Parity Violating Electron Scattering

CAMERON CLARKE, Stony Brook University — Parity violating electron scattering (PVES) has developed many uses since its discovery in the famous SLAC E122 experiment. The Hall A Collaboration at the Thomas Jefferson National Accelerator Facility (JLab) has developed expertise using PVES to make measurements of such quantities as nucleons’ electric and magnetic form factors, distributions within nuclei, and their weak charges. Measurements involve detecting small parity violating asymmetries in the parts per billion range amongst very large signals, using rapid helicity reversed polarized electron beam and often polarized targets. These high precision measurements are entering a new phase with the CEBAF 12GeV upgrade just completed at JLab. Of particular interest is the MOLLER experiment which promises to make the highest precision measurement ever of \( \sin^2(\theta_w) \) at low \( Q^2 \), potentially unveiling realms of new physics and providing an unparalleled test of the Standard Model of particle physics where theory makes very clear predictions.

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