

The Qweak Experiment: First Determination of the Weak Charge of the Proton

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Collaboration

Qweak

Abstract content

The primary focus of the Qweak experiment at Jefferson Lab is to perform a precision measurement of the proton's neutral weak charge. The Standard Model gives a firm prediction for the weak charge; any deviation from that can be interpreted as evidence for new physics beyond the Standard Model. The experiment measures the parity-violating asymmetry in the elastic scattering of 1.1 GeV longitudinally polarized electrons on the proton at low momentum transfer ($Q^2 \approx 0.025(\text{GeV}/c)^2$). A description of the technical challenges and achievements of the experiment and the procedure for obtaining the weak charge from the asymmetry will be provided. Results and implications from the recently published first determination of the proton's weak charge, based on about 1/25 of the overall dataset, will be presented. The status of the analysis effort leading to the final precision result based on the full dataset will also be discussed.

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