

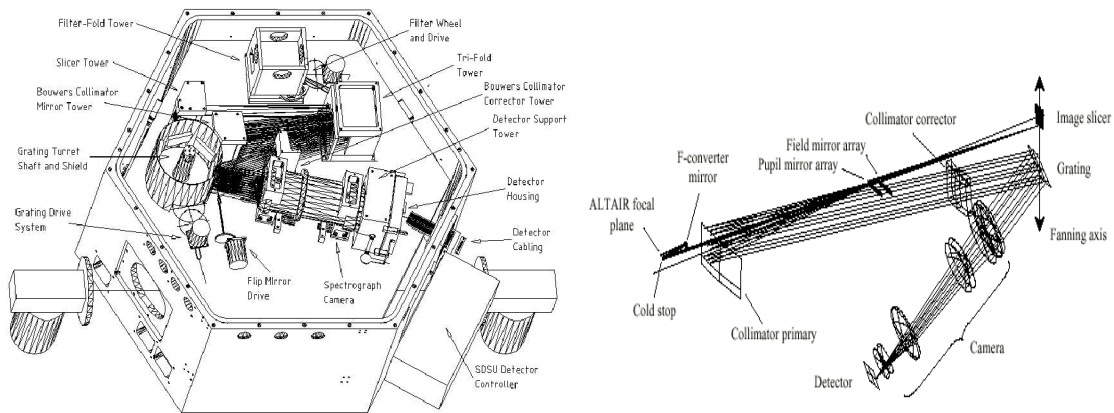
NIFS

Description

NIFS is an integral field spectrograph, covering a spectral range of 0.95–2.4 μm with spectral resolution $R \sim 5000$. It is designed for use with the ALTAIR AO system. The 3" x 3" integral field unit (IFU) is composed of 29 x 69 spaxels, each 0.1" x 0.04".

Core operating modes (3):

- The adaptive optics mode with ALTAIR achieves spatial resolution of 0.15". ALTAIR requires a tip/tilt guide star located nearer than 25" of the science target. The tip/tilt guide star has to be brighter than $R \sim 15$ and $R \sim 18.5$ mag for the non-laser and laser-guide star ALTAIR modes respectively.
- Used with natural seeing and guided with the telescope peripheral wavefront sensor (PWFS2) the achieved spatial resolution is 0.4", while the location of the guiding star can be as far as 6.5'.
- Coronagraphic mode using occulting disks of 0.2" and 0.5", suited to adaptive optics observations and best performing at H and K bands.



Components

Entrance window, F-converter mirror and cold stop. Pick-off mirror, which sends a 3" x 3" field into the spectrograph, while the rest goes into the OIWFS separated optical path.

Near-infrared On-instrument Wavefront Sensor (OIWFS) for tip-tilt guiding, slow flexure and tracking corrections, $K \sim 14.5$ mag. It has broadband filters, 2" FOV (within a 120" patrol field), HgCdTe 1024 x 1024 detector and 0.17"/pixel sampling.

Filter wheel, contains 3 order sorting filters (ZJ, JH, HK) and two neutral density filters to avoid saturation of very bright targets.

NIFS

Focal plane mask wheel, including two occulting disks for coronagraphy.

IFU optics:

- Concentric IFU re-imaging the focal plane at enlarged scale.
- Image slicer array, concave stack of 29 mirrors forming pupil images.
- Array of concave pupil mirrors re-imaging the focal plane at a de-magnified scale on an array of field mirrors.
- Array of field mirrors reformatting the input into a “long slit” array.

Bowers collimator made of spherical mirrors (primary and concentric meniscus).

Grating turret: Four gratings with spectral resolutions within the range 5000-6000 and working in the spectral ranges Z (0.94–1.15 μm), J (1.15–1.33 μm), H (1.49–1.80 μm), K (1.99–2.40 μm).

Refractive five-element camera with a focal length of 2.86 m.

Hawaii-2RG HgCdTe detector: 2048 x 2048 pixels, 0.9–2.4 μm working spectral range.

Science operations

NIFS started regular queue operations in 2006A at GN.

Semester	Demand (% *)	Inst. allocation (% of total assigned)	Observed hours**	Hours lost to fault
2014B	12	8	134.4	0.7
2015A	20	13	114.4	0.2
2015B	10	5	29.8	0.0
2016A	12	8	72.0	2.0

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

** Approximate on-sky use.

Modes pending commissioning or non-operating

OIWFS re-commissioning would allow minimizing flux losses due to flexure. Its NIR detector would allow expanding sky coverage to regions of high optical obscuration.

Upgrades

A spectro-polarimetry mode could be exploited by adding a Wollaston prism to NIFS and commissioning the GPOL unit at the same time (under consideration).