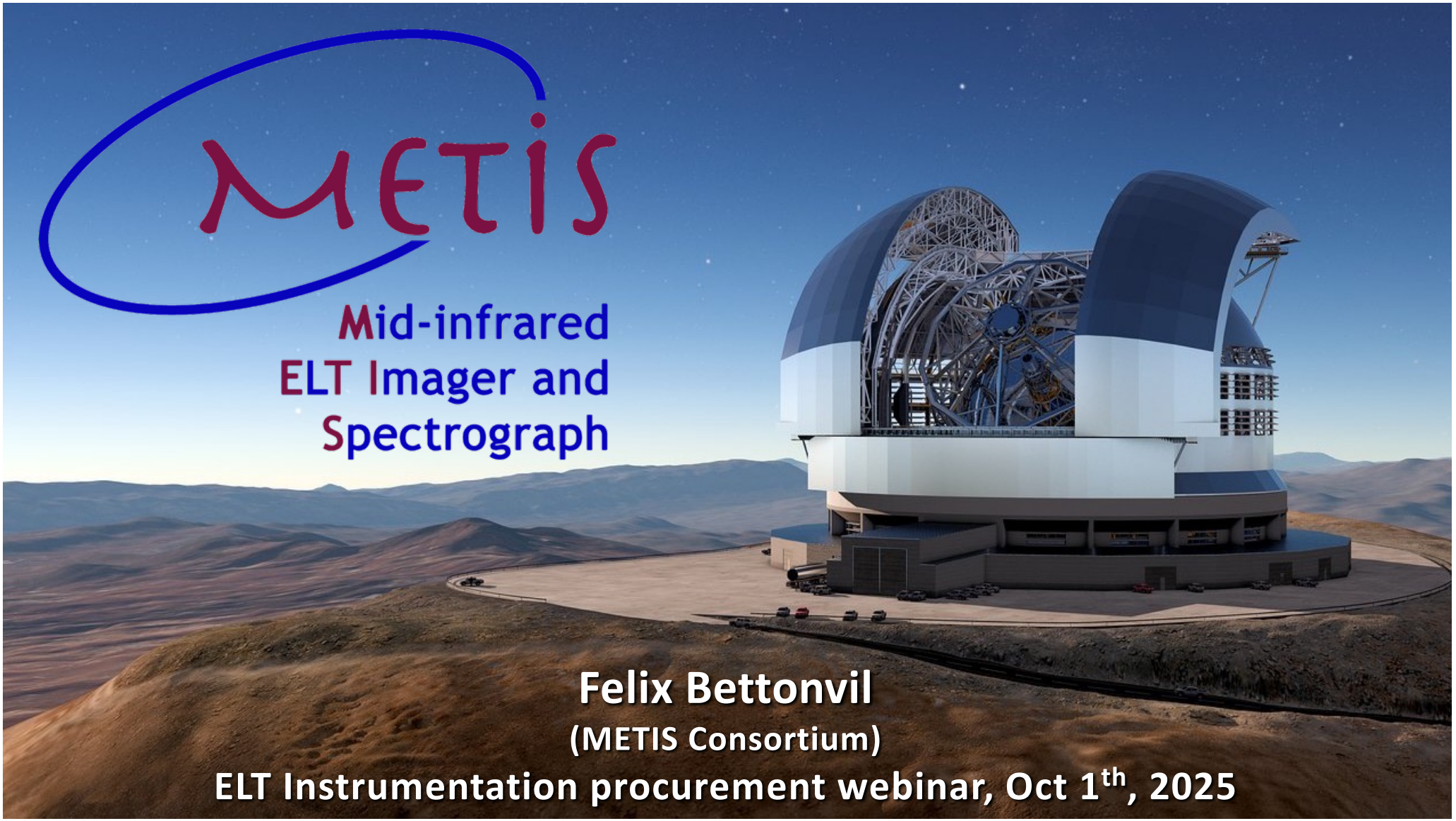
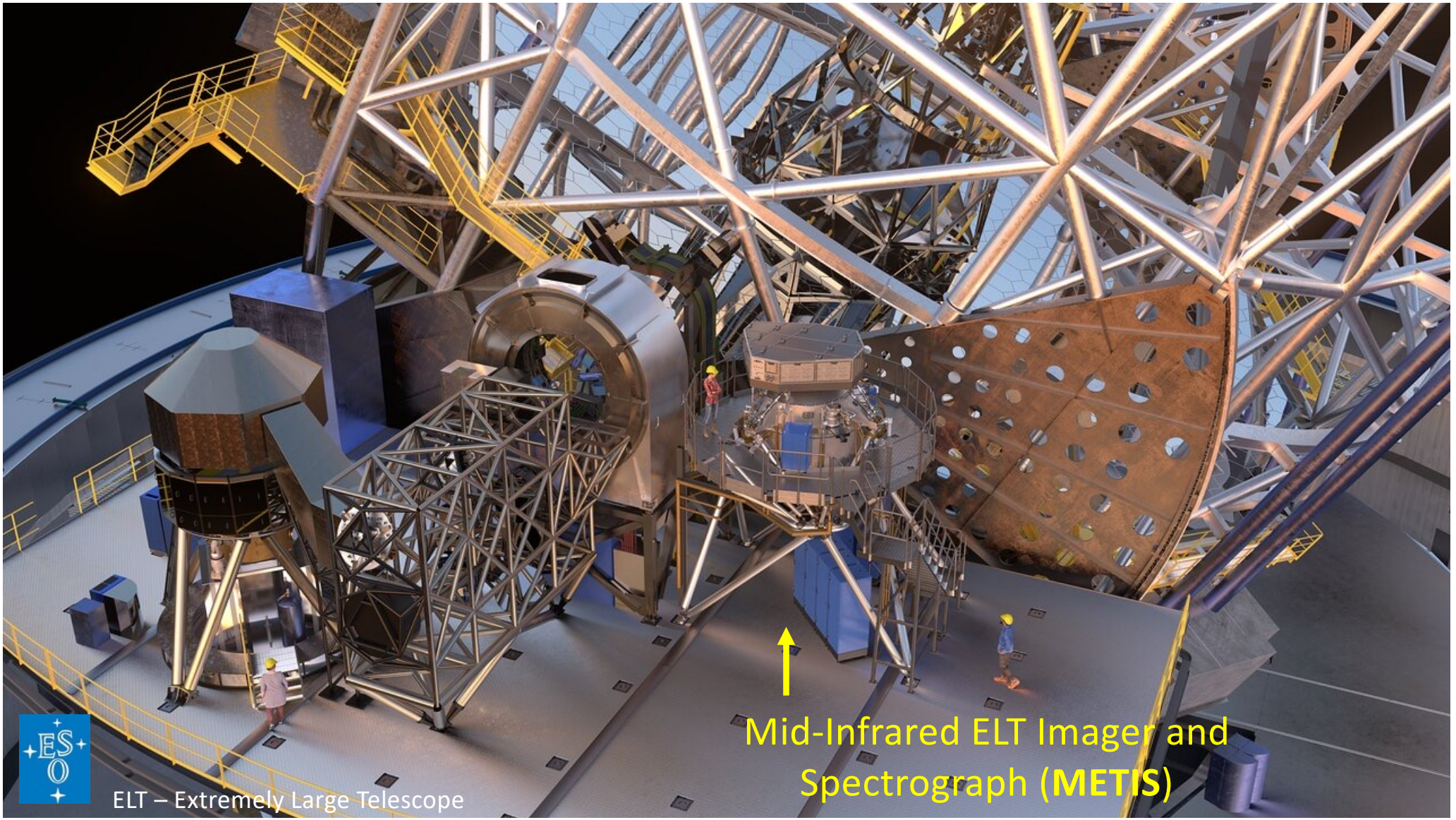
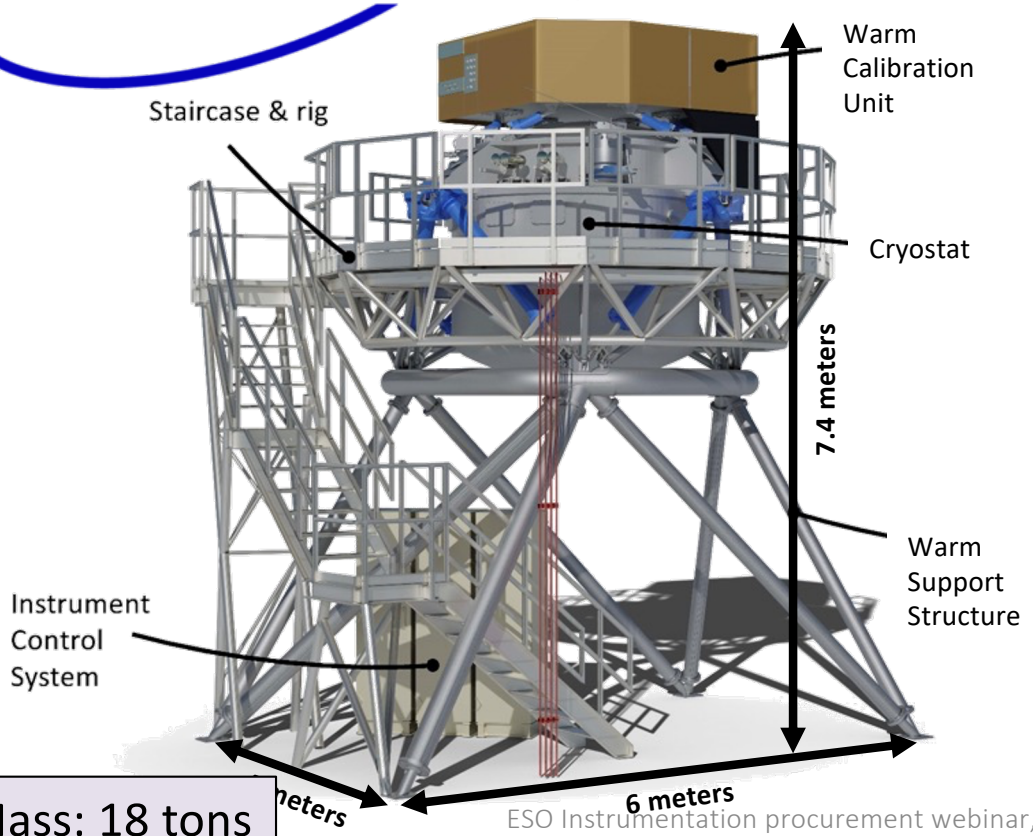
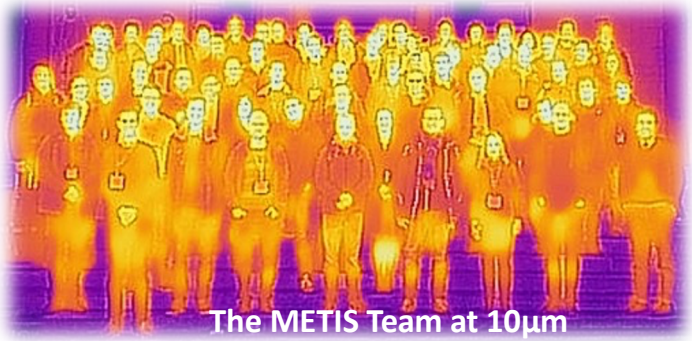

