

Abstract Submitted
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Calibrating the sensitivity of high-rate asymmetry measurements to beam motion¹ TAO YE, Stony Brook University, PREX/CREX COLLABORATION — The Lead Radius Experiment (PREX) is making a precise measurement of the parity violating asymmetry in polarized elastic electron-nucleus scattering to extract the neutral weak form factor and therefore the neutron RMS radius of ^{208}Pb . PREX was proposed to measure the ~ 0.6 ppm asymmetry with an overall uncertainty of better than 20 ppb (3%). The total scattering event rate at the detectors is ~ 4 GHz and is characterized by event-by-event statistical fluctuation in the raw asymmetry of ~ 90 ppm standard deviation over 33 ms integrating time. In such a high rate measurement, detected asymmetries can be overwhelmed by fluctuations induced by random as well as helicity-correlated beam motion. Calibrating sensitivity to beam motion provides linear coefficients to remove its effect in asymmetry to first order. In addition, the grand averaged correction for beam motion can potentially make a sizable contribution to the central value of the observed raw detector asymmetry. Therefore precise and accurate sensitivity calibration techniques are crucial to achieve a small systematic uncertainty. In this talk, methods for analyzing calibration data, the size of beam corrections and their uncertainties from the recently completed PREX-II physics run will be discussed.

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