IACSAT-1
The first space observatory of the IAC

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GOBIERNO DE ESPAÑA Plan de Recuperación, Transformación y Resiliencia

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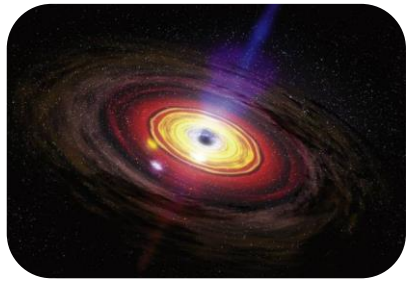
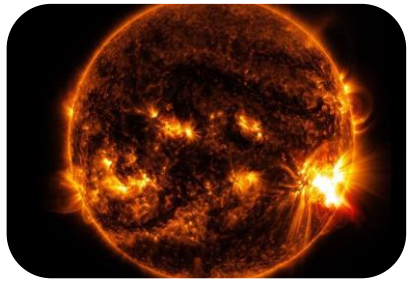
IACSAT-1: Multi-purpose space observatory

Exoplanets

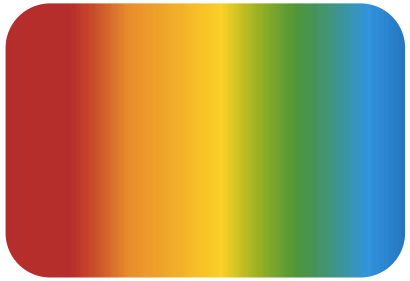
Primitive asteroids



Blazars



Stellar activity



VIS-NIR photometry

NUV spectroscopy

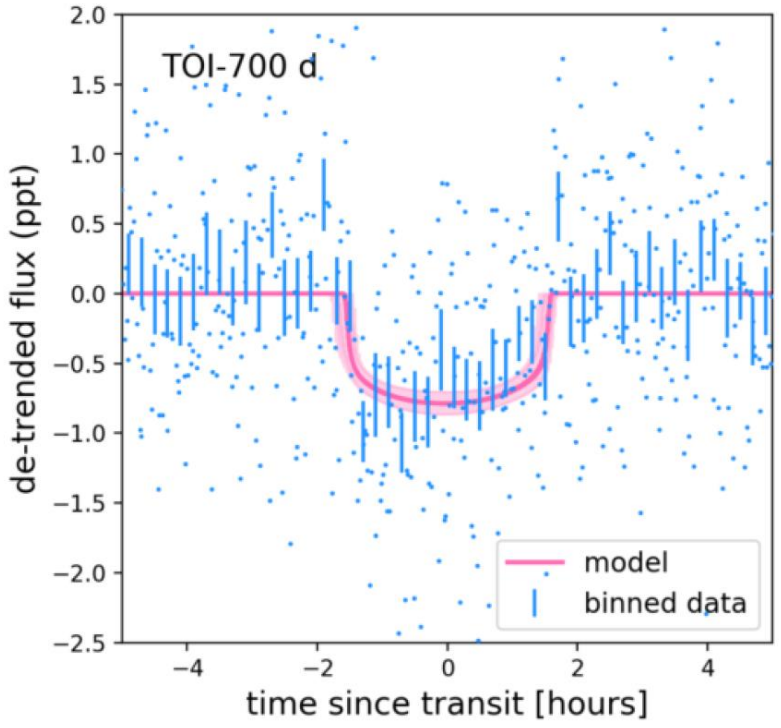
Confirmation of Earth-like exoplanet candidates

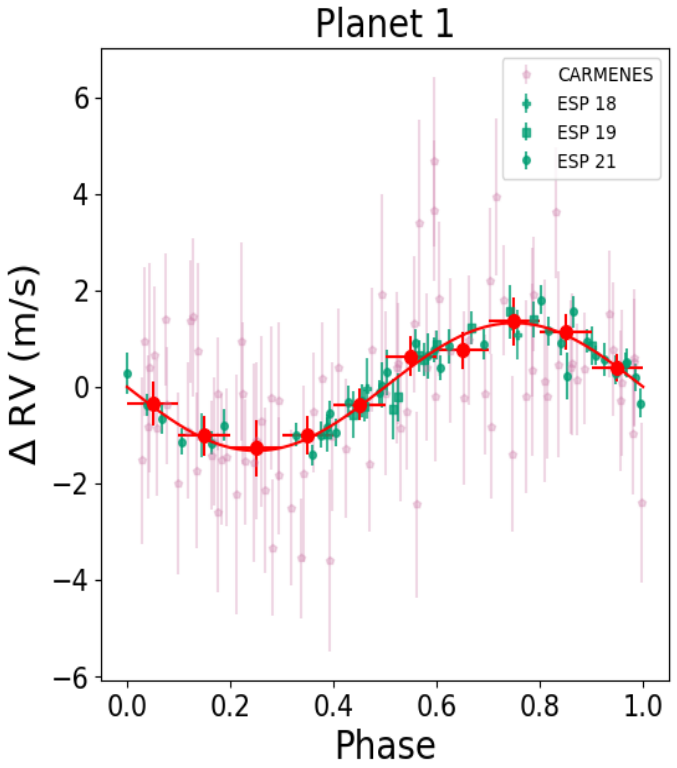
Earth-like candidates from TESS are challenging to validate using ground-based telescopes