METIS
Mid-infrared
ELT Imager and
Spectrograph
Felix Bettonvil
(METIS Consortium)
ELT Instrumentation procurement webinar, Oct 1th, 2025


Mid-Infrared ELT Imager and
Spectrograph (**METIS**)
ELT – Extremely Large Telescope

METIS



Mass: 18 tons

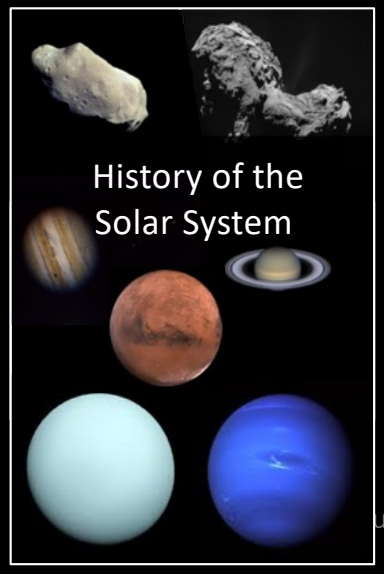


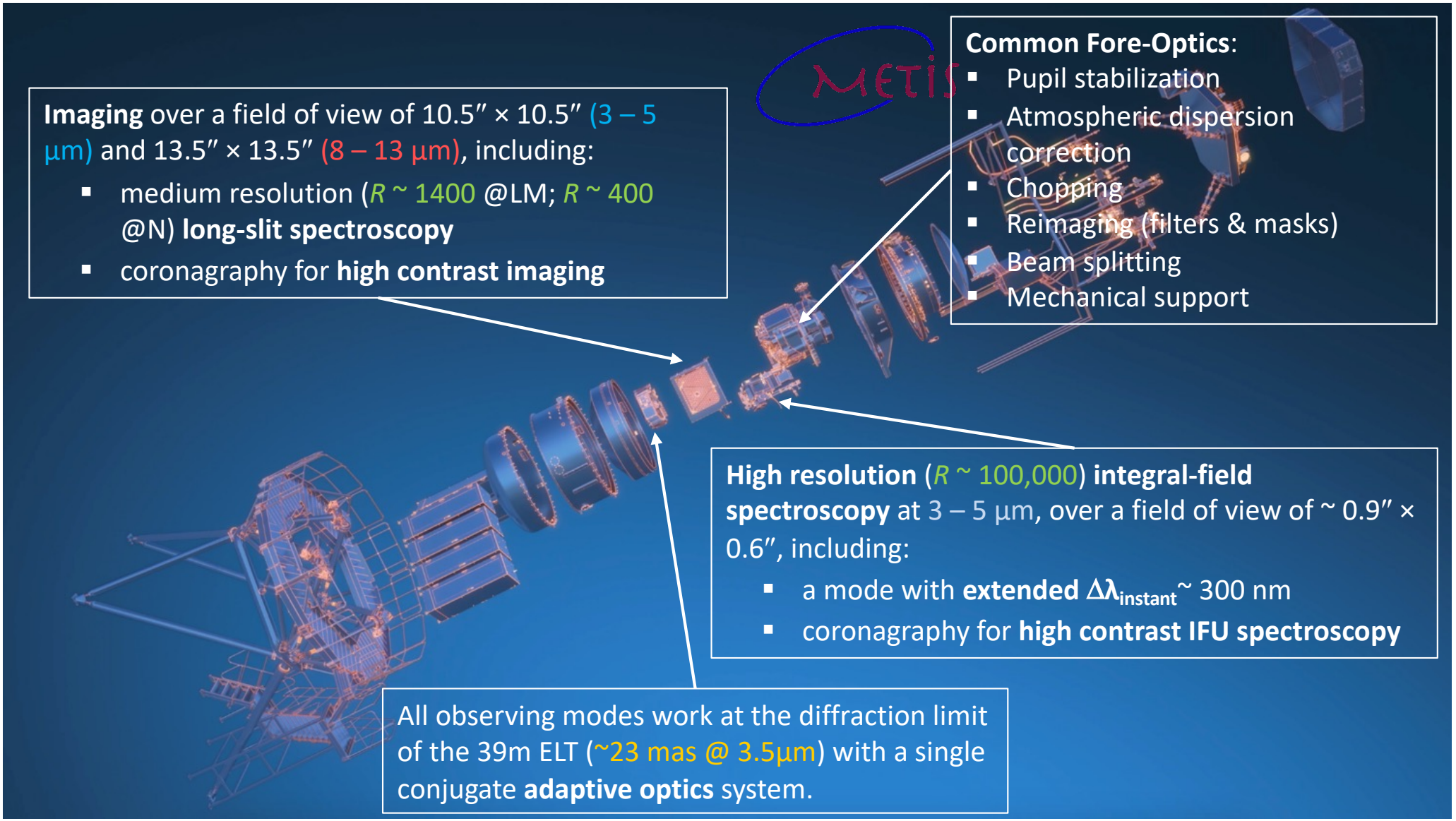
Altogether approximately:
- ~27 M€ for hardware
- ~800 FTEs in labor

