Performance Characterization of the Chromospheric Lyman-Alpha Spectro-Polarimeter (CLASP) CCD Cameras

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ABSTRACT

The Chromospheric Lyman-Alpha Spectro-Polarimeter (CLASP) is a sounding rocket instrument which is currently being developed by NASA's Marshall Space Flight Center (MSFC) and the National Astronomical Observatory of Japan (NAOJ). The goal of this instrument is to observe and detect the Hanle effect in the scattered Lyman-Alpha UV (121.6nm) light emitted by the Sun's Chromosphere to make measurements of the magnetic field in this region. In order to make accurate measurements of this effect, the performance characteristics of the three on-board charge-coupled devices (CCDs) must meet certain requirements. These characteristics include: quantum efficiency, gain, dark current, noise, and linearity. Each of these must meet predetermined requirements in order to achieve satisfactory performance for the mission. The cameras must be able to operate with a gain of no greater than 2 e-/DN, a noise level less than 25e−, a dark current level which is less than 10e−/pixel/s, and a residual non-linearity of less than 1%. Determining these characteristics involves performing a series of tests with each of the cameras in a high vacuum environment. Here we present the methods and results of each of these performance tests for the CLASP flight cameras.