

## Electron Scattering at JLab and Lead Radius Experiment PREX

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I will start with a brief overview of the research being conducted with the 6 GeV electron beam (soon to be upgraded to 12 GeV) at the Thomas Jefferson National Accelerator Facility (Jefferson Lab or JLab), and then focus for most of the talk on the recently published results from the Lead Radius Experiment PREX. The experiment measures the parity-violating asymmetry in the elastic scattering of longitudinally polarized electrons from a  $^{208}\text{Pb}$  nucleus at an energy of 1.06 GeV and a scattering angle of  $5^\circ$ . The  $Z$  boson that mediates the weak neutral interaction couples mainly to neutrons and provides a clean, model-independent measurement of the RMS radius  $R_n$  of the neutron distribution in the nucleus. This measurement is a fundamental test of nuclear structure theory, and our result establishes the existence of the neutron skin, i.e. that  $R_n > R_p$  at the 95% CL. A precise measurement of  $R_n$  pins down the density-dependence of the symmetry energy of neutron-rich nuclear matter, which has impacts on neutron star structure, heavy ion collisions, and atomic parity violation experiments. The experiment capitalizes on JLab's unique strengths for carrying out high-precision parity experiments. In addition to presenting the PREX results, I'll describe proposals for future measurements at JLab from  $^{208}\text{Pb}$  and other nuclei such as  $^{48}\text{Ca}$ .