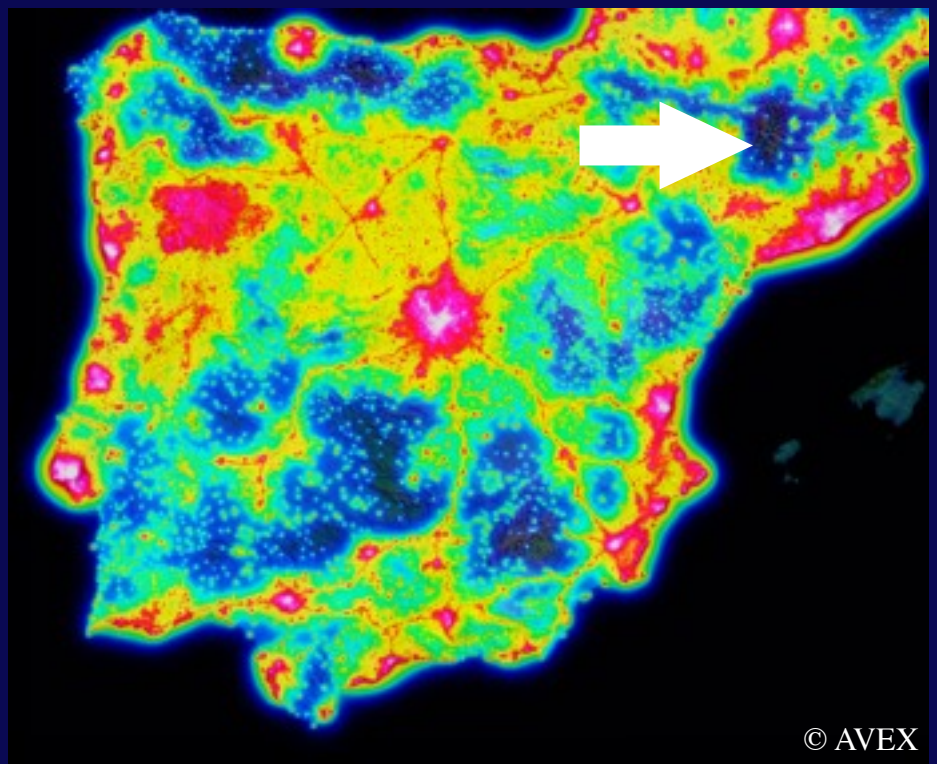
The spectrograph ARES at the Montsec Observatory

J. Colomé, P. Gil, I. Ribas, J. Sanz, F. Vilardell

The Observatori Astronòmic del Montsec (OAdM)

- Main astronomical observatory in Catalunya
- Western part of Catalunya (1570 m):
  - ✓ Dark skies
  - ✓ Good weather (similar to Calar Alto)
  - ✓ Good seeing (median ~1 arcsec)
- **Observatory operations:** IEEC
- Six facilities of six institutions operating
  - ✓ **SMC:** XEMA weather station
  - ✓ **ICTJA-CSIC:** XVPCA air pollution network
  - ✓ **ICE-CSIC:** Allsky camera for meteors detection
  - ✓ **STScI:** XO exoplanet search network
  - ✓ **RACAB & ROA:** TFRM 0.5m Baker-Nunn camera
  - ✓ **Generalitat de Catalunya:** TJO 0.8m Ritchey-Crétien telescope



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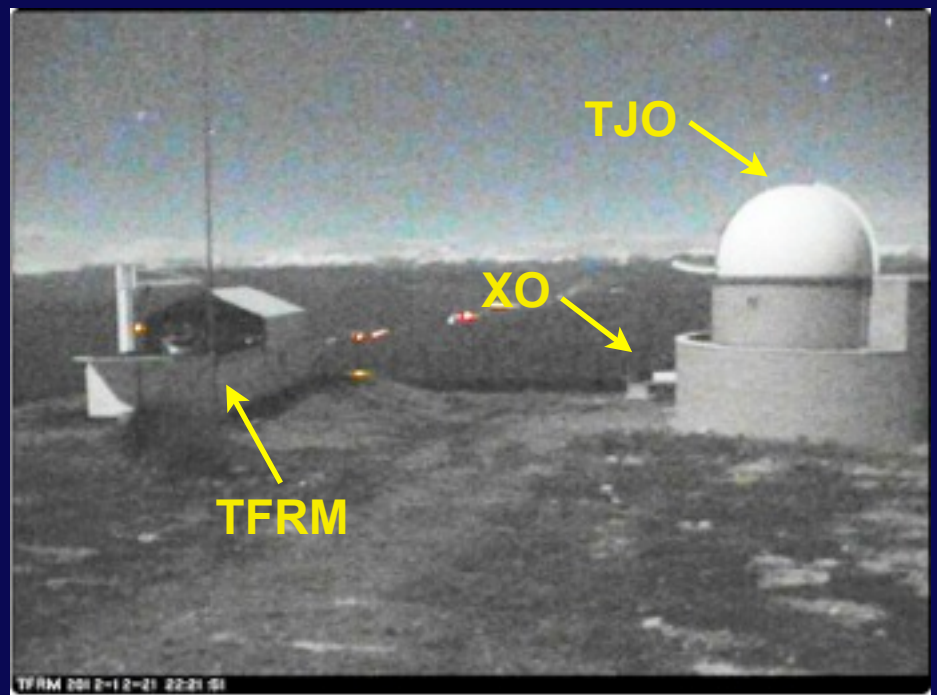
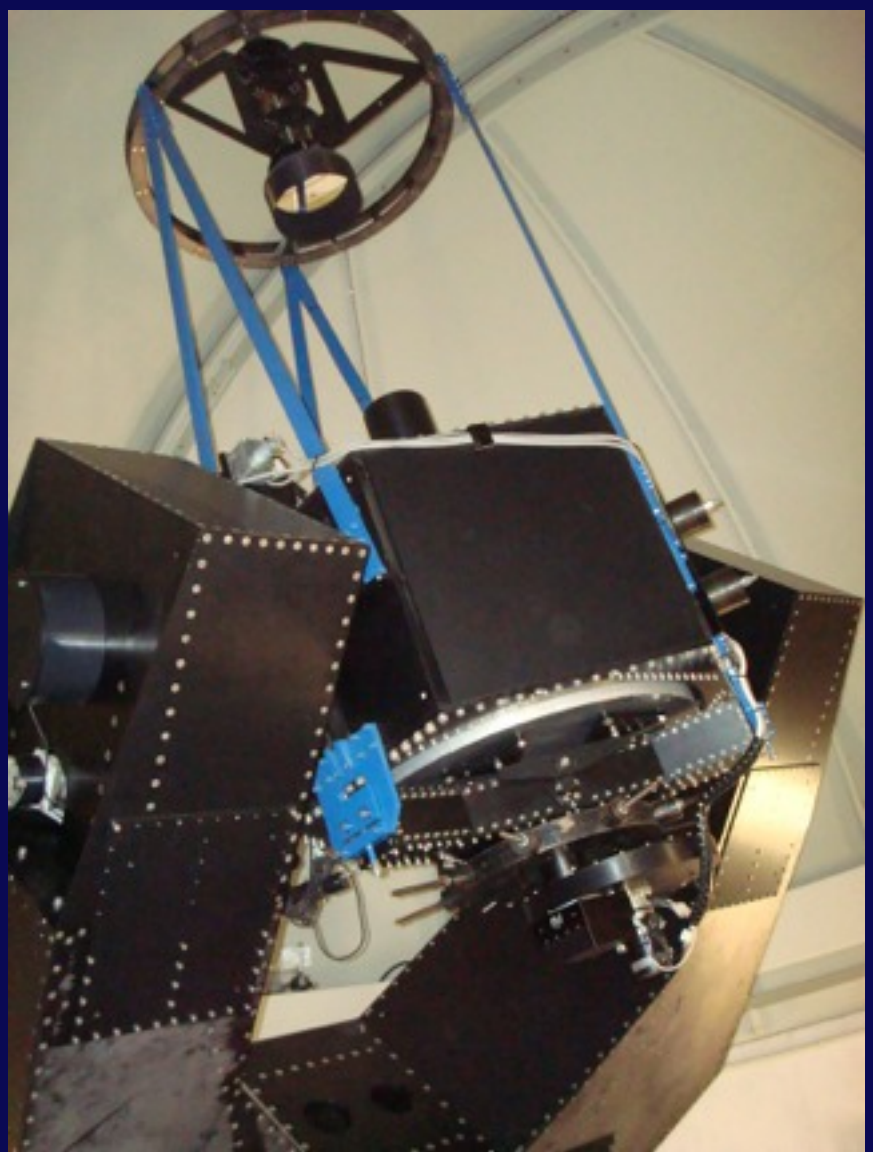


