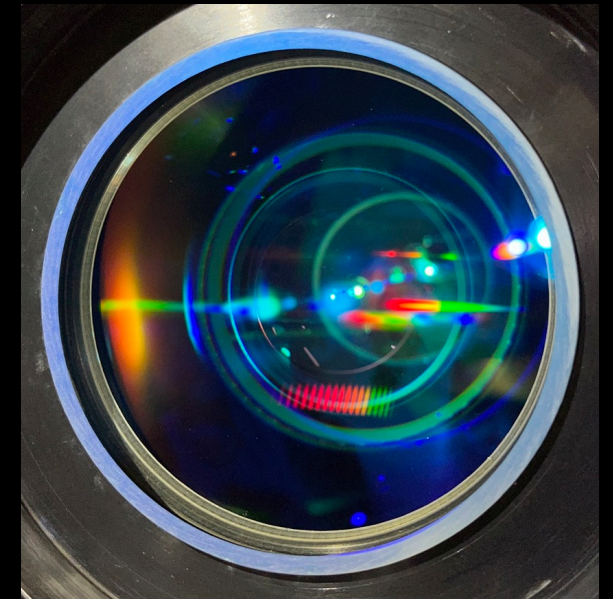
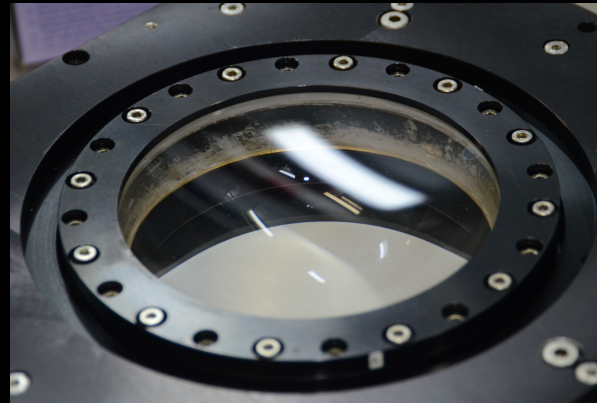
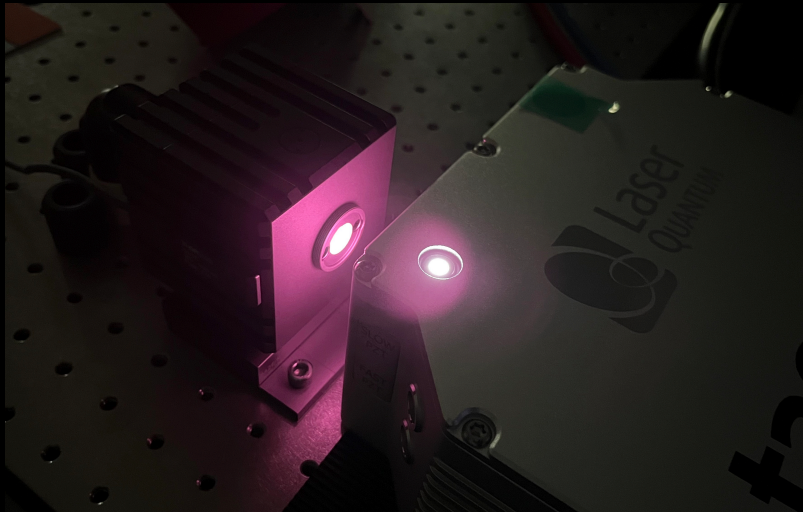


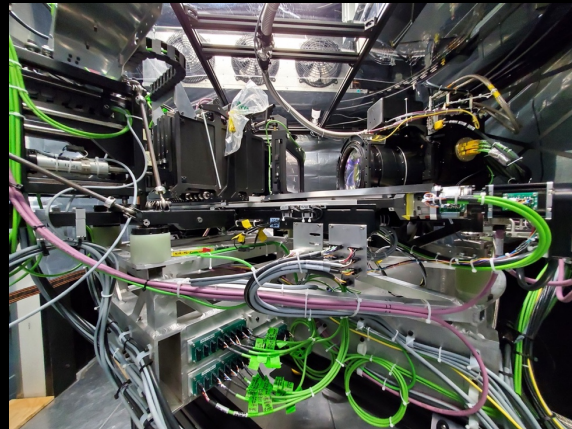
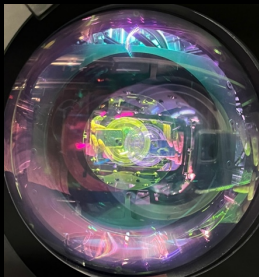
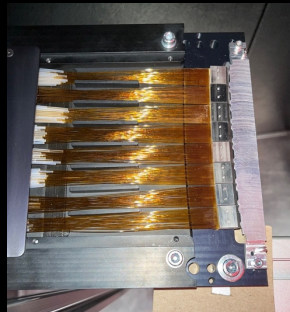
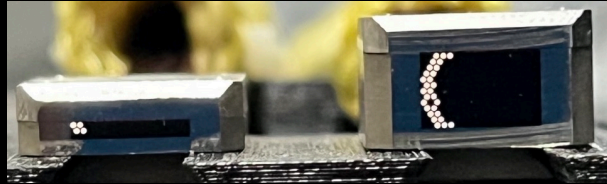
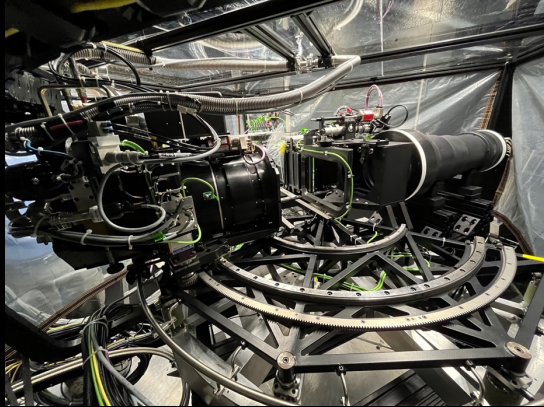
SALT Instrumentation Updates



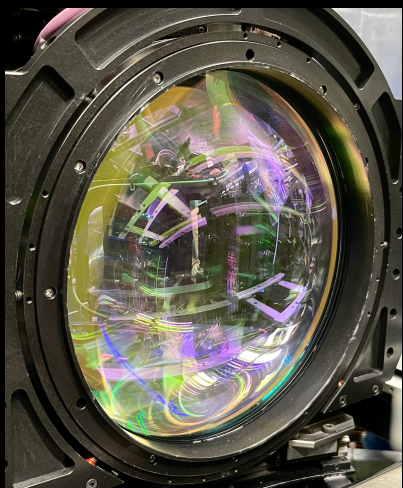
SALT Workshop

14-15 November 2022

New Arrival: Near-Infrared Spectrograph (NIR)!!

