

Abstract

The goal of this study was to develop a linear polarimeter for astrophysical observation. Furthermore, the aim of the study was to determine the instrumental polarization of the polarimeter. The polarimeter design enhanced a worm drive system, with a half-wave plate mounted on the worm wheel. The light then passed through a calcite savart plate into a CCD detector. The worm gear was controlled by a step motor connected to an Arduino Uno, and rotation was measured by a rotary encoder. The polarimeter measurements and calculations were automated using Python scripts.

The unpolarized standard stars, Caph and Procyon, were measured in order to determine the instrumental polarization of the polarimeter, and to calibrate future measurements. The instrumental polarization measured was 0.001548702789. This was then applied to measurements taken on the stars HD 165908 and HD 147084, achieving fractional polarization of 0.00129 and 0.0520, respectively. These measurements were consistent with reported values for HD 165908 and HD 147084, demonstrating the utility of this linear polarimeter optical system for beyond standard model studies.