Typical characteristics:

- M-dwards (< 0.5 Msun)
- Vmag 11-14
- Radius < 2 Earth radii
- Insolation < 5 Earth flux

Prime targets for mass measurements and atmosphere characterization to search for biomarkers.





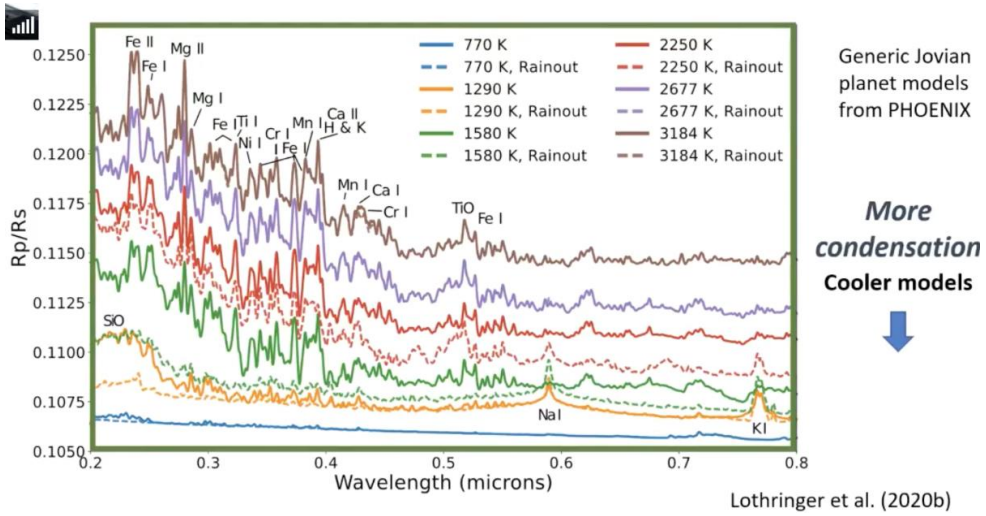
Exoplanet atmospheres

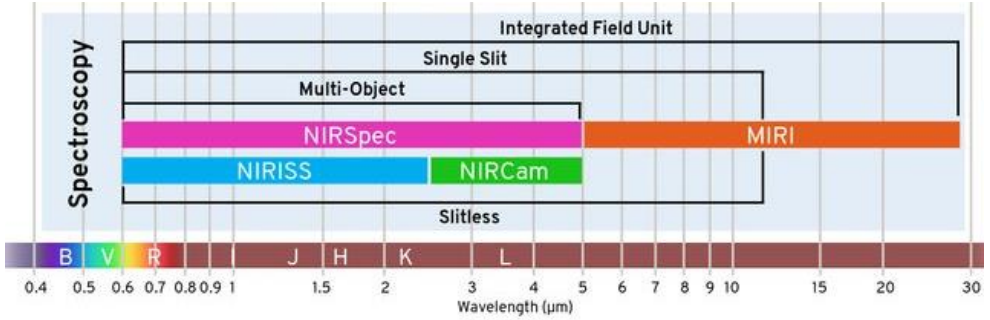
Rayleigh scattering by atmospheric hazes dominates the NUV region

Measure radii differences with wavelength in the NUV región

Distinguish between atmospheric metallicity and height of the cloud deck location

Completes the transmission spectra expected with JWST and ground-based facilities





