

Abstract Submitted  
for the DNP19 Meeting of  
The American Physical Society

**The Systematics of PEN: A Precision Measurement of the Pion Electronic Decay Branching Ratio**<sup>1</sup> CHARLES GLASER, University of Virginia, PEN COLLABORATION — The goal of the PEN collaboration, an international collaboration led by the University of Virginia, is to obtain the pion electronic decay branching ratio  $\Gamma(\pi \rightarrow e\nu(\gamma))/\Gamma(\pi \rightarrow \mu\nu(\gamma))$  with a relative uncertainty of  $5 \times 10^{-4}$  or better. This measurement provides the best test for electron muon universality. The PEN experiment was performed using stopped pions at the Paul Scherrer Institute in Zurich. The detector was comprised of active plastic beam counters and stopping target, a mini-time projection chamber, two cylindrical multi-wire proportional chambers, twenty plastic stave hodoscopes, and a 240 module pure CsI calorimeter with a solid angle coverage of  $3\pi$  steradians. An ultra realistic Monte Carlo simulation was constructed by the PEN collaboration to obtain the acceptances and study the low energy tail in the CsI calorimeter. Branching ratio extraction requires precise descriptions of hard radiative decays, decays in flight, and corrections from the chamber efficiencies, timings, and the the CsI low energy tail, the most difficult systematic in the analysis due to muon decay background, energy leakage and photonuclear effects. A detailed analysis of the uncertainty budget will be presented.

<sup>1</sup>Work supported by grants from the US National Science Foundation, most recently PHY-1614839

Charles Glaser  
University of Virginia

Date submitted: 01 Jul 2019

Electronic form version 1.4