FAST DETECTION AND FOLLOW-UP OF HIGH ENERGY TRANSIENTS WITH SVOM & COLIBRI

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SVOM MISSION

The SVOM mission (Wei, Cordier et al., 2016, Fig. 1) is a French-Chinese space mission for the gamma-ray burst (GRB, Fig. 2) science and transient exploration to be launched in October 2023.

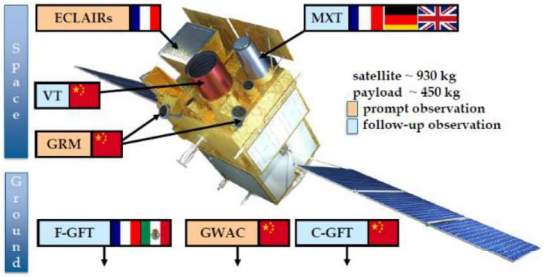

Fig. 1: SVOM space mission, its instruments on board and ground base network.

GRB are the most energetic explosions in the Universe characterized by high energy, short explosion with gamma ray emission and an afterglow that could be visible in other wavelengths. In astrophysics they are interesting because they can be used as cosmological probes or to study properties of early galaxies.

Fig. 2: Credits: NASA, ESA and M. Kornmesser

SVOM will detect ~60 GRB/year and send alerts of detection to its ground based network of telescope (e.g. COLIBRI).

COLIBRI

Fig. 3: COLIBRI telescope currently installed at Observatoire de Haute-Provence (France) for initial testing.

COLIBRI (Fig. 3, PI: S. Basa) is one of the ground follow-up telescopes under French responsibility especially developed for the SVOM mission (Wei, Cordier et al., 2016), to quickly detect and study the objects from SVOM (rapidity is a key aspect of the mission to improve the knowledge of the physics of GRB). This French-Mexican (AMU, CNES, INSU/CNRS, UNAM-CONACyT) 1.3 m telescope will be commissioned and installed at the Observatorio Astronómico Nacional (Mexico) by beginning 2023.

It will be able to be on target from any position in the sky in less than 20 s and provide a photometric redshift estimate with 5 min from the receival of the alert (Fig. 4). This will be possible thanks to its multi-band sensitivity with the three photometric arms working at the same time in blue & red (visible channel) and near-infrared bands (IR channel). The IR channel will be the first astronomical camera equipped with the Astronomical Large Format Array (ALFA) manufactured by LYNRED and based on the HgCdTe (mercury cadmium tellurium) technology developed at CEA-LETI.

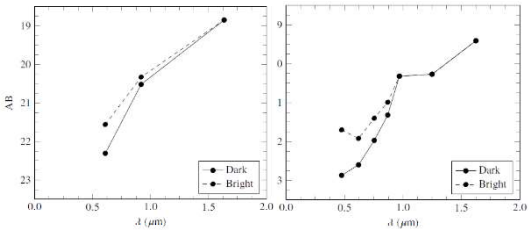

Fig. 4: Right: Limiting magnitudes (10 σ) in the different bands, for the photometric redshift estimates (left) and the follow-up (right).

MY ROLE FIRST YEAR OF CNES FELLOWSHIP: Project scientist of COLIBRI to ensure the readiness of follow-up system for SVOM alerts in time for its launch,

WORK DONE SO FAR

Preparation and verification of all the tests for image quality, tracking speed, software pipeline, for COLIBRI, in such a way that it fulfills the requirement prescribed by SVOM.

FUTURE RESEARCH PLAN

Exploit the data of SVOM/COLIBRI network to improve our knowledge of GRB by studying the connection GRB-supernova believed to be a possible progenitor for GRBs.

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