The Telescopi Joan Oró (TJO)

- **The largest telescope in Catalunya:**
  - ✓ Primary mirror: 0.8 m
  - ✓ Ritchey-Chrétien optical configuration (f/9.6)
- **MEIA:**
  - ✓ Imaging camera: 12.3x12.3 arcmin FoV
  - ✓ Five Johnson-Cousins filters: U, B, V, R_C, I_C
  - ✓ Magnitude limit (S/N~100 in 5 minutes): V<17 mag
- **OpenROCS:** Robotic supervised operations (fully robotic during 2013)
- **Scientific & technical exploitation:** IEEC
- Open to institutions **all around the world**



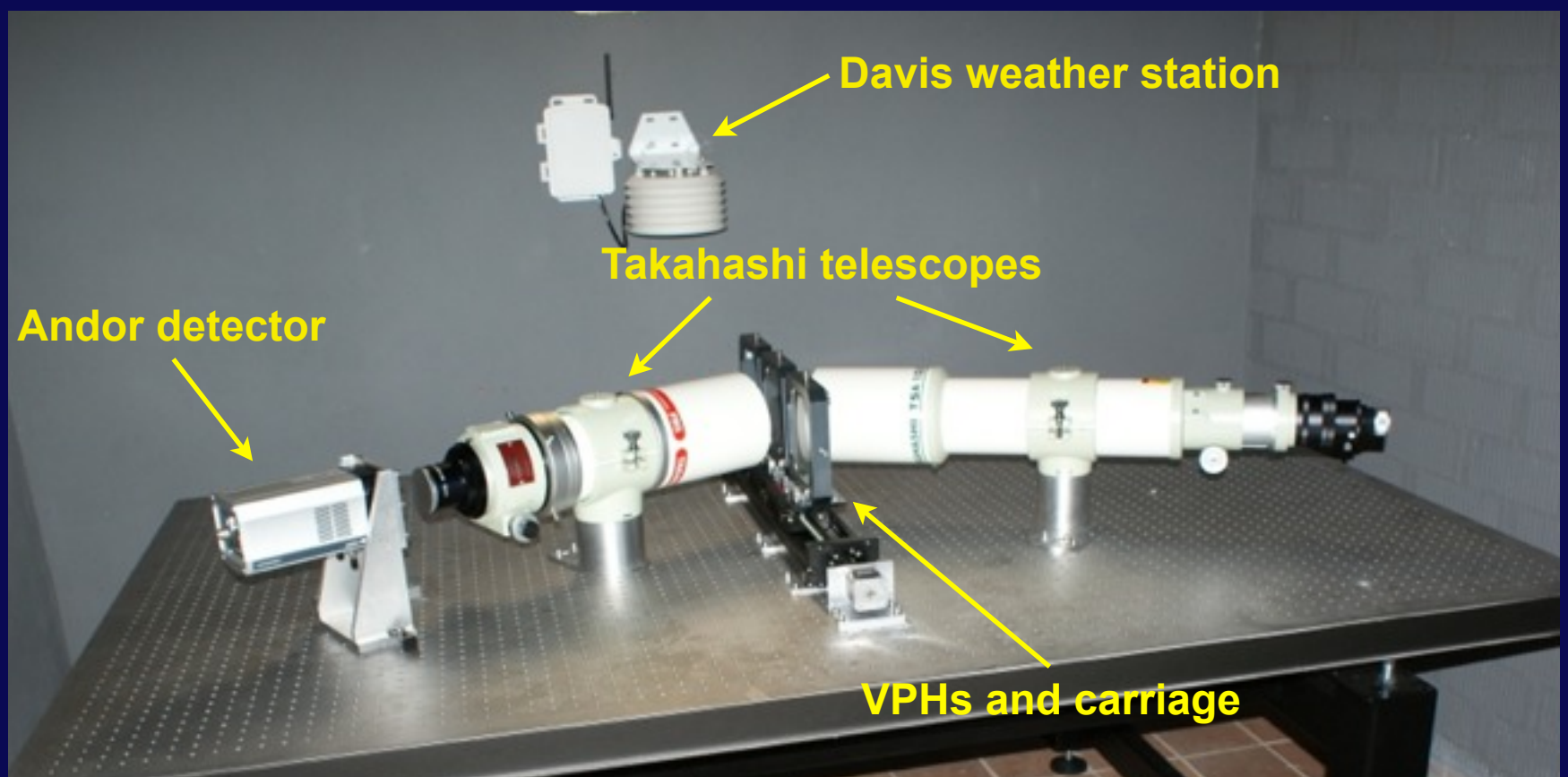
ARES conceptual design

- Optical spectrograph
- **Spectral resolution:** R=12.000
