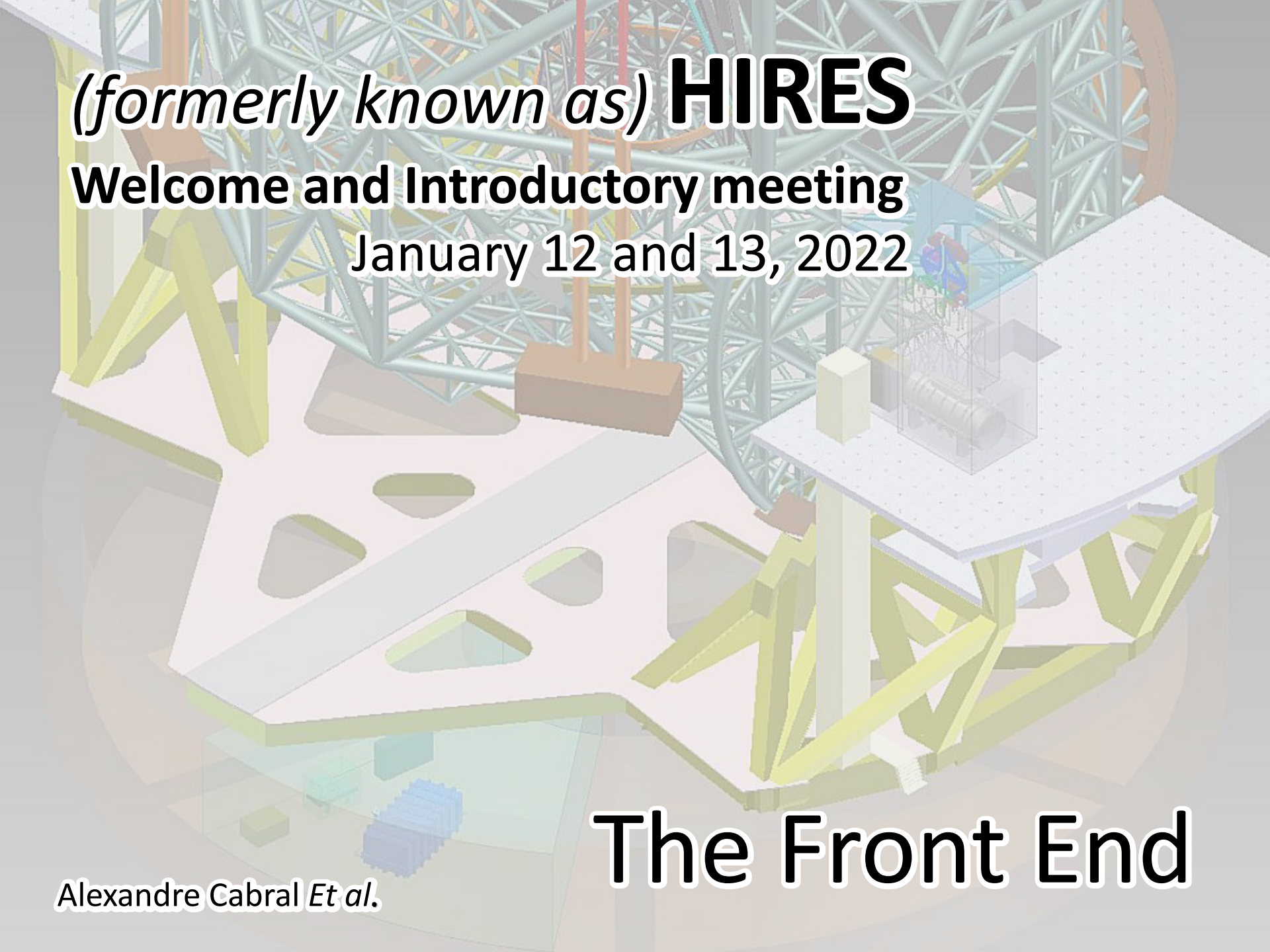


(formerly known as) HIRES

Welcome and Introductory meeting

January 12 and 13, 2022

The Front End

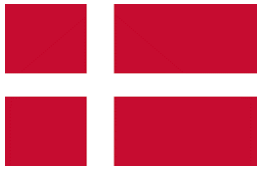
Alexandre Cabral *Et al*.

The Front End Team (Phase B)

(PM) *Alexandre Cabral*
(SE) *Manuel Abreu*
Bachar Wehbe
Manuel Monteiro
João Coelho
Pedro Santos
António Oliveira
Cédric Pereira
Inês Leite
Nuno Gonçalves

