

Early Results from the Qweak Experiment

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A subset of results from the recently completed Jefferson Lab Qweak experiment will be reported. This experiment, sensitive to physics beyond the Standard Model, exploits the small parity violating asymmetry in elastic $\vec{e}p$ scattering to make the first direct measurement of the proton's weak charge Q_W^p . The experiment employed a 180 μ A longitudinally polarized 1.16 GeV/c electron beam on a 35 cm long liquid hydrogen target. Scattered electrons in the angular range $6^\circ < \theta < 12^\circ$ corresponding to $Q^2 \approx 0.026$ (GeV/c)² were detected in one of eight Cerenkov detectors arrayed symmetrically about the beam axis. The goals of the experiment were to provide a measure of Q_W^p to 4.1%, which implies a measure of $\sin^2(\theta_W)$ to 0.3%, and to provide a tight constraint on a combination of the vector weak quark charges C_{1u} and C_{1d} . Aspects of the experimental method will be described, with a focus on the challenges presented and met by the world's highest power LH₂ target. The new constraints on C_{1u} and C_{1d} provided by the subset of the experiment's data analyzed to date will also be shown.