



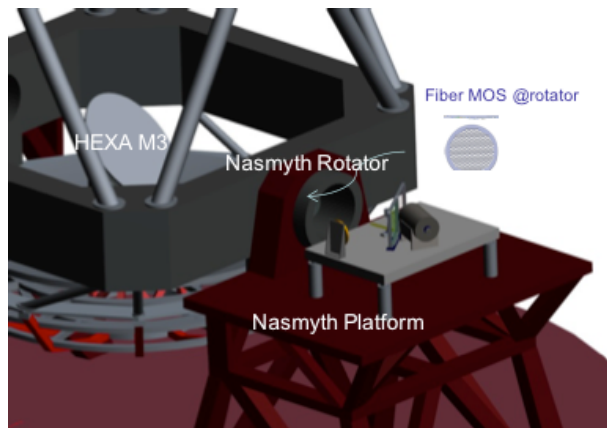
HEXA/HEXAT+GYES: a fiber positioner and spectrograph for the Calar Alto Observatory (Almería, Spain)

## What is HECATE+GYES?

HEXA is the next generation telescope for the Calar Alto Observatory. One of the proposed instruments is multifiber positioner (HECATE) and a high-spectral resolution spectrograph with a high degree of multiplexing (GYES). HECATE can work, simultaneously, with cameras and other spectrographs (an IFU and/or a very-high resolution echelle spectrograph, similar to CARMENES).

## HECATE-GYES

HECATE-GYES is a concept for a high multi-plexing, high spectral resolution spectrograph and fiber positioner.



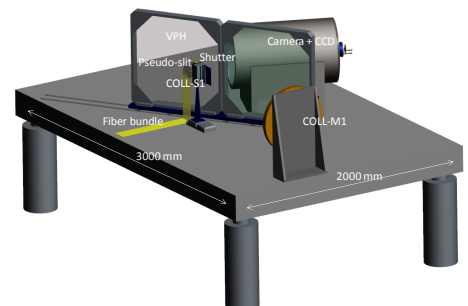
It is composed by the Fiber MOS subsystem (HECATE), the fibers and the spectrograph itself (GYES).

HECATE Fiber MOS (attached to the Nasmyth rotator) allows placing up to 361 individual positioners. Each actuator can handle a single fiber or a mini-bundle with a positioning precision of  $\pm 25\mu\text{m}$  within a patrolling area of  $\sim 3$  arcmin on sky (equivalent to a linear distance of 20.1mm between two neighbor positioners on the focal plane)

HECATE single fibers for the high-resolution spectrograph GYES have  $150\mu\text{m}$  core, equivalent to 1.35 arcsec on sky.

The GYES spectrograph will provide simultaneous spectra of all the objects acquired with the Fiber MOS ( $\sim 361$ ), over 1 degree on sky. The instrument has high spectral resolution,  $R = 25000$  reached thanks to the use of a VPH grating as disperser on pupil and a fast catadioptric collimator and camera.

Four spectral windows have been pre-selected for the first survey, centered at  $H\alpha$  (6563 Å) and Li I (6708 Å); K I (7700 Å); Na I (8200 Å) and Ca II Triplet in the IR (8498, 8542, 8662). The spectral windows on detector are 6515 – 6730 Å; 7570 – 7820 Å; 8065 - 8330 Å and 8455 – 8730 Å.



Among other ideas discussed for HEXA maximum efficiency and scientific return, the following aspects have been considered of high interest for the community:

- ✓ Complement the instrumentation with other **low- and medium-resolution spectrographs** that can share the same Fiber MOS (HECATE). One or few fibers could go to a very high-resolution (echelle) spectrograph.
- ✓ Include a **central IFU and/or mini-bundles** that could feed the spectrograph/s. The current telescope design prevents the use of microlenses so that compact bundles are not foreseen. These IFU and/or mini-bundles could work **simultaneously** with the GYES spectrograph, enhancing the multi-plexing capability.
- ✓ Leave some free space on the focal plane (e.g. decreasing the number of positioners to  $\sim 350$ ) to allow placing other instruments (**direct imager** for Target of Opportunities observations and/or a **Lucky Imaging camera**).
- ✓ Use the **other Nasmyth** for specific instruments for large programs (MONSUL and GEA instrumental concepts).

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