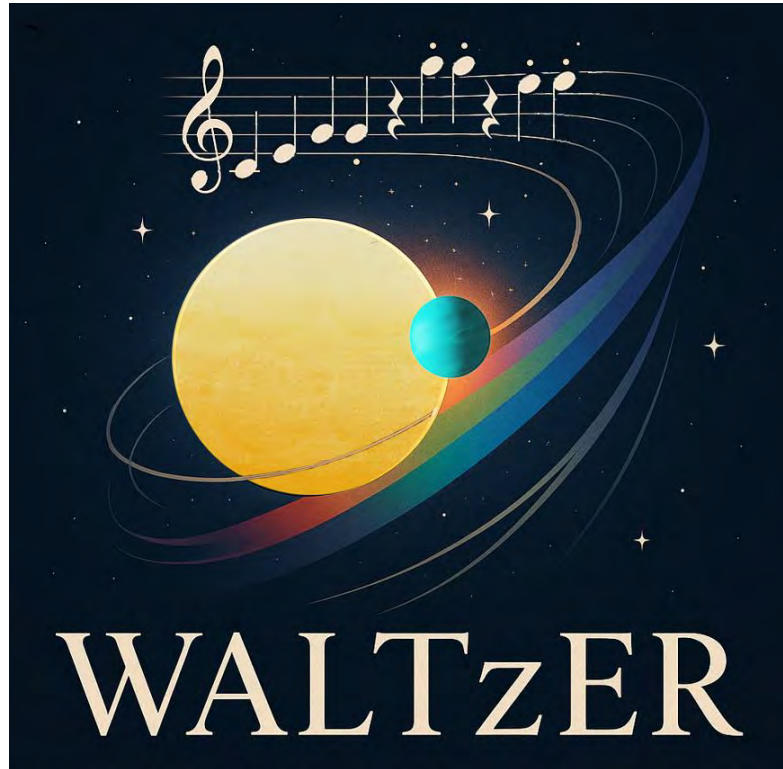


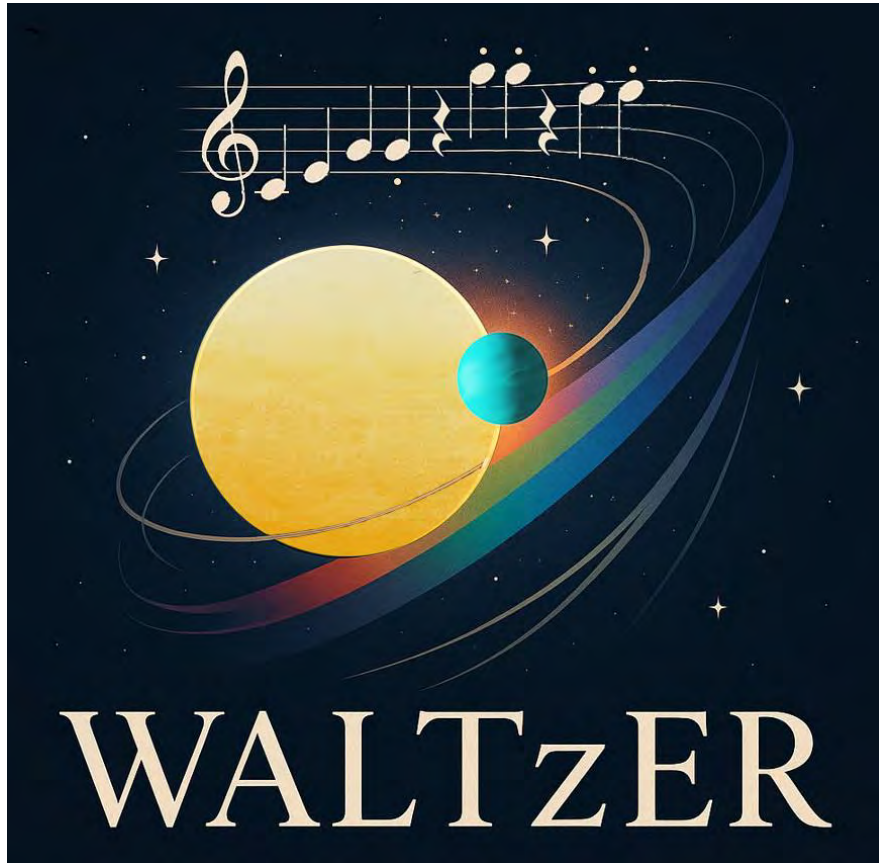


WALTZER

AN APPROACH TO EXPLORING THE
UNIVERSE FROM THE UV TO THE IR

Sreejith Aickara Gopinathan
Space Research Institute (IWF)

WALTzER: WIDE BAND ATMOSPHERIC LABORATORY FOR TRANSITING EXOPLANET RESEARCH



ESA F3 mission concept

AT & CH equal PIs:  

Consortium:



CONTEXT: ESA MISSIONS & CALLS

ESA COSMIC VISION VOYAGE 2050

Mission calls/cadence:

L-class: 7-10 years (e.g. JUICE, LISA, NewAthena)

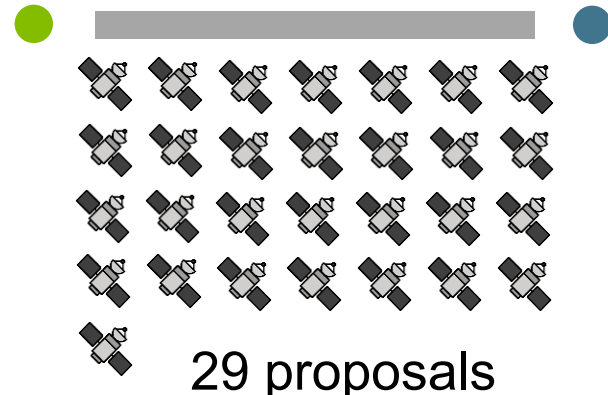
M-class: 4-6 years (e.g. Solar Orbiter, PLATO)

F-class: 4-6 years (e.g. Comet Interceptor, ARIEL)

Next F-class mission (F3)

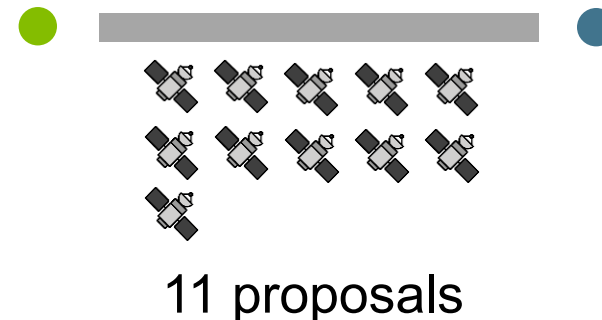
Call for proposals / step 1

March 2025 May 2025



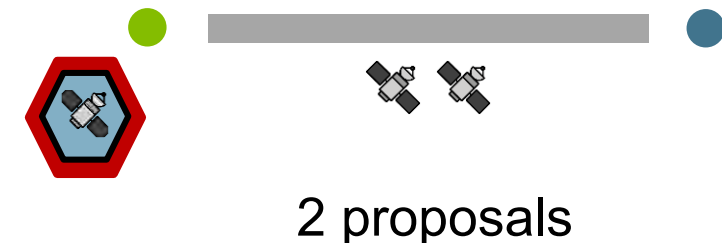
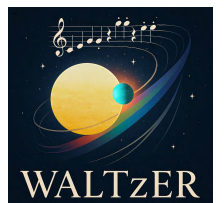
Step 2

