Performance characterization of UV science cameras developed for the Chromospheric Lyman-Alpha Spectro-Polarimeter

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The NASA Marshall Space Flight Center (MSFC) has developed a science camera suitable for sub-orbital missions for observations in the UV, EUV and soft X-ray. Six cameras will be built and tested for flight with the Chromospheric Lyman-Alpha Spectro-Polarimeter (CLASP), a joint National Astronomical Observatory of Japan (NAOJ) and MSFC sounding rocket mission. The goal of the CLASP mission is to observe the scattering polarization in Lyman-α and to detect the Hanle effect in the line core. Due to the nature of Lyman-α polarization in the chromosphere, strict measurement sensitivity requirements are imposed on the CLASP polarimeter and spectrograph systems; science requirements for polarization measurements of Q/I and U/I are 0.1% in the line core. CLASP is a dual-beam spectro-polarimeter, which uses a continuously rotating waveplate as a polarization modulator, while the waveplate motor driver outputs trigger pulses to synchronize the exposures. The CCDs are operated in frame-transfer mode; the trigger pulse initiates the frame transfer, effectively ending the ongoing exposure and starting the next. The strict requirement of 0.1% polarization accuracy is met by using frame-transfer cameras to maximize the duty cycle in order to minimize photon noise. Coating the e2v CCD57-10 512x512 detectors with Lumogen-E coating allows for a relatively high (30%) quantum efficiency at the Lyman-α line. The CLASP cameras were designed to operate with a gain of 2.0 ± 0.5, ≤ 25 e^- readout noise, ≤ 10 e^-/second/pixel dark current, and $< 0.1\%$ residual non-linearity. We present the results of the performance characterization study performed on the CLASP prototype camera; system gain, dark current, read noise, and residual non-linearity.