The SVOM Mission for GRB Studies

Major questions for the next decade

Astrophysics

How black holes form relativistic outflows?

What was the first stellar population?

How the universe has been re-ionized?

.....

Physics

What is the nature of the dark energy?

Where UHE cosmic-rays are accelerated?

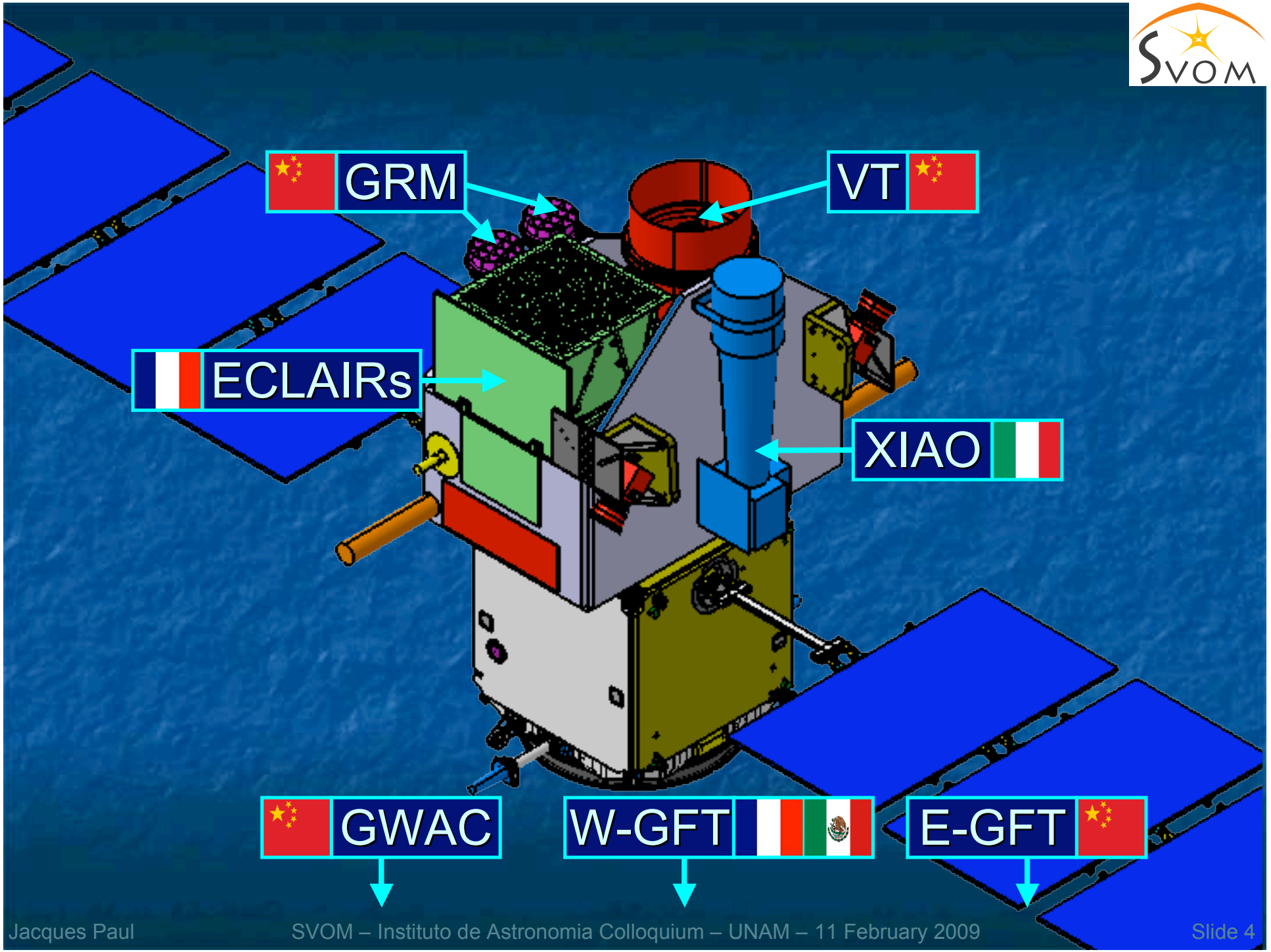
Is the Lorentz invariance principle broken?