Nov. 2025 April 2026

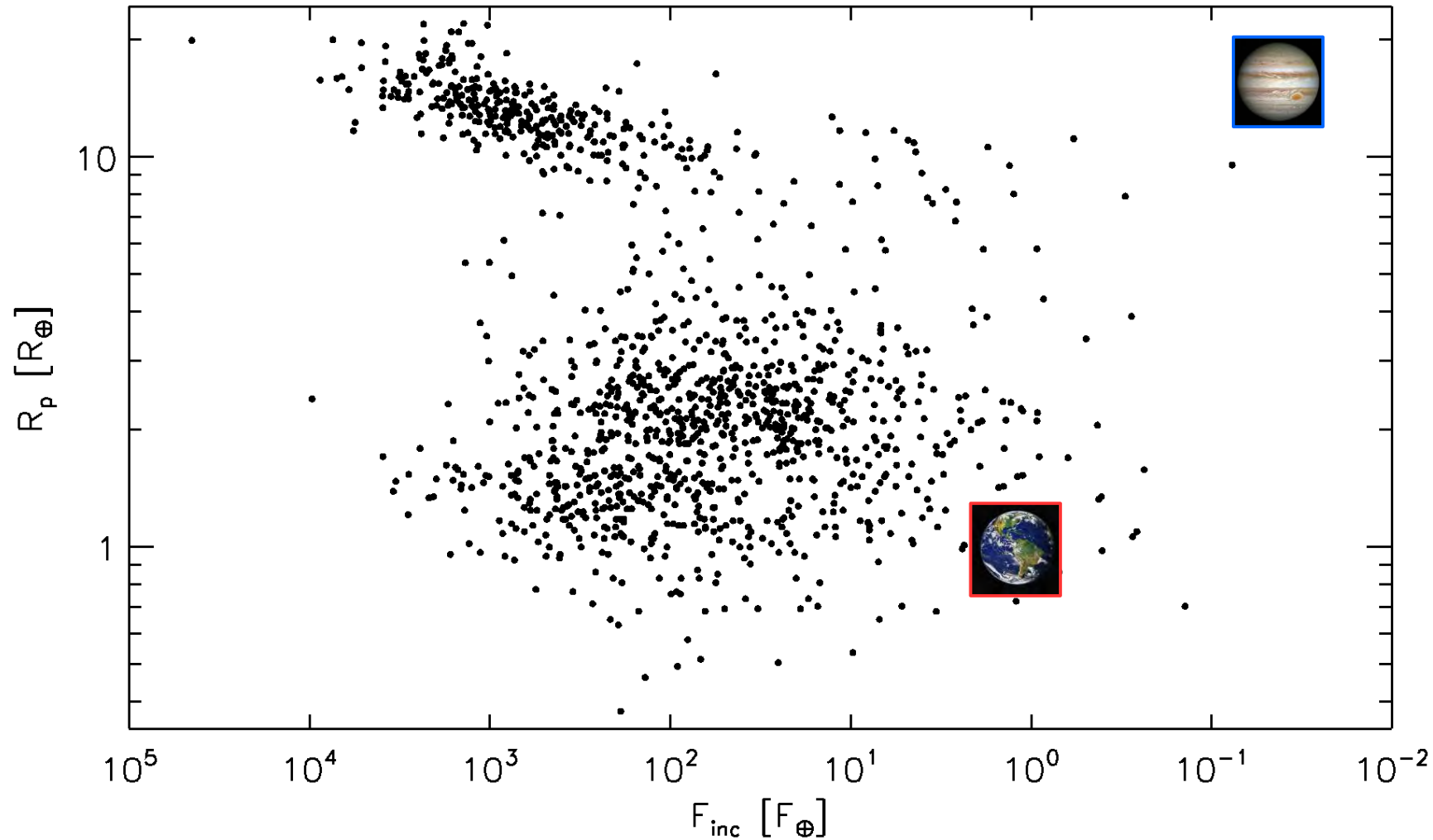


1st downselection

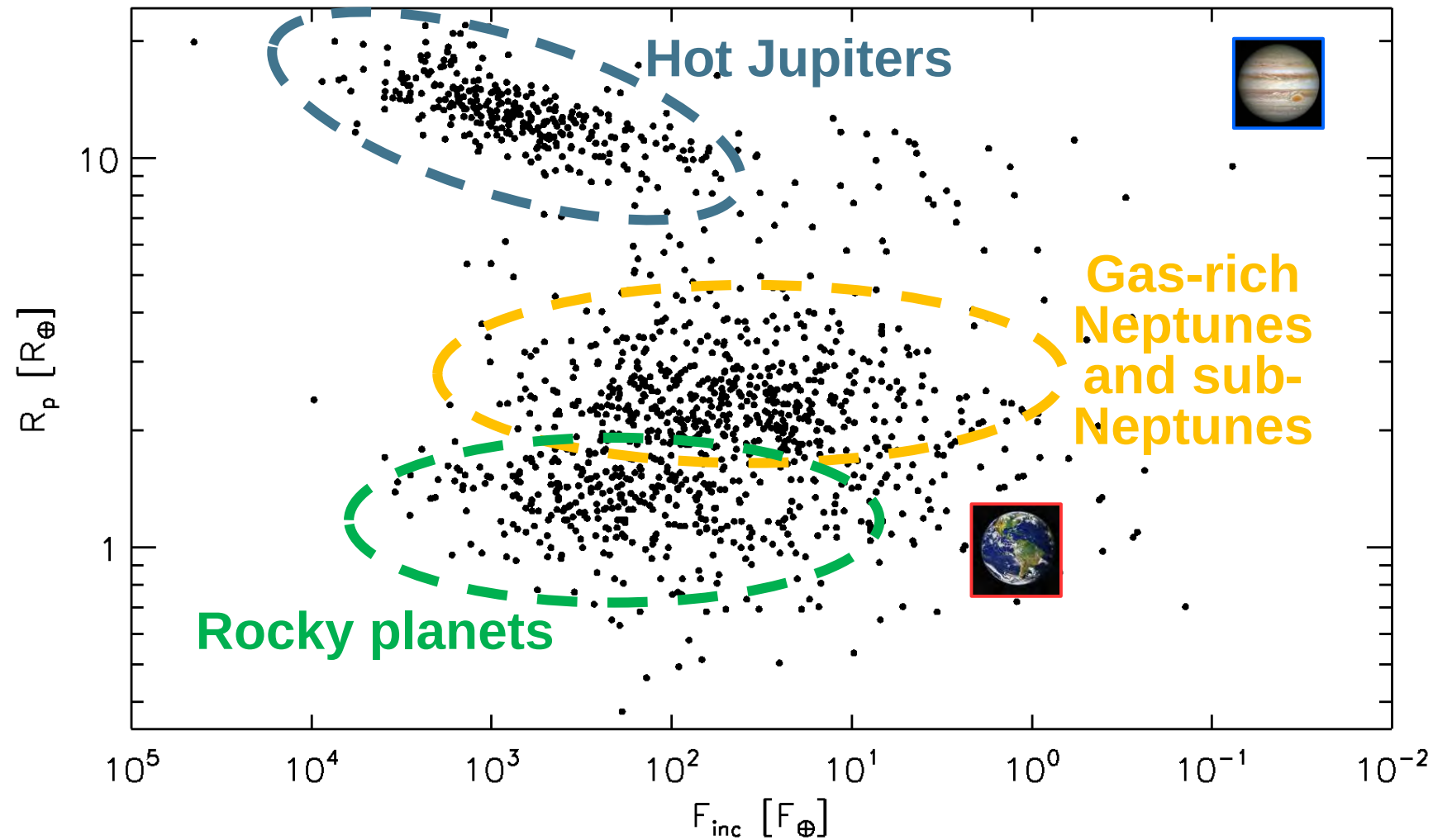
Nov. 2026 Nov. 2027



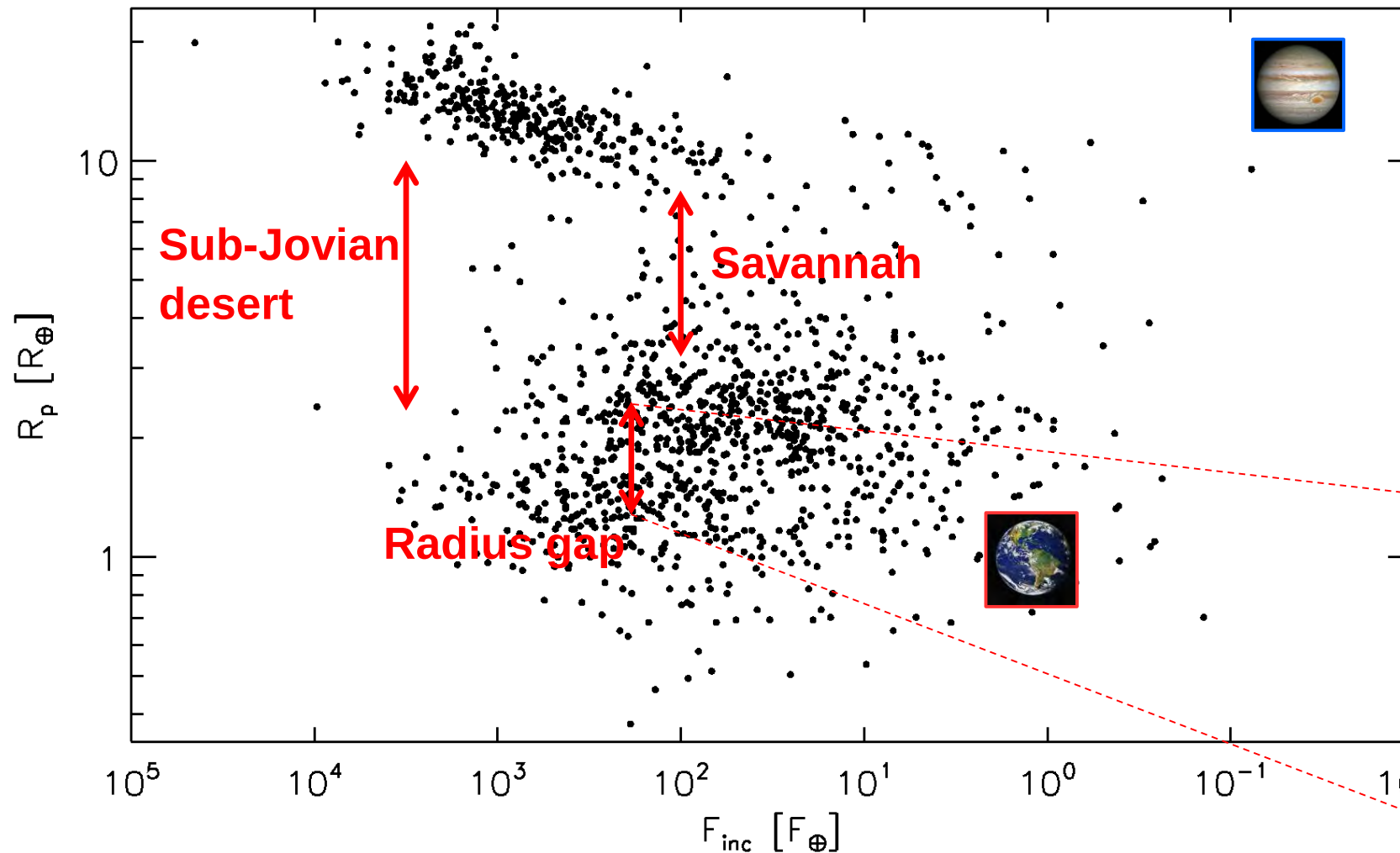
THE EXOPLANET POPULATION



EXOPLANET DIVERSITY



PLANET FORMATION, MIGRATION, AND ATMOSPHERIC LOSS SHAPE THE DIVERSITY AND POPULATION



Formation:

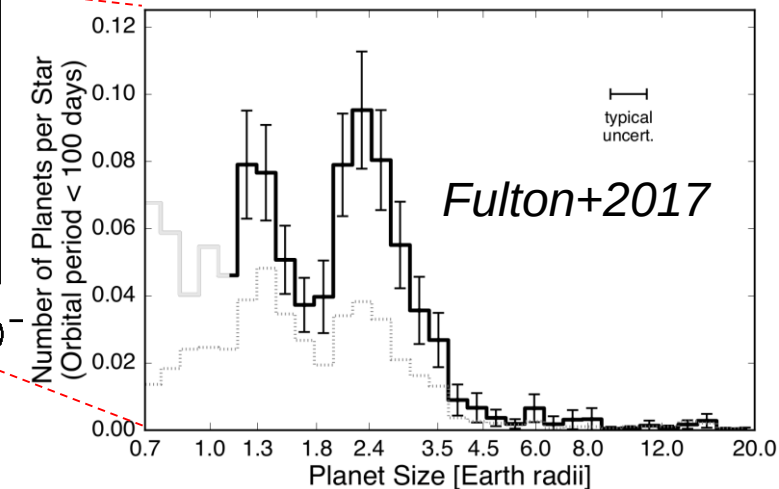
- atmospheric accretion (H)
- f(disk mass, lifetime)

Composition:

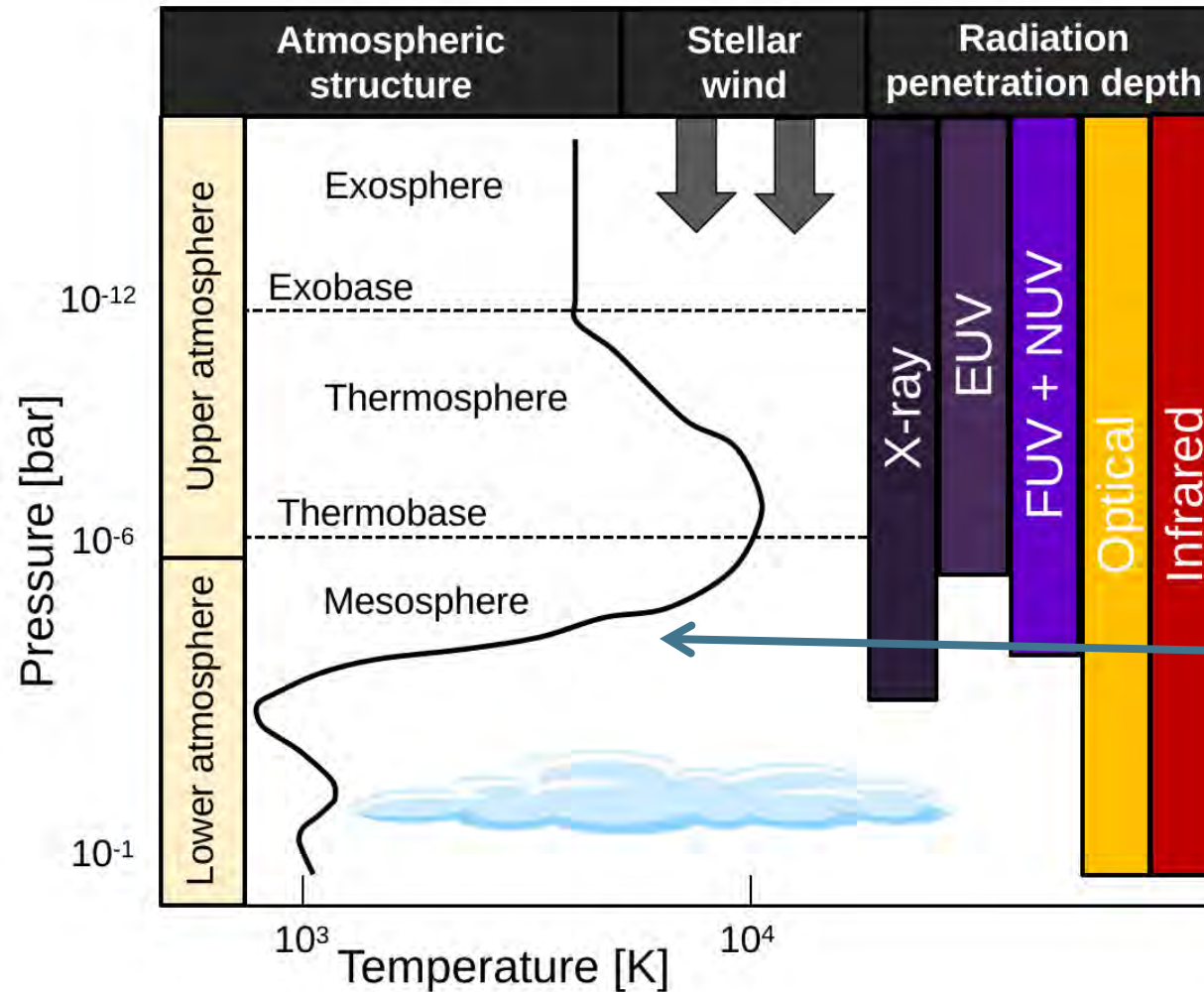
- f(formation location within the disk, mass-loss history)

Migration:

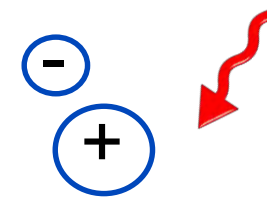
- inside vs outside the disk, affecting accretion and irradiation



