

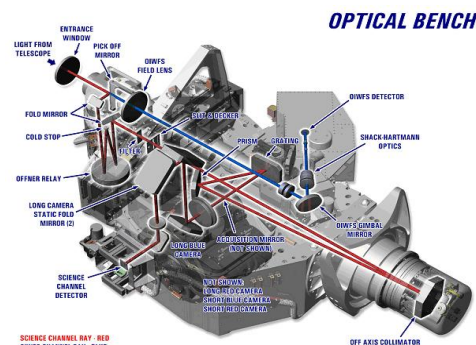
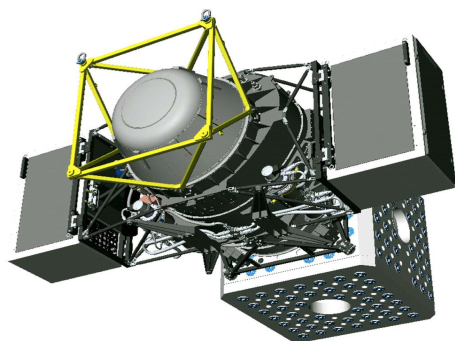
## GNIRS

### Description

GNIRS is a multi-function spectrograph, covering a spectral range of 0.8–5.4  $\mu\text{m}$  and providing a variety of low, medium, and high resolution modes sampled by four different camera options. It can be used with the ALTAIR AO system. GNIRS has some limited imaging capabilities.

Core operating modes (3):

- Cross-dispersed spectroscopy within 0.8–2.5  $\mu\text{m}$ , slit lengths of 7" (short camera) or 5" (long camera). Multi-order sampling and resolution 1800, 5400, or 18,000 for 2-pixel slit, depending on the chosen camera and grating.
- Long Slit spectroscopy within selected portions of the 1.0–5.4  $\mu\text{m}$  range, slit lengths of 99" (short camera) or 45" (long camera). Resolution 1200–18000 for 2-pixel slit, depending on the chosen camera and grating. Wavelength coverage depends on this choice.
- Imaging in small ( $\sim 10''$ ) fields of view dependent on filter, spatial sampling of 0.15"/pixel for the short camera and 0.05"/pixel for the long camera options.



### Components

Entrance window and pick-off mirror.

Fold and Offner mirrors, cold stop.

Filter wheels (2, 11 places each):

- Order blocking and broadband filters, X (1.03–1.17  $\mu\text{m}$ ), J (1.17–1.37  $\mu\text{m}$ ), H (1.47–1.80  $\mu\text{m}$ ), K (1.91–2.49  $\mu\text{m}$ ), L (2.8–4.2  $\mu\text{m}$ ), M (4.4–6.0  $\mu\text{m}$ ), XD (0.8–2.5  $\mu\text{m}$ ).
- Narrow band H2 (2.122  $\mu\text{m}$ ), Y (0.97–1.07  $\mu\text{m}$ ), PAH (3.295  $\mu\text{m}$ ), J-MK (1.17–1.34  $\mu\text{m}$ ), K-MK (2.03–2.37  $\mu\text{m}$ ), and attenuation filters.

Focal Plane Mechanisms:

- Deckers, for slit lengths 99", 7" (short camera), 49", 5.1"/7" (long camera).
- Slit widths 0.10", 0.15", 0.20", 0.30", 0.45", 0.675", and 1.0".

## GNIRS

Collimator: off axis, reflective.

Acquisition mirror: bypasses the prism/grating sending the beam directly to the camera.

Spectroscopic analyzers:

- Long slit: 10, 31.7 and 110.5 l/mm gratings.
- Cross dispersion: "SXD" and "LXD" SF57 glass prisms

Camera multi-element lens/mirror system, with 4 parfocal options:

- "Long" and "short" focal lengths (0.05 and 0.15 "/pixel respectively).
- "Blue" and "red" (0.9–2.5 and 2.8–5.4  $\mu\text{m}$  respectively).

Aladdin III InSb detector: 1024 x 1022 pixels, QE ~ 90% within 0.9–5  $\mu\text{m}$ .

### Science operations

GNIRS started regular queue operations on 2004B at GS. After a large fault in 2007 requiring major repairs at GN, it restarted queue operations at GN in 2010B.

Semester	Demand (% *)	Inst. allocation (% of total assigned)	Observed hours**	Hours lost to fault
2014B	23	27	167	5.1
2015A	22	24	202	5.9
2015B	25	25	210	7.3
2016A	19	16	161	

\* Fraction of total hours requested in all proposals received for the semester, per telescope.

\*\* Approximate on-sky use.

### Modes pending commissioning or non-operating

The short-red camera option is unavailable, one of the lenses was found cracked in 2012. A replacement has been obtained, but the repair is not yet planned.

A near-IR OIWFS is installed but is not commissioned

IFU mode damaged in the 2007 large fault and has not been replaced. It was based in a 5"x3" image-slicer and spatial sampling of 0.15", optimized for 1-2.5  $\mu\text{m}$ .

### Upgrades

Minimize vibration from the cold-heads (ongoing).

Replacement of the GNAAC detector controller to solve chronic faults (on-hold).