

Measurement of the Neutron and ^3He Extended GDH Integral at Low Q^2

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Abstract

The study of the nucleon spin structure has been an active field for over twenty years. The ultimate goal is to understand the structure and interactions of protons and neutrons in terms of quarks and gluons. The Gerasimov-Drell-Hearn (GDH) sum rule is an important tool available to study nucleon spin structure. Originally derived for real photon absorption, the sum rule has been extended to non-zero Q^2 . The extension of the sum rule provides a unique relation, valid at any Q^2 , that can be used to experimentally or theoretically study the nucleon spin structure. An overview of measurements on both the GDH sum rule and its extension will be given. Emphasis will be placed on Jefferson Lab experiment E97-110, which used a polarized ^3He target to perform a precise measurement of the Q^2 dependence of the extended sum rule for the neutron and ^3He between 0.02 and 0.3 GeV^2 . This data allows us to test predictions from Chiral Perturbation Theory and check the GDH sum rule by extrapolating to the real photon point. The data have been taken in Hall A using a high resolution spectrometer with the addition of a septum magnet, which allowed us to access the low Q^2 region. The status of the data analysis will be discussed, and preliminary results will be shown.