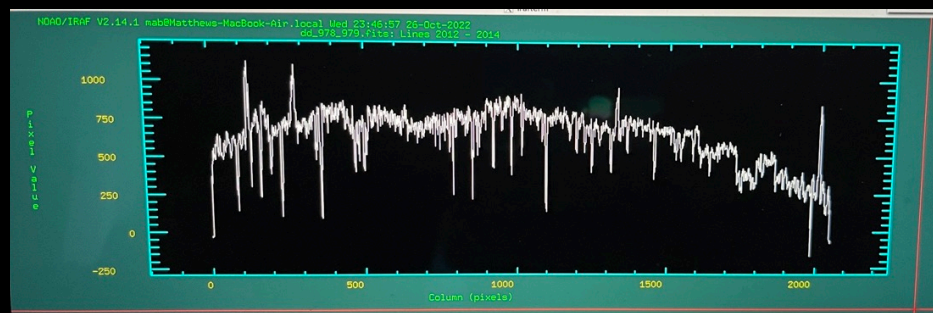
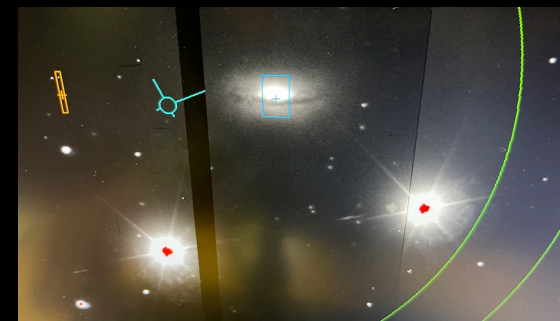
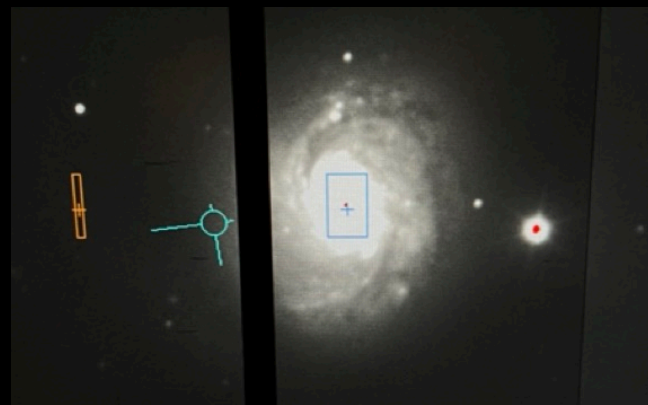
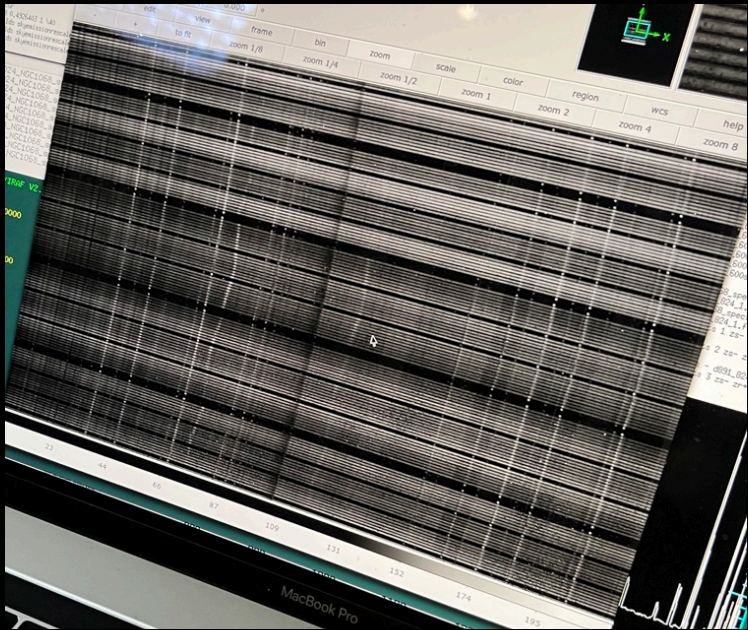


- Fibre fed: science IFU = $212 \times 1.3''$ ($18'' \times 29''$) + 36-fibre sky IFU can be $50'' - 160''$ away
- λ range: 800 – 1700 nm
- Resolution: 2000 – 5000
- Estimated peak throughput: 40%
- Detector: Teledyne H2RG IR array
- Thermal enclosure: -40C
- First light: 7 July 2022!
- Science commissioning: started in late October, looks Good 😊
- NIR science data pipeline: Yes!



NIR = NIRWALS!

