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The Q-weak Experiment: An Overview and Preliminary Analysis

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The Q-weak experiment completed data taking at Jefferson Laboratory in 2012, with the aim of making the first experimental determination of the proton's weak charge, Q_W^p, which is the neutral-weak analogue of the proton's electric charge. The experiment measured the small parity-violating asymmetry in elastic electron-proton scattering at forward angles and low momentum-transfer ($Q^2 = 0.026$ GeV^2), allowing direct extraction of Q_W^p. Once extracted, the current results directly probe potential new parity-violating semi-leptonic physics beyond the Standard Model at the TeV scale. This talk will focus on the implications of the current Q-weak experimental results, including the extraction of the proton and neutron weak charges, Q_W^p and Q_W^n, the individual quark weak-vector couplings, C_{1u} and C_{1d}, and also highlight the mass-limit reach of Standard Model extensions probed. An experimental overview will be provided, along with preliminary results from the first period of data-taking, which comprises 4% of the total data set. Projections to the final Q-weak dataset will also be discussed.

Primary author: Mr MAGEE, Joshua (College of William and Mary)

Presenter: Mr MAGEE, Joshua (College of William and Mary)

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