
EXPERIMENTAL STUDY OF THREE-NUCLEON SYSTEM DYNAMICS IN PROTON-DEUTERON BREAKUP REACTION

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Reaction of proton-deuteron breakup can serve as a tool for testing modern approach to describe nuclear interactions between three nucleons [1][2][3]. At intermediate energies, below the threshold for pion production, comparison of the data with exact theoretical calculations is possible and subtle effects of the dynamics beyond the pairwise nucleon-nucleon interaction, so called three-nucleon force (3NF), are significant. Beside 3NF, Coulomb interaction or relativistic effects are also important for exact describing of differential cross section of breakup reaction.

Series of experiments was carried out at KVI Groningen and FZ-Julich to determine cross section and polarization observables of the $^1\text{H}(d,pp)n$ and $^2\text{H}(p,pp)n$ breakup reaction at several energies. The experimental data confirmed importance of 3NF and huge influence of Coulomb interaction between protons at certain kinematic configurations. There are also regions and observables where pd elastic scattering and/or breakup reaction data are not well described. Very limited database for breakup reaction - rich in data points, but sparse in studied energies – hinders the conclusions. As a continuation of these studies, the first measurements are carried out at the new Cyclotron Center Bronowice (Kraków), at three proton energies (108, 135, 160 MeV/nucleon).

The combination of large phase space coverage of the BINA detector system and wide range of accessible beam energies, provides an unique possibility to study various aspects of the dynamics in three nucleon system, at regions of their maximum visibility. Preliminary analysis and the prospects for the future measurements will be presented.

REFERENCES

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