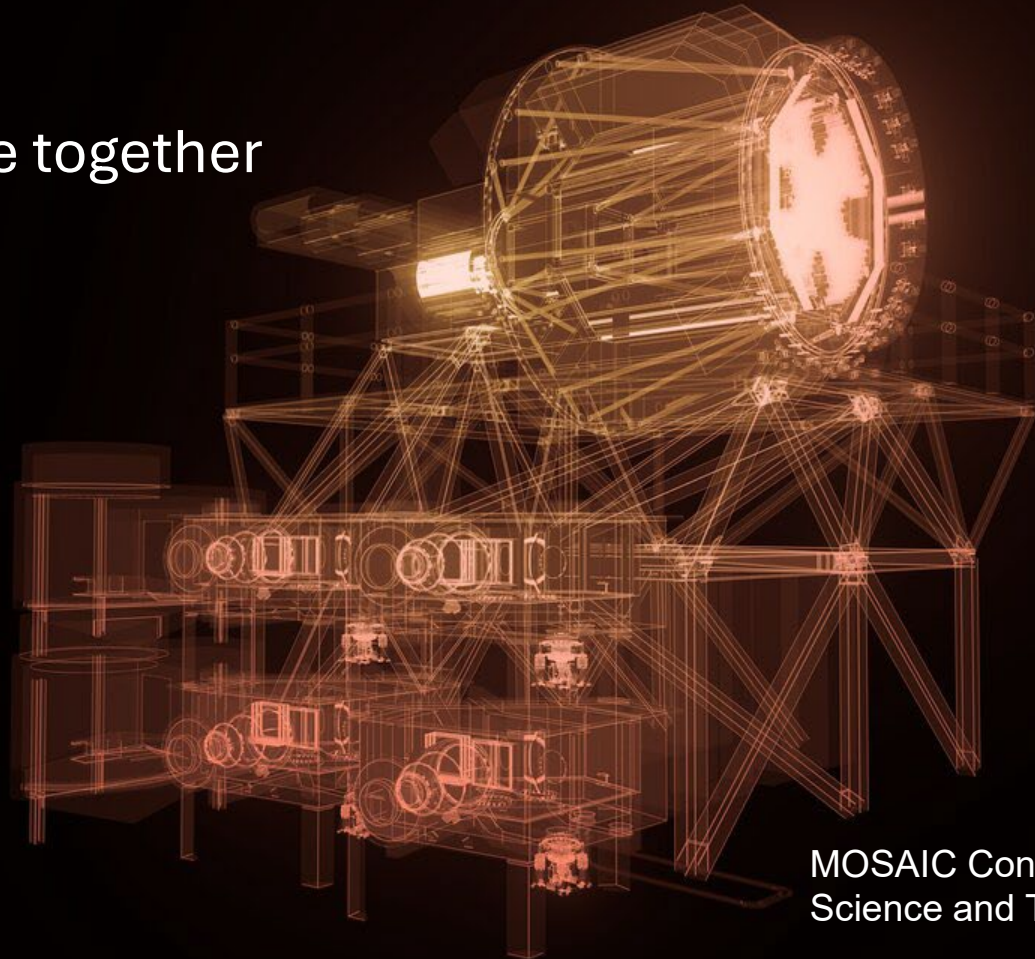


MOSAIC

Shaping the future together

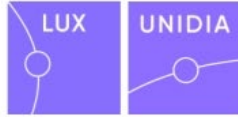


Dr Hermine Schnetler
Project Manager

MOSAIC Consortium
Science and Technical Team



MOSAIC CONSORTIUM



Science and
Technology
Facilities Council



RAL Space



UNIVERSITY OF AMSTERDAM



ZENTRUM FÜR
ASTRONOMIE



Universidade de São Paulo
Brasil



UNIVERSIDAD
COMPLUTENSE
MADRID



universität
wien



Institute of
Science and
Technology
Austria



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ULisboa
Faculdade
de Ciências
da Universidade
de Lisboa



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LUND
UNIVERSITY



UPPSALA
UNIVERSITET



SAPIENZA
UNIVERSITÀ DI ROMA

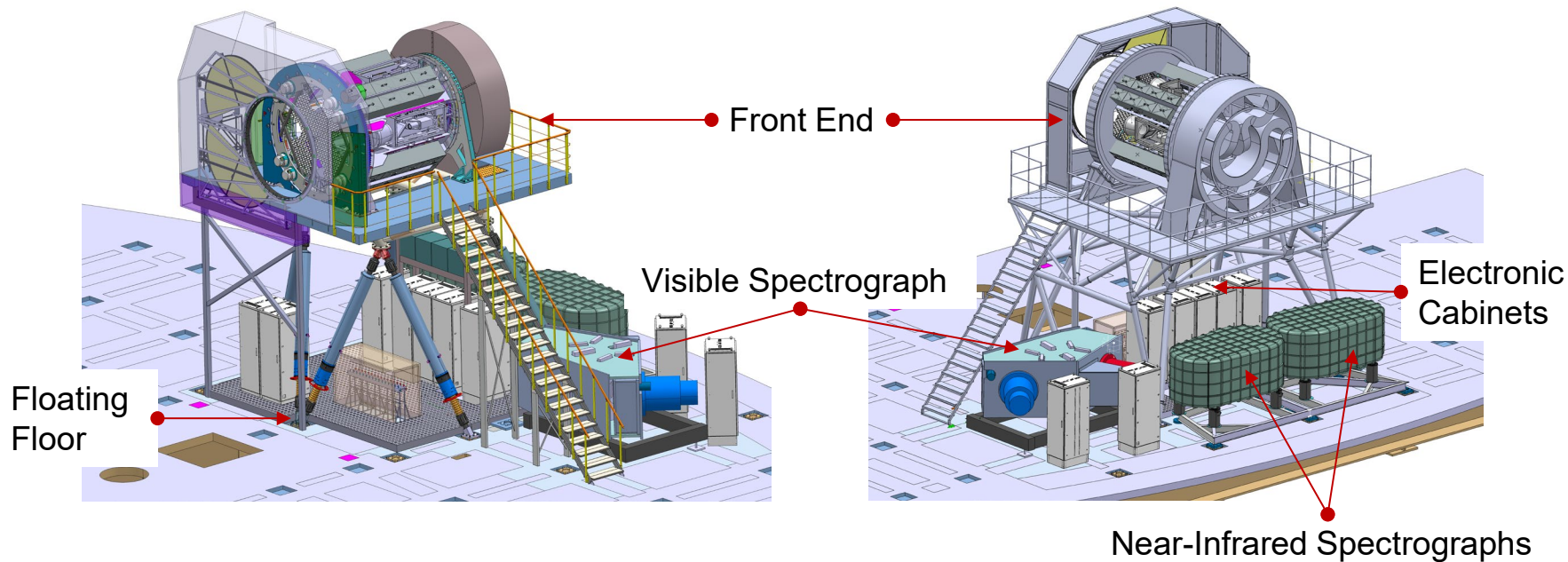




MOSAIC

MOSAIC (ELT-MOS)

