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High Precision Polarization Strategy for the Q_{weak} Experiment[1]
JUAN CARLOS CORNEJO, College of William & Mary, Q-WEAK COLLABORATION — The Q_{weak} experiment in Hall C at Jefferson Lab is measuring the weak charge of the proton to an uncertainty of 4.1% by scattering longitudinally polarized electrons from protons in a liquid hydrogen target. The electron beam polarization is budgeted as the largest experimental systematic uncertainty of 1.5%. Aiming for a polarization measurement to within 1%, two independent polarimeters monitored the beam polarization by measuring the asymmetry of the polarized electron beam scattering either via the Møller or Compton process. The Møller polarimeter detects the pair of electrons scattered from a highly polarized thin iron foil through two identical calorimeters. However, it was limited to running at much lower currents and measurements are invasive to the experiment. The Compton polarimeter was commissioned to remove this limitation by using a high powered Fabry-Pérot cavity laser to provide a polarized photon source. The use of Compton scattering allows for non-invasive measurements and the ability to run at the same currents as the main experiment. The Compton scattered photons and electrons are detected independently. I will discuss the polarimetry strategy and preliminary polarization results for the Q_{weak} experiment using these three techniques.

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