- **Overall throughput:** >10%
- **Magnitude limit at the TJO:** V<11 mag (up to 1 million stars)
- Non-dedicated instrument (compatible with MEIA)
- **Design & integration:** Fractal, S.L.N.E.
- Fiber fed + VPH dispersers ➡ Spectrograph + fiber + fiber link

ARES spectrograph

- Specific room at the TJO building
- Two commercial (Takahashi) telescopes
- Littrow configuration
- Andor detector

- Up to three spectral windows (VPHs):
  - ✓ Blue: 439 - 469 nm ➡ postponed
  - ✓ Green: 495 - 529 nm ➡ MgI triplet
  - ✓ Red: 634 - 678 nm ➡ Hα line



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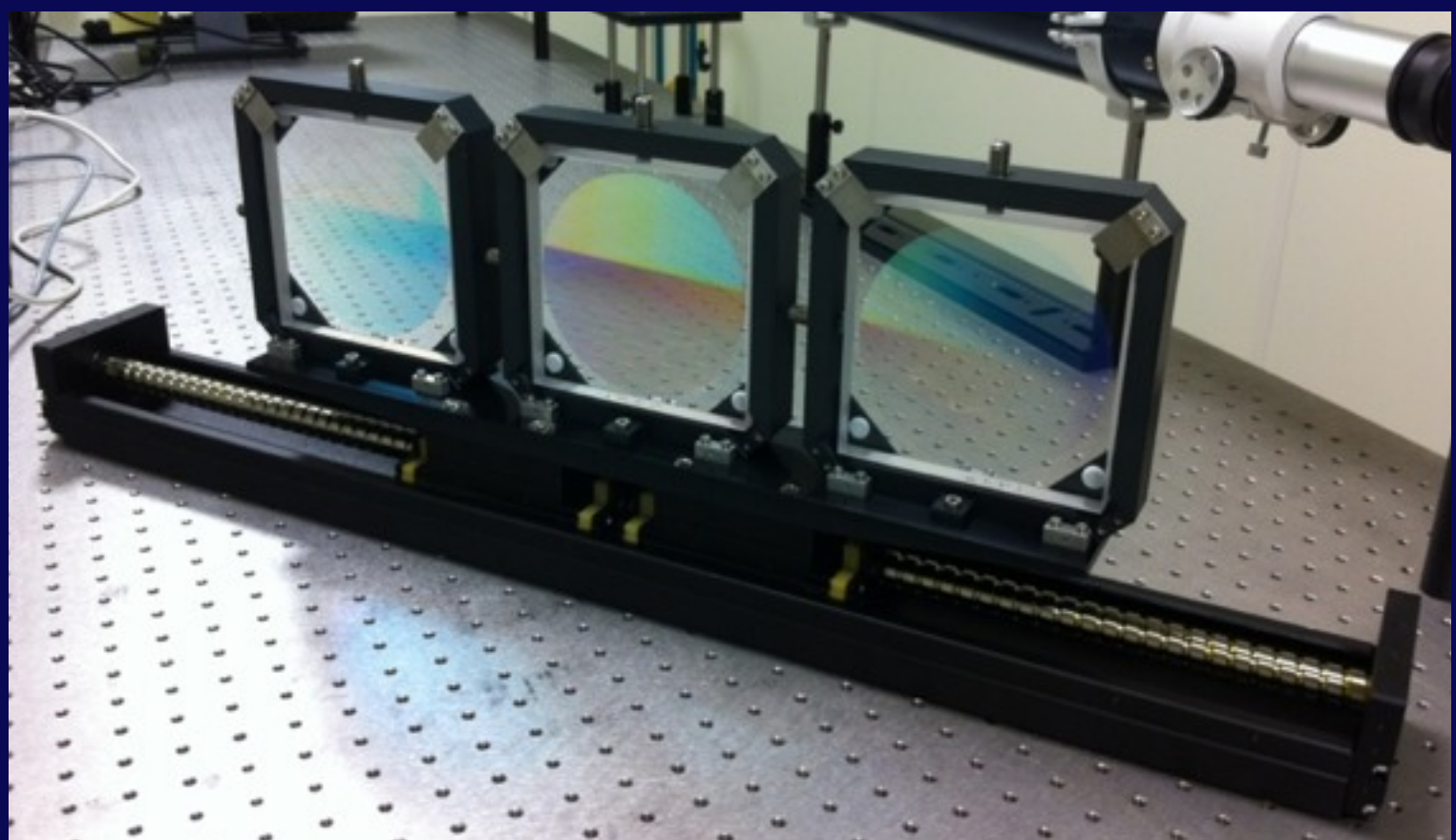

