The MAAT IFU at GTC

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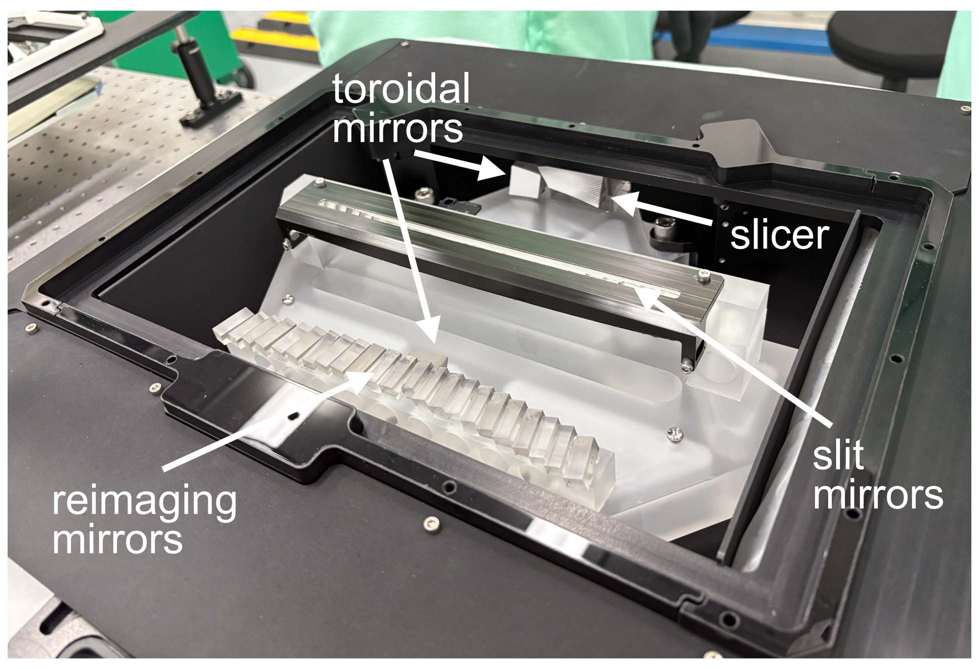
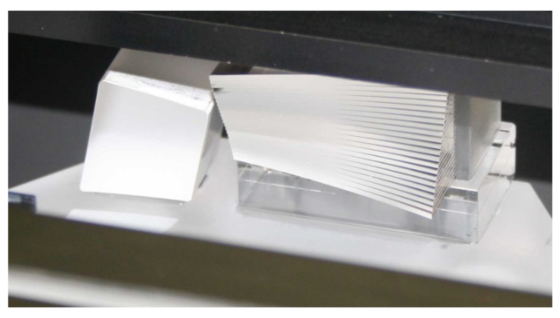
1 · First Light and Next Steps

The MAAT IFU has been built for the OSIRIS+ spectrograph on the Gran Telescopio Canarias (GTC) to provide focal-plane reformatting for integral-field spectroscopy with over a seeing-limited FoV 7'' x 10'' with a slice width of 0.305'' [1].

MAAT achieved very promising First-Light results at the GTC on 24 May 2026, with the first-light observations showing excellent image quality as reported in this poster. The remaining commissioning work during summer 2026 will verify the whole-beam MAAT-IFU alignment, the fine alignment of the IFU optical bench relative to its mechanical support, the repeatability of the insertion mechanism, and the internal IFU input–output pointing, with the goal of potentially offering MAAT to the GTC community in Semester 2027A.