Matteo Aliverti
Edoardo Redaelli
To Be Defined

Michael Andersen
To Be Defined

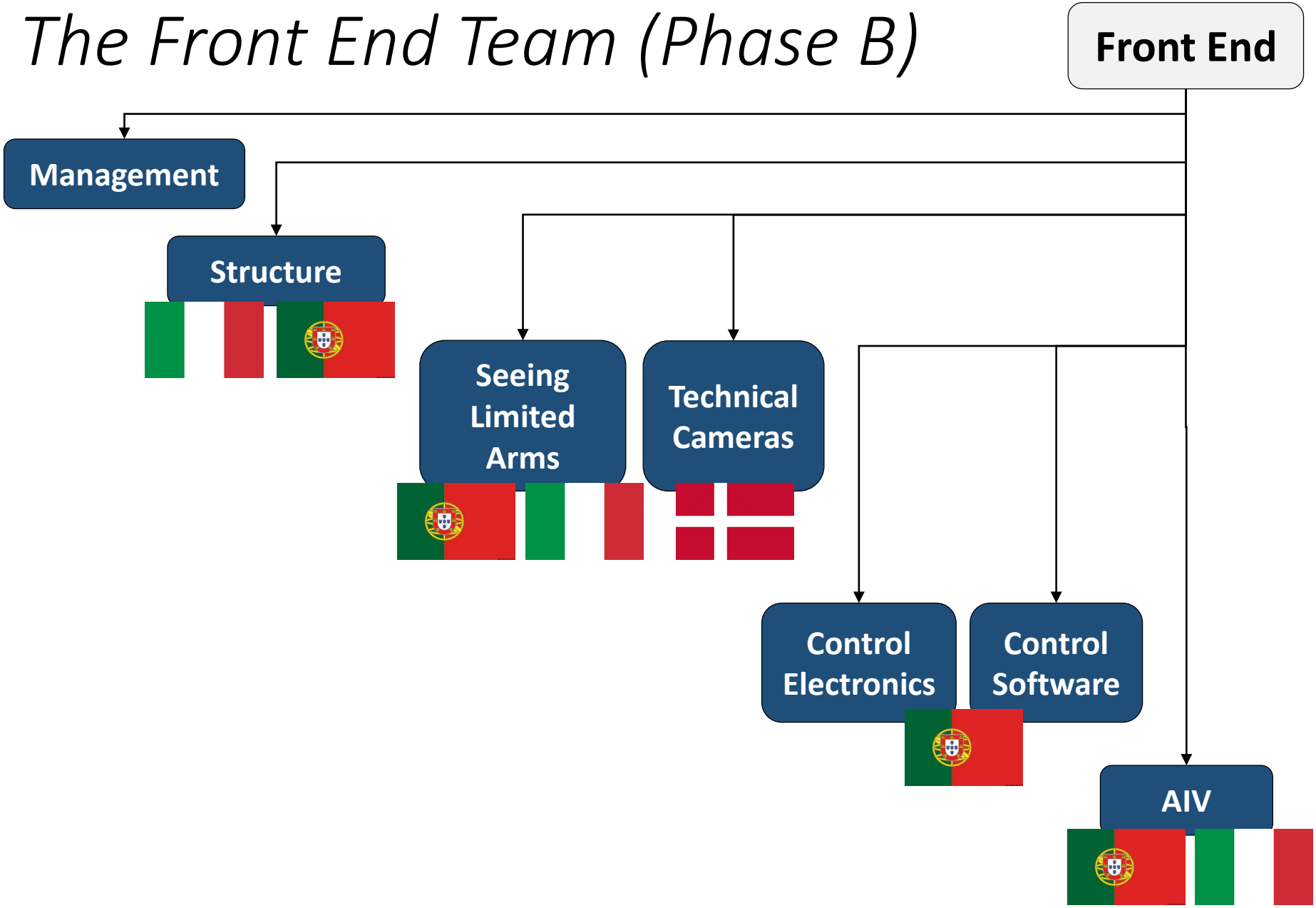


IA
Institute of Astrophysics and Space Sciences (Lisbon and Porto)

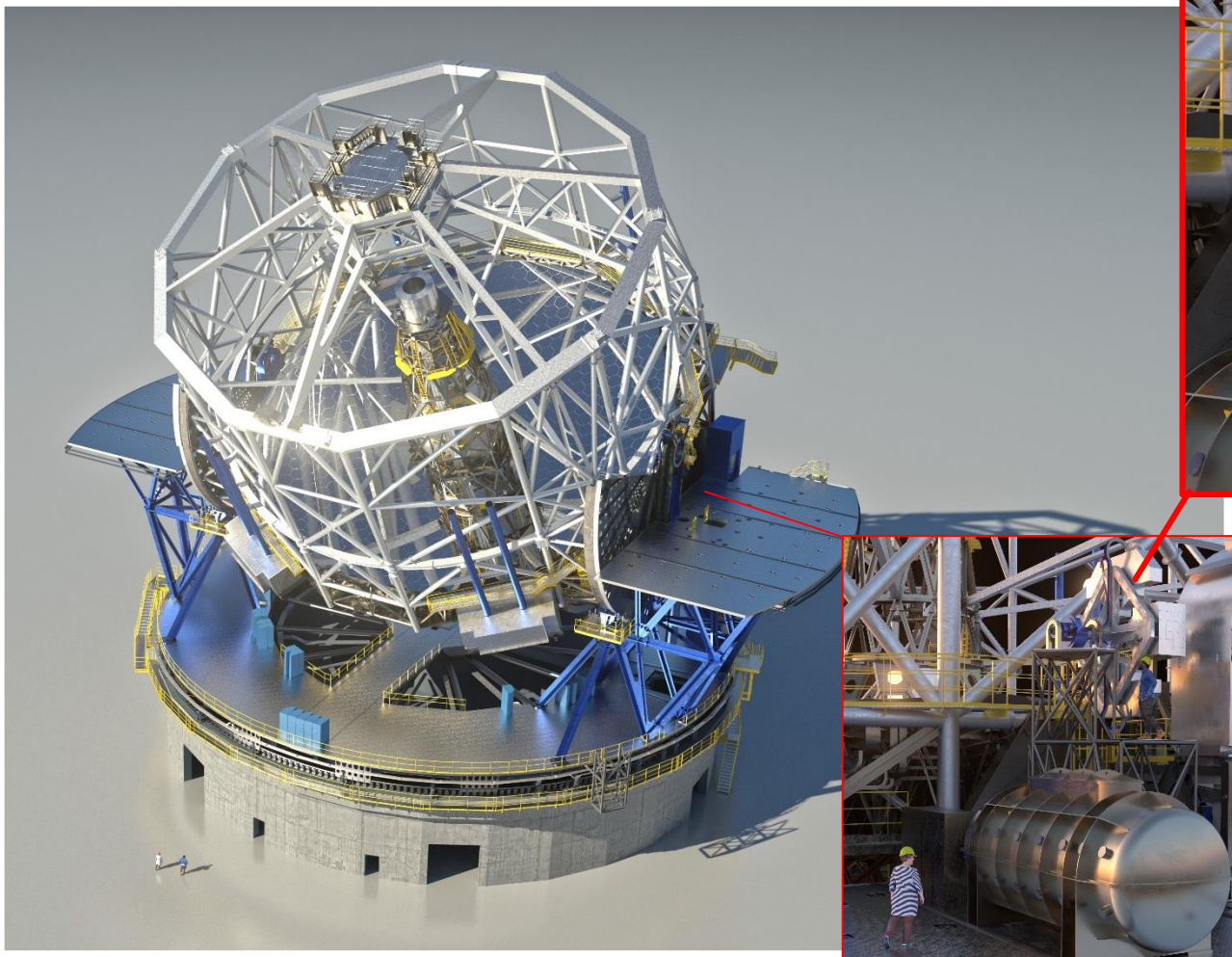
INAF-OAB
Astronomical Observatory of Brera

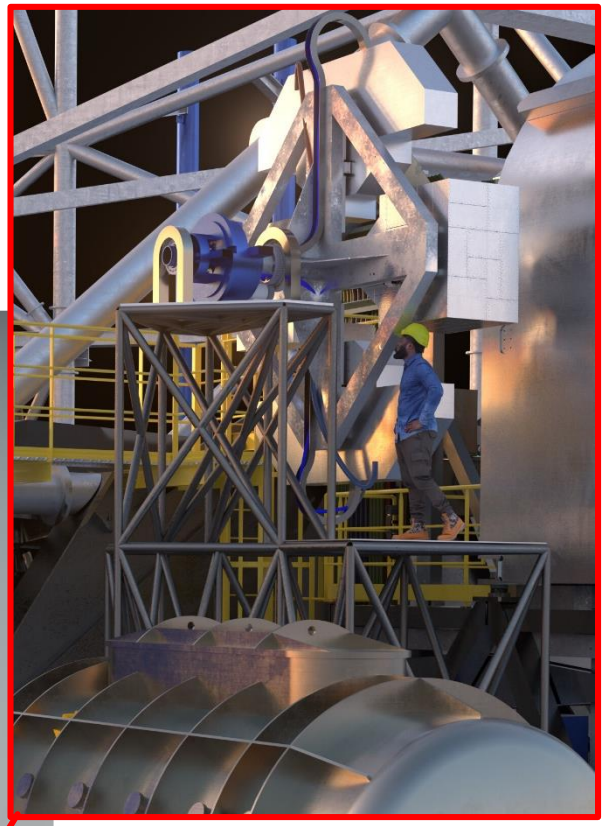
NBI
Niels Bohr Institute (Copenhagen)

The Front End Team (Phase B)