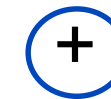
ATMOSPHERIC LOSS



EUV



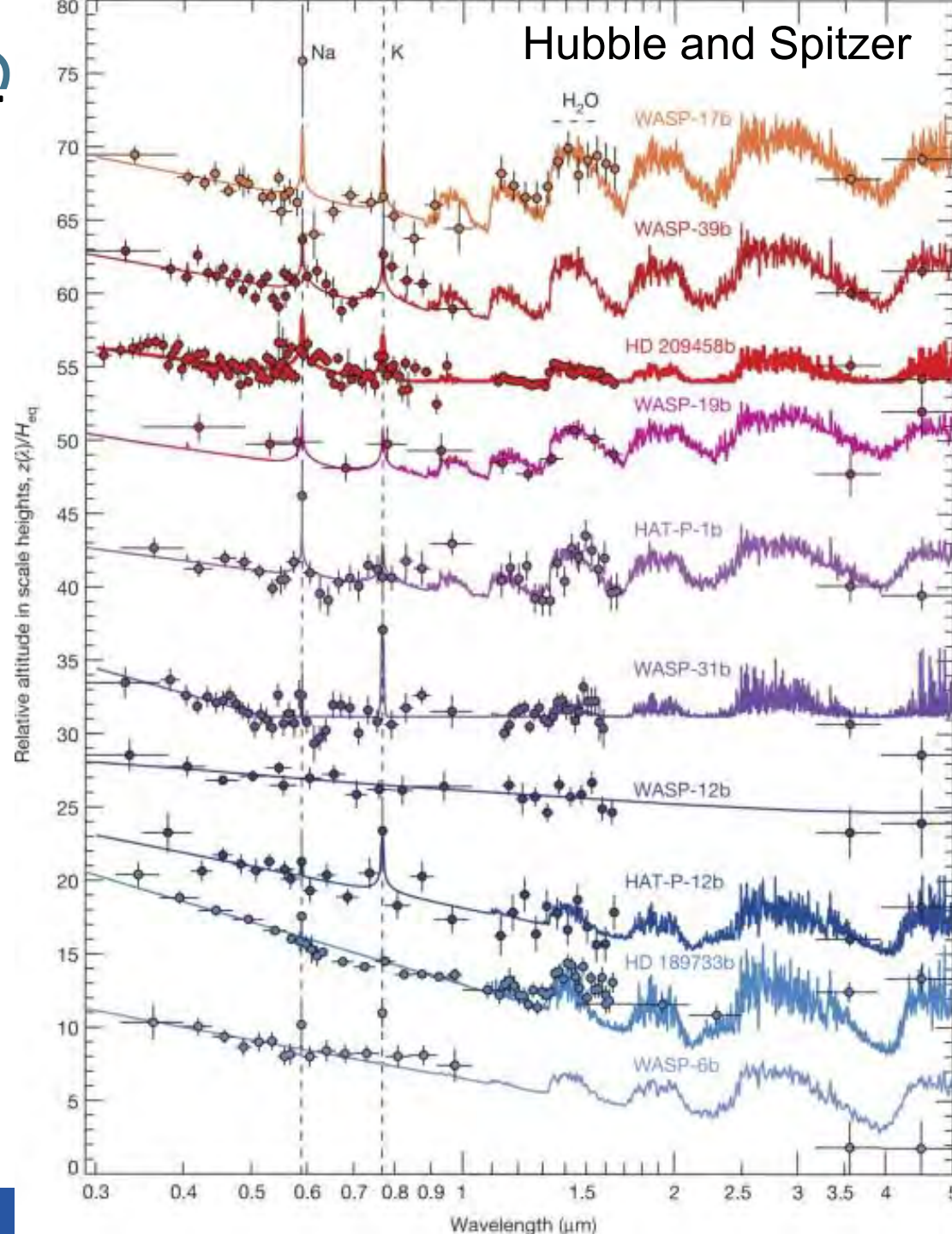
Ionisation



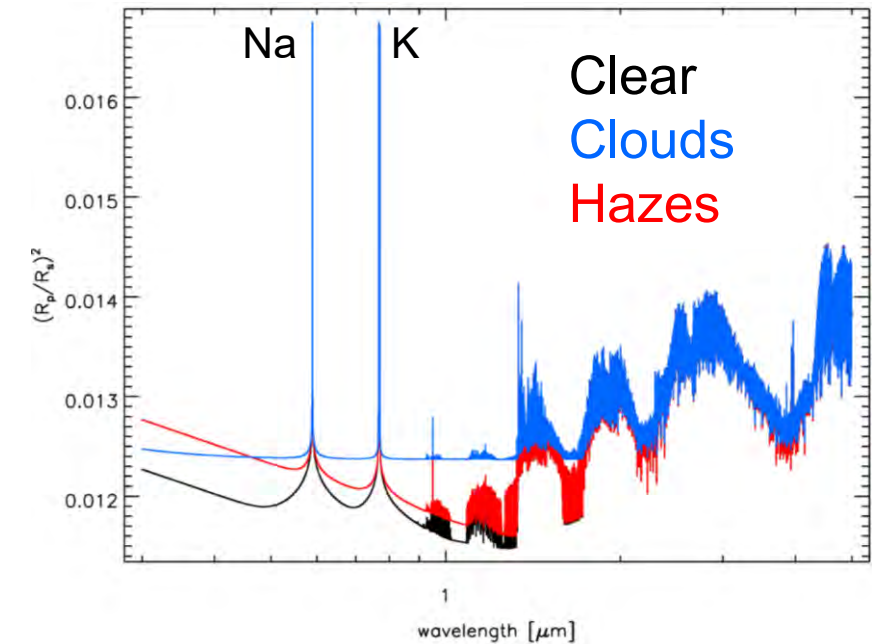
Heating



Hubble and Spitzer

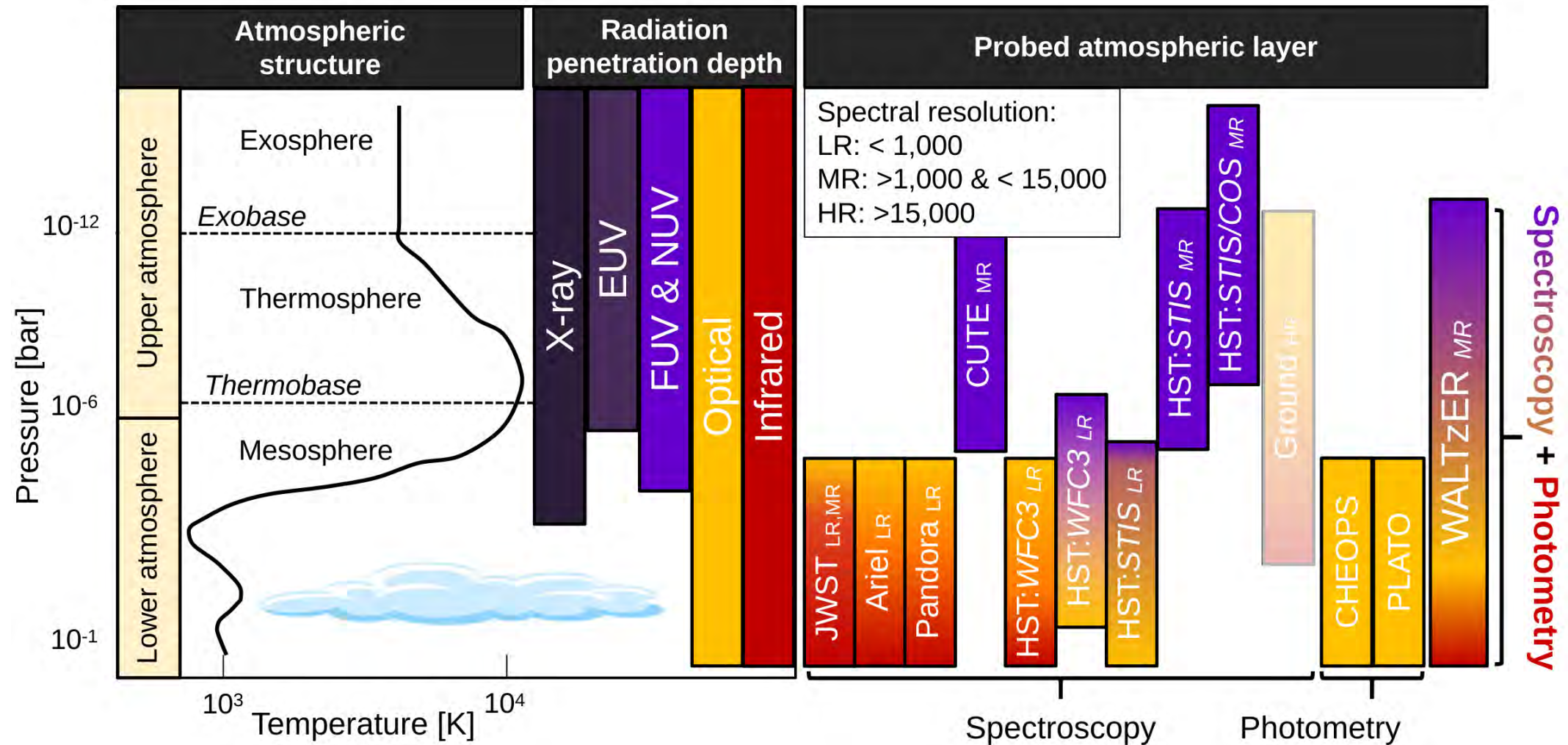


AEROSOLS AND ALKALI LINES



If Mg/Fe are locked in clouds, aerosols can impact the atmospheric temperature, and thus the escape

SUMMARY



PRIMARY SCIENCE CASE

What is the origin of planetary atmospheres and how do they evolve?

Observe a representative sample of planets spanning different stellar irradiation regimes and ages.

How do lower and upper atmospheric layers interact?

Observe the full vertical atmospheric extent for a representative sample of planets.

