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Science Goals and Drivers for Future Exoplanet, Space Astronomy and Space Physics (2)

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FIRST LIGHT OF SHARJAH-SAT-1: POTENTIAL TARGETS AND EARLY SCIENCE

Abstract

Sharjah-Sat-1 is a 3U+ CubeSat developed as a collaborative research project between the Sharjah Academy for Astronomy, Space Sciences, and Technology (SAASST), University of Sharjah (UoS), Istanbul Technical University (ITU), and Sabanci University (SU). Sharjah-Sat-1 was launched on January 3rd, 2023, equipped with a dual payload onboard: (i) an improved X-ray Detector (iXRD) and (ii) a system of two optical cameras. Its primary scientific mission is to study bright, hard X-ray sources, in our Galaxy as well as solar coronal holes. The primary science payload onboard is the iXRD (improved X-ray Detector; developed by Sabanci University) with CdZnTe-based crystal as the active material and a Tungsten collimator with a field of view of 4 degrees. The energy coverage ranges from 20 keV to 200 keV, with a spectral resolution of 6 keV @ 60 keV. Sharjah-Sat-1 is currently in the commissioning phase and we anticipate early observation in the next few weeks.

Its main science goal is to observe the brightest galactic hard X-ray sources, transient and persistent. Black hole candidates and pulsars emit radiation up to a few 100 keVs, making them potential targets. Long observations of bright Black Hole Candidates will allow observing spectral transition (hard/soft) and studying their variability. Besides, solar observations will be conducted to study hard X-ray spectra of flares and coronal holes. Other targets of opportunity are transient bright events, such as gamma-ray bursts (GRB). While the detector's effective area is only 6.5 cm², it is expected to reach a sensitivity of around 60 mCrab in a single day in the 20 keV to 100 keV band assuming 600s exposure for each orbit. However, further in-flight calibrations are needed. By the time of the conference, we anticipate having and presenting the very first high-level products (i.e., spectra and lightcurves) of the brightest X-ray galactic sources (e.g., Cyg X-1, Sco X-1, etc) observed by Sharjah-Sat-1.