

Studies of Proton Induced Deuteron Breakup with BINA@CCB

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Research in the domain of few-nucleon systems is the basis for understanding of nuclear interactions and properties of nuclei. The theoretical calculations taking into account important components of the three nucleon system dynamics. For this purpose a series of measurements of deuteron breakup in collision with proton was conducted in KVI Groningen and FZ-Jülich. These studies confirmed the important role of the Three-Nucleon Force (3NF) and huge influence of Coulomb interaction between protons [1-3]. However, some discrepancies persist, indicating that our present understanding of the problem is not yet perfect [4-6].

Continuation of the studies in a wide range of energies, at the regions of the maximum visibility of the certain effects are necessary. For this purpose, the BINA (Big Instrument for Nuclear-polarization Analysis) detection system has been installed at CCB (Cyclotron Center Bronowice).

BINA covers nearly 4π solid angle, making it possible to study almost full phase-space of the $^2\text{H}(p,pp)n$ breakup reactions and proton-deuteron elastic scattering [4,7]. Studies of the differential cross section are planned at three beam energies: 108, 135 and 160 MeV. The first goal is to determine the differential cross section of the breakup reaction on a dense grid of forward proton emission angles ($\theta < 40^\circ$). Next, the specific kinematic configurations called "Star" will be analysed with the aim to study the Space Star Anomaly in the range of intermediate energies.

The first measurement have been conducted at beam energy of 108 MeV. The data consistency checks and preliminary results will be shown, together with plans of further studies.

Bibliography

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