Jefferson Lab Experiment E01-012: Measurement of neutron (^{3}He) spin structure functions in the resonance region.

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January 10, 2003

Abstract

Spin structure functions provide basic information about the spin of the quark distributions inside the nucleon. Polarized ^{3}He target at Jefferson lab hall-A combined with Jefferson Lab high-polarization continuous electron beam have provided the opportunity to make high precision neutron spin structure measurements in the high x_{bj} region. Jefferson Lab Experiment E01-012 uses this target to provide a precision extraction of the neutron spin structure function g_1^n and the virtual photon asymmetry A_1^n in the resonance region over a moderate Q^2 range (up to $Q^2 = 4(\mathrm{GeV/c})^2$). The Bloom-Gilman duality has been experimentally demonstrated for the spin independent structure functions of the proton down to small values of Q^2. Data from E01-012 combined with Deep-Inelastic-Scattering data provides a precision test of quark-hadron duality predictions for neutron spin structure functions. The demonstration of duality for spin structure functions will enable the use of resonance data as a powerful tool to study the nucleon spin structure in the very high x region.