

Abstract Submitted
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Monte Carlo Simulations for Likelihood Analysis of the PEN experiment¹ CHARLES GLASER, Univ of Virginia, PEN COLLABORATION — The PEN collaboration performed a precision measurement of the $\pi^+ \rightarrow e^+ \nu_e(\gamma)$ branching ratio with the goal of obtaining a relative uncertainty of 5×10^{-4} or better at the Paul Scherrer Institute. A precision measurement of the branching ratio $\Gamma(\pi \rightarrow e \bar{\nu}(\gamma))/\Gamma(\pi \rightarrow \mu \bar{\nu}(\gamma))$ can be used to give mass bounds on “new”, or non V–A, particles and interactions. This ratio also proves to be one of the most sensitive tests for lepton universality. The PEN detector consists of beam counters, an active target, a mini-time projection chamber, multi-wire proportional chamber, a plastic scintillating hodoscope, and a CsI electromagnetic calorimeter. The Geant4 Monte Carlo simulation is used to construct ultra-realistic events by digitizing energies and times, creating synthetic target waveforms, and fully accounting for photo-electron statistics. We focus on the detailed detector response to specific decay and background processes in order to sharpen the discrimination between them in the data analysis.

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