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The Result on the Proton Charge Radius from the PRad Experiment[1]

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Motivated by the desire to resolve the proton charge radius puzzle that started in 2010, the PRad experiment (E12-11-106) was performed in 2016 in Hall B at Jefferson Lab, with 1.1 GeV and 2.2 GeV unpolarized electron beams to measure the e-p elastic scattering cross sections at very low values of four-momentum transfer squared (Q^2), covering a range of 2×10^{-4}–$6 \times 10^{-2}(\mathrm{GeV/c})^2$, with a sub-percent precision. The proton electric form factor is then extracted from the measured cross section in order to extract the proton charge radius. The experiment utilized a calorimetric method with a high-resolution calorimeter (HyCal) that is magnet free, and two large- area, high-spatial resolution Gas Electron Multiplier (GEM) detectors. The experiment also used a windowless target flowing cryogenically cooled H_2 gas to remove typical backgrounds from target cell windows. The systematic uncertainties of the absolute cross section measurement from e-p elastic scattering are also controlled by the well-known Möller scattering process, which was measured simultaneously within similar kinematics and detector acceptances in this experiment. In this talk, I will discuss the experiment, the data analysis, and present the result on the proton charge radius from PRad.

For the PRad Collaboration

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