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Photon Detector for Compton Polarimetry in the PREX-II Experiment

Thursday, 26 September 2019 14:00 (20 minutes)

The Jefferson Lab Continuous Electron Beam Accelerator Facility's experimental Hall A employs a Compton polarimeter to measure incoming beam polarization for parity violating electron scattering experiments. The polarimeter operates by amplifying green laser light in a Fabry-Perot cavity which then Compton scatters off the incoming electron beam. The scattered photons are then passed through a scintillating GSO (Gadolinium Oxyorthosilicate) crystal which creates light which registers in a photomultiplier tube. The polarization measurement is conducted by taking advantage of the helicity-dependence of Compton scattering. By measuring the integrated signal from photons scattered while the beam is in different helicity states, we generate a differential asymmetry between these states, which then yields information about the electron beam's longitudinal polarization. Measuring the asymmetry requires a robust background subtraction of helicity-correlated asymmetry as well as identifying the Compton edge from observing spectra. This measurement aids in minimizing a key source of systematic error in many parity-violating electron scattering experiments. This talk will be about the integrating photon detector analysis as well as the recent results from the PREX-II experiment.

Summary

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