Multi-Object Spectrograph for Astrophysics, Intergalactic-medium studies and Cosmology

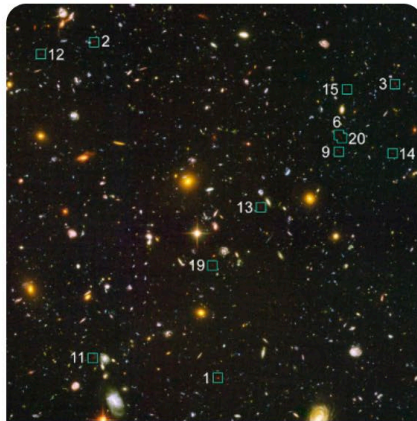




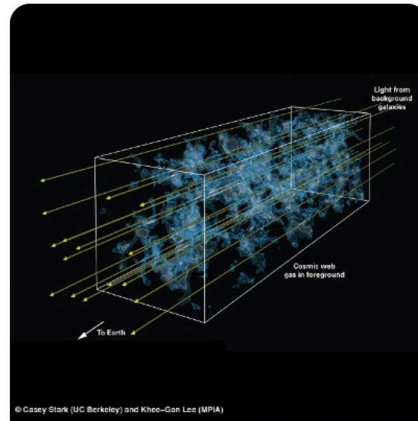
Science Goals

- ✓ **optimized** to provide high survey speed
- ✓ a **leading follow-up machine** in the 2030s landscape
- ✓ **unique** in providing multiplex over a large patrol field on the largest optical telescope ever built
- ✓ enabling ambitious shared **surveys**

2025-10-01



★ First light

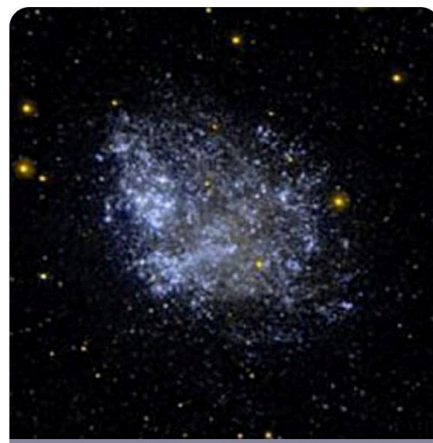


© Casey Stark (UC Berkeley) and Khoo-Gan Lee (MPIA)

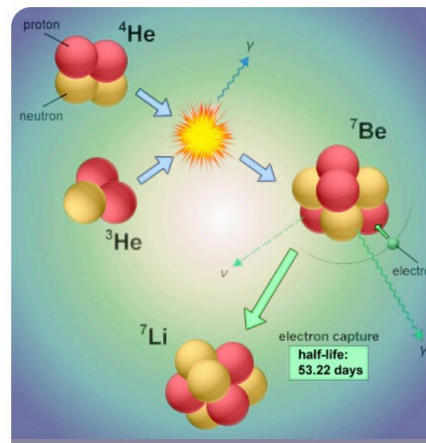
★ Inventory of matter



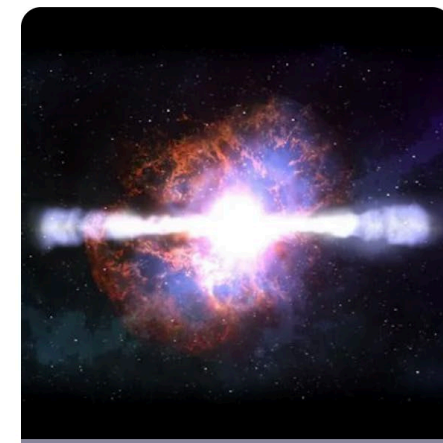
★ Mass assembly of galaxies through cosmic time



★ Resolved stellar populations beyond the Local Group



★ Galaxy archaeology



★ Transients and Multimessengers

Our Vision

2025-10-01



Vision

Deliver an instrument in a timely fashion such the there are still exciting discoveries to be made



Mission

The MOSAIC consortium aims to develop the best-in class multi-object spectrograph that we can with the funds available

Goals

- Hit each and every milestone on time
- Plan for success



The Story Thus Far

System Architecture Review (SAR)



We had a successful System Architecture Review

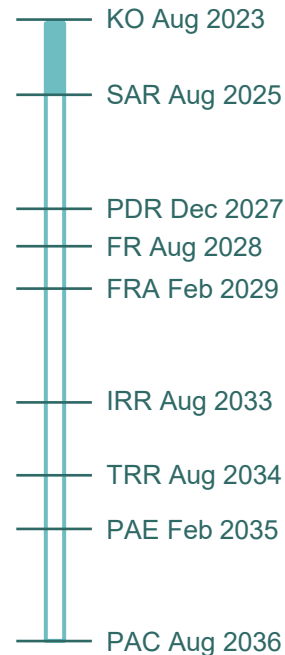
Conceptual design completed

Early risks identified and some been addressed

Momentum is building

Requirements established

Contractual dates in SOW



Contractual Key Milestones



Dates reflects contractual dates as defined in
ESO-349511MOSAIC SOW

**** Important note:**

If it is possible to conclude funding review (a) in time for the board meeting in December 2028, this date can accelerate the process

The next three years

6 months

Requirements Engineering:

- Ensure that all user requirements are flowed down correctly and consistently.
- All critical engineering requirements have been identified and captured.
- All interfaces identified and defined.

12 months

Complete sub-system designs

- Ensure that all the critical parts used have a technology readiness level of 5/6 or above.
- Create performance models to prove compliance of the designs.
- Get quotation and refine direct material and non-recurring costs.

