

# MARVEL: Spectrograph Optical Design and Facility Status Update

J. Pember, C. Schwab, G. Raskin & the MARVEL Consortium

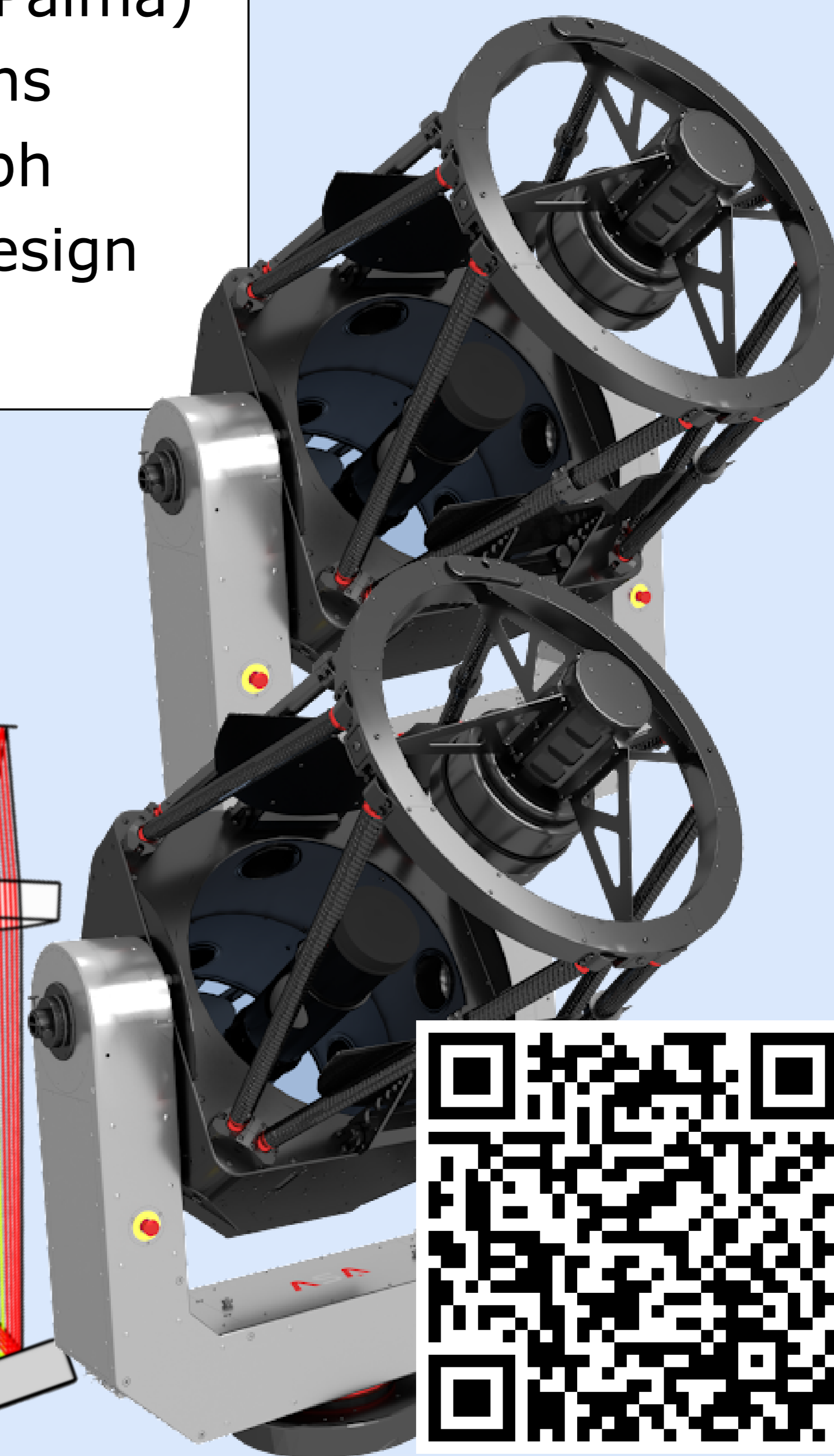
