



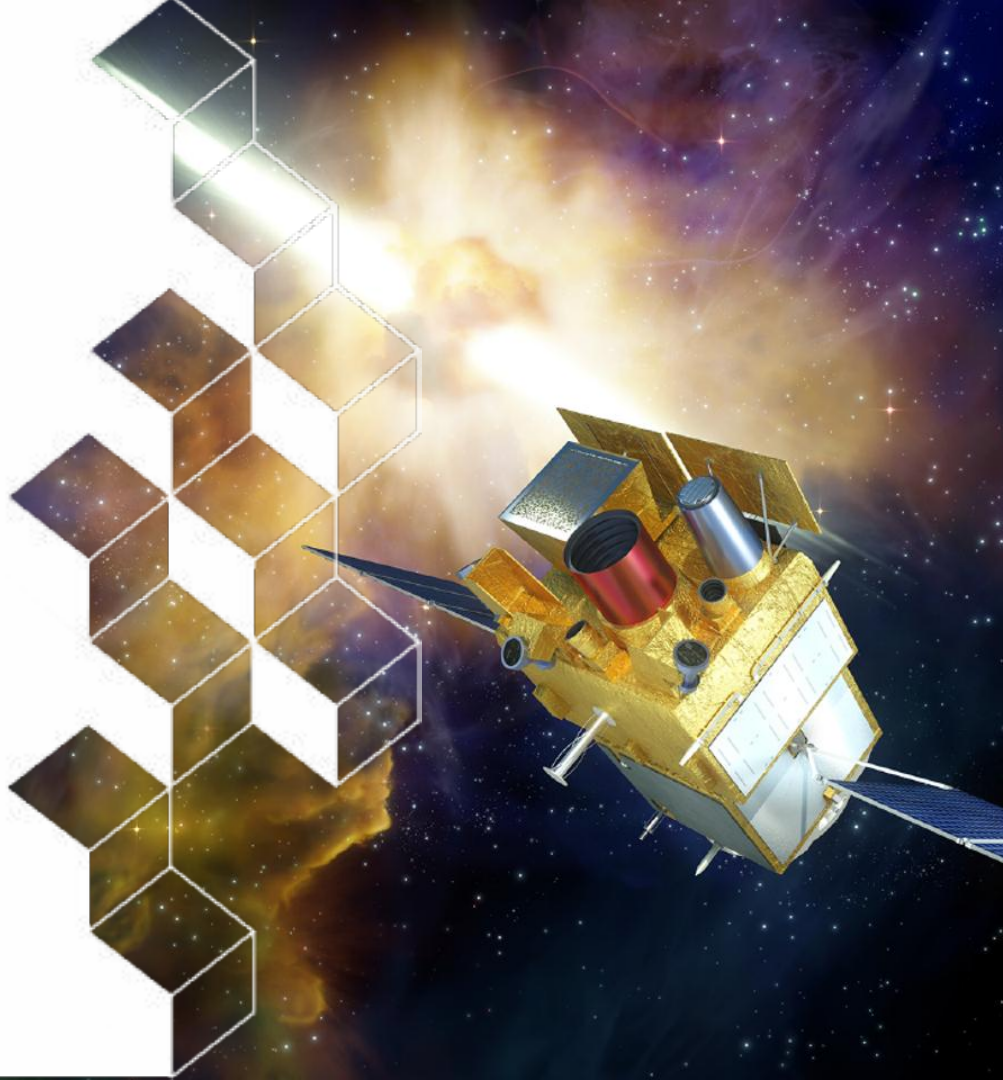
irfu



SVOM

a new mission to explore the high energy transient sky of the next decade

Damien TURPIN (CEA-Saclay)



Outlines of the talk



I- SVOM in a nutshell

II- The first 3 months of commissioning operations: current instrument status and 1st results

III- SVOM's next milestones: towards the scientific exploitation of SVOM alerts



1 ■ **SVOM in a nutshell**

Science objectives & mission profile

The Space-based multi-band astronomical Variable Object Monitor



ECLAIRS 
« The trigger camera »
Wide-field X and Gamma rays telescope
Spectral range : 4 keV – 150 keV
Localization accuracy < 12arcmin

MXT  CEA irfu
“The Micro-channel X-ray Telescope”
Narrow-field X-ray telescope
Spectral range : 0.2 keV – 10 keV
Localization accuracy < 1arcmin

GRM 
“The Gamma-Ray burst Monitor”
X-rays and Gamma-rays detectors
15 keV – 5 MeV
Localization accuracy < 5°

VT 
“The Visible Telescope”
Narrow-field visible telescope
Ritchey Chretien $\Phi=400\text{mm}$
Localization accuracy < 1arcsec

