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Monte Carlo simulation of secondary electron emission in the Nab experiment[1] CHATHAM DAVID MCLAUGHLIN, University of Virginia, NAB COLLABORATION — The Nab experiment aims at a precise measurement of a, the electron neutrino correlation parameter and b the Fierz interference term in neutron β decay. The measurement is to be performed at the Spallation Neutron Source (SNS) in Oak Ridge, TN using a asymmetric magneto-electrostatic spectrometer. One of the main challenges is the detection of the low energy proton resulting from the $n \to e^- p \bar{\nu}_e$ decay. This can be accomplished in two ways: by placing the detector itself at a negative potential to accelerate the protons. Alternatively we detect the secondary emission electrons (SEEs), from multiple passages of the proton through a thin ($\sim$100nm) foil in front of the detector. The foil is at a high negative potential. The Poisson distributed SEEs are detected in segmented Si detectors with virtually no adverse effects due to the detector's thin dead surface layer. Initial Monte Carlo simulation of the problem using GEANT4 indicates a mean of 8.7 secondary electrons are generated using a Al foil at -30kV. While most are immediately reabsorbed, a median of 2 electrons is detected per proton. Other suitable foil materials can increase the number of detected SEEs. Representative results of a full simulation in both detection modes will be presented.

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