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Neutron Detection Efficiency Optimization Studies of the Neutron Polarimeter for the C-GEN Electric Form Factor at Jefferson National Laboratory[1] ASHLEY ADZIMA, WILLIAM TIREMAN[2], Northern Michigan University, C-GEN COLLABORATION[3] — The electric form factor is an important quantity to further the understanding of the atom and its constituent parts. The C-GEN collaboration at Jefferson National Laboratory plans to measure this fundamental quantity using recoil polarimetry. An efficient neutron polarimeter is essential for the collection of precise data and involves maximizing the ratio of elastic to inelastic events identified. The determination of the elastic to inelastic ratio of neutron events was simulated using GEANT-4 on 5 cm, 10 cm, and 15 cm thick detectors. Specific requirements were set in place by C-GEN to determine what marks an elastic event. Plots of neutron scattering events versus detector thickness were analyzed, and the ratio of elastic to inelastic events was extracted for each section per vertical slice, as well as an average ratio. The average ratio of elastic to inelastic events were 0.2206, 0.1706, and 0.1507 for the 5 cm, 10 cm, and 15 cm detectors, respectfully. The impact of these ratios on the statistics and costs of altering the polarimeter's original 10 cm detector design will be further discussed.

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