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Intrinsic Mirror Birefringence Measurements for the Any Light Particle Search (ALPS)[1] CLAIRE BAUM, The University of Illinois at Urbana-Champaign, GUIDO MUELLER, DAVID TANNER, SIMON BARKE, ZACHARY BUSH, GIACOMO CIANI, HAL HOLLIS, TOMOYUKI UEHARA, GUSTAVO PEREZ, PAUL FULDA, MAURICIO DIAZ-ORTIZ, TODD KOZLOWSKI, RYAN GOETZ, JOE GLEASON, The University of Florida, THE ANY LIGHT PARTICLE SEARCH (ALPS) COLLABORATION — The Standard Model is the most comprehensive theory of particle physics, yet it fails to explain phenomena such as dark matter. In the Any Light Particle Search (ALPS) experiment at the Deutsches Elektronen-Synchrotron (DESY), researchers are searching for weakly interacting sub-eV particles (WISPs). WISPs are predicted by extensions of the Standard Model that may explain dark matter and support string theory. The design of ALPS also allows researchers to measure the vacuum birefringence (BF) in a magnetic field. This vacuum magnetic BF (VMB) is predicted by QED and lacks experimental confirmation. ALPS researchers must know the BF of their optics and how it is affected by a magnetic field to make reliable VMB measurements. In my research, I used a heterodyne polarimeter to perform preliminary BF measurements on a mirror. For a mirror at 45° incidence, 0° incidence, and 0° incidence with an applied magnetic field, the effective path length difference between two 1064 nm laser beams was ≈26.6 nm, 4.871 ± 0.046 nm, and 16.58 ± 0.11 nm respectively.

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