

APR18-2018-000788

Abstract for an Invited Paper
for the APR18 Meeting of
the American Physical Society

Measurements of Neutron Skins through Parity-Violating Electron Scattering¹

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The neutron densities in atomic nuclei are notoriously difficult to observe with high precision: the standard tool of electromagnetic interactions which has been used to map out the nuclear charge distributions is simply insensitive to neutrons. However, encoded in the small differences between the proton and neutron densities is a wealth of important information about the equation of state for asymmetric nuclear systems and the density dependence of the symmetry energy. Such information is crucial not only in modeling nuclei, but also extreme systems such as neutron stars and with the advent of gravitational wave astronomy there are exciting new opportunities to test such models. Fortunately, nature provides a novel way to image this side of the nucleus: through fundamental weak force interactions, which interact primarily to neutrons rather than protons, in contrast to the electromagnetic interaction.. Presented will be why these neutron distributions play an important part in our understanding of nuclear physics, how one images this aspect of such systems with electron beams, and the recent and upcoming experimental efforts for such measurements.

¹This material is based upon work supported by the U.S. Department of Energy, Office of Science, Office of Nuclear Physics, under contract number DE-AC02-06CH11357.