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Recent Results in Parity-Violating Electron Scattering at Jefferson Lab: PREX and HAPPEX-III¹

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The parity-violating asymmetry A_{PV} in electron scattering from the ^{208}Pb nucleus is cleanly sensitive to the neutron radius R_n . A precision measurement of R_n would have important implications for the understanding of nuclear structure, and be a powerful constraint on the symmetry energy $S_\nu(n)$ of neutron-rich nuclear matter, including neutron stars. The PREX collaboration has completed a first run, measuring R_n to a precision of $\sim 2.5\%$. The measurement of A_{PV} in electron-proton scattering is sensitive to vector form-factors associated with an intrinsic strange quark content of the nucleon. While at one time such contributions were considered to be potentially large, a world-wide program of parity-violation measurements has constrained these form-factors to be smaller than a few percent of the electric and magnetic form-factors of the proton at low momentum-transfer. HAPPEX-III has recently completed a measurement to improve the precision of this constraint at $Q^2 \sim 0.6\text{GeV}^2$, a region in which previous experiments had indicated the possibility of intriguingly large strange contributions. Results from each experiment, and prospects for more precise R_n measurements, will be discussed.

¹On behalf of the HAPPEX Collaboration and PREX Collaboration.