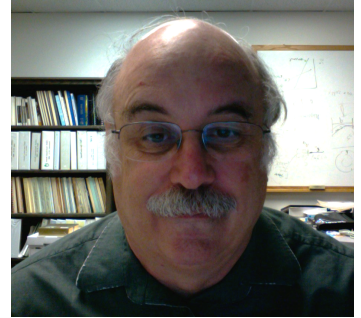


# Journal Club

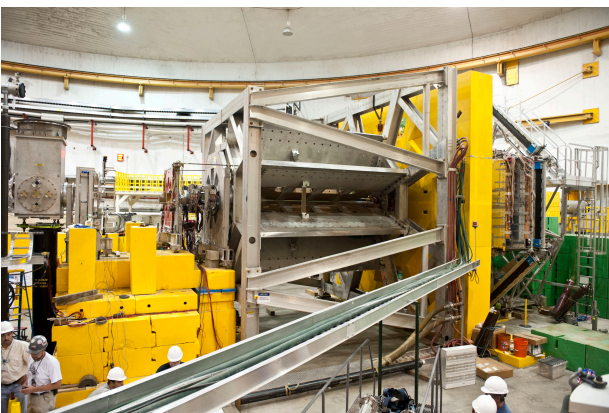
**Roger Carlini**

Jefferson Lab



## First Results from the Qweak Experiment

By utilizing a state-of-the-art polarized injector, the stability of the superconducting linac, the world's highest power liquid hydrogen target and a large symmetric "integrating" mode spectrometer/detector system, the Qweak experiment has measured the parity-violating asymmetry in polarized e-p elastic scattering at  $Q^2 = 0.025 \text{ (GeV/c)}^2$ . A discussion of the methodology, unique instrumentation and the results from the experiment's commissioning run will be presented. The small  $Q^2$  of this experiment has made possible the first precision determination of the weak charge of the proton,  $Q^{p_w}$ . From our commissioning data (~4% of the total collected) along with earlier higher  $Q^2$  parity-violating electron scattering data (to constrain hadronic corrections), a value of  $Q^{p_w} \text{ (PVES)} = 0.064 \pm 0.012$  was extracted, which is in good agreement with the Standard Model prediction of  $Q^{p_w} \text{ (SM)} = 0.0710 \pm 0.0007$ . When this result is further combined with the Cs atomic parity violation (APV) measurement, significant constraints on the weak charges of the up and down quarks can also be extracted. That PVES+APV analysis reveals the neutron's weak charge to be  $Q^{n_w} \text{ (PVES+APV)} = -0.975 \pm 0.010$ .



**Friday**

**May 9, 2014, 4:00pm**

301 Physical Sciences Bldg.

Refreshments, 3:45pm