Primitive asteroids

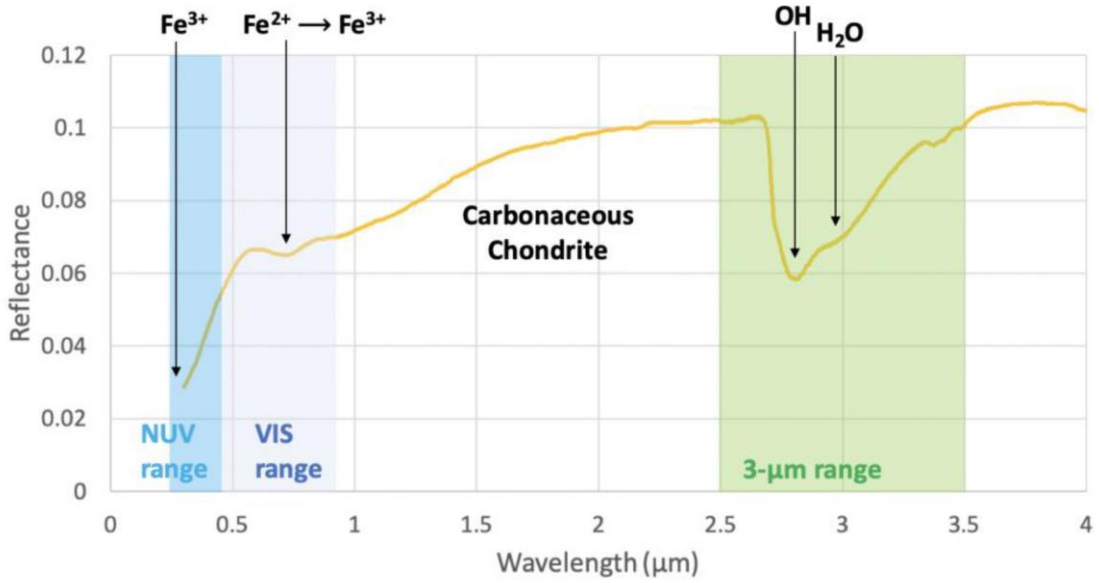
Shallow absorption in VIS range

Deep absorption in 3-microns

Deep absorption in NUV range

- Not typically explored

Correlations between UV, 0.7-µm, and 3-µm absorptions could help us understand the asteroids composition



Characterization of blazars

Blazars show two broad bands peaking at gamma rays and NUV regions

Disentangle mechanism behind SED.