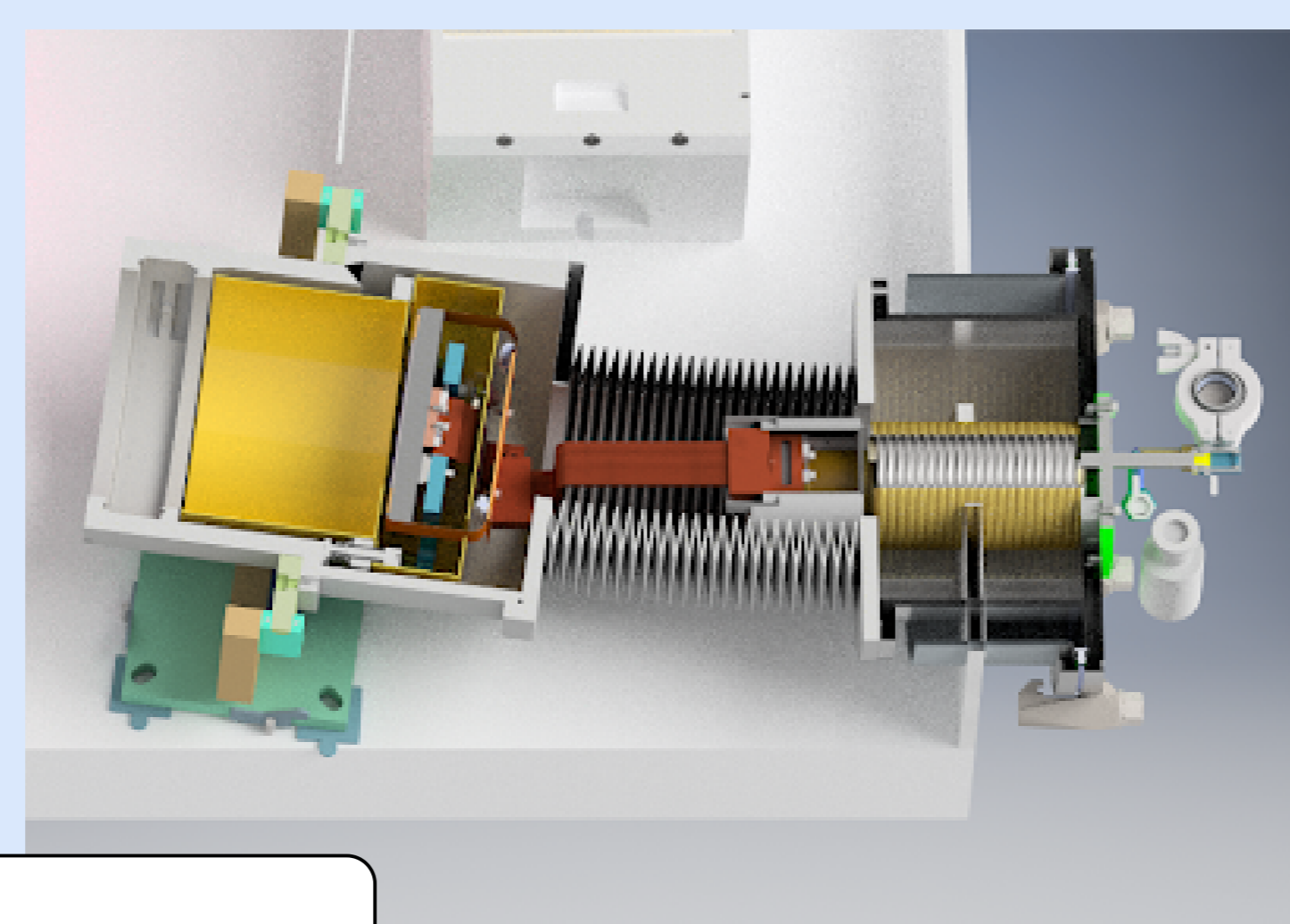
