Analysis of Quasi-Elastic e-n and e-p Scattering from Deuterium[1]

Alexander Balsamo, Keegan Sherman, Gerard P. Gilfoyle
University Of Richmond

One of Jefferson Lab's goals is to unravel the quark-gluon structure of nuclei. We will use the ratio, R, of electron-neutron to electron-proton scattering on deuterium to probe the magnetic form factor of the neutron. We have developed an end-to-end analysis from simulation to extraction of R in quasi-elastic kinematics for an approved experiment with the CLAS12 detector. We focus on neutrons detected in the CLAS12 calorimeters and protons measured with the CLAS12 forward detector. Events were generated with the Quasi-Elastic Event Generator (QUEEG) and passed through the Monte Carlo code *gemc* to simulate the CLAS12 response. These simulated events were reconstructed using the latest CLAS12 Common Tools. We first match the solid angle for *e-n* and *e-p* events. The electron information is used to predict the path of both a neutron and proton through CLAS12. If both particles interact in CLAS12 the *e-n* and *e-p* events have the same solid angle. We select QE events by searching for nuclei near the predicted position. An angular cut between the predicted 3-momentum of the nucleon and the measured value, θ_{pq}, separates QE and inelastic events. We will show the simulated R as a function of the four-momentum transfer Q^2.

[1] Work supported by the University of Richmond and the US Department of Energy.