

SVOM MISSION



SVOM OBSERVATORY SCIENCE: The General Program

A. Goldwurm on behalf of the
French Working Group on SVOM Observatory (non-GRB) Science

SVOM Observatory Science



- **SVOM Observatory Science**, as opposed to **Core Science**, is dedicated to **Non-GRB Science**
- It includes all science topics that are not connected directly to Gamma-Ray Bursts
- Operationally will be covered by the **General Program (GP)** and the nominal **Target of Opportunity (ToO)** Observations: planned and unplanned observations of “non-GRB” sources
- These will cover > 70% of the SVOM nominal observing time
- Must exploit:
 - SVOM performances to detect and position variable / transient events
 - SVOM Broad-band and Multi-wavelength capabilities
 - Fast reaction to repoint and fast alert distribution system
 - Dedicated and flexible optical/IR ground based follow-up facilities

SVOM Observatory Science: Target Sources and Science Objectives



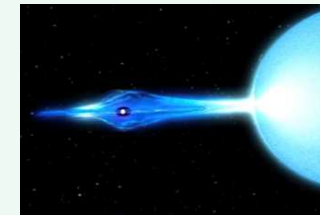
Extragalactic Compact Objects:

- AGN and Blazars
- Tidal Disruption Events
- Ultra Luminous X-ray Sources



Galactic (or LMC/SMC) Compact Objects:

- BH/NS X-ray Binaries and Transients
- Magnetars, SGRs, Isolated NS and Bright PWN
- CVs (White Dwarf binaries) and Active Stars

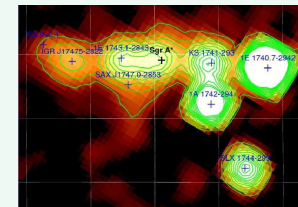


Galactic Diffuse components:

- Cosmic X-Ray Background
- Galactic Ridge X-Ray Emission

Peculiar objects and exceptional events:

- Solar Emission, Earth albedo, Aurorae, TGF ...
- Galactic SN, Sgr A* outburst, Magnetars Super-Bursts