ARES expected results

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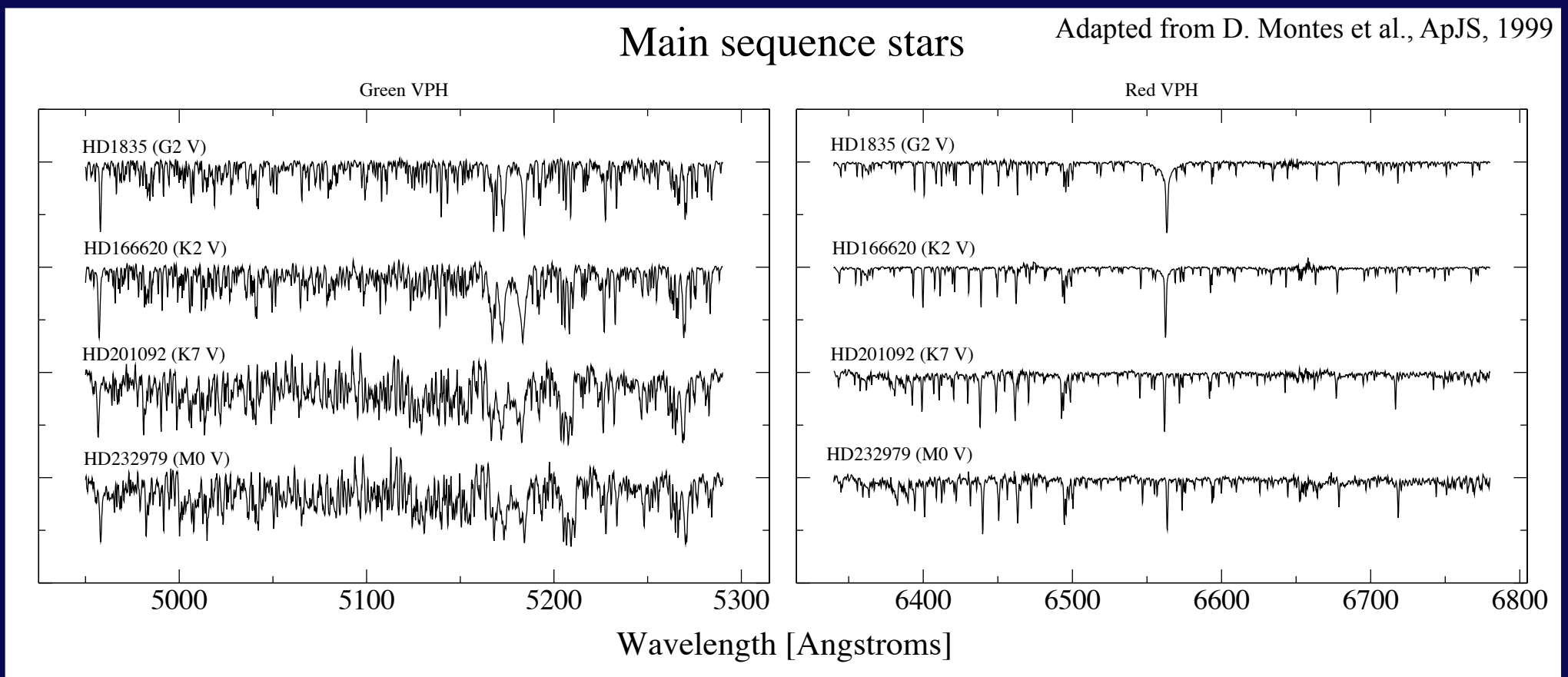

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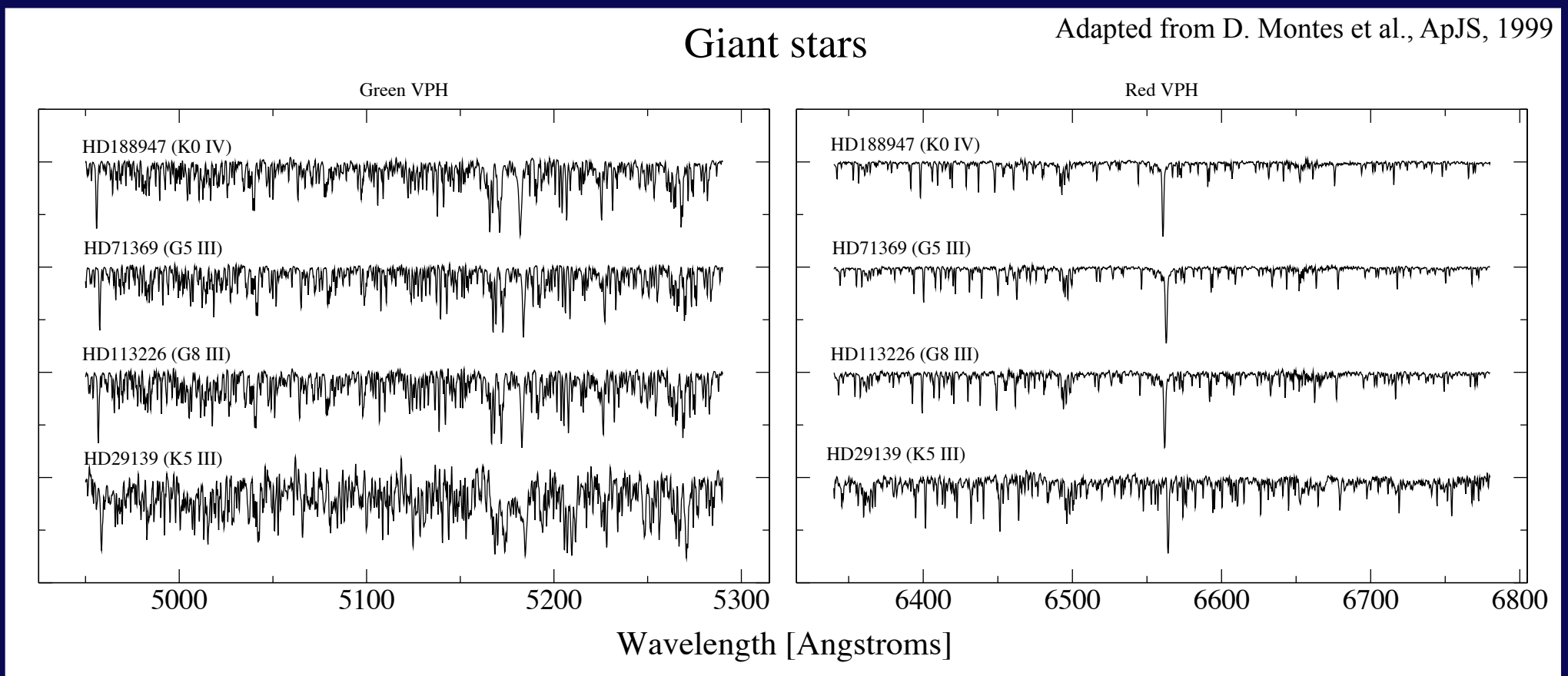

