

Parity Violating Electron Scattering Measurements

Friday 14 April 2023 16:00 (30 minutes)

The technique of parity-violating electron scattering (PVES) can be used to make relatively clean measurements of nuclear and nucleon properties. Electrons have long been used as clean nuclear probes because they do not interact via the strong force. Much of what we know about nuclei, nucleons and their constituents is from electromagnetic scattering. The parity-violating asymmetry in the scattering of longitudinally polarized electrons from a variety of targets gives us access to properties ranging from the role of sea quarks in nucleons to the density dependence of the symmetry energy of neutron matter. Perhaps most interestingly, precision measurements of the weak charges of electrons as well as protons can provide a low energy test of the Standard Model by determining the resulting value of the weak mixing angle $\sin^2\theta_W$ in both leptonic and semi-leptonic channels. These searches are sensitive to mass scales of new physics up to 42 TeV, depending on the model of the new physics. In addition, the quark coupling constants can be determined from the semi-leptonic measurements. In this talk I will describe the technique of PVES and summarize upcoming future measurements.

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