DREB2022 - Direct Reactions with Exotic Beams



Contribution ID: 238

Type: Poster

Breakup dynamics of s-wave neutron-halo systems in zero binding energy limit

We present an analysis of the 11Be+208Pb and 37Mg+208Pb breakup reactions in the projectile zero binding energy limit. The objective is to verify whether finite and converged breakup observables can be obtained for an s-wave neutron-halo system when its ground-state binding energy approaches zero. Applying the CDCC formalism, it is shown that for both projectiles, finite and converged breakup cross sections are obtained despite an infinite tail of the projectile ground-state wave functions to infinity. It is argued that this is due to the square-integrability of the bin wave functions, which are involved in the CDCC formalism. This is evidenced by the lack of convergence of the elastic scattering calculations, where the radial integral of the matrix elements contains the projectile ground-state density and is independent of the bin wave functions.

Topic

Theory

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Session Classification: Poster session