.....

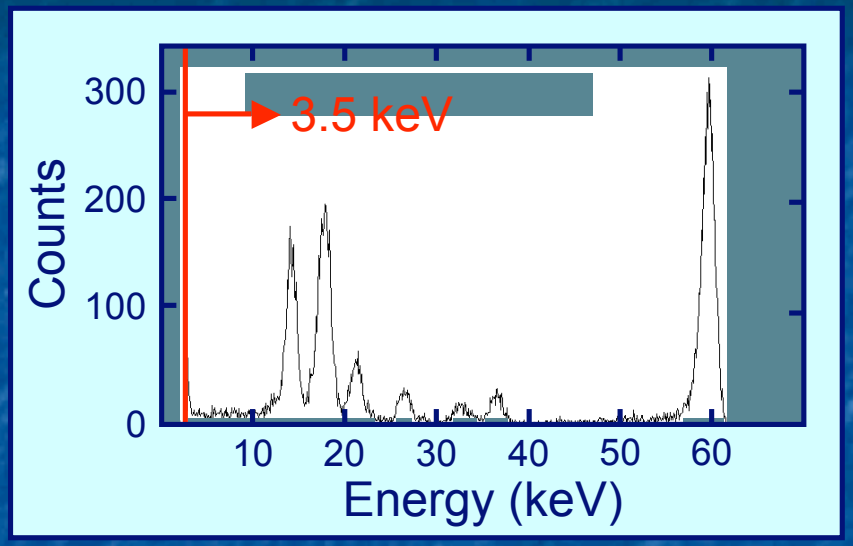
GRB studies could provide unique answers

Scientific requirements

- Permit the detection of all know types of GRBs, with a special care on high-z GRBs and low-z sub-luminous GRBs
- Provide fast, reliable and accurate GRB positions
- Measure the broadband spectral shape of the prompt emission (from visible to MeV)
- Measure the temporal properties of the prompt emission
- Quickly identify the afterglows of detected GRBs, including those which are highly redshifted (z>6)
- Quickly provide (sub-) arcsec positions of detected afterglows
- Quickly provide redshift indicators of detected GRBs