Launch : 2024, June 22nd for 3 (nominal) +2 (extended) years

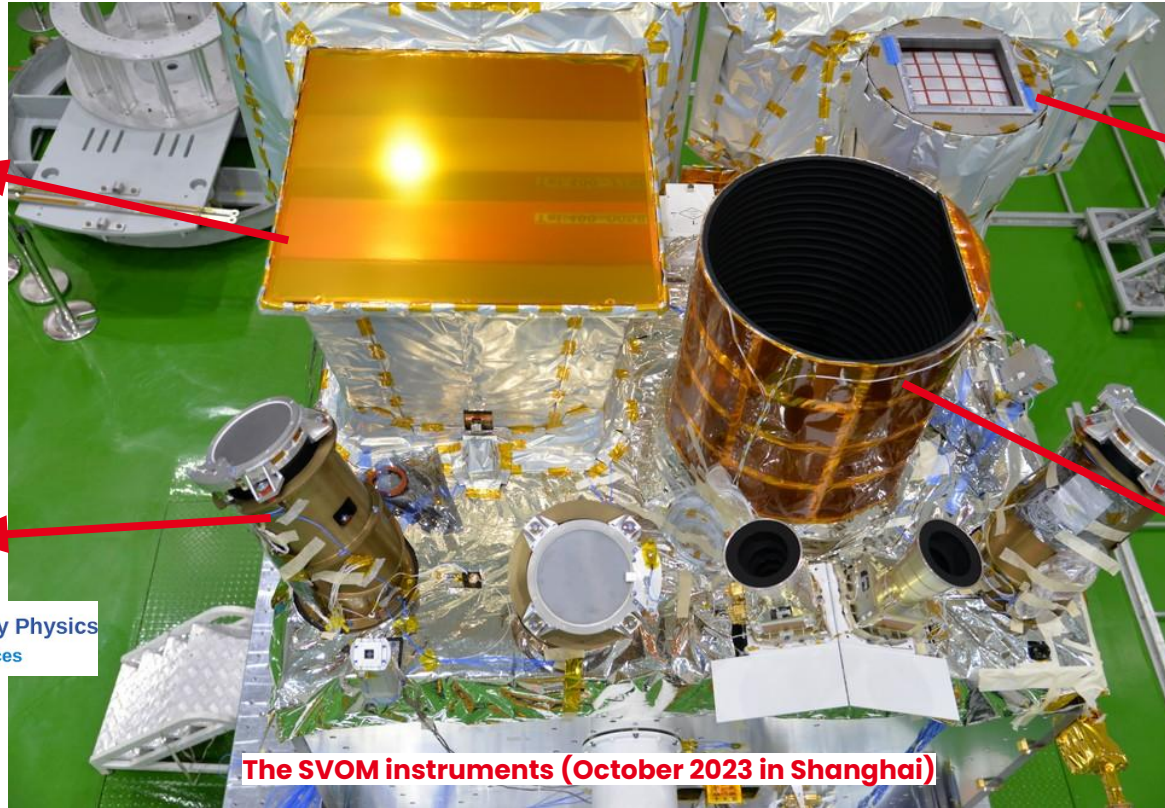


The Space-based multi-band astronomical Variable Object Monitor



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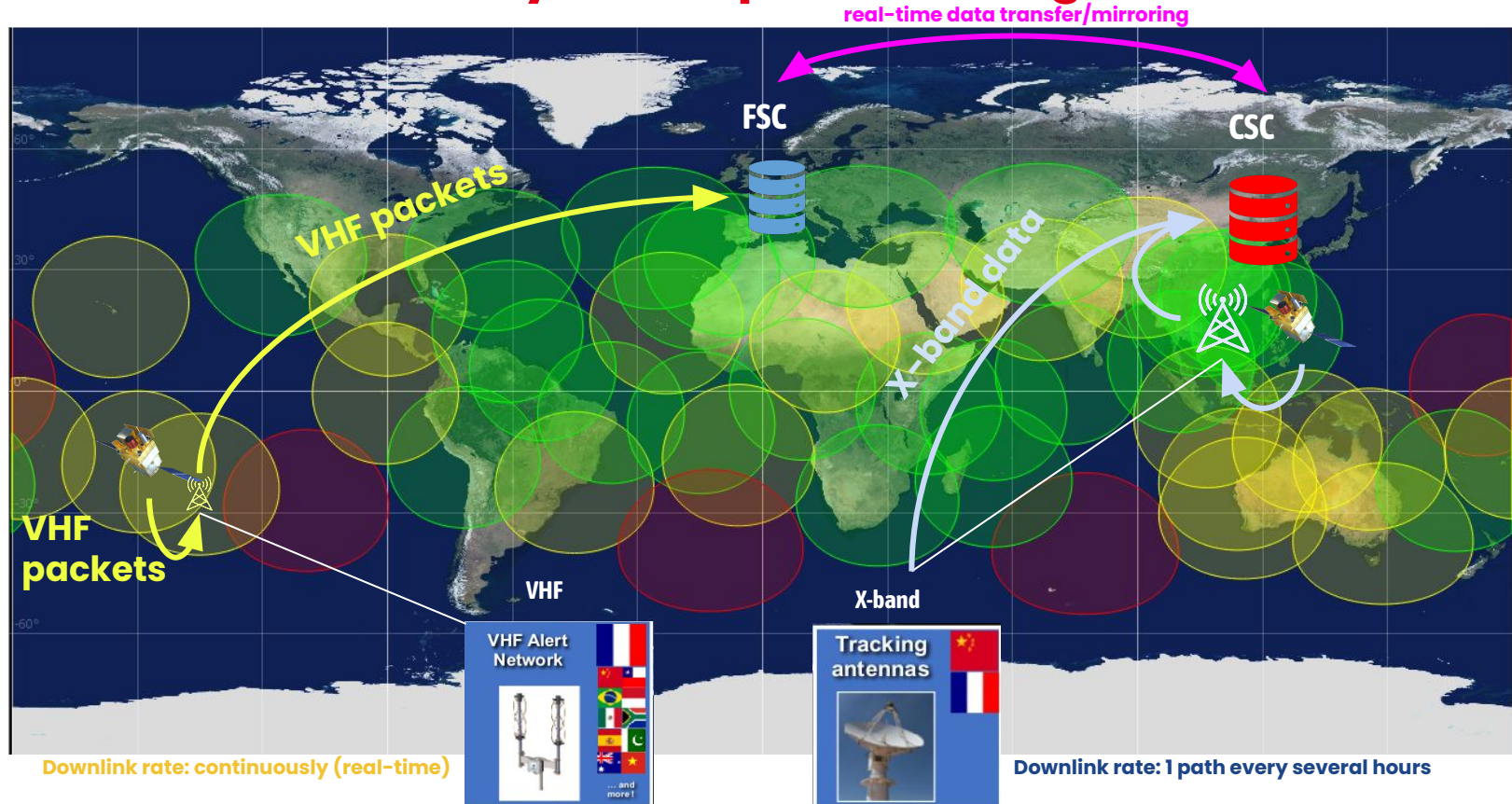
«The Visible Telescope»
Narrow-field visible telescope
Ritchey Chretien $\Phi=400\text{mm}$
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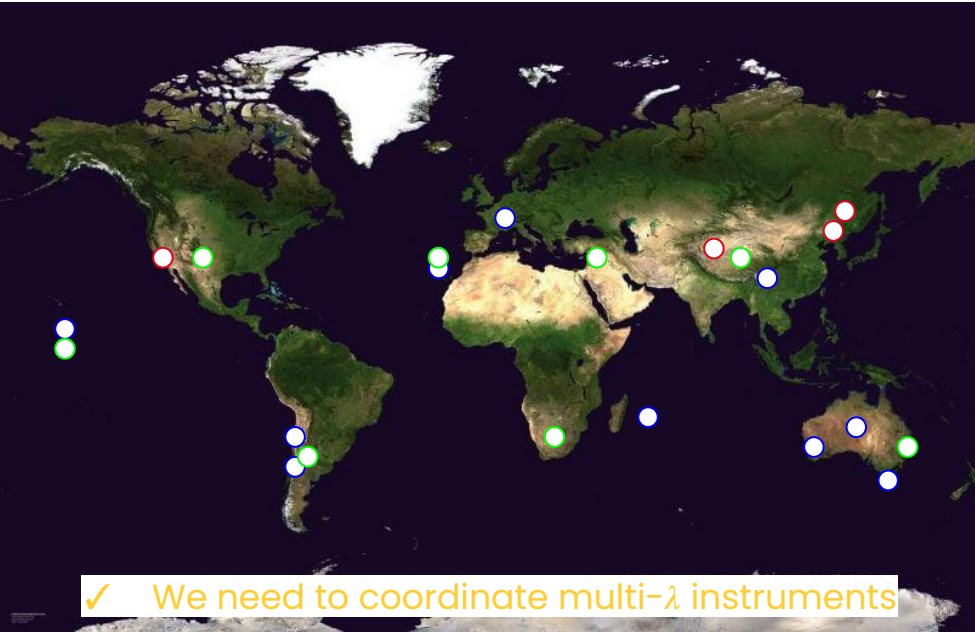
Institute of High Energy Physics
Chinese Academy of Sciences

