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Deuteron-alpha scattering: separable vs nonseparable Faddeev approach LINDA HLOPHE, Michigan State University, LEI JIN, CHARLOTTE ELSTER, Ohio University, ANDREAS NOGGA, Forschungszentrum Julich, FILOMENA NUNES, Michigan State University, DARIUS JURCIUKONIS, ARNAS DELTUVA, Institute of Theoretical Physics and Astronomy, Vilnius University — Deuteron-induced nuclear reactions are an essential tool for probing nuclear structure as well as extracting quantities of astrophysical interest. Those (d,p) reactions may be viewed as three-body reactions and described with Faddeev techniques. Specifically, the Alt-Grassberger-Sandhas (AGS) formulation of the Faddeev equations is adopted in this work. A great simplification of the Faddeev-AGS equations occurs if the subsystem interactions are of separable form. However, it needs to be demonstrated that observables calculated based on separable interactions agree exactly with those based on nonseparable forces. We thus use the example of deuteron-alpha scattering to benchmark the separable expansion approach to solving the Faddeev equations without the Coulomb potential. To do so, elastic as well as breakup observables are calculated and compared to results in which the interactions in the two-body sub-systems are represented by separable interactions derived in the Ernst-Shakin-Thaler (EST) framework. We find that the calculations based on the original interactions and their separable presentations give results that are in excellent agreement.

Linda Hlophe
Michigan State Univ

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