Mid Infrared ELT Imager and Spectrograph

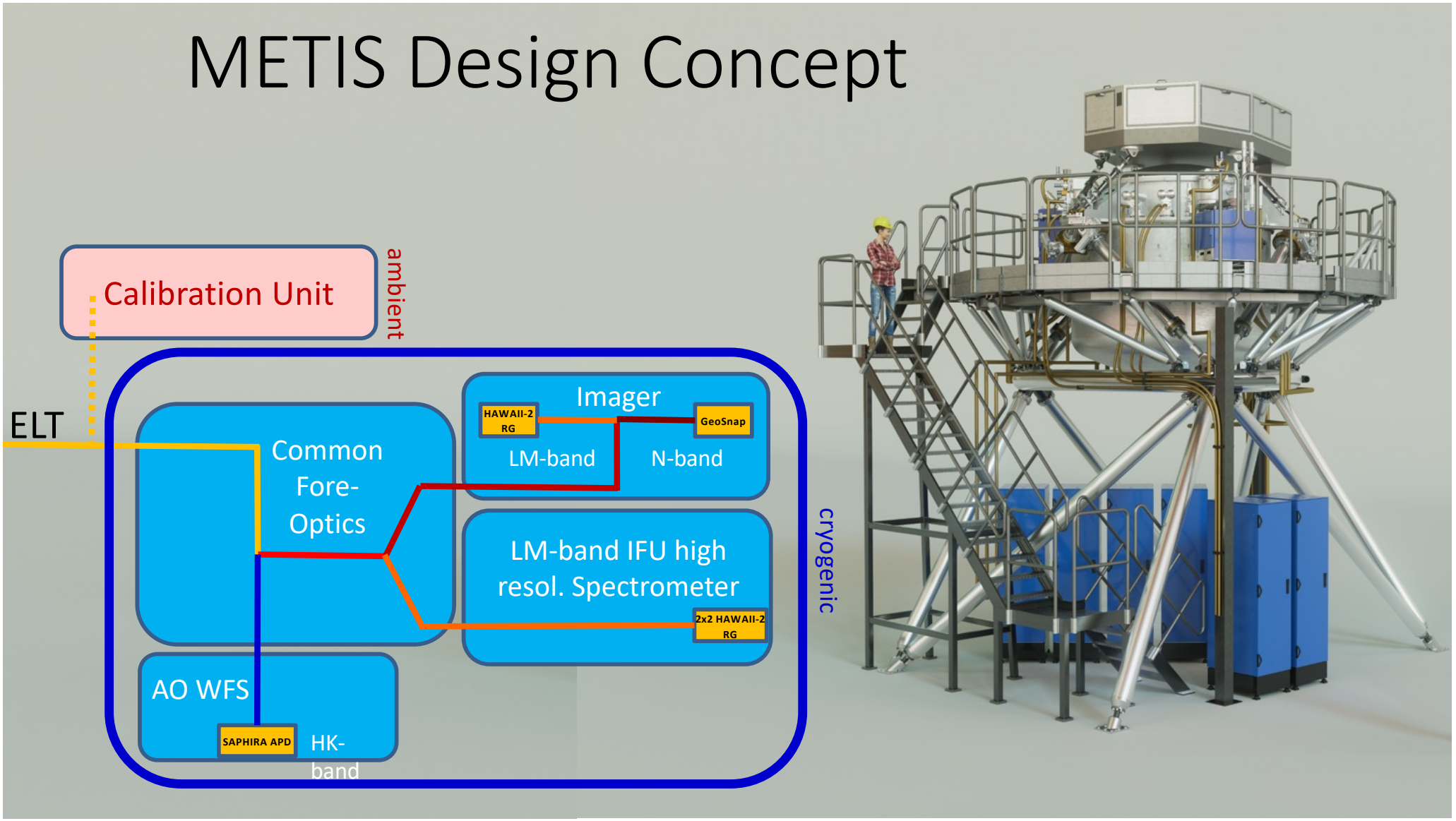
Main Science Drivers:

Compact Sources in a cool and dusty Universe




METIS
Imaging over a field of view of 10.5″ × 10.5″ (3 – 5 µm) and 13.5″ × 13.5″ (8 – 13 µm), including:
▪ medium resolution (*R* ~ 1400 @LM; *R* ~ 400 @N) **long-slit spectroscopy**
▪ coronagraphy for **high contrast imaging**
Common Fore-Optics:
▪ Pupil stabilization
▪ Atmospheric dispersion correction
▪ Chopping
▪ Reimaging (filters & masks)
▪ Beam splitting
▪ Mechanical support
High resolution (*R* ~ 100,000) **integral-field spectroscopy** at 3 – 5 µm, over a field of view of ~ 0.9″ × 0.6″, including:
▪ a mode with **extended** $\Delta\lambda_{instant}$ ~ 300 nm
▪ coronagraphy for **high contrast IFU spectroscopy**
All observing modes work at the diffraction limit of the 39m ELT (~23 mas @ 3.5µm) with a single conjugate **adaptive optics** system.

