**Abstract**

SVOM is a French-Chinese space mission to be launched in 2021. Its goal is the study of Gamma-Ray Bursts, the most powerful stellar explosions in the Universe. The Micro-channel X-ray Telescope (MXT) is an X-ray focusing telescope, on board SVOM, with a field of view of 1° working in the 0.2-10 keV energy band. It is dedicated to the rapid follow-up of the Gamma-Ray Bursts counterparts and to their precise localization. In order to reduce the optical mass and to have an angular resolution of few arc minutes, a “Lobster-Eye” optical configuration has been chosen. Using a numerical model of the MXT point spread function (PSF) we simulated MXT observations of point sources in order to develop and test different localization algorithms to be implemented on board SVOM. These algorithms have to be a combination of speed and precision. We present the preliminary results of the different methods.

**Gamma-Ray Burst**

- **Definition**
  - Powerful explosions
  - Brief gamma-ray phenomena
  - Few ms – hundreds seconds
  - Random events in time and space
  - Accretion disk + 2 sided jets

- **Formation**
  - Long (>2s) = Collapse of a massive star (>50 Msun)
  - Short = Merging of 2 compact objects (neutron stars)

- **Scientific goals**
  - Distant GRBs = cosmological goal: investigate the early Universe (firsts stars)
  - Understand physical processes associated with GRBs

- **Characteristics**
  - Emission from radio to gamma rays

**SVOM**

- Space based multi-band astronomical Variable Object Monitor
  - **Collaboration**
    - The French Space Agency (CNES)
    - The Chinese Academy of Sciences (CAS) and the Chinese Space Agency (CNSA)

- **Aim of the mission**
  - Study Gamma-Ray Bursts

- **Instruments on board**
  - 2 wide fields of view: ECLAIRs and GRM
  - 2 narrow fields of view: MXT and VT
  - Operates from near-infrared to gamma rays

- **A GRB happens**
  - ECLAIRs will detect and localize the GRB
  - SVOM will reorient itself thanks to ECLAIRs indication
  - MXT will observe the GRB with a better precision and transmit the information to ground based telescopes

**MXT**

- **Goal**
  - Observe GRBs in X-rays (0.2-10 keV)
  - Localize GRB afterglows in real time
  - Transmit their positions to ground based telescopes

- **Localization of GRBs**
  - Field of view 64 x 64 arcmin
  - Smaller Point Spread Function (PSF) than ECLAIRs: 4.5’ vs 1’

- **Localization error**
  - Less than 1’ vs less than 10’ for ECLAIRs

- **Composition**
  - Detector of 256 x 256 pixels, 75μm side
  - Optics in Lobster Eye configuration = focus X-rays thanks to reflections in micropores

**SVOM**

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**MXT Simulator**

- **Goals**
  - Simulate realistic MXT observations
  - Develop and optimize the on board localization algorithms

**Localization methods**

- **MXT Simulator**
  - **Goals**
    - Simulate realistic MXT observations
    - Develop and optimize the on board localization algorithms

**Satellite reorientation**

- **Goal**
  - GRB afterglows decline rapidly with time. If we wait for the complete stabilisation of the satellite, we will miss data at highest fluxes.

- **Simulation**
  - Distance simulations - reference < 1 arcmin
  - MXT can observe the GRB during precious seconds before the complete stabilisation of SVOM

**References**

- L. Gosset et al., SPIE, 9905L1 (2016)
- D. Götz et al., SPIE, 9905L4 (2016)

**Conclusions**

We have developed a simulator to assess the scientific capabilities of MXT. It is highly configurable and produces event files and spectra for each observation. It demonstrates the gain in scientific performance of starting the localization algorithms before reaching the complete stabilization of SVOM. We plan to develop a simulation to include the defects of the optics and more detector effects.