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Reduction of Helicity-Dependent Instrumental Laser Intensity Asymmetries SAMANTHA BURTWISTLE, JOAN DREILING, TIMOTHY GAY, University of Nebraska-Lincoln — We present a new optical system that greatly reduces helicity-dependent instrumental intensity asymmetries. The optical setup is similar to that described in Fabrikant *et al.* [1], where two beams with orthogonal linear polarizations are sent through a chopper, allowing only one beam to pass through the optical system at a time. The two temporally-separated beams are then spatially recombined. We now use a system, with a second active polarization changing element, that is analogous to that described in Gay and Dunning [2], which compensates for false asymmetries in Mott polarimetry. In our setup, the orthogonal linear polarizations are now circularly polarized by a Pockels cell switching between a retardance of $+\lambda/4$ and $-\lambda/4$ at the same frequency as the chopper, but with a 90-degree phase shift. Using this method, we have been able to control the standard deviation of the mean of our asymmetries, as measured by a photodiode with lock-in signal processing, to $3*10^{-8}$.

[1] M.I. Fabrikant, K.W. Trantham, V.M. Andrianarijaona, and T.J. Gay, Appl. Opt. **47**, 2465-2469 (2008).
[2] T.J. Gay and F.B. Dunning, Rev. Sci. Instrum. **63**, 1635 (1992).

Samantha Burtwistle
University of Nebraska-Lincoln

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