The Data Quality and Analysis Status of the Proton Charge Radius (PRad) Experiment at JLab [1]

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In order to investigate the proton radius puzzle, the PRad experiment (E12-11-106[2]) was performed in 2016 in Hall B at Jefferson Lab, with 1.1 and 2.2 GeV unpolarized electron beam on a windowless H_2 gas flow target. The experiment aims to extract the electric form factor of proton in an unprecedented low four-momentum transfer squared region, $Q^2 = 2 \times 10^{-4} - 0.06$ $(GeV/c)^2$, with a sub-percent precision. The PRad experiment utilizes a non-magnetic calorimetric method with a high efficiency and high resolution calorimeter (HyCal), and two large area, high spatial resolution Gas Electron Multiplier (GEM) detectors. The systematic uncertainties are well controlled by two main advantages of this experiment: (1) The absolute $e-p$ elastic scattering cross section will be normalized to the well-known Møller scattering process, which is measured simultaneously within similar kinematics and experimental acceptances; (2) The gas flow target has no cell windows at both up- and downstream, which was one of the primary background sources in the previous $e-p$ elastic scattering experiments. Thus the PRad experiment has systematic uncertainties totally different from the previous magnetic spectrometric $e-p$ elastic scattering experiments. In this talk, we will discuss the data quality and analysis status, and present the first preliminary results from the current analysis process.

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