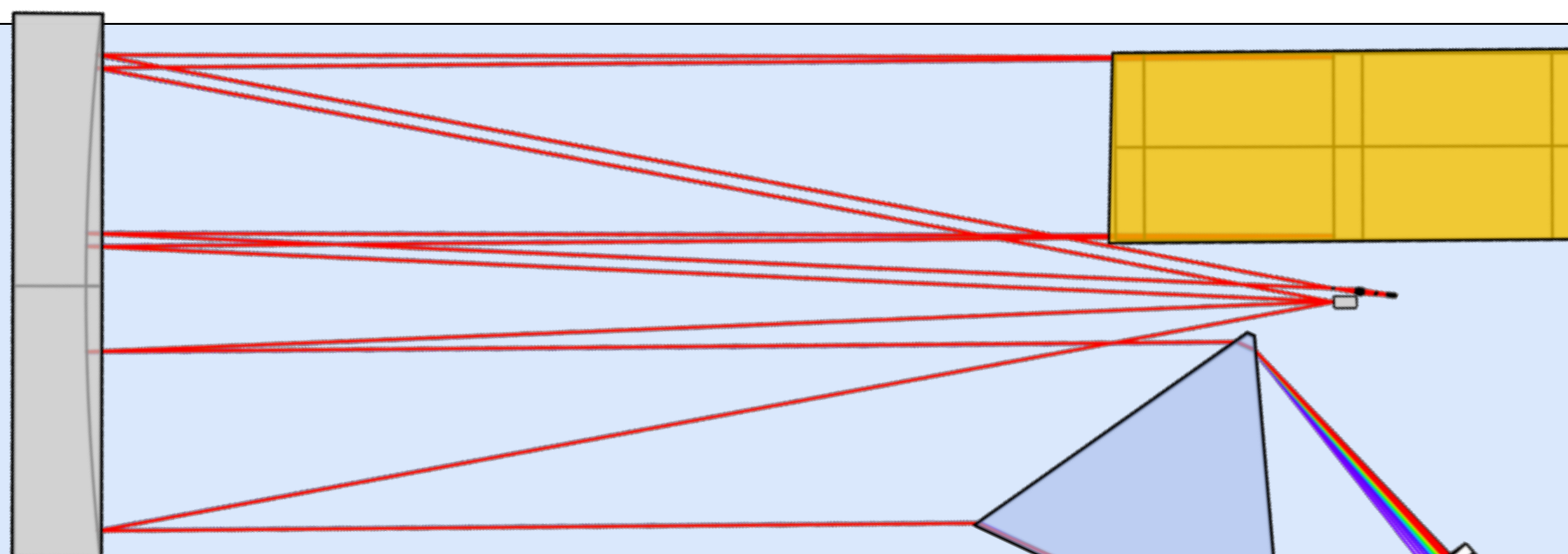
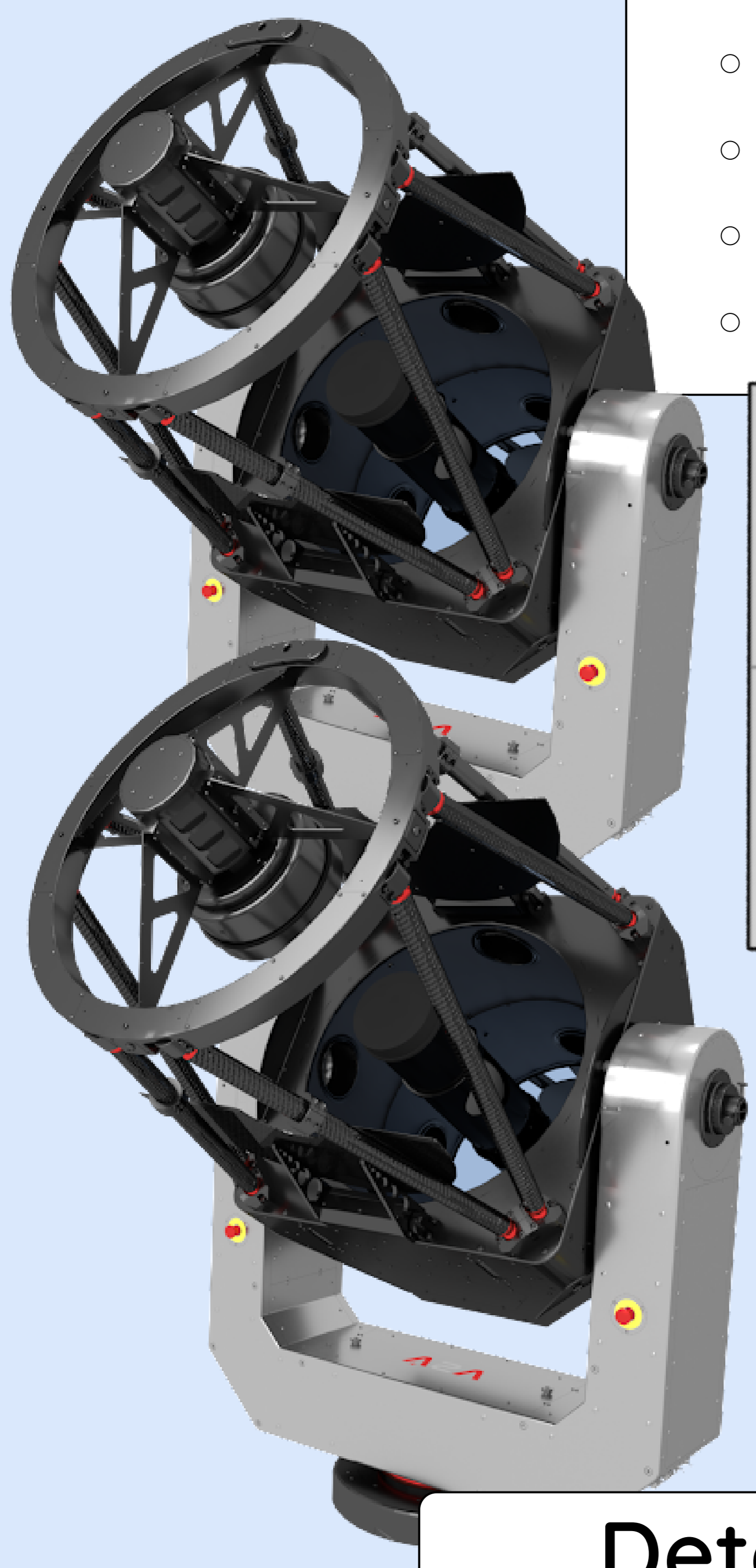


