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A Wide-Field Coronal EUV Imager-Spectrometer for Studies of Coronal Dynamics

We have proposed a novel dual-use EUV imager designed to observe the dynamics of streamers and other large-scale structures in the solar corona from the solar surface out to ~3 R sol. The COSIE instrument is proposed as an MoO within the SMEX program, with the objectives of: 1.) understanding the dynamics of the Transition Corona, the region of the upper corona in which the plasma beta changes from low to high and the atmosphere transitions from being dominated by magnetically confined closed structures to high beta with generally open radially-directed regions with outflowing solar wind streams; 2.) providing new tools for space weather forecasting via early detection of coronal mass ejections (CMEs), determination of early acceleration and path changes, and modeling of the CME magnetic configuration at event initiation. A novel feature of COSIE is that the observing mode is switchable between ultra-high sensitivity direct imaging and a global spectroscopic imaging mode. The overlapped spectra can be unfolded to provide spectral resolution of 20,000 over the 185-206 Å passband. The imaging channel has ~1,000X greater sensitivity than existing EUV imagers and is capable of detecting streamers and CMEs out to at least 2.5 R_sol. The imaging spectrometer channel provides full-field images in strong spectral lines covering a wide coronal temperature range, as well as providing full-Sun density images every 10 seconds. This presentation will introduce the COSIE concept and address uses of global EUV spectra in the study of coronal heating and dynamics. COSIE mounts to the ISS, tracking the Sun continuously during its daylight passes. The sensitivity and field of view of the design are flexible and many other locations are feasible, including L5.