

Jefferson Lab's GEn-II Experiment: Measurement of the Neutron Electric Form Factor at High Q^2

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Nucleon electromagnetic form factors offer insight into the internal structure of those nucleons. The Super Bigbite Spectrometer (SBS) program at Thomas Jefferson National Lab conducts experiments measuring nucleon form factors at high Q^2 values. Previous electric form factor measurements for the proton, G_E^p , were measured for $Q^2 = 8.5 \text{ GeV}^2$, where as the neutron's, G_E^n , had only been measured to $Q^2 = 3.4 \text{ GeV}^2$.

By colliding a polarized electron beam with a redesigned ^3He target, experiment E12-09-016 (September 2023 - October 2024), GEn-II, reached luminosities previously unattainable in form factor experiments. With the ^3He acting as an effective polarized neutron source, GEn-II measured the double spin asymmetry of the $e - n$ cross section in order to extract the form factor ratio G_E^n/G_M^n at Q^2 values of 2.9, 6.6, and 9.7 GeV^2 . This talk will cover performance aspects of the ^3He target during GEn-II as well as the status of analysis.

This work was supported by the U.S. Department of Energy and Jefferson Lab.