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Light charged particle multiplicities in fusion and quasifission reactions

The light charged particle evaporation from the compound nucleus and from the complex fragments in the reactions $^{32}\text{S}+^{100}\text{Mo}$, $^{121}\text{Sb}+^{27}\text{Al}$, $^{40}\text{Ar}+^{164}\text{Dy}$, and $^{40}\text{Ar}+\text{natAg}$ is studied within the dinuclear system model. The possibility to distinguish the reaction products from different reaction mechanisms is discussed.

From the comparison of the calculated light charged particle (LCP) multiplicities and experimental data, we show the possible overlap of the decay products from different reaction mechanisms. With increasing the bombarding energy the ratio of the LCP multiplicity from the fission-like fragments to the LCP multiplicity from the compound nucleus increases due to the increase of fission and quasifission probabilities. The simultaneous description of the LCP multiplicities and of the production cross sections of the evaporation residues and complex fragments gives us a chance to distinguish the reaction products from different reaction mechanisms. The calculated LCP multiplicities show weak dependence on the reasonable variation of the level density parameter, and stronger dependence on the Coulomb barrier heights.

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