The (Phase A) Front End





The (Phase A) Front End

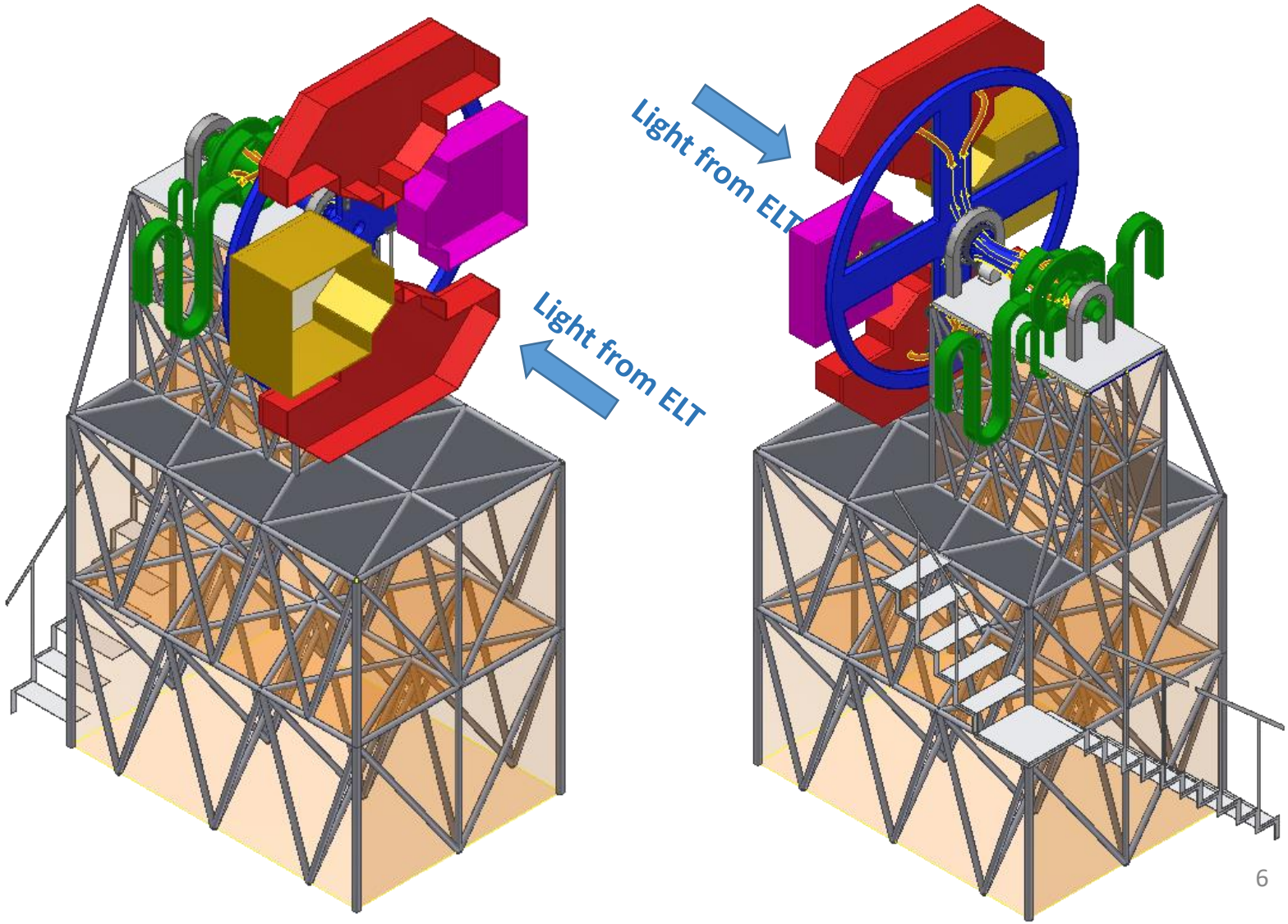
Composed by up to four Spectrographs for the **U**, **BVRI**, **ZYJH** and **K** band.

Front End composed by a structure, a cable derotator and four benches:

- **two** for the Observation (seeing limited) mode arms,
- **one** for the Polarimeter arm
- **one** for the IFU/SCAO arm

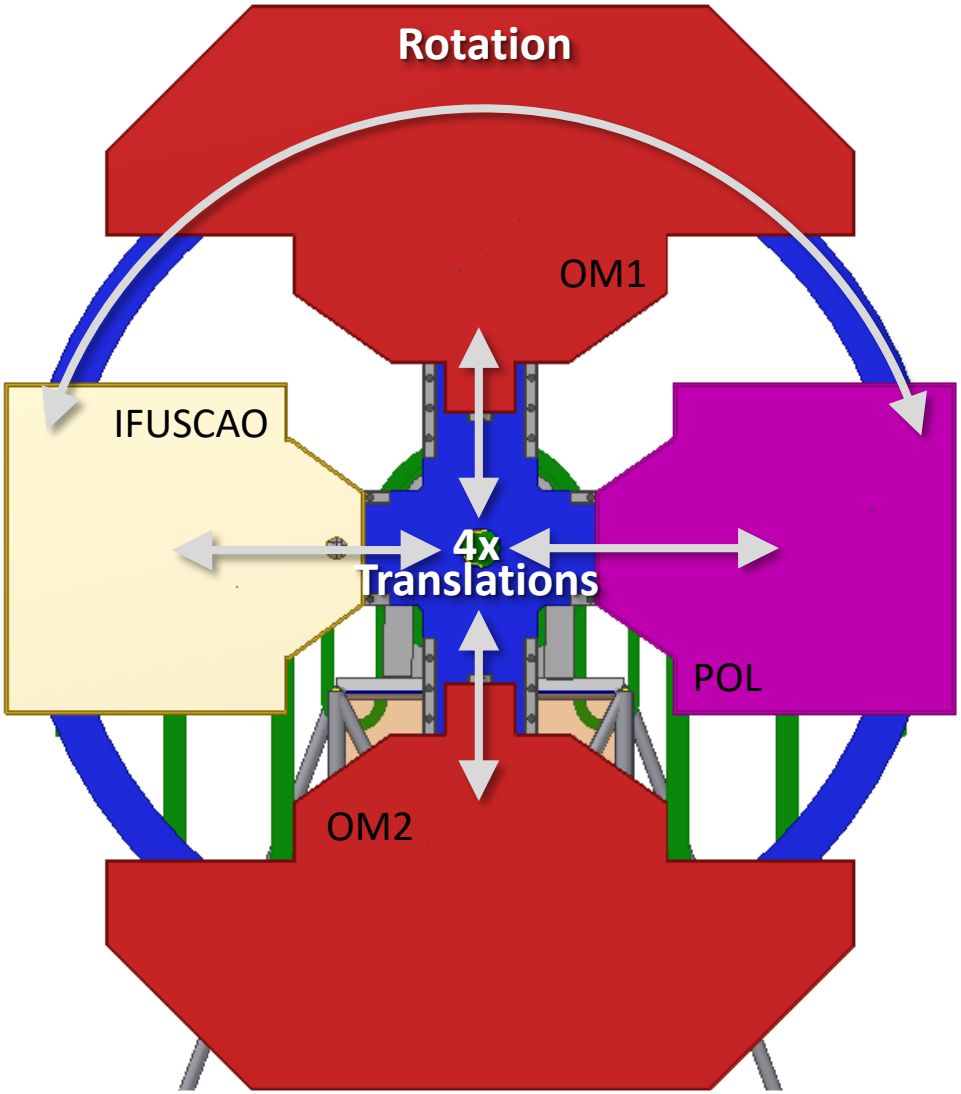
The (Phase A) Front End

Structure (fixed and rotating parts)