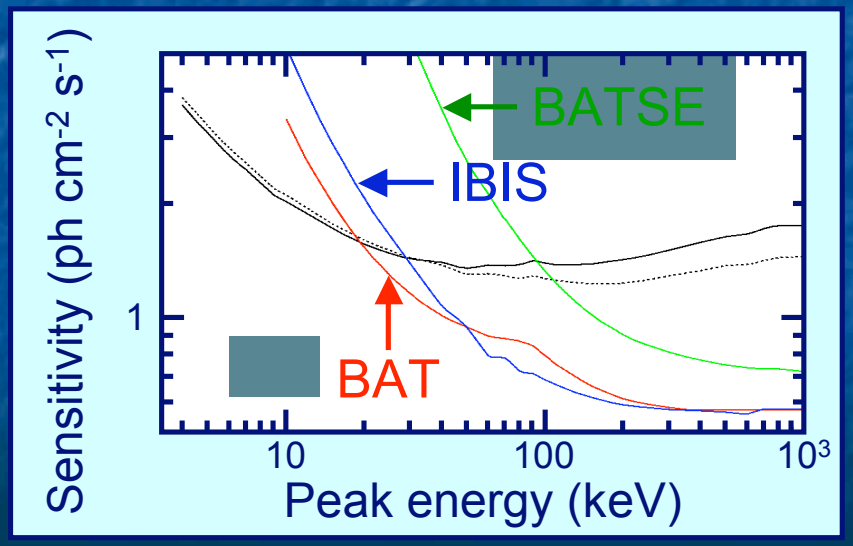

GRM
VT
ECLAIRs
XIAO
GWAC
W-GFT
E-GFT

ECLAIRs: the trigger camera



Main design goal

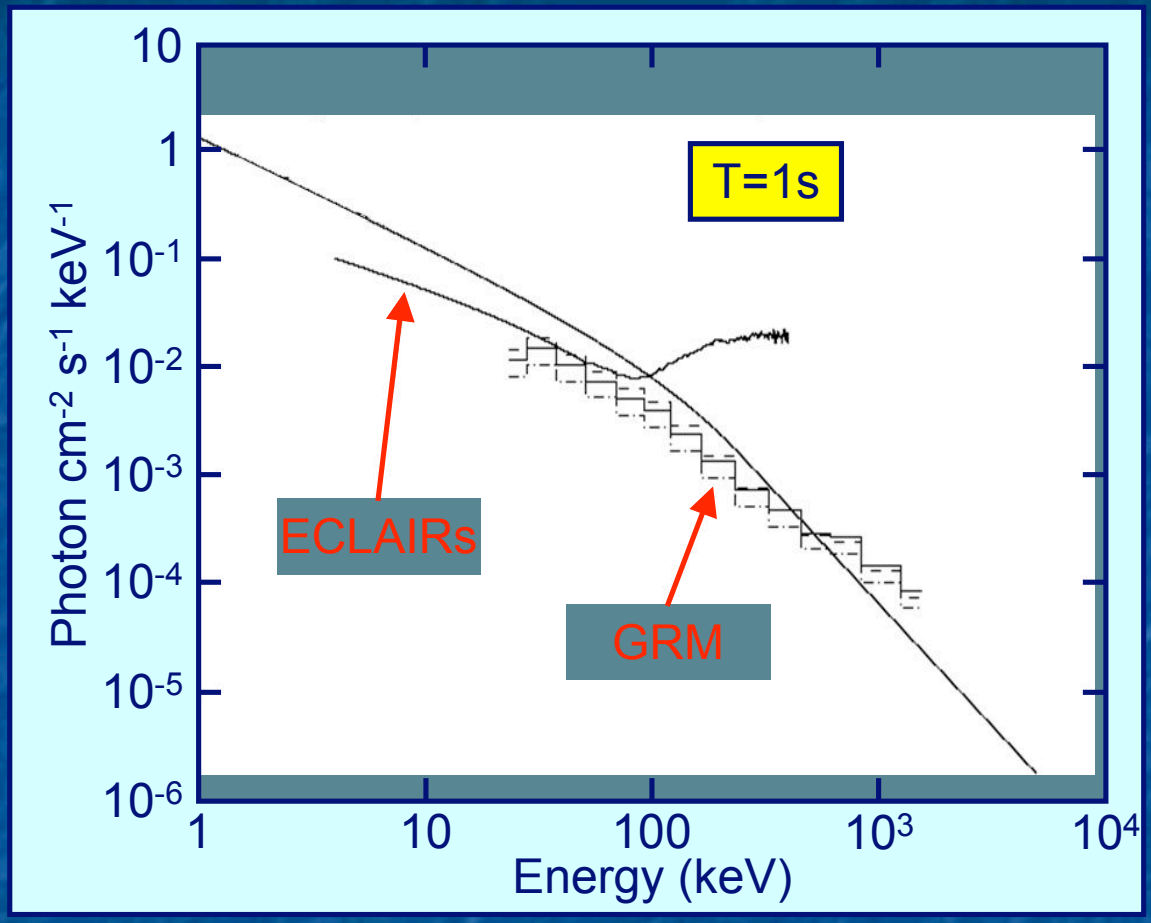
A low energy threshold in the X-ray domain



Simulated sensitivity

ECLAIRs expected to be more sensitive than SWIFT (BAT) for GRBs whose peak energy is < 20 keV