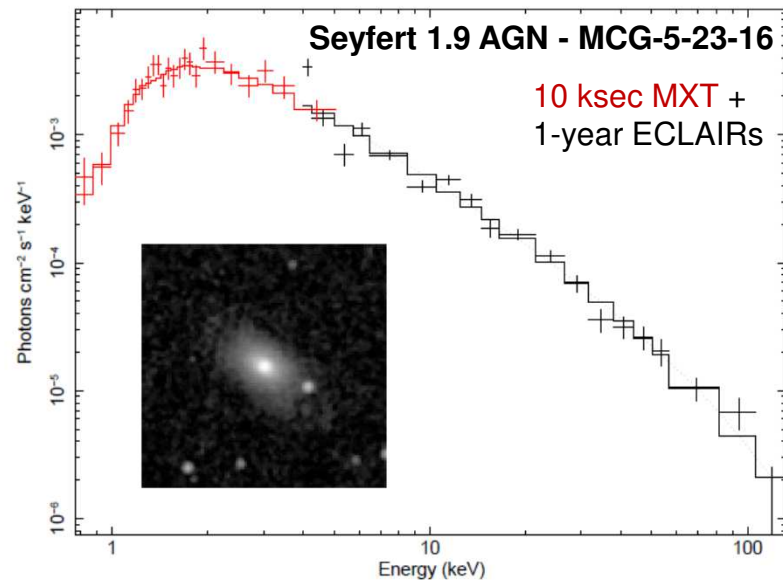


**Accretion /
Ejection
Physics**

**Matter in
Extreme
Gravitational
& Magnetic
Fields and
Densities**

**CR and
Particle
Acceleration**

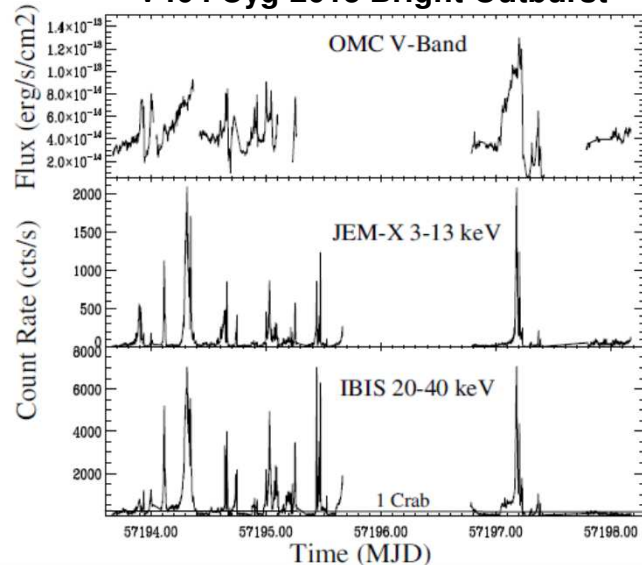
General Program and ToO Targets



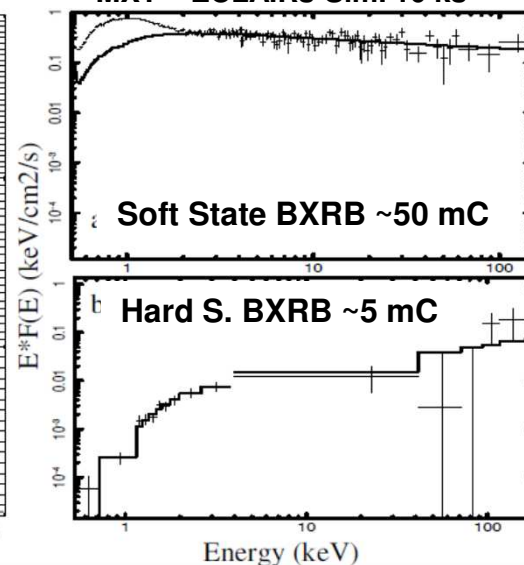
SVOM Extragalactic surveys will:

- Measure reflection, Compton hump and absorption in ~ 10 mCrab AGN
- Measure photon index and columns density in ~ 1 mCrab AGN
- Detect > 250 AGN with ECLAIRs in the first year, ~ 700 at end of mission