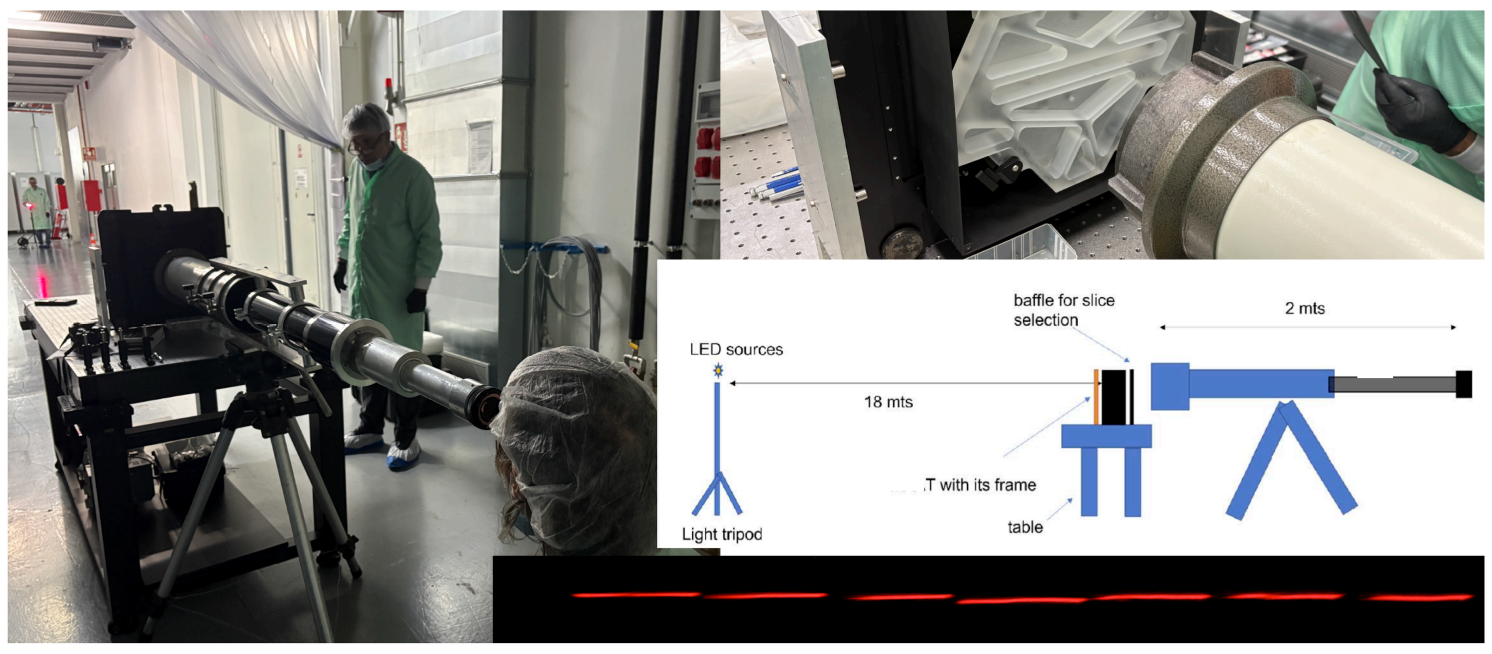
2 · The IFU optical system



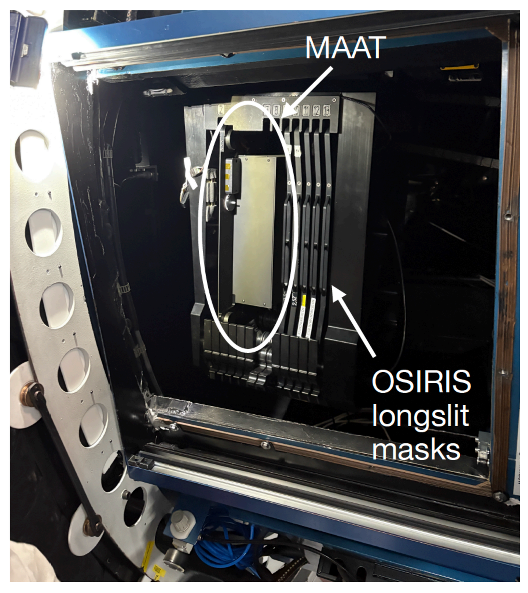


The MAAT optical design is based on the Advanced Image Slicer concept given in [2]. Images show the IFU optics inspection at the GTC lab on 22 May 2026.

