments is extracted within DCM framework. The calculated FE and FF decay cross-sections find nice agreement with the available experimental data [1] for both the choices of fragmentation (spherical as well as β_2-deformed). Experimentally, it has been observed that the total contribution of FE and FF decay cross-sections is much less than the total reaction cross-sections (estimated according to [4]), suggesting the presence of some nCN component such as deep inelastic collisions (DIC), which generally contributes at higher ℓ-values or above critical angular momentum (ℓ_{cr}). In view of this, DIC contribution is also investigated.

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