

Pixelated CdTe Detectors for Imaging X-rays on-board Solar Orbiter space mission

Thursday, 6 September 2012 15:10 (1 hour)

The STIX (Spectrometer Telescope for Imaging X-rays) instrument will be used on board the Solar Orbiter space mission to perform X-ray imaging and spectroscopy of solar flares. STIX is one of 10 instruments of the confirmed M-class mission of the European Space Agency (ESA) to be launched in 2017. The imaging is realized by a Fourier-imaging technique using tungsten grid collimators in front of 32 pixelated CdTe detectors. Solar thermal and non-thermal hard X-ray emissions from 4 keV to 150 keV will be imaged with high resolution (1 keV).

CdTe detectors dedicated for STIX are 10x10x1 mm³ in size. 8 big pixels plus 4 small pixels arranged in an asymmetrical geometrical configuration surrounded by a guard ring are read out with the Caliste-SO ASIC module developed at CEA. The pixel effective areas range from 9.7 mm² for the big and 1.0 mm² for the small ones. The pixelization process developed at the Laboratory for Micro- and Nanotechnology for the detectors purchased from Acrorad Co., Ltd Japan will be described. Our results for leakage current measurements and spectral measurements obtained after the segmentation process are presented and discussed. For the selection of flight-quality detectors two setups were developed at PSI and ETH. The setup allows a serial and fast measurement of the leakage current of each individual pixel including guard ring. All measurements are carried out at different temperature levels. Since the detectors are very sensitive to mechanical shock (brittle, increasing leakage current with decreasing spectral performance) a protecting support is needed for handling the devices. Specially developed detector holders with electrical contact to the pixels are used to ensure a safe transfer between two setups.

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Session Classification: Poster session

Track Classification: X-ray imaging applications - Astronomy