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Measuring the Proton's Weak Charge DAVID MACK, TJNAF, JEFFERSON LAB QWEAK COLLABORATION — Precision measurements of Standard Model-suppressed, weak-scale observables provide a window on potential new physics at the TeV scale. The proton neutral weak charge, Q^p_{Weak}, is just such a suppressed quantity being proportional to $1 - 4\sin^2\theta_W \approx 0.05$. In particular, Q^p_{Weak} can be shifted from its Standard Model value by any new physics which modifies electron-quark interactions such as leptoquarks, substructure, Z's, or R-parity violating SUSY. Our experiment, currently under construction, will measure the proton's neutral weak charge with a projected total error of 4%. The interference between γ and Z exchange in elastic $e+p$ scattering produces a parity-violating asymmetry which at low momentum transfers is dominated by Q^p_{Weak}. The measurement is highly interpretable and complementary to other measurements of the weak charge of the electron and atomic nuclei. Achieving the necessary statistical error on the -300 ppb parity-violating asymmetry will require JLab's high intensity and high polarization electron beam as well as the world's highest power liquid Hydrogen target (2.5 KWatts). Elastically scattered electrons will be focused by a resistive, toroidal spectrometer onto one of eight 2 meter long bars of radiation-hard fused silica. Cerenkov light will be converted to current by PMTs and digitized by 18-bit, fast sampling ADC's. The beam polarization will be reversed at nearly 300 Hz. After overviewing the physics and the experiment, the status of the construction effort will be summarized.

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