



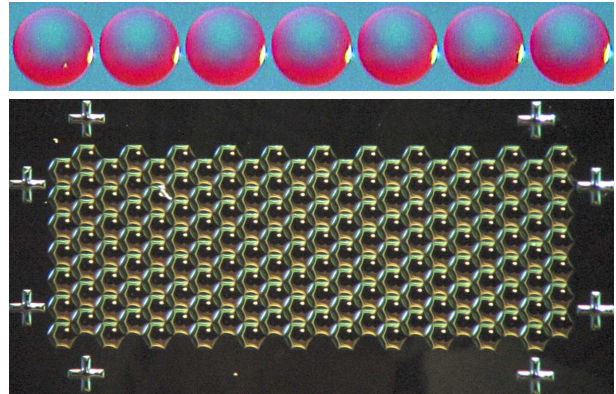
ABSTRACT: For KMOS, an imaging multi-object spectrograph for the VLT, a fiber integral-field-unit (IFU) has been studied, and the prototype of a pickoff arm carrying a fiber-IFU and a steering mirror have been built.

KMOS is a second generation near-infrared imaging multi-object spectrograph for the VLT. The instrument is presently in the concept phase, first light is planned for 2009. KMOS will be built by a British and German consortium. During the concept phase, MPE has worked on fiber-IFUs, positioners for these IFUs, and steering mirrors. All these components have been designed for operation at LN2 temperature.

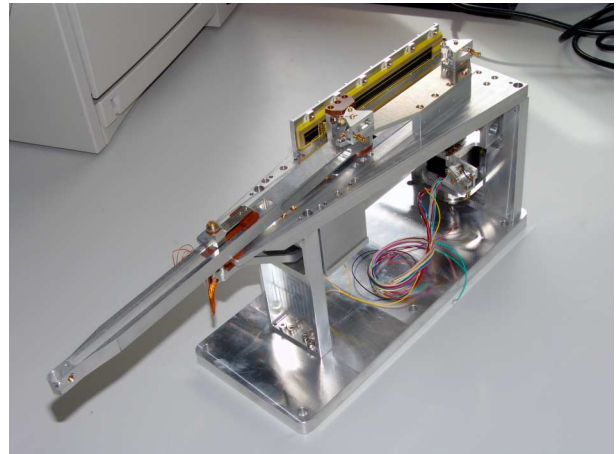
Fiber IFUs: A 2-dimensional array of micro-lenses positioned on a source image feeds a fiber bundle. The fiber outputs are arranged along the spectrograph input slit. A 1-dimensional array of micro-lenses adapts the fiber output f-number to that of the spectrograph. We have measured fiber transmissions in J and H-band, and have procured micro-lens arrays. An open problem is the connection between fibers and micro-lens arrays with a position accuracy of a few micrometers and stability over a wide temperature range.

IFU positioner: A pickoff arm for cryogenic environment has been built to position a fiber-IFU anywhere in a sector covering about 30% of the patrol field. Cryogenic tests have been postponed because a higher priority has been given to steering mirrors.

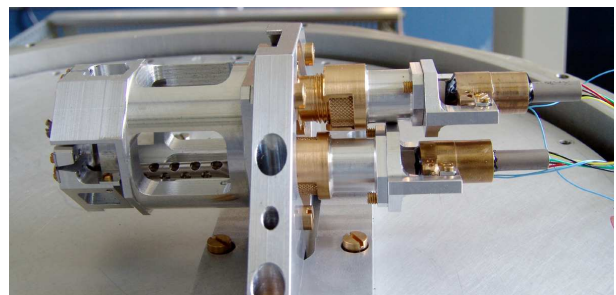
Steering mirror: A completely different concept for field selection employs an array of field optics covering the telescope image plane in combination with an array of steering mirrors placed in the pupil images. By tilting a steering mirror about two axis, it images one small subfield (typically 2"x2") within the area covered by its field optics element (typically 1'x1') on the IFU entrance port. Advantages of this solution are small mirror tilts of less than 1 mm at the edge of a 20 mm diameter steering mirror as compared to 20 cm excursions of an IFU positioner. The main disadvantage is the reduced flexibility in source selection. We have built and tested a steering mirror unit carrying a 20 mm diameter mirror for use with a field lens of 1' width (34 mm at the VLT). The unit is driven by two linear drives specified for operation at 4 K. The stroke is measured by linear variable differential transducers (LVDTs, also specified for operation at 4 K) with a resolution of 0.2 μm . The mirror is suspended in a gimbaled mount with joints made from 100 μm thick steel sheets. Joints between the motors and the mount are 100 μm thick steel wires with 1 mm free length.



Pictures of the prototype 1d (top) and 2d (bottom) microlens arrays. Center to center separation of the lenses in the 1d-array: 150 μm , width of the hexagonal lenses in the 2d-array: 300 μm .



Prototype of a cryogenic spider arm for positioning a fiber-IFU. Length of the unit: about 40 cm.



Prototype of a cryogenic steering mirror unit in its test mount. The motors are hidden inside their brass mounts on the right side. The grey tubes on the far right are the position sensors. The gimbaled mirror mount is located to the far left.