Status and first results of SVOM Observatory Science

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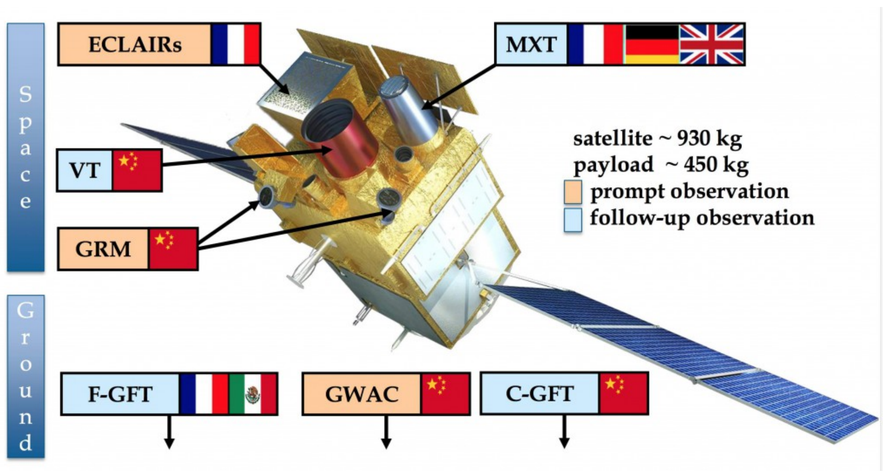
SVOM MISSION

Launched on June 22, 2024 from Xichang, China

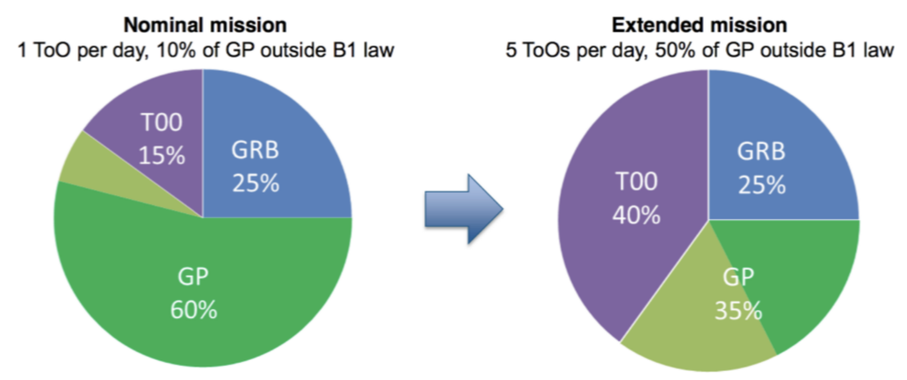
4 intruments:
- **ECLAIRs** Large field of view Coded-mask telescope (**4 to 150 keV**)
- **MXT** Focusing X-ray telescope (**0.3 to 10 keV**)
- **GRM** Gamma-Ray Monitor. 3 modules detecting in **15 keV to 5 MeV**
- **VT** Visible Telescope



Alert transmission to ground through VHF network and Beidou
→ **65% of alerts < 30s**
→ **Fast multi-wavelength follow-up observations**

OBSERVATORY SCIENCE

Science operations started early 2025



→ **General Program (GP):**
- Regular observations of a list of sources (pointings driven by MXT and VT)
- Mainly sources located outside of the galactic plane (B1 law)
- Multi-wavelength observations with all intruments

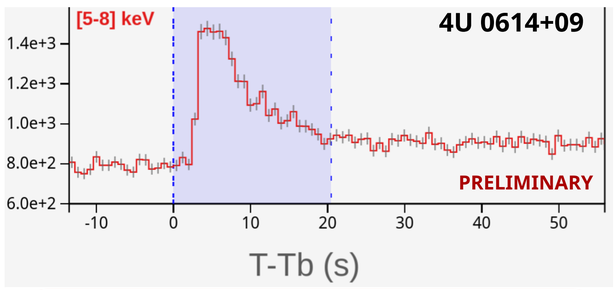
→ **Target Of Opportunity Program (ToO):**
- Nominal ToOs: new transients, GP sources, GRB revisits (**1/day**)
- Multi-messenger alert follow-up (Gravitational Waves, Cosmic Neutrinos)
- Exceptional ToOs (not interrupted by GRBs)

