



# Institute Overview and Astrophysics Programme

Michael Wise - SRON Director

Ukrainian Delegation - June 10, 2025

# Space Research Organization **Netherlands**

Lead NL participation in the ESA science program  
National expertise center for NL research community  
Perform world-leading research with NL universities  
Develop technology and instrumentation with NL industry  
Advise government on space policy and strategy

# SRON Overview

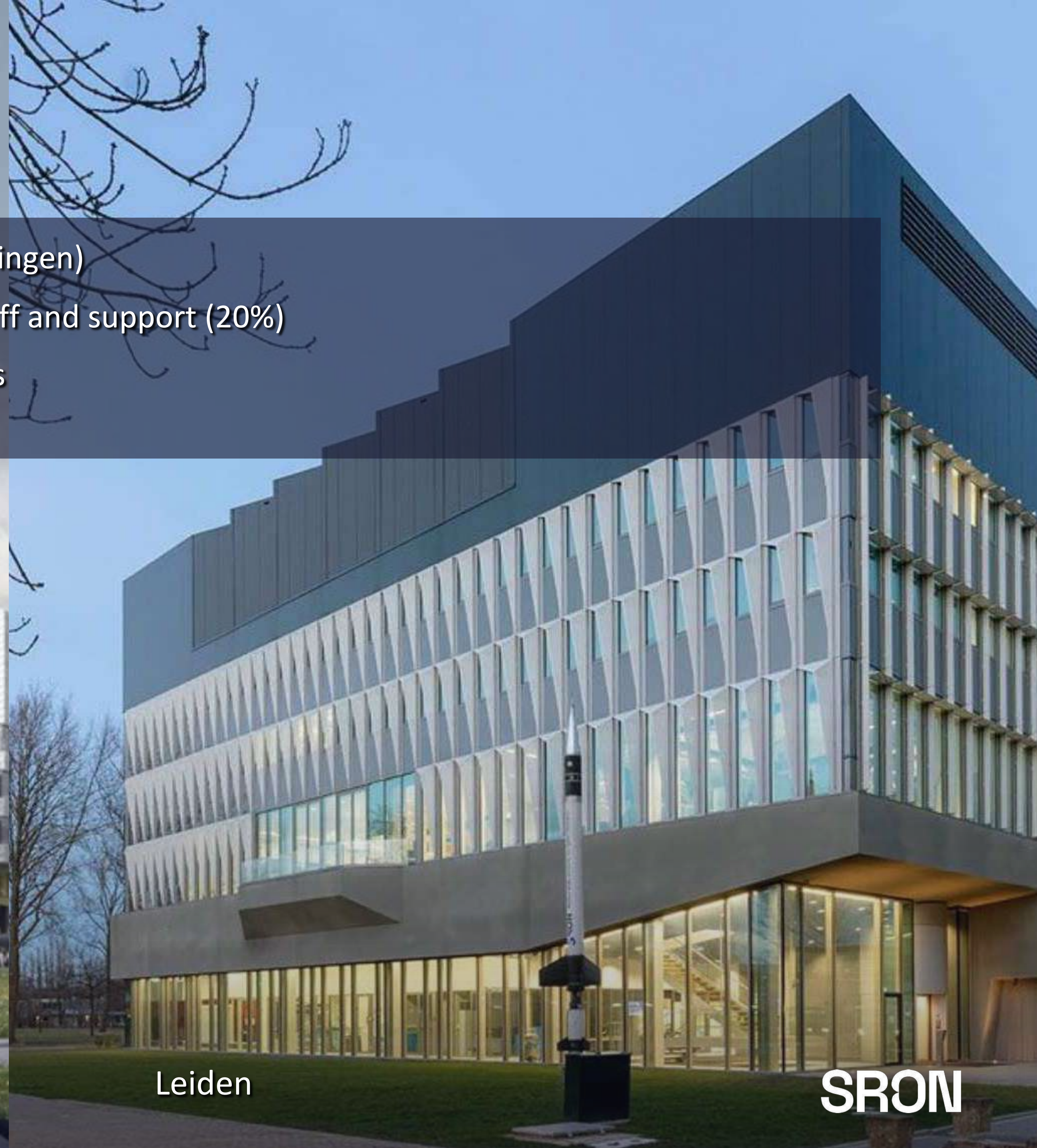
One Institute, two locations, 210 staff (165 Leiden, 45 Groningen)

Scientists/Instrument Scientists (50%), Engineers (30%), Staff and support (20%)

Strong scientific and technical connections in both locations



Groningen



Leiden

SRON

# SRON Research

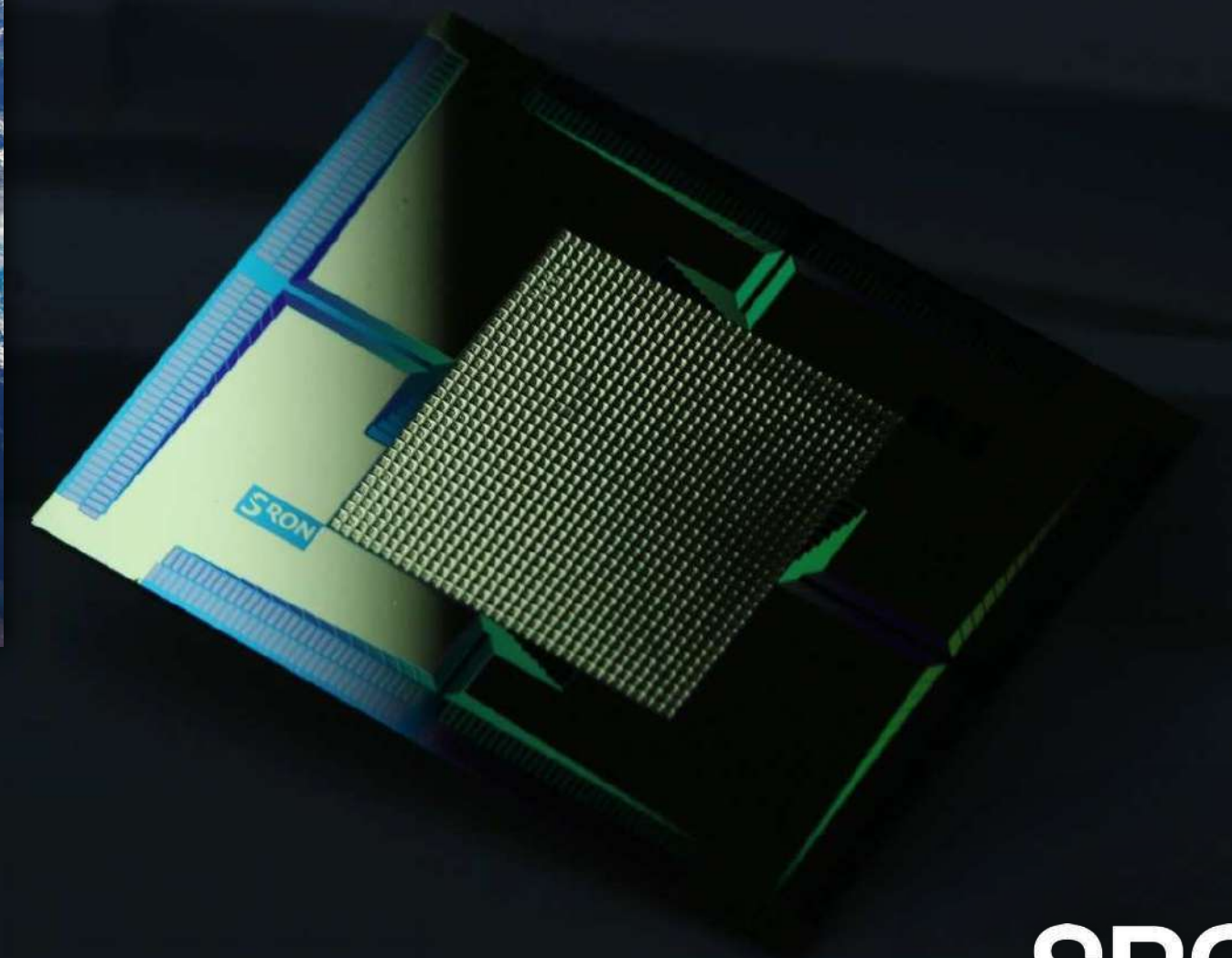


Astrophysics and  
Exoplanets

Earth Observation and  
Climate Studies



Technology and  
Instrumentation



# SRON **Astrophysics**

## High-energy Astrophysics

- Large scale structure and chemical evolution of the Universe
- Black holes, accretion physics, AGN feedback, compact objects
- Gravitational waves and transients

## Far-infrared Astrophysics

- Star formation history of the Universe
- ISM of star-forming galaxies, galaxy mergers
- Protoplanetary disks and planet formation