The SVOM instruments (October 2023 in Shanghai)

The SVOM machinery from space to the ground

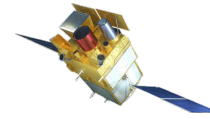


The SVOM follow-up system on-ground

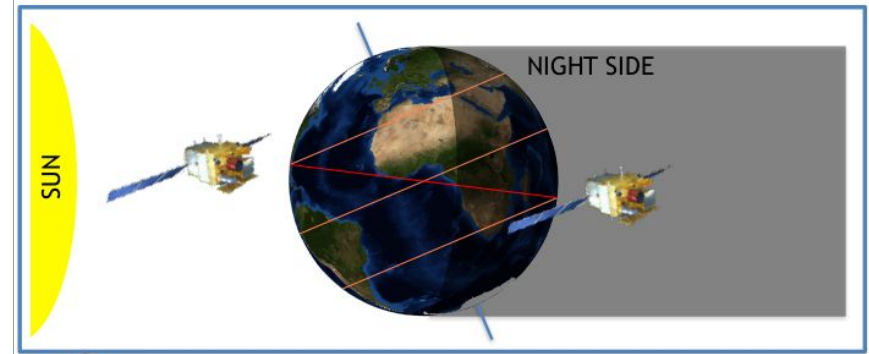


○ Official Partners ○ Associate Partners

○ LCOGT (purchase of time)



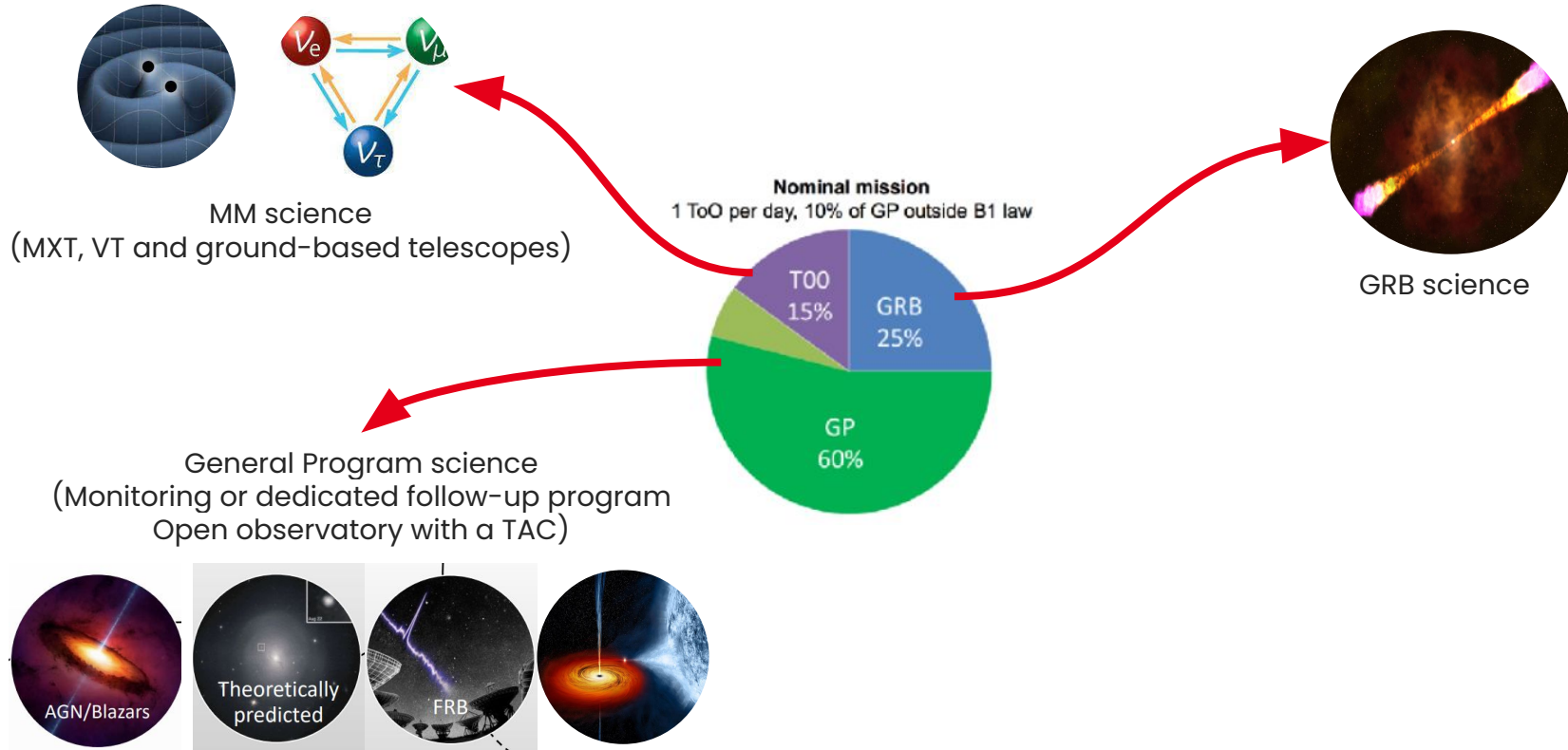
SVOM anti-solar pointing, LEO 635 km, $\sim 30^\circ$ inclination angle (1 orbit ~ 90 min)



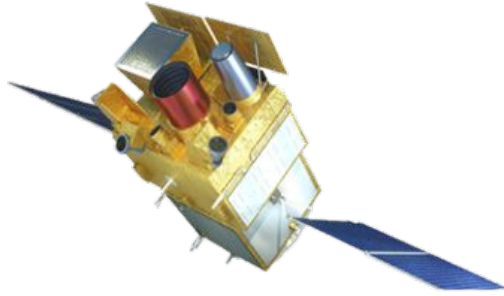
The SVOM pointing strategy is optimised for prompt follow-up response on-ground (space-ground synergies)



The scientific programs of SVOM (nominal mission)



