

**Jan Geralt
Bij de Vaate**

Head of Instrument Science

j.g.bij.de.vaate@sron.nl

National Institute for Space Research

- *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*



Staff and Locations



- One Institute, two locations, ~190 staff (~140 Leiden, ~50 Groningen)
- Scientists/Instrument Scientists (50%), Engineers (30%), Staff and support (20%)

SRON Research Themes

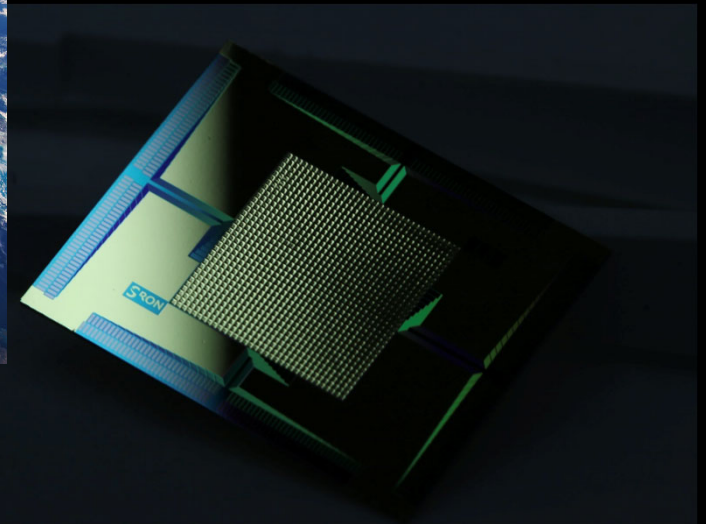


*Astrophysics
and Exoplanets*

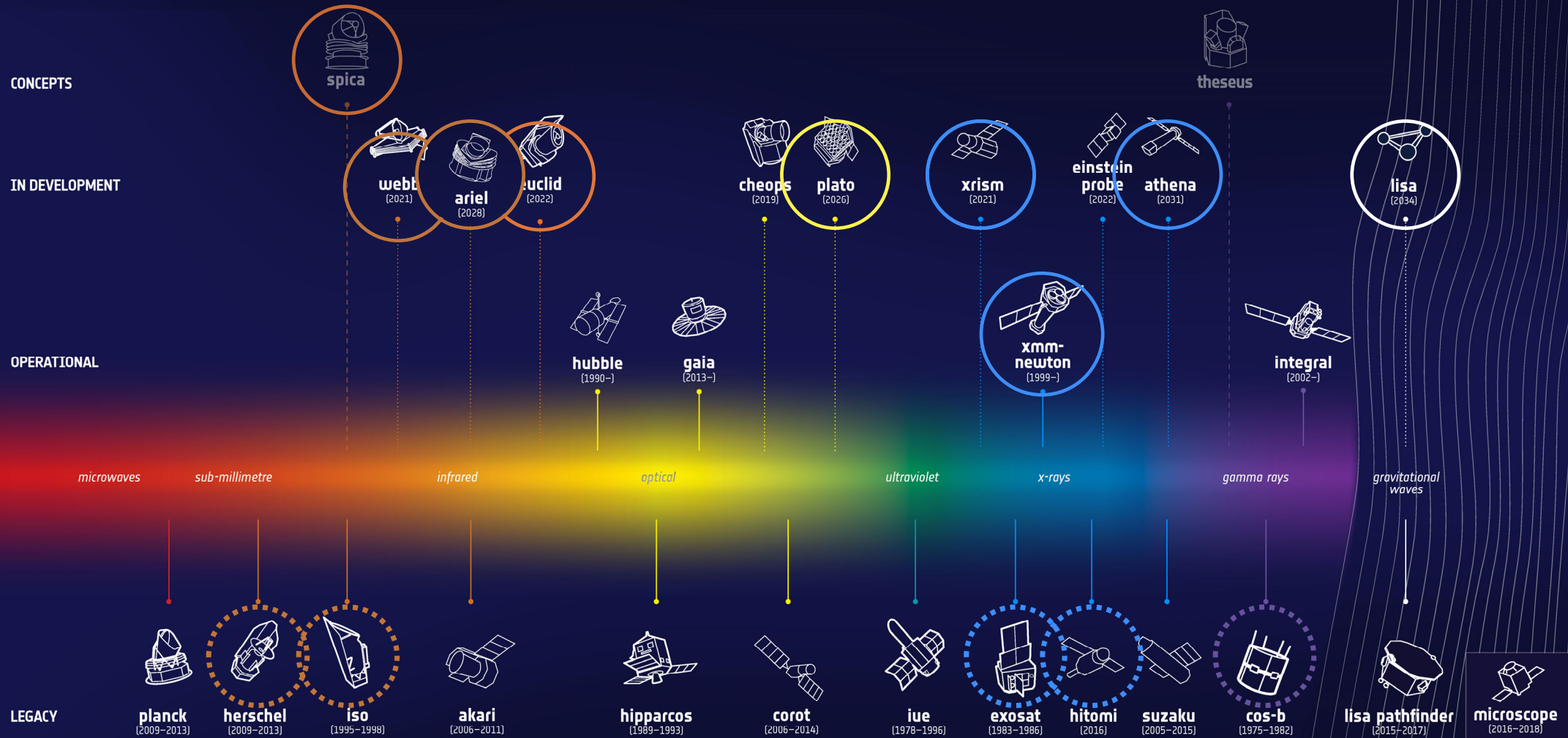
*Earth Observation
and Climate Studies*



*Technology and
Instrumentation*



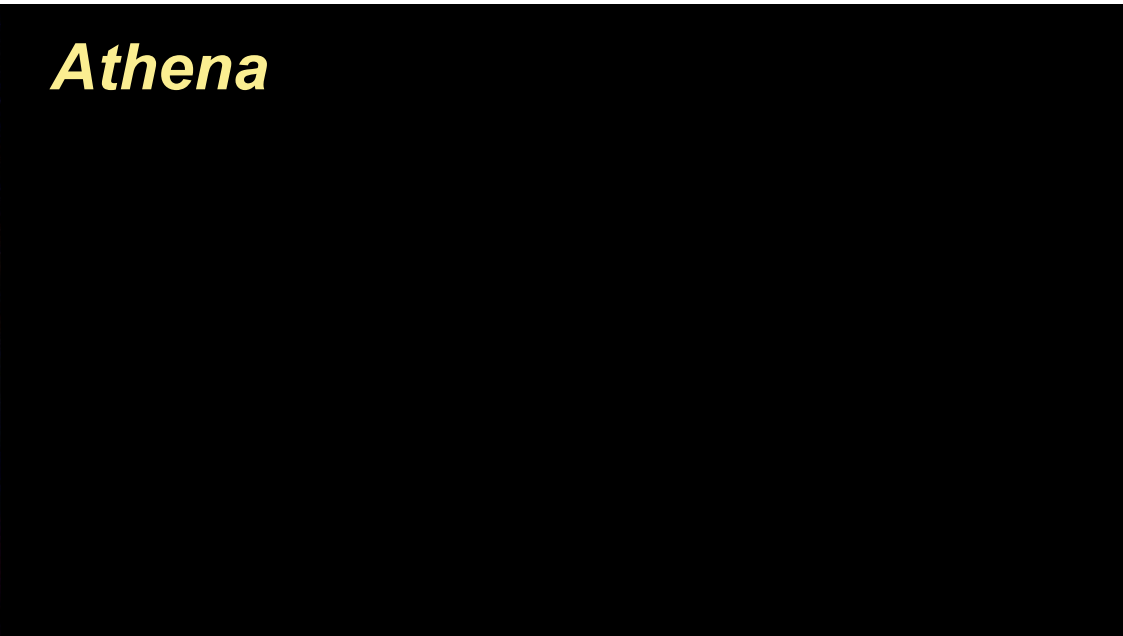
ESA Current and Future Fleet



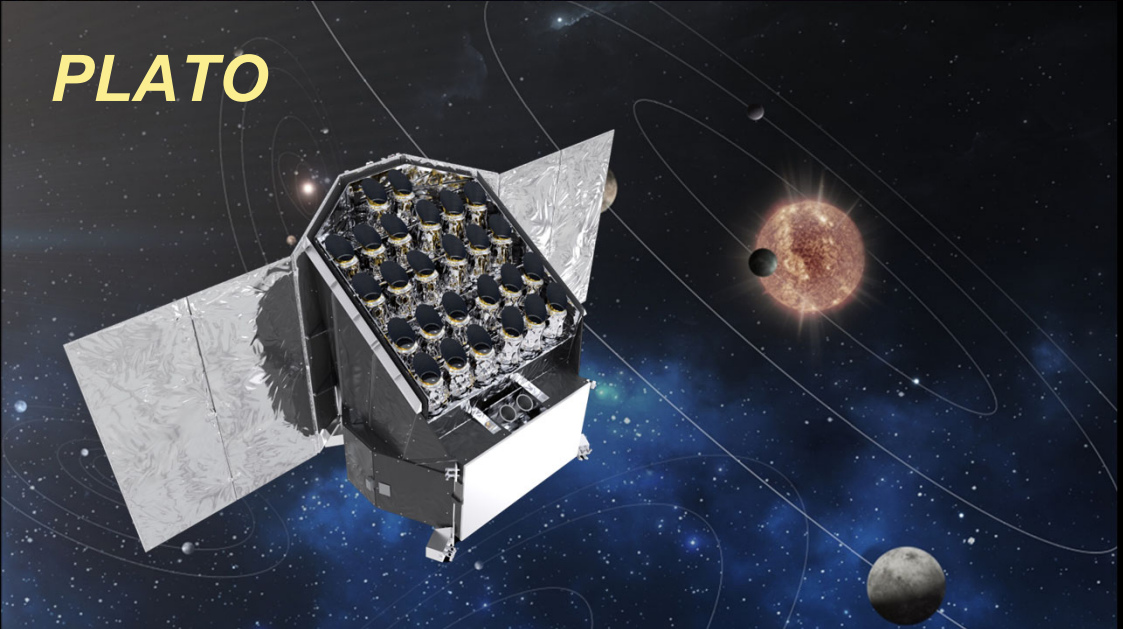