## Exoplanet and Planetary Systems

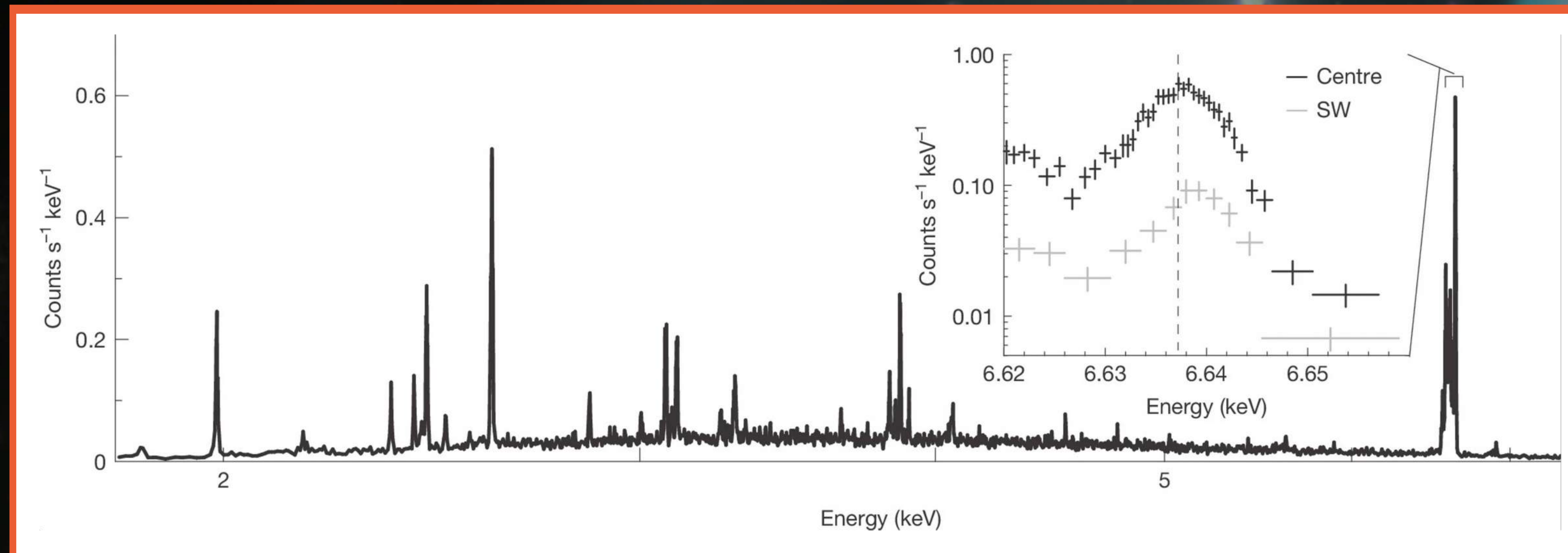
- Detection and characterization of exoplanets
- Physics and chemistry of exoplanet atmospheres
- Planetary habitability and search for life

# Detection of Bulk Gas Motion in Galaxy Clusters with XRISM

*XRISM Collaboration (A. Simionescu, L. Gu, E. Costantini, Nature, Feb 2025)*

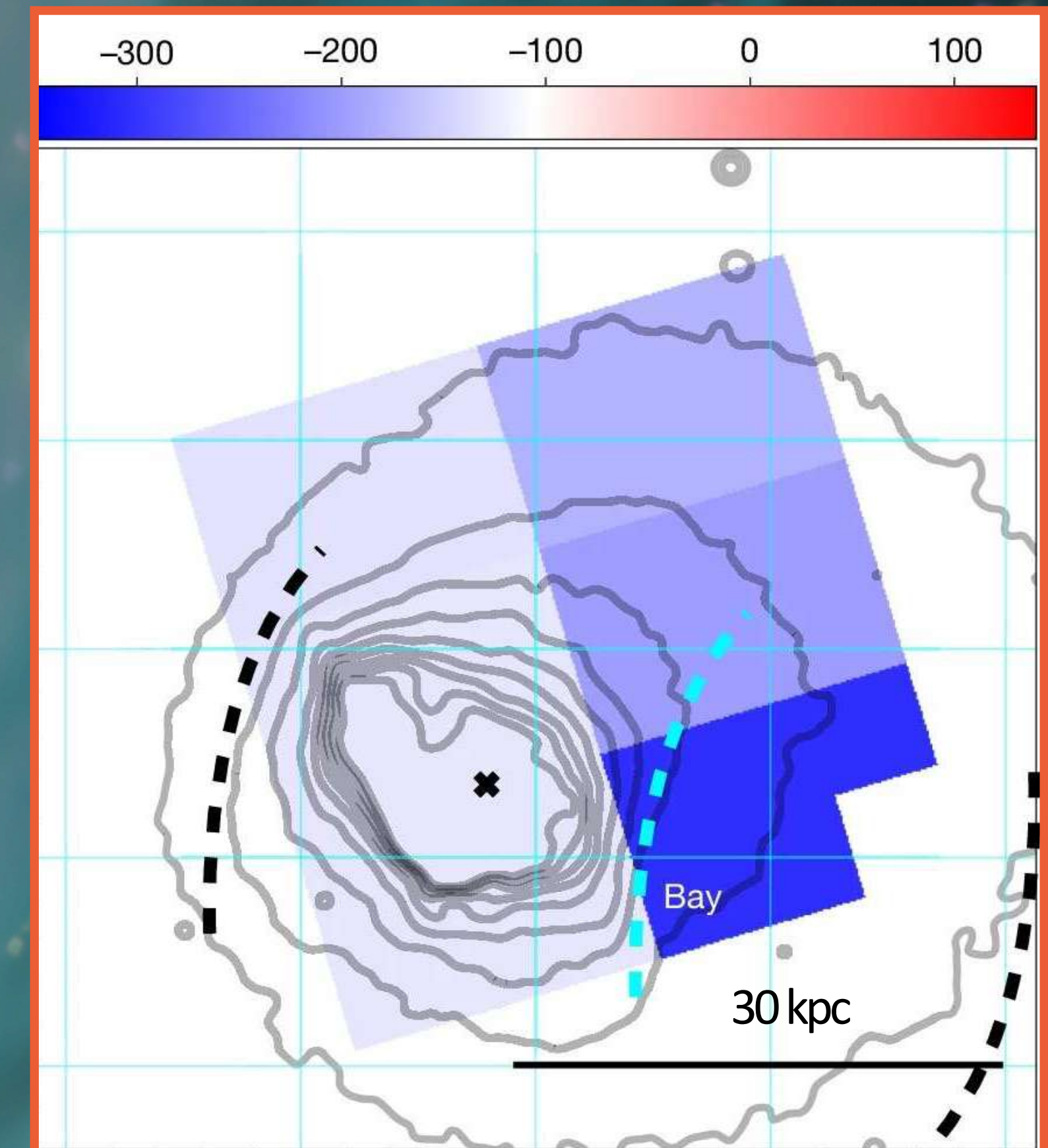
**SRON**

# Detection of Bulk Gas Motion in Galaxy Clusters with **XRISM**

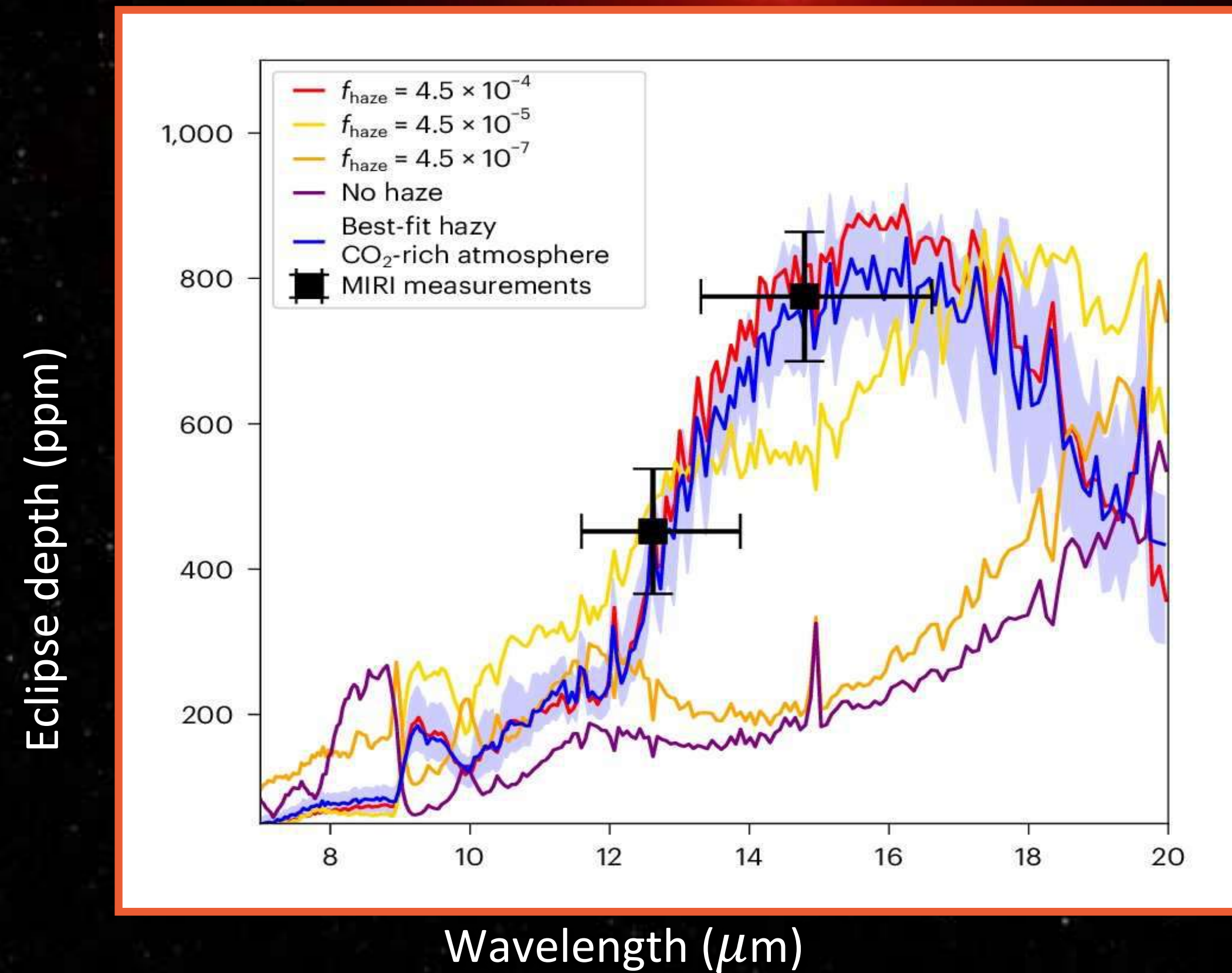


XRISM/Resolve spectrum Centaurus Cluster

Bulk Gas Velocity (km/s)