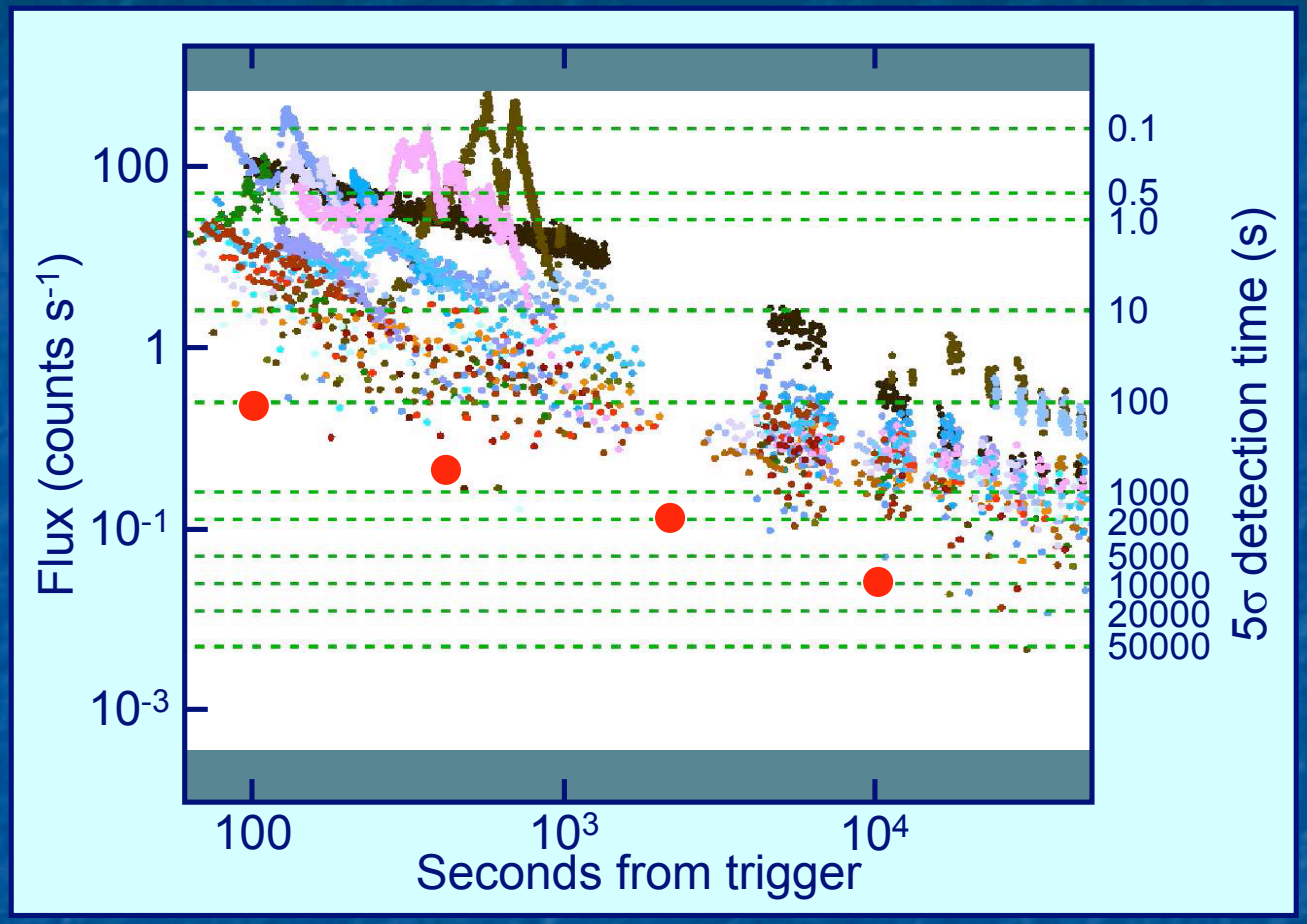
GRM: the gamma-ray spectrometer



Average GRB spectrum with a 50-300 keV flux of 1 photon cm^{-2} s^{-1}

Enable E_{peak} measurement up to ~ 500 keV

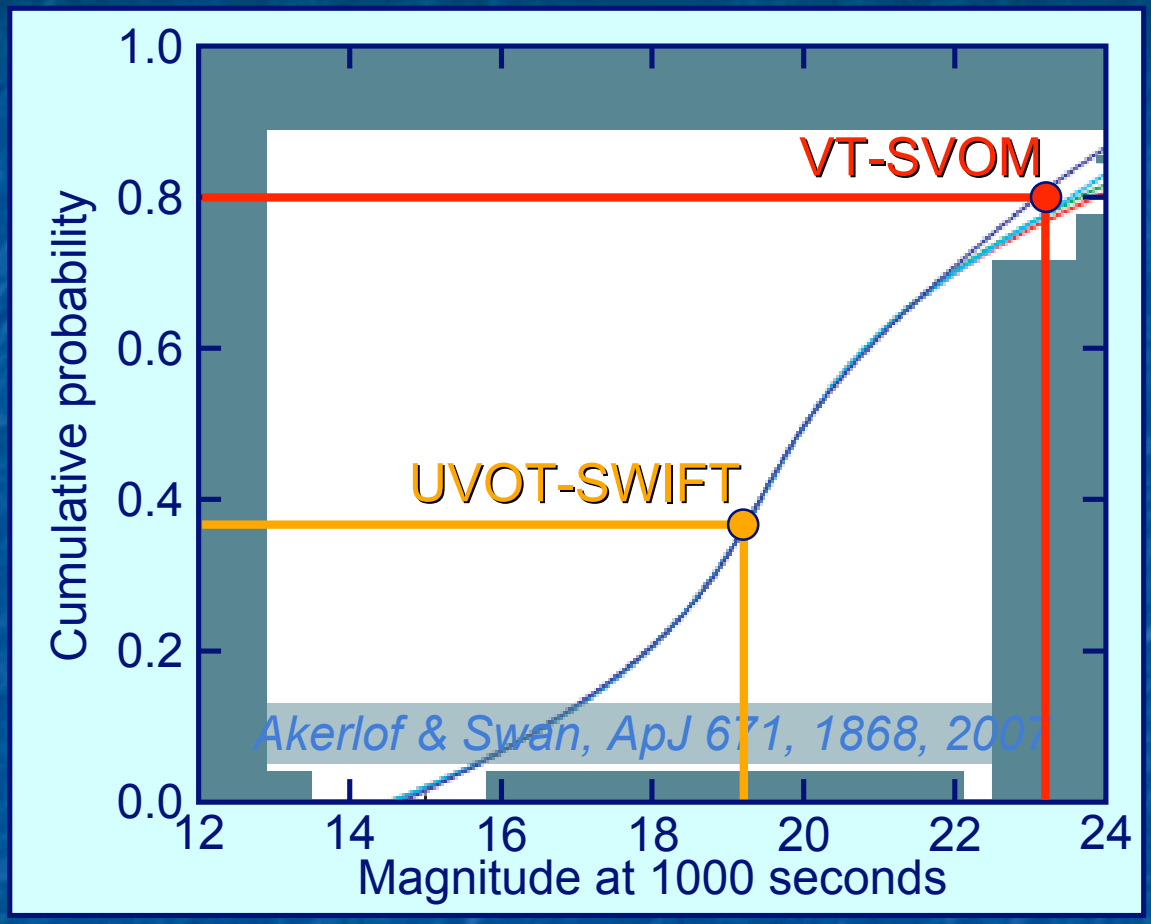
XIAO: the soft X-ray telescope



Expected XIAO light curves for a sample of representative afterglows

XIAO is sensitive enough to provide precise localizations for most GRBs

VT: the visible telescope



The intrinsic cumulative GRB apparent optical afterglow distribution

VT is sensitive enough to detect ~ 80% of the SVOM GRBs

Space instruments required performances

	Spectral band	Field of View	location Accuracy	GRBs/yr
GRM	50keV-5MeV	2 sr	*Not applicable*	~80(TBD)
ECLAIRs	4-250 keV	2 sr	10 arcmin	~80
XIAO	0.3-2 keV	diameter 25 arcmin	10 arcsec	~72
VT	400-650 nm 650-950 nm	21 × 21 arcsec	1 arcsec	~64

Ground instruments

GWAC

Wavelength coverage: ~ 400-900 nm

Limiting magnitude: ~ 15 (5σ, 10s)

Overall field-of-view: ~ 90 deg. × 90 deg.

