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Measurement of the Weak Charge of the Proton by the QWeak Collaboration

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The QWeak collaboration has un-blinded its final result from data taken at Jefferson Laboratory. We describe the longitudinally polarized electron-proton elastic scattering technique employed to isolate and extract the scattering asymmetry, which constituted our observable. The precision obtained from our combined two run periods was ±9 ppb. The results from these run periods were in excellent agreement. Some of the backgrounds and corrections applied in the measurement will be discussed. We provide the results from several methods used to extract consistent values of the proton's weak charge Qp

W from our measurement. From the proton's

weak charge is obtained a result for sin2qW at the low Q2 scale of the measurement, which is a sensitive Standard Model test of the running of sin2qW. This defines a mass reach for any parity violating semi-leptonic physics beyond the Standard Model. Implications for specific physics models will be discussed. We also present results for the strange and axial form factors obtained from a fit which included additional existing parity-violating electron scattering data. In conjunction with existing atomic parity violation results on 133Cs we also extract the vector weak quark couplings C1u and C1d. The latter are combined to obtain the neutron's weak charge.

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