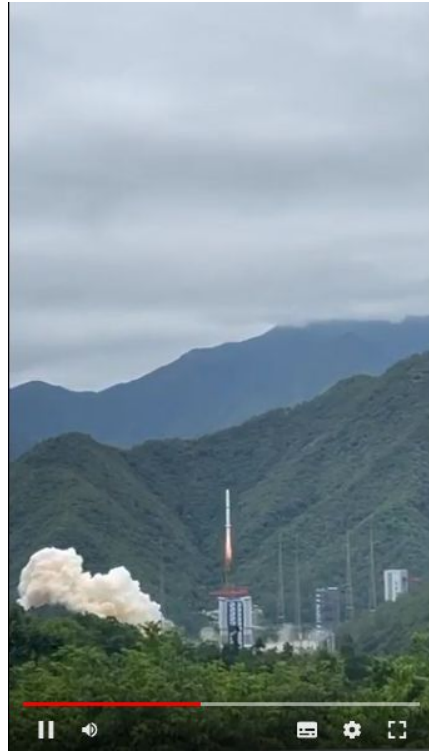
The SVOM innovations in a nutshell



- **A 4 keV low energy trigger threshold**
(new space of discoveries like for EP/WXT (WXT = 0.5–4 keV see Erik Kuulkers talk))
- **A full spectral coverage of the burst's emission from 4 keV – 5 MeV**
(A kind of Swift/BAT + Fermi GBM capabilities in the same platform)
- **A large FoV ($1^\circ \times 1^\circ$) for the MXT x-ray telescope**
(allows to monitor large part of the sky in one shot)
- **A sensitive 40cm telescope operating in blue and red channels**
(largely inspired by the Swift/UVOT)
- **A pointing strategy optimised to coordinate fast follow-up observations during night time**
(to maximise the number of redshift measured for each detected bursts)
- **A network of robotic telescopes (0.2 – 1.3 m) dedicated to (promptly) respond to the SVOM alerts**
(to systematically catch the early optical/IR emission of SVOM's bursts)

SVOM is flying!

2024, June 22nd Xichang launch site (China) - 3km away from the rocket

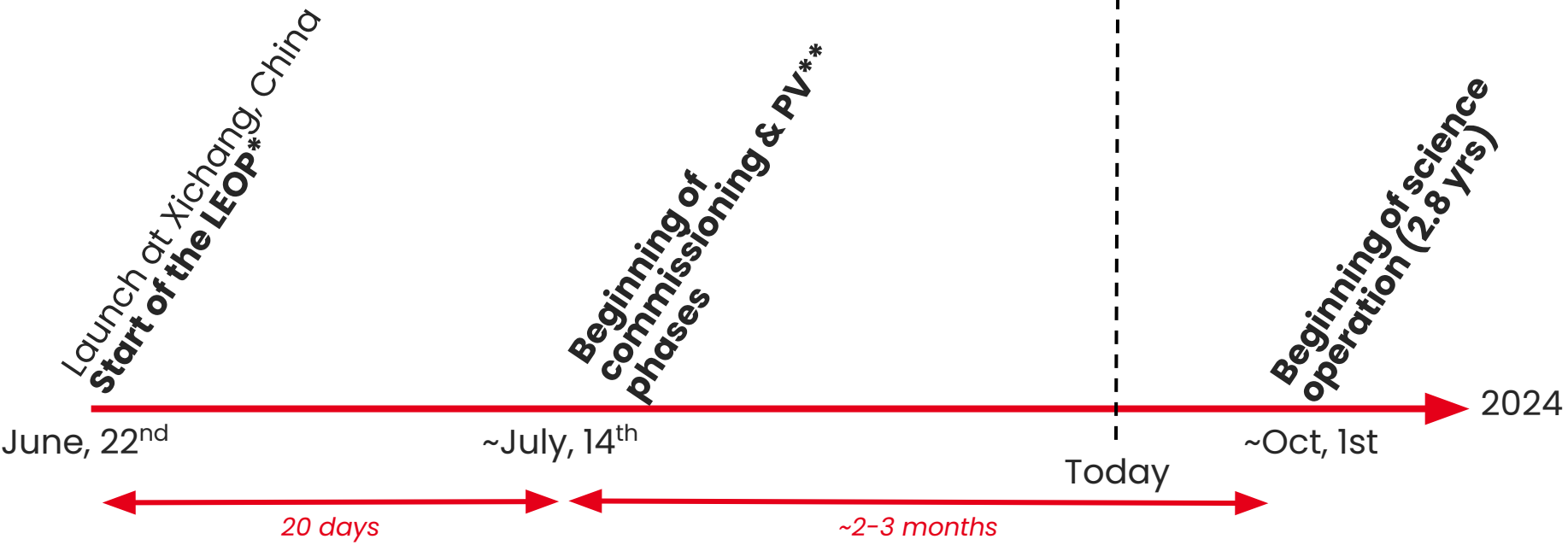




2 ■ **SVOM after its first 3 months**

Instrument status and 1st results of the commissioning phase

The post-launch calendar



*Launch and Early Orbit Phase
** Performance verification



The instrument status

- **ECLAIRS (PI: J-L. Atteia / O. Godet at IRAP, Toulouse, France)**
Since August 7th, in full time OPER mode. Few times off due to several constraints of the platform. Optimizing the trigger parameters, localisation accuracy and SAA cut-off zones.
- **GRM (PI: Shaolin Xiong at IHEP, Beijing, China)**
Since June 25th, in full time OPER mode.
Optimizing the trigger parameters, the rough localisation software (when 3 GRDs detect the source), the SAA cut-off zones and solar flares + particle events signature identification. Calibration procedures on-going.
- **MXT (PI: D. Götz at CEA-Saclay, Paris-Saclay, France)**
Since beginning of July, in full time OPER mode. Optimizing the instrument parameter configuration, the on-board localisation accuracy and energy calibration
- **VT (PI: Y. Qiu at NAOC, Beijing, China)**
Since mid-July, in full time OPER mode. Astrometric and photometric calibration and performance tests. ToO observation already performed
- **VHF (PI: CNES + H. Louvin/A. Formica at CEA-Saclay, Paris-Saclay, France)**
Works smoothly since the launch date. Alert sequences + platform communication received in real-time.
~ 84% of the alert notices generated in less than 30 sec post alert time (median delay ~13s). Better than the requirement. Some delays are sometimes induced by geographical holes between 2 VHF antenna (ex: hole in the Pacific Ocean)
- **Satellite platform (Mission center at NSSC, China)**
Orbit parameters are stable, the solar panels are well oriented and provide the power supply as expected, the pointing accuracy is totally consistent with the requirements. Automatic slew triggered by an on requested alert has been successfully tested on 2024, August 30th