V404 Cyg 2015 Bright Outburst



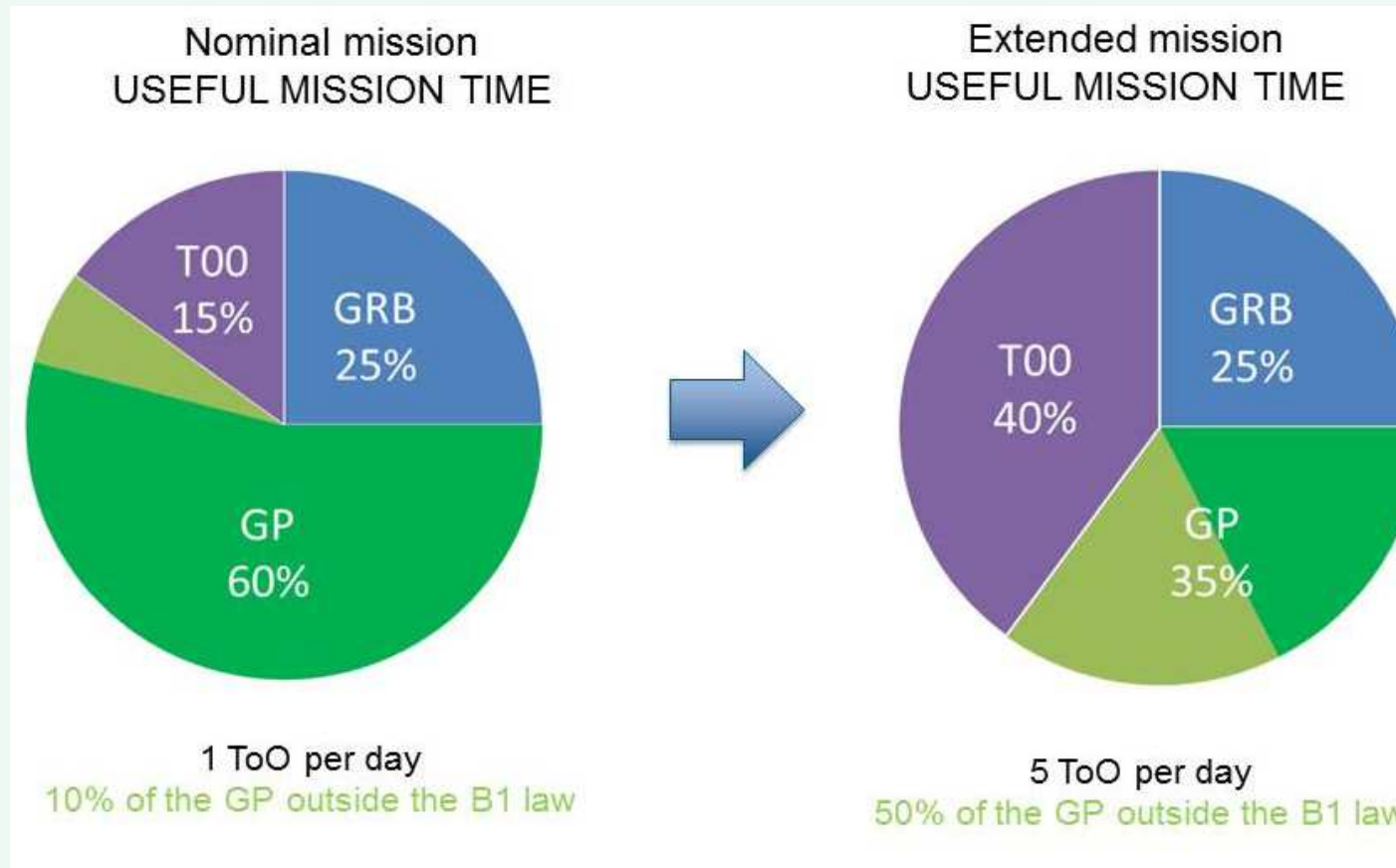
MXT – ECLAIRs Sim. 10 ks



SVOM ToO Observations of galactic transients will:

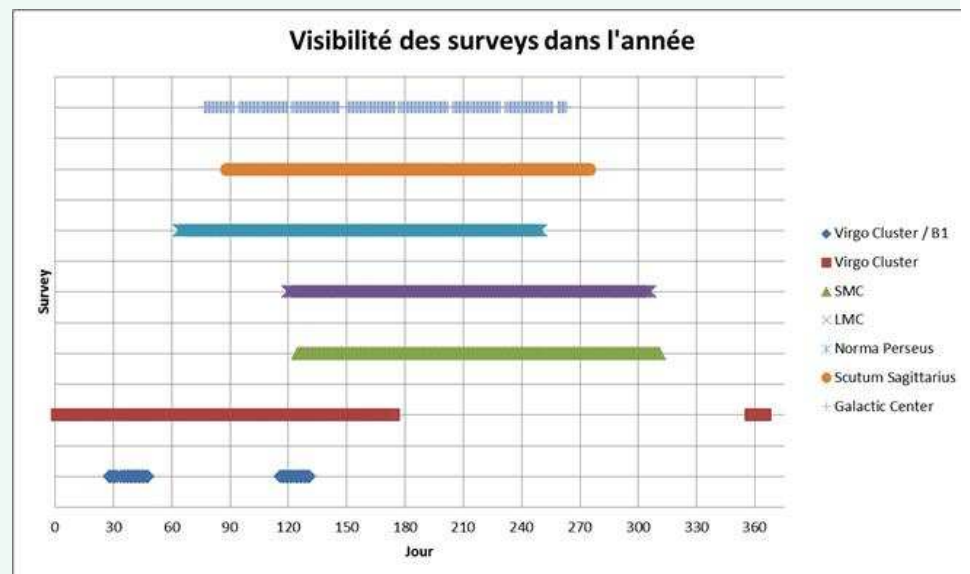
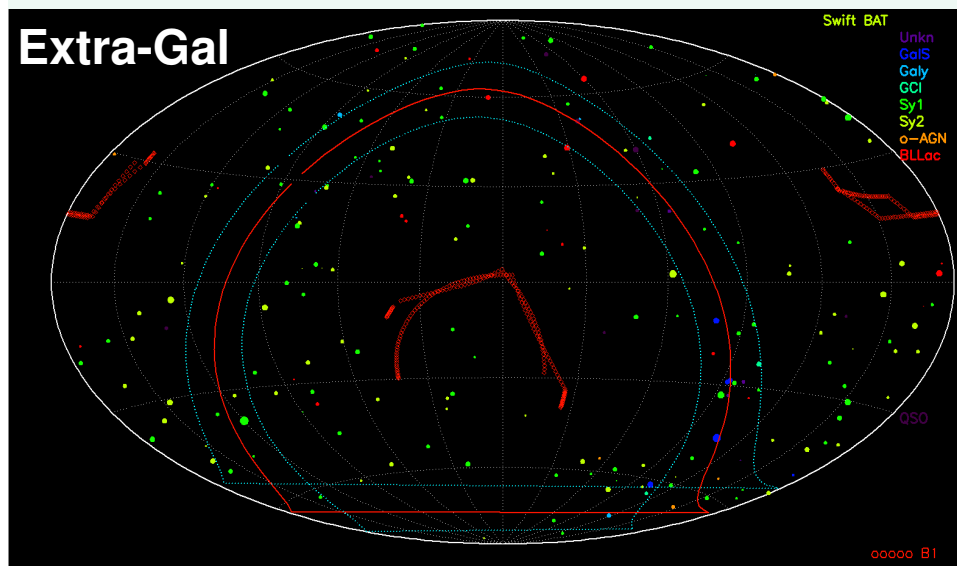
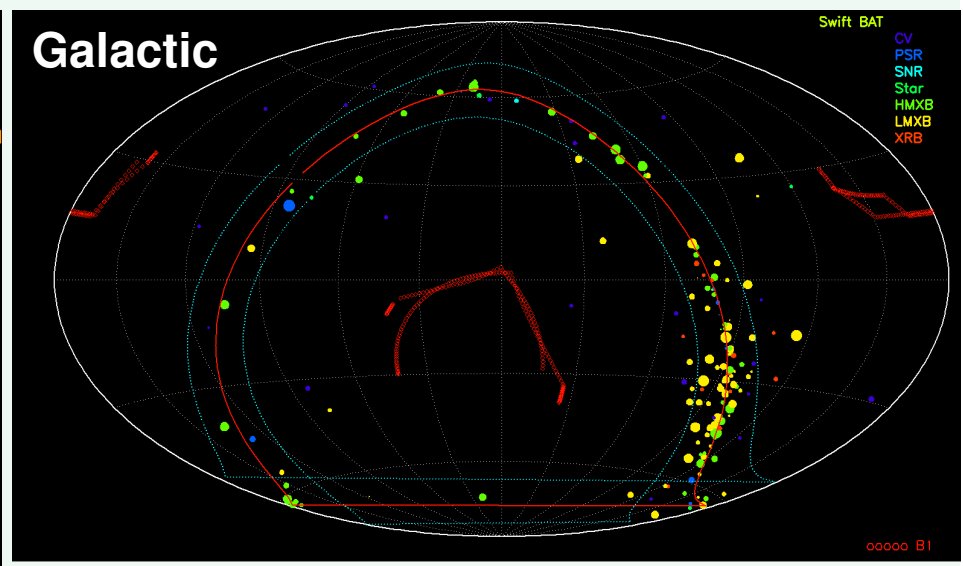
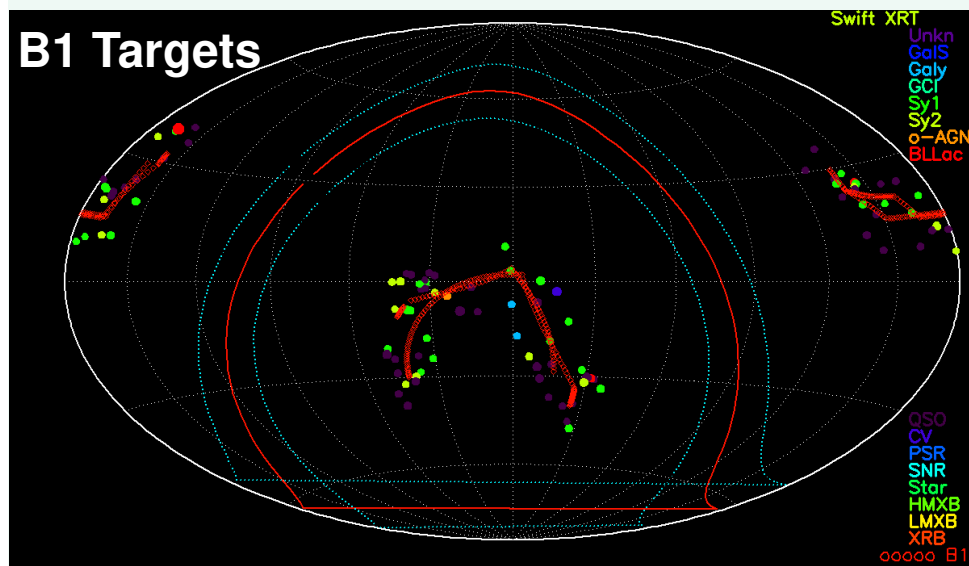
- Allow simultaneous multi- λ monitoring of XRB in outburst
- Measure variabilities of their spectral components
- Trigger multi- λ campaigns

SVOM General Program: Obs. Time



- **GP will use large part of observing time in the Nominal phase**
- **Then up to 35% in Extended mission phase when fraction of out-of-B1 will increase from 10% to about half the GPtime**

Targets of 1 year General Program



Virgo cluster survey with MXT to search for TDEs

Proposed MXT Virgo survey
(C. Motch & R. Soria):

