The Proton Spin-Dependent Structure Function, g_2, at Low Q^2

Ryan Zielinski
Department of Physics, University of New Hampshire, Durham, NH 03824-3568

On behalf of the Jefferson Lab E08-027 collaboration
June 26, 2013

Abstract

The Jefferson Laboratory accelerator has been used to great effect in the study of the polarized structure of nucleons. Measurements of the spin-dependent structure functions have proven to be powerful tools in testing the validity of a number of effective theories of Quantum Chromodynamics. While the neutron spin structure functions, $g_{1,2}^n$, and longitudinal proton spin structure function, g_1^p, have been measured over a wide kinematic range, the second proton spin structure function, g_2^p, has not. In this talk I will present the E08-027 (g2p) experiment, which was an inclusive measurement of the proton's spin structure function, g_2^p, in the resonance region at Jefferson Lab's Hall A. This is the first measurement of g_2^p covering $0.02\ \mathrm{GeV}^2 < Q^2 < 0.2\ \mathrm{GeV}^2$. The experiment will allow us to test the Burkhardt-Cottingham Sum Rule at low Q^2 as well as extract the longitudinal-transverse generalized spin polarizability and compare it to predictions made by Chiral Perturbation Theory. In addition, the data will reduce the systematic uncertainty of calculations of the hyperfine splitting of hydrogen and extractions of the proton charge radius. I will also present an update on the status of the analysis.