Measurement of ^{3}He Diffractive Minimum with Polarization Observables

Michael Nycz on behalf of the E12-06-121 Collaboration

A comparison of the measured ^{3}He electric (G_E) and magnetic (G_M) form factors with theoretical predictions reveals a discrepancy in the locations of the first diffractive minima. Using unpolarized elastic scattering data, these form factors are extracted using either Rosenbluth separation or from fits to world cross section data. While the sources of the disagreement are not fully understood, an alternative determination of the driffactive minima is possible by measuring the double-polarization asymmetry from elastic electron scattering off of a polarized ^{3}He target at different Q^2 settings. The zero crossings of the double-polarization asymmetry versus Q^2 correspond to the diffractive minima of the electric and magnetic form factors. Performed in Hall C at Jefferson Lab, experiment E12-06-121A measured the double-polarization asymmetry by using the CEBAF longitudinally polarized electron beam as well as a polarized ^{3}He gas target. Elastically scattered electrons were detected in each of the High Momentum and Super High Momentum Spectrometers at a series of Q^2 values. This measurement will further constrain the diffractive minima's location of both electromagnetic form factors and be used further to test theoretical predictions made by various ^{3}He form factor models.