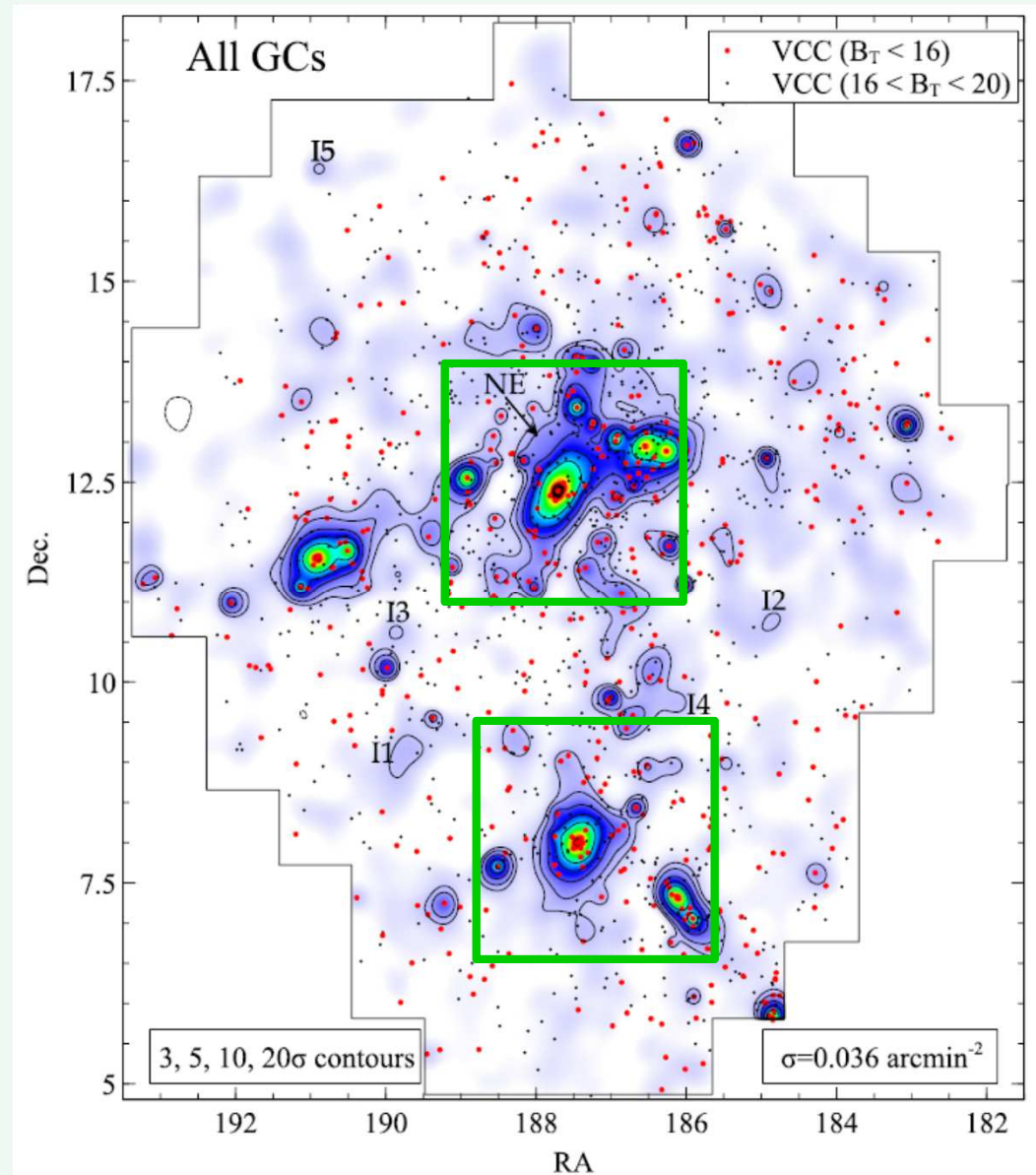
- 5 ks observations
- 2 x (3° x 3°) fields
- once a week for 5 years
- centered on M87 and M49

Virgo Cluster close to B1 att-law =>
MXT monitoring of densest Virgo regions
could significantly constrain TDE rates

Given uncertainties N. of detectable TDE

- could be as low as 2 over 5 years
- but may be up to 6 or higher

Existing high quality multi-wave data
(NGVS) will ease identifying the origin of
the TDE => eRosita survey comparison



NGVS density map of GCs, and location of identified galaxies (from Durrell+ 2014)