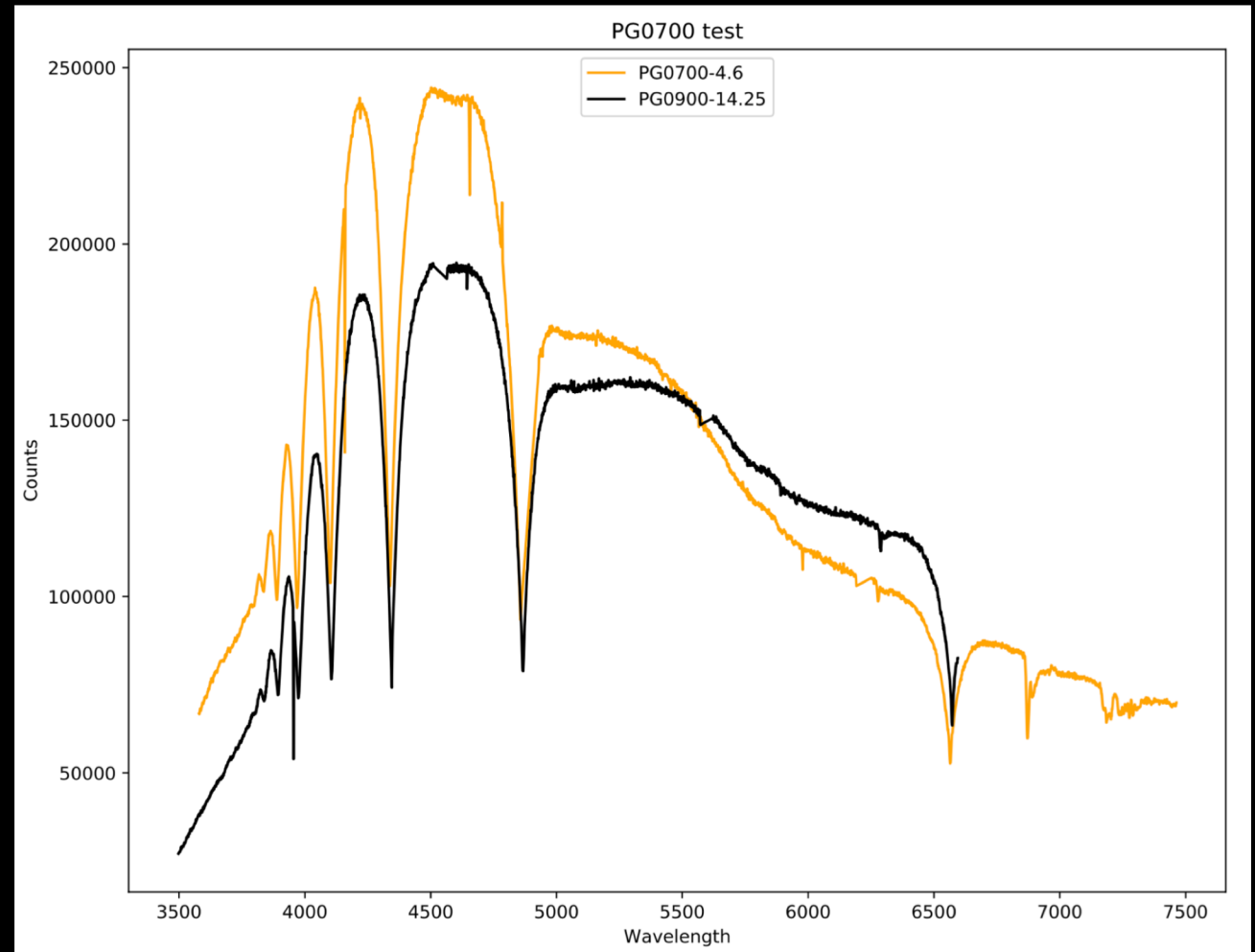
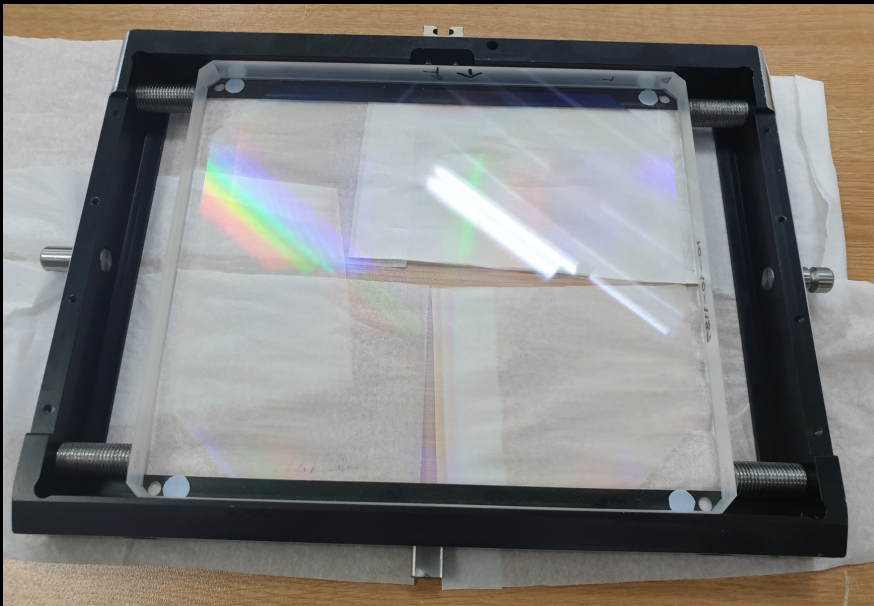
NIR Washburn Labs Spectrograph



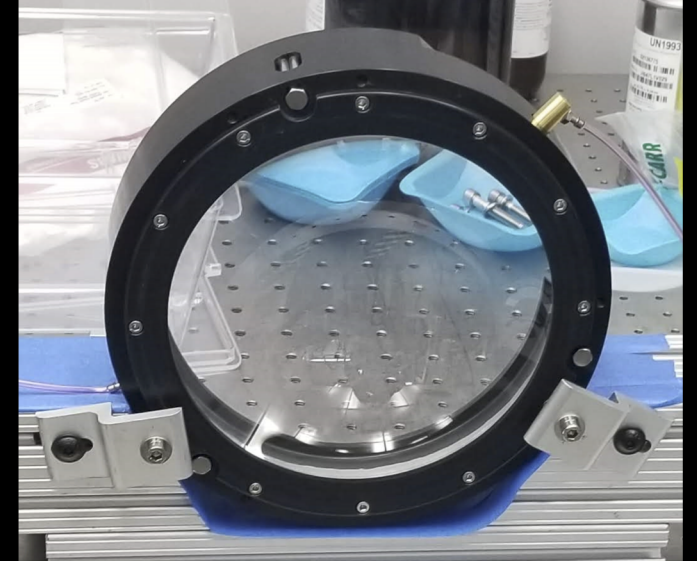
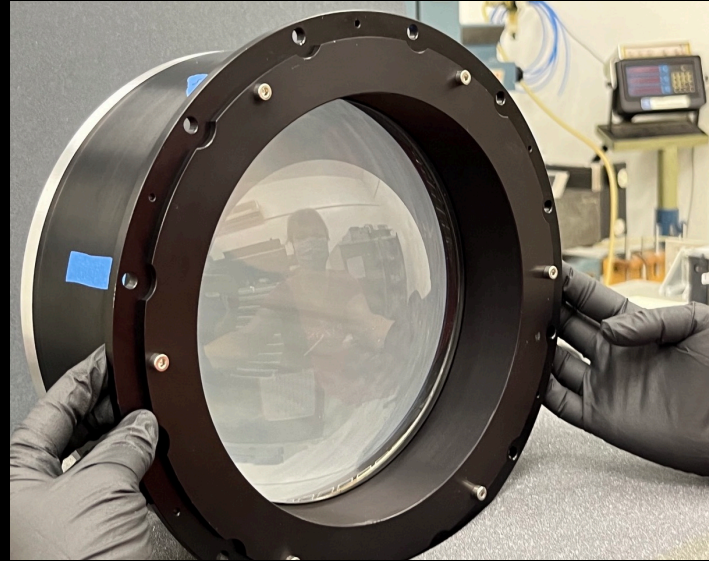
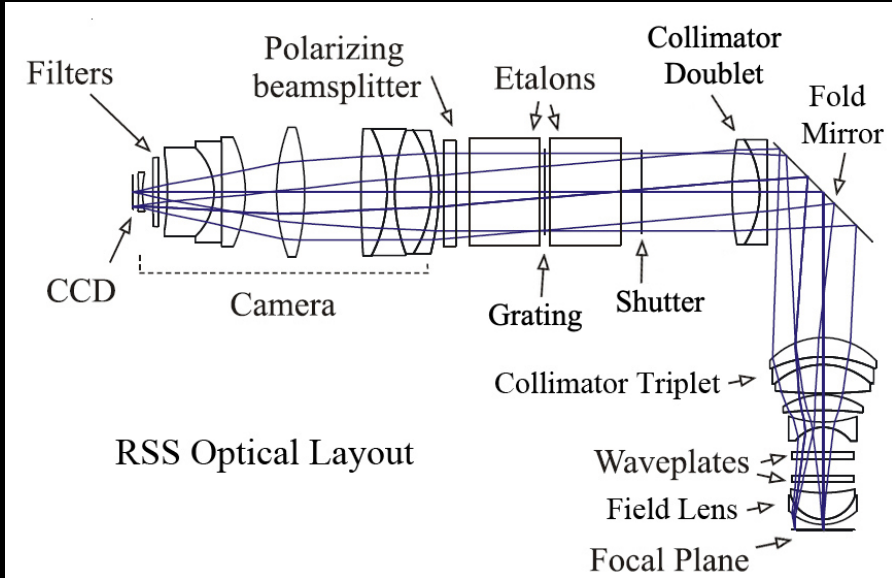
- More science commissioning early next year...

