Abstract Submitted
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Measurement of the Two-Photon Exchange contribution to the electron-neutron elastic scattering cross section ERIC FUCHEY, Univ of Connecticut - Storrs, SHEREN ALSALMI, King Saud University, Riyadh 11451, Saudi Arabia, BOGDAN WOJSTEKHOWSKI, Jefferson Lab, SBS COLLABORATION — We propose to make a high precision measurement of the two-photon exchange contribution (TPE) in elastic electron-neutron scattering at a four-momentum transfer $Q^2 = 4.5$ GeV^2. While significant efforts to study the two-photon-exchange have focused around elastic electron-proton scattering, the impact of TPE on neutron form factors was never examined experimentally. This experiment will provide the very first assessment of the two-photon exchange in electron-neutron scattering, which will be important for understanding the nucleon form factor physics.
The proposed experiment will be performed in Hall A using the BigBite (BB) spectrometer to detect the scattered electrons and Super-BigBite (SBS) to detect the protons and neutrons. This experimental setup is identical to the one of E12-09-019 G_M^n, expected to run in 2021, with which this experiment should run.
The ratio method, already used to measure the neutron magnetic form factor at JLab and Mainz, will be extended to extract the electric form factor of the neutron G_E^n by scattering unpolarized electrons from deuterium quasi-elastically at two beam energies 4.4 and 6.6 GeV. This approach greatly reduces systematic errors compared to single electron arm configuration.

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