East-GFT

Diameter: ~ 100 cm

Field-of-view: ~ 23 arcmin × 23 arcmin

Wavelength coverage: ~ 400-950 nm

West-GFT

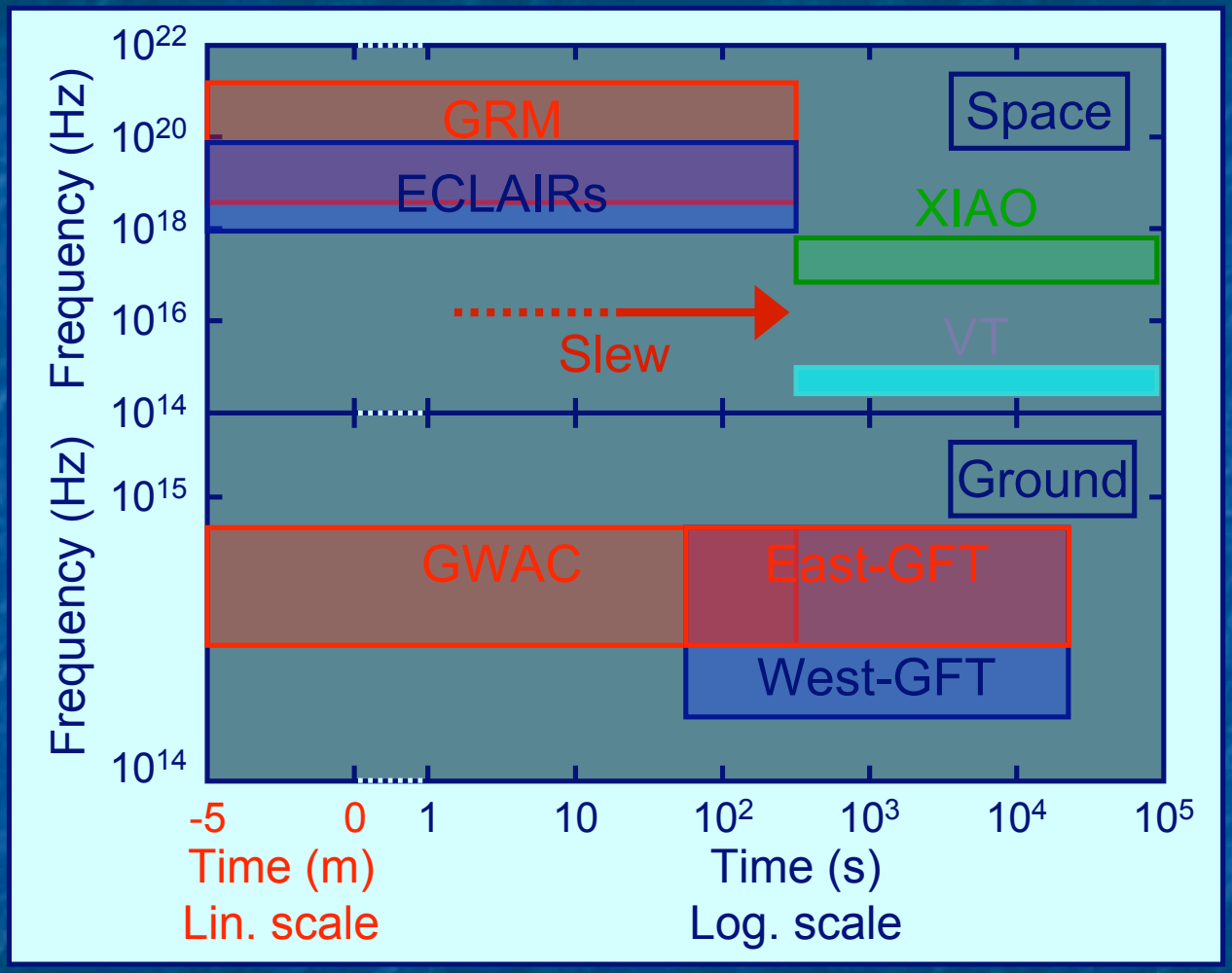
Diameter: ~ 100 cm

Field-of-view: ~ 30 arcmin × 30 arcmin

Photometric band: B V R I J H

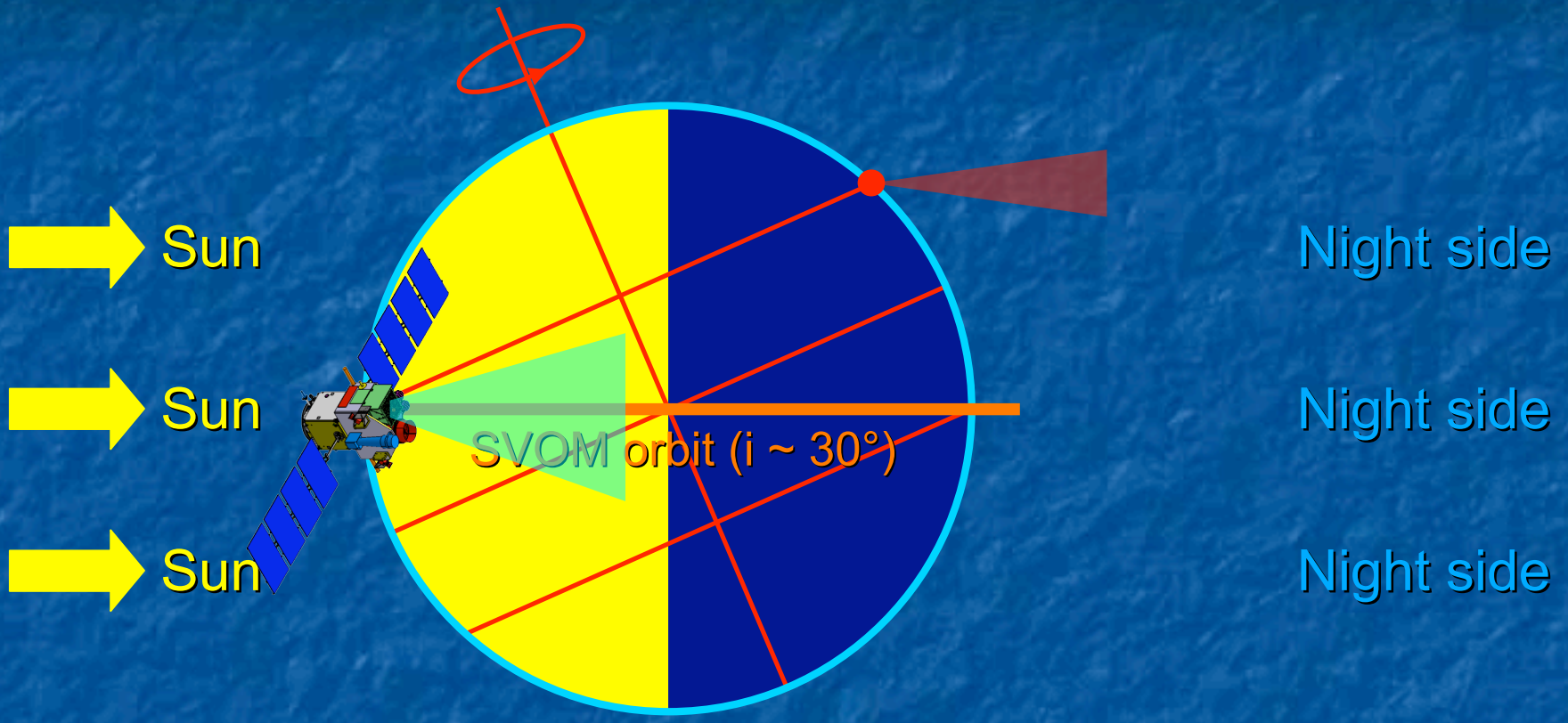
Photometric redshift of high-z GRBs

SVOM multi-wavelength capabilities



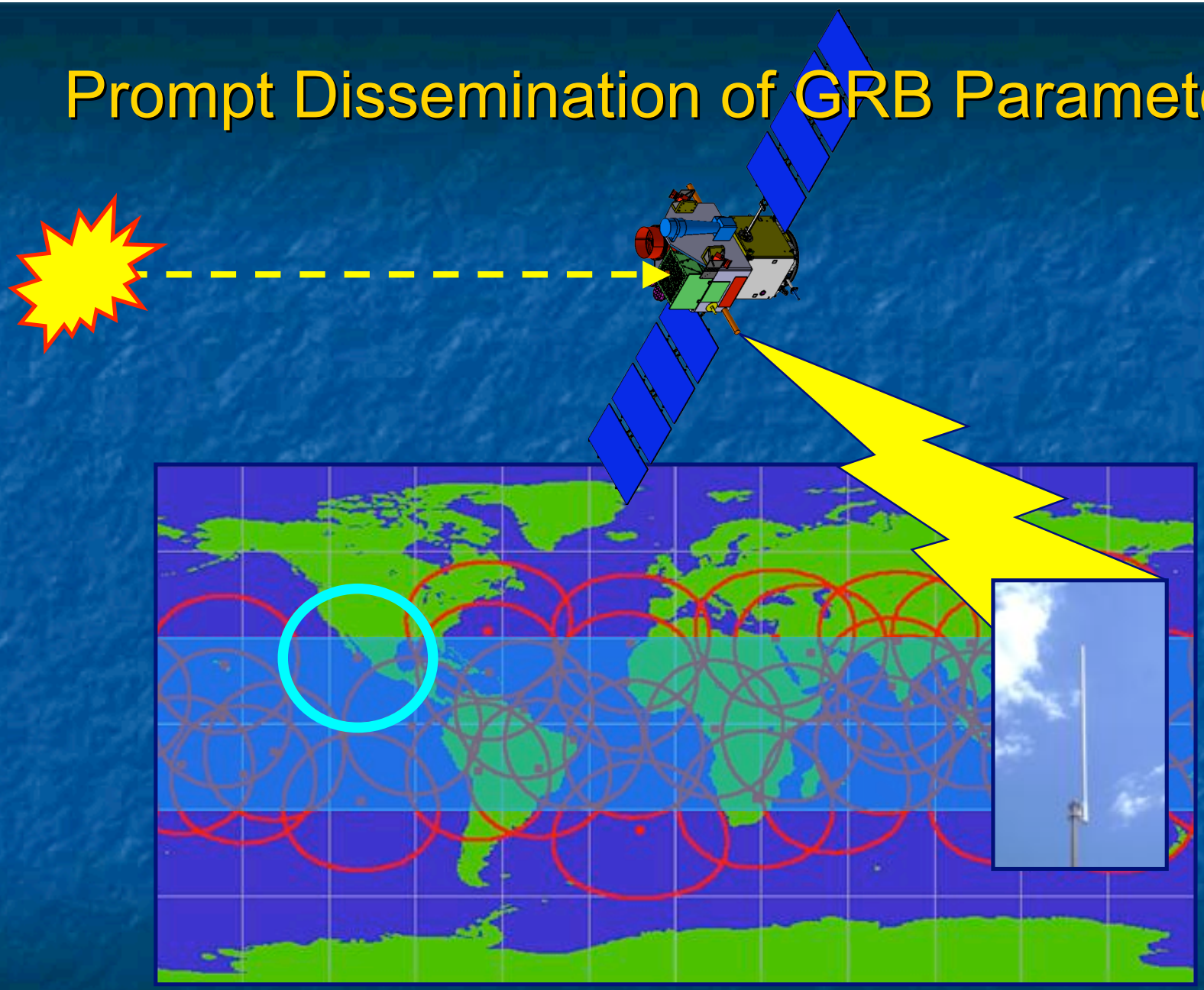
Space and ground instruments join to enable a unique coverage

SVOM Pointing Strategy



Most of the GRBs detected by SVOM to be well above the horizon of large ground based telescopes all located at tropical latitudes

Prompt Dissemination of GRB Parameters



SVOM Compared to SWIFT

Prompt emission measurement

- More sensitive below 20-30 keV
- E_{peak} measurement capability
- Multi-wavelength capabilities from visible band to MeV gamma rays

Afterglow emission measurement

- > 10 more sensitive in the visible
- Sensitive in the 650-950 nm band

Follow-up observations

- Dedicated follow-up robotic telescopes
- GRBs much easily scrutinized by the largest telescopes

SVOM: the successor of SWIFT…

SVOM
The next gamma-ray burst mission

- SVOM has successfully completed its phase A at the end of 2008
- SVOM is to be launched mid-2014
- SVOM will fly in an extremely favourable context: GLAST, JWST, VLT X-Shooter, SKA pathfinder, VIRGO, LIGO, IceCUBE, ANTARES