JWST



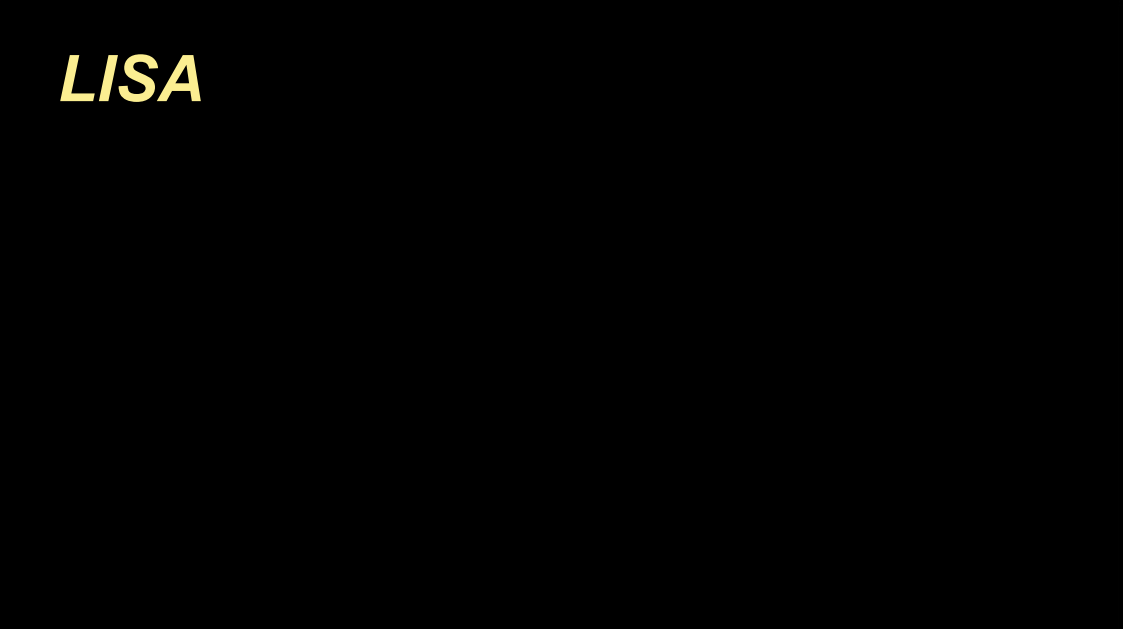
Athena



PLATO



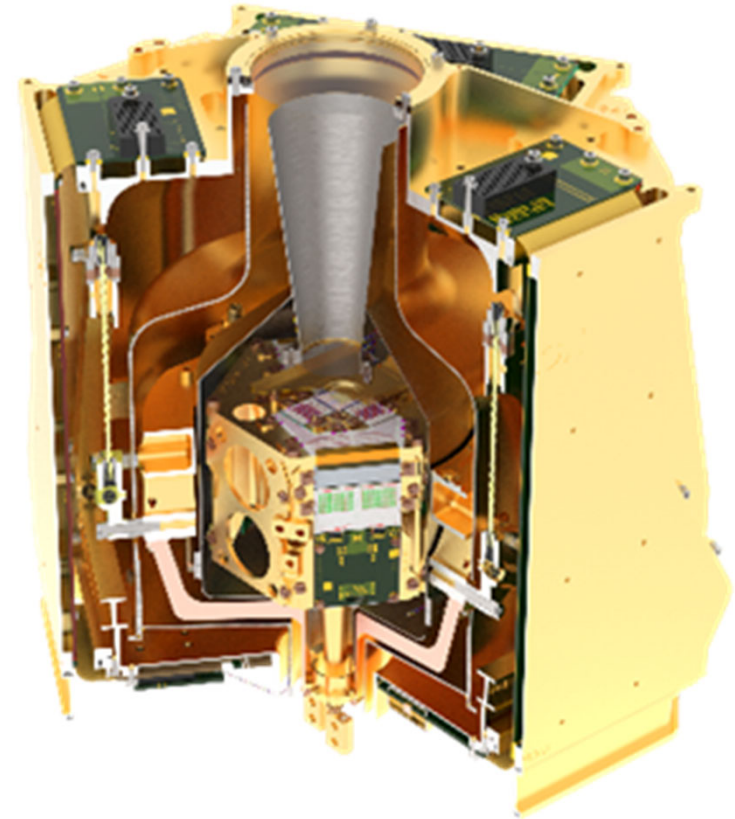
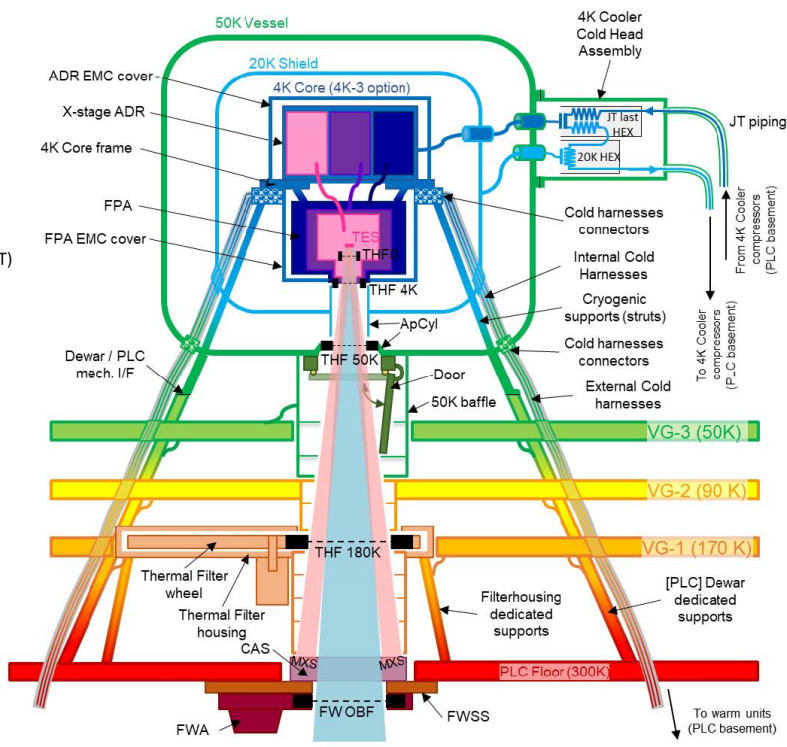
LISA



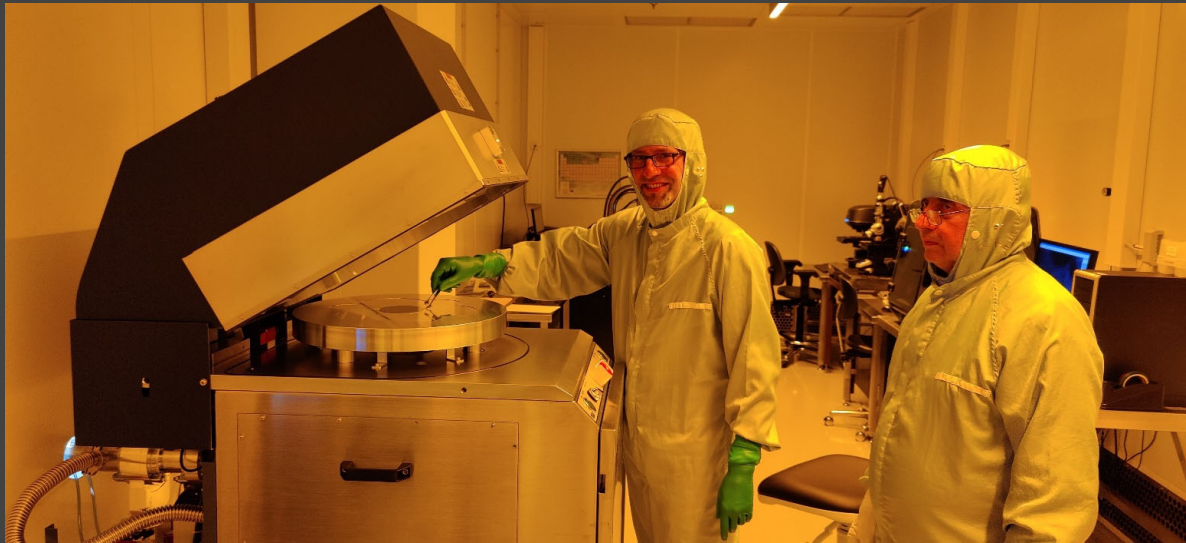
Athena, an X-ray mission

T° Color code

- T0 (50 mK)
- T1 (300 mK)
- 2.0 K
- 4.5 K
- 20K
- 50 K
- 90 K
- 170 K
- 270K~300K (RT)



