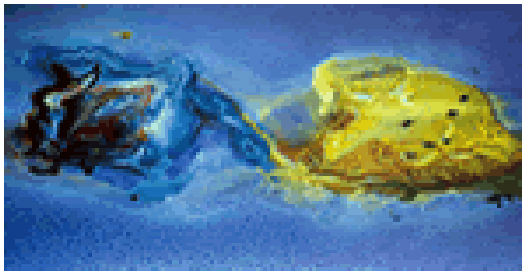

Contribution ID: **278** Type: **Invited talk**

Parity-Violating and Parity-Conserving Asymmetries in ep and eN Scattering in the Qweak Experiment

Thursday, 2 August 2018 17:20 (30 minutes)

The Standard Model provides the current best description of fundamental particles and forces, but among other limitations it fails to account for dark matter which could manifest itself as more massive particles. Precision measurements of well predicted observables in the Standard Model allow for highly targeted tests for physics beyond the Standard Model. The Qweak experiment at Jefferson Lab has made the first precise determination of the weak charge of the proton in elastic scattering of longitudinally polarized electrons from unpolarized protons. To achieve the required precision to measure the small parity-violating asymmetry of -226.5 ± 9.3 parts per billion, we directed a high current polarized electron beam on a liquid hydrogen target and integrated scattered events in eight azimuthally symmetric fused silica Cerenkov detectors. We find a value for the weak charge of proton of 0.0719 ± 0.0045, in agreement with predictions of the Standard Model. This result rules out leptoquark masses below 2.3 TeV and excludes generic new semi-leptonic parity-violation physics beyond the Standard Model below 3.5 TeV. To correct for the contributions from background processes, we conducted several additional parity-violating and parity-conserving asymmetry measurements with different kinematics (elastic and through the production of a Delta resonance), polarization (longitudinal and transverse), and targets (protons, electrons, aluminum, and carbon). I will discuss the results of the main experiment and highlight several ancillary results of interest to experiments at future facilities.

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