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Breakup effects on fusion. Reduction methods and quantum-mechanical methods for the CF and ICF calculation

We discuss the effect of weakly bound projectiles' breakup (BU) channels on complete and total fusion. For that, we report our fusion method based on the Wong formula, which allows for comparing reduced experimental data to the universal fusion function to find the effect of the BU channel on fusion. We report a recent improvement to the Wong formula to upgrade our reduction method and introduce the classic line benchmark for energies above the Coulomb barrier. The new method is also used to study the effect of CN probability on the fusion cross section and to study the hindrance of the fusion cross section of super-heavy nuclei.

A new theoretical method for the calculation of complete (CF) and incomplete fusion (ICF) recently proposed by us will be presented. This method is based on the continuum discretized coupled channel method plus a classical statistic to derive the corresponding probabilities. The method will be used to derive the CF and ICF of the reactions induced by $6,7\text{Li}$ on heavy targets. The capability to describe the experimental data for the reactions induced by neutron halo projectiles will also shown. Finally, we will also show that from the inclusive alpha emission cross section from $6\text{Li} + 90\text{Zr}$ at near barrier energies, the deuteron-ICF can be derived, and the theoretical prediction agrees very well with this indirect experimental quantity.

Notes

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