The SANE Experiment and QCD Color Forces

Whitney R. Armstrong

July 1, 2016

Abstract

QCD Confinement precludes experiments from resolving colored quarks in order to understand the strong forces between them, however, polarized DIS experiments uniquely provide a clean measurement of observables used in determining an *average color Lorentz force* on the struck quark. Within the operator product expansion framework, the twist-3 matrix element, $d_2^p = \int x^2(2g_1+3g_2)dx$, is proportional to the average color Lorentz force on the quark (moving in the infinite momentum frame) the instant after being struck by a virtual photon. The Spin Asymmetries of the Nucleon Experiment (SANE) measured the proton's polarized spin structure functions g_1 and g_2 in a range of Bjorken x, $0.3 < x < 0.8$, where the d_2^p integral is most sensitive. The data was taken from Q^2 equal to $2.5GeV^2$ up to $6.5GeV^2$ allowing for the Q^2 dependence of d_2^p to be studied. In addition to presenting the latest results on spin structure functions, we will discuss the physics impact and extraction of d_2^p.