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# Entrance channel effects in heavy-ion collisions within three-dimensional full dissipative dynamics

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We have thoroughly investigated the influence of entrance channel effects on the spin distribution and angular momentum in heavy ion collisions, employing three-dimensional dissipative dynamics. The microscopically derived Langevin equations were numerically solved using the distance, neck, asymmetry and the three angular macroscopic variables, which allow for an adequate description of the fusion process, as it was done in Ref. [1]. Our analysis showed that, unlike what was done in Ref.~[1], a special handling of the boundary conditions is necessary to describe the correct asymptotic shape of the spin distributions. Moreover, by considering the full range of the asymmetry variable, rather than freezing it, we provide a comprehensive understanding of its impact on dissipative dynamics.

Different systems, involving various asymmetry entrance channels were studied using a Yukawa-plus-exponential folding + Coulomb potential, and we will present results for the following heavy-ion reactions: $^{64}$Ni+$^{92,96}$Zr, and the asymmetric systems $^{16}$O+$^{152}$Sm and $^{48}$Ca,$^{50}$Ti,$^{54}$Cr on $^{208}$Pb.

Our analysis considers factors such as friction, mass tensor parameters, diffusion strength, potential energy, and stochasticity in a complete three-dimensional picture. We observe significant variations in the spin distribution by considering various target-projectile combinations with the same excitation energy and compound system. This underscores the crucial role of entrance channel asymmetry in shaping the spin distribution, as it strongly influences the hindrance mechanism and in turn, plays a vital role as a weight for subsequent processes such as splitting.

This investigation enhances our understanding of the intricate relationship between entrance channel effects and the resulting spin distribution, contributing to a broader understanding of dissipative dynamics in heavy ion collisions. Our ultimate aim is the inclusion of shell effects in the potential surface to give a fully microscopic-macroscopic description of the dissipative process.

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