Abstract Submitted
for the 4CS19 Meeting of
The American Physical Society

Characterization of Unresolved Satellite Imagery Using Polarization Data LUCY ZIMMERMAN, MICHAEL KORTA, ADRIAN SCHEPPE, FRANCIS CHUN, CAMERON HARRIS, DAVID STRONG, ROGER TIPPETS, MICHAEL PLUMMER, MARCO PIROZZOLI, United States Air Force Academy — Cadets in the Department of Physics at the US Air Force Academy are developing a new optical sensing modality and characterizing the polarization of a 16-inch DFM Engineering telescope and camera system that will allow us to determine the full linear polarization components of a geosynchronous satellite. The use of polarimetry allows us to characterize a satellite from a point source image in order to further inform space situational awareness. To characterize the polarization of the telescope/camera system, a polaroid film is placed on a rotating frame mounted to an Alnitak Flatman light source, and the relative intensities are measured through four polarized filters oriented at different optical angles (0, 45, 90, and 135). For each of the polarized filters, the polaroid film is rotated every 10over a range from 0to 180. Using this data, Malus curves are created, allowing us to construct the Mueller matrix for the optical system. The Mueller matrix will allow us to determine the Stokes vector, which describes the polarized optical signature of a satellite. We will present the results of calibrating the polarization of the telescope/camera system as well as polarization signatures of geosynchronous satellites.

Lucy Zimmerman
United States Air Force Academy

Date submitted: 16 Sep 2019 Electronic form version 1.4