- Leptonic vs pure hadronic emission models

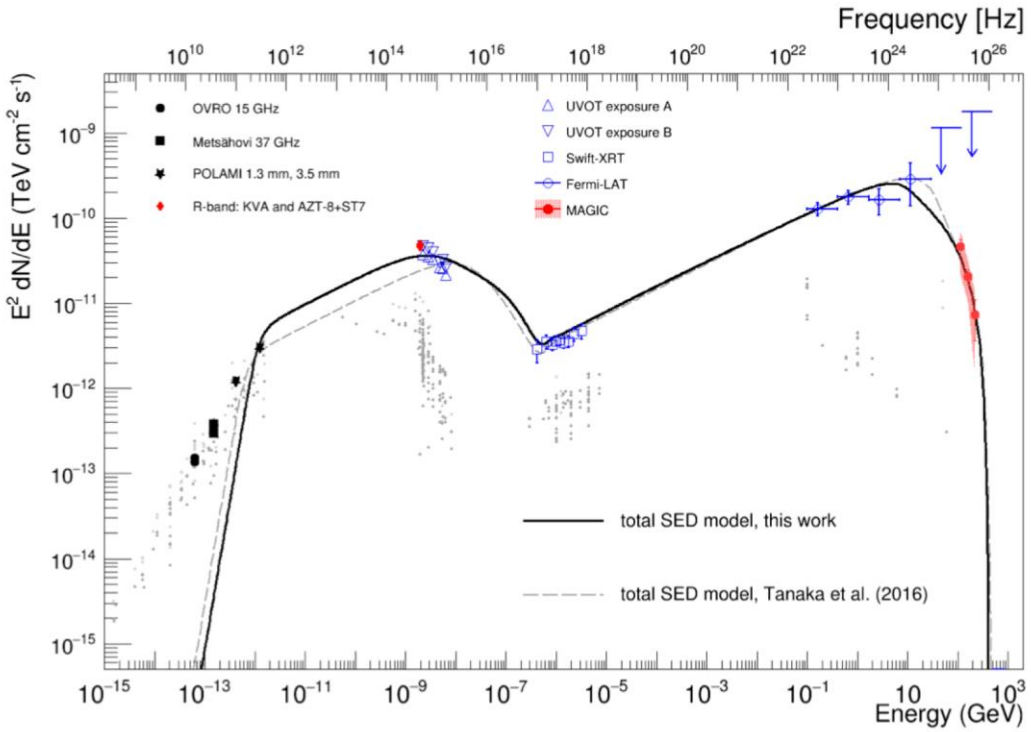
Leptonic framework

- Predicts correlation

Hadronic framework

- Predicts no correlation

Observations simultaneous with Fermi-Lat and Cherenkov telescopes

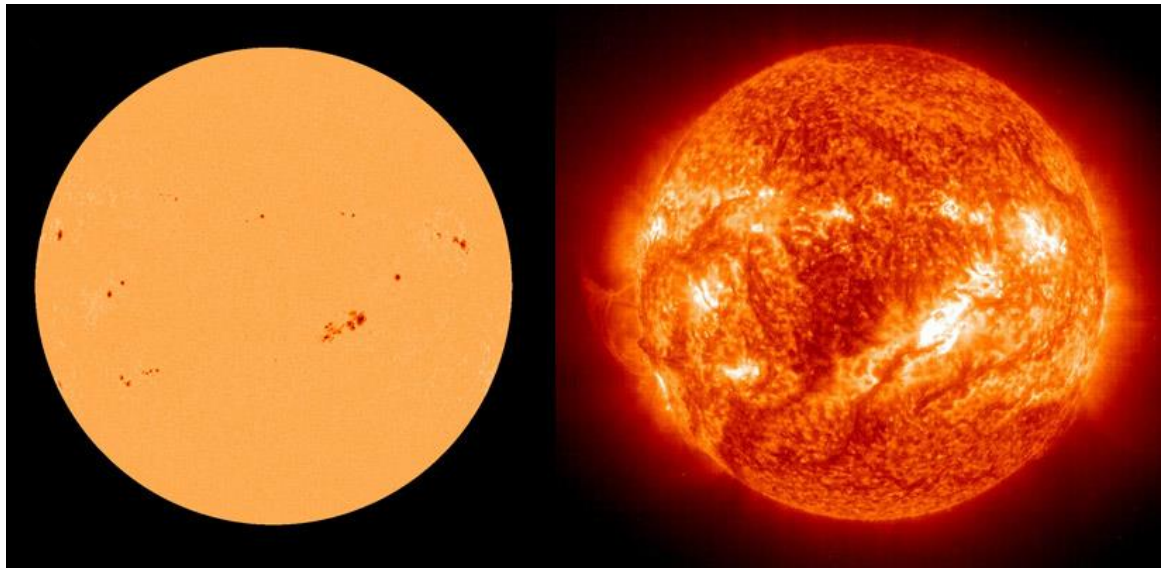


Stellar activity

Different active regions visible at different wavelengths