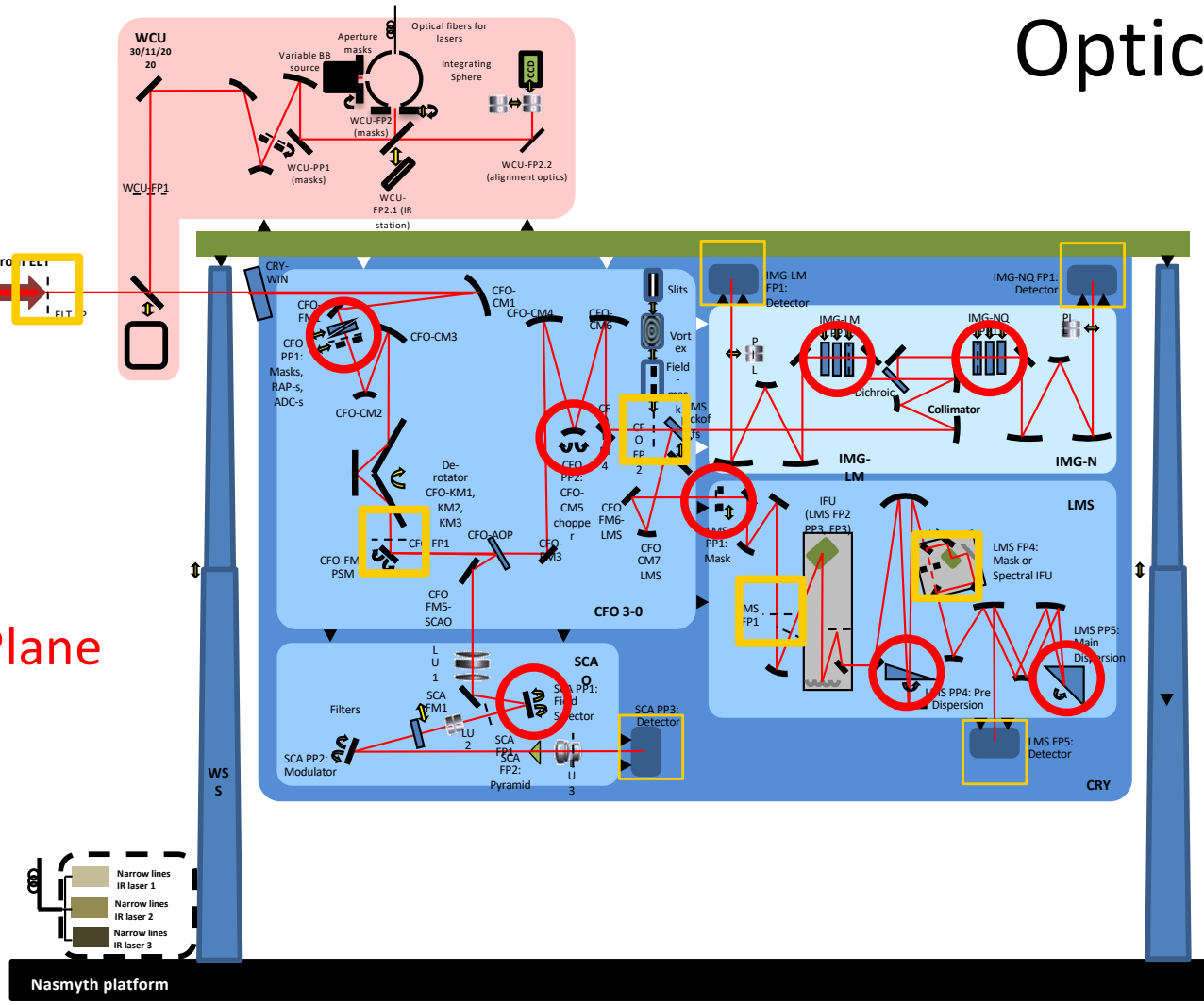
METIS Design Concept



Optical layout

Focal Plane

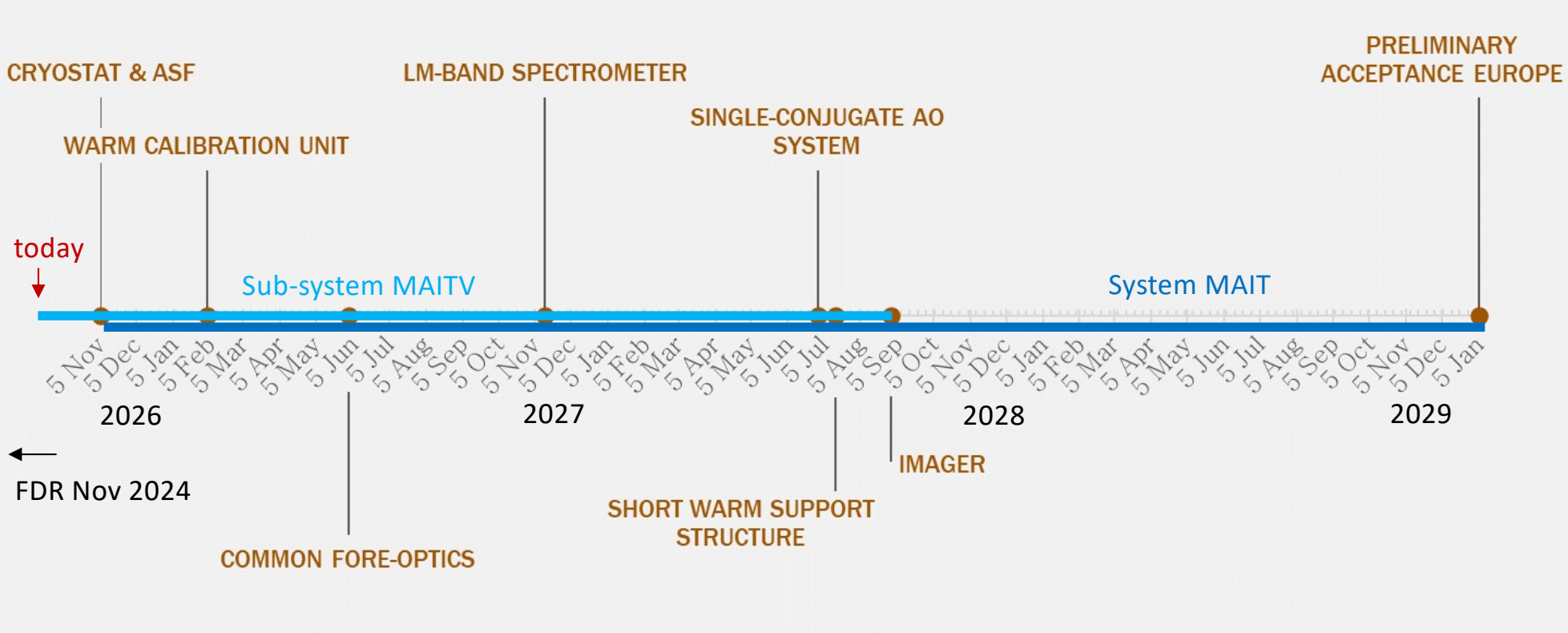
Pupil Plane



Mid Infrared ELT Imager and Spectrograph

METIS

The METIS Schedule



Mid Infrared ELT Imager and Spectrograph

Hardware budget

- Hardware 21.6M€
- Realized & committed 20.5M€
- Open 1.1M€

→ Almost all items have been procured

Instrument status

METIS transport container. Currently underway to Rotterdam / Netherlands

Damping system

Warm Support Structure, being tested at Cunhol / Portugal

METIS