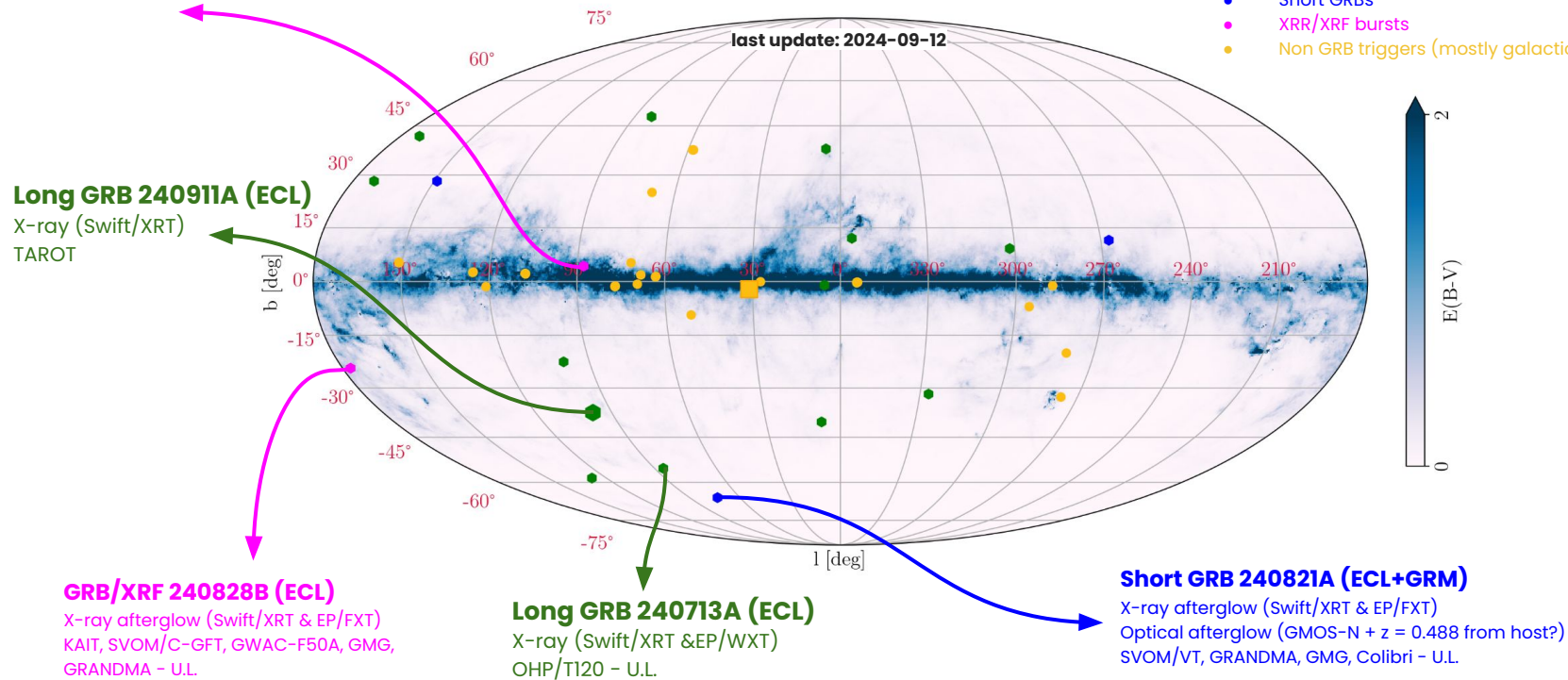
The first bursts of SVOM

GRB/XRF 240819A (ECL)

X-ray afterglow (Swift/XRT & EP/FXT)
KAIT optical follow-up - U.L.

33 GRB + 38 non GRB triggers
since launch 2024 June, 22nd

- Long GRBs
- Short GRBs
- XRR/XRF bursts
- Non GRB triggers (mostly galactic x-ray binaries)



The first bursts of SVOM

4 GRBs

- 3 GRM
- 1 ECLAIRS+GRM (GRB 240713A)

29 GRBs

- 23 GRM only
- 3 ECLAIRS (GRB 240819A, 240828B, 240911A)
- 3 ECLAIRS + GRM (GRB 240814A, 240821A, 240914A)

> 50 GCNC sent for detection or follow-up reports

The SVOM community is already very active

GCN Circular 36805

Subject The first three GRBs detected by SVOM: GRB 240627B, GRB 240629A and GRB 240702A
Date 2024-07-03T03:46:41Z
From Shaolin Xiong at IHEP-xiongsl@ihep.ac.cn
Via Web form

SVOM/GRM team: Yong-Wei Dong, Jiang-Tao Liu, Shi-Jie Zheng, Wen-Jun Tan, Jian-Chao Sun, Chen-Wei Wang, Jiang He, Min Gao, Hao-Xuan Guo, Yue Huang, Lu Li, Yong-Fe Li, Hong-Wei Liu, Xin Liu, Hao-Li Shi, Li-Ming Song, You-Li Tuo, Hao-Xi Wang, Jin Wang, Jin-Zhou Wang, Ping Wang, Rui-Jie Wang, Yu-Xi Wang, Bo-Bing Wu, Shao-Lin Xiong, Jian-Ying Ye, Yi-Tao Yin, Wen-Hui Yu, Fan Zhang, Li Zhang, Peng Zhang, Shuang-Nan Zhang, Wen-Long Zhang, Yan-Ting Zhang, Shu-Min Zhao, Xiao-Yun Zhao, Chao Zheng (IHEP), Maria-Grazia Bernardini (LUPM/INAF-OAB), Laurent Bouchet (IRAP), David Corre (CEA), Patrick Maeght (LUPM), Frédéric Piron (LUPM), Jingwei Wang (IAP)

SVOM J5WG: Jian-Yan Wei (NAOC), Bertrand Cordier (CEA), Shuang-Nan Zhang (IHEP), Stéphane Bassa (LAMI), Jean-Luc Atteila (IRAP), Arnaud Claret (CEA), Zi-Gao Dai (USTC), Frédéric Daigne (IAP), Jin-Song Deng (NAOC), Andrea Goldwurm (APC), Diego Götz (CEA), Xu-Hui Han (NAOC), Cyril Lachaud (APC), En-Wei Liang (GXU), Yu-Let Qiu (NAOC), Susanna Vergani (Obs.Paris), Jing Wang (NAOC), Chao Wu (NAOC), Li-Ping Xin (NAOC), Bing Zhang (UNLV)

report on behalf of the SVOM team:

GCN Circular 36906

Subject GRB 240713A: 30th GRB observation
Date 2024-07-03T13:30:26Z
From karmeg@hep.ac.cn
Via Web form

SVOM/GRM team: Wen-Jun Tan, Yong-Wei Dong, Jiang-Tao Liu, Shi-Jie Zheng, Jian-Chao Sun, Chen-Wei Wang, Jiang He, Rui Gao, Hao-Xuan Guo, Yue Huang, Lu Li, Yong-Fe Li, Hong-Wei Liu, Xin Liu, Hao-Li Shi, Li-Ming Song, You-Li Tuo, Chen-Wei Wang, Hao-Xi Wang, Jin Wang, Jin-Zhou Wang, Ping Wang, Rui-Jie Wang, Yu-Xi Wang, Bo-Bing Wu, Shao-Lin Xiong, Jian-Ying Ye, Yi-Tao Yin, Wen-Hui Yu, Fan Zhang, Li Zhang, Peng Zhang, Shuang-Nan Zhang, Wen-Long Zhang, Yan-Ting Zhang, Shu-Min Zhao, Xiao-Yun Zhao, Chao Zheng (IHEP), Maria-Grazia Bernardini (LUPM/INAF-OAB), Laurent Bouchet (IRAP), David Corre (CEA), Patrick Maeght (LUPM), Frédéric Piron (LUPM), Jingwei Wang (IAP)

