

The Generalized GDH sum rule: Measuring the Spin Structure of ^3He and the Neutron using Nearly Real Photons

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Abstract

The Gerasimov-Drell-Hearn (GDH) sum rule was originally derived for real photon absorption (corresponding to $Q^2=0$) and has been generalized to finite Q^2 . The goals of Jefferson Lab experiment E97-110 are to perform a precise measurement of the generalized GDH integral and the moments of the neutron spin structure functions in order to study their Q^2 dependence between 0.02 and 0.3 $(\text{GeV}/c)^2$. This Q^2 range will allow us to extrapolate to the real photon point for ^3He and the neutron. Furthermore the low Q^2 predictions of Chiral Perturbation Theory and its limits of applicability can be tested. The measurements will provide new constraints on understanding the ^3He and neutron spin structure and contribute to the understanding of the nucleon resonances. The acquisition of data was completed in August of 2003 using the Jefferson Lab high polarization continuous-wave electron beam, the Hall A polarized ^3He target, and the new Hall A septum magnet, which allows measurements at forward angles of 6 and 9 degrees. The status and prospects of the data analysis will be discussed.