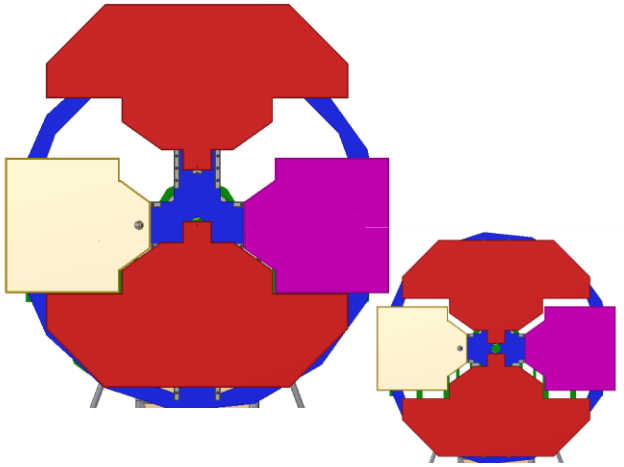


The (Phase A) Front End

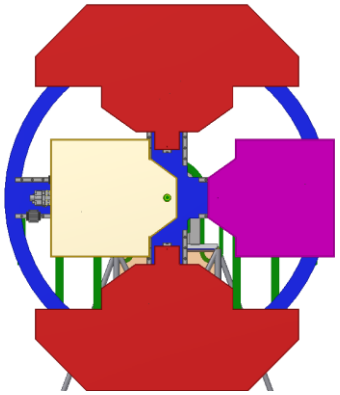
Arms management



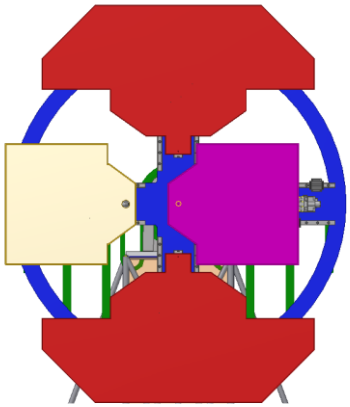
Observation Modes Arms



IFU/SCAO Arm



Polarimetric Arm



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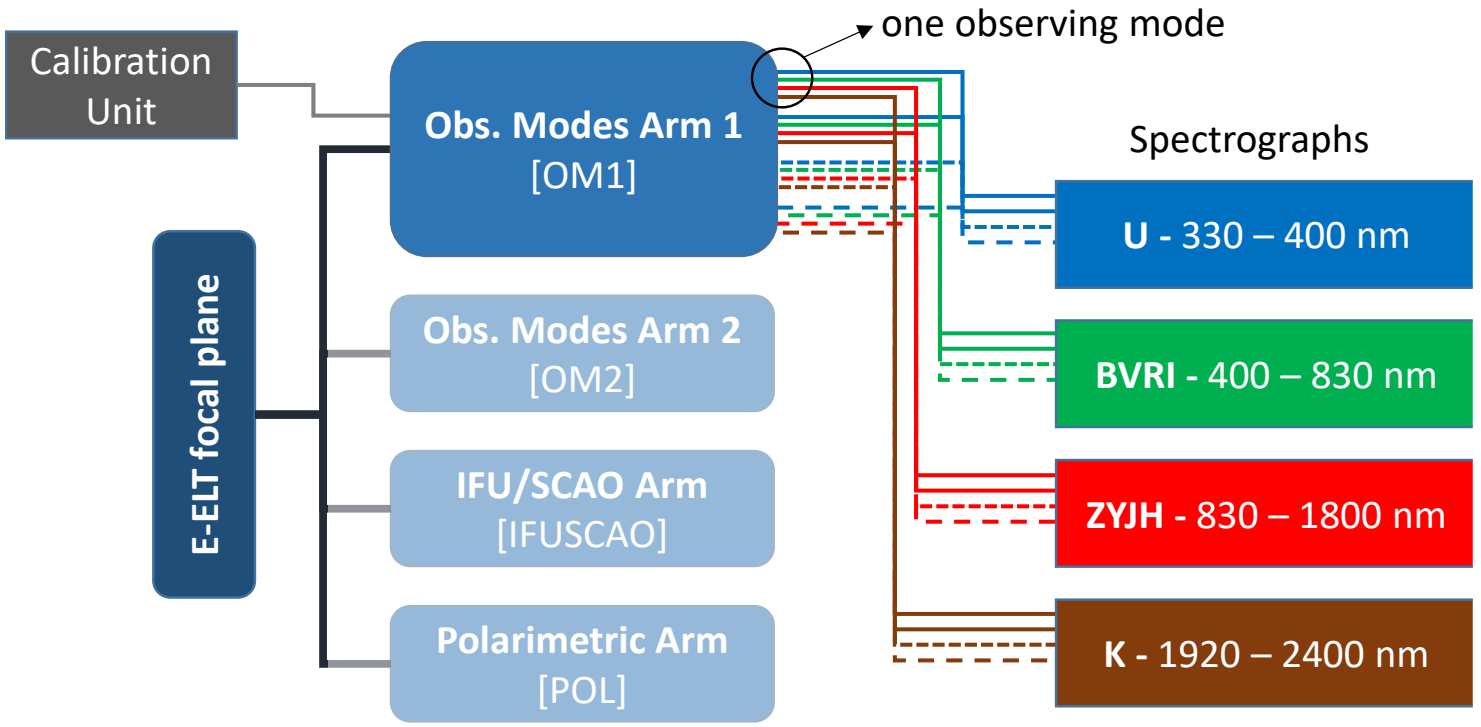
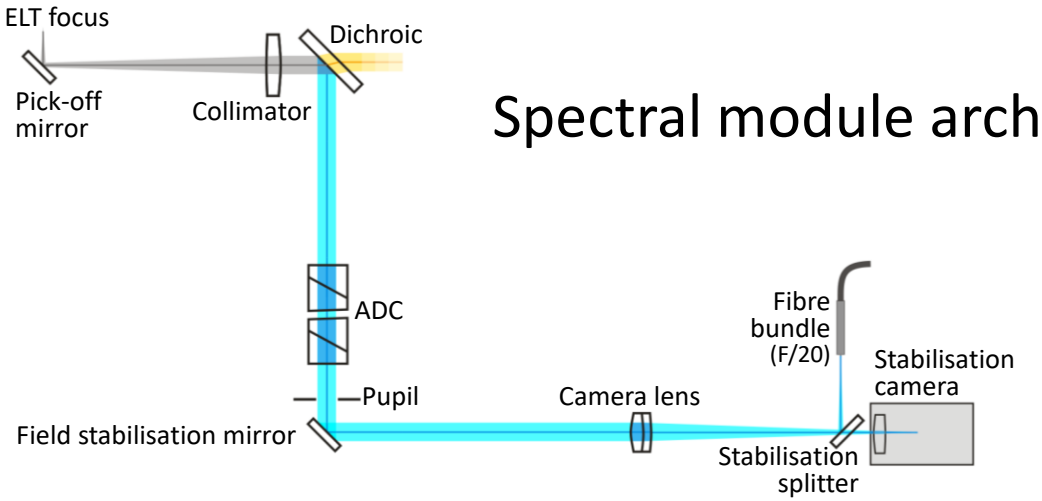