Contemporaneous VIS+NUV to disentangle the Nature of the observed variations

Study a sample of stars to put constraints on the dynamo models



IACSAT-1: Base characteristics

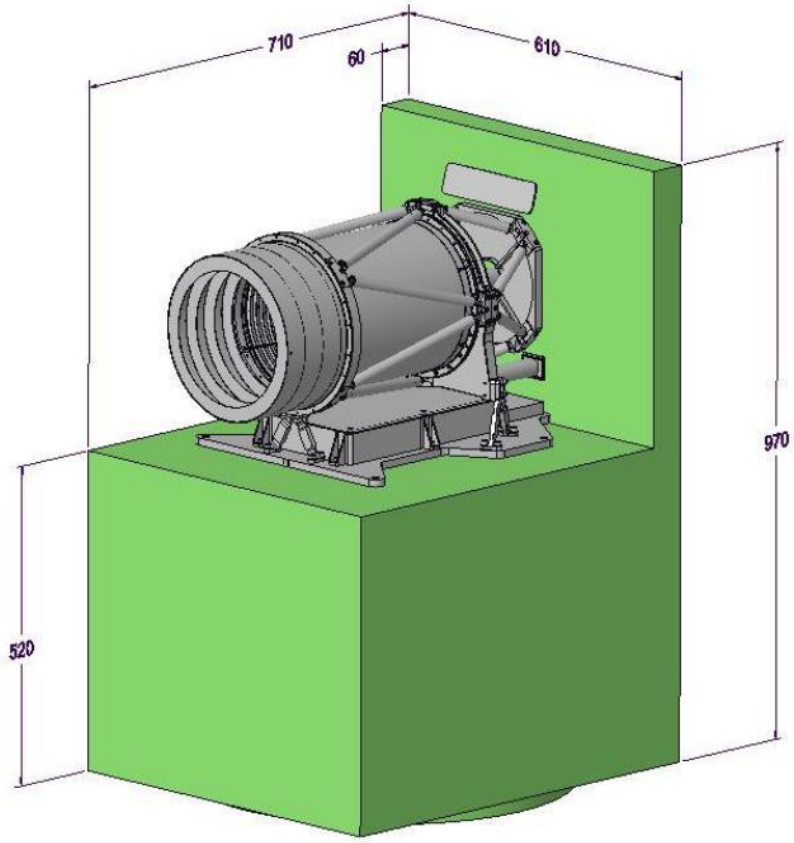
22 cm primary mirror

Wavelength coverage 250-1000 nm

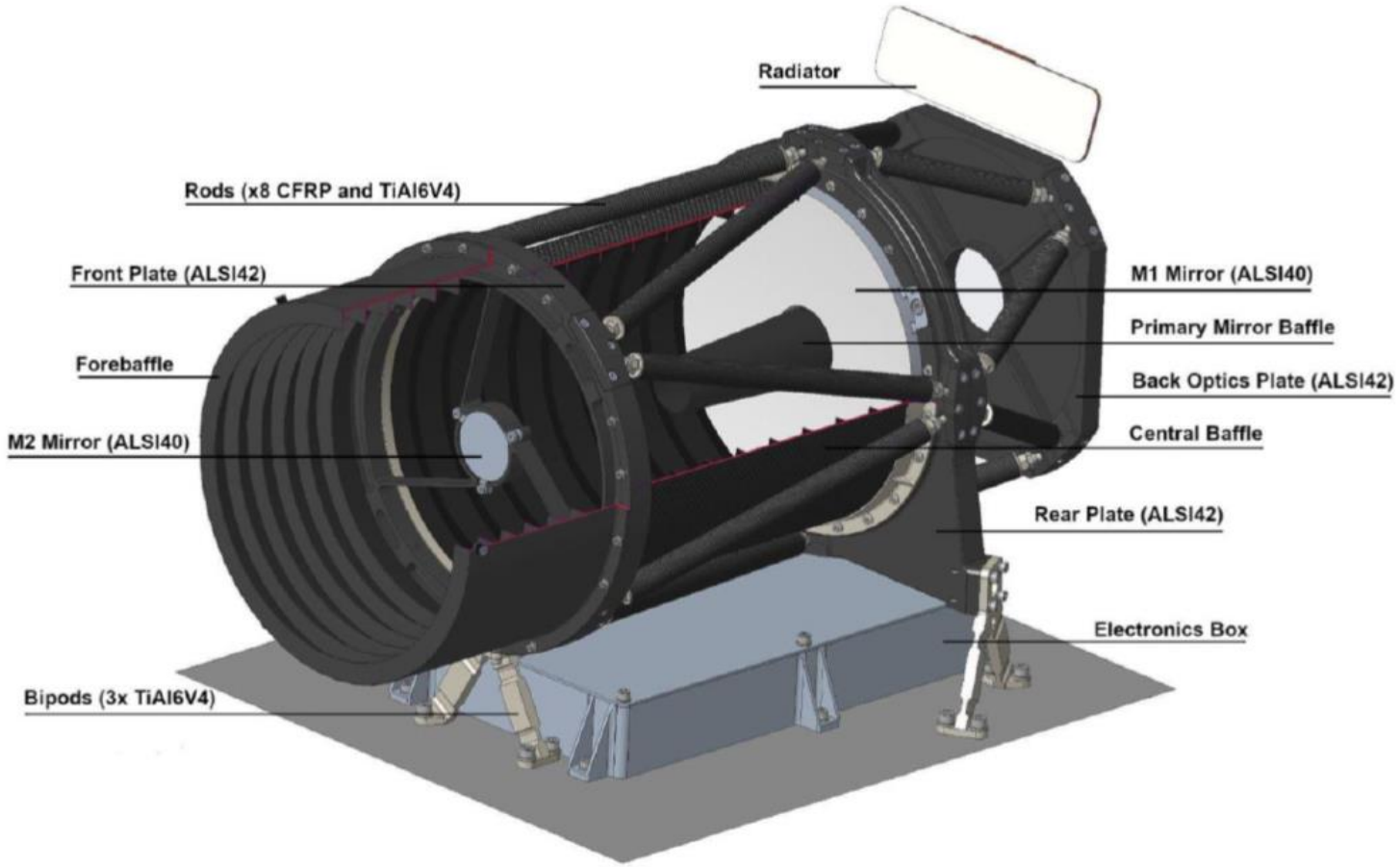
Two channels:
- VIS-NIR photometry
- NUV spectroscopy