SVOM J5WG: Jian-Yan Wei (NAOC), Bertrand Cordier (CEA), Shuang-Nan Zhang (IHEP), Stéphane Bassa (LAMI), Jean-Luc Atteila (IRAP), Arnaud Claret (CEA), Zi-Gao Dai (USTC), Frédéric Daigne (IAP), Jin-Song Deng (NAOC), Andrea Goldwurm (APC), Diego Götz (CEA), Xu-Hui Han (NAOC), Cyril Lachaud (APC), En-Wei Liang (GXU), Yu-Let Qiu (NAOC), Susanna Vergani (Obs.Paris), Jing Wang (NAOC), Chao Wu (NAOC), Li-Ping Xin (NAOC), Bing Zhang (UNLV)

report on behalf of the SVOM team:

GCN Circular 36854

Subject GRB240713A: The first probable GRB Located on-Board SVOM by ECLAIRS
Date 2024-07-13T11:07:40Z
From Jean-Luc Atteila at IRAP-iateila@irap.omp.eu
Via Web form

Stéphane Schanne (CEA), Olivier Godet (IRAP) on behalf of the ECLAIRS collaboration

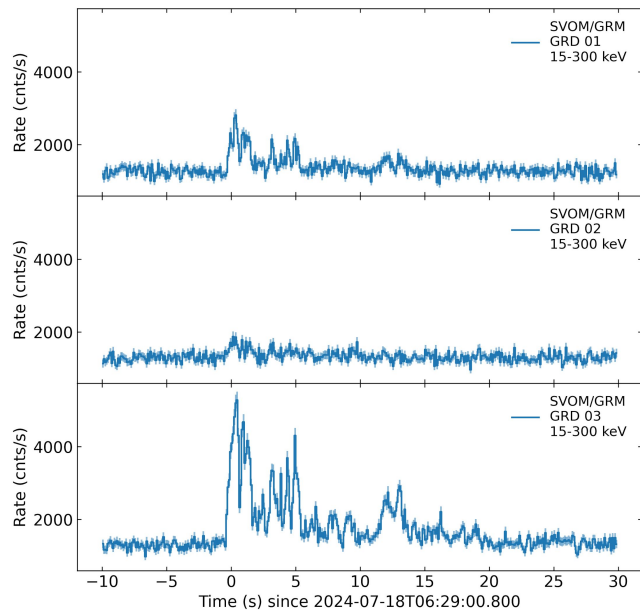
and SVOM J5WG: Jian-Yan Wei (NAOC), Bertrand Cordier (CEA), Shuang-Nan Zhang (IHEP), Stéphane Bassa (LAMI), Jean-Luc Atteila (IRAP), Arnaud Claret (CEA), Zi-Gao Dai (USTC), Frédéric Daigne (IAP), Jin-Song Deng (NAOC), Andrea Goldwurm (APC), Diego Götz (CEA), Xu-Hui Han (NAOC), Cyril Lachaud (APC), En-Wei Liang (GXU), Yu-Let Qiu (NAOC), Susanna Vergani (Obs.Paris), Jing Wang (NAOC), Chao Wu (NAOC), Li-Ping Xin (NAOC), Bing Zhang (UNLV)



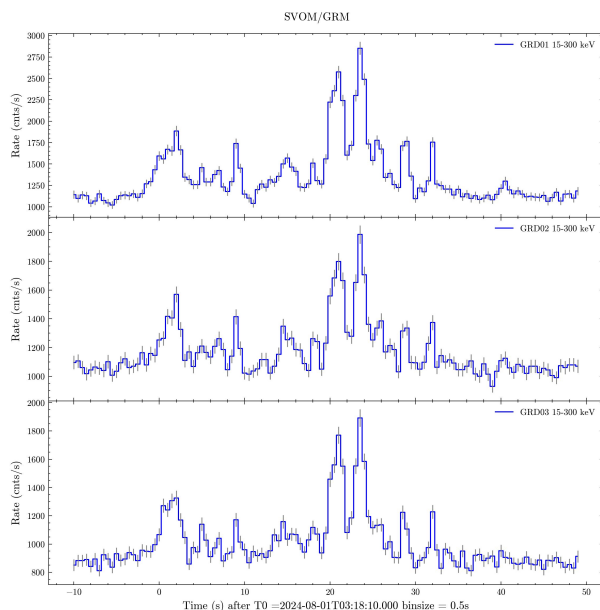
The first bursts of SVOM (collection of light curves)



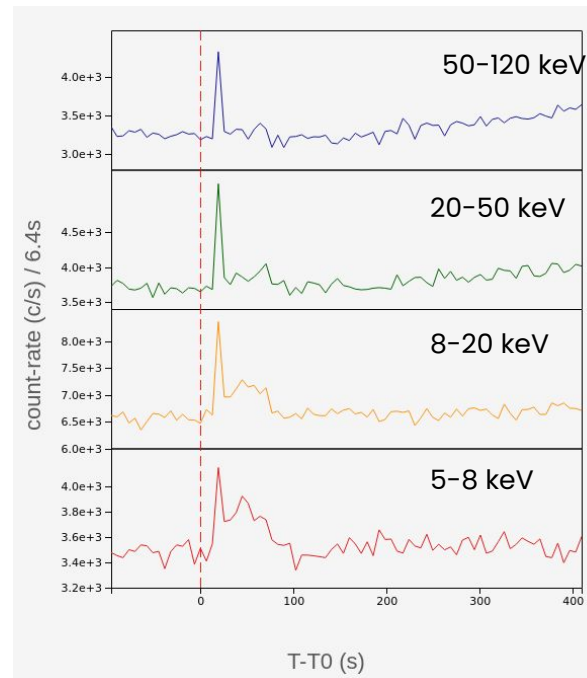
Long GRB 240718A (GRM)



Long GRB 240801A (GRM)



Short +EE GRB 240821A (ECL)

