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Simulations of Proton Detector Performance in the BL3 Experiment[1] WOUTER DECONINCK, T.T. TRANG BUI, Univ of Manitoba, JASON FRY, Eastern Kentucky University, ROBERT PATTIE, East Tennessee State University, BL3 COLLABORATION — The BL3 experiment at the NIST Center for Neutron Research aims to improve the systematic precision of neutron lifetime measurements in order to resolve the 8.7 s discrepancy between beam-type and bottle-type measurements of the neutron lifetime. In the experiment, the recoil protons from neutron decay in a quasi-Penning trap with a solenoidal magnetic field and axial electrodes propagate to a segmented silicon detector. The BL3 experiment will use higher neutron flux in a wider beam which requires a larger proton detector than the BL2 experiment. The BL3 collaboration is using a combination of simulation tools to assess the anticipated performance. A geant4-based simulation has been developed which uses an external magnetic and electric field map and a dedicated low-energy physics list for semiconductor interactions. A Kassiopeia-based simulation uses a multipole expansion for the electric and magnetic fields calculated from their current distributions, which allows more easily for changes in field geometries. An SRIM-based simulation is used to determine energy deposition, dead layer effects, and charge sharing in the proton detector. This talk will compare the results obtained with these three different approaches in achieving the performance parameters for the BL3 experiment.

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