Stable pointing

Expected mass 100-180 Kg

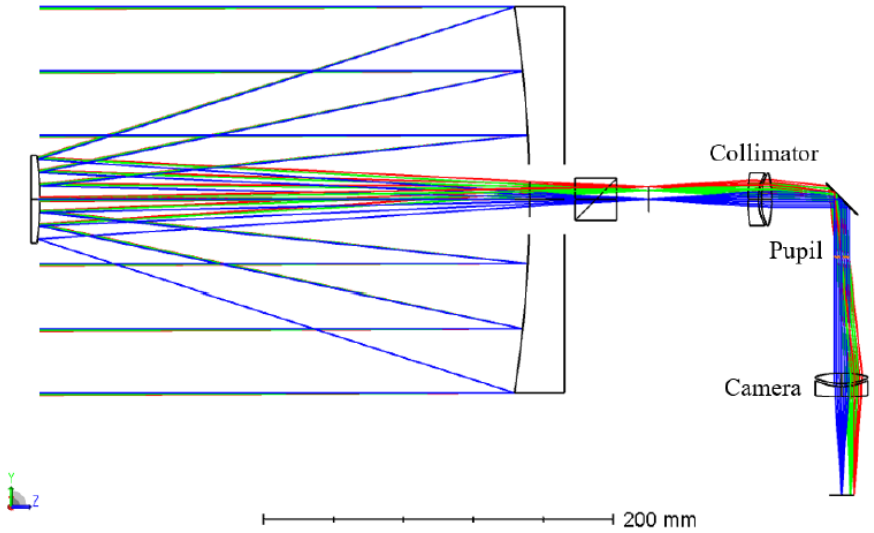


IACSAT-1: Optical bench

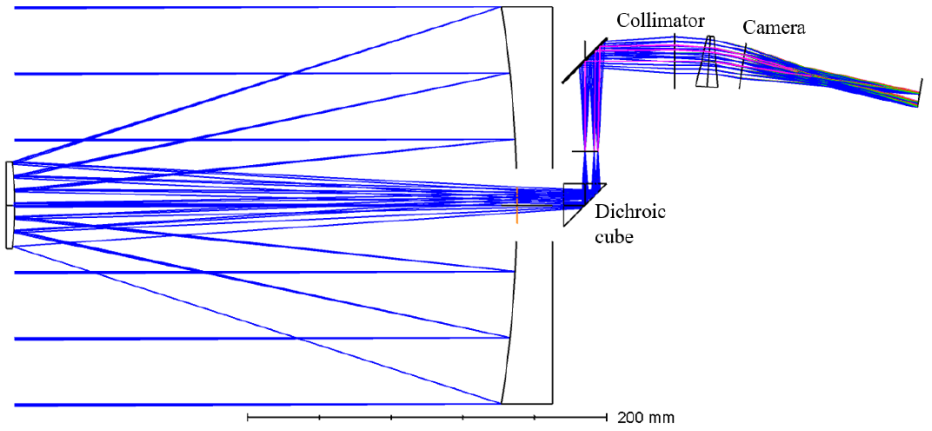


IACSAT-1: Two chanels

VIS-NIR chanel



NUV chanel



IACSAT-1: Two chanels

VIS-NIR chanel

Broadband photometry

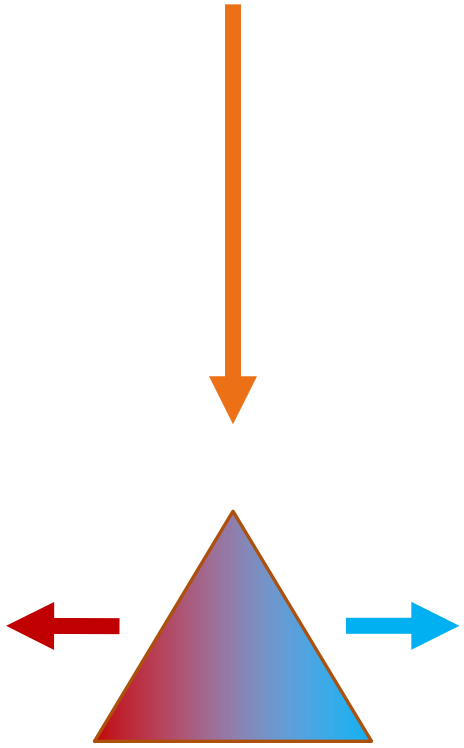
Wavelength range: 450-1000 nm

Precision: 350 ppm

- 1 hour RMS, V~13.5

FOV 30’

