



Contribution ID: 135

Type: **Talk**

A Flight Photon Counting Camera for the WFIRST Coronagraph

Wednesday, 6 September 2017 09:30 (20 minutes)

A photon counting camera based on the Teledyne-e2v CCD201-20 electron multiplying CCD (EMCCD) is being developed for the NASA WFIRST coronagraph, an exoplanet imaging technology development of the Jet Propulsion Laboratory (Pasadena, CA) that is scheduled to launch in 2026. The coronagraph is designed to directly image planets around nearby stars, and to characterize their spectra. The planets are exceedingly faint, providing signals similar to the detector dark current, and require the use of photon counting detectors. Red sensitivity (600-980nm) is preferred to capture spectral features of interest. Since radiation in space affects the ability of the EMCCD to transfer the required single electron signals, care has been taken to develop appropriate shielding that will protect the cameras during a five year mission. In this paper, consideration of the effects of space radiation on photon counting observations will be described with the mitigating features of the camera design. An overview of the current camera flight system electronics requirements and design will also be described.

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Session Classification: Detectors for ground and space-based astronomy, planetary and space science (III)