SCIENCE CASES

Core science

Simultaneously characterise lower & upper atmospheres of close-in gas rich planets:

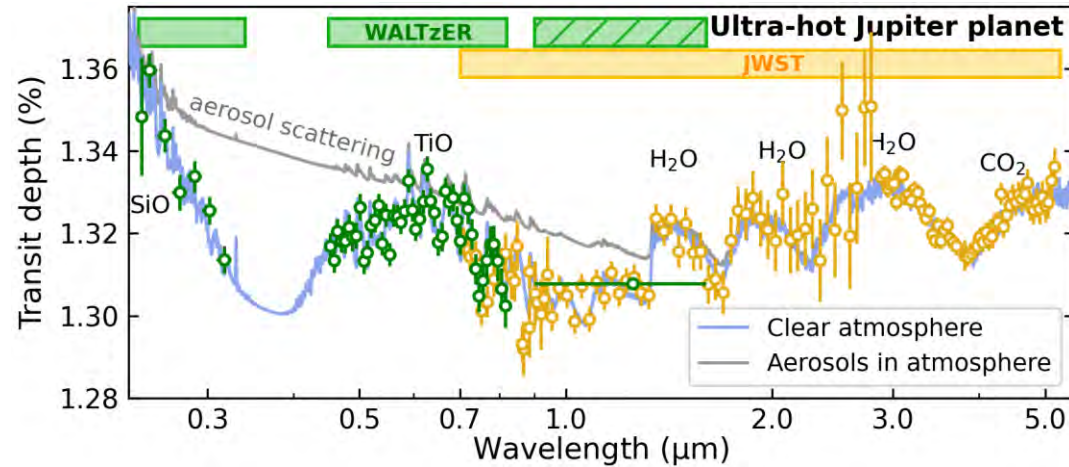
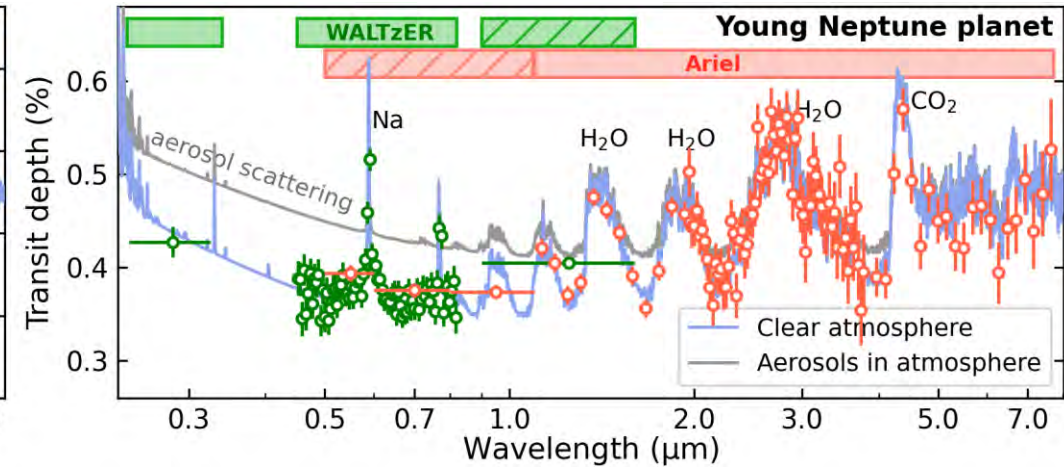
- Temperature
- Composition
- Aerosols
- Mass-loss
- Variability