- 1.6”/pixel resolution



NUV chanel

Slitless spectroscopy

Wavelength range: 250-450 nm

Resolution element: 10 nm

SNR/pixel ~10

- 10 minutes exposure, Vmag 14

IACSAT-1: Orbit

Sun-snchronous orbit

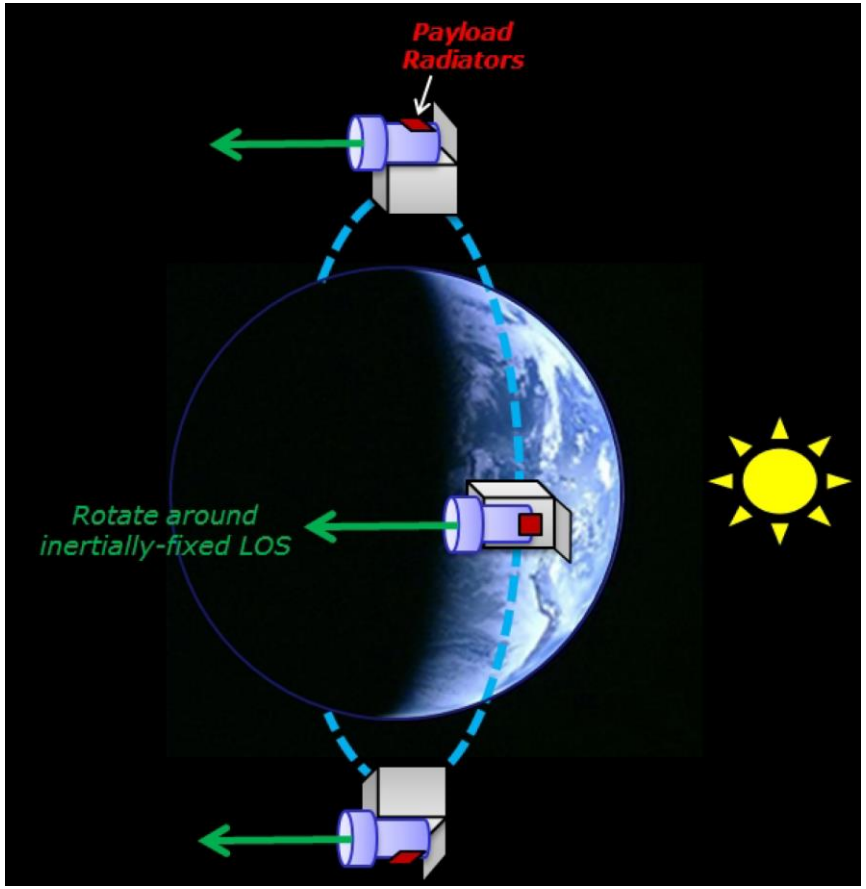
600 km altitude

Riding the day-night terminator

- Limits impact of sunlight
- Limits impact of reflected light

Telescope rotation

- Optimal thermal stability
- Constraints to observing strategy



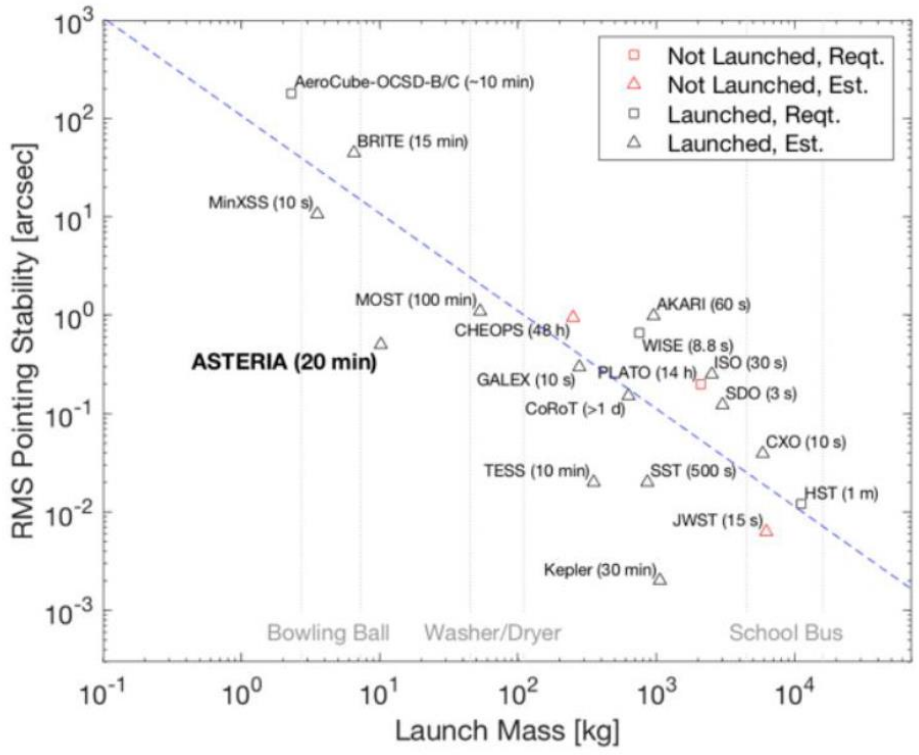
IACSAT-1: Pointing stability

2 arcsec RMS

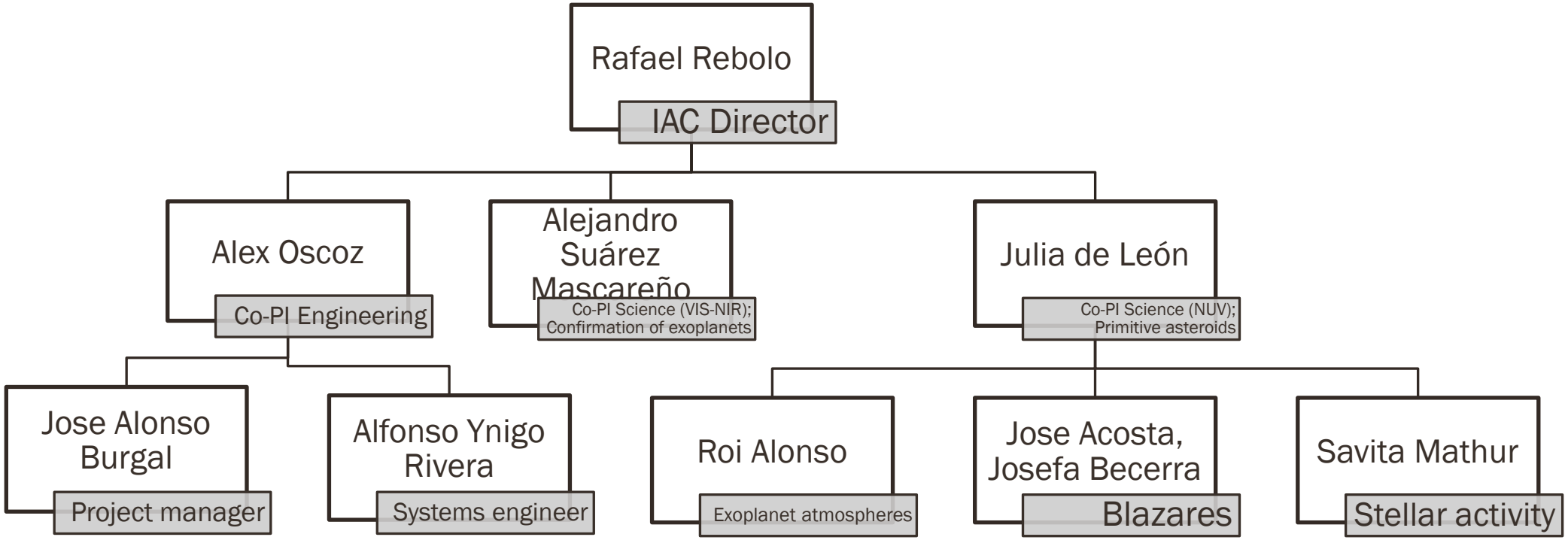
- Needed for high precision photometry
