

The effect of three nucleon force in theoretical calculations

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Collaboration

Abstract content

The basic way to understanding the mechanism of reactions involving nucleons and nuclei is creating a model of nuclear forces which with a very good agreement describes the data from experiments. For systems of three nucleons one can do an exact calculations using one of three types of theory, which are used for comparisons with experimental data. The first theory (calculations of Witała group [1]) is based on realistic nucleon-nucleon potentials (such as charge-dependent (CD) Bonn, AV18, Nijm I and Nijm II) which could be combined with the models of three nucleon force (TM99 or Urbana IX). The second one is based on coupled-channel potential (CCP) with Δ -isobar excitation [2]. In these calculations the potential is given by the realistic CD Bonn potential, but in addition includes the excitation of single nucleon to Δ -isobar. The third calculations [3] based on the Chiral Perturbation theory (ChPT). In order to observe the scale of effect of three nucleon force in dp breakup reactions at different beam energies we compared the results of two types of calculations (CDB+TM99, AV18+UIX) of the Witała group. Such analysis of theoretical results it is very important from the experimental point of view, because it provides information about the phase space of such effect.

[1] H. Witała, et al., Phys. Rev. Lett. 81 (1998) 1183 [2] A. Deltuva, et al., Phys. Rev. C 68 (2003) 024005 [3] E. Epelbaum, et al., Eur. Phys. J. A 19 (2004) 125; *ibid.* A 19 (2004) 405

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