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Electric Form Factor of the Neutron

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Recent polarization-based precision measurements of the nucleons' elastic electric form factors have led to surprising results. The measurement of the ratio of the proton's electromagnetic form factors, $\mu_p G_E^p/G_M^p$, was found to drop nearly linearly with Q^2 out to at least 5GeV^2, inconsistent with the older Rosenbluth-type experiments. A recent measurement of G_E^n, the neutron's electric form-factor saw G_E^n does not fall off as quickly as commonly expected up to $Q^2 \approx 1.5\text{GeV}^2$. Extending this study, a precision measurement of G_E^n up to $Q^2 = 3.5\text{GeV}^2$ was completed in Hall A at Jefferson Lab. The ratio G_E^n/G_M^n was measured through the beam-target asymmetry $A_\perp$ of electrons quasi-elastically scattered off polarized neutrons in the reaction $^3\overrightarrow{He}(\overrightarrow{e}, e'n)$. The experiment took full advantage of the electron beam, recent target developments, as well as two detectors new to Jefferson Lab. The measurement used the accelerator's 100% duty-cycle high-polarization (typically 84%) electron beam and a new, hybrid optically-pumped polarized $^3\overrightarrow{He}$ target which achieved in-beam polarizations in excess of 50%. A medium acceptance (80msr) open-geometry magnetic spectrometer (BigBite) detected the scattered electron, while a geometrically matched neutron detector observed the struck neutron. Preliminary results from this measurement will be discussed and compared to modern calculations of G_E^n.