→ **Serendipitous transient observations**

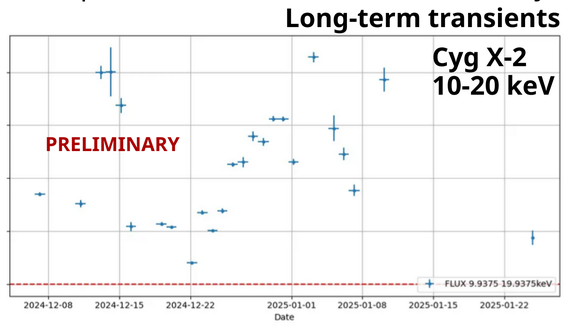
SERENDIPITOUS TRANSIENTS

ECLAIRs large field of view (90°x90°) → Potentially multiple sources observed simultaneously

Short-term transients



Long-term transients



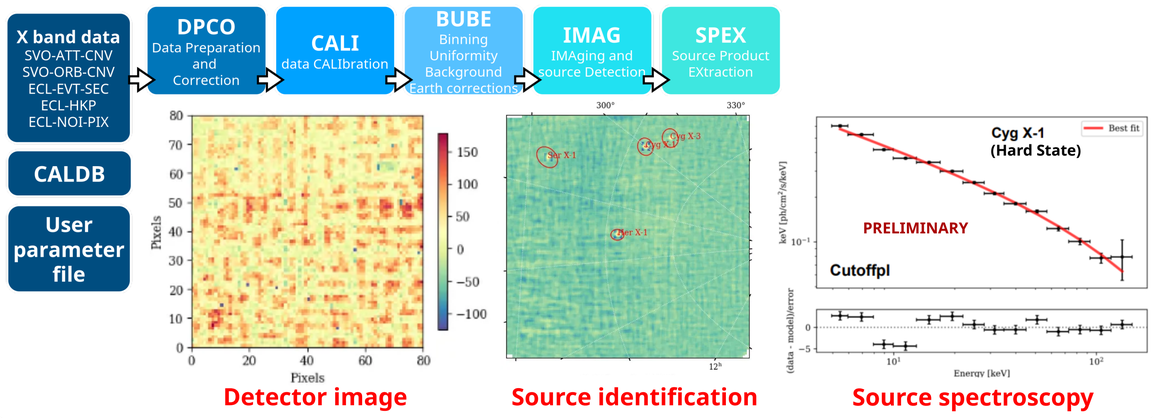
Trigger system:
- Time delay: few seconds (**on-board trigger**) to few hours (**offline trigger**)
- Alerts for fast X-ray transients
- Relevant sources: **binaries, particularely NS Type I X-ray bursts, blazars**

Source monitoring:
- Few hours delay
- Alert generation system in progress
- Data not public (yet)
- Relevant sources: **AGNs, BHBs, Classical Novae...**

DATA ANALYSIS PIPELINE

- **Ground segment automated data processing**
- **High-level scientific products from X-band (high bandwith) data**
- **Few hours delay**

ECLAIRs Xband data Analysis Pipeline (Quicklook Analysis) :

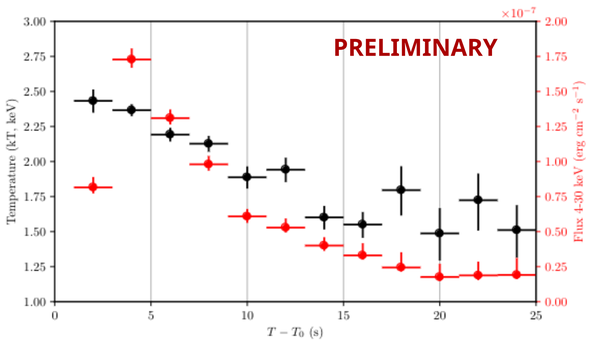


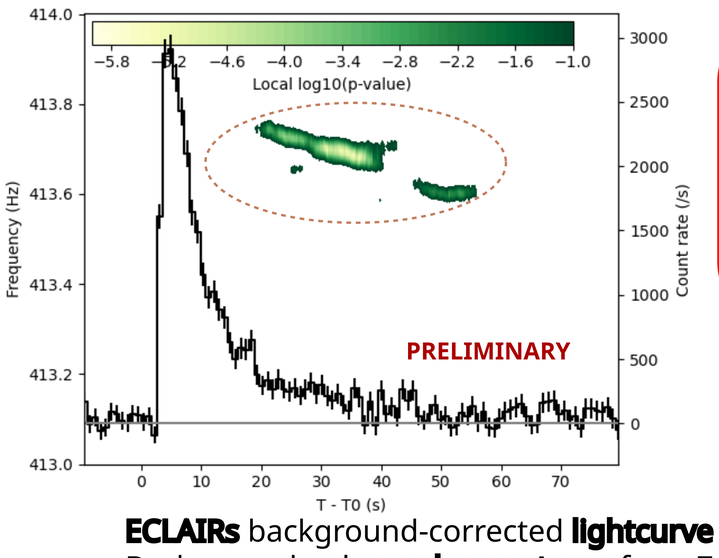
Detector image | Source identification | Source spectroscopy