The SRON clean room



PE-CVD (SiO_2 , Si_3N_4 , a-Si, SiC)

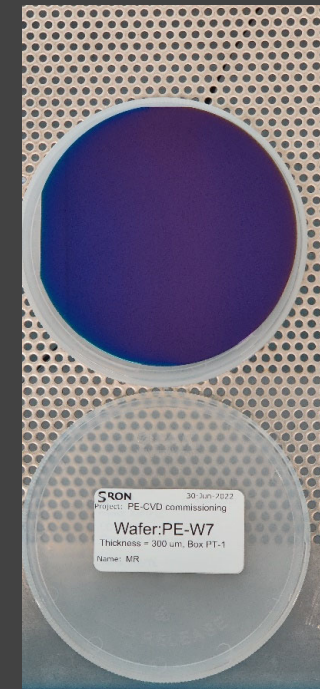
Etch masks

Isolators, optical layers

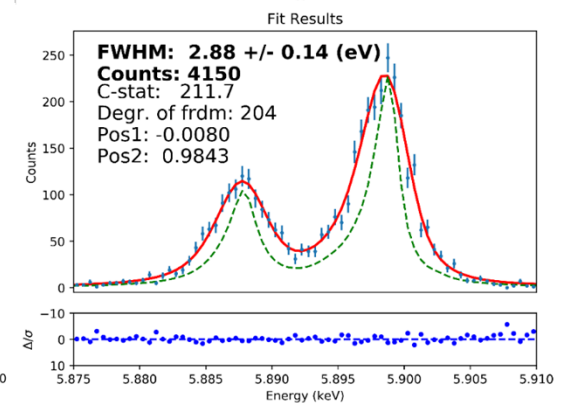
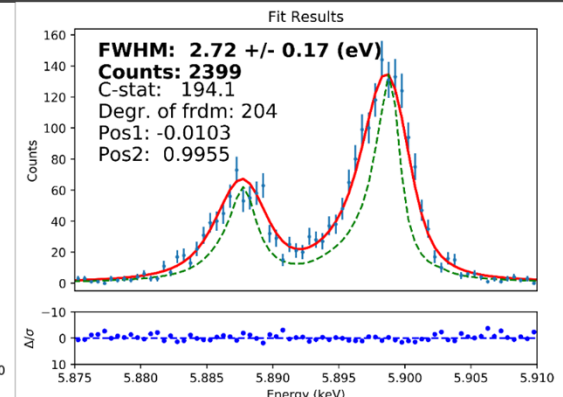
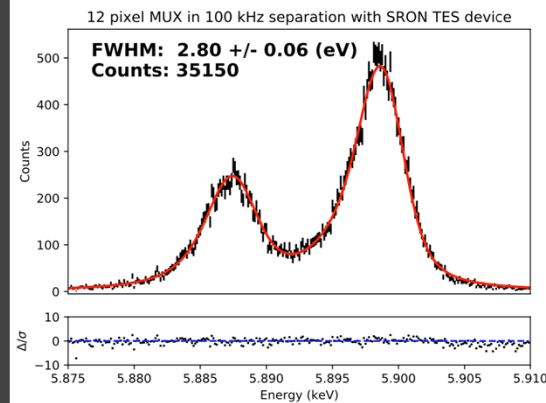
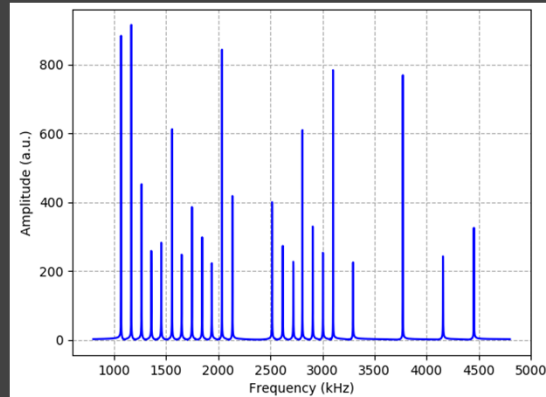
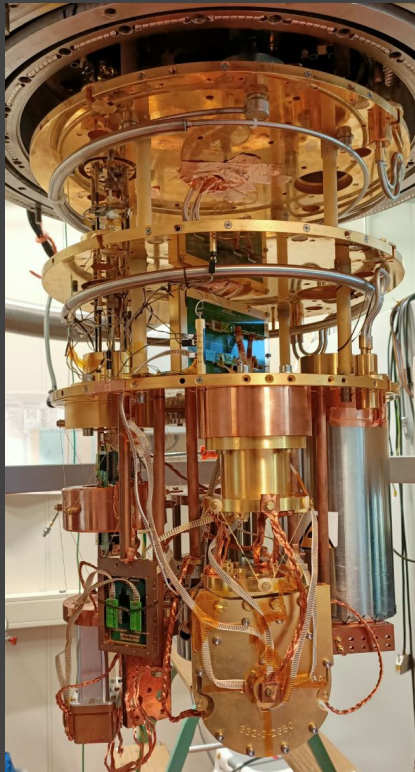
Dielectric layer for LC filters