RSS Upgrades in Progress – 700 l/mm Grating

- New PG0700 gives 360-740 nm in a single shot & uses the full extent of the CCD
- It will replace the 300 l/mm grating This Week!



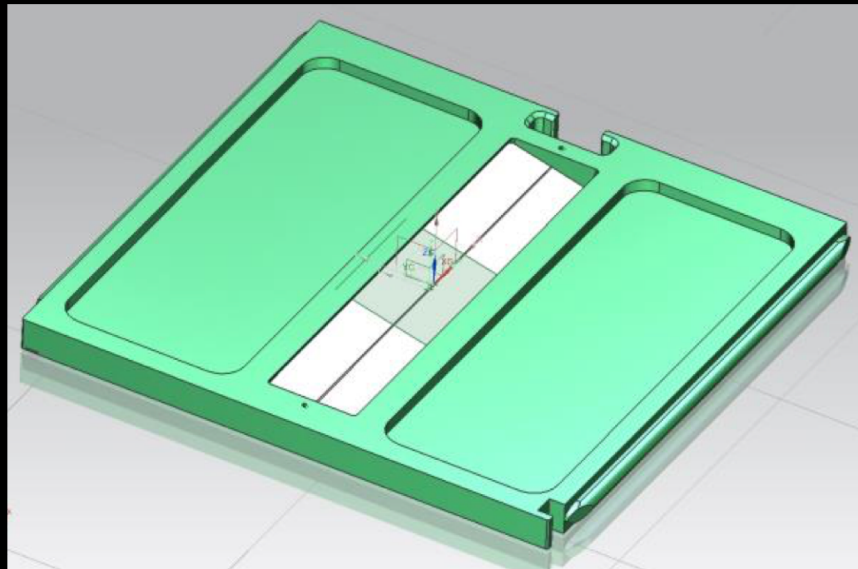
RSS Upgrades in Progress – New Collimator Optics



- **Triplet:** ($\text{CaF}_2 - \text{NaCl} - \text{CaF}_2$) + LL3421 lens fluid
- **Doublet:** ($\text{CaF}_2 - \text{Fused Silica}$) + LL5610 lens fluid
- Both to undergo lab testing in Cape Town before installation during the next RSS shutdown, in February 2023

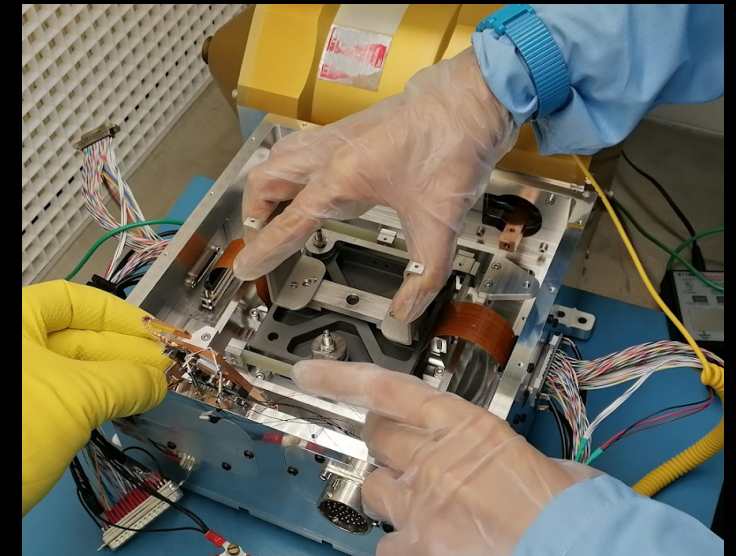
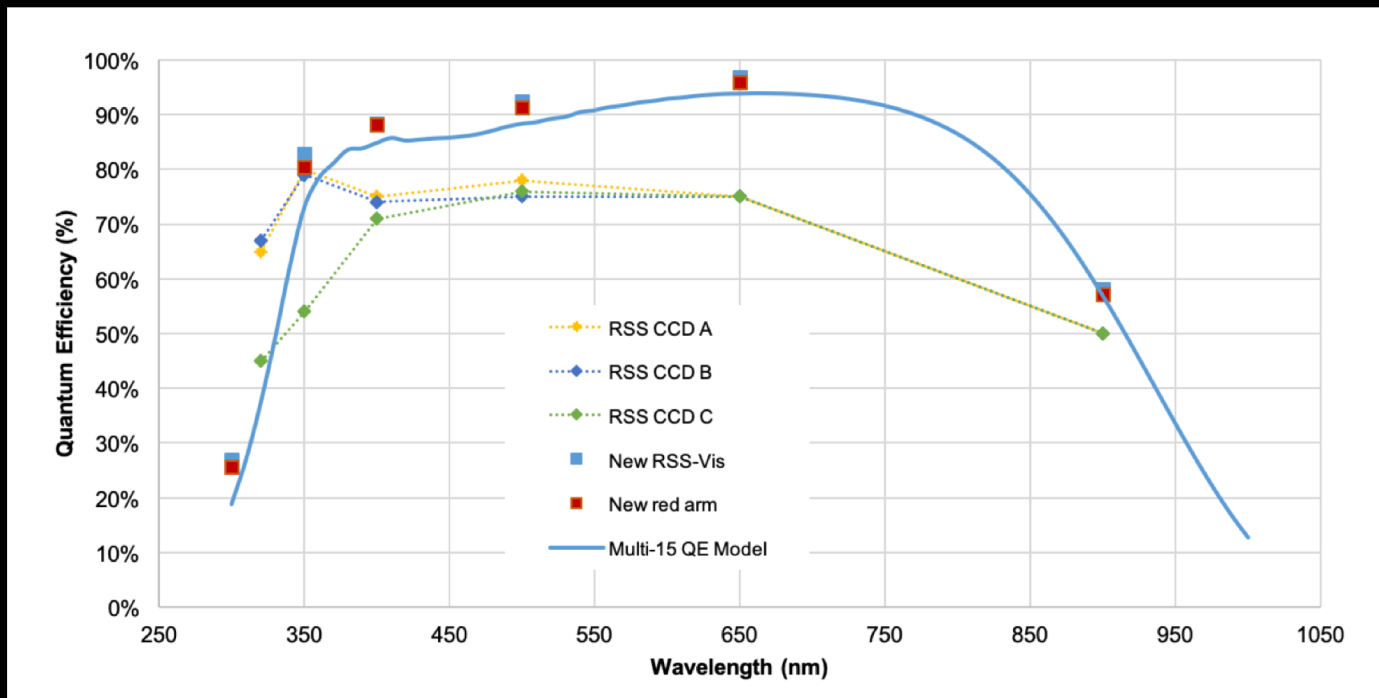
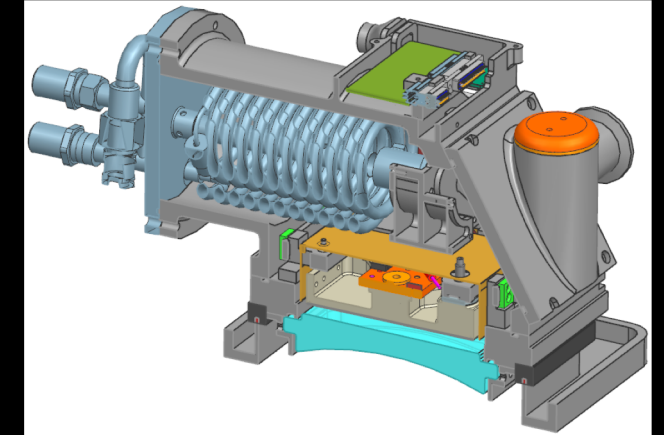
RSS Upgrades in Progress – New Long-slits