ARES spectrograph verification

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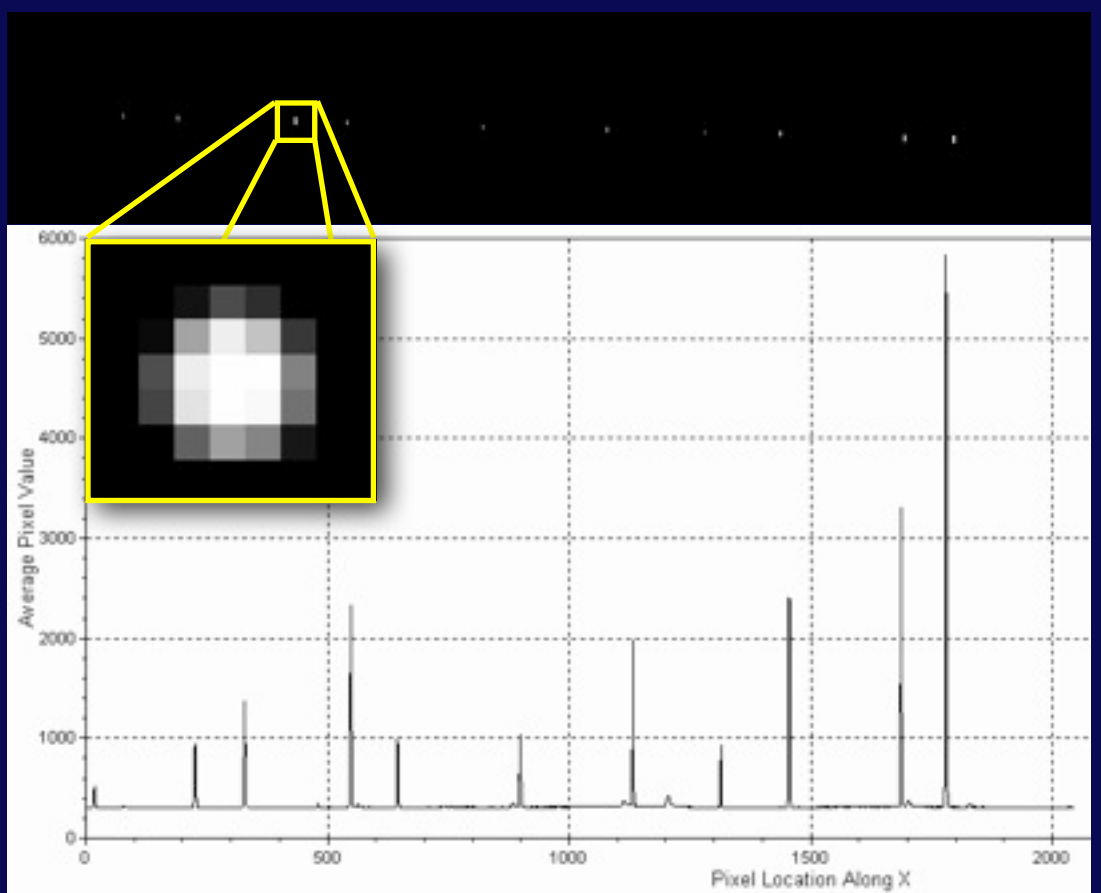
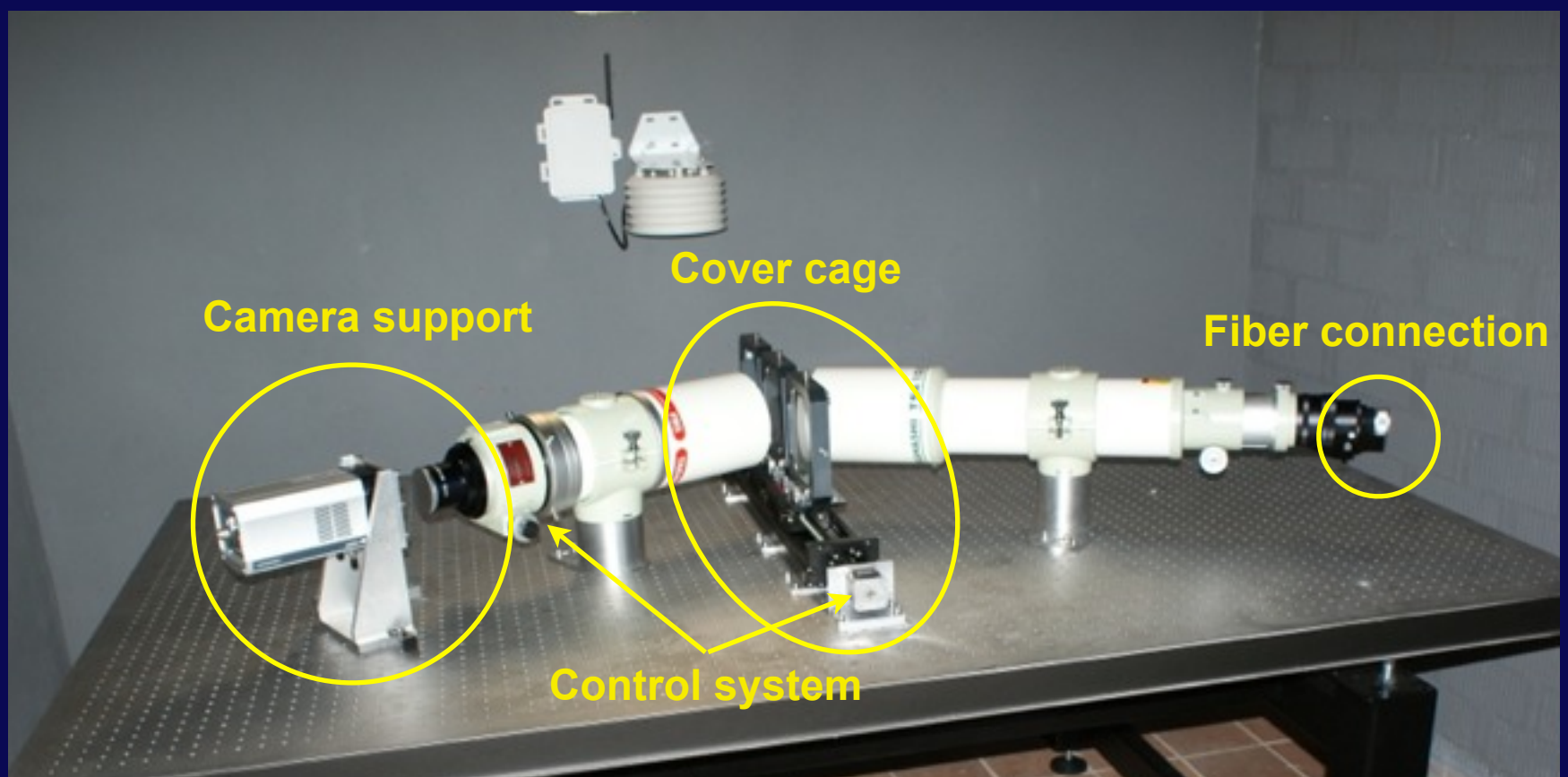
x3.5