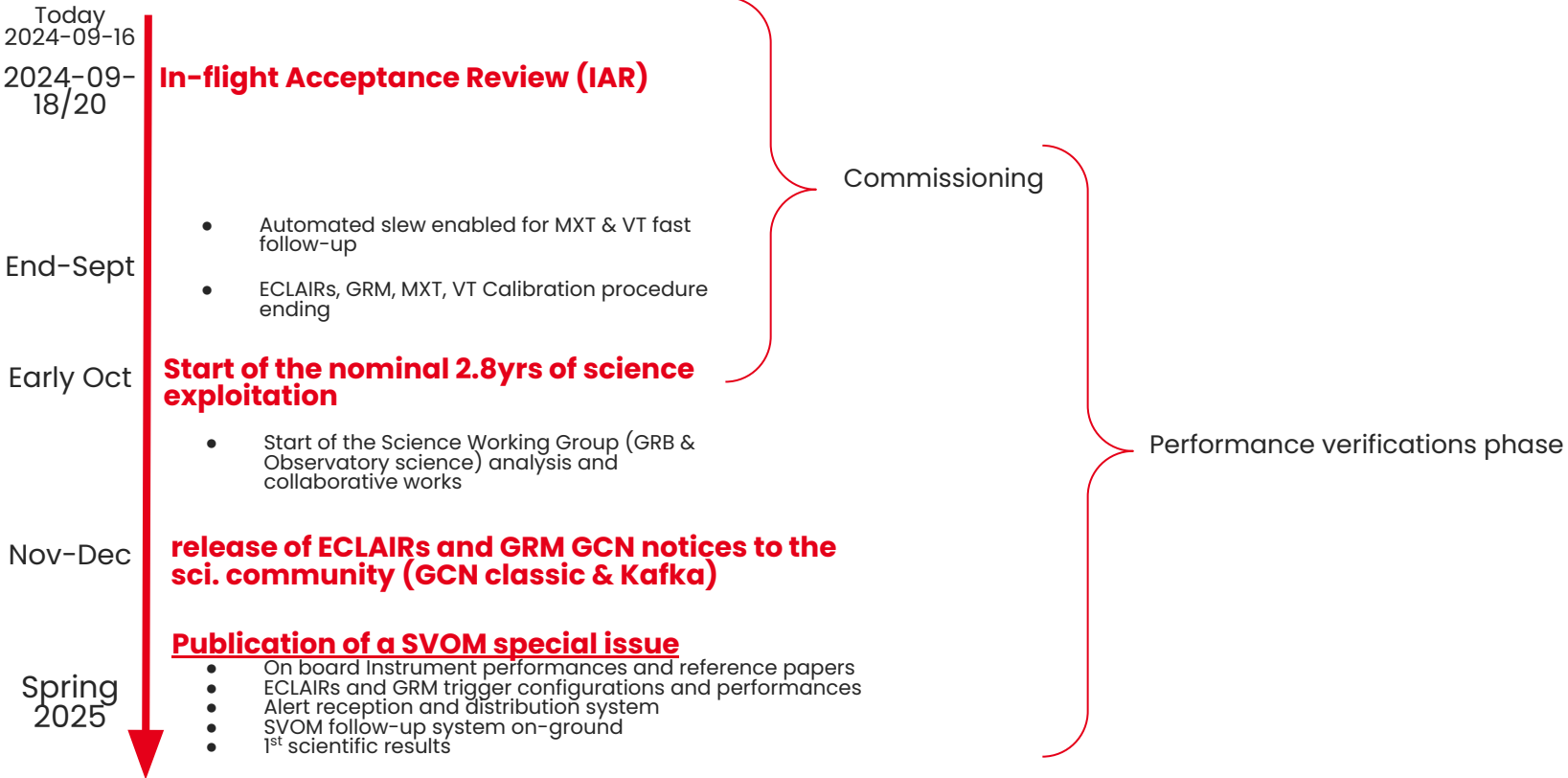




3 ■ SVOM's next milestones

A path towards the scientific exploitation of the SVOM alerts

Calendar of the next months



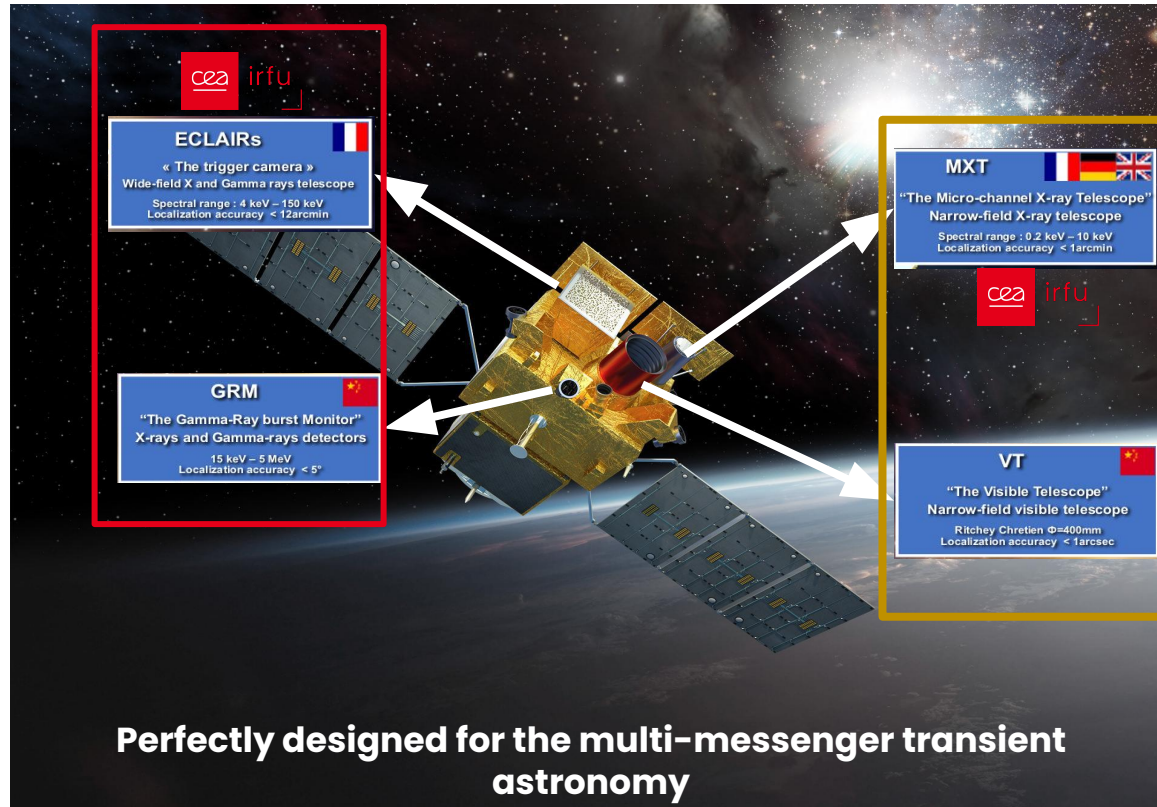


4 ■ Back-up slides

The Space-based multi-band astronomical Variable Object Monitor

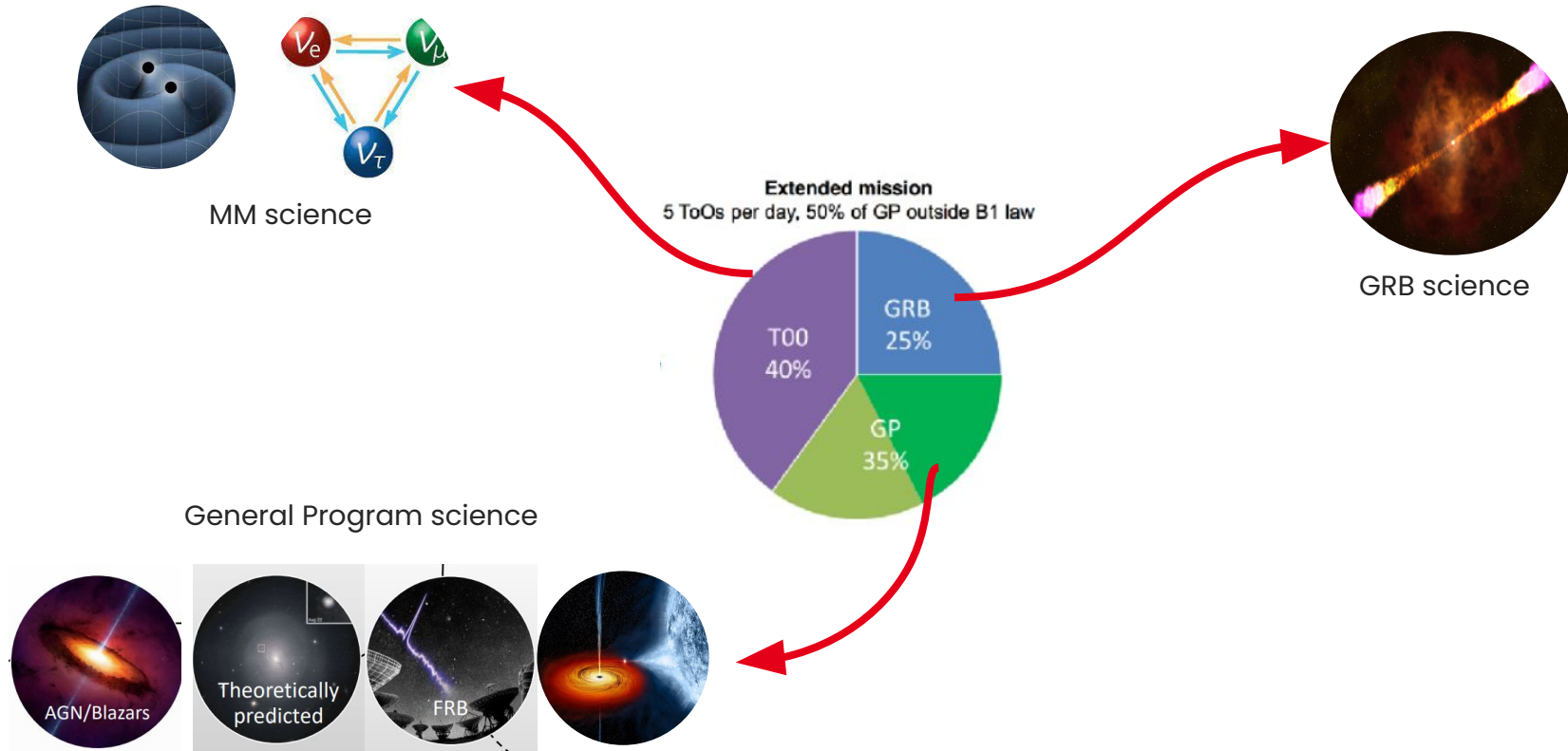


- ✓ We need large FoV instrument
