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Simulations of Protons in the BL3 Experiment[1] TRANG BUI, Univ of Manitoba, BEAM LIFETIME 3 COLLABORATION COLLABORATION — The Beam Lifetime 3 (BL3) experiment at the National Institute of Standards and Technology aims to improve the precision of beam-type measurements of the neutron lifetime to resolve the 8.7 seconds difference (4 standard deviations) between beam-type and bottle-type measurements of the neutron lifetime. In the experiment, a neutron beam passes through a quasi-Penning trap, and decay protons are trapped electrostatically between electrodes at +800V and magnetically by an axial magnetic field that does not vary by more than 0.2% of its average. When enough decay protons have accumulated, one side of the trap is opened and decay protons follow a bend in the magnetic field to a silicon detector. In this project, we studied the motion of protons moving around in the BL3 proton trap by running simulations in 'Kassiopeia' developed for the KATRIN experiment in Karlsruhe, Germany. We used SRIM (Stopping and Range of Ions in Matter) to study energy deposition, dead layer effects, and charge sharing in the proton detector. Combining results from these simulations from nanometer to meter scales will ascertain the performance parameters for the BL3 experiment.

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