3 · Laboratory pupil-imaging tests and installation in OSIRIS+ at GTC

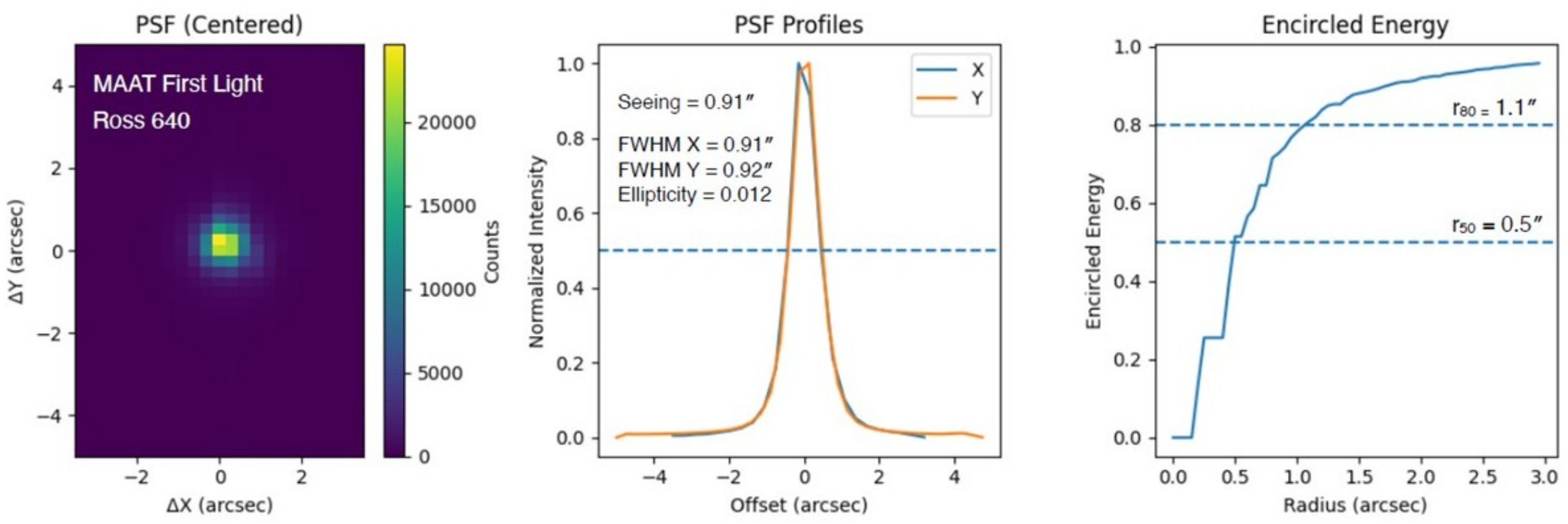


Lab MAAT pupil-stack test setup, showing the LED source at 18 m, slice-selection baffle, test camera optics, and the resulting IFU pseudo-slit image.

