

Abstract Submitted  
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**Realistic Monte Carlo Simulation of PEN Apparatus<sup>1</sup>** CHARLES GLASER, Univ of Virginia, PEN COLLABORATION — The PEN collaboration undertook to measure the  $\pi^+ \rightarrow e^+ \nu_e(\gamma)$  branching ratio with a relative uncertainty of  $5 \times 10^{-4}$  or less at the Paul Scherrer Institute. This observable is highly susceptible to small non  $V - A$  contributions, i.e, non-Standard Model physics. The detector system included a beam counter, mini TPC for beam tracking, an active degrader and stopping target, MWPCs and a plastic scintillator hodoscope for particle tracking and identification, and a spherical CsI EM calorimeter. GEANT 4 Monte Carlo simulation is integral to the analysis as it is used to generate fully realistic events for all pion and muon decay channels. The simulated events are constructed so as to match the pion beam profiles, divergence, and momentum distribution. Ensuring the placement of individual detector components at the sub-millimeter level and proper construction of active target waveforms and associated noise, enables us to more fully understand temporal and geometrical acceptances as well as energy, time, and positional resolutions and calibrations in the detector system. This ultimately leads to reliable discrimination of background events, thereby improving cut based or multivariate branching ratio extraction.

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