Secondary surveys

- Stellar high-energy emission
- Solar system active bodies
- **25% open time**

Nominal mission
3 years

COMPLEMENTARITY TO JWST AND ARIEL

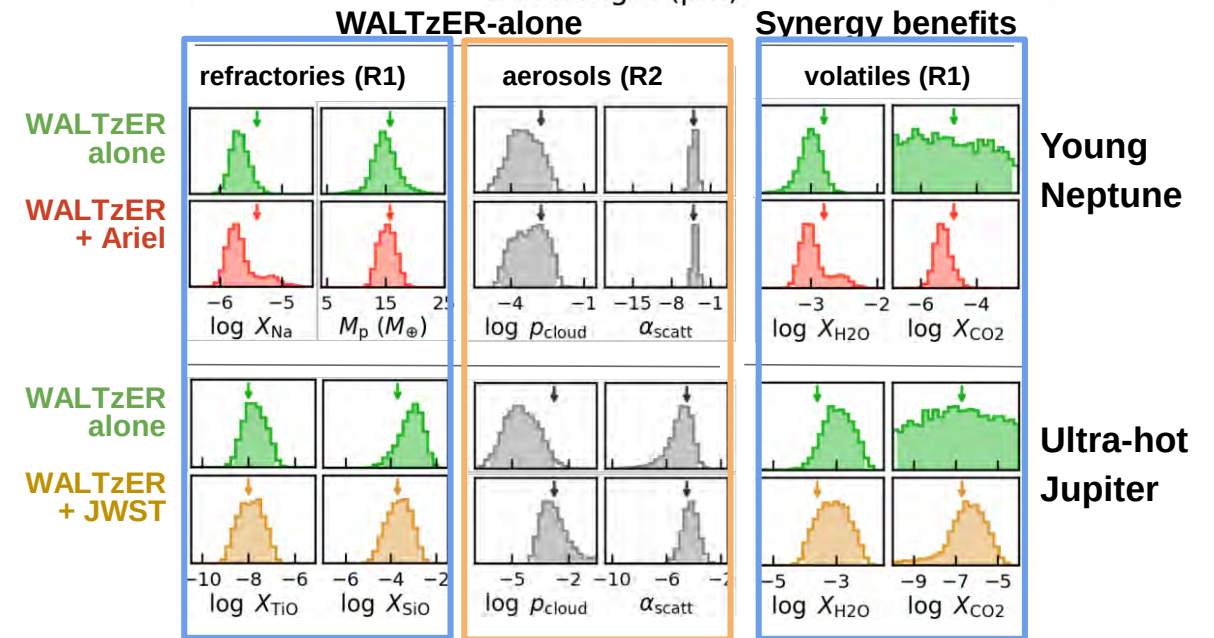


Science Requirements

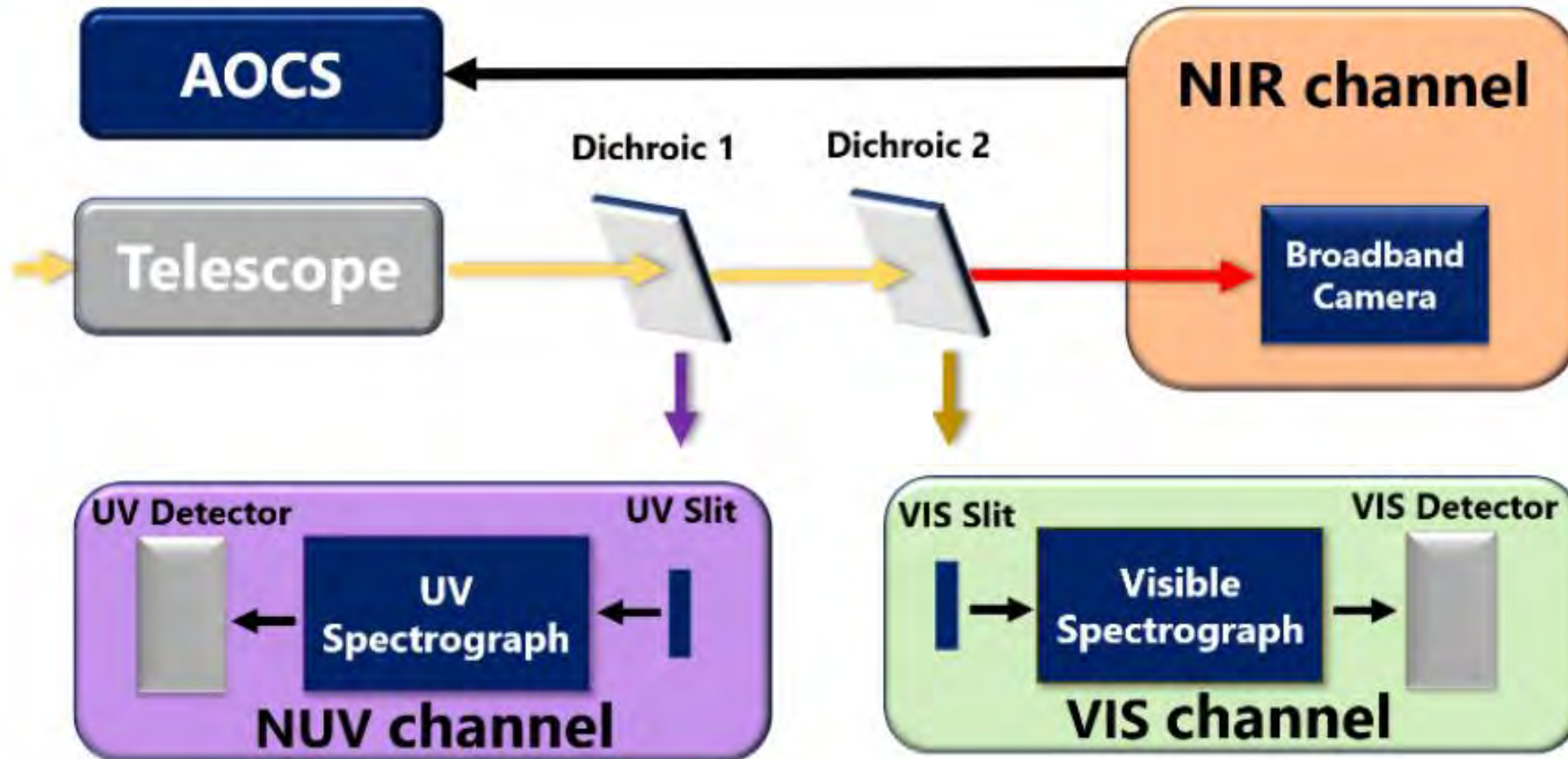
R1: Na & K detection ●

R2: aerosol vs cloud-free ●

R3: Fe & Mg mass-loss ●●



WALTZER CONCEPT

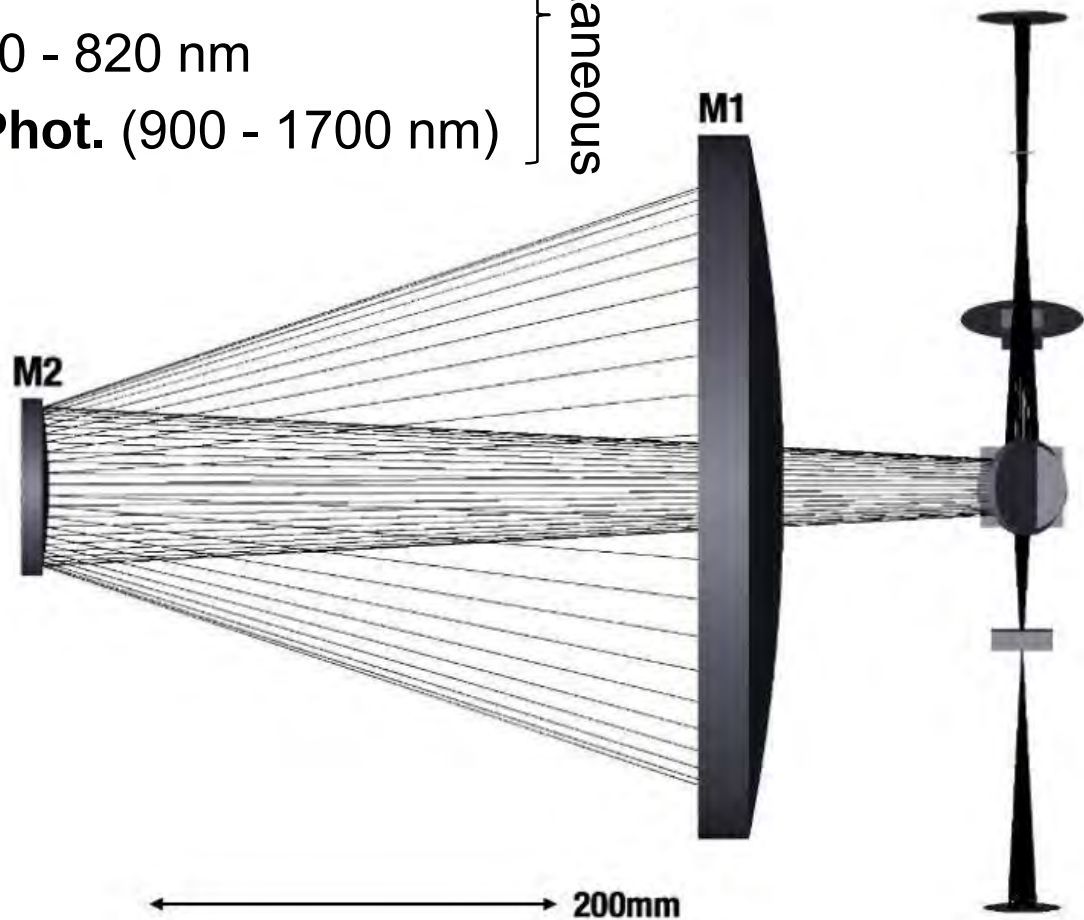
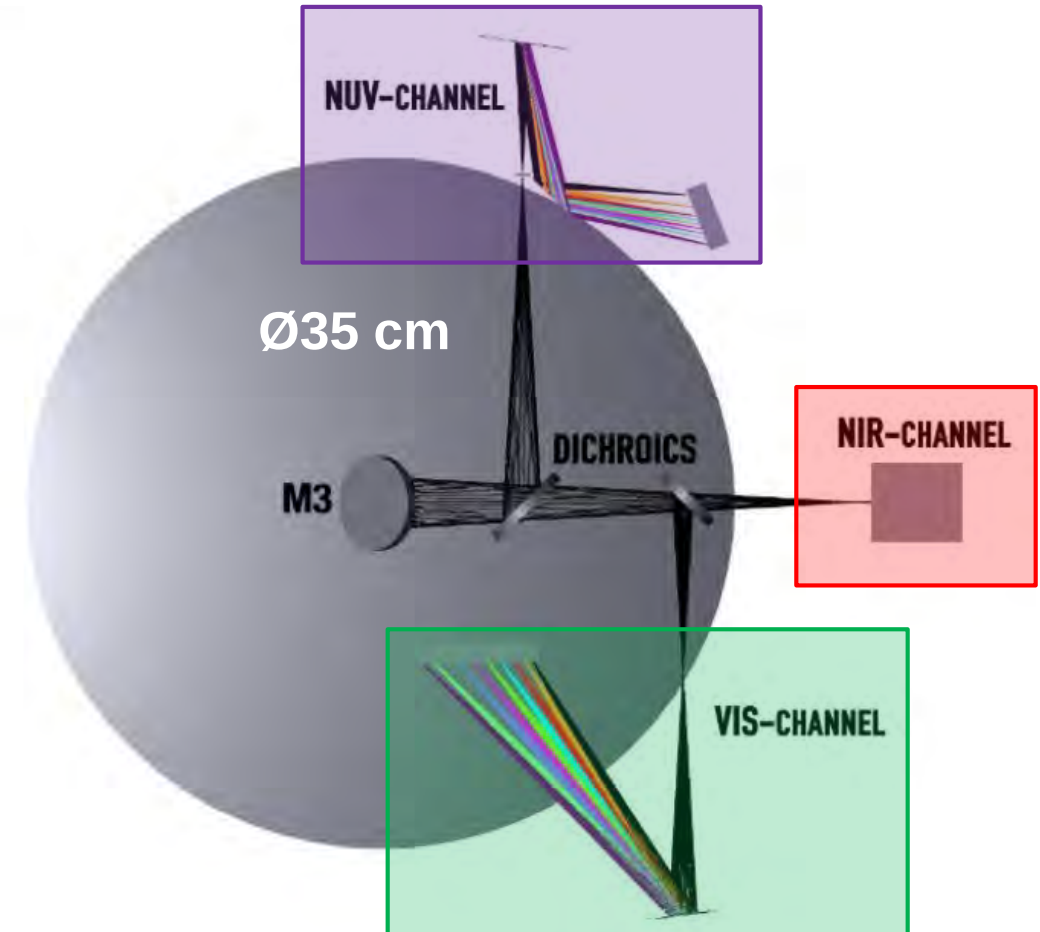