ARES spectrograph pending works

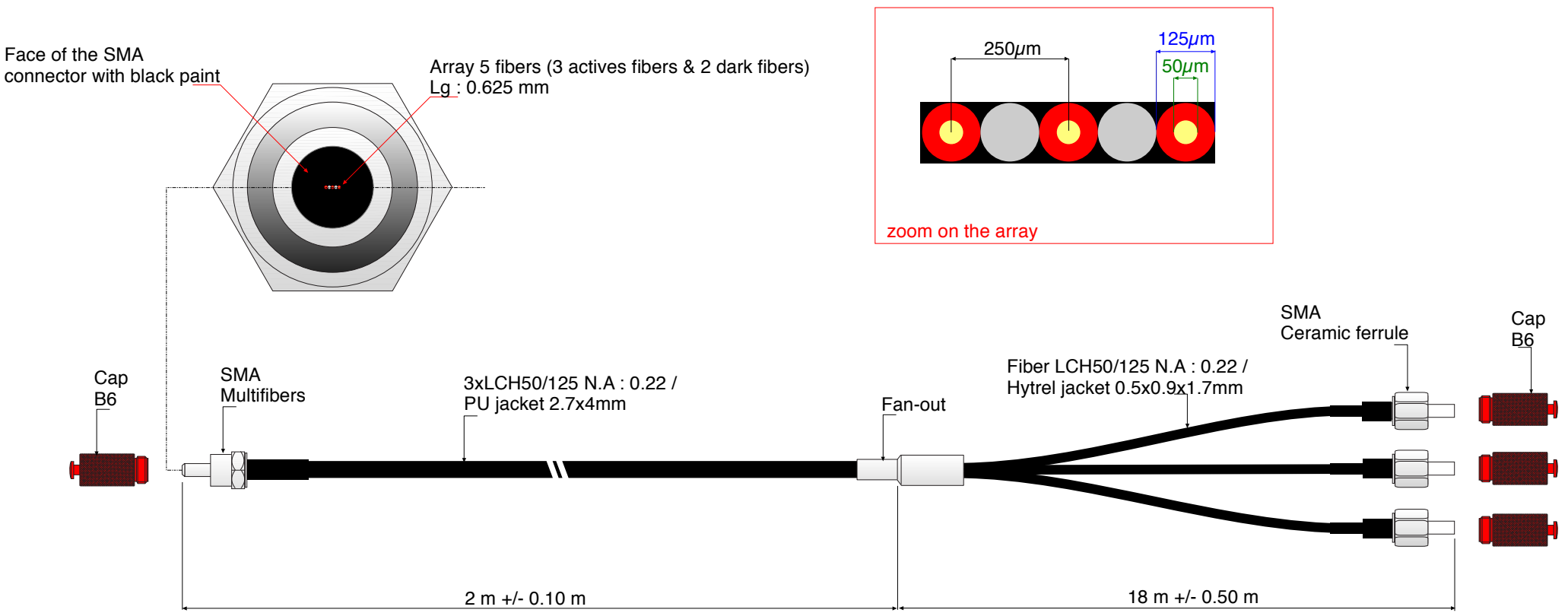
- Camera support
- Cover cage
- Fiber connection

- Control system:
  - ✓Integrated into OpenROCS
  - ✓VPH motor controller
  - ✓Focus
  - ✓Calibration lamp



