

# Probing Nucleon Spin Structure with Deep Inelastic Scattering: Neutron $g_2$ and $d_2$ <sup>1</sup>

Change title somewhat,  
it's the same as last time

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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)<sup>2</sup>. 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.

... a (dense) polarized  
helium-3 gas target

The extraction of  
 $d_2n(Q^2)$  will serve as a  
benchmark .....

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