- Aiming for better reflectivity, flatness & slit uniformity
- Will streamline acquisitions & improve data quality
- New sample 1.5" slit to be tested on-sky shortly!



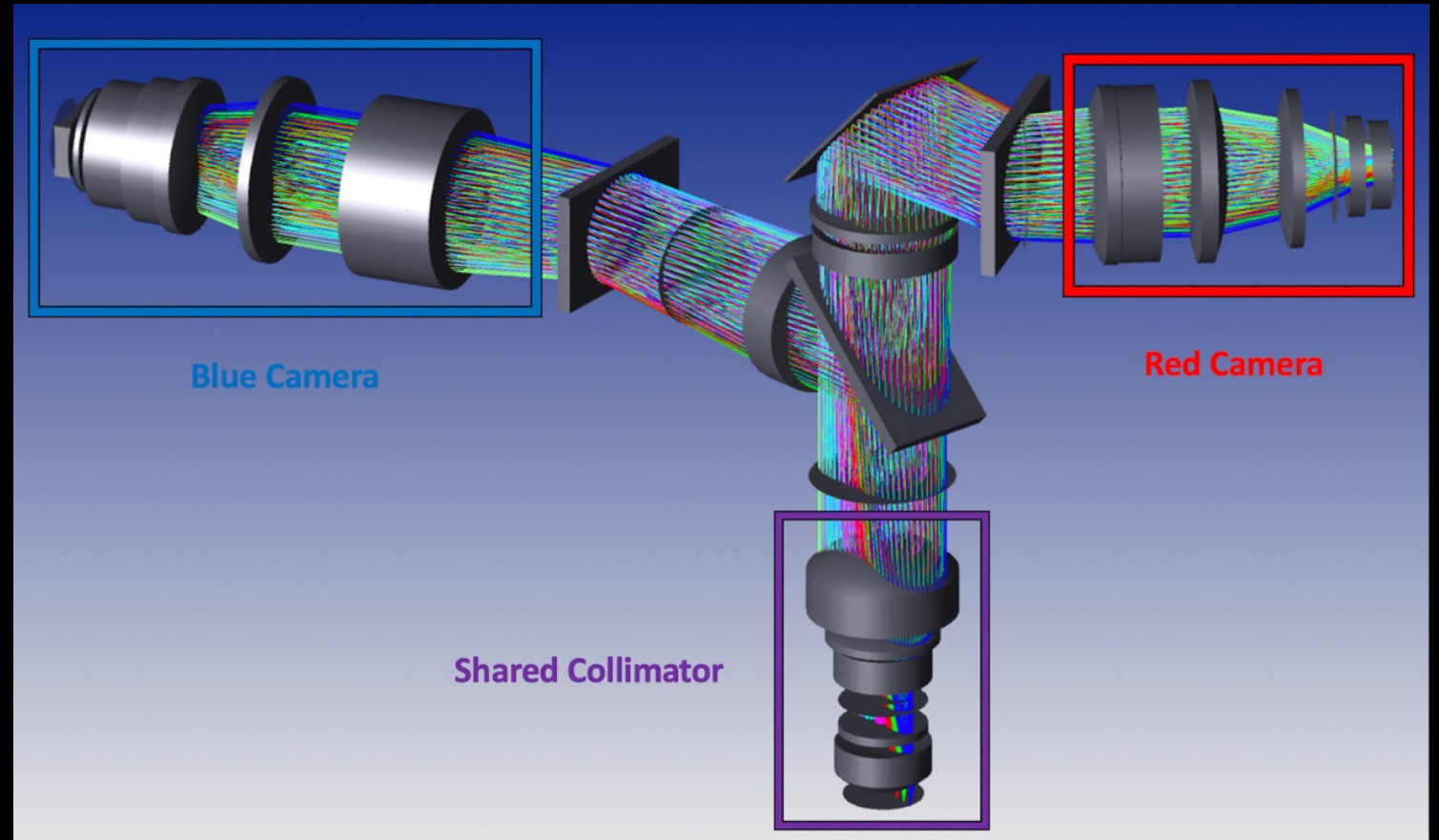
RSS Upgrades in Progress – New Detector System

- **6K x 6K CCD:** monolithic chip so no more gaps to avoid!
- Better QE & fringe suppression than our current chips
- New CCD controller architecture: IUCAA IDSAC
- Cryo-cooler system for temperature control

