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Testing and characterization of XGIS detectors for THESEUS mission

Transient High-Energy Sky and Early Universe Surveyor (THESEUS), a multi-instrument space mission concept, is currently one of the three candidates of the European Space Agency (ESA) M7 medium size missions, with strong heritage derived from the M5 Phase-Assessment (Phase-A) study in 2018-2021.

With an intended launch in 2037, the main goals of this mission include exploring the early universe by identifying and localising Gamma Ray Bursts (GRBs) at high redshifts (potentially up to z = 10 and beyond) and contributing to multimessenger time-domain astrophysics through extensive X/gamma-ray transient universe monitoring. Crucial to THESEUS success is its comprehensive transient detection and characterization capabilities, provided by wide and deep sky monitoring across a broad energy band (0.3 keV −10 MeV) in which the X and Gamma-ray Imaging Spectrometer instrument (XGIS) plays an essential role. The X and Gamma-ray Imaging Spectrometer instrument is capable of covering an unprecedented wide energy band (2 keV −10 MeV), with imaging capabilities and location accuracy <15 arcmin up to 150 keV in a Field of View (FOV) of 77x117 deg2.

To ensure THESEUS mission's success, defining and finalizing the procedures for construction, testing, and qualification of instruments to be flown onboard is essential. Given the complexity of it's instruments, thorough procedures are essential. This work presents the **strategy adopted for the development of the test procedures implemented during development of various XGIS components**. Additionally, it discusses the current performance of XGIS detectors highlighting the potential areas for detector characterization improvement along with simplification of manufacturing processes to support large scale production of at least 100 detector modules per XGIS camera.

Eligibility for "Best presentation for young researcher" or "Best poster for young researcher" prize

Yes

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