Cryostat and Assembly Support Frame at ETH, Zürich

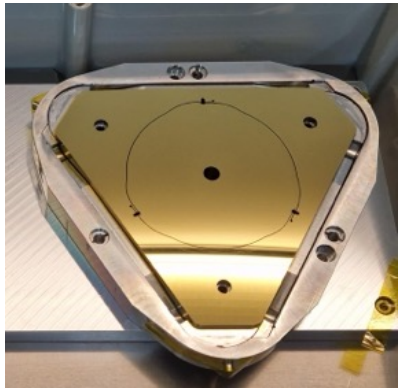
DAL BEN
Leading vision

Mid Infrared ELT Imager and Spectrograph

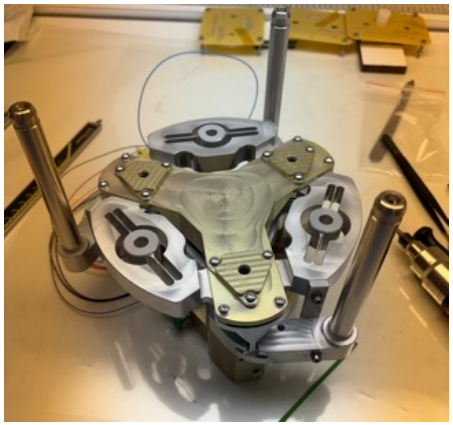
METIS

Common Fore-Optics Subsystem

Backbone structure



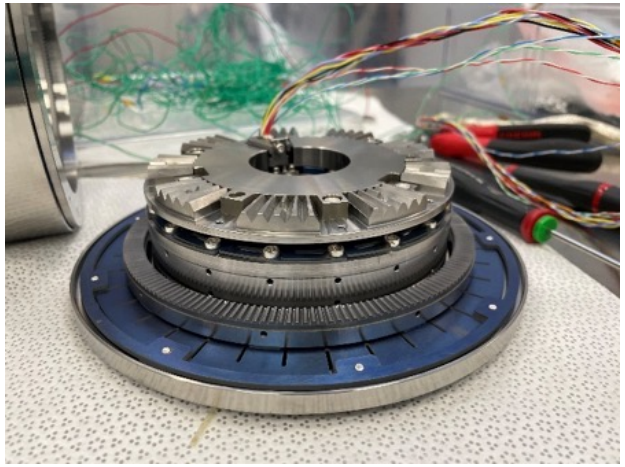
Chopper mechanism



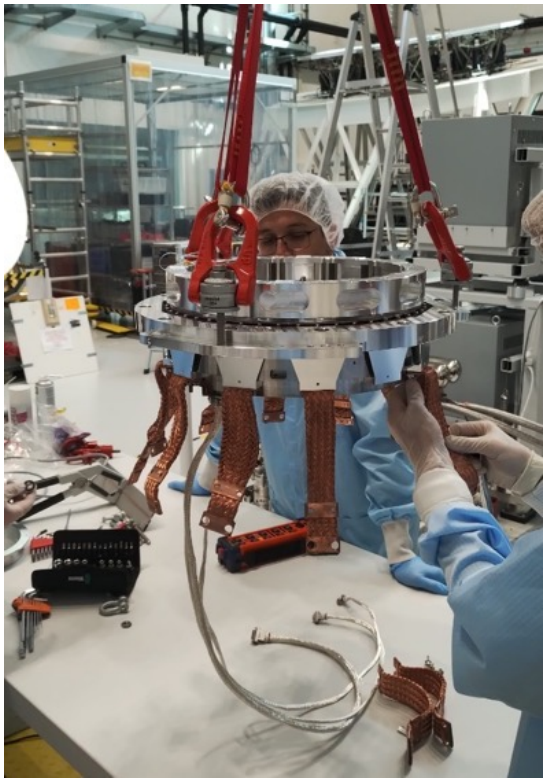
Pupil stabilization mirror

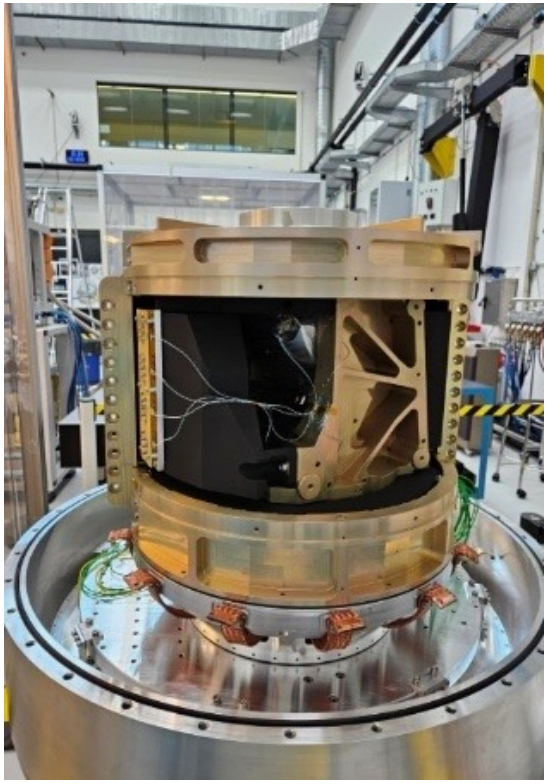
JAKOB BEHR
Maschinenfabrik
seit 1904

Mechanisms



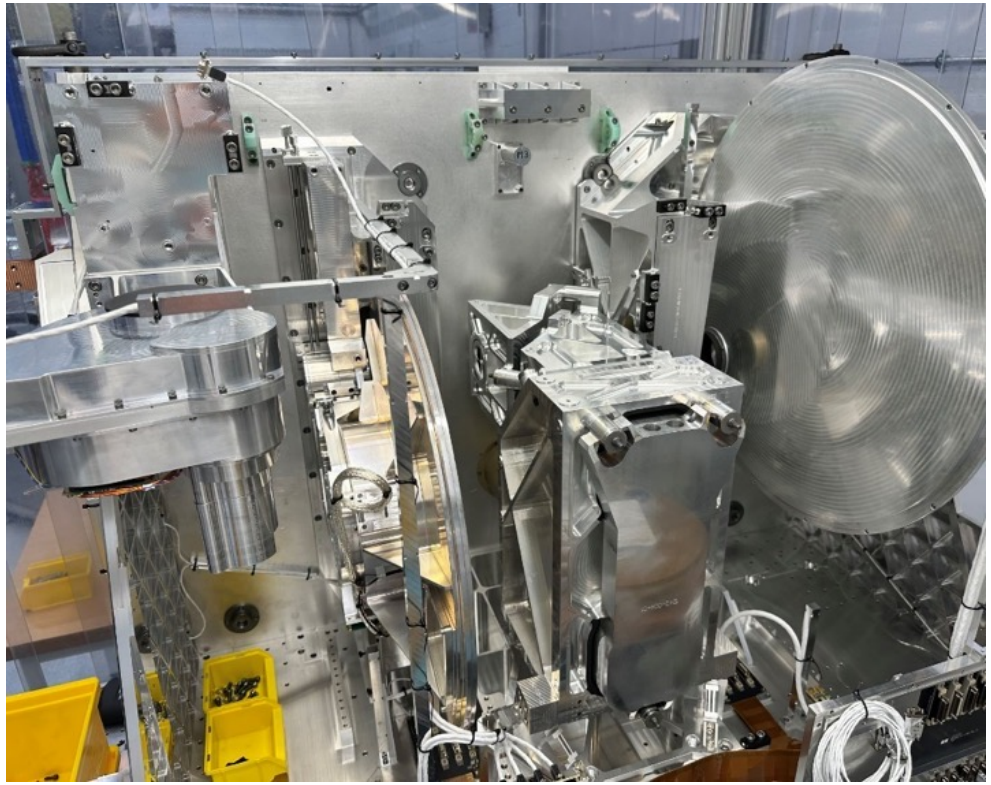
Cryogenic ‘set-forget’ motors (ICAR)



