

Probing Nucleon Spin Structure with Deep Inelastic Scattering: Neutron g_2 and d_2 ¹

Murchhana Roy and Wolfgang Korsch on behalf of the E06-121 and E06-110 Collaborations

University of Kentucky

The experiment E12-06-121 at Jefferson Lab aims to do a precision measurement of the neutron spin structure function g_2 using the deep inelastic scattering of electrons over the kinematic range $0.20 < x_{Bj} < 0.95$ and $2.5 < Q^2 < 6.0$ (GeV/c)². The large kinematic coverage will allow for the precision determination of d_2 , the third moment of the linear combination of the spin structure functions g_1 and g_2 . As one of the cleanest higher twist observables, g_2 contains information on quark-gluon correlations and d_2 is connected to the “color polarizability” of the nucleon. The experiment was performed and successfully completed in Hall C using a longitudinally polarized 10.4 GeV electron beam and polarized helium-3 target. The combination of Super High Momentum Spectrometer (SHMS) and High Momentum Spectrometer (HMS) allowed us to run the experiment for three truly constant Q^2 values over a wide range of x_{Bj} for the first time. Physics will be explored to benchmark predictions from Lattice QCD. An overview of the experiment and the present status of the experimental data analysis will be presented.

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