Expected Eclairs 1 yr - Exposure

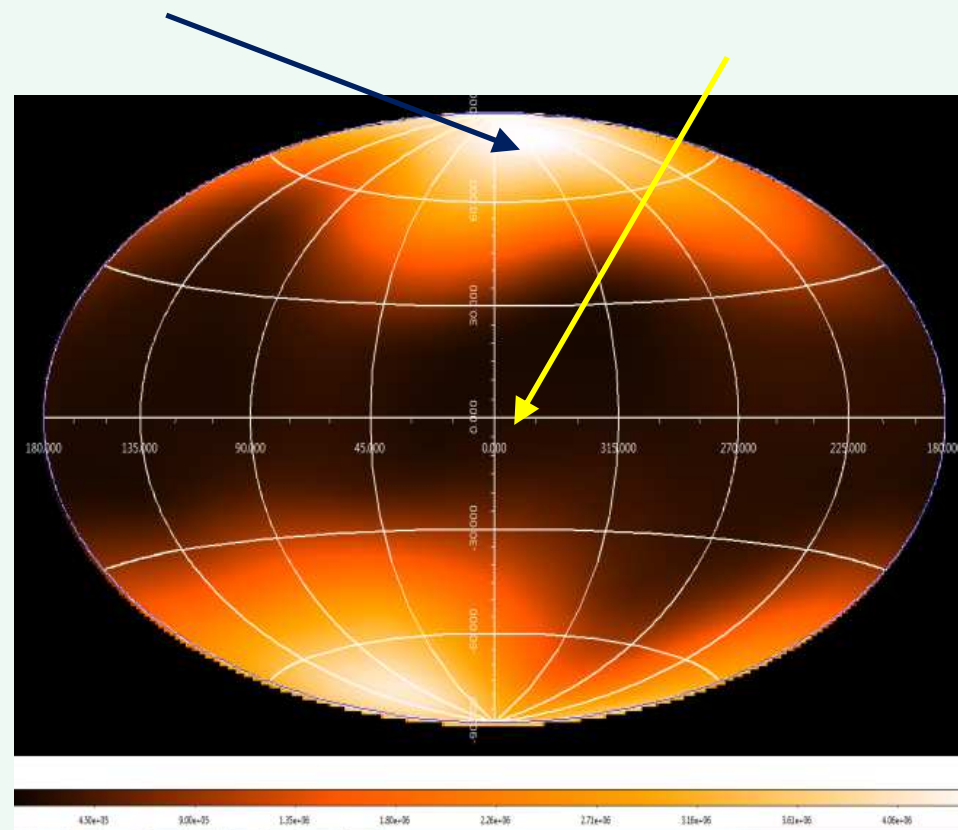
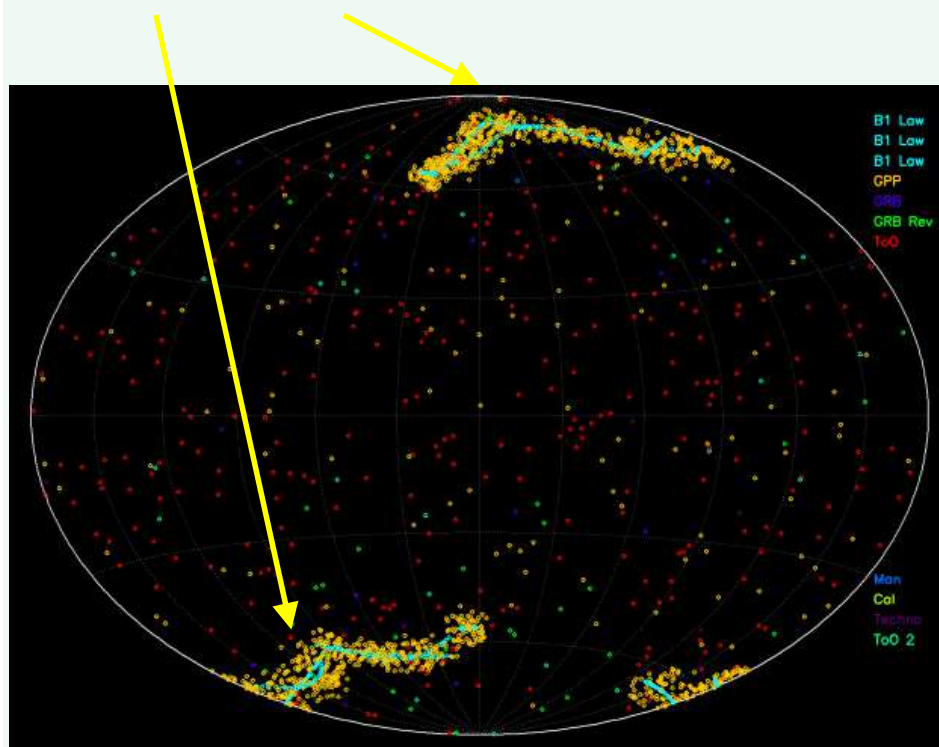