24 - 36 months

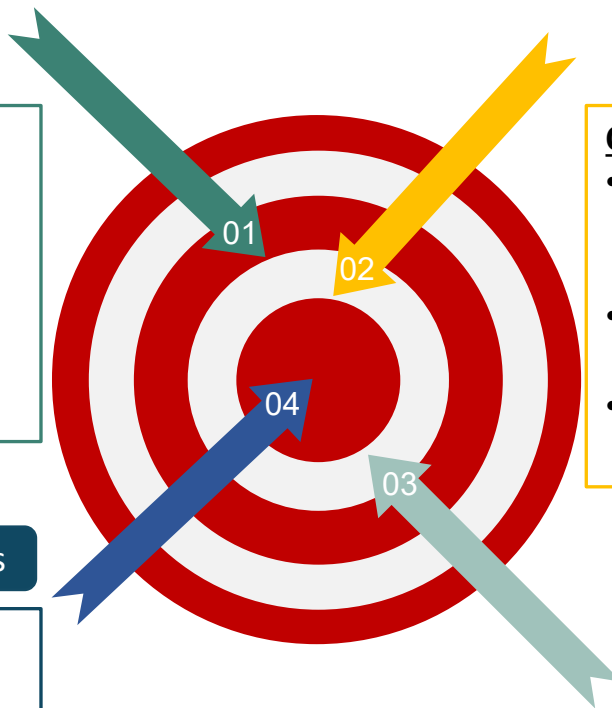
PDR Data Pack:

Prepare the preliminary design review data pack for a successful Instrument PDR

18 months

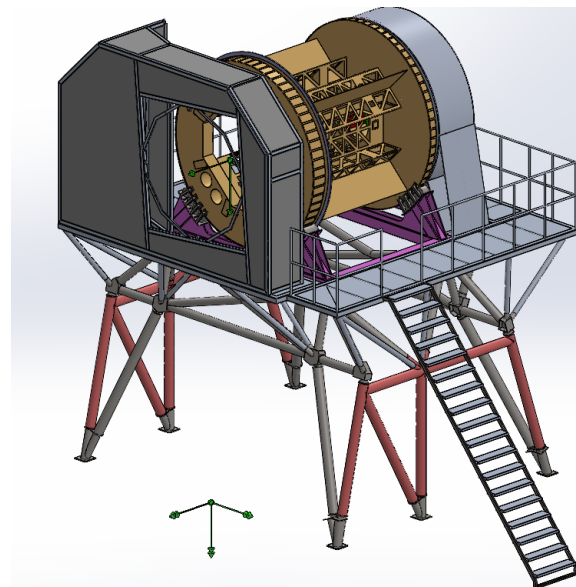
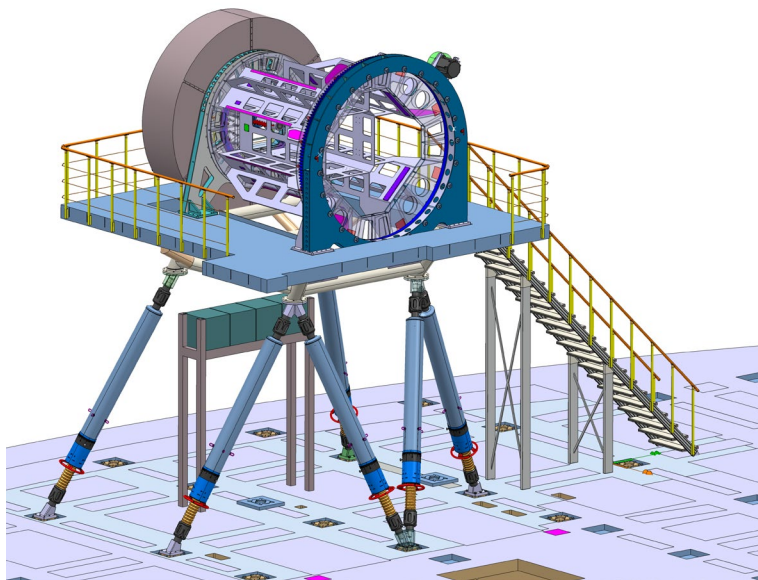
Prototypes:

Build, test and characterise prototypes identified in the MOSAIC Technology Development Plan





Procurements needs for MOSAIC Front End



MOSAIC Front-End Overview

ICOS:

Rotating Structure
Cable Wrap
Static Structure

Contacts:

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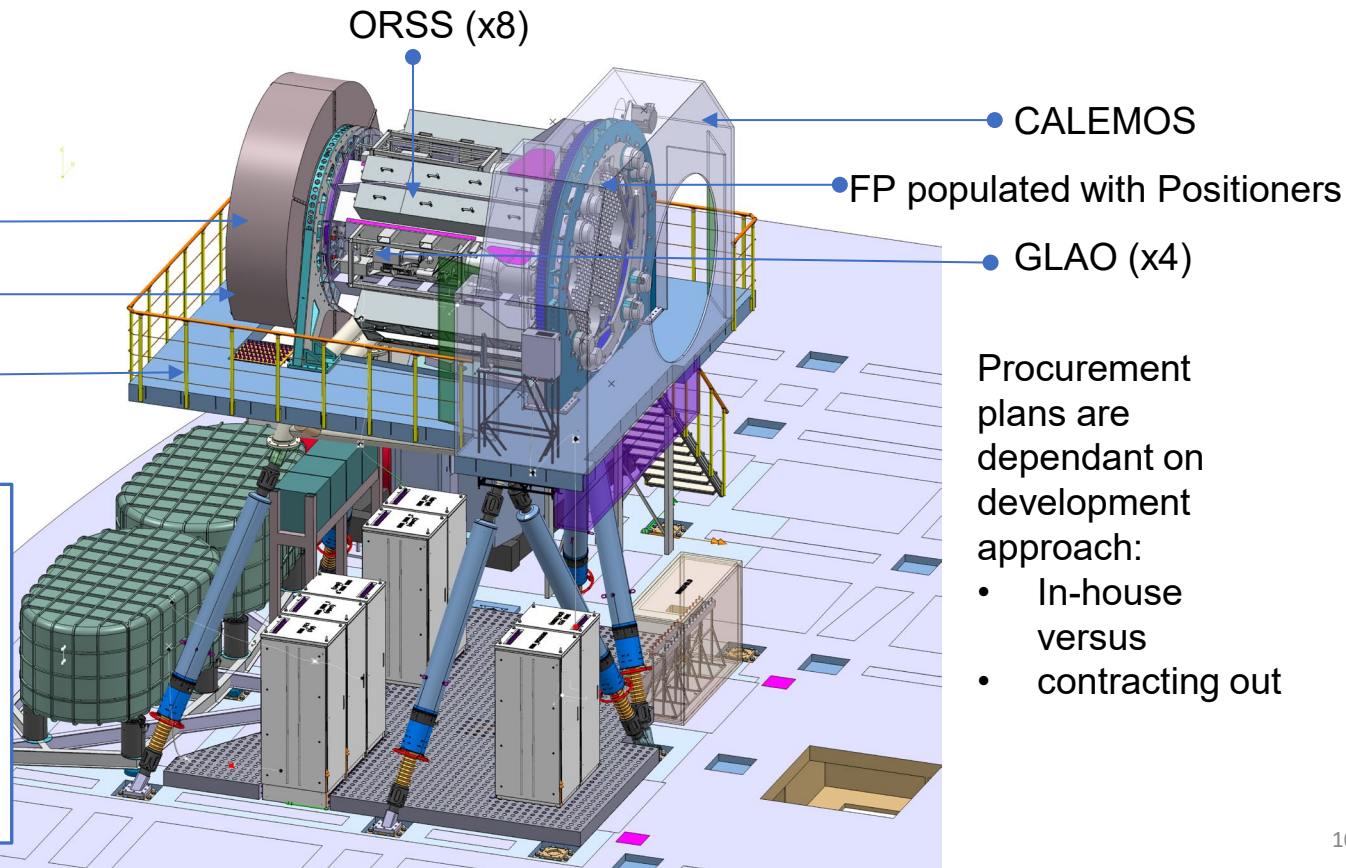
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Procurement plans are dependant on development approach:

