

## PRad-II Experiment - A High-Precision Measurement of Proton Charge Radius at Jefferson Lab

*Sunday 3 August 2025 13:30 (25 minutes)*

Accurate proton charge radius is essential for high-precision QED calculations of atomic energy levels, and to test the Standard Model. It also has a strong impact on the Rydberg constant. Typically, one can measure the proton charge radius using ordinary hydrogen spectroscopy or elastic e-p scattering. However, in 2010, the first muonic hydrogen spectroscopy experiment, with an unprecedented precision (0.1%), yielded a radius result that was  $7\sigma$  smaller than previous measurements. This unexpected discrepancy is often referred to as the “proton charge radius puzzle”. In the past decade, significant progress has been made in both theory and experiment, yet many problems remain. For example, the  $G_E^p$  form factor results are inconsistent between PRad and Mainz experiments. In this talk, I will introduce the PRad measurement, and also its upgraded experiment PRad-II which will run at early 2026, aiming a factor of 3 smaller total uncertainty compared to PRad. This new experiment will help address discrepancies of different scattering measurements.

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