Simulation of 1 yr SVOM Observing Program

B1 Attitude law

Max Expo: 4.5 Ms

Galac. Cent: 200 Ks



SVOM GP: selection and planning



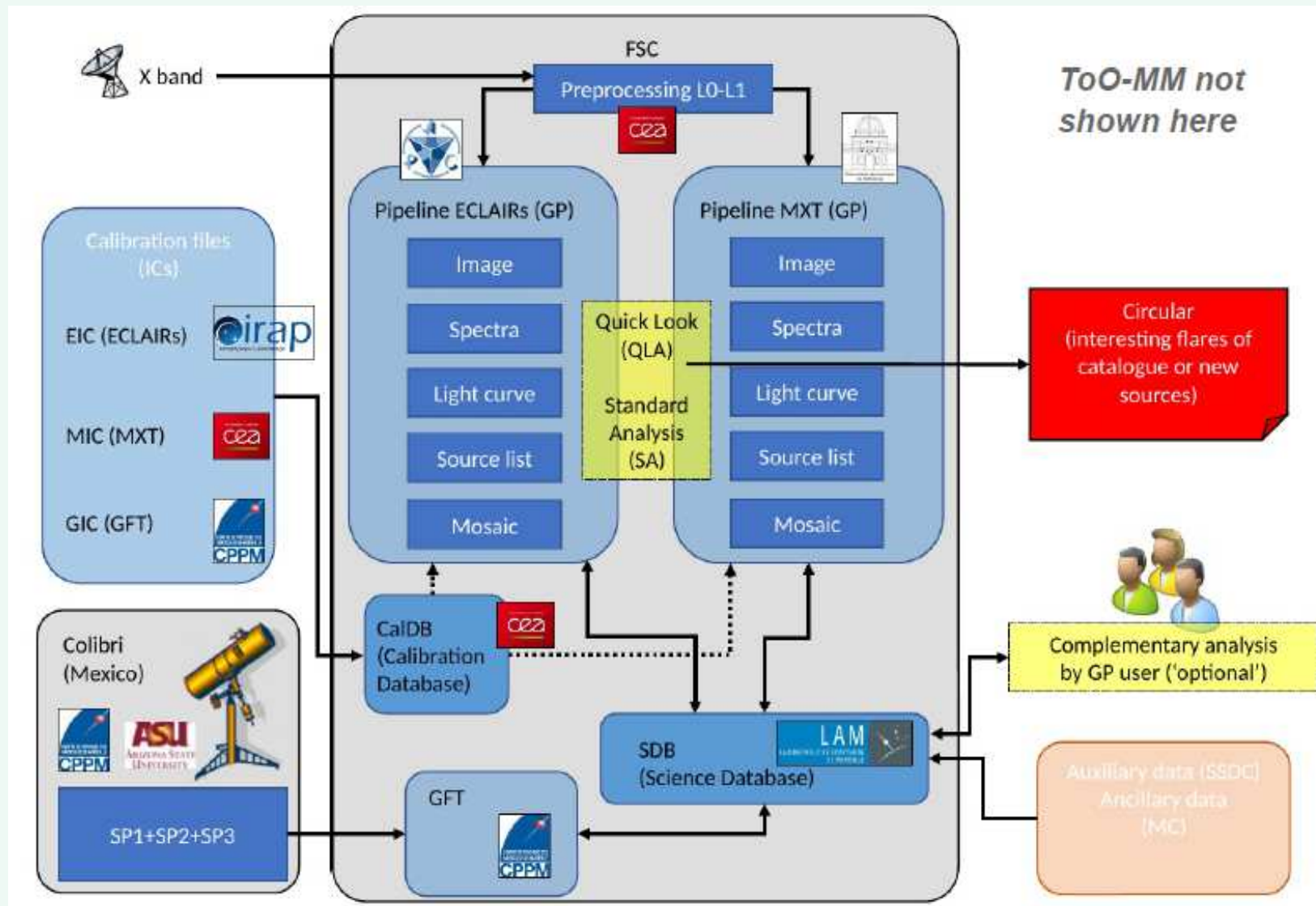
- **Selection of preplanned pointing observations**
 - AO Call for proposal of SVOM GO observations (each year)
 - Proposal System set up and handled by China
 - Open WW but proposers shall have at least 1 SVOM Co-I included
 - Selection by a TAC: scientific value but ~ 60% China 40% F-Eur
 - Priority to B1 law compatible in order to fulfill requirements
 - Programs of long surveys of interesting sky regions (e.g. Virgo Cluster)
- **GP planning and observations**
 - Long term GP defined based on TAC selection + operation constraints
 - Each week short term plan defined for next week (changes)
 - Obs. can be interrupted by GRB / ToO: GP restarts as no interruption
 - Target type A (about 50%): recovery or reschedule of lost obs. to complete the program