100 mm & 150 mm wafers

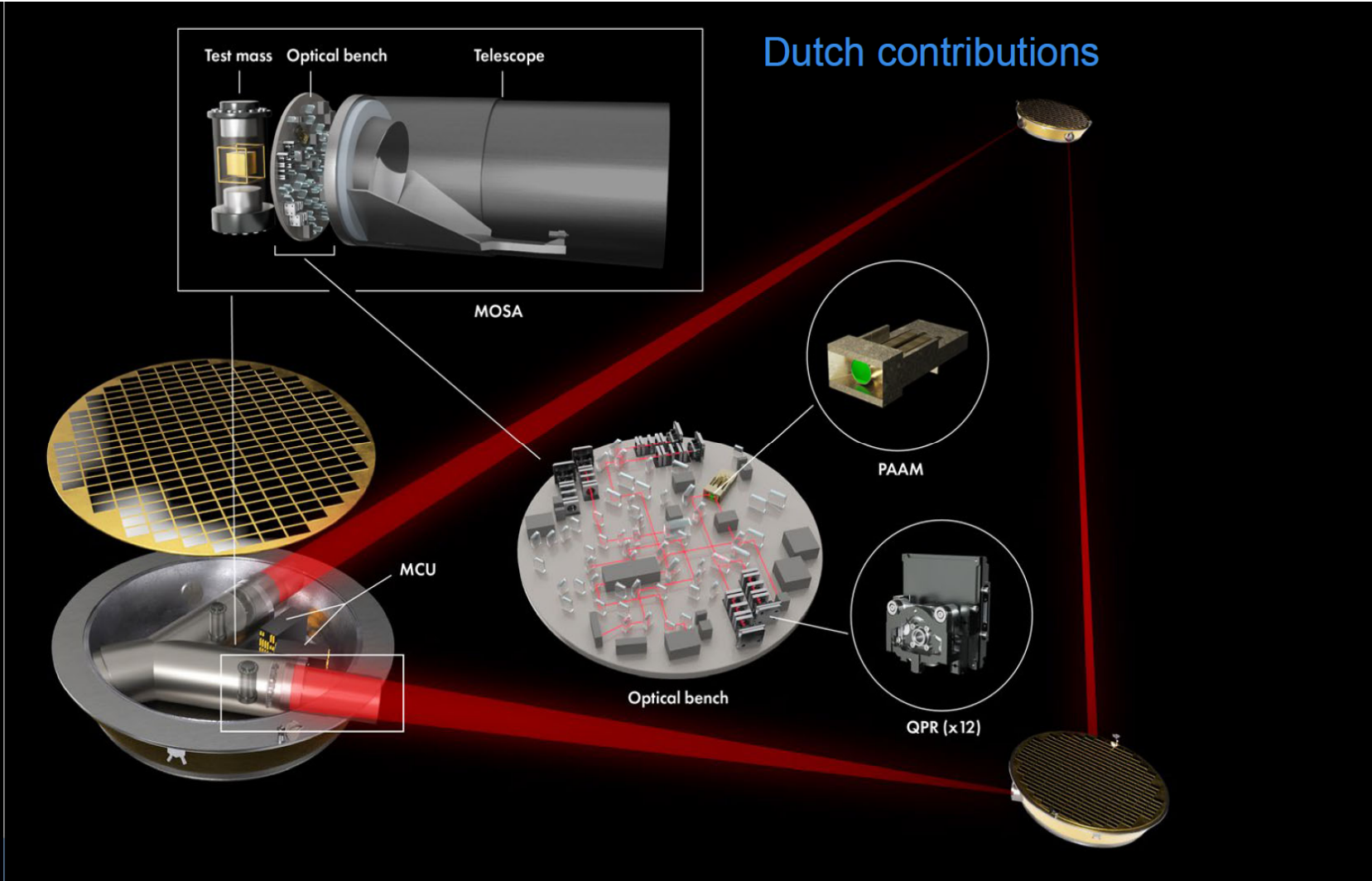
- New technique for SRON
- Process commissioning going
- SiO_2 properties & uniformity OK
- Si_3N_4 , a-Si in progress



FDM Read out for X-ray TES micro-calorimeters



LISA, gravitational wave detection



Quadrant Photo Receiver

- QPD
- FEE
- Housing
- tests

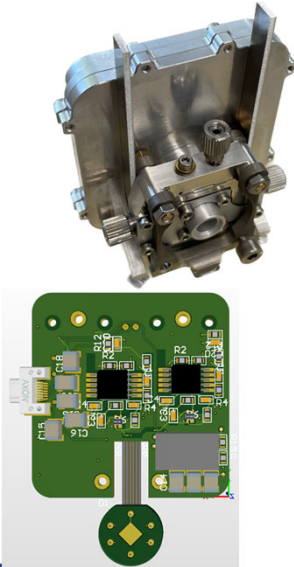
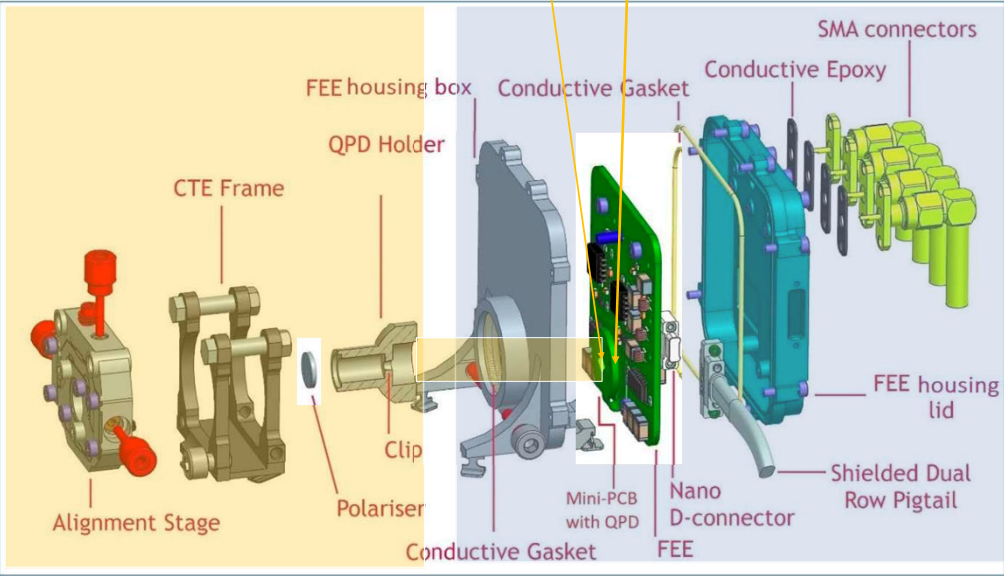
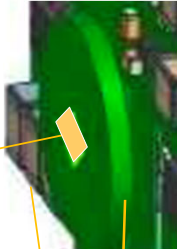


