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Calculation of proton-deuteron breakup scattering cross section in intermediate energies

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Abstract

In this paper, we reformulate three-nucleon breakup scattering in leading order approximation by considering spin-isospin degrees of freedom. At first, considering the inhomogeneous part of Faddeev equation, which is a valid approximation in high and intermediate energies, we present the Faddeev equation as a function of vector Jacobi momenta and spin and isospin quantum numbers. In this new formulation, a three-dimensional representation of deuteron wave function instead of its partial wave representation. Then, this equation is rewritten in suitable coordinate system as a function of vector magnitudes and angles between them for numerical calculation. Finally, by applying the Bonn-B potential the proton-deuteron breakup scattering cross section is calculated and the results are compared with the experimental data.

Keywords: breakup scattering, Faddeev equation, three-dimensional approach

For full article, refer to the Persian section