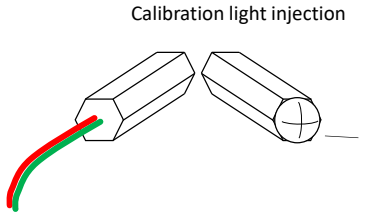
The (Phase A) Front End

Observation (seeing limited) Arms

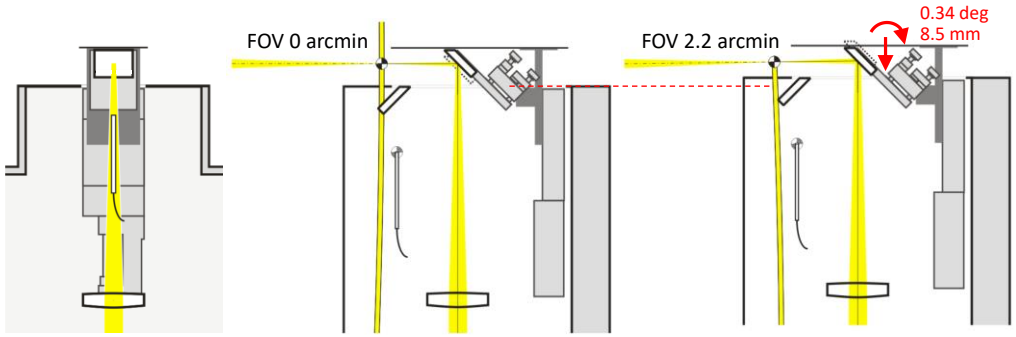


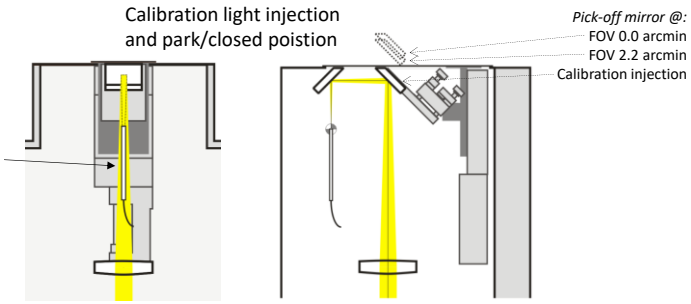
Spectral module architecture

calibration injection



field curvature compensation

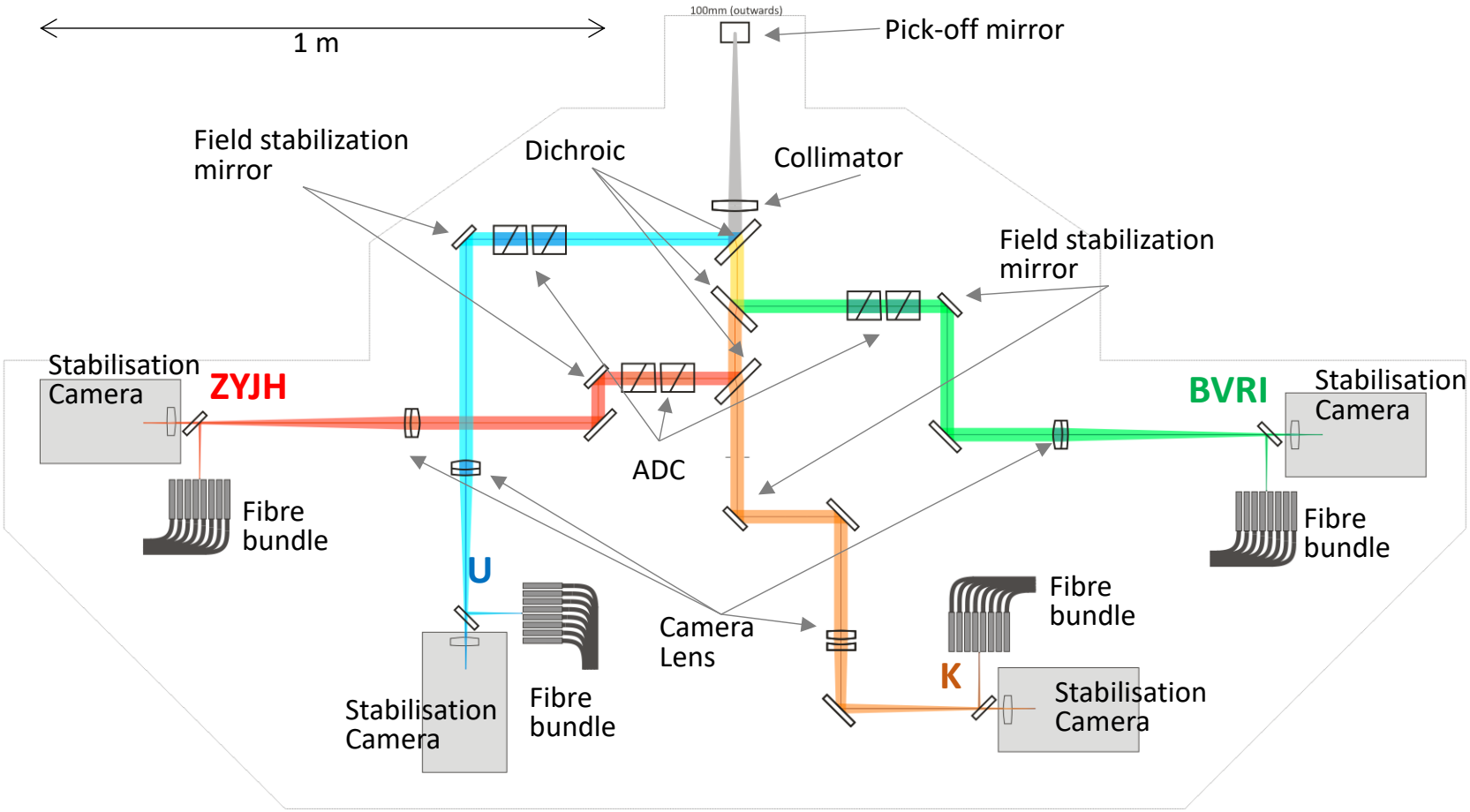




The (Phase A) Front End

Observation (seeing limited) Arms

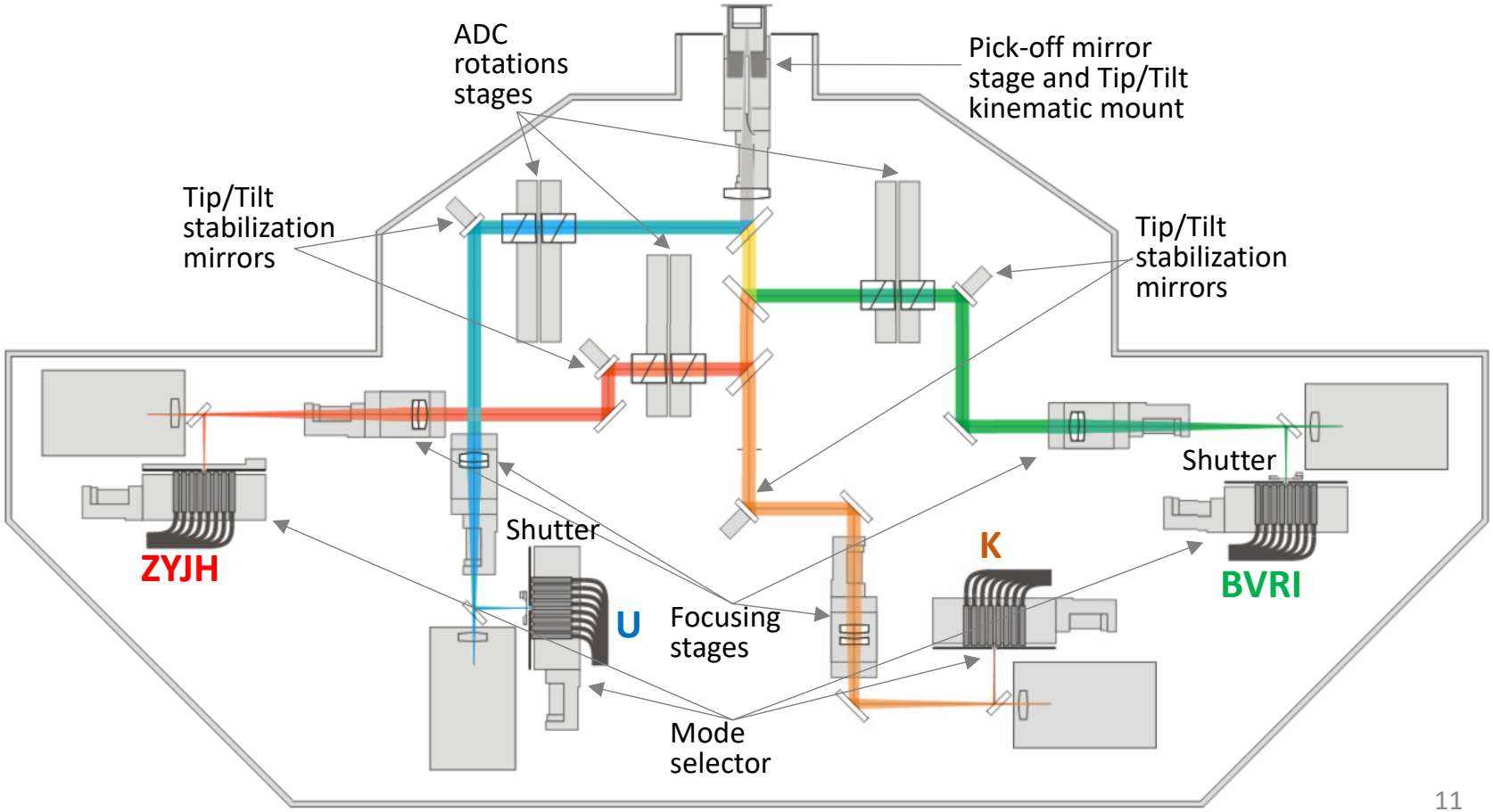
Optical Design



The (Phase A) Front End

Observation (seeing limited) Arms

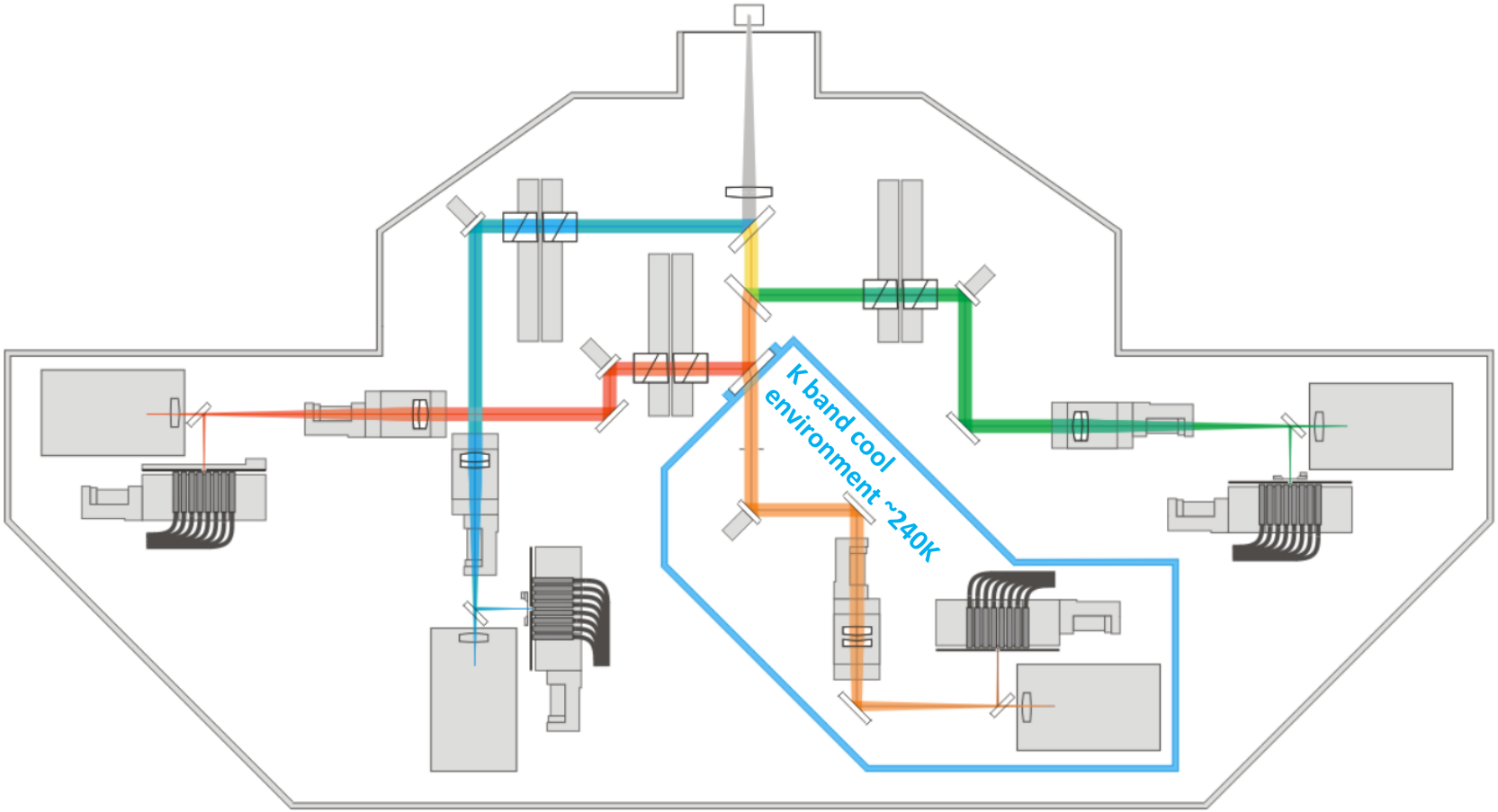