- ✓ We want to detect sources in the keV-MeV energy domain
- ✓ we need real-time trigger capabilities

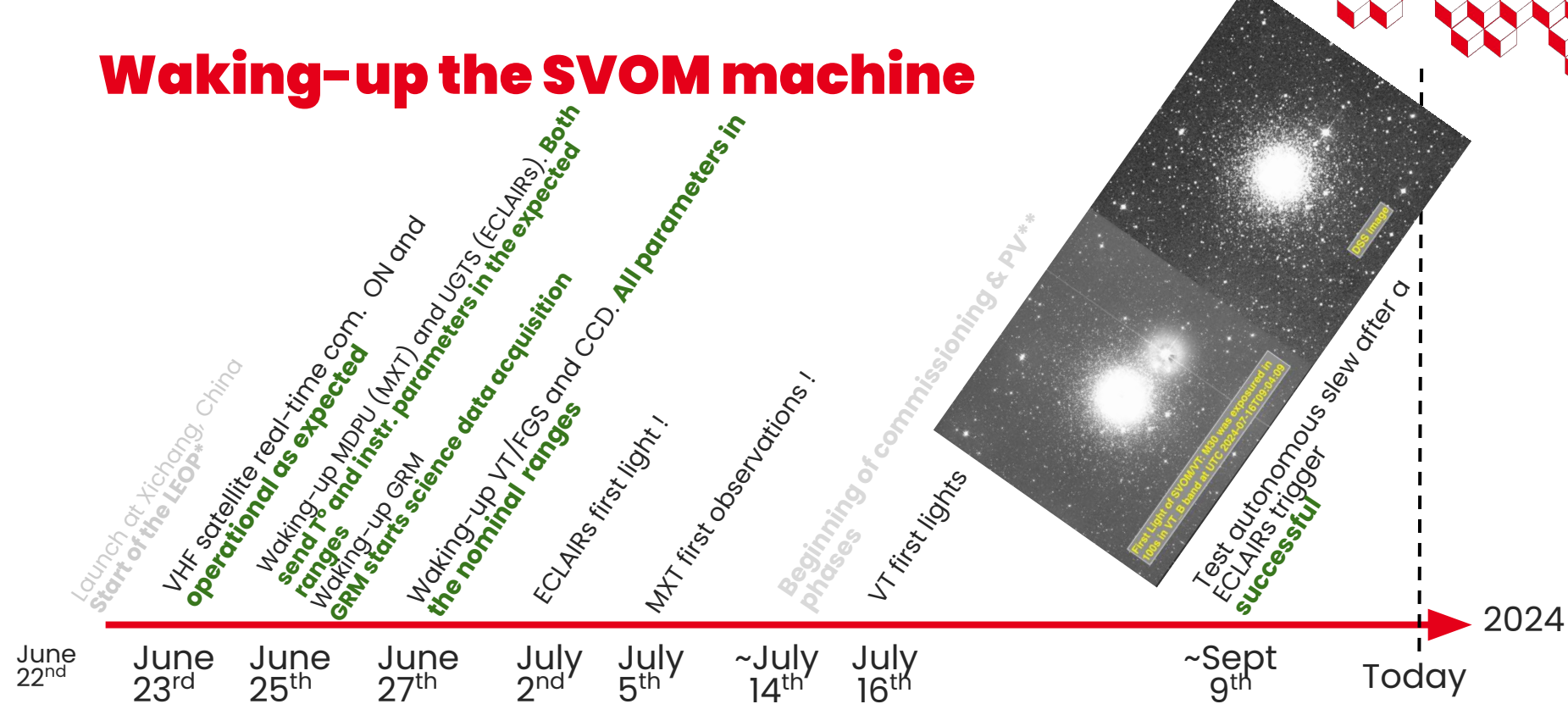


- ✓ We need fast follow-up response
- ✓ We need to coordinate multi- λ instruments

The scientific programs of SVOM in the 2 yrs of extension



Waking-up the SVOM machine



*Launch and Early Orbit Phase
 ** Performance verification