Abstract Submitted
for the APR21 Meeting of
The American Physical Society

GHP Dissertation Award (2021): A High Precision Measurement of the Proton Charge Radius at JLab1 WEIZHI XIONG, Syracuse University — In 2010, a new method using muonic hydrogen spectroscopy led to a pro- ton charge radius (rp) result that was nearly ten times more precise but significantly smaller than results obtained using the two traditional meth- ods, namely e p scattering and ordinary Hydrogen spectroscopy. This discrepancy triggered the so-called proton charge radius puzzle. To inves- tigate this discrepancy, the PRad collaboration performed a new experiment in 2016 in Hall B at the Thomas Jefferson National Accelerator Facility. With both 1.1 and 2.2 GeV electron beams, the experiment measured the e p elastic scattering cross sections in an unprecedentedly low values of momentum transfer squared region (Q2 = 2.1 104 0.06 (GeV/c)2), with a sub-percent precision. The PRad experiment utilized a magnetic- spectrometer-free setup, which was based on a large acceptance and high resolution calorimeter (HyCal), a plane of two large-area Gas Electron Mul- tiplier (GEM) detectors, and a windowless H2 gas-flow target. In this talk, I will discuss details of the data analysis and present the results of this experi- ment. I will also discuss briefly the PRad-II experiment, which will improve the uncertainty of rp by a factor of 4 compared to that of PRad.

Weizhi Xiong
Syracuse University

Date submitted: 02 Apr 2021 Electronic form version 1.4