Investigation of three nucleon force effects in deuteron-proton breackup reaction

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Investigation of three-nucleon system provides basis for understanding of details of interaction between nucleons, going also beyond simple pairwise forces. Quantitatively this can be done by comparing observables calculated with the use of Faddeev equations with results of precise measurements. Modern realistic NN interaction models describe well systems composed of two nucleons. They are able to correctly predict observables of deuteron-proton breakup reaction only if combined with additional component of the dynamics – the three nucleon force (3NF). The two- and three-nucleon interactions can also be modelled within the coupled-channel (CC) framework by an explicite treatment of the Δ-isobar excitation. Alternatively, contribution of NN and 3NF to the dynamics may come from Chiral Perturbation Theory. Here the many-body interactions appear naturally at growing orders (non-vanishing 3NF at next-to-next-to leading order). All approaches to describe the system of 3 nucleons should include not only different 3NF, Coulomb interactions [1] or relativistic component [2]. All effects reveal in different parts of the phase space with different magnitude what can be noticed in the observables.
Experiments devoted to study such subtle ingredients of nuclear dynamics in 3-nucleon systems were carried out at KVI Groningen [3, 6] and FZ-Juelich [4, 5] with the use of the $^1H(d,pp)n$ breakup reaction at intermediate energy deuteron beams. Present work is continuation of those experiments and focuses on measurement done with unpolarised deuteron beam at 80 MeV/nucleon energy impinging on liquid hydrogen target. Aim of the work was to determine the breakup differential cross-section. Elastic scattering process was also measured for the purpose of the breakup cross-section normalisation.
Preliminary results of the data analysis, including geometry cross-check, energy calibration, particles identification and sample distributions of the breakup differential cross-sections, will be presented.

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