Mechanical Design



The (Phase A) Front End

Observation (seeing limited) Arms

Mechanical Design



The (Phase A) Front End

Mechanisms

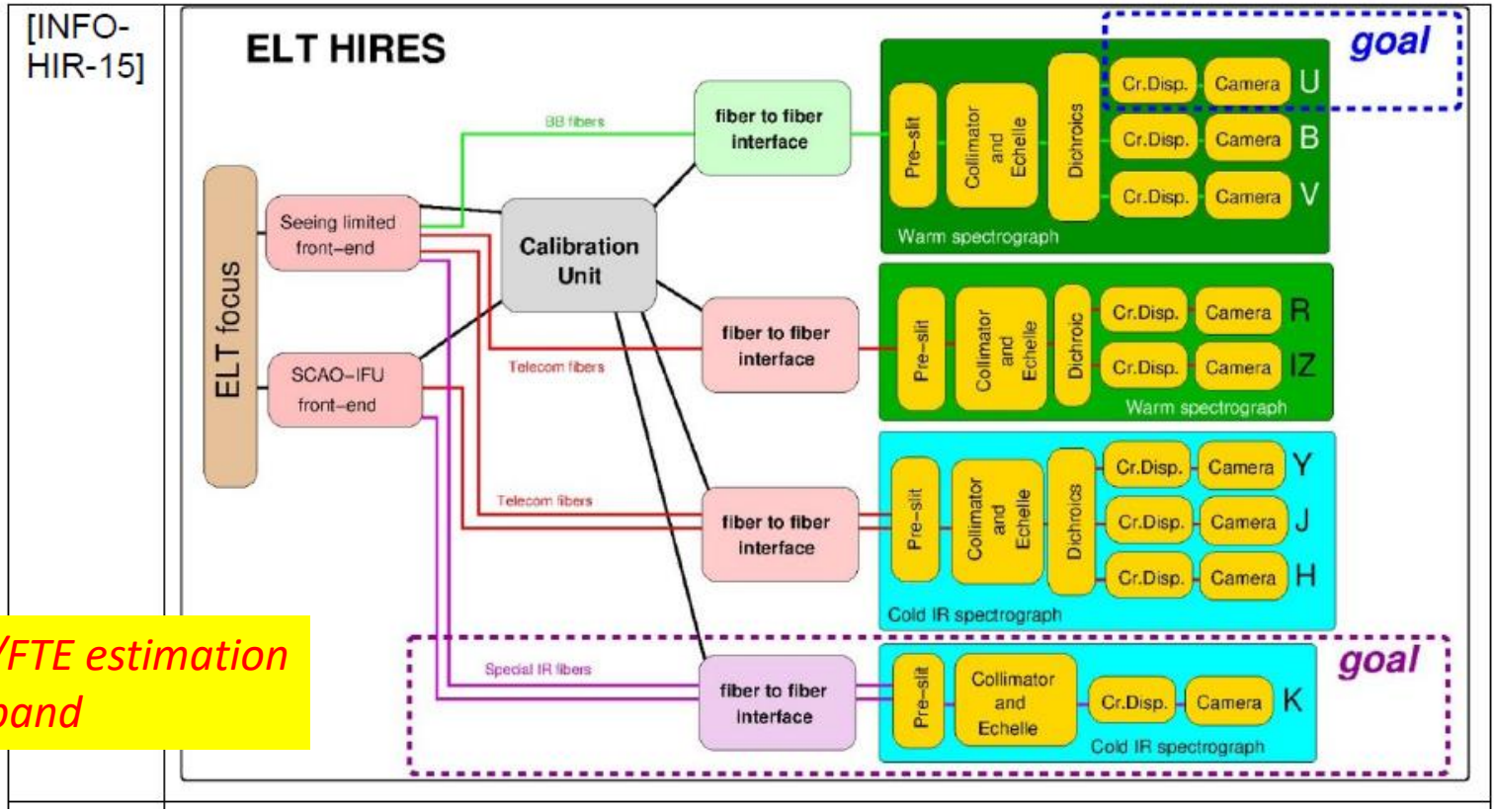
Mechanisms	**2**	**22**		**13**	**8**	**8**	**2**	**4**
HIRES Front End	Kinematic mount (2DoF)	Linear Stage		Rotary stage	Piezo (2DoF)	Technical 2D sensor	TEC	Shutter
Fixed main structure				1				
Main Rotor		4						
2x Observation mode arm								
Field Curvature compensation	2	2						
2x 4 Front End Modules		*Focusing*	*Mode selection*	*ADC*	*Stabilisation Tip/Tilp Mirror*	*Stabilisation camera*	*Cold mirror*	*Shutter*
U band Module		2	2	4	2	2		2
BVRI bands Module		2	2	4	2	2		2
ZYJH bands Module		2	2	4	2	2	2	
K band Module		2	2		2	2		

Front End Required Inputs for Phase B

- **What type of K Band implementation?**

- phase A like ⇨ High cost and complexity
- phase A without components (upgradable) ⇨ Small cost saving same complexity
- Only on SCAO/IFU arm ⇨ Current solution (?)
- On independent ARM (prev. polarimetric) ⇨ Makes it a modular approach