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## MARVEL

- New radial velocity facility at the Mercator Observatory (La Palma)
- Target vetting & follow-up for TESS, PLATO, & ARIEL missions
- 4×0.8 metre telescopes feeding a single echelle spectrograph
- Spectrograph optimised for high throughput, simplicity of design
- First light target: end 2024



## Detector

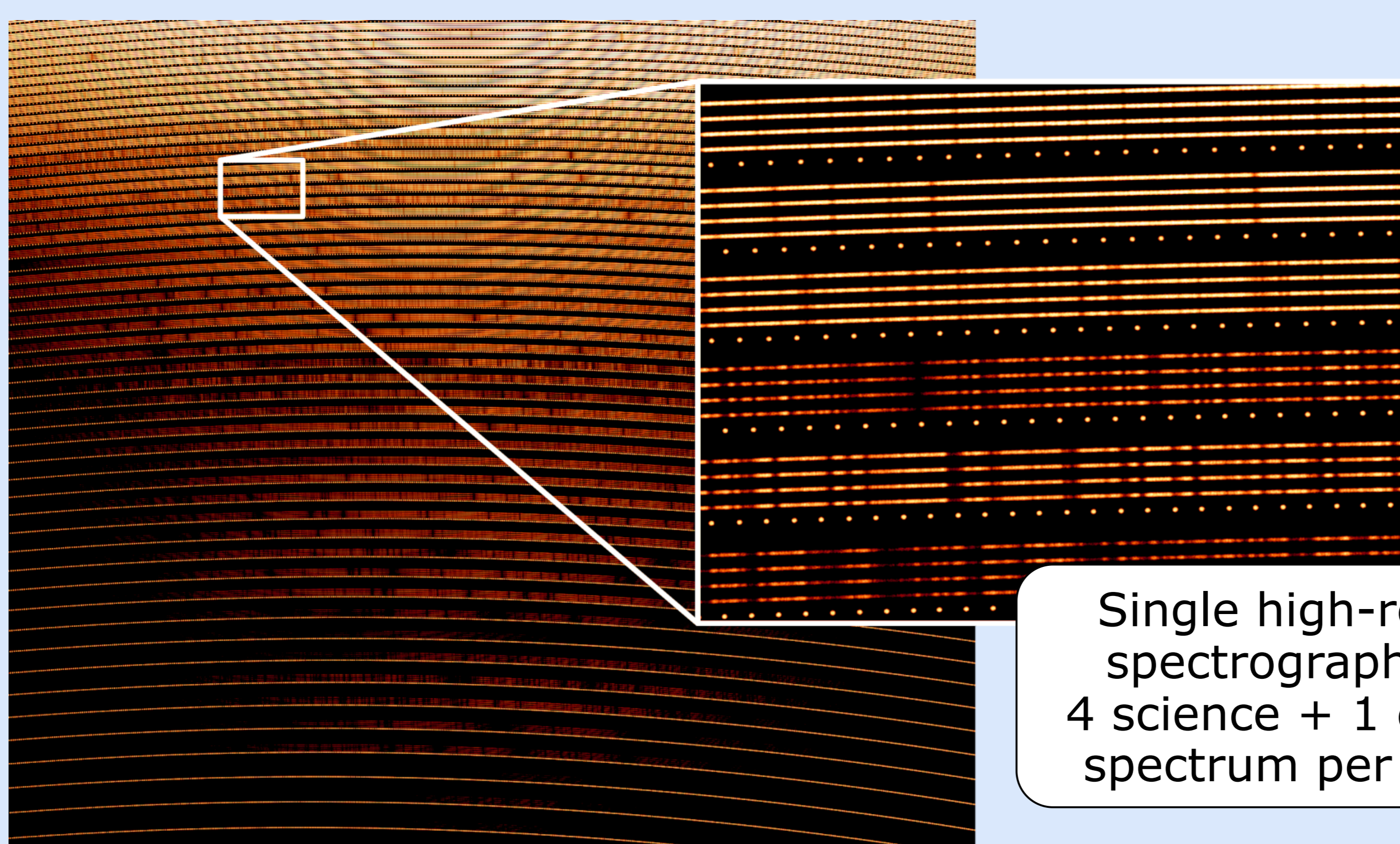
A. Glasse, J. Harman, S. Kovacs, R. Sharman, C. Waring +

- STA1600 CCD, 10k × 10k 9um pixels
- Complete assembly to be delivered by UK-ATC
- Last lens acts as cryostat window

## Spectrograph Optics

J. Pember, C. Schwab, G. Raskin

- Single-arm symmetric white-pupil relay design
- Beam diameter: 160mm
- Collimator: f/2.25 paraboloid (ASA) used in triple-pass
- Echelle: R2.7, 52.67 g/mm (Richardson)
- Cross-disperser: Single F2 prism (Schott, Docter, NOVA)
- All-spherical injection & camera lens system, just 9 air/glass interfaces total
- Wavelength coverage: 380–950nm
- Resolution R=90,000, additional R=135,000 mode planned, pending fibre characterisation



Single high-resolution spectrograph records 4 science + 1 calibration spectrum per exposure

## Wavelength Calibration

C. Schwab, J. Stürmer, J. Pember, Y. V. Gurevich, D. Coutts, T. Führer, A. Seifahrt +

- Fabry-Pérot etalon system provides a comb of evenly-spaced reference peaks across the full wavelength range
- Etalon is tracked against hyperfine transitions of Rubidium-87

