

The XGIS instrument: an unprecedented wide-band GRB monitor for future space mission opportunities

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We describe the design and the expected performances of the X/Gamma-ray Imaging Spectrometer (XGIS), a GRBs and transients monitor being developed for the THESEUS mission now in Phase A as ESA M7 candidate. XGIS 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 over a Field of View of 2 sr, a few hundreds eV energy resolution in the X-ray band (<30 keV) and timing resolution down to a few μ s. XGIS exploits the coupling between Silicon Drift Detectors (SDD) with crystal scintillator bars and a very low-noise distributed front-end electronics (ORION ASICs). The XGIS particular configuration also allows 3D position sensitive detection which also enables hard x-ray polarimetric capability. Here we also describe the possible improvements that can be applied to this technology in order to further improve the performance of the instrument. Thanks to its modular design, the XGIS instrument can be easily rescaled/reshaped and adapted for fitting the available resources and specific scientific objectives of future high-energy astrophysics missions, and especially those aimed at fully exploiting GRBs and high-energy transients for multi-messenger astrophysics and fundamental physics.

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