

Recent advances in Multi-Channel Algebraic Scattering*

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With the rush to build new radioactive-ion-beam (RIB) facilities, notably FRIB, the descriptions of weakly-bound systems, and the scattering therefrom, are becoming increasingly important. A central aspect of this, particularly in coupled-channels approaches to scattering, is the need to include target excited states that are unbound, with particle-emission widths that are significantly different from zero. One question which arises is how the particle-emission widths affect the formation of compound states, as well as the scattering cross sections. This is explored within the framework of the Multi-Channel Algebraic Scattering (MCAS) method. We consider a range of light-mass, particle unstable targets, and compare the results with, and without, the inclusion of the target resonance widths. We find that the compound spectra and evaluated cross sections vary markedly with the resonance character of the target. A proper description of the energy dependence of the decay widths is needed, to ensure a correct specification of both the sub-threshold bound and scattering states.

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