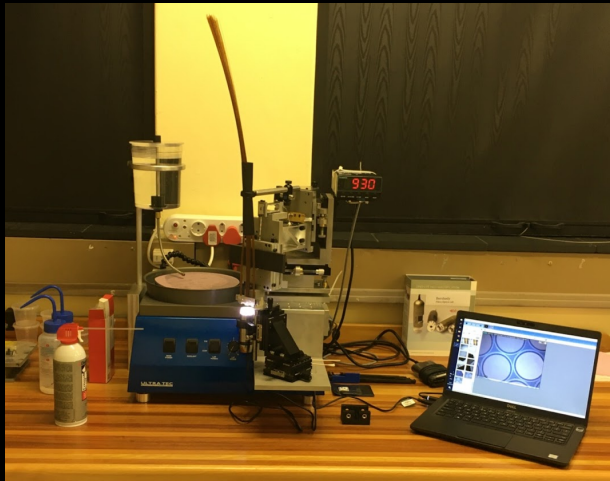
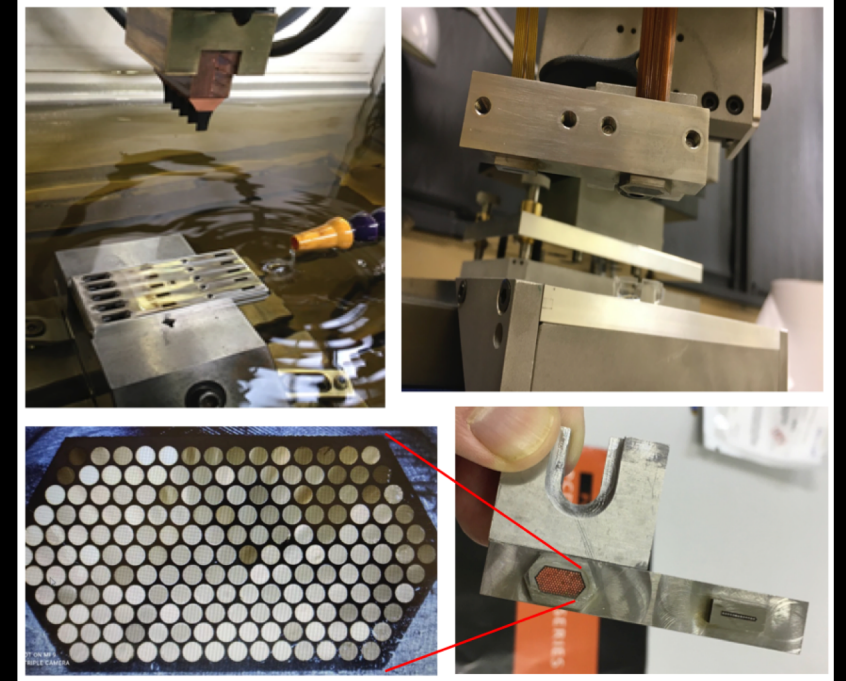
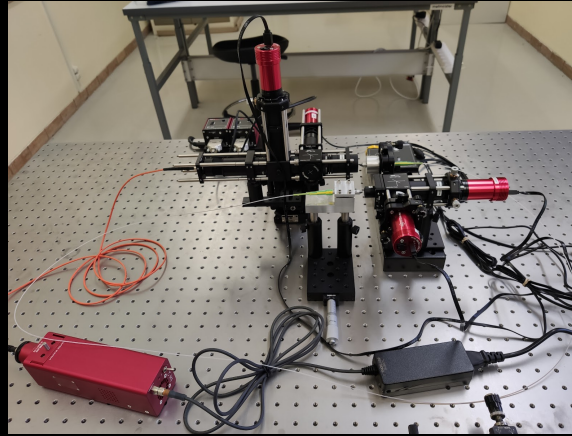


New RSS Red Arm: MaxE (aka RSS Dual)

- **RSS Dual**: new Red channel for RSS
- Full coverage of visible spectrum at suitable resolution for good sky subtraction, to support ID spectroscopy for transient follow-up
- SAAO/SALT's first major collaboration with SARA0
- Optics PDR on 22 Nov
- Full PDR early 2023

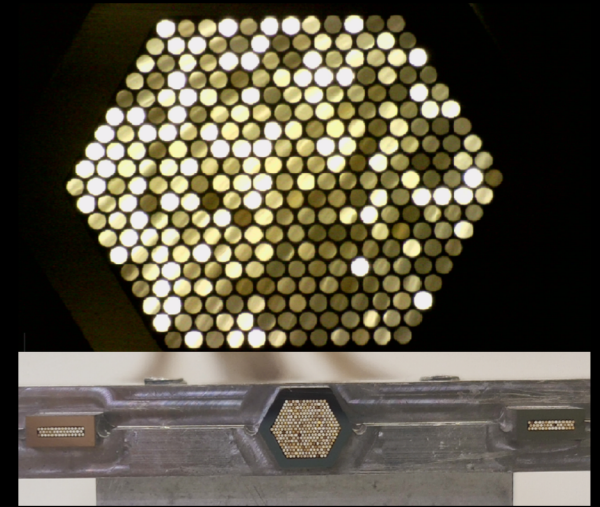
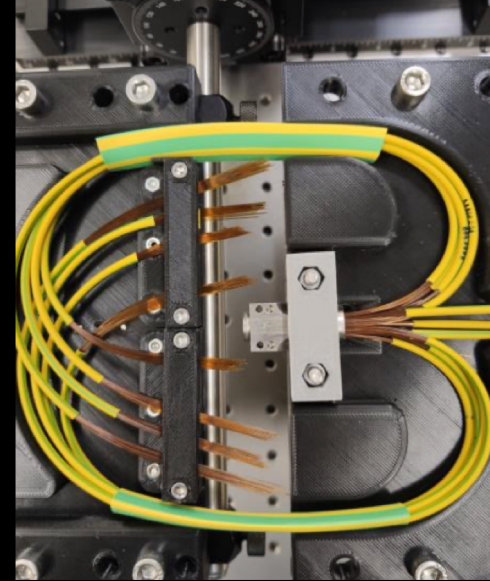
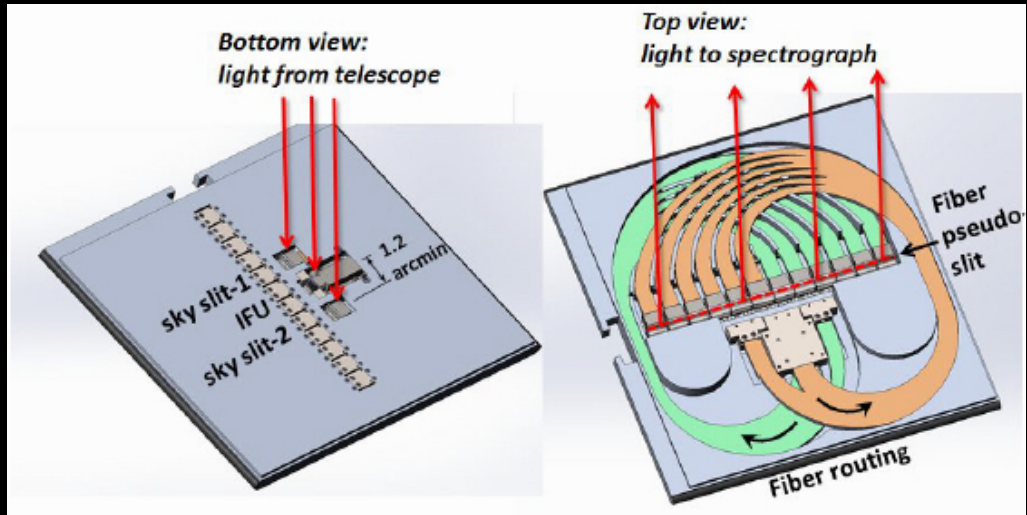


