

Abstract

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Physics

POLARIZED ${}^3\text{He}(e, e'n)$ ASYMMETRIES IN THREE ORTHOGONAL MEASUREMENTS

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Asymmetry measurements were conducted in Jefferson Lab's experimental Hall A through electron scattering from a polarized ${}^3\text{He}$ target in the quasi-elastic ${}^3\text{He}(e, e'n)$ reaction. Measurements were made with the target polarized in the longitudinal direction with respect to the incoming electrons (A_L), in a transverse direction that was orthogonal to the beam-line and parallel to the q-vector (A_T), and in a vertical direction that was orthogonal to both the beam-line and the q-vector (A_y^0). The experiment measured A_y^0 at four-momentum transfer squared (Q^2) of $0.127 (\text{GeV}/c)^2$, $0.456 (\text{GeV}/c)^2$ and $0.953 (\text{GeV}/c)^2$. The A_T and A_L asymmetries were both measured at Q^2 of $0.505 (\text{GeV}/c)^2$ and $0.953 (\text{GeV}/c)^2$. This is the first time that three orthogonal asymmetries have been measured simultaneously. Results from this experiment are compared with the plane wave impulse approximation (PWIA) and Faddeev calculations. These results provide important tests of models used to extract neutron form factors from polarized ${}^3\text{He}$.