

Mott polarimeter upgrade at Jefferson Lab

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A Mott polarimeter with a design optimized for 5.5 MeV/c has been in routine use at the CEBAF accelerator for well over a decade, providing polarization measurements approaching 1% accuracy. Measurements with different target elements (Au, Ag, Cu) over decades of target thicknesses (100 – 10,000 angstroms), and beam energies between 2 and 8 MeV allow us to determine the effective analyzing power with a high degree of certainty. Recent and planned improvements in our polarimeter configuration, detectors and data acquisition system, coupled with a low 31 MHz repetition rate beam allow us to distinguish and suppress electrons that do not originate from the target foil. This work coupled with a significant effort to produce a detailed GEANT4 model of the polarimeter is part of an effort to determine systematic uncertainties at the level of the theoretically calculated analyzing power. We describe our activities and a series of planned measurements that will allow us to demonstrate and possibly improve the precision and accuracy of polarization measurements at JLab, as required for future parity violation experiments.