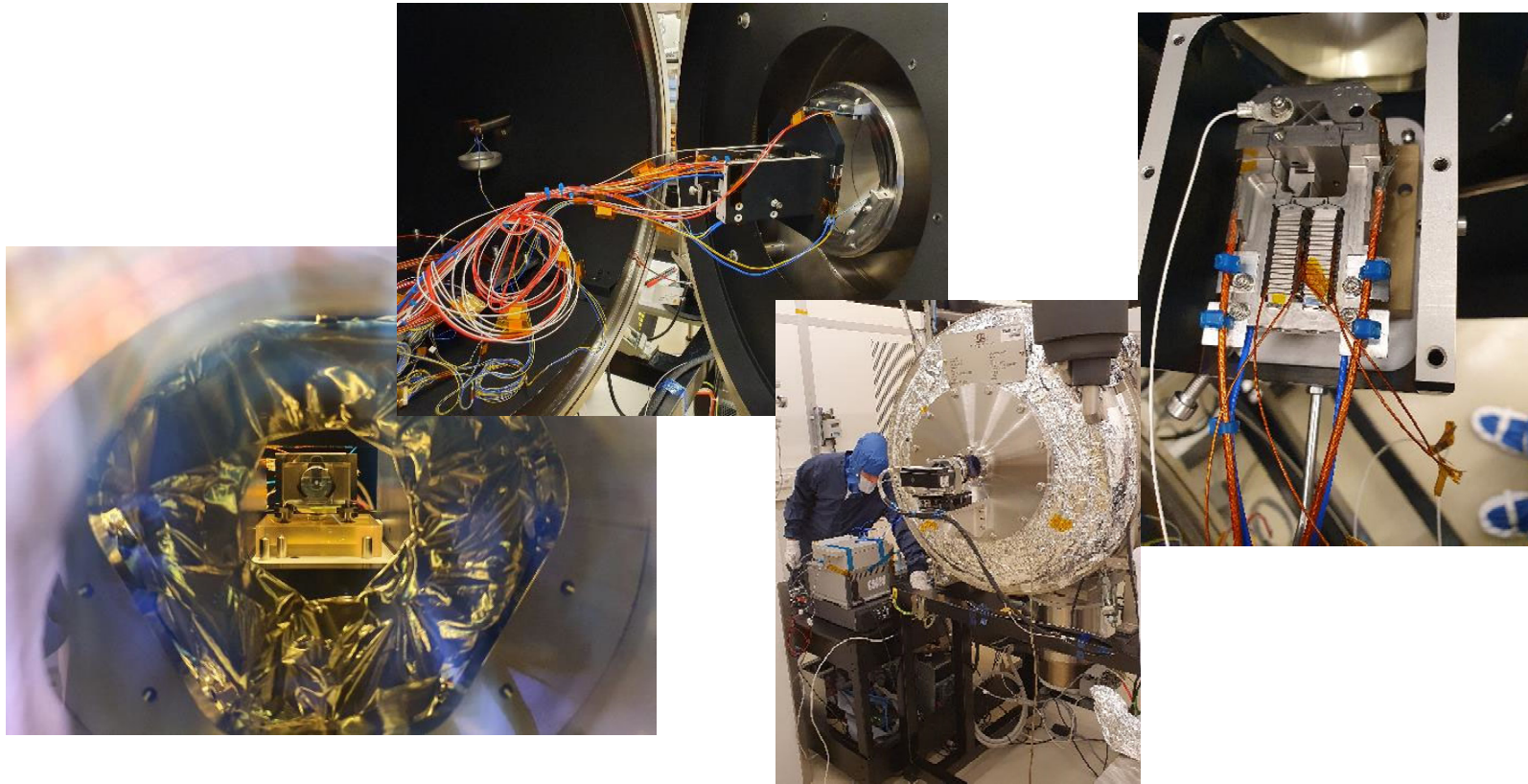
Photo diode on flexible PCB



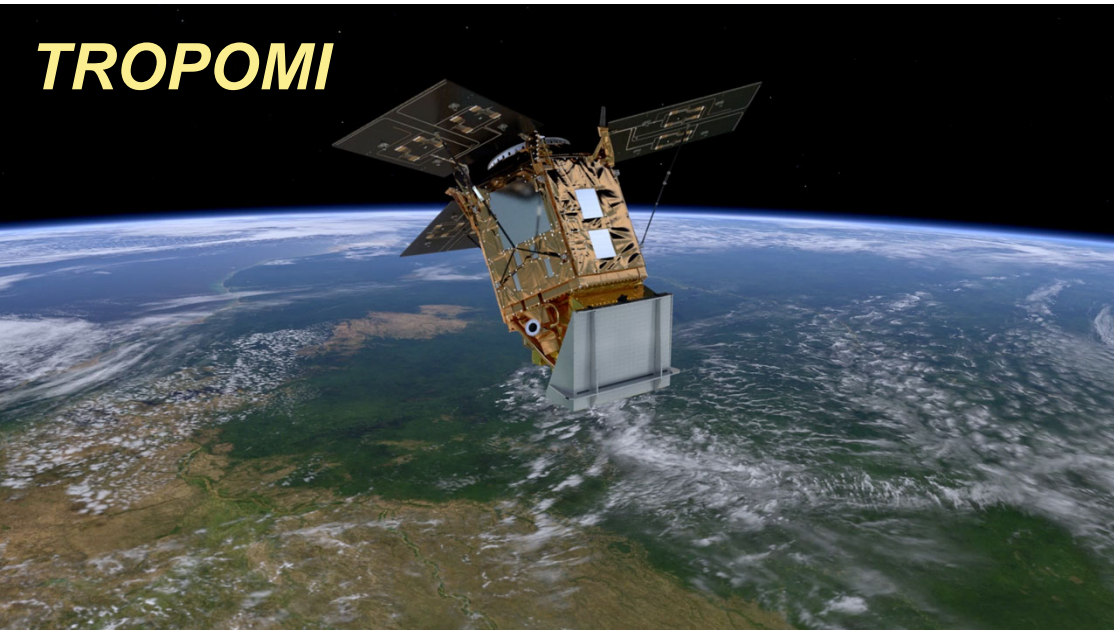
Stable/aligned structure

FEE structure

Impressions of PAAM2.0 Testing



TROPOMI



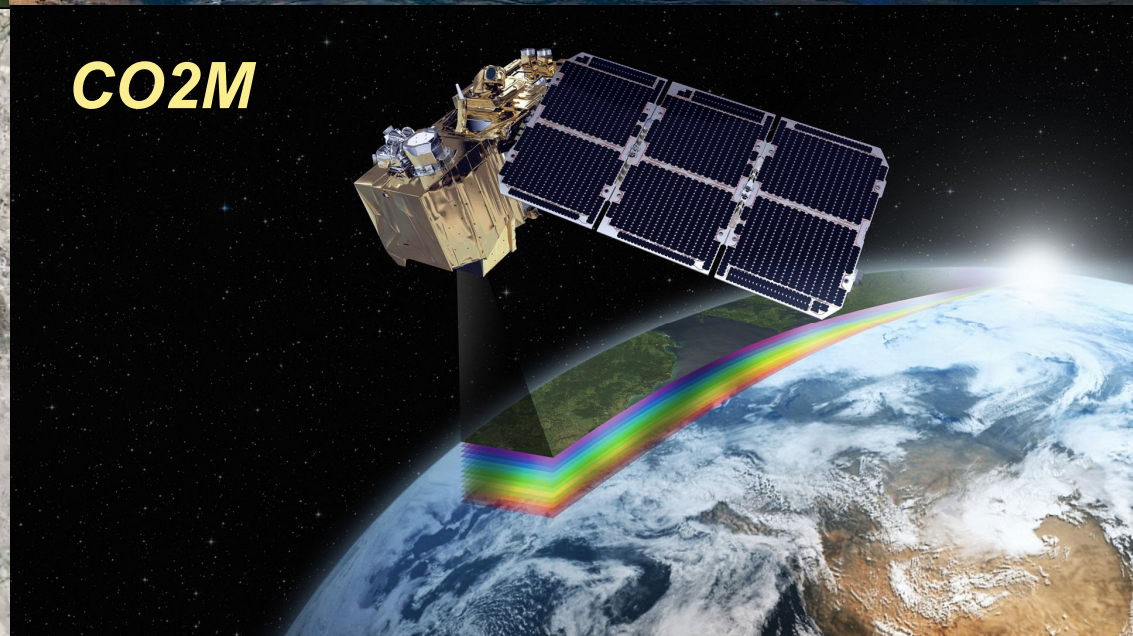
PACE



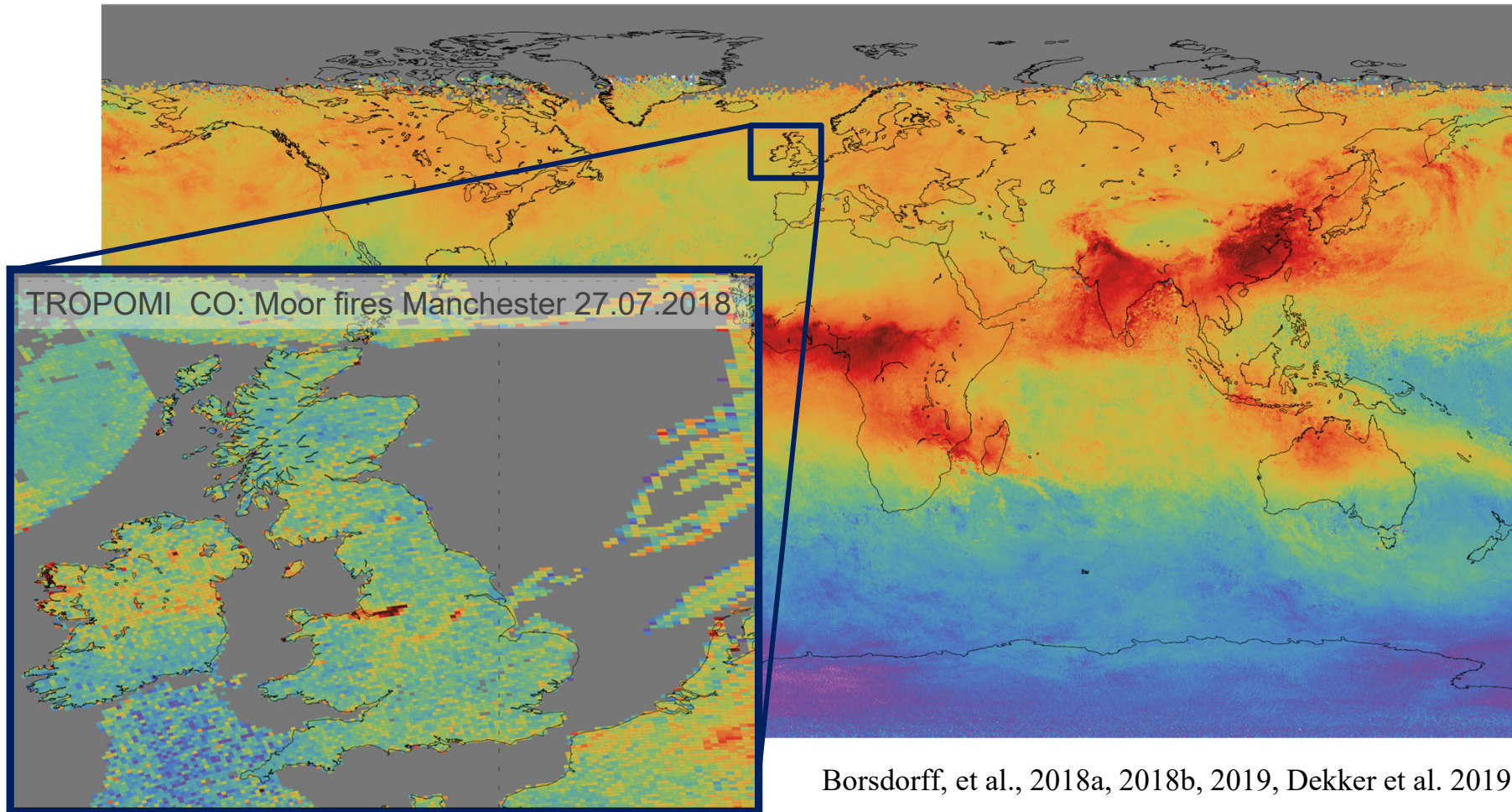
TANGO



CO2M



Sentinel-5P/TROPOMI results: CO mapping



Borsdorff, et al., 2018a, 2018b, 2019, Dekker et al. 2019

TANGO Mission

Cubesat 1:
NO₂ measurements in the visible

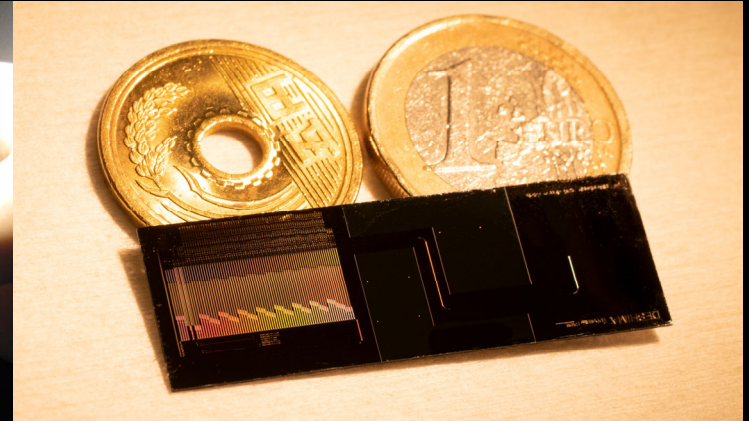
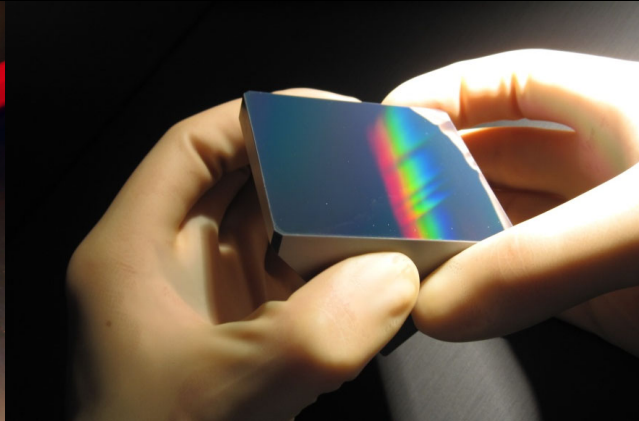
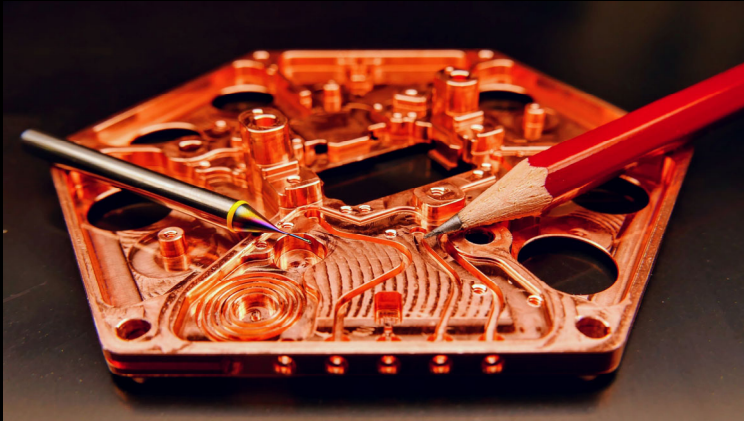
Cubesat 2:
CO₂ and CH₄
measurements in