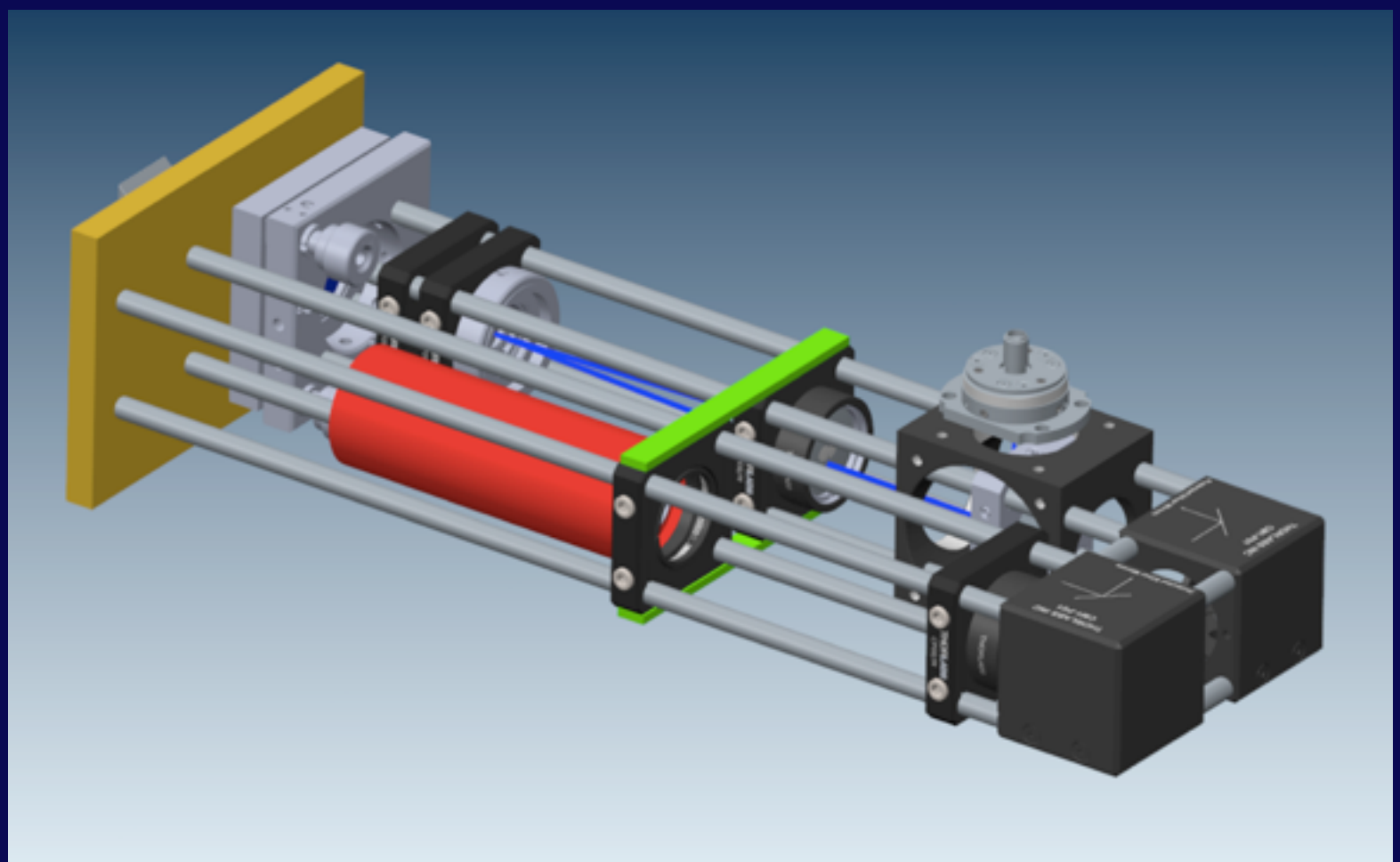
ARES fiber

- **Blundle of three fibers**
  - ✓ **Object**
  - ✓ **Sky**
  - ✓ **ThAr calibration lamp**
- **Connects ARES with the TJO**
- **Total length: 20 m**
- **Already delivered by SEDI**



ARES fiber-link design

- Pick-off mirror
- Focal reducer f/9.6 ➡ f/7.6
- SBIG slit viewing camera
- Two fiber ports
  - ✓Object
  - ✓Sky



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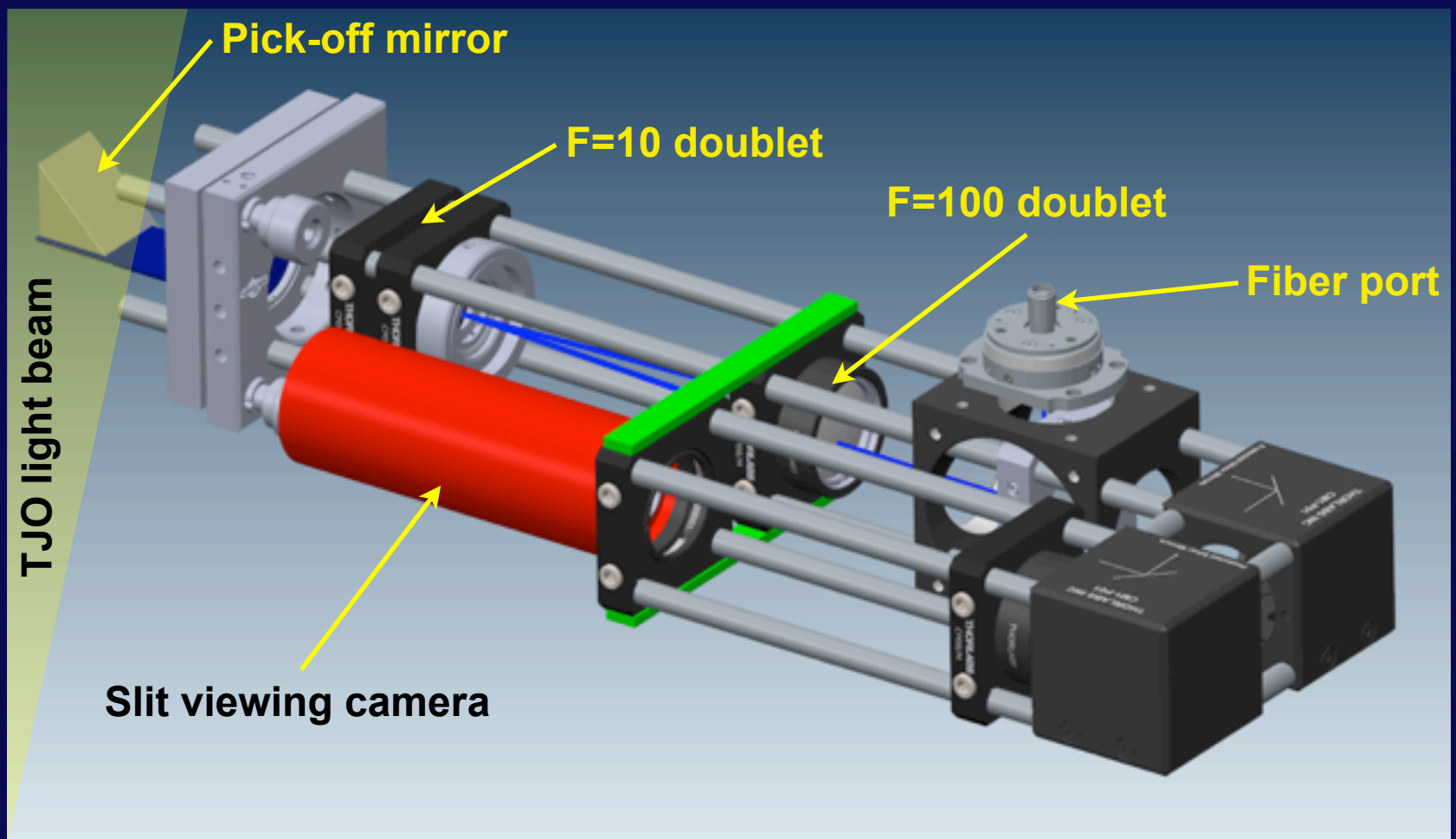