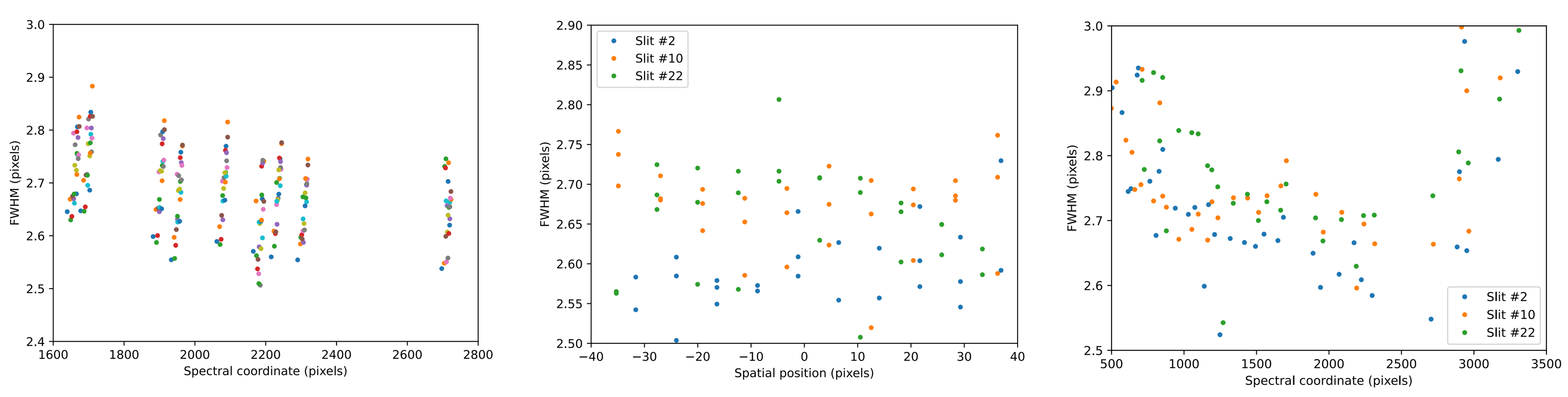


Left: Manual insertion of MAAT into the OSIRIS+ mask-loader, showing the magnetic interface. Right: MAAT installed in the OSIRIS+ mask-loader, positioned next to the standard OSIRIS+ long-slit masks.

4 · First-Light image quality results



A MAAT reconstructed white-light image of the standard star Ross 640, highlighting the excellent image quality.



Arc-lines in focus show expected variations across spectral and spatial directions.

References:

[1] Prada et al. (2020), arXiv:2007.01603
[2] Content et al., (2024) SPIE,13096, 1309695
[3] Prochaska et al. (2020), JOSS, 5, 2308