Current FE cost/FTE estimation considers no K band

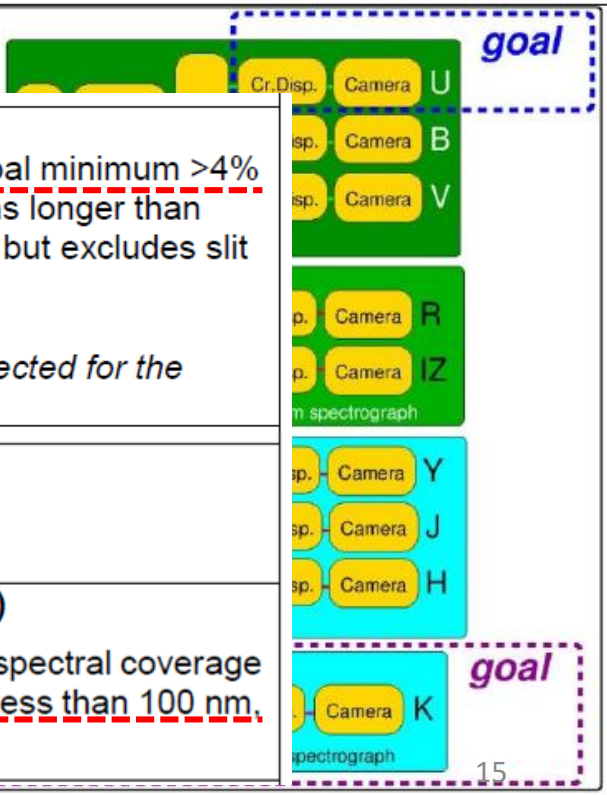


Front End Required Inputs for Phase B

- **What are the different Spectrographs spectral bands?**

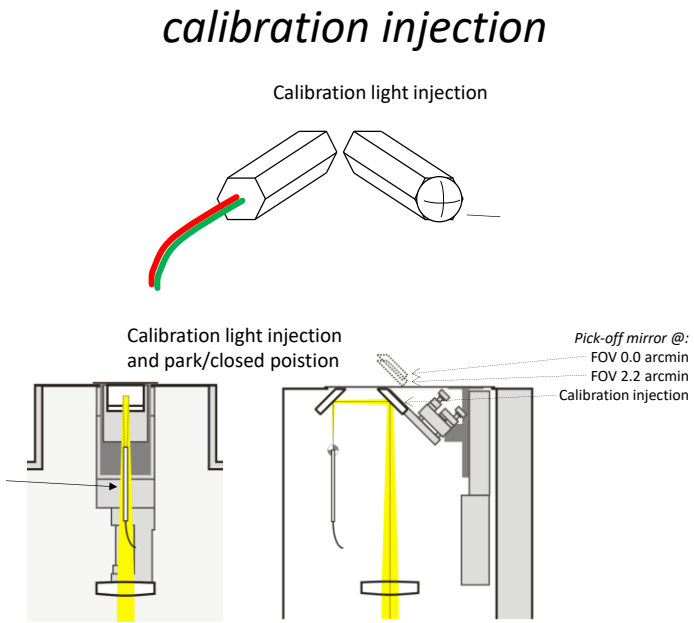
- Dichroics and efficiency at band split
- Possible use on non-science spectral parts for secondary guiding injection

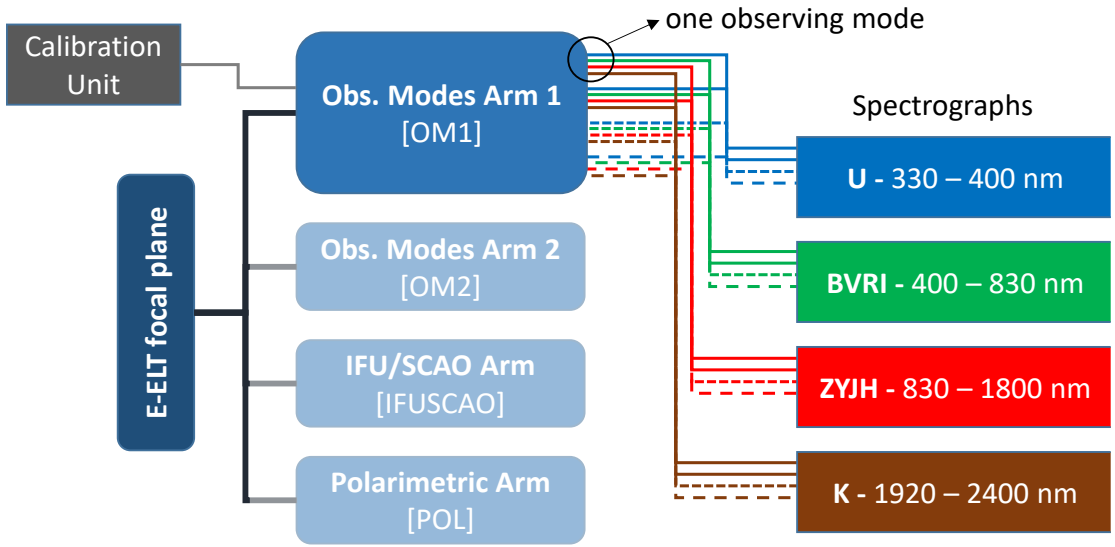
[INFO-HIR-15]	**ELT HIRES**
[R-HIR-34] D/A/-/T	**Transmission (TLR-A.8 & TLR-A.21)** The instrument shall have an average transmission >7% with a global minimum >4% (goal: >5%) at wavelengths longer than 400nm (goal: at wavelengths longer than 350nm). The transmission includes the detector quantum efficiency but excludes slit losses due to seeing. *Note: For PAC, the transmission measurement on sky shall be corrected for the calculated seeing-related slit losses.*
	5.2.1 Seeing-limited mode requirements
[R-HIR-40] D/A/-/T	**Spectral Wavelength Coverage (TLR-A.3, TLR-A.11 & TLR-A.19)** The instrument in seeing-limited mode shall provide a simultaneous spectral coverage from 400 nm to 1800 nm (goal: 350 nm to 2400 nm). Only one gap, less than 100 nm, centered between 1360 nm and 1410 nm shall be tolerated.



Front End Required Inputs for Phase B

- **What is the expected F/# for the Front-End / Fiber-Link interface?**
- **What are number/type of observing modes in each seeing limited arm?**
- **Shall we maintain the Phase A interface concept with the Calib. Unit?**





Front End Required Inputs for Phase B

- **Are the Patrol field and min separation goals fundamental for the science?**

- Patrol field goal of 5 arcmin impacts considerably the size of the FE
- Minimum separation below 15 arcsec are hard to implement due arms collision avoidance

	5.1.1 Requirements for the focal plane
[R-HIR-28] D/A/-/T	**Patrol field** The Instrument Field-of-View (area on sky) in seeing-limited mode shall allow picking-up two targets with a separation of up to 2 arcmin (goal: 5 arcmin) and recording their spectra simultaneously.
[R-HIR-29] D/A/-/T	**Minimum separation** The minimum separation between two objects, which can be fed into the two fiber channels, shall be 15 arcsec (goal: 10 arcsec)
[R-HIR-30] D/A/-/T	**Secondary guiding** HIRES shall stabilize the de-rotation and centering. The instrument shall allow tracking the object(s) with the pick-off arm(s). The tracking error shall be lower than 50mas rms in the seeing limited mode and lower than 2mas rms in the IFU mode over a timescale of 1hour.

Front End Required Inputs for Phase B

- **What is the altitude range for the instrument required by the science? Do we need to go as low as 20 deg?**

- The +20 deg altitude can have a considerable impact on the Amospheric Dispersion Correction

3.2 Telescope Kinematics

3.2.1 Range of Motion

[I-INS/ELT-67] / / /

During science observation the telescope shall allow for the following motion range:

- Azimuth: -270 to +270deg from the geographical East (or -180 to +360deg from South)
- Altitude: +20 to +88.5deg from the horizon (1.5deg radius blind spot at zenith)

[I-INS/ELT-68] / / /

Outside science observation, the telescope shall allow for the following motion range:

- Azimuth: -270 to +270deg from the geographical East (or -180 to +360deg from South).
- Altitude: 0 to +90deg from the horizon

(formerly known as) **HIRES**

Welcome and Introductory meeting

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Questions?

The Front End

Alexandre Cabral *Et al.*