TRACKING REXIS PERFORMANCE WITH $^{55}$FE ONBOARD RADIOACTIVE SOURCES AND CALIBRATION OPERATIONS.
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OVERVIEW: The main instrument of the Regolith X-ray Imaging Spectrometer (REXIS) is a coded-aperture imaging soft X-ray telescope [1]. It consists of $2 \times 2$ X-ray CCDs (MIT Lincoln Laboratory CCID-41) and a stainless steel mask, covering ~30 deg Full Width Half Maximum (FWHM) Field of View (FoV) with 26 arcmin resolution in the 0.4 – 8 keV band. Each X-ray CCD in REXIS has 1024 × 1024 pixels, which are grouped into four independent nodes (256 × 1024 pixels), each read out with its own signal processing chain.

In order to track the spectral gain and resolution of the REXIS X-ray CCDs, REXIS carries a set of $^{55}$Fe radioactive sources with the combined activity of ~2 µCi at the time of the launch. The $^{55}$Fe sources are arranged to monitor the spectral performance of each node of the REXIS CCDs as well as the Charge Transfer Inefficiency (CTI) with monochromatic X-ray lines at 5.9 and 6.4 keVs.

In addition to the onboard radioactive sources, REXIS performed a series of calibration operations to characterize the REXIS instruments: (1) Internal Calibration before the cover opening, (2) The Cosmic X-ray Background (CXB) measurement, (3) Crab nebular observations, (4) the OB F verification, and (5) the mask calibration with observations of Sco X-1.

We will present the results of our calibration operations, describing what we learned from the data, and how they feed in to the optimization of the REXIS CCD operational parameters. We will also address the lessons learned from these calibrations that will be of value to future missions employing similar advance planetary x-ray imaging spectrometers.

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References: