Parity-Violating Electron Scattering on Hydrogen and Helium and Strangeness in the Nucleon

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Parity violation in elastic electron scattering is sensitive to possible strange quark contributions to the vector structure of the nucleon, and thus provides an opportunity to isolate effects of the q-qbar sea. The small parity-violating asymmetry in the cross section for the scattering of polarized electrons, which arises from an interference of the electromagnetic and weak neutral-current interactions, when combined with the known electromagnetic form factors, provides access to strange quark matrix elements. The HAPPEX collaboration in Hall A at Jefferson Lab has measured the parity-violating asymmetry in the scattering of longitudinally-polarized 3 GeV electrons from both hydrogen and 4He cryogenic targets, at a small scattering angle (6 degrees) and low four-momentum transfer (Q2 = 0.1 GeV2) . The asymmetry for hydrogen is a function of a linear combination of GsE and GsM, the strange quark contributions to the electric and magnetic form factors of the nucleon respectively, and that for 4He is a function solely of GsE. The combination of the two measurements therefore allows GsM and GsE to be separately determined. Results will be presented from the complete data set, obtained in runs in 2004 and 2005, yielding results of unprecedented precision.