

Inclusive spin structure function measurements with 12 GeV Jefferson Lab

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Abstract

The 12 GeV upgrade of Jefferson lab electron beam, combined with high luminosity targets and large acceptance spectrometers, enables the study of nucleon inclusive spin structure in the high x_{Bj} valence quark region with unprecedented precision. One of the first 12 GeV experiments will use a polarized ^3He target and the Bigbite spectrometer in experimental Hall A to measure the virtual photon asymmetry for the neutron, A_1^n , up to $x_{Bj} \approx 0.71$. Subsequent experiments with HMS and SHMS spectrometers in Hall C and with Super-Bigbite spectrometer in Hall A will extend the x_{Bj} reach to almost 0.8. The Hall B CLAS spectrometer will be used to measure the virtual photon asymmetry of the proton, also up to $x_{Bj} \approx 0.8$. These data will be used to test firm predictions from relativistic constituent quark models and perturbative QCD based models. Since the predictions from pQCD are quite sensitive to the manner in which quark orbital angular momentum is handled, these experiments will provide considerable insight into the evolving picture of the role that quark OAM plays in the nucleon wavefunction. Furthermore, A_1^n and A_1^p data together will allow a precision flavor decomposition of the quark polarizations in the valence quark region.