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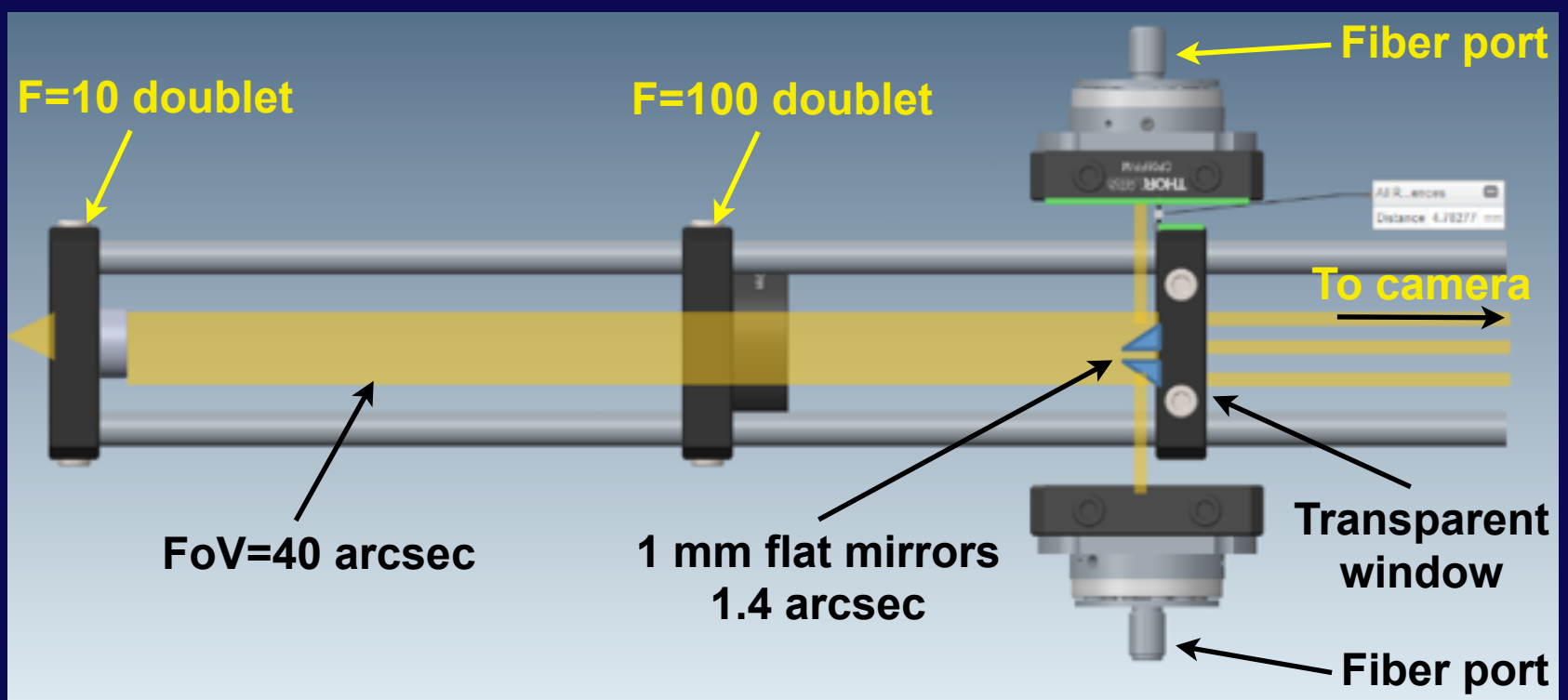
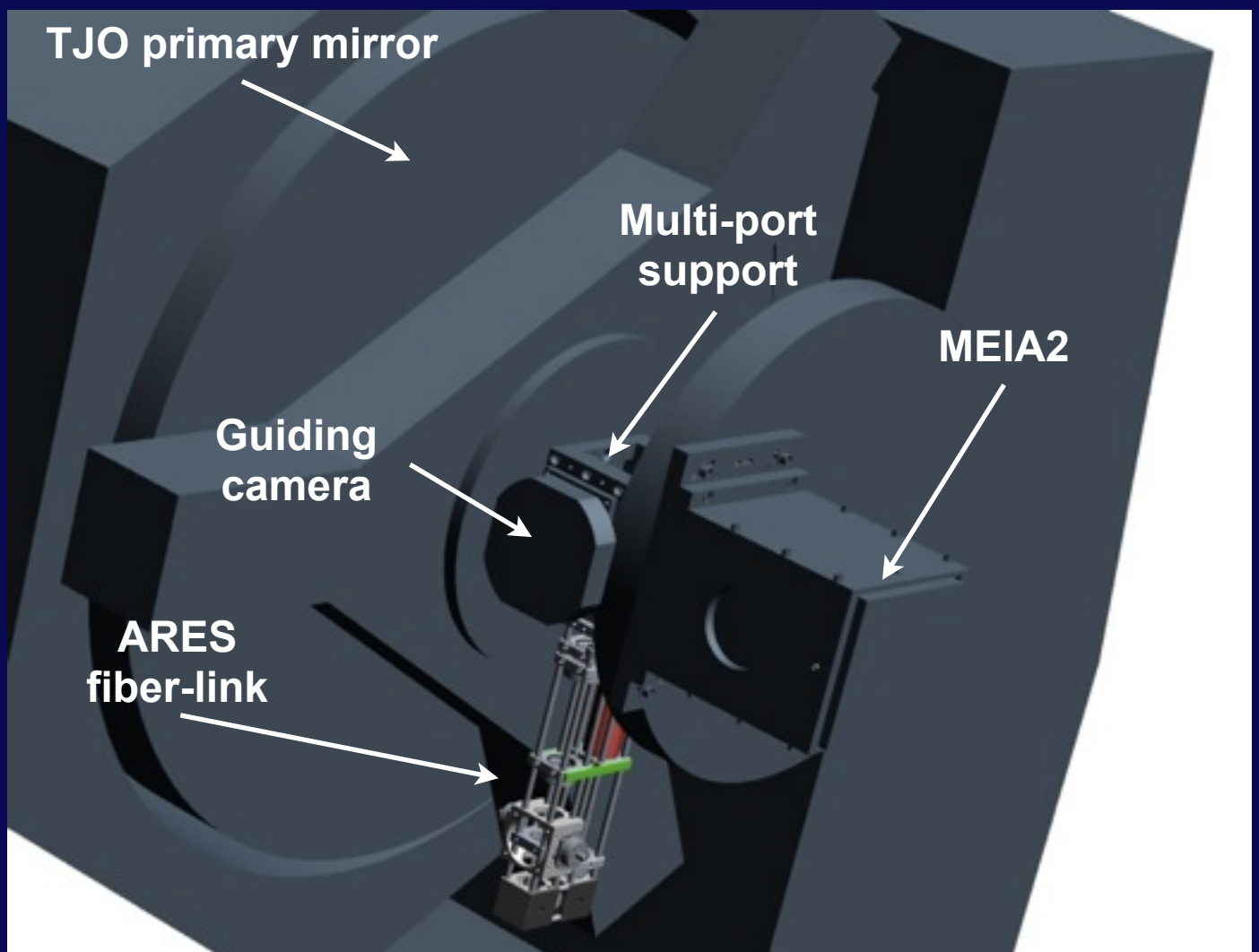


TJO back-focus modification

- New back-focus support
- ARES fiber-link
- New imaging camera (MEIA2)
- New guiding camera for MEIA2



Thank you for you attention