



## The LUCIFER Multi-Object-Spectroscopy Unit

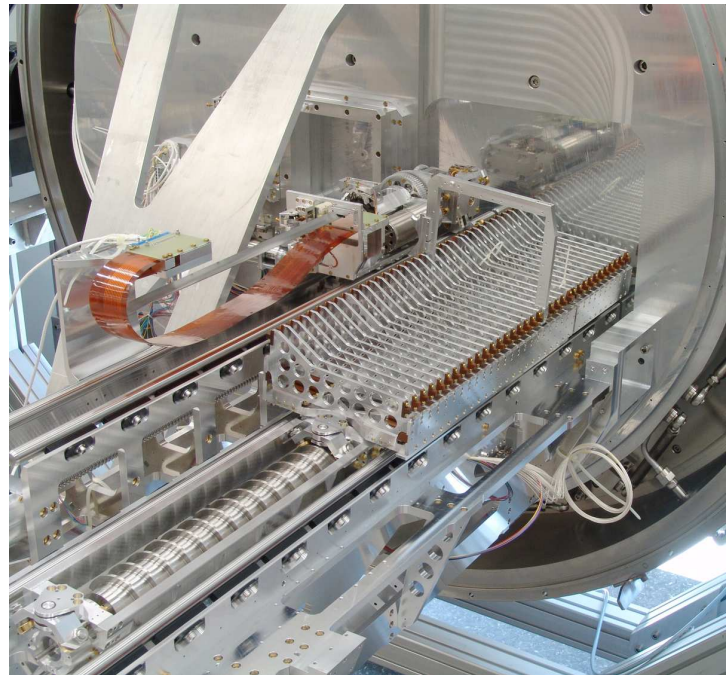


**ABSTRACT:** A cryogenic multi-object spectroscopy (MOS) unit for LUCIFER has been developed and is presently being tested. This MOS unit exchanges slit masks between a clamp mechanism in the focal plane area and two storage cabinets inside the LUCIFER cryostat. The unit also permits the exchange of a cold mask cabinet between LUCIFER and an auxiliary cryostat.

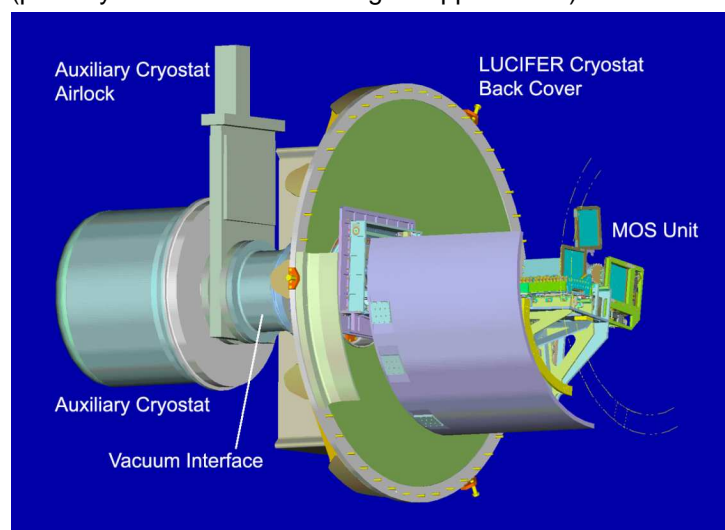
LUCIFER, the near-infrared camera and spectrograph for seeing- and diffraction limited observations at the LBT, is being built by a German consortium led by the Landessternwarte Heidelberg (LSW). The project started in 1999, first light is planned for 2006.

The most powerful observing mode of LUCIFER is seeing limited multi-object spectroscopy with multi-slit masks. The cryogenic MOS unit developed at MPE handles 10 long-slit and field limiting masks in a stationary storage cabinet and 23 multi-slit masks in an exchangeable cabinet. A robot picks up a mask from its slot in the storage cabinet, carries it over a distance of up to 50 cm to the focal plane area, and deposits the mask in a focal plane unit where it is positioned with an accuracy of  $\pm 10 \mu\text{m}$  and fixed by a clamping mechanism. The unit works in arbitrary orientations of the rotating instrument, which is mounted at a bent Gregorian focus of the LBT.

The multi-slit masks have to be custom made for each field to be observed, and after observing 23 fields, the whole lot has to be replaced. Warming up the cryostat and breaking the vacuum for mask exchange is not feasible, because the thermal cycle time of LUCIFER is comparable to the observing time for the 23 masks. Therefore, the MOS unit has been designed to permit mask cabinet exchange without warmup of the instrument. For this procedure, an auxiliary cryostat is connected to LUCIFER, the interface between the two cryostats is evacuated, the 32 cm diameter gate valves at both cryostats are opened, and the mask cabinet is transferred between the two cryostats on rails. Actually, two auxiliary cryostats are available, one accepts the used masks, the other one houses the pre-cooled new masks.



The LUCIFER MOS unit mounted in the test cryostat. From front to back: Mask cabinets on rails with drive screw, one mask inserted; mask handling robot with flexible board power lines; cryostat base plate and focal plane clamp mechanism (partially hidden behind the bright support strut.)



3d-model of the setup for mask cabinet exchange.