- In-house versus
- contracting out

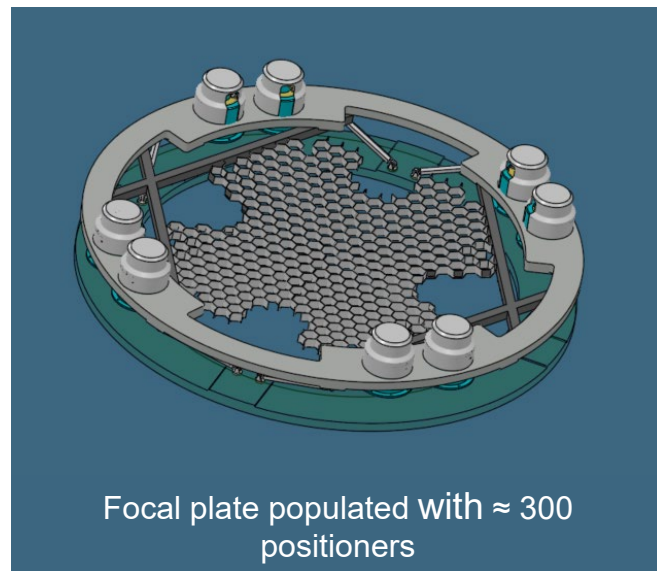


MOSAIC Focal Plate

- Focal Plane WP provided by University of Oxford (UoX)
- Quantity: One – 1
- Material : Steel, Aluminium or Carbon fibre (TBC)
- No planned procurement

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**Plan to manufacture
in-house**

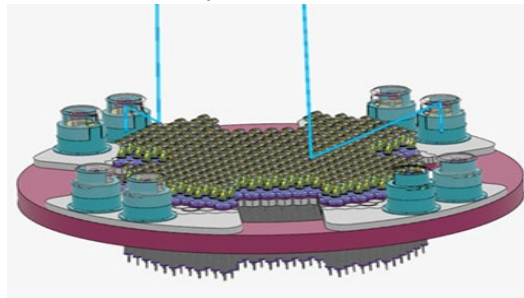


Focal plate populated with ≈ 300
positioners

MOSAIC Positioners

- Positioner WP: managed by EPFL
- Opto-Mechanical Assembly :
 - 5 mirrors: est. 500€
 - 2 lens doublets: est. 400€
 - 2x ADC triplet prisms : est. 3k€
 - 5 BLDC motors
 - 1x 13mm diameter motors
 - 4x 8 mm diameter motors (identical)
 - Hall sensors or encoders TBD
- Electronics: Control PCA
- POS Quantity: 300 and spares (TBD)
- Planning : early prototyping and design qualification during PDR and production readiness during the FDR phase.
- Production should start after MOSAIC FDR (2031)

Focal plate populated with ≈ 300 positioners

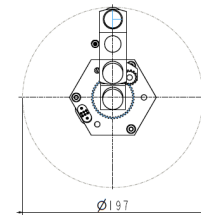
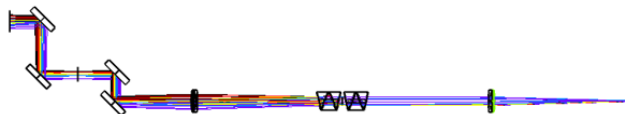
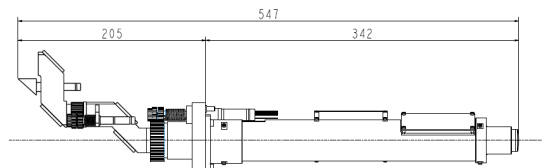
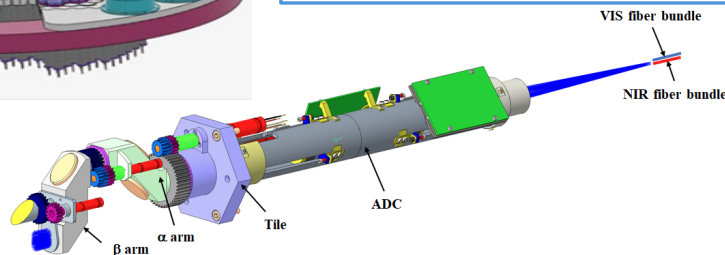


Contacts:

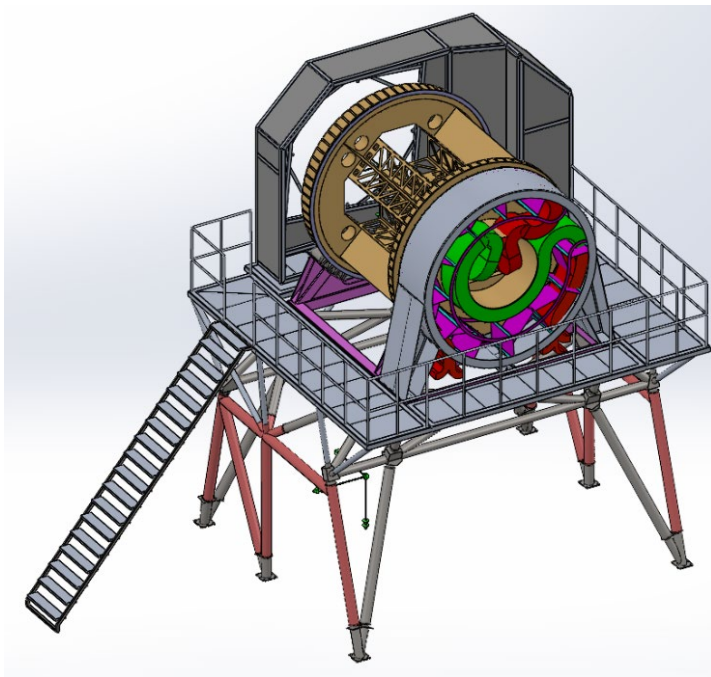
Always cc the PM: Hermine Schnetler
(hermine.schnetler@obspm.fr)

EPFL:

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Maxime Rombach (maxime.rombach@epfl.ch)
Optics: Jurgen Schmoll Durham University
(jorgen.schmoll@durham.ac.uk)



MOSAIC Instrument Rotating, Static Structure, & Cable Wrap



Contacts:

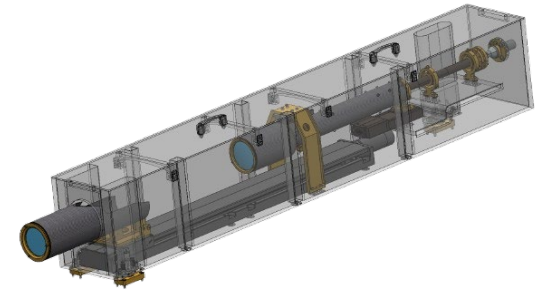
LNA : Bruno Castilho bruno@lna.br

LNA Decio Ferreira dferreira@lna.br

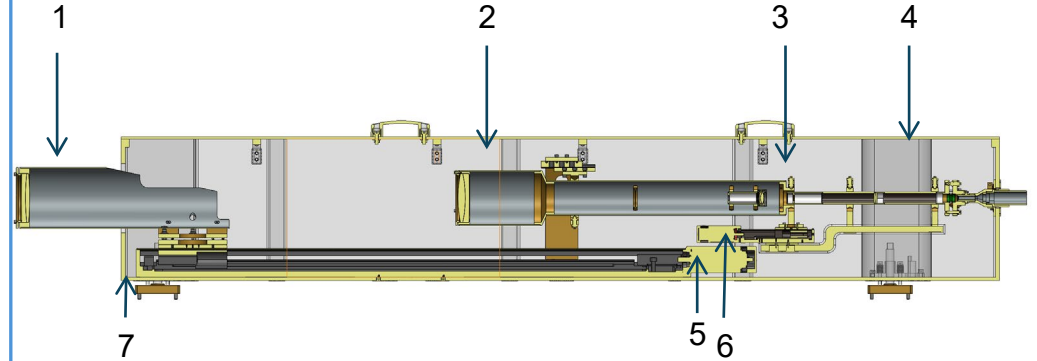
Always cc the PM: Hermine Schnetler OBSP
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- Quantity: one
- Material : Steel
- ICOS WP: managed by LAM/USP - Brazil
- Mass Budget: 13,3tons
- Size :
 - Height 8 metres, Barrel diameter 3meters
 - Footprint (excluding the stairs): $\approx 6\text{ m} \times 6\text{ m}$
- Planning : procurement after FDR (2031) or earlier depending on chosen strategy

MOSAIC ORSS



- Optics
 - 1-4: Custom NIR achromats
 - Qty: 10 of each, incl. prototyping and spares
 - Est. cost: 200 k€
- Linear stages
 - 5: 1000 mm range, closed loop
 - 6: 45 mm range, closed loop
 - Qty: 10 of each, incl. prototyping and spares
 - Est. cost: 230 k€
- 7: Carbon structure
 - Qty: 10, incl. prototyping and spares
 - Est. cost: 200 k€
- Planning : First items for prototyping in 2026-27, total after FDR (2031)



Contacts:

Lagrange Nice:

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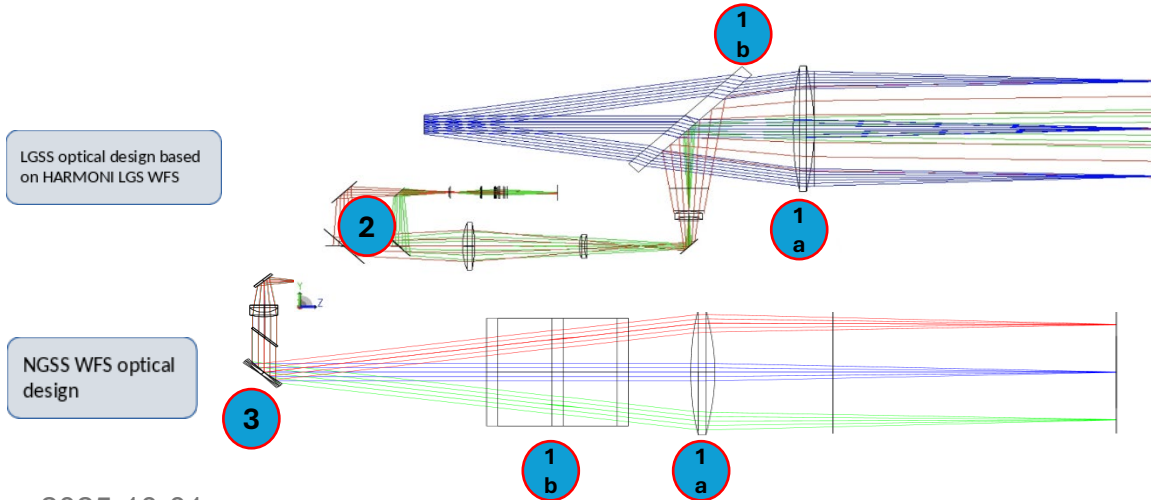
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Procurement planned for post FDR (2031)