- Needed for spectroscopy
- Instrument on loop system

On par with:

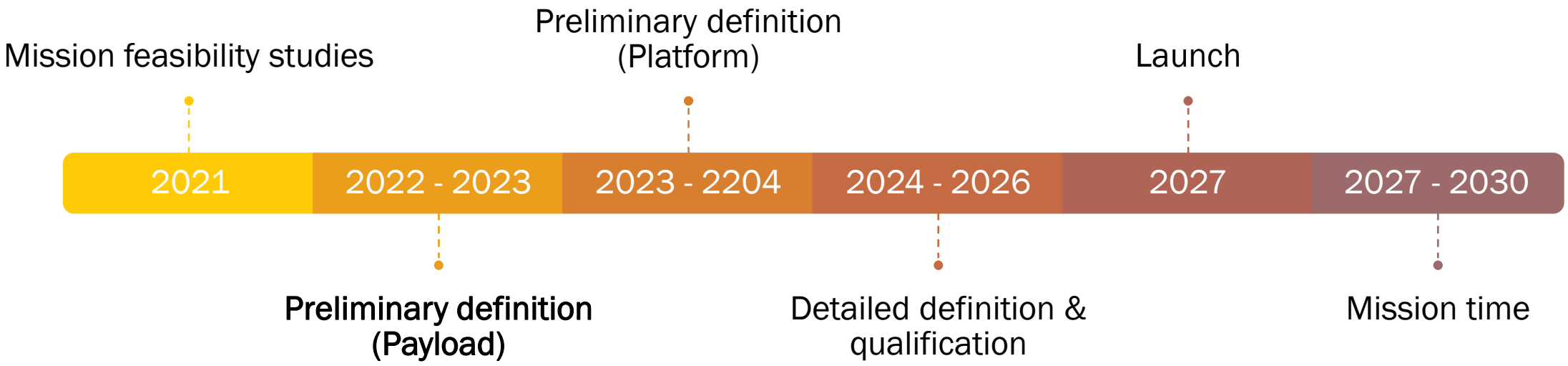
MOST
CHEOPS
ASTERIA
AKARI
WISE



IACSAT-1: Project organization



IACSAT-1: Project timescale



Summary

IACSAT-1: Multi-purpose space observatory

22 cm primary mirror

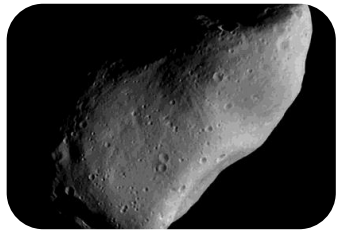
VIS-NIR photometry

NUV spectroscopy

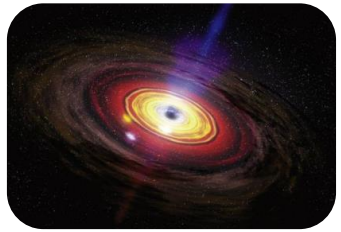
Sun-synchronous orbit

Launch: 2027
    Currently in phase B

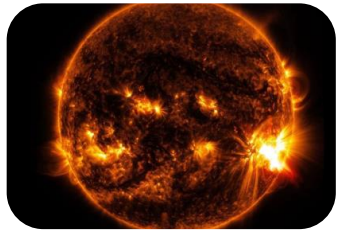
Exoplanets



Primitive asteroids



Blazars



Stellar activity

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