SVOM GP: data analysis and rights



- **GP data analysis**
 - Data are treated and analyzed in preliminary QLA to search for transient events (timescale 1-3 days from data collection)
 - Complete data standard analysis (SA) is then performed by FSC/CSC
 - SA Science Data Products are delivered to the GO PI
 - Re-analysis can be performed by GO PI through the involved SVOM Co-I (no sw delivery)
- **GP data rights**
 - Distributed data as Products (event lists, images, spectra, light-curves)
 - Data delivered to GO PI < 1 month after observation
 - Data rights for 1 yr
 - Data public after 1 yr

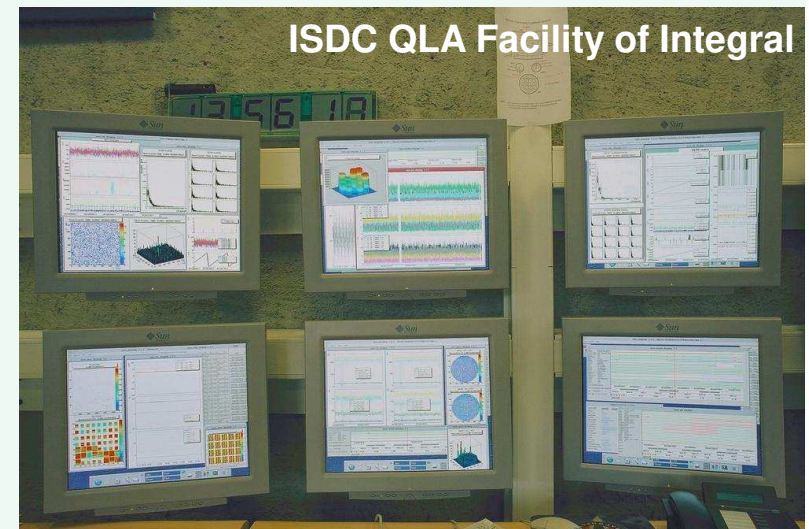
SVOM GP Data Analysis at FSGS



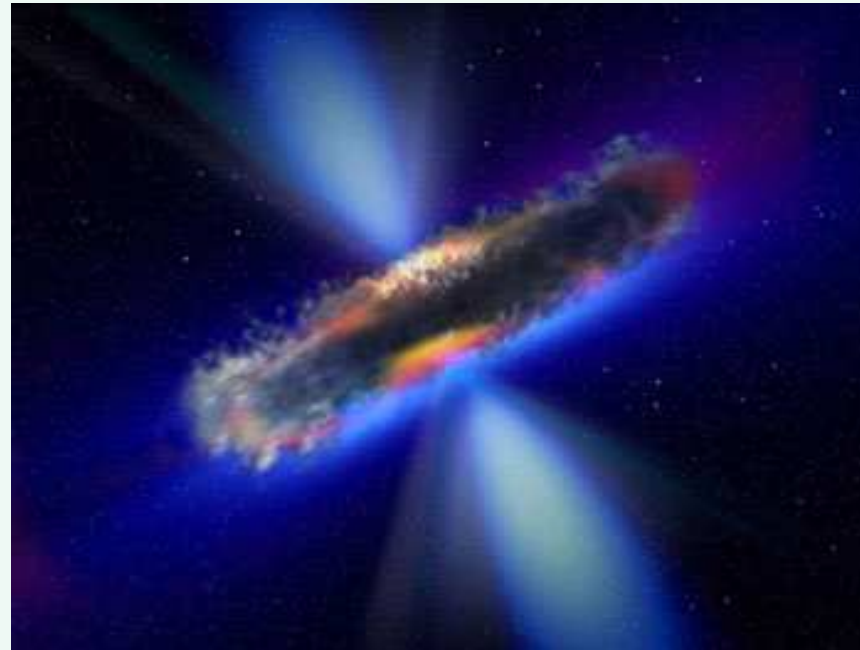
SVOM GP: Quick Look Analysis



- **X-band data** (particularly of large FoV instruments) are searched to look for transient events (Flaring-AGNs / Blazars, XRB transients, Magnetars, TDEs, Bursts, ...)
- **Requirements:**
 - Provide preliminary ToO data products within 24 hr
 - Alert community about a new transient event within 72 hr
 - Check presence of transient events from on-board or external alerts
 - Allow to rapidly trigger a new ToO
- **Process:**
 - Semi-Automatic with scientist on duty
 - Fast but not real-time
 - Imaging (Spectra/LC of target or new s.)



SVOM General Program



Thank You