New Fibre Instrumentation Lab @ SAAO

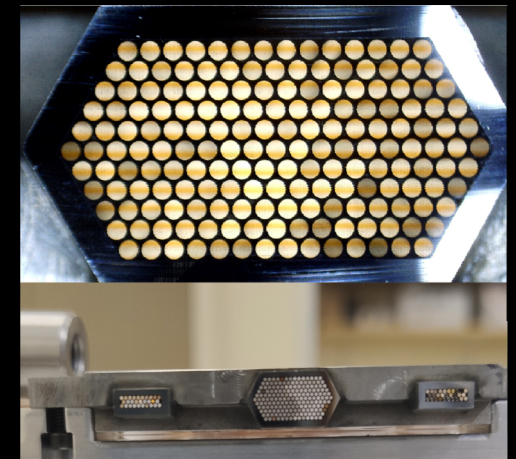


- **Fibre Lab:** stations for 3D Printing, Assembly, Polishing & Metrology
- SAAO Mechanical Workshop: has specialised EDM capabilities

Developing Fibre IFUs Locally

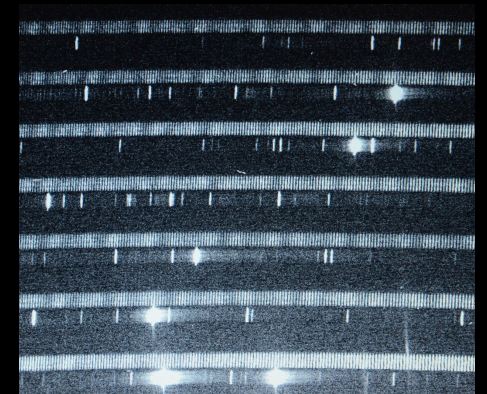
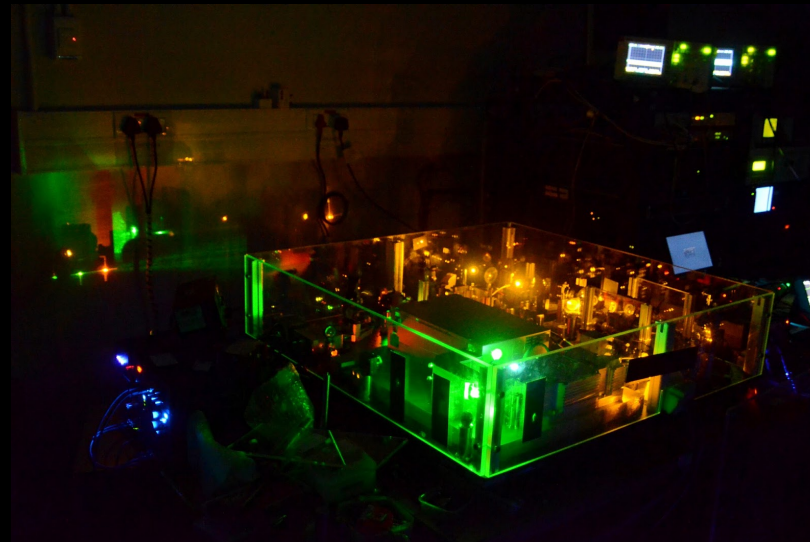
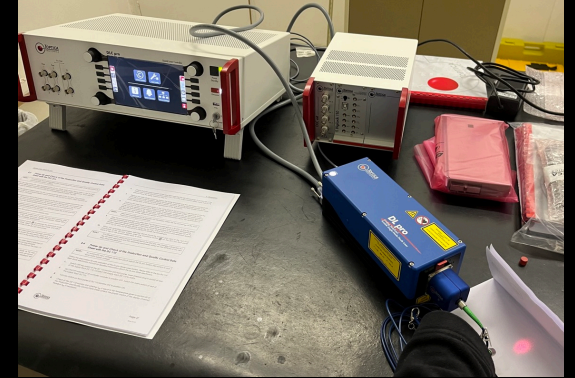


- **Slit-mask IFUs for RSS:** innovative & non-invasive way to add integral field spectroscopy to the RSS
- Currently developing versions with 200 & 400 micron fibres: 309 x 0.9" (18" x 23") & 179 x 1.8" (21" x 44") IFUs, respectively
- Aiming to go on-sky with these next year!