# Evidence for Hazy CO<sub>2</sub>-rich Atmosphere in Trappost 1b with JWST

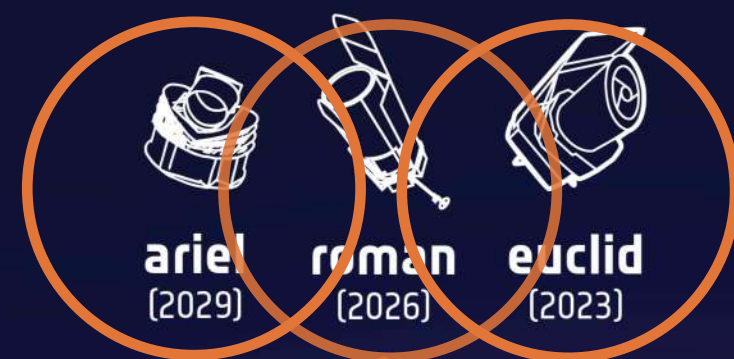


(M, Min, R. Waters, B. Edwards, et al., Nature, Dec 2024)

# COSMIC OBSERVERS



IN DEVELOPMENT



ACTIVE



microwaves

sub-millimetre

infrared

optical

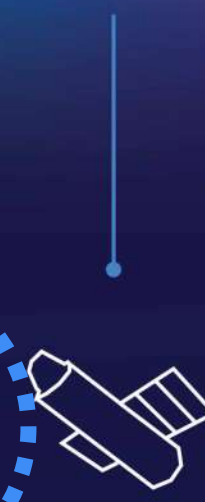
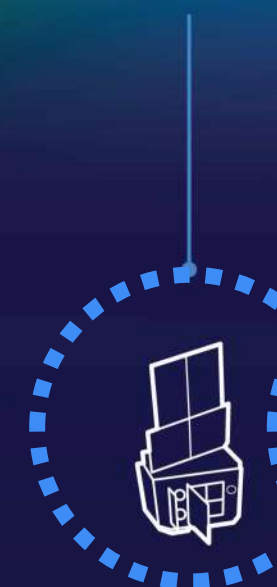
ultraviolet

x-rays

gamma rays

gravitational waves

LEGACY



planck  
(2009-2013)

herschel  
(2009-2013)

iso  
(1995-1998)

akari  
(2006-2011)

hipparcos  
(1989-1993)

corot  
(2006-2014)

iue  
(1978-1996)

exosat  
(1983-1986)

hitomi  
(2016)

suzaku  
(2005-2015)

cos-b  
(1975-1982)

lisa pathfinder  
(2015-2017)

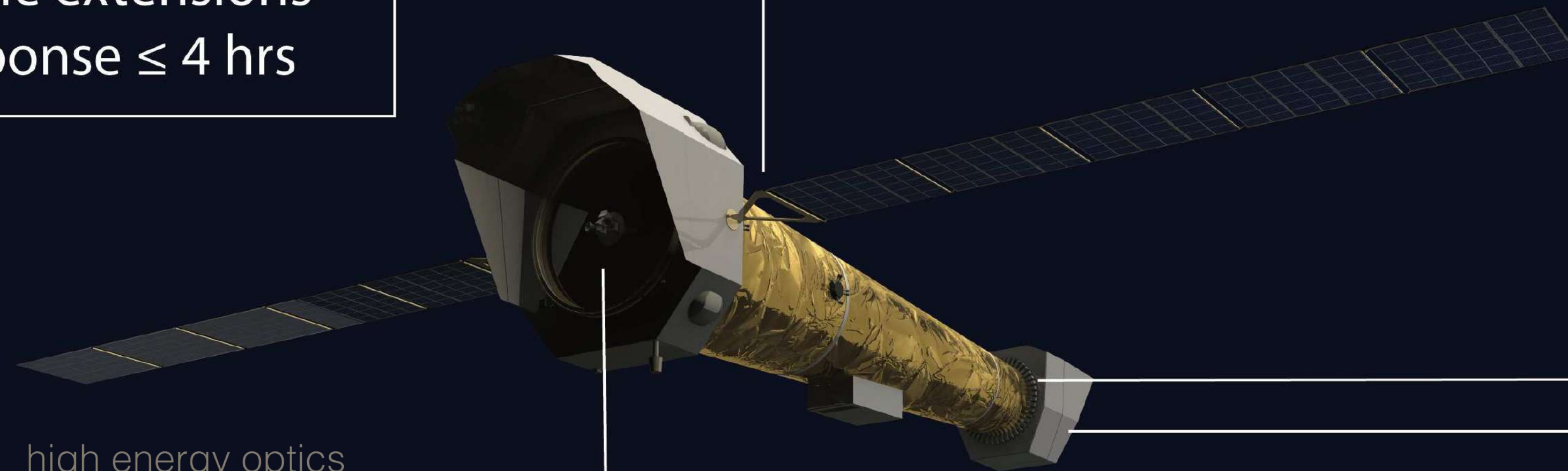
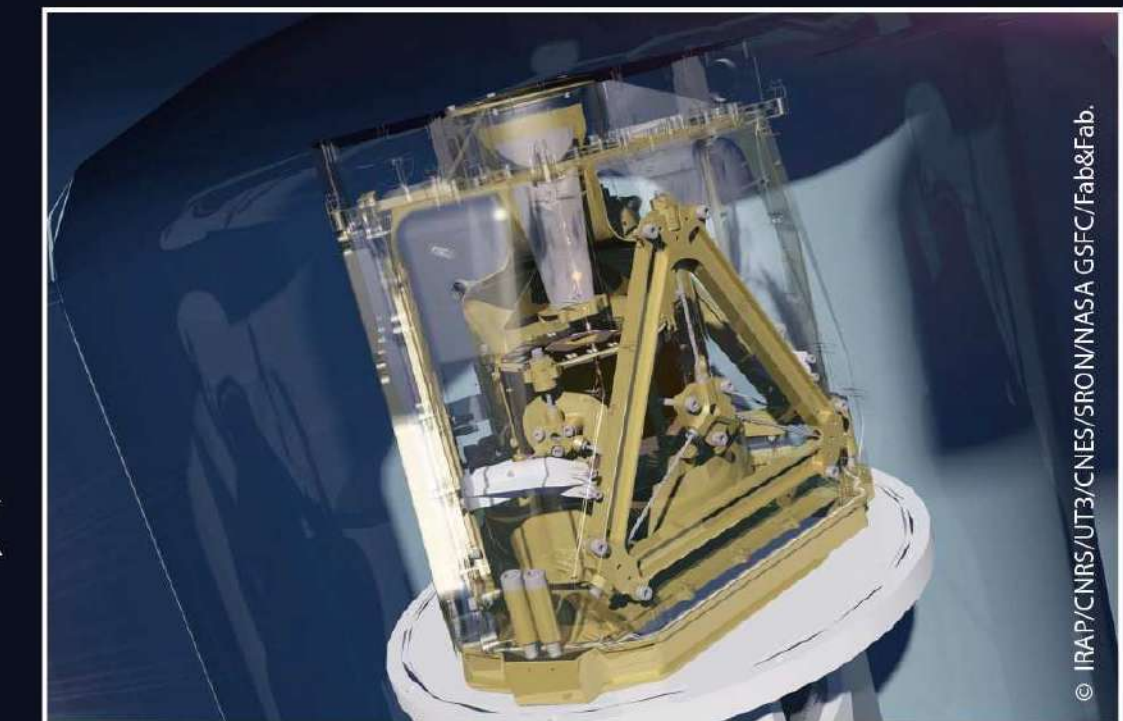
microscope  
(2016-2018)

# ESA X-ray Flagship **Athena**

Ariane 6  
L1 orbit  
4 years nominal mission  
+ possible extensions  
ToO response  $\leq 4$  hrs

X-ray Integral Field Unit:  
 $\Delta E$ : 2.5 eV  
Field of view: 5 arcmin  
Operating temperature: 50 mK