WALTZER CONCEPT

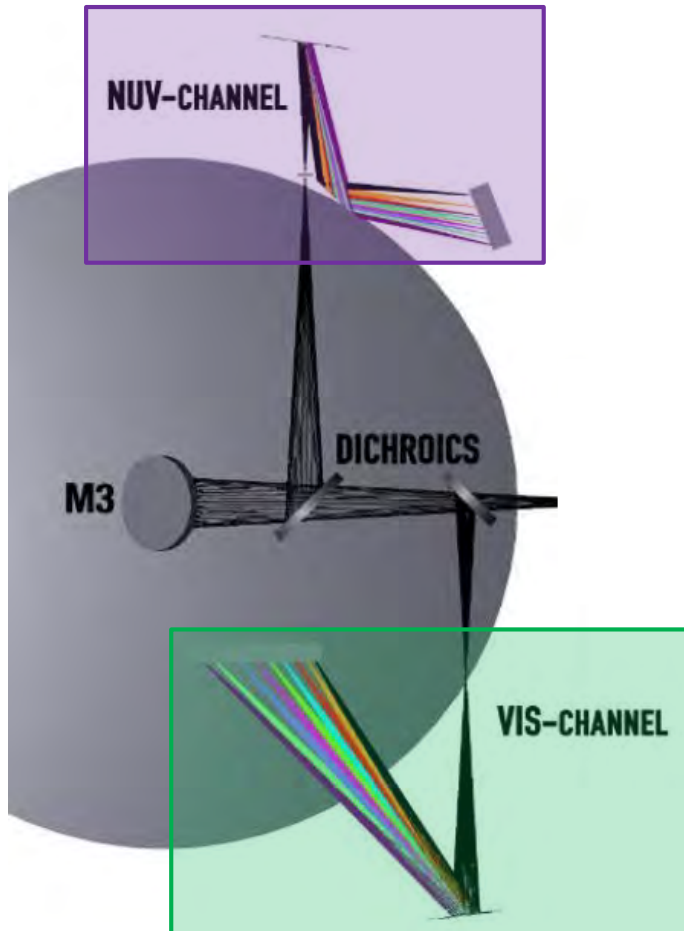
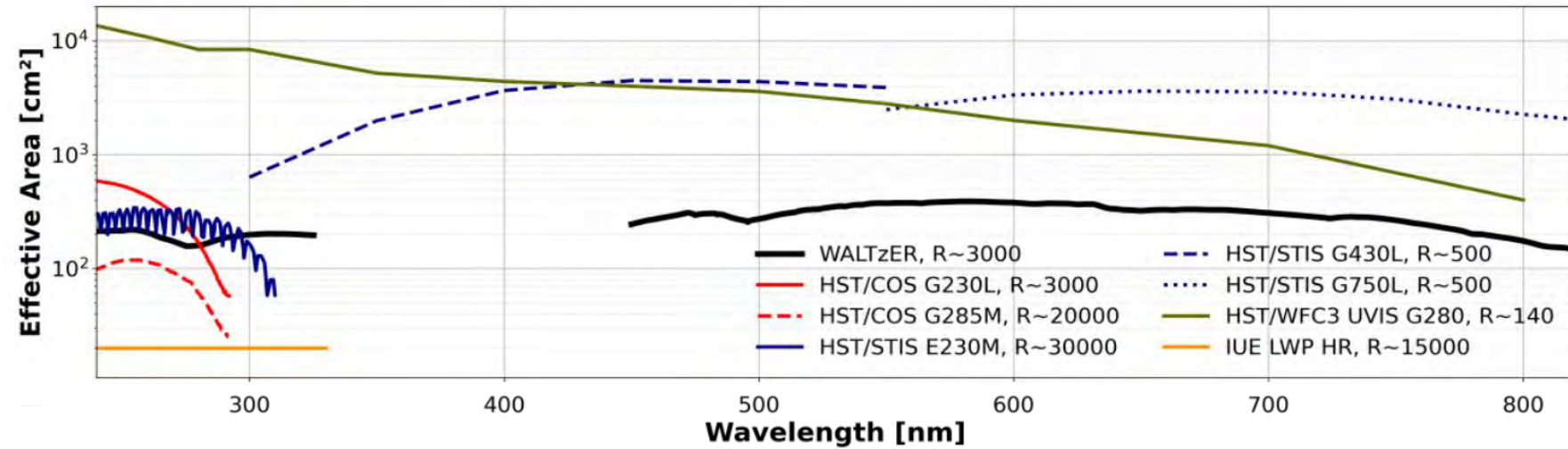
NUV & VIS Spec. (R~3000) } Simultaneous

- 240 - 325 nm
- 450 - 820 nm

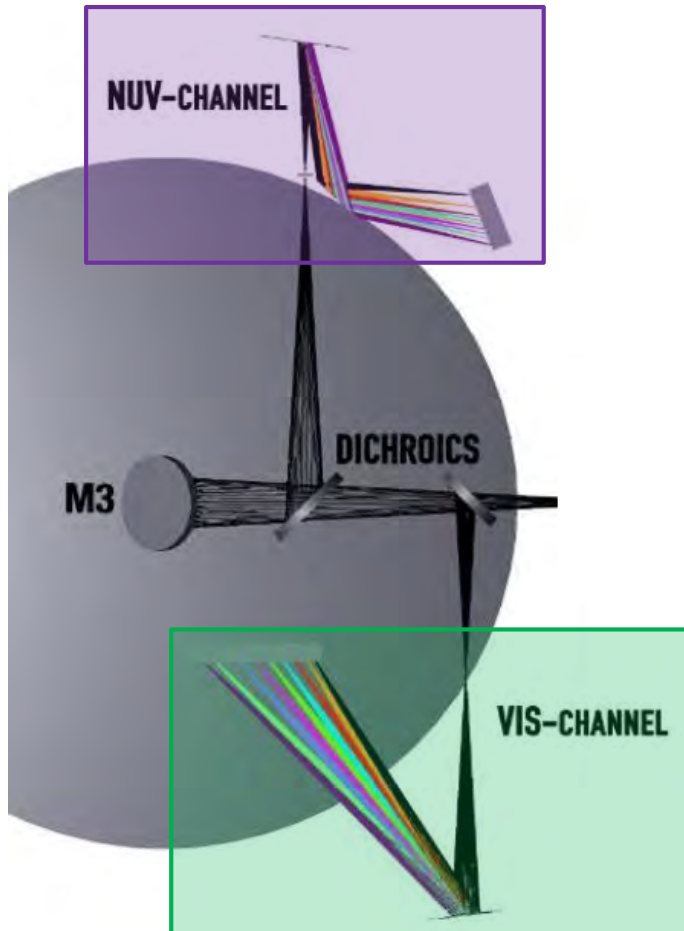
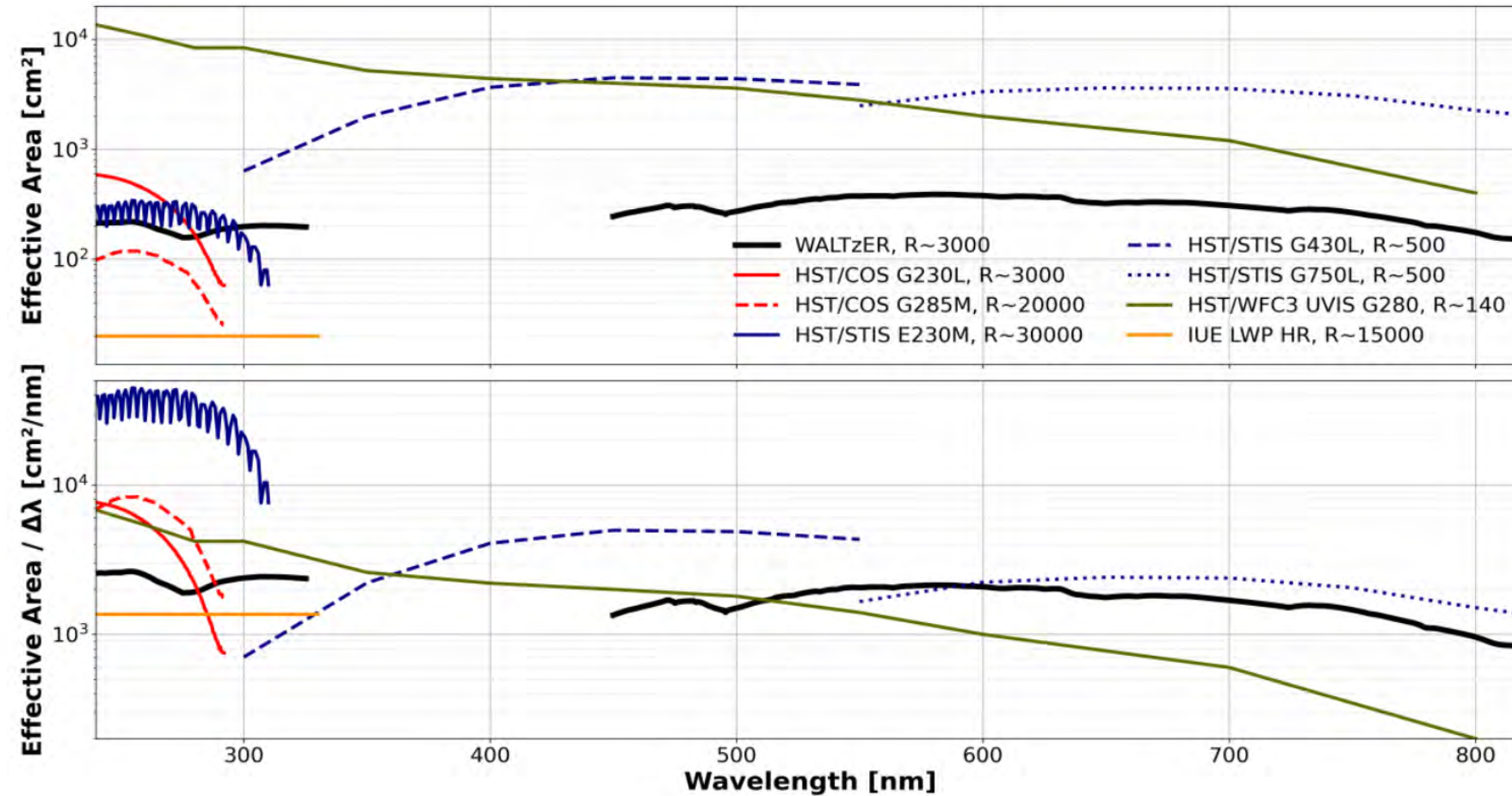
NIR Phot. (900 - 1700 nm) }



NUV AND VIS SPECTROGRAPHS



NUV AND VIS SPECTROGRAPHS



NIR CAMERA

We baseline the SNAKE detector from Lynred, as on the TANGO mission.

