Spin Structure of the Deuteron - New Results from CLAS

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Abstract

Double spin asymmetries for the proton and the deuteron have been measured in the EG1b experiment using the CLAS detector at Jefferson Lab. Longitudinally polarized electrons at energies 1.6, 2.5, 4.2 and 5.7 GeV were scattered from longitudinally polarized NH_3 and ND_3 targets. The double spin asymmetry $A_{\parallel}$ has been extracted from these data as a function of Q^2 and W with unprecedented precision. The virtual photon asymmetry A_1 and the spin structure function g_1 can be calculated from these measurements by using parameterizations to the world data for the virtual photon asymmetry A_2 and the unpolarized structure functions F_1 and R. The large kinematic coverage of the experiment (0.05 GeV^2 $< Q^2 <$ 5.0 GeV^2 and 1.08 GeV $< W <$ 3.0 GeV) helps us to better understand the spin structure of the nucleon, especially in the transition region between hadronic and quark-gluon degrees of freedom. The results from EG1b combined with other experiments provide a good description of the virtual photon asymmetries making their parameterizations possible in a large kinematic range. In this talk, the results on A_1, g_1 and the first moment Γ_1^1 of the deuteron will be presented. The parametrization efforts on the asymmetries and the spin structure functions will be discussed. The neutron spin structure function, extracted from the combined proton and deuteron data, will be shown.