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Precision electroweak measurements of the neutron radii of calcium and lead

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The RMS radius of neutrons within a nucleus may be measured cleanly, and without model dependence arising from hadronic interactions, through the parity-violating electroweak asymmetry in the elastic scattering of longitudinally polarized electrons. The PREX2 and CREX experiments recently measured the neutron radius of lead-208 and calcium-48 with varied physical implications from the understanding of neutron stars to the role of 3-neutron forces in microscopic models, and together provide a meaningful constraint on the density dependence of the symmetry energy in neutron rich nuclear matter, a parameter of the nuclear equation of state. The analysis and results of the experiment will be presented, along with a brief discussion of the experimental techniques and challenges required to achieve this precise measurement.

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