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SPACE  
RESEARCH  
ORGANISATION  
NETHERLANDS



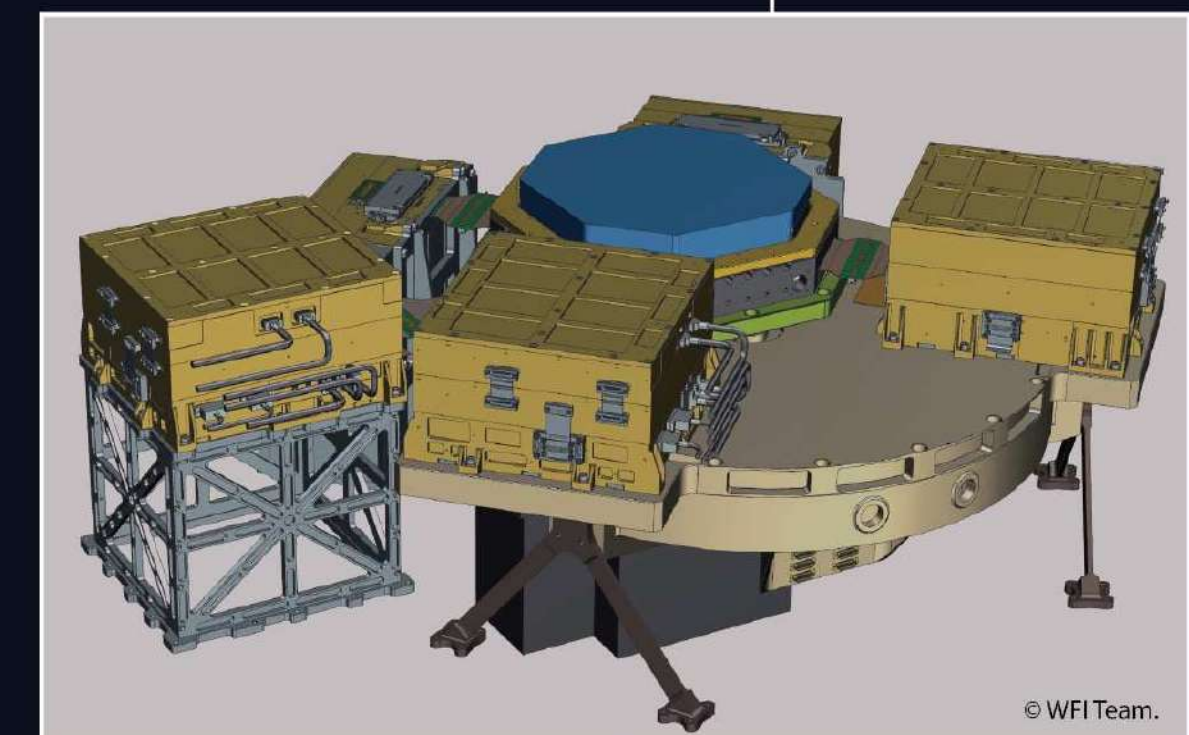
**cosine**

high energy optics

**Silicon Pore Optics:**  
1.4 m<sup>2</sup> at 1 keV  
5 arcsec HEW  
Focal length: 12 m  
Sensitivity:  $3 \cdot 10^{-17}$  erg cm<sup>-2</sup> s<sup>-1</sup>



**Wide Field Imager:**  
 $\Delta E$ :  $< 80$  eV at 1 keV  
Field of view: 40 arcmin  
Small/Fast detector for  
bright sources



# Detecting Gravitational Waves with LISA

*Essential contributions for LISA*

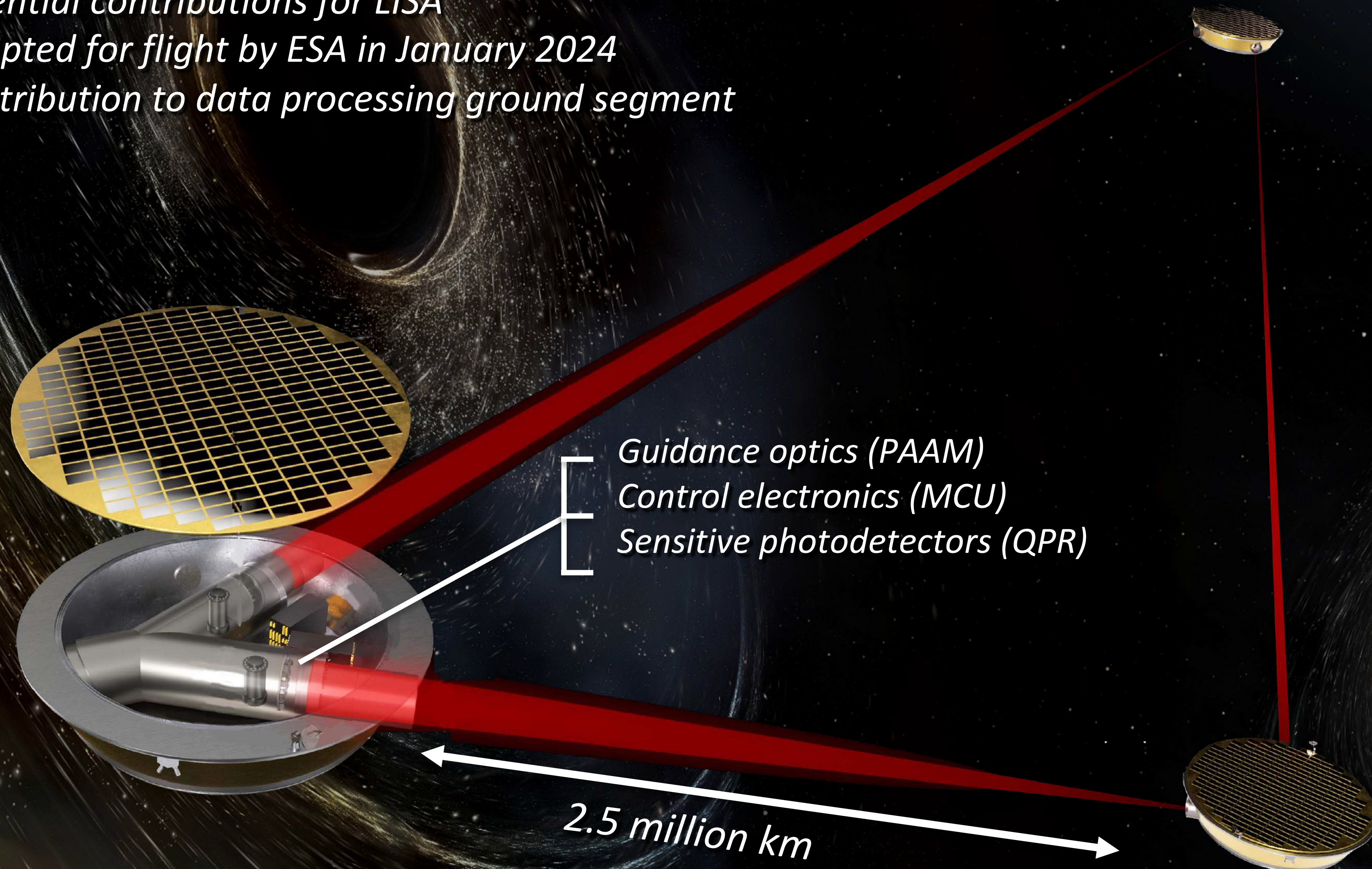
*Adopted for flight by ESA in January 2024*