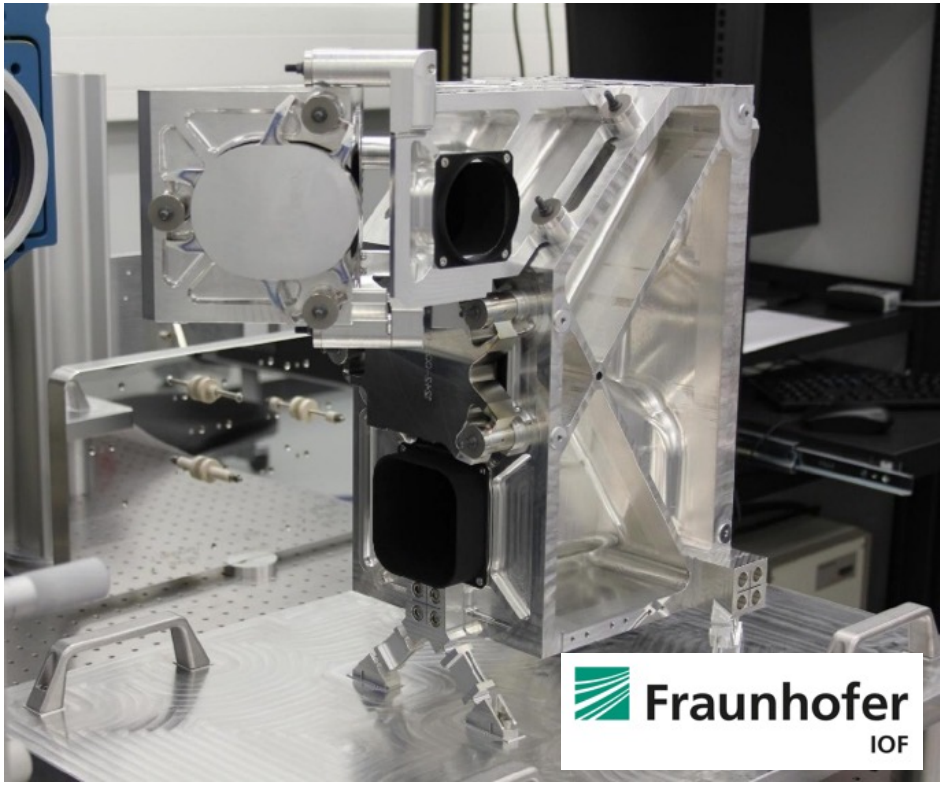


Cryogenic 3-mirror detorator

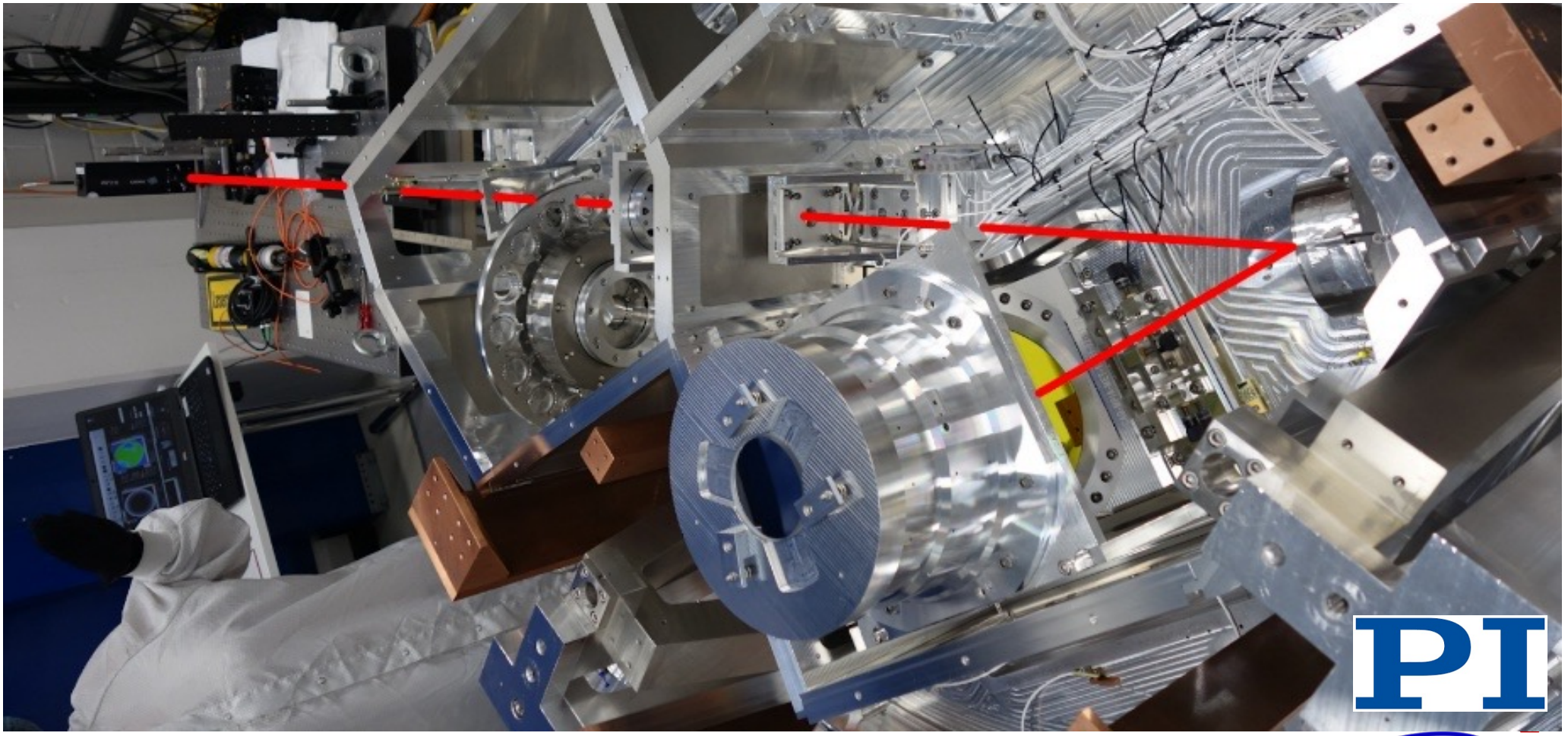
LM & N band Imager



Largely integrated Imager at MPIA Heidelberg



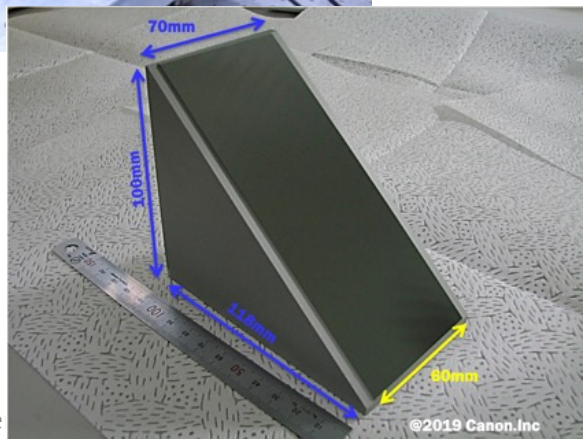
IMG cold optics collimator system (Courtesy: IOF)