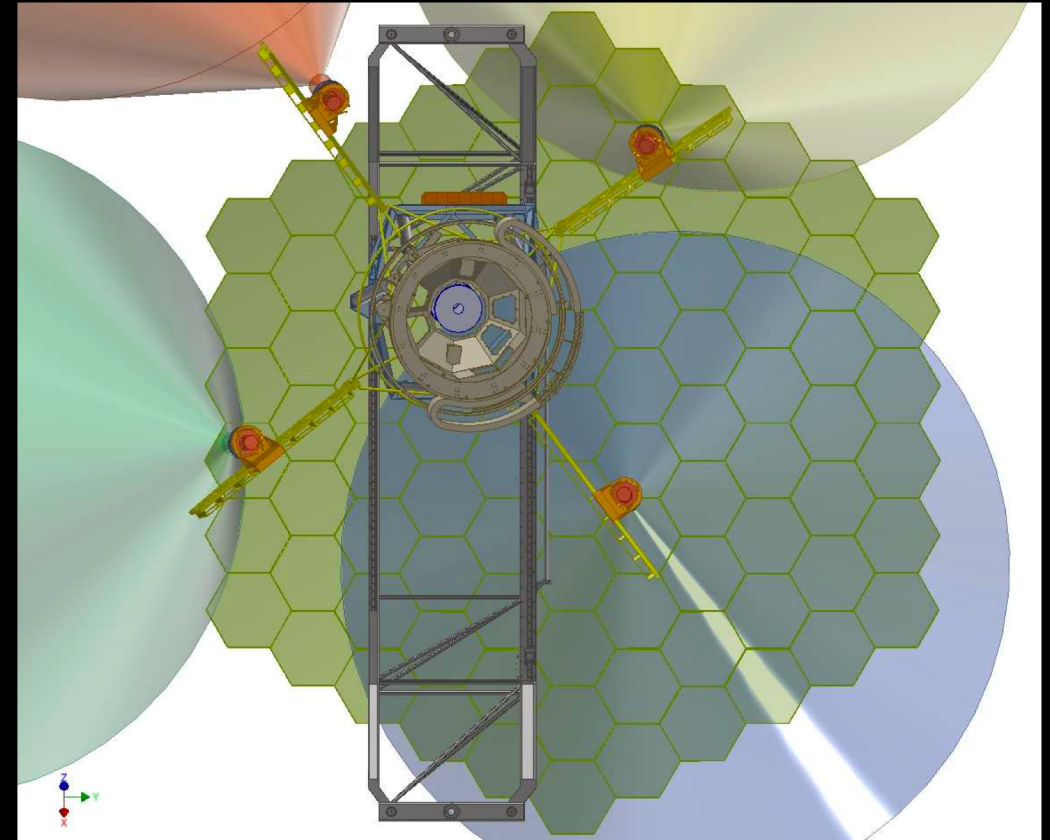
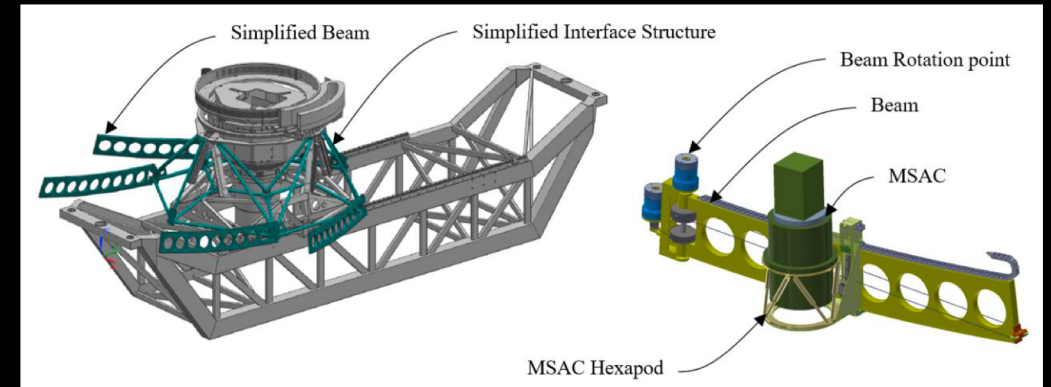
HRS High-Stability Mode Upgrades

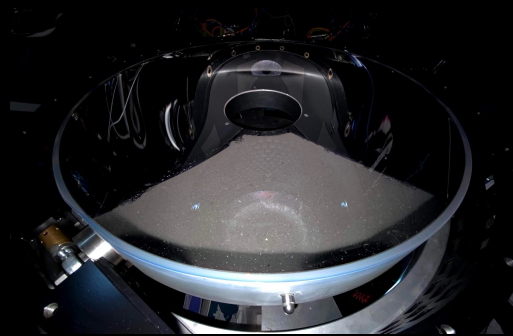
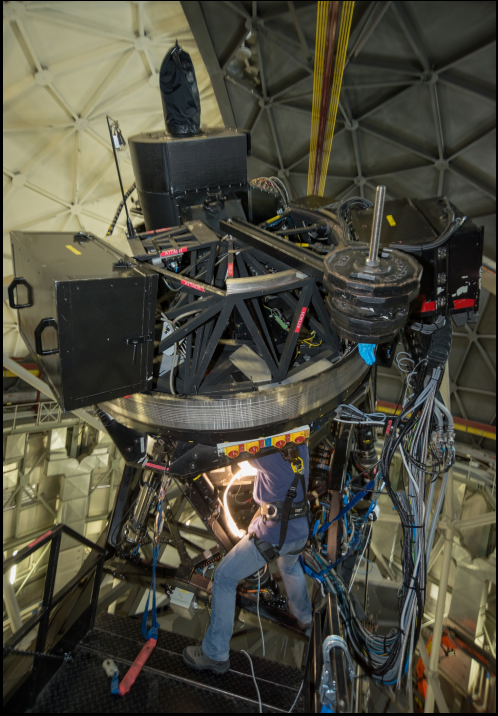
- **Laser Frequency Comb:** precision wavelength calibrator for the HRS
- Exciting multi-disciplinary collaboration with laser physicists in Scotland
- **Precision radial velocity pipeline:** for HRS High-Stability mode, to support exoplanet science
- Comb integration planned for early 2023, pipeline a year or so later



Mini-Trackers Study

- Idea presented in 2017 strategy discussion, feasibility study done in 2020/2021
- Employ mini spherical aberration correctors (mSACs) on robotic arms to leverage SALT's enormous uncorrected field
- Effectively multiple >4m telescopes that can simultaneously observe targets within ~10 degrees of the main SALT SAC
- Considered technically do-able, but would need a compelling science case
- Unique development path + opportunities for novel instrumentation
- We could potentially revisit this in future...





A New Top End?

- Redesign & replace prime focus payload: fit-for-purpose & more future-proof
- Fibre-feed RSS (to the spectrometer room) for better stability & maintainability
- Free up space for new instrumentation (e.g. deployable IFUs, guest instruments)
- Use more modern technologies to enhance telescope + instrument performance (e.g. wavefront sensors, fast tip/tilt system, etc.)
- Simplify operations & maintenance: access is critical for maintaining corrector optics & other key sub-systems
- Aiming for pre-study approval this week...

Next Steps for SALT

- User community engagement: recap 2018 strategic plan, update on progress, check we are still on track & poll for new ideas
- Complete the projects we are working on!
- In parallel:
 - Explore options for a new top end (including replacing SALTICAM, fibre-feeding RSS, redesigning fibre instrument feed...)
 - Establish an astronomical instrumentation training path for students
- Draw on the skills, collaborators & infrastructure we are accumulating to tackle the development of a major Gen II instrument for SALT
- Perhaps a deployable IFU system to support the Baryon Cycle science case?





SALT Happenings Blog: <http://salthappenings.blogspot.com>

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