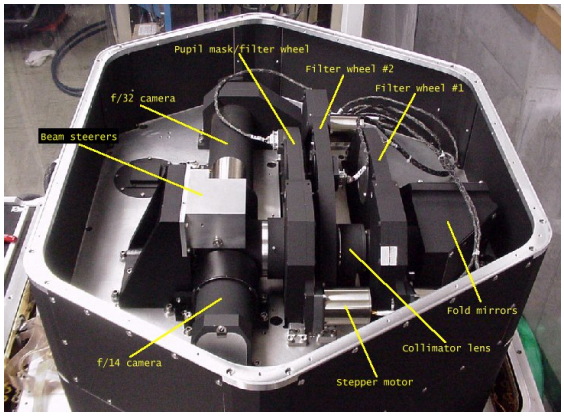
NIRI

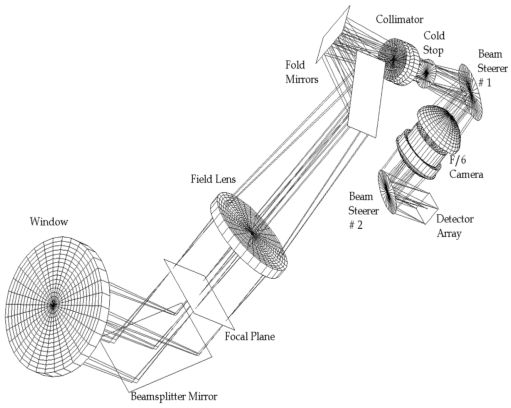
Description

NIRI is a multifunction spectrograph, covering the spectral range 0.9–5 μm, with a maximum field of 120" x 120" at 0.117"/pixel. NIRI is the primary infrared imager at Gemini North. It may be used with natural seeing or fed by ALTAIR, the adaptive optics system, which provides a corrected wavefront to the GN instruments.

Core operating modes (3):

- Natural seeing imaging with three camera options: f/32, f/14, and f/6, with sampling of 0.022, 0.050, and 0.117"/pixel, and fields of view (FOV) of 22" x 22", 51" x 51", and 120"×120", respectively. The f/32 mode is best suited for thermal imaging (2.5–5 μm).
- AO imaging fed by ALTAIR (with or without laser guide star), using the f/14 or f/32 camera options.
- Long slit spectroscopy, with or without adaptive optics, spectral resolution R ~ 500–1600 (currently unavailable).





Components

Beam splitter turret, with three beam splitter mirrors matching each camera FOV, plus a pinhole mask for optical alignment (currently not functional).

Focal plane mask wheel, with 8 slits available. Depending on the camera the width options range from 2 to 10 pixel, and the lengths are 22", 50" and 110" (currently not functional).

Field lens and then filter wheel #1. This filter wheel is for broadband non-tilted filters, like the Mauna Kea standard filters and spectroscopic order-sorting filters.

Fold mirrors and collimator multi-element lens.

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Filter wheel #2, holding tilted filters (to avoid reflections) in the collimated beam.
Filter wheel #3 in the pupil plane holding the a 38 mm cold stop, additional filters, dispersive elements and a Wollaston prism (uncommissioned). There are 8 grisms, which may be installed to provide low-resolution spectroscopy within the J, H, K, L, and M broad spectral bands (currently not installed).

Beam steerers (2): these steering mirrors direct the beam through one of the three cameras.

Pupil viewer system: made of two group of lenses to do telescope-instrument alignment and optimize the cold stops alignment (uses the f/32 camera).

Aladdin 1024 x 1024 InSb detector with ~90% peak QE, sensitive within 0.9–5.5 μm.

Science operations

NIRI started regular queue operations on 2001B.

Semester	Demand (% *)	Inst. allocation (% of total assigned)	Observed hours**	Hours lost to fault
2014B	7	13	134	3.6
2015A	10	6	77	1.2
2015B	12	8	114	2.2
2016A	8	10	131	2.6

* 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 focal plane mask mechanism is currently not working, which means that spectroscopic modes and the pinhole mask for measuring internal focus for each filter are unavailable (focus is estimated with the Altair calibration source).
The OIWFS was never commissioned, and is now deemed unnecessary given the low impact of flexure on imaging. Its NIR detector would allow expanding sky coverage to regions of high optical obscuration.

Upgrades

Polarimetric mode: the pupil wheel hosts a Wollaston prism and this upgrade is complementary to the GPOL unit commissioning (under consideration).
Wide field camera: an H4RG large detector (0.9–2.5 μm) and wide field optics could be installed in the path and volume of the OIWFS system (under consideration).
Detector controller: replacement of the GNAAC by a more reliable controller (on hold).