*Contribution to data processing ground segment*

Nikhef

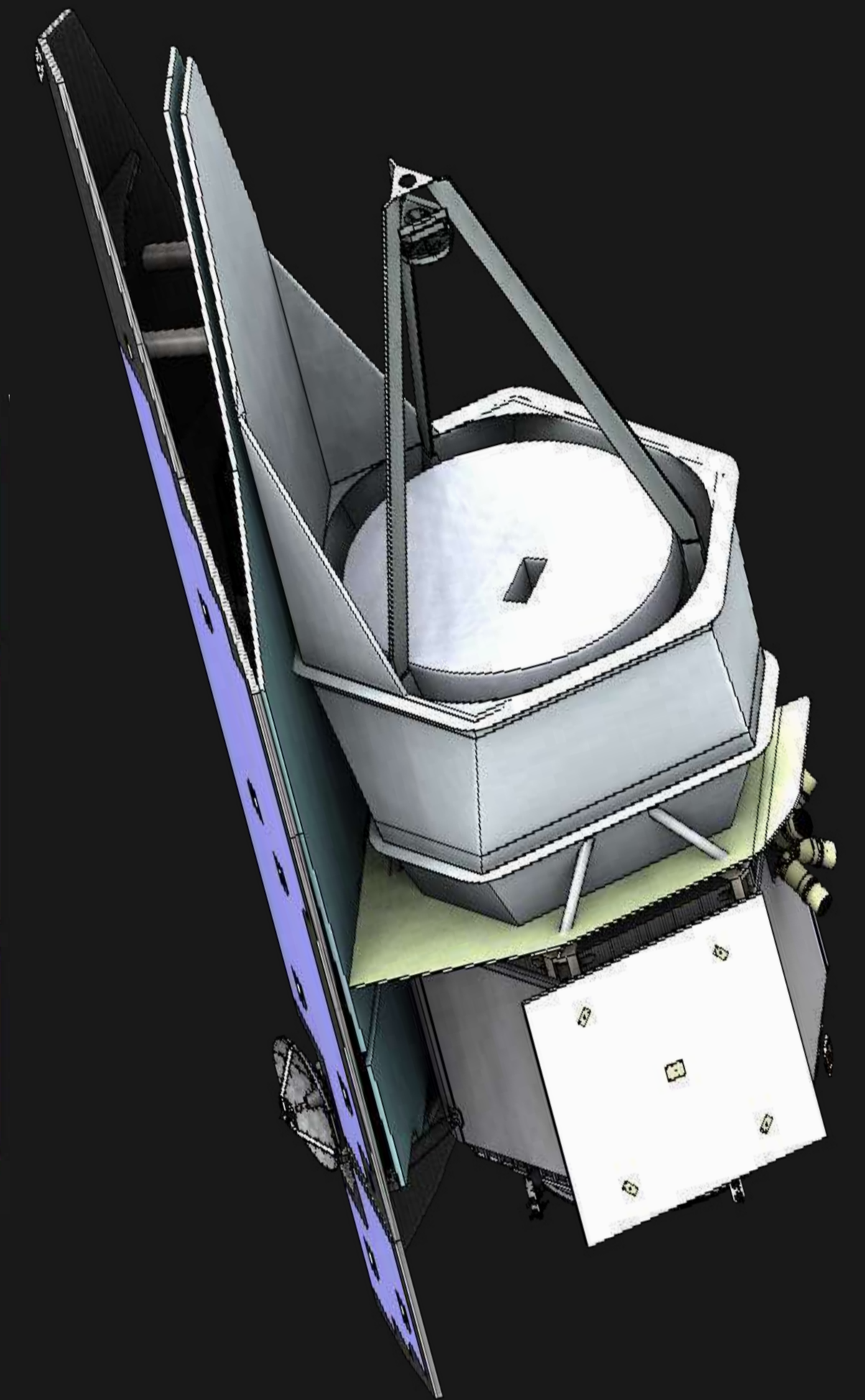
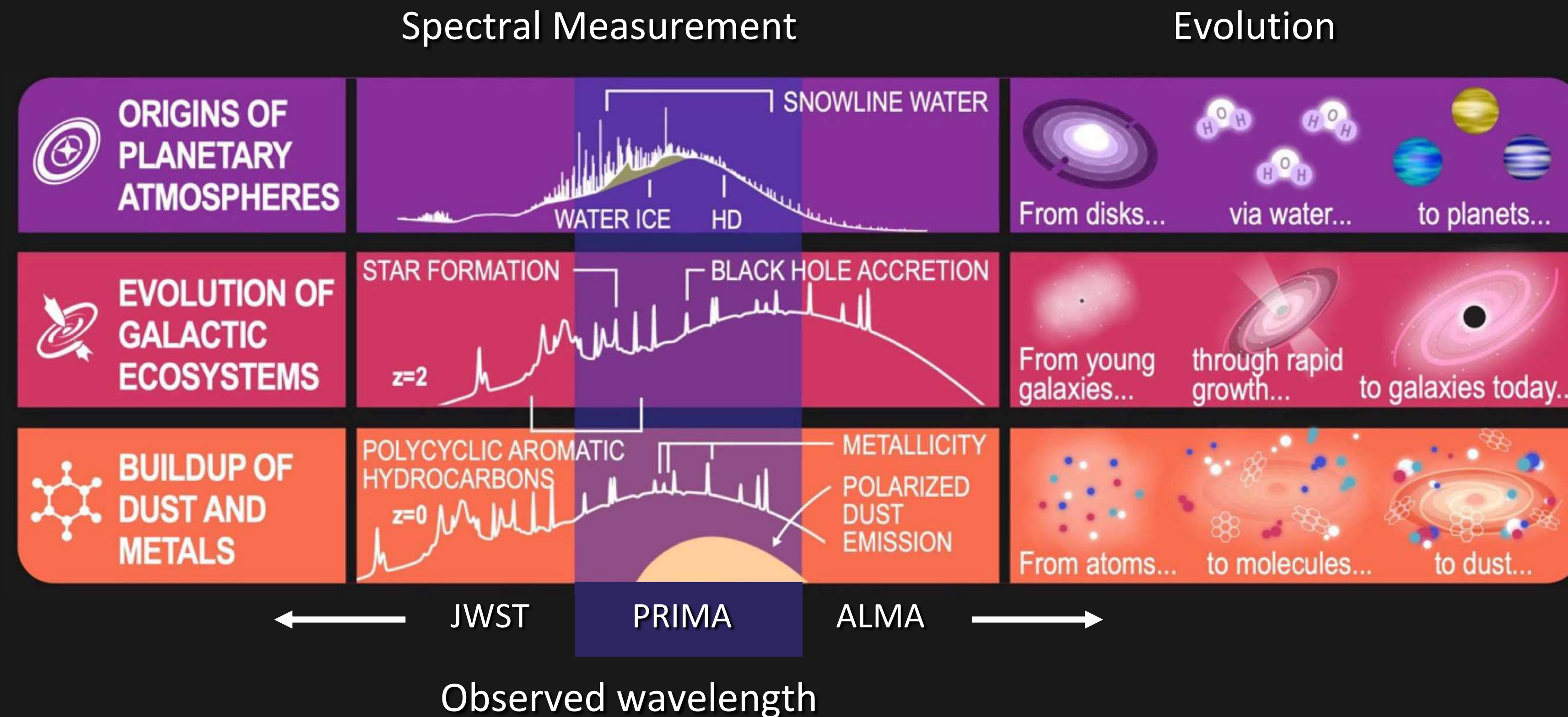


TNO innovation  
for life



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# NASA FIR Probe Mission **PRIMA**



NASA Probe mission (1B USD) candidate selected for Phase A study  
Mission selection is expected in Q1 2026 with planned launch in 2032  
SRON supplying MKID detectors for European-led PRIMAgger instrument

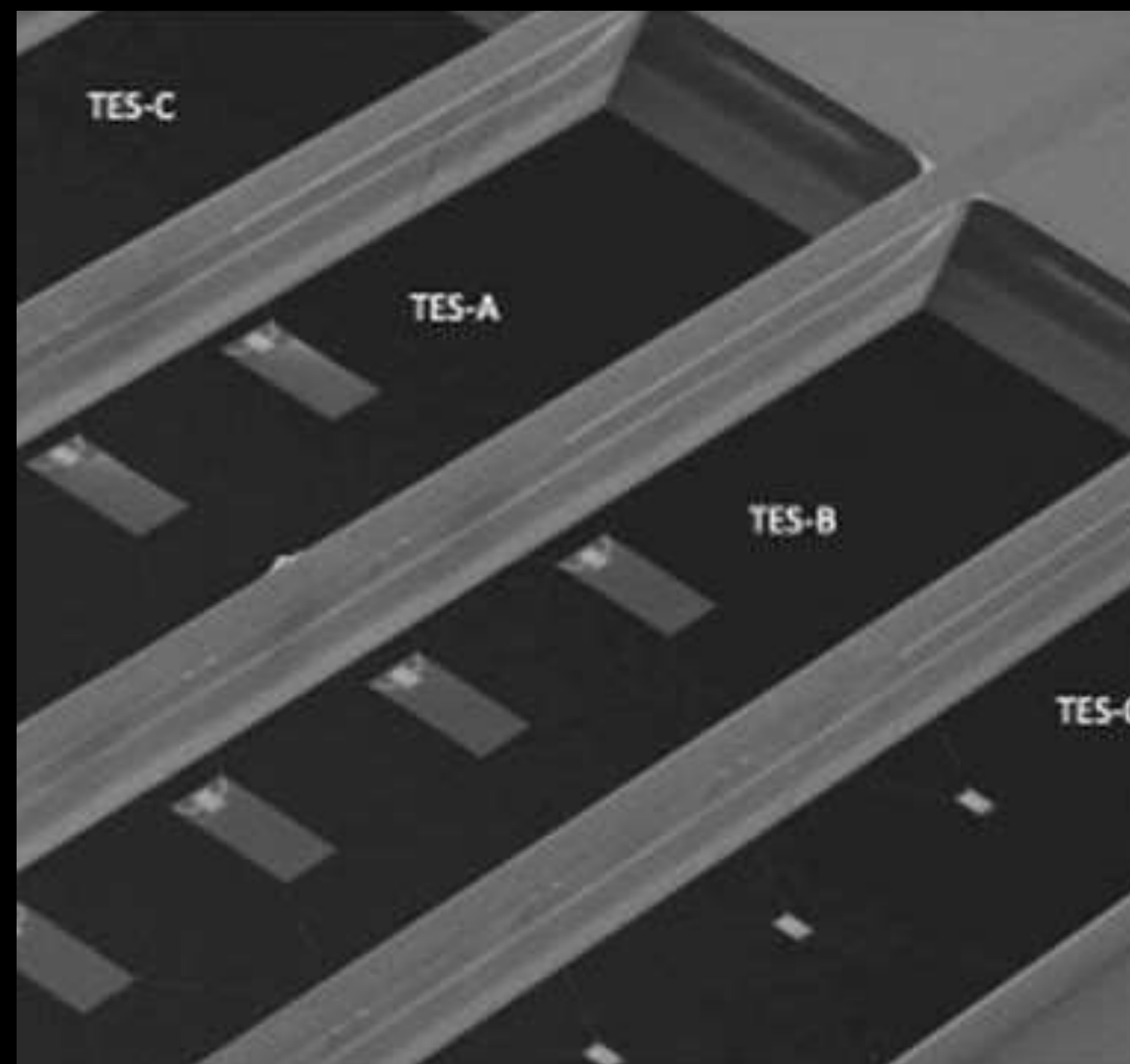
# European Instrument Consortium for LiteBIRD

