Abstract Submitted
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Accurate Electron Spin Optical Polarimetry (AESOP)[1] KEITH FOREMAN, TIMOTHY GAY, University of Nebraska-Lincoln — Third generation parity-violation experiments involving high-energy longitudinally polarized electron scattering require determination of the electron beam polarization to unprecedented accuracy [1]. We are developing a new method to improve polarimetry for such beams based on polarized electron impact excitation of noble-gas targets [2]. A crucial requirement of this technology ("accurate electron spin optical polarimetry" (AESOP)) is the ability to measure optical polarization to an accuracy of 0.1% of the Stokes parameter values. We report recent progress towards achieving optical polarization measurements to this level of accuracy. Using both a laser-based table-top optical polarimeter and TracePro [3] ray-tracing software, we have identified several unexpectedly large (˜0.5%) sources of error associated with reflections and spurious temperature variations. The mechanisms by which they contribute to the polarimetry measurement, how the errors are correlated, and the relative magnitude of the contribution of each error, as well as error mitigation methods, are discussed.
1) E. Chudakov, AIP Conf. Proc. 1563, 29 (2013). 2) T. J. Gay, J. E. Furst, K. W. Trantham, and W. M. K. P. Wijayaratna, Phys. Rev. A 53, 1623 (1996). 3) TracePro Expert version 7.8.4, Lambda Research Corporation, Littleton, MA, USA

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