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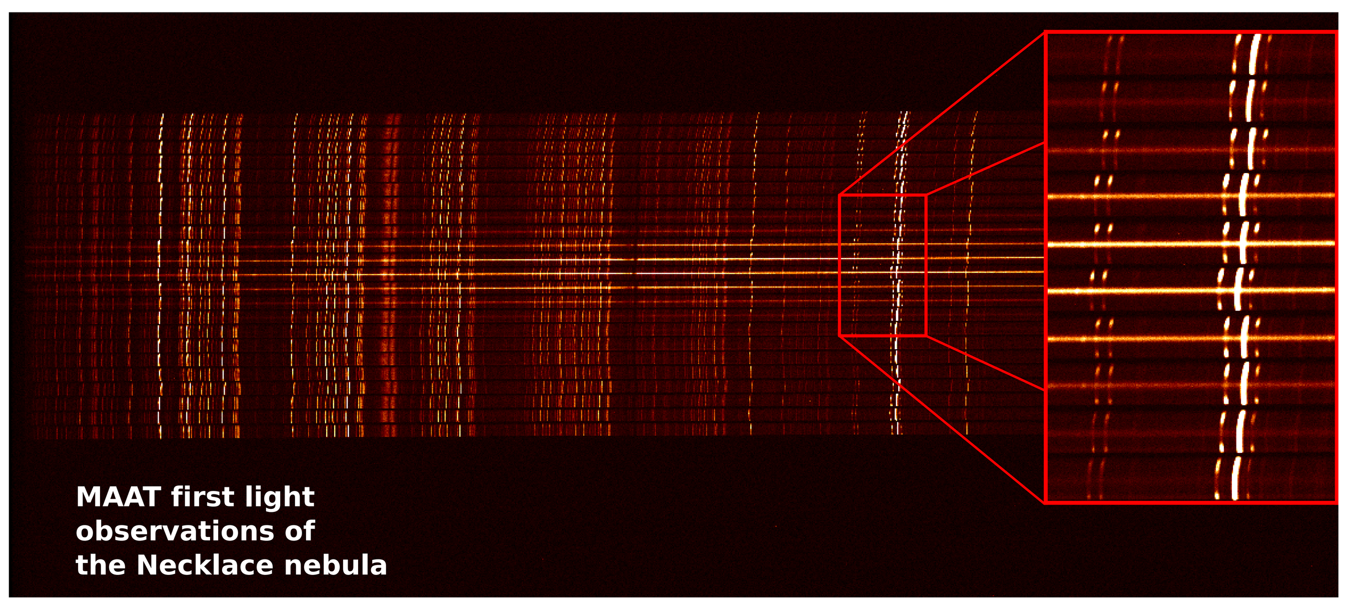
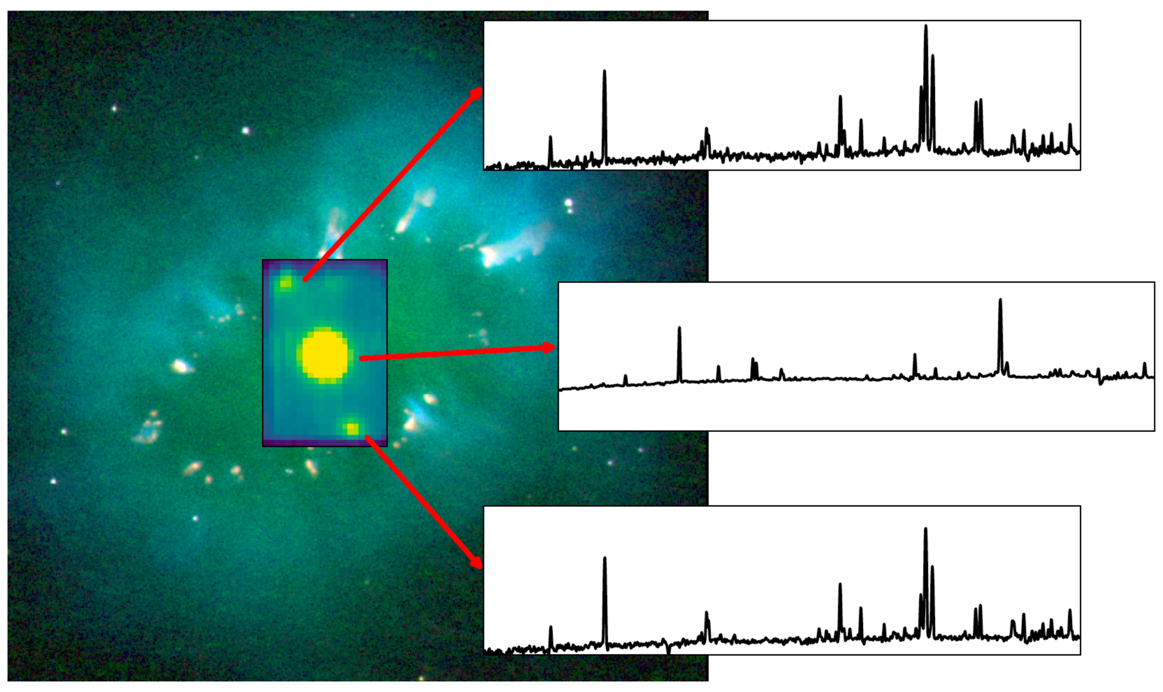
5 · First-Light science images



Top: Raw MAAT/OSIRIS+ CCD frame from the first-light observation of the Necklace Nebula. The 23 horizontal traces correspond to the 0.3″ × 10″ MAAT slitlets; the inset highlights the nebular emission-line region around [SII] 6731+6717, [NII] 6583, Hα and [NII] 6548 (red is left, blue right); the central-star continuum is visible in the central slitlets. Below: PypeIt-reduced [3] reconstructed MAAT first-light image overlaid on an HST image of the field. Each MAAT spaxel contains a spectrum, with examples extracted for the central star and two nebular knots within the MAAT field.



6 · Manufacturing Challenges to First Light

Manufactured by Bertin-Winlight, the MAAT IFU uses a precision image slicer made of 23 thin mirrors to rearrange the telescope focal plane into a pseudo-slit. During final integration and verification in autumn 2025, a critical manufacturing error was identified: the slicer mirrors had been produced with their centres of curvature reversed relative to the optical design. This systematic inversion produced beam deviations outside tolerance and made the IFU optical system non-functional in its original configuration. Our SPIE paper describes this failure and the innovative recovery solution developed by MAAT optical scientist Robert Content, who redesigned the slicer configuration to obtain a working image slicer. Our experience provides important lessons learned for future IFU projects, especially on manufacturing control, independent optical verification, and recovery strategies for complex image-slicer systems.