JAXA flagship mission for precision measurement of CMB polarization

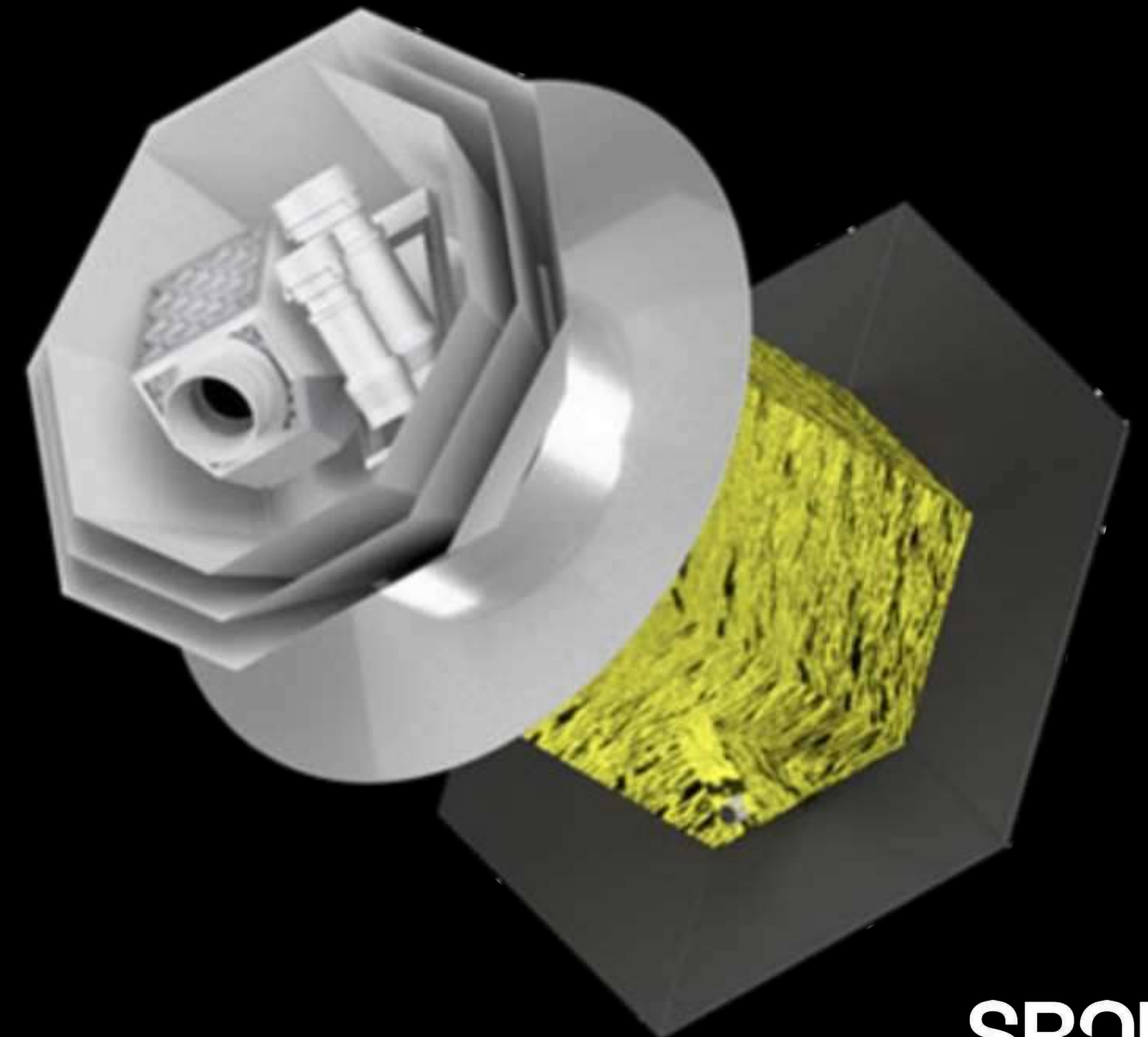
Polarization sensitivity 30x Planck, complement to ground-based measurements

Mission currently in pre-Phase A, formal selection in Q4 2025, launch 2034

SRON TES Bolometer



Dual-pol, dichroic pixel



SRON TES detectors are baseline for LiteBIRD

JWST



PLATO



ARIEL



EnVision



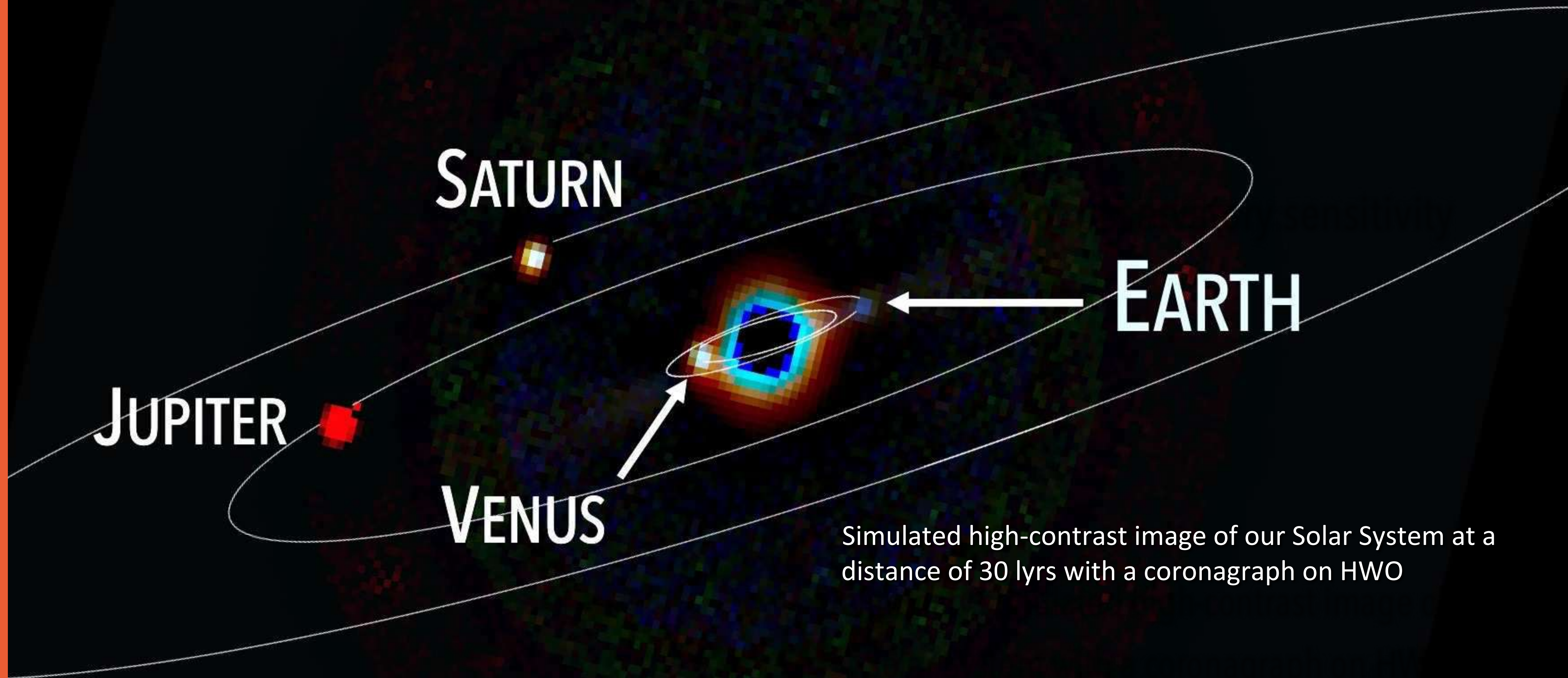
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# NASA Flagship Habitable Worlds Observatory

Expected launch in 2045 timeframe

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# Searching for another Earth



Simulated high-contrast image of our Solar System at a distance of 30 lyrs with a coronagraph on HWO