Single Conjugate Adaptive Optics System (SCAO), with cryogenic modulator and field-selector. Operation @ 70 K

TMA for LM IFU spectrograph

CMMOPTIC

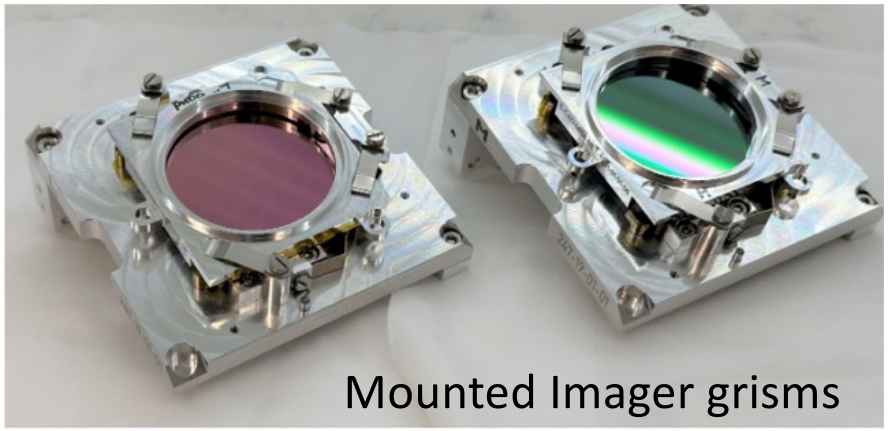


Canon

Immersed grating

ESO Instrume

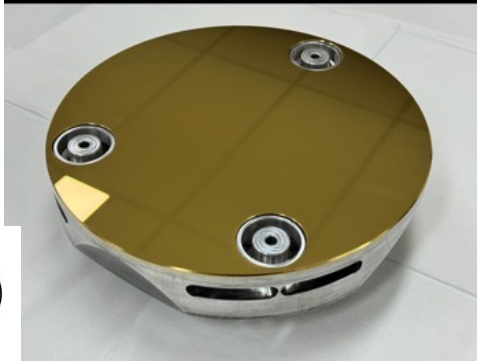
G&H ARTEMIS



Mounted Imager grisms

Canon

Aluminium mirrors

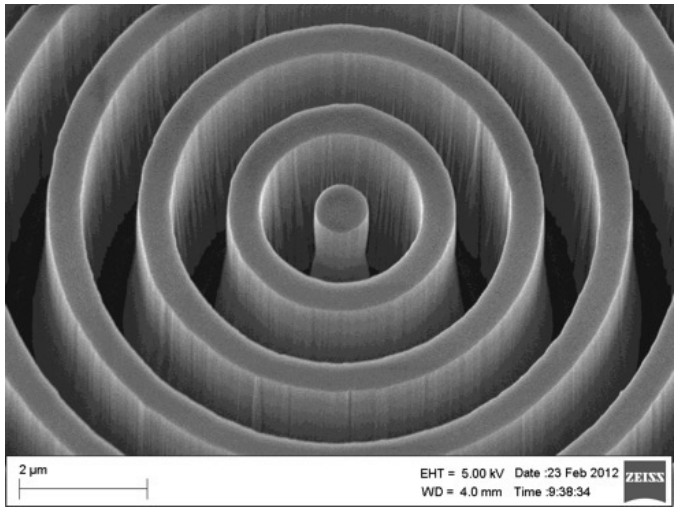


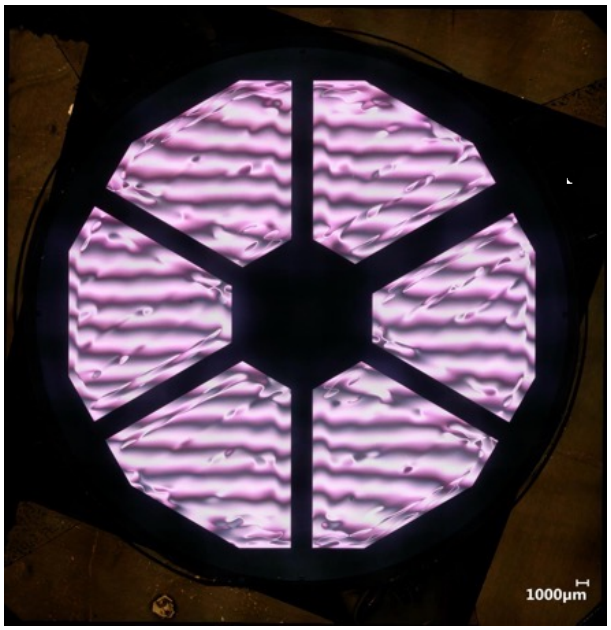
NOVA

TNO

Coronagraphs for METIS

Vortex coronagraphs





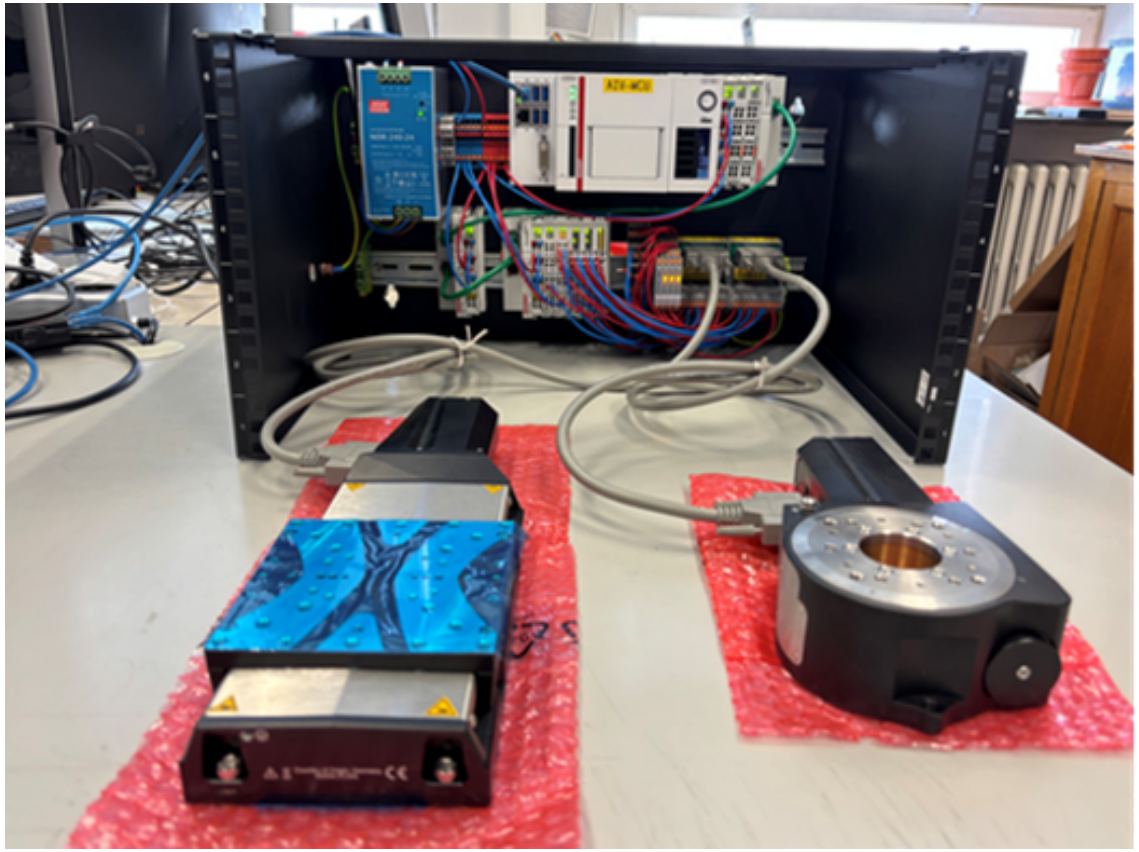
vAPP coronagraphs

UPPSALA UNIVERSITET

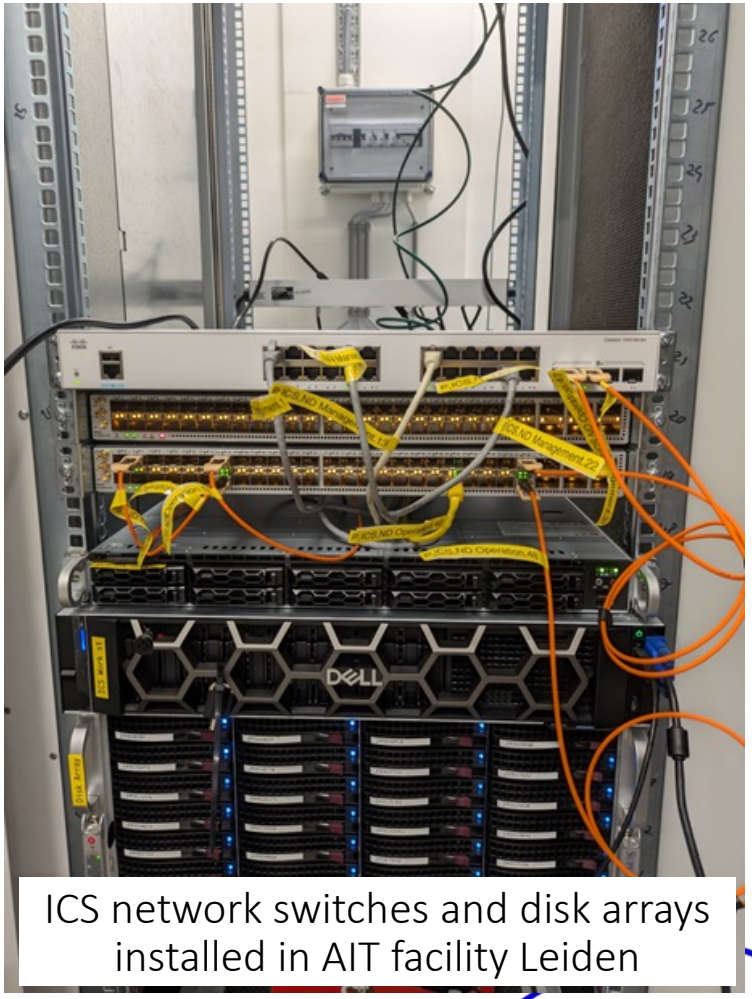
Mid Infrared ELT Imager and Spectrograph

METIS

Instrument control