the 1.6 μm range

Unique spatial resolution of 300x300 m² for selected target areas
Targeted monitoring of green house gas emissions
Very high precision for quantifying emission fluxes

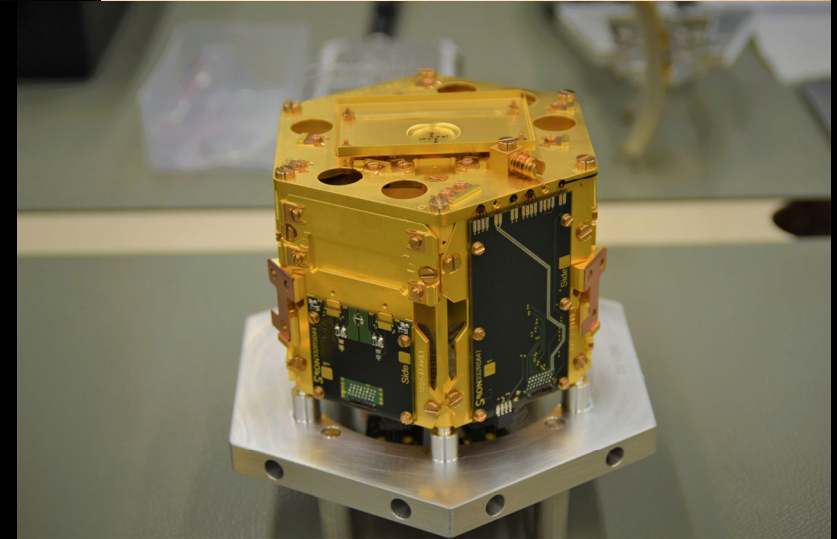
⇒ **Not selected during first round of ESA Scout mission**
Discussion underway about funding for maturation phase



SRON Technology Development



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



Partnerships with Industry

AIRBUS
veldlaser

PHOTONIS

ASML

 **Systematic**

 **AimValley**

cosine | measurement systems

 **SUMIPRO** bv
Submicron lathing

s [&] t
dependable solutions

ceratec[®]
TECHNICAL CERAMICS BV

PMP
Precision Mechanical Production

STT
PRODUCTS B.V.

PHILIPS
Innovation Services

TNO innovation for life

 **NEWAYS**

 **NTS MECON**



Shell
Nederland

 **NORTHERN NETHERLANDS REGION OF SMARTFACTORIES**

 **VDL** Enabling Technologies Group

 **ISIS**

 **Holland.**

Holland High Tech
Global Challenges, Smart Solutions

A cosmic background image featuring a bright, glowing nebula with intricate filamentary structures in shades of white, blue, and purple. A small, dark, circular object is visible in the dark space to the left of the nebula.

Welcome to SRON!

<https://www.sron.nl>

https://twitter.com/SRON_Space