*Credit: Kammerer, Pueyo (STScI), Juanola Parramon, Stark (GSFC)*

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# The Road to Voyage 2050

Cosmic Vision

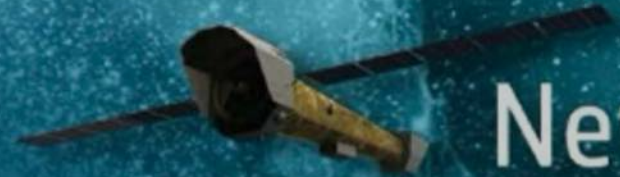


JUICE

LISA

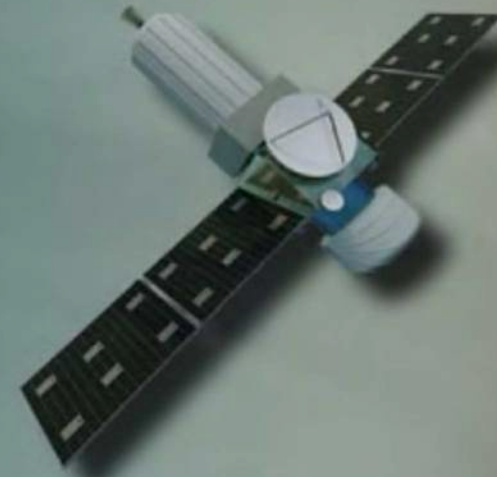


NewAthena



L4

Moons  
of the  
Giant Planets



L5

From temperate  
exoplanets to  
the Milky Way

L6

New physical  
probes of the  
early Universe

Voyage 2050

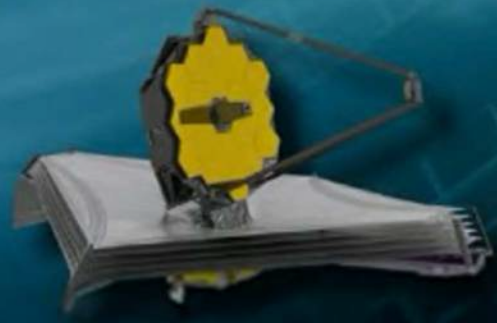
Large . . . . ➔ Leadership

Medium, Fast, mini-Fast . . . . . ➔

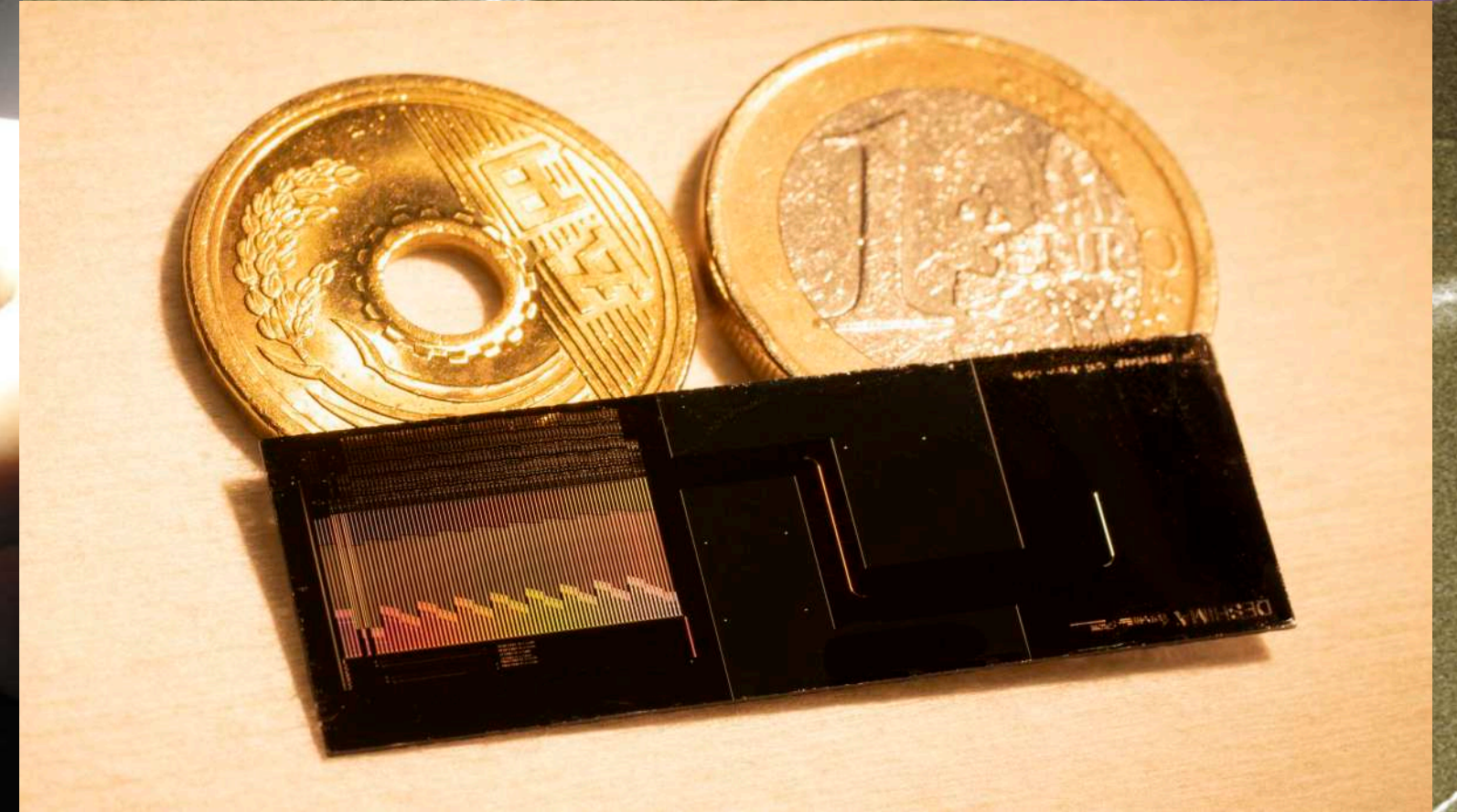
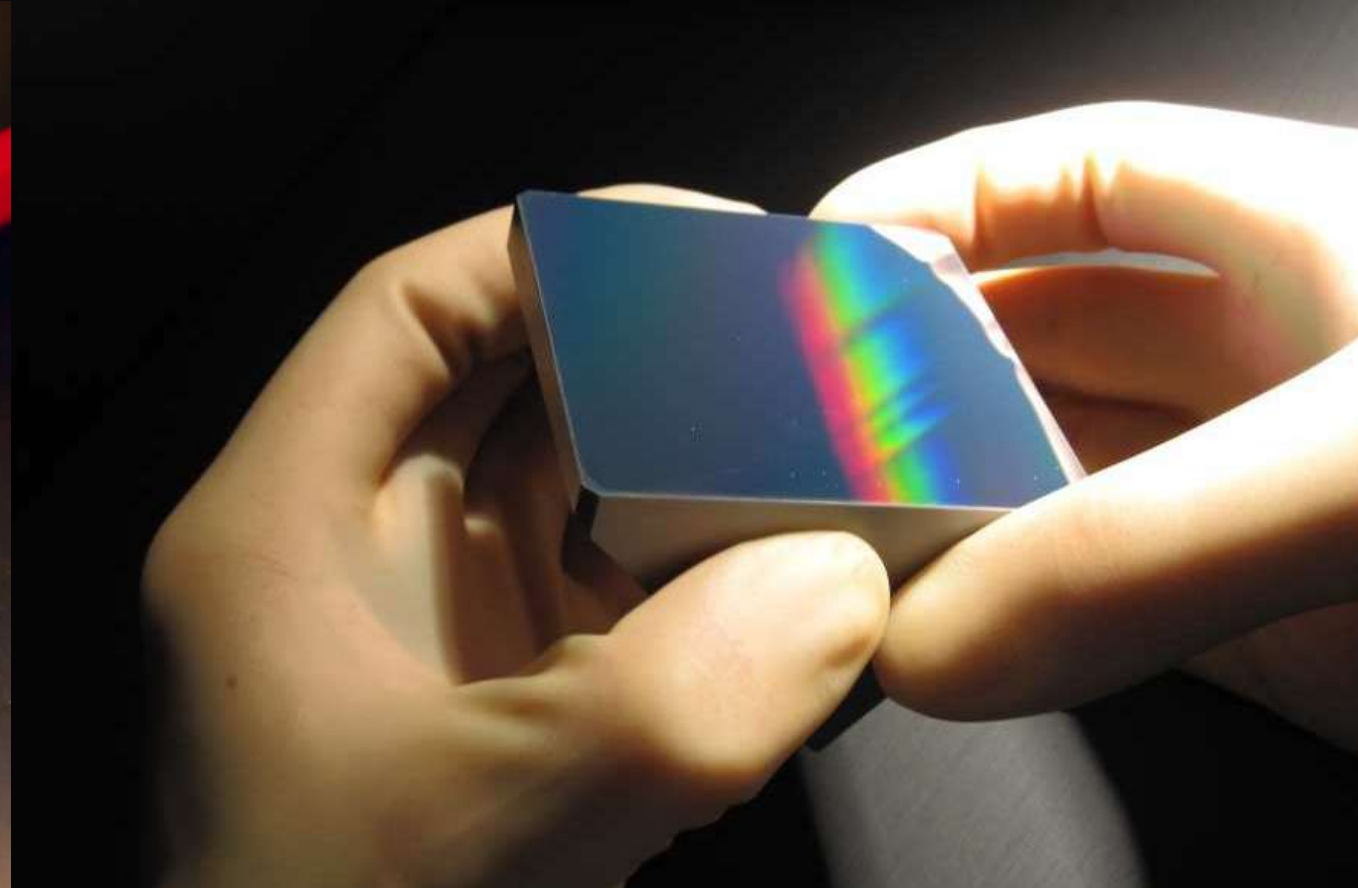
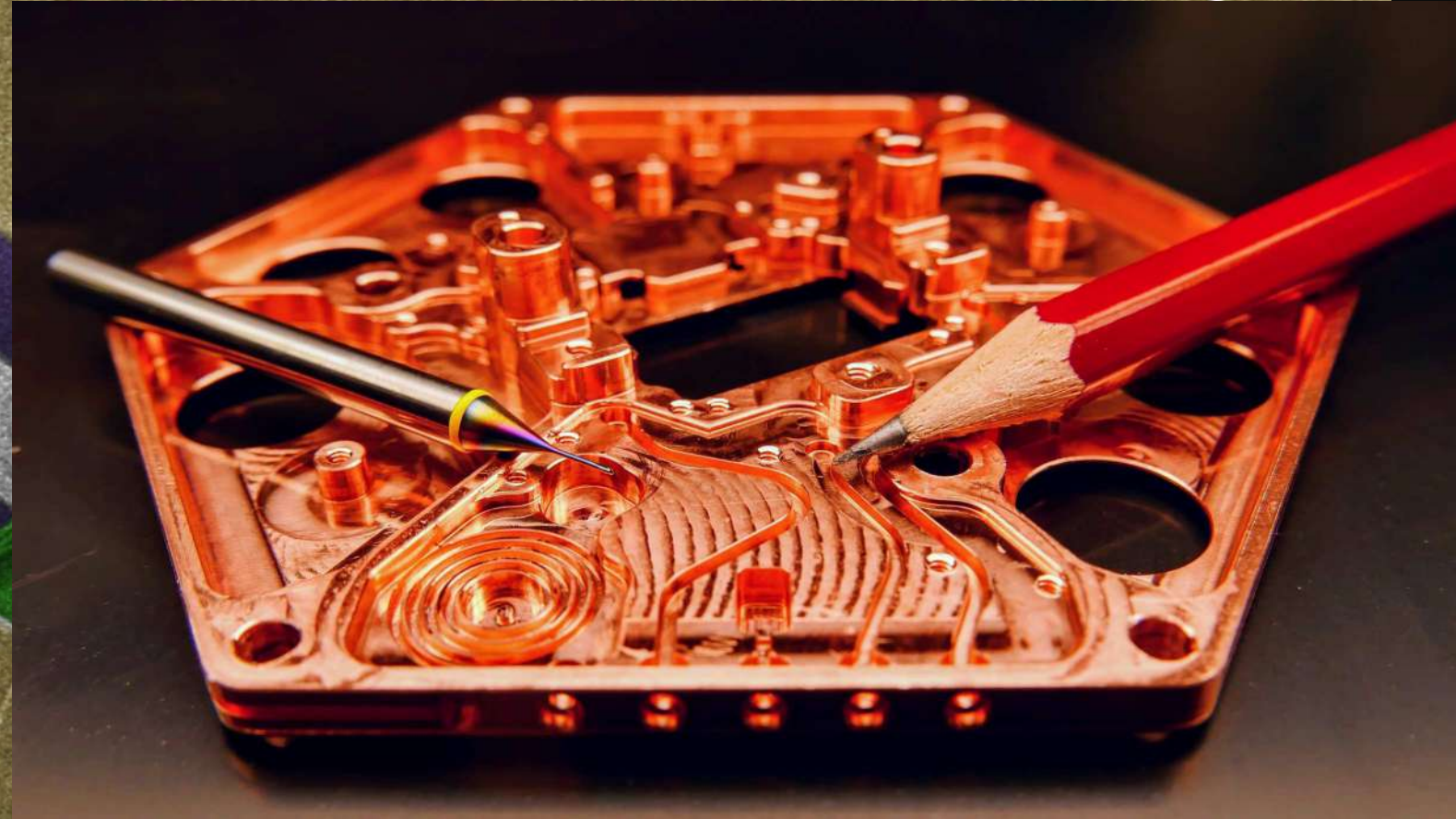