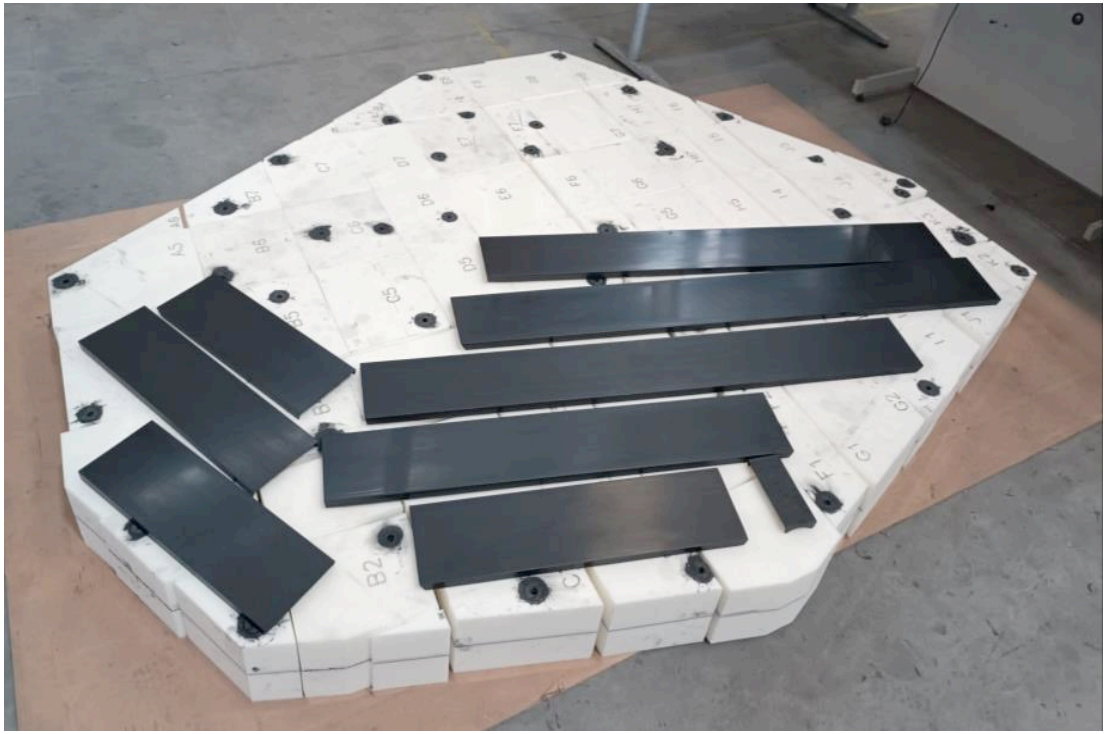


Instrument Control System for Warm Calibration Unit

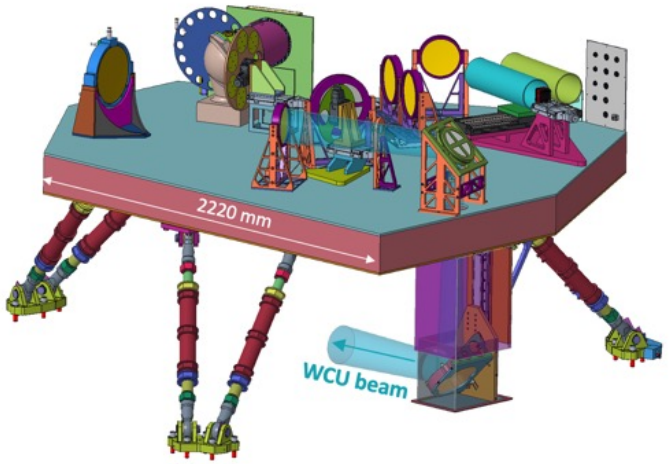


ICS network switches and disk arrays installed in AIT facility Leiden

Warm calibration bench



optimal Structural Solutions



Production of the CFRP bench for the Warm Calibration Unit

METIS

NOVA METIS AIT hall (Univ Leiden / NL)

Upcoming procurement opportunies

Items still in the process of ordering are:

- CFO thermal dummy frame
  - Design and manufacturing
- Computer hardware
  - > 5 yrs
  - GPUs, workstations requirements not known

Contact

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The Netherlands