

Performance evaluation of MWDCs for deuteron-proton scattering measurement

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Understanding nuclear forces is necessary to describe nuclear phenomena, and recently it has become clear that three-nucleon forces, which act between three nucleons, are also essential. We are planning to measure the spin correlation coefficient, one of the spin observables, from deuteron-proton elastic scattering for gathering accurate information on three-nucleon forces.

We use a polarized proton target for the deuteron-proton elastic scattering experiments and the magnetic field generated by an electromagnet for polarization of the target. Since the magnetic field bends the trajectory of scattered particles, we have constructed multi-wire drift chambers, or MWDCs, to track the particle trajectories. The MWDC is a detector with an array of wires that detects passing charged particles by ionization of the gas inside, allowing tracking of particle trajectories.

In this research the detection efficiency and the position resolution of two MWDCs were evaluated using proton-polarized proton elastic scattering at 200 MeV/nucleon, performed with HIMAC in QST. As a result, both MWDCs achieved 99% detection efficiency, and the position resolution of those was $201 \pm 2 \mu\text{m}$ and $227 \pm 3 \mu\text{m}$, respectively. Based on this result, the evaluation of resolution under the stronger influence of the magnetic field will be discussed in the future.

Presentation type

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