	Est. cost / item	Description	Num.	Specification
1	k€150	Large optics (a. lens of approx $\varnothing 500$ x4, b. dichroic ca. 500×700 x4) and small optics	4	Lens AR coated $R < 0.5\%$ 550—850nm Dichroic long bandpass cut-on 560nm, cut-off 620nm, peak R 588-591nm, T 630—800nm
	k€20	Space frame	4	Stainless steel box tubing welded into defined structure, CNC machined with TBD precision, blackened
	k€12	Rotation stage (high precision & accuracy)	4	To hold $\varnothing 120$ mirror, all gravity orientations, angular range ± 0.3 degrees, precision $1:5 \times 10^5$
2	k€12	Positioning linear stage (high precision & accuracy)	4	To hold 1kg, all gravity orientations, translate 150mm, precision of ± 0.5 mm, encoder required
3	k€4	Kinematic feet	8 sets	Load 200kg per triplet in all gravity orientations, may require customisation
	k€30	Rotating test stand	1	Capable of 200k unit rotation $3 \times 1 \times 1$ metres, clear access from front, integrated cable wrap, 0—15 deg C operation, low runout rotary positioner with encoders



Contacts:

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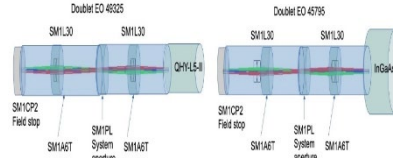
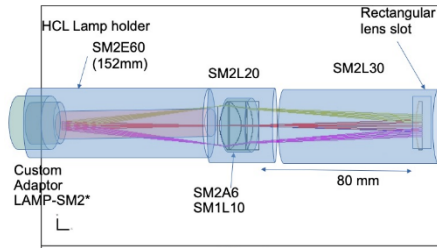
Always cc the PM: Hermine

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MOSAIC CALEMOS

- Illumination projectors & UST screen
- Procurement planned for after FDR (2031)



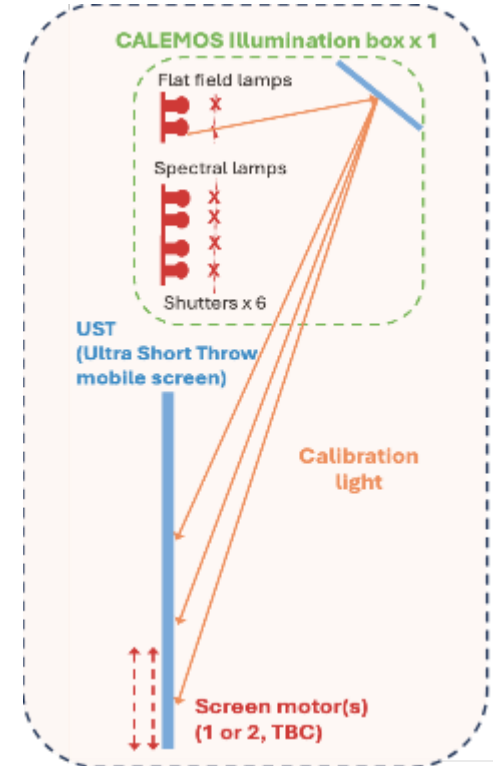
Contacts at Fractal:

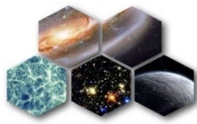
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MOSAIC

mIFU - Prototyping phase

- French funds (400k€) from DIM ACAV+ & ANR for the study, manufacturing and metrology for a prototype with 28 fibres.
 - Results beginning 2026
- New proposal (682k€) to DIM ORIGINES
 - Manufacturing the first IFU of MOSAIC with 168 fibres.
 - Analysis and final design of the full-scale prototype and MAIT of its.
 - The funding level will be known at the end 2025.

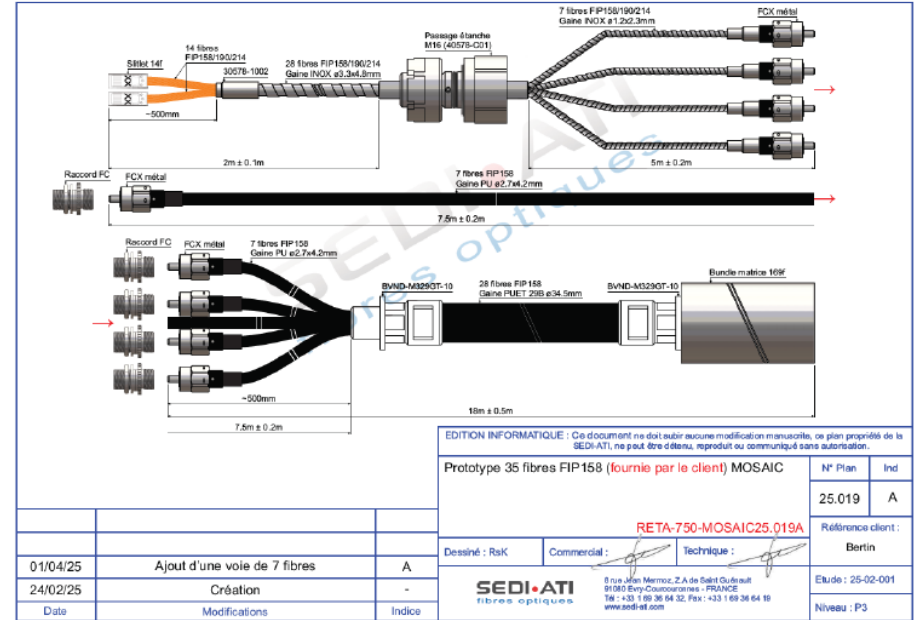


Figure 1 : Plan d'ensemble Prototype

Contacts at OBSPM:

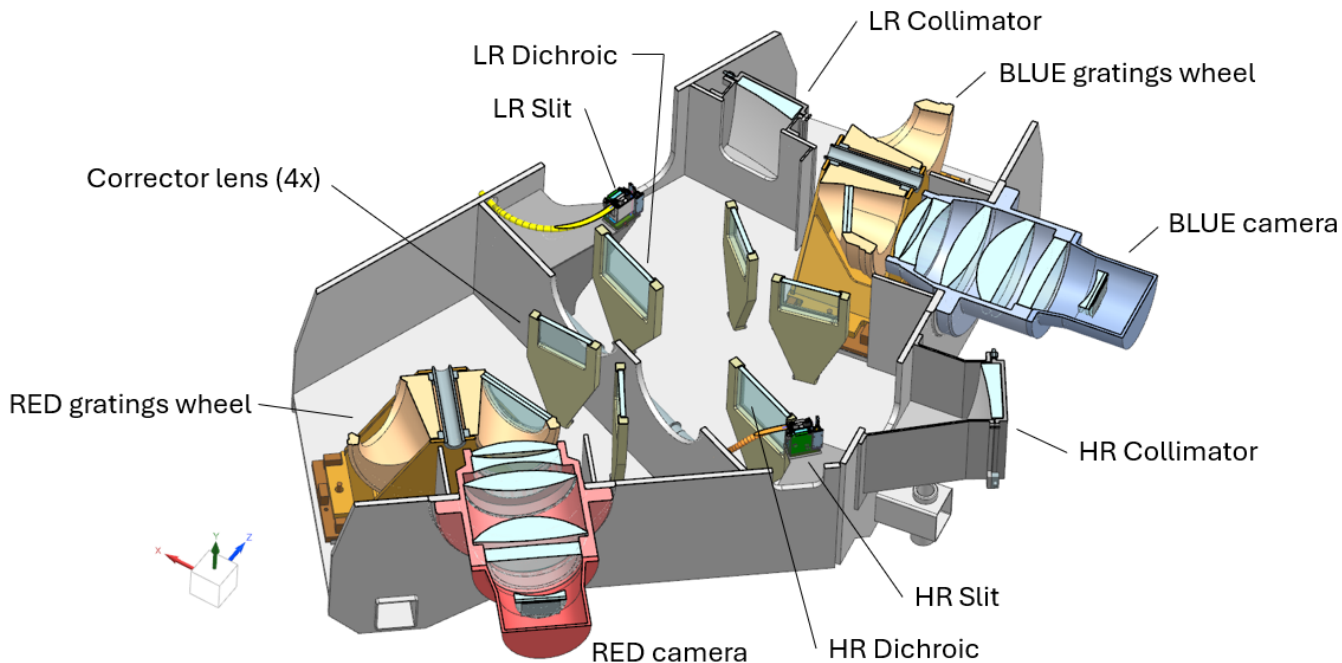
Isabelle Guinouard (isabelle.guinouard@obspm.fr)

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(Hermine.Schnetler@osbpm.fr)



Procurements Needs for MOSAIC VIS Spectrograph





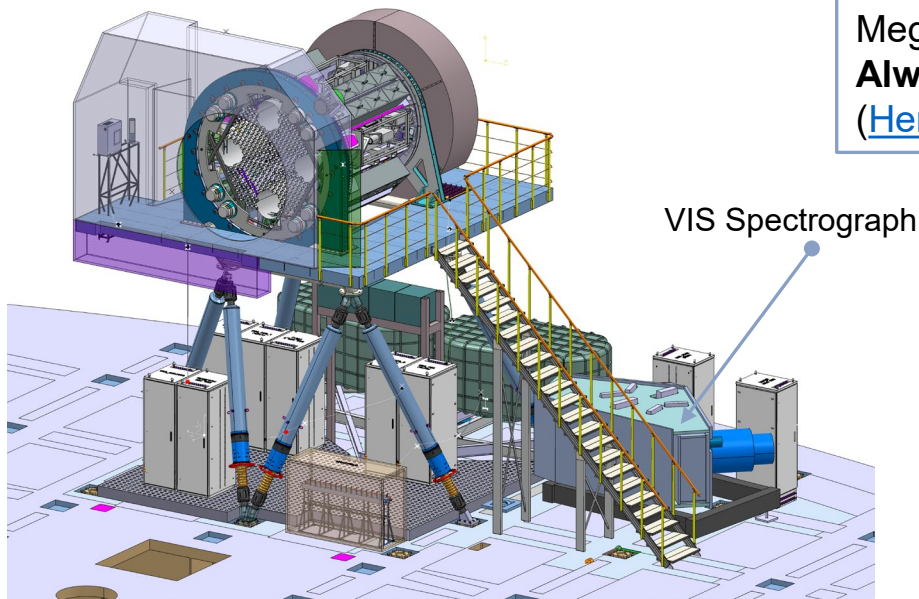
MOSAIC VIS Spectrograph Overview

Contacts:

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Meghna Mohamed (mohamed@astron.nl)

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(Hermine.Schnetler@osbpm.fr)



- Procurement planned for directly after FDR (2031) or earlier depending on whether we need Long Lead Item (LLI) reviews

VIS Spectrograph Cameras

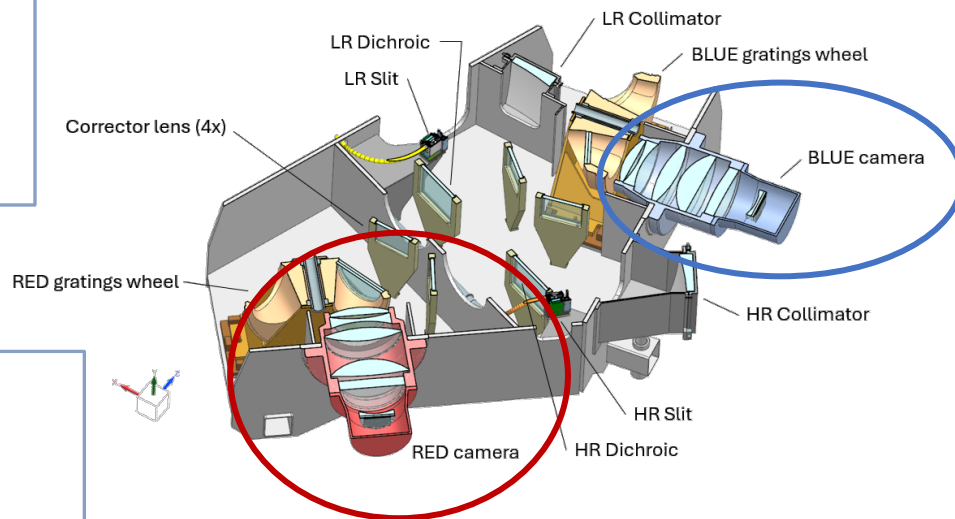
- Strategy – to be decided (whether to outsource completely or do in-house)
 - Quantity – 2 (1 red camera and 1 blue camera)
 - Planning : procurement after (LLI) FDR
 - Contact persons : LSW Heidelberg:

Contacts:

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VIS Spectrograph Gratings

- 3 gratings per arm (1 red LR, 2 x red HR for red arm and 1 blue LR, 2x blue HR for blue arm)
- Waiting for ROM quotes from Horiba, INAF, Wasatch, IoF (VPH)
- Received ROM quote from Plymouth (Binary grating)
- Planning : procurement after (LLI) FDR