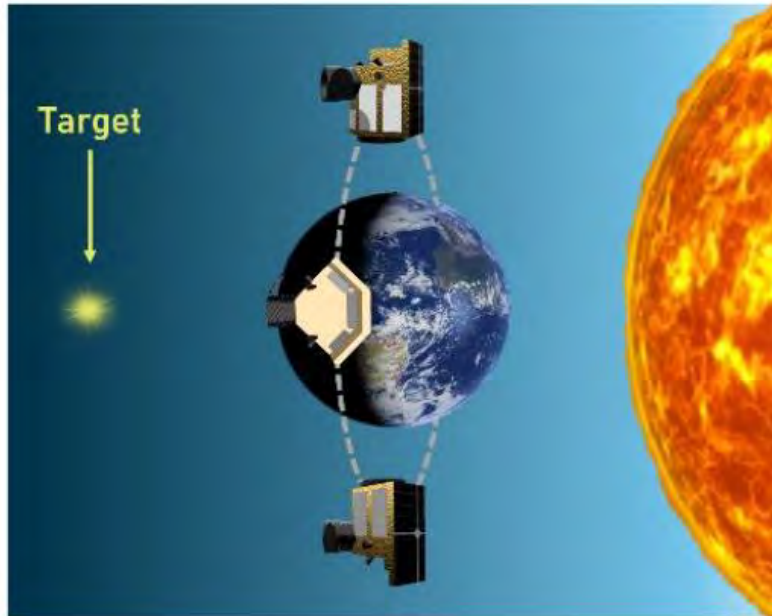
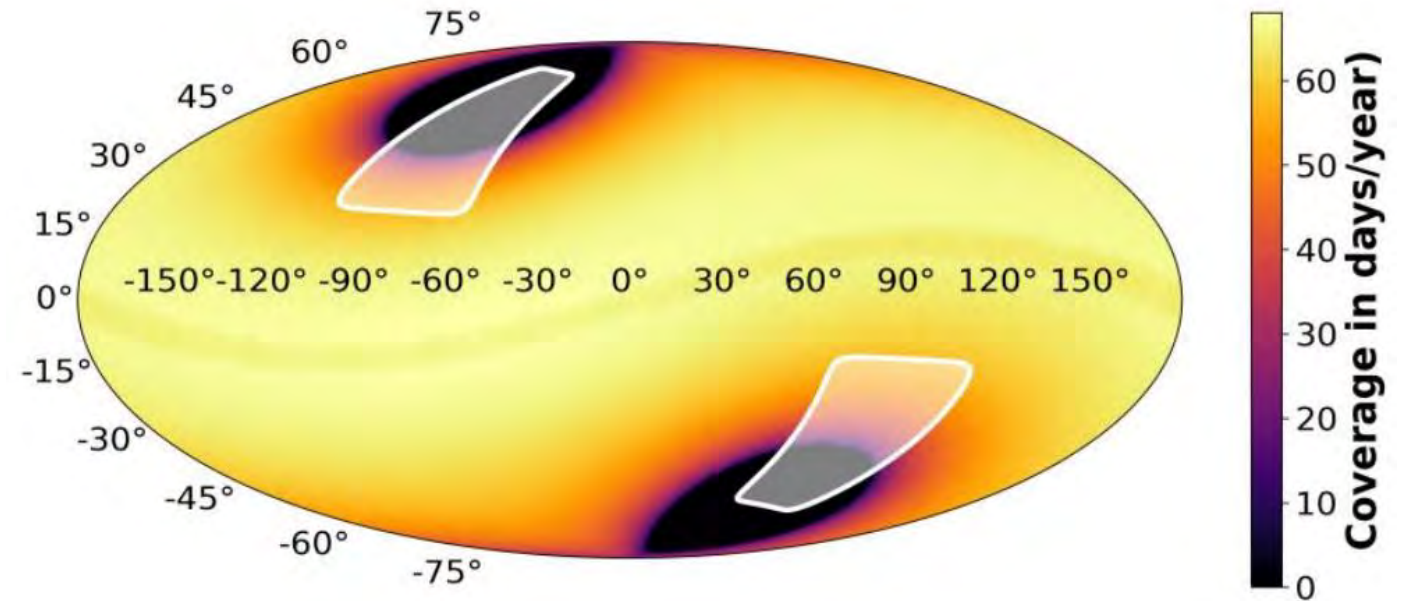


- Pointing
- Simultaneous reference light curves (e.g. timing)
- Aid the correction of systematic noise
- Allows cross-calibration with JWST and Ariel

The camera is slightly defocused and a shutter is located close to the focus



SPACECRAFT ORBIT AND ATTITUDE

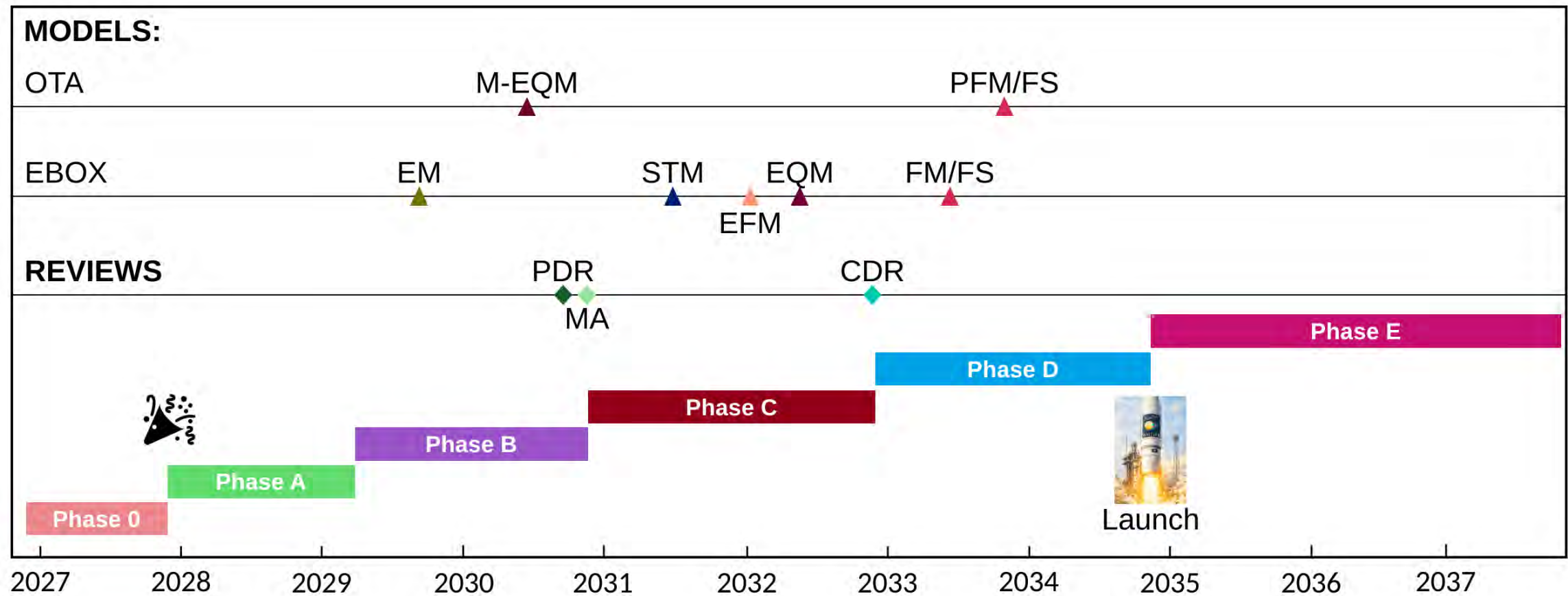


Low-Earth orbit at 700 km height

The Nadir-locked spacecraft enables to thermally stabilise the instrument

Sky coverage: 90% for >10 consecutive days in a year

TIMELINE





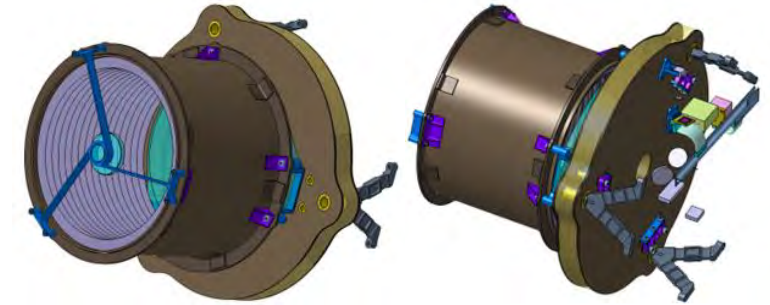
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