PRELIMINARY RESULTS

LMXB 4U 0614+09 THERMONUCLEAR BURST OSCILLATIONS

→ Burst detected on January 10th 2025
→ On-board ECLAIRs Trigger[1]
→ Thermonuclear (Type I) X-Ray burst
→ Time-resolved spectroscopy shows cooling





→ **Significant detection of burst oscillations**

→ **f = 413.7 Hz**

→ **Previously detected by Swift/BAT at f = 414.7 Hz in a 2006 burst [2]**

[1]Cangemi, F., Coleiro, A., Atteia, J. L., et al. 2025, The Astronomer's Telegram, 16973

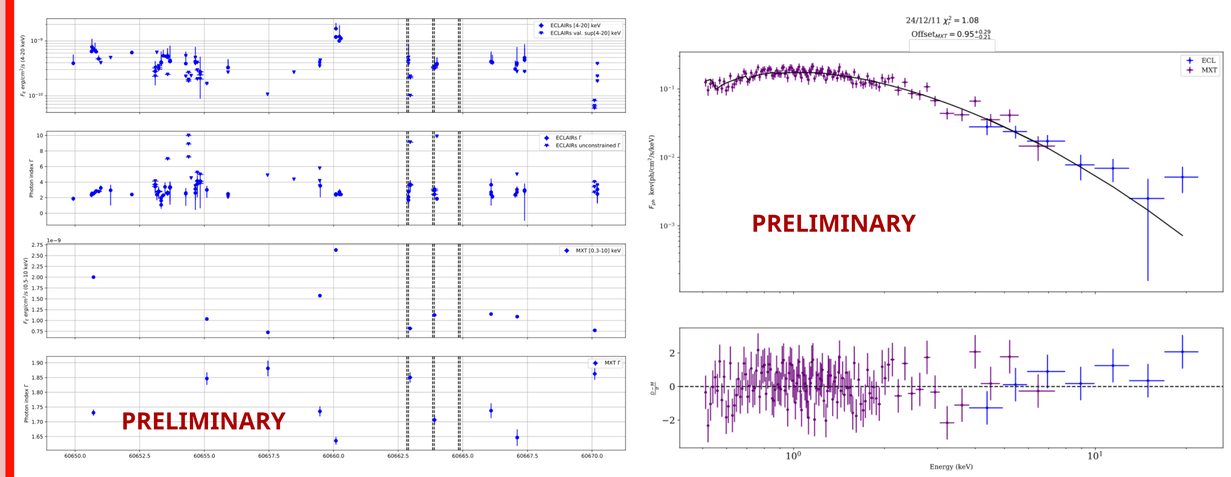
[2]Strohmayer, T. E., Markwardt, C. B., & Kuulkers, E. 2008, ApJL, 672, L37

ECLAIRs background-corrected **lightcurve** in **4-20 keV**
Background only **p-value contours** from Z_n^2 test computed in **20 second rolling time window**

MONITORING OF THE BLAZAR 1ES 1959+650

→ X-Ray flare detected on December 6th 2024 by ECLAIRs [3]
→ Regular multi-wavelength observations with ECLAIRs + MXT [4]
→ Follow-up observations by Swift [5,6]

→ **Multi-wavelength monitoring to probe acceleration processes**
→ **Harder-when-brighter behavior observed during the flare**
→ **Joint simultaneous MXT-ECLAIRs fit with log-parabola model**



[3] Coleiro A., Maggi P., Götz D., et al. 2024, The Astronomer's Telegram, 16935
[4] Foisseau A., Cangemi F., Coleiro A., et al. 2025, The Astronomer's Telegram, 16978
[5] Komossa S., Grupe D., Wei J., et al. 2024, The Astronomer's Telegram, 16941
[6] Komossa S., Grupe D., Wei J., et al. 2024, The Astronomer's Telegram, 16955