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## Final results from the QWeak experiment: The Weak charge of the proton and new mass scale limits on possible physics beyond the Standard Model. (I)

*Monday 11 June 2018 16:15 (30 minutes)*

The QWeak collaboration completed a two year long, high precision measurement of the parity violating asymmetry in the elastic scattering of 1.1 GeV, longitudinally polarized electrons from protons. At low momentum transfer the measured asymmetry is directly related to the Weak charge of the proton  $Q_W^p = 1 - 4\sin^2\theta_W$ . The Standard Model makes a firm prediction for the size of the Weak charge, based on the “running” of the Weak mixing angle  $\sin^2\theta_W$ , away from the  $Z^0$ -pole, toward lower energies. The QWeak measurement provides a sensitive test for new physics beyond the Standard Model, with a mass scale sensitivity up to  $\Lambda/g = 7.5$  TeV. I will provide an overview of the experiment, including the measurement methodology and associated systematic effects. I will then present our final results for the proton Weak charge, the Weak mixing angle, and an extraction of the vector Weak quark couplings  $C_{1u}$  and  $C_{1d}$ , using a combination of the  $^{133}\text{Cs}$  APV and QWeak measurements. I will also discuss the QWeak mass reach for new beyond-the-Standard-Model physics and briefly discuss our sensitivity to a few models.

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