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THE HIGH ENERGY ASTROPHYSICS GROUP IN THE LIGHT OF SHARJAH-SAT-1 AND FUTURE PROJECTS

Abstract

The newly formed High Energy Astrophysics (HEA) Group at the Sharjah Academy of Astronomy, Space Science, and Technology (SAASST) and the University of Sharjah (UoS) focuses on the accretion processes onto compact objects, mainly on neutron stars and black holes, across the electromagnetic spectrum. Our research lies on observations of Galactic Black Hole Candidate systems as well as accreting neutron stars in both high mass and low mass X-ray binary systems. An extensive research programme on accreting compact objects utilizes an armada of X-ray observsatories (e.g., XMM-Newton/ESA, Chandra/NASA, INTEGRAL/ESA, Nihels Gherelse Swift Observatory/NASA, NuStar/NASA, etc) alongside major ground-based facilities such as the European's Southen Observatory (ESO) Very Large Telescope (VLT) and smaller 1m-class telescopes. Besides the observational part, in our research group we are using an advanced inventory of state-of-the-art tools such as (magneto)hydrodynamical and General-Relativistic (magneto)hydrodynamical simulations, alongside radiative transfer , and raytracing tools to further study and shed light onto the elusive nature of these accreting compact objects and their surrounding envirionment.

Moreover, this group will provide a direct science exploitation of the forthcoming 3U CubeSat SHARJAH-SAT-1. The primary science payload on board is the iXRD (developed by the Sabanci University) which will provide an improved version of XRD on board BeEagleSat. The leading technology behind iXRD is a CdZnTe-based crystal, operational in the hard X-rays regime, between 20 and 200 keV energy range. The target spectral resolution of the detector is 6 keV at 60 keV. Its main science goal of the mission is to observe the very bright galactic X-ray sources, transient and persistent. Black Hole candidates and pulsars can emit radiation up to a few 100 keVs making them potential targets. In addition, hard X-ray

spectra from solar flare and coronal holes will be studied. Another target of opportunity (ToO) is the transient bright events, such as gamma-ray burst (GRB) and magnetar bursts. Currently, shortly before the Critical DesignReview (CDR) the anticipated launch is planned for early-to-mid 2021.