Contacts:

VIS PM: Thomas Augusteijn

(augusteijn@astron.nl)

WPM: Walter Seifert

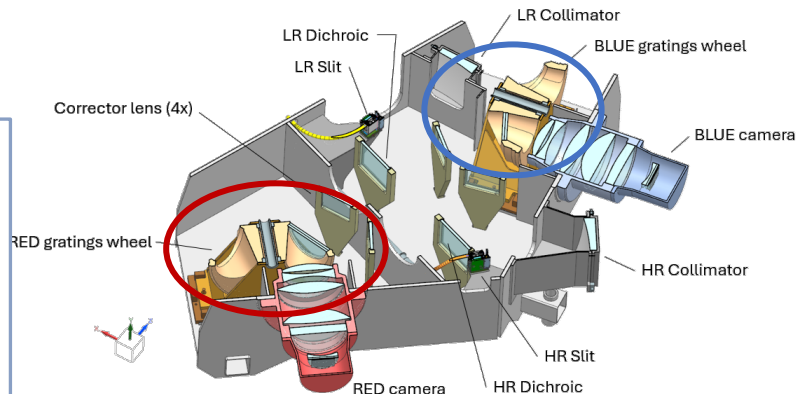
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(hermine.schnetler@obspm.fr)

2025-10-01



Specifications LR high-efficiency Gratings B & R
DRAFT data

LR gratings B & R	
Operating mode	Transmission
Beam polarization	unpolarized
Line density	1335 l/mm ± 2 l/mm
Dispersion orientation	Parallel to long side of substrate
Wavelength range	390nm – 625nm
Center wavelength	511nm
AOI	19.95° $\pm 0.25^\circ$
AOI	19.95° $\pm 0.25^\circ$
Efficiency 1 st order	Spec: 80% peak, > 50% at edges Goal: > 85% peak, > 60% at edges
Useful area	elliptical 285mm x 260mm (Beam size 250mm)
Diffracted wavefront quality	Goal: PV <2, over CA @633nm (best effort)

Specifications HR high-efficiency Gratings B1 & B2
DRAFT data

HR gratings B1 & B2	
Operating mode	Transmission
Beam polarization	unpolarized
Line density	2703 l/mm ± 2 l/mm
Dispersion orientation	Parallel to long side of substrate
Wavelength range	505nm – 580nm
Center wavelength	542nm
AOI	47.5° $\pm 0.25^\circ$
AOI	47.5° $\pm 0.25^\circ$
Efficiency 1 st order	Spec: 65% peak, > 40% at edges Goal: > 75% peak, > 50% at edges
Useful area	elliptical, 390mm x 260mm (Beam size 250mm)
Diffracted wavefront quality	Goal: PV <2, over CA @633nm (best effort)

Specifications HR high-efficiency Gratings R1 & R2
DRAFT data

HR gratings R1 & R2	
Operating mode	Transmission
Beam polarization	unpolarized
Line density	2278 l/mm ± 2 l/mm
Dispersion orientation	Parallel to long side of substrate
Wavelength range	610nm – 880nm
Center wavelength	647nm
AOI	47.5° $\pm 0.25^\circ$
AOI	47.5° $\pm 0.25^\circ$
Efficiency 1 st order	Spec: 65% peak, > 40% at edges Goal: > 75% peak, > 50% at edges
Useful area	elliptical, 390mm x 260mm (Beam size 250mm)
Diffracted wavefront quality	Goal: PV <2, over CA @633nm (best effort)

VIS Spectrograph 'Other' Optics

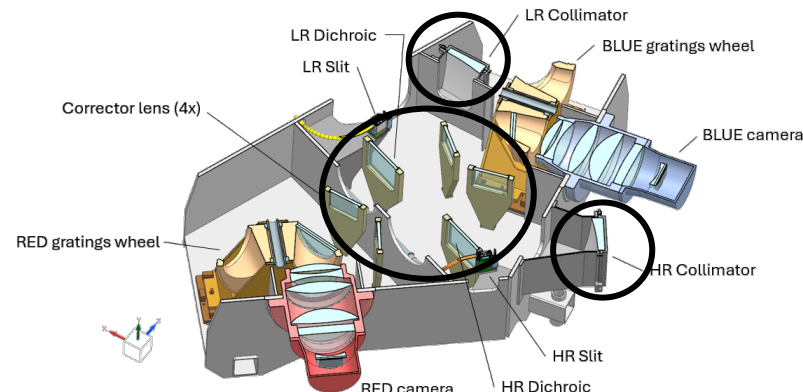
- 2 x collimators, 2 x dichroic, 4x corrector lenses
- Planning : procurement after Long Lead Item Review
- Contact persons : LSW Heidelberg:

Contacts:

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Meghna Mohamed (mohamed@astron.nl)

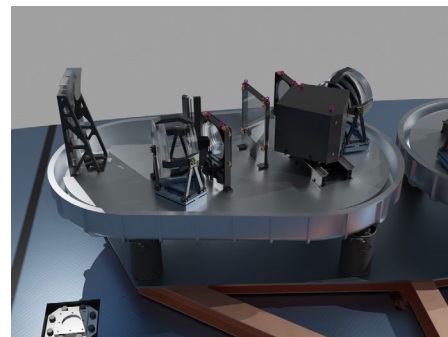
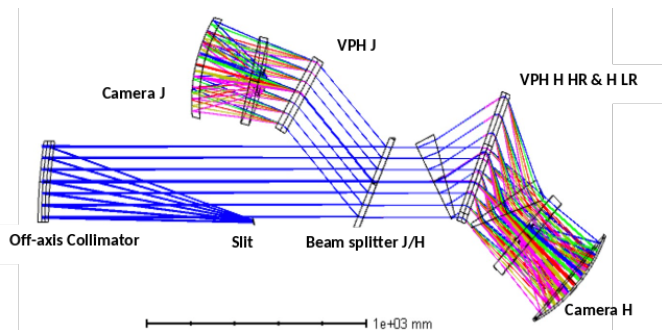
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Procurements Needs for MOSAIC NIR Channel

Key Items (indicative):

- Cryogenic systems (cryostats, mechanisms)
- Optical assemblies (benches, collimators, cameras, beam splitters, filters, mirrors)
- Large optics (VPH gratings)
- Calibration sources (spectral & continuum lamps)
- Structural components



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