New calls to widen bottom-up community engagement

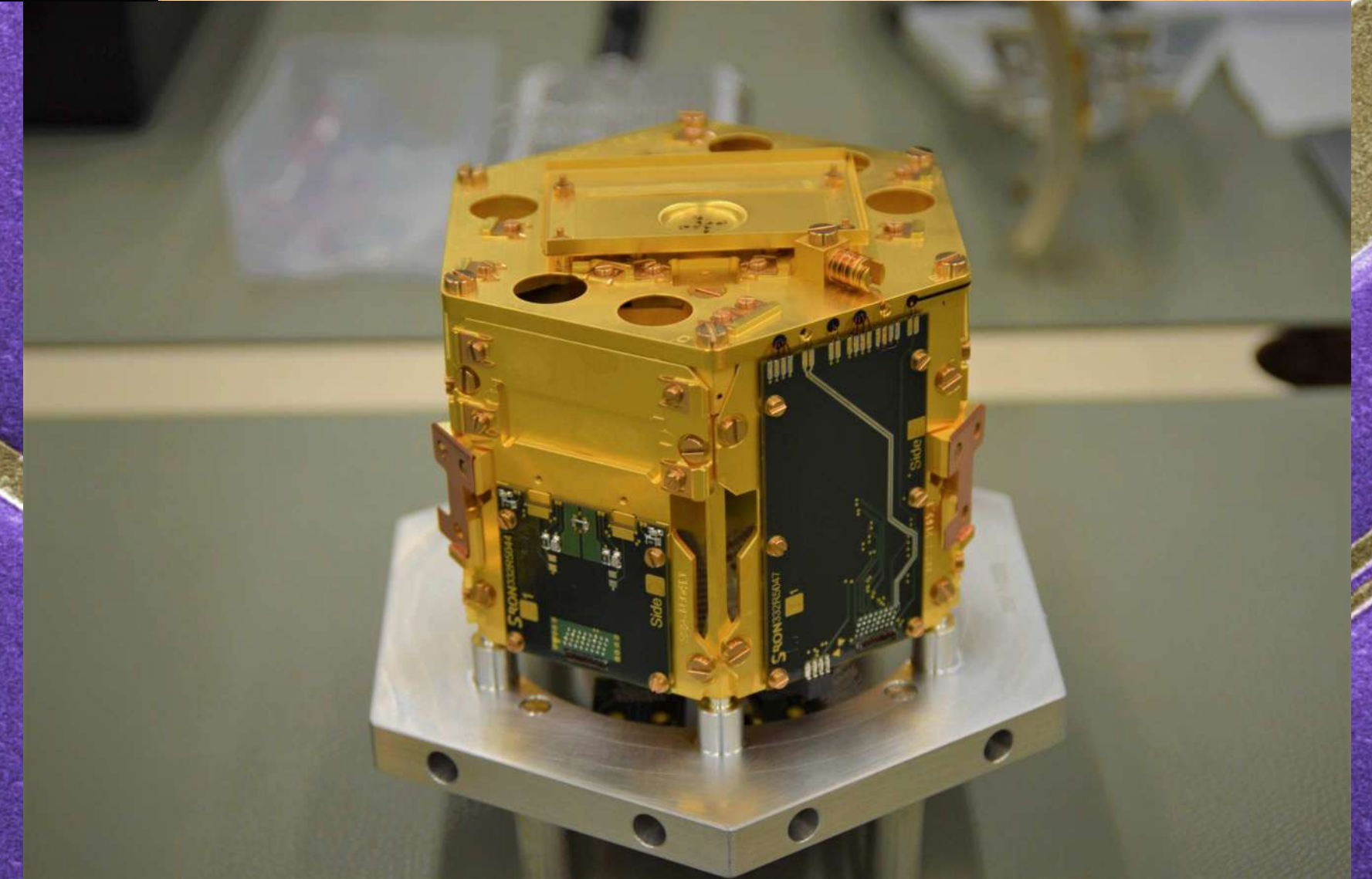
International cooperation . . . . . ➔ Grant access to 'Flagship' missions for European scientists and Member States



# SRON Technology



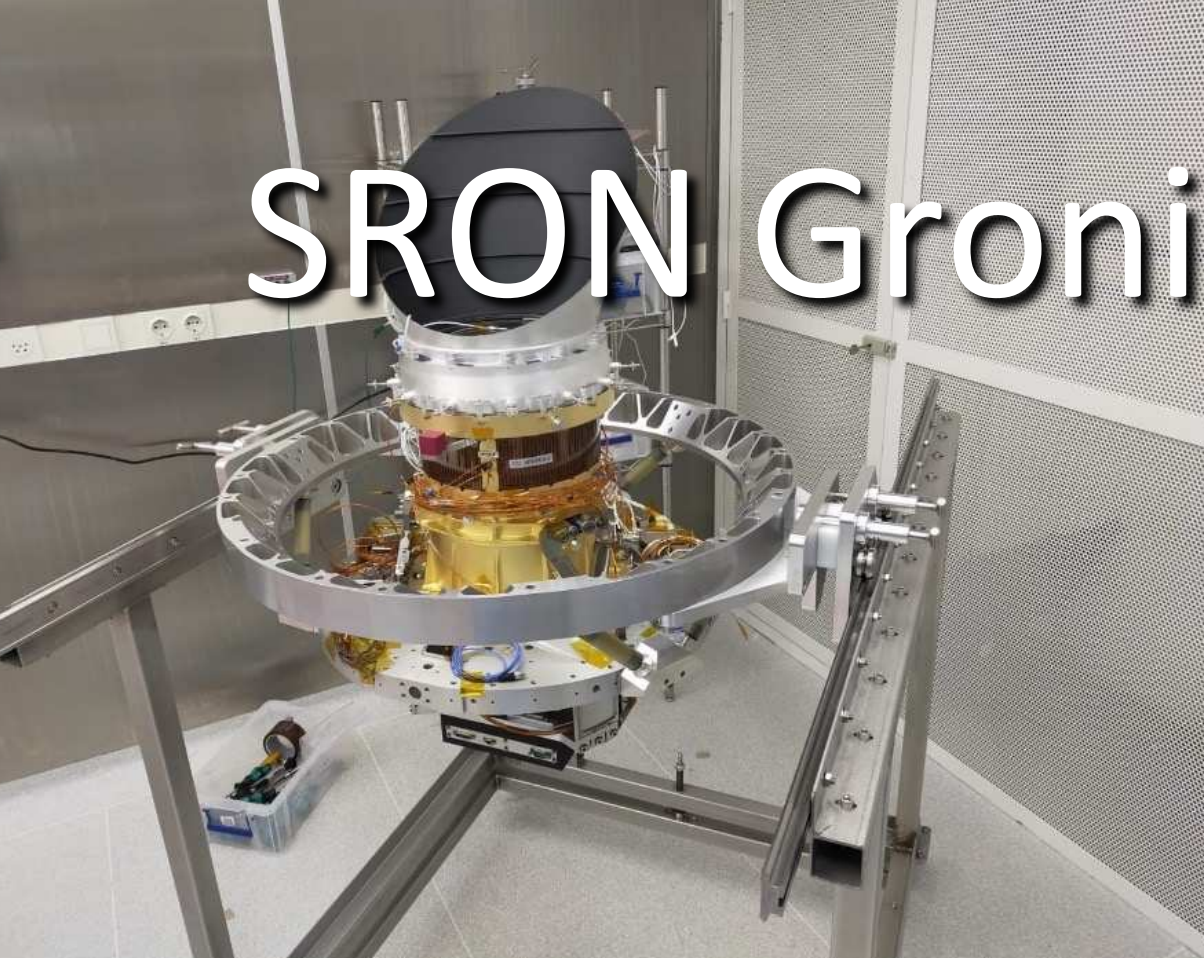
Detectors and spectrographs  
Cryogenic sensors and read-out electronics  
Ultra-high contrast imaging and optics  
Focal plane manufacture and assembly  
Instrument concepts and demonstrators



# SRON Leiden Clean Room and Fabrication Labs

*State of the art lithography, cryogenics, space-qualified electronics, mechanical engineering, and test facilities*

# SRON Groningen Space Simulator Test Facility



*Develop and calibrate a space simulator for testing PLATO cameras*

# SRON Societal Impacts

- Driving world-leading space research
- Transfer of knowledge to NL industry
- Training of research and technical staff
- Public outreach and engagement



# Strong partnerships with Industry

**AIRBUS**



**cosine** | measurement system

**veldlaser**

**ceratec**  
TECHNICAL CERAMICS BV

**PMP**  
Precision Mechanical Production

**ASML**

**Systematic**

**SUMIPRO** bv  
Submicron lathing

**TNO** innovation  
for life

**NEWAYS**

**STT**  
PRODUCTS B.V.

**s[&t**  
dependable solutions

**PHOTONIS**



NORTHERN NETHERLANDS REGION OF  
**SMARTFACTORIES**

**NTS** mecon



Shell  
Nederland

**PHILIPS**  
Innovation  
Services

**ISIS**

**VDL** VDL Enabling Technologies Group

**ColorLink Japan, Ltd.**

**SRON**



# SRON

SPACE  
RESEARCH  
ORGANISATION  
NETHERLANDS

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SRON is part of NWO-I  
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