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Probing the Faraday Effect of Polarized ^3He GRETCHEN PHELPS, JOSH ABNEY, WOLFGANG KORSCH, University of Kentucky — The Faraday Effect refers to the phenomenon in which the polarization of light transmitted through a magnetized medium is rotated. The relation $\phi = VlB$ describes the magnitude of the rotation, where V is the material dependent Verdet constant and l is the length of the medium in an applied magnetic field B. Polarized ^{3}He, generated in a glass cell constructed of GE-180, gives rise to a Faraday rotation via nuclear spin optical rotation (NSOR), a measure of which establishes a new technique in ^{3}He polarization monitoring. Our set-up incorporates a triple-modulation technique with present sensitivities at the μrad level. This is accomplished through the combination of a photo-elastic modulator, an optical chopper, and a sinusoidally driven magnetic field. Several calibration samples were used to test the triple-modulation method. Good agreement between our results and the commonly accepted values for the Verdet constant was achieved. Technical challenges and progress towards the determination of $V_{^3He}$ will be presented.

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