

Inclusive deuteron-induced reactions

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Deuteron-induced reactions have long been used to probe single-particle aspects of nuclear spectra. Understanding the reaction mechanism is essential in order to disentangle direct reaction contributions (transfer and elastic breakup) from compound nucleus formation and partial or total fusion. Furthermore, as one moves away from the Fermi energy, such states acquire a larger width, and, while approaching the drip line, the Fermi energy eventually slides into the continuum. Aside from providing valuable spectroscopic information, (d,p) reactions in which the neutron is absorbed by the heavy nucleus can be used as surrogates for (n, γ) reactions, of great practical and astrophysical interest. We thus present a formalism able to deal with the variety of processes (direct transfer to sharp states, transfer to wide states, population of resonances in the continuum, capture, elastic breakup, etc.) encountered in the context of a (d,p) process.

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