Measuring the Neutron Detection Efficiency in CLAS12[1] KEE-
GAN SHERMAN, GERARD GILFOYLE, Univ of Richmond — One of the central
physics goals of Jefferson Lab is to understand how quarks and gluons form nuclei.
To that end, one of the approved experiments in Hall B will measure the magnetic
form factor of the neutron with the new CLAS12 detector. We will extract the ratio
of electron-neutron to electron-proton scattering events from deuterium which re-
quires a measurement of the neutron detection efficiency (NDE). To measure NDE
we will take calibration data using a proton target to produce tagged neutrons
from the p(e,e'π^+)n reaction. We are now simulating this reaction and developing
the analysis code to extract the NDE. We use PYTHIA 6.4 to generate p(e,e'π^+)n
events and simulate the response of CLAS12 with the Geant4-based Monte Carlo
code *gemc*. To tag the neutron, we use the measured, scattered electron, and π^+ in-
formation to predict the neutron's path. If the path intersects the fiducial volume of
the CLAS12 electromagnetic calorimeters, then we search for a hit near that point.
The NDE is the ratio of the number of neutrons found in the calorimeters to the
number of neutrons predicted to hit the calorimeters. The analysis was done using
the CLAS12 Common Tools. We observe a rapid rise in the NDE at low neutron
momentum and a plateau above 60%.

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