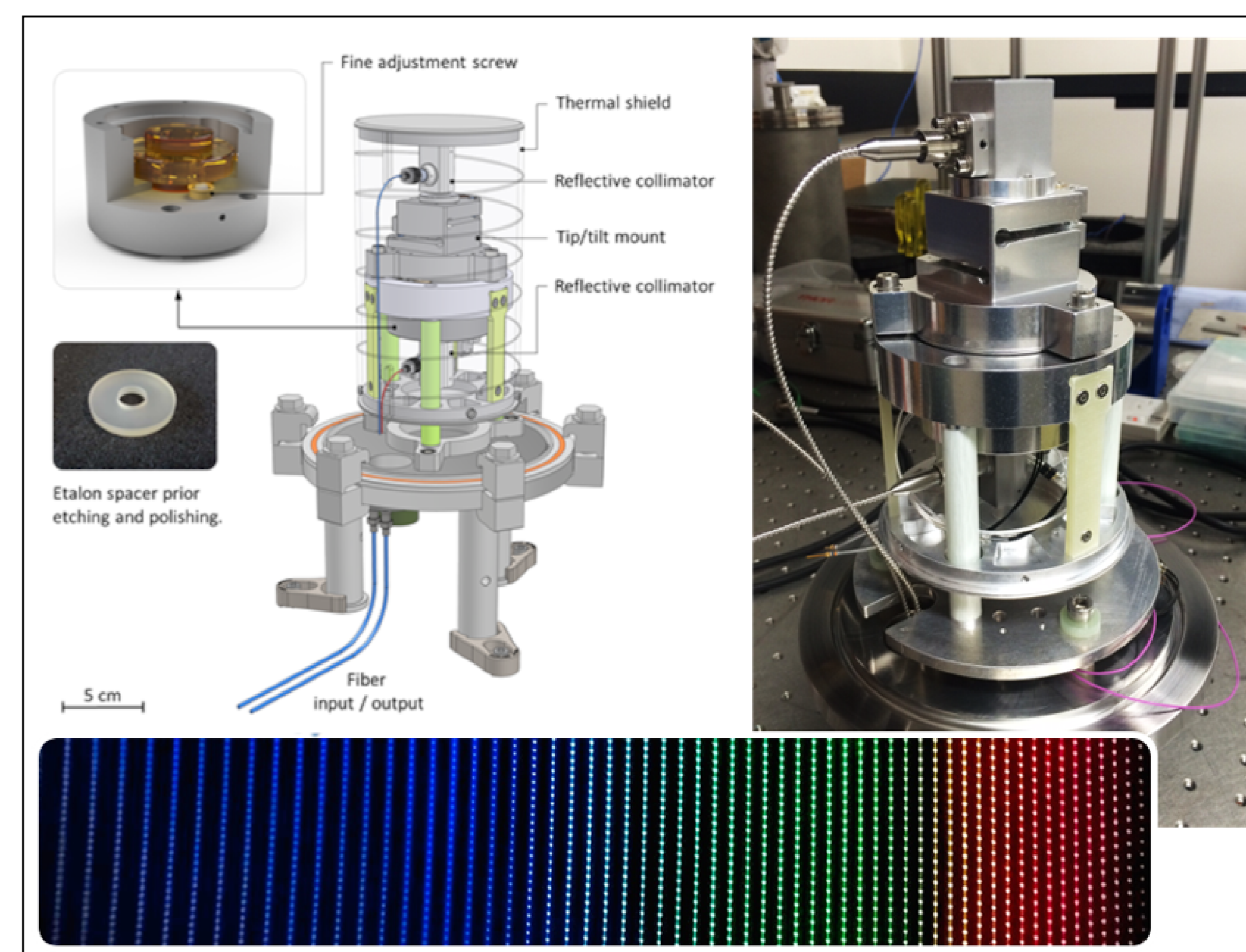
## Simulator & Pipeline

N. Janssen, D. Seynaeve, J. De Ridder, J. Stürmer +

- Full spectrograph simulator is available, used to inform design choices and to develop data reduction pipeline
- The optical model of the simulator is updated with measurements of optics to reflect the performance of the as-built system

## MARVEL Site

- 4× new domes to be located close to existing Mercator telescope (La Palma)
- Dedicated spectrograph building designed for stability of environment, short fibre run
- Shared infrastructure with existing Mercator building



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