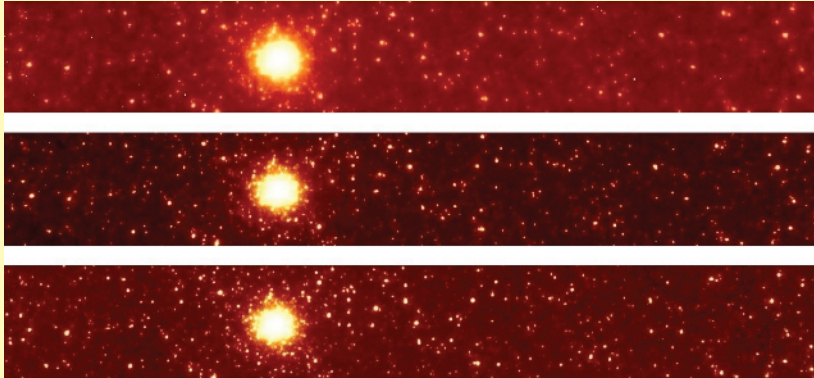


Some information herein was excerpted from IGO Web pages.

For complete information, please see:

<http://www.gemini.edu/sciops/instruments/niri>

<http://www.gemini.edu/sciops/instruments/altair>



These J, H, and K (top, middle, bottom, respectively) images of the core of M33 show the remarkable new performance possible with Altair (the facility adaptive optics system) and NIRI. Strehl ratios at large distances from the wavefront sensor (WFS) star (up to ~ 30") are much improved with a new field lens. The images above cover roughly 45" and all use the core of M33 as the Altair WFS star. See <http://www.gemini.edu/sciops/instruments/altair/altairFieldLens.html> for details. Image Credit: Gemini Observatory.

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Queries for Gemini-specific issues should be directed to the Gemini HelpDesk at:

<http://www.gemini.edu/sciops/helpdesk/helpdeskIndex.html>

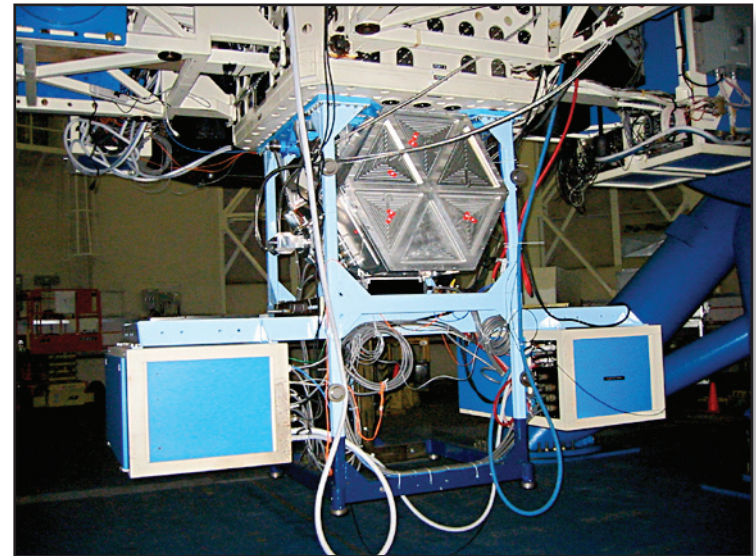
Cover image courtesy of K. W. Hodapp, Institute for Astrophysics, Univ. of Hawaii.



December 2007

NIRI

Near-IR Imager and Low-Resolution Spectrograph



This image shows NIRI mounted on the uplooking port at Gemini North.

*Offered at **Gemini North***



NIRI Instrument Properties

Detector 1024 × 1024 pixel ALADDIN InSb array, sensitive from 1 to 5 μm.

The Aladdin detector has uniform response and low dark current. Various size centered subarrays may be read out instead of the full 1024×1024 array. The bias voltage may be adjusted to modestly increase the well depth for thermal IR (L and M band) observations. The NIRI array is read out in different modes for different kinds of observations that trade read noise against integration time:

1) at **high background** (e.g., thermal IR), the array is read once at the beginning and once at the end of the exposure and the difference is recorded; RN=70e, min exp time is 0.18 sec*

2) at **medium background** (e.g., broad band JHK imaging) the same basic mode is used, but beginning and end reads are digitally averaged 16 times; RN=35e, min exp time is 0.55 sec*

3) at **low background** (e.g., 1-2.5 μm narrow band imaging and 1-2.5 μm faint object spectroscopy), the array is read 16 times at the beginning and the end of the exposure, with the above digital averaging also taking place during each read; RN=12e, min exp time is 8.8 sec*

**numbers given are for full array*

Imaging Mode

Both classical and queue mode observations supported.

Three Cameras and Pixel Scales:

- f/32 at 0.022 arcsec/pixel over 22 × 22 arcsec
- f/14 at 0.050 arcsec/pixel over 51 × 51 arcsec
- f/6 at 0.117 arcsec/pixel over 120 × 120 arcsec

Filters: J, H, K, K_S, K', L', M' broad-band filters and a full complement of line and feature narrow-band filters

Spectroscopic Mode

- Moderate resolution long-slit grism spectroscopy
- The available slit widths (optimized for the f/6 camera) are ~ 0.23, 0.46, and 0.69 arcsec (2, 4, and 6 pixels) wide and 50 arcsec long.

- Spectral Resolution over each complete spectroscopic band: J (770/610/460), H (1650/825/520), K (1300/780/550), L (1100/690/460), M (1100/690/460)

Spectroscopic observations are currently available in queue and classical modes.

Guiding Options – Guide Stars

The peripheral wavefront sensors (PWFS), which are usable in a number of optical bands and cover up to a 7' patrol field (but are not mechanically part of NIRI), can be employed to provide fast guiding, focus, and low order M1 adjustments. PWFS2 should be used for most programs.

NIRI has a near-IR on-instrument wavefront sensor (OIWFS) to provide fast guiding information in optically obscured regions or to account for flexure between NIRI and the adaptive optics system (see below).

The OIWFS is not currently available.

Adaptive Optics

NIRI can operate in conjunction with Altair, a natural guide star and laser guide star adaptive optics system for the Gemini North telescope built at the Herzberg Institute for Astronomy. Both imaging and spectroscopy are supported at f/32:

- 1-2.5 μm imaging (broad band and narrow band filters) and L' (for point sources)
- 1-2.5 μm low resolution grism spectroscopy. Slit widths at f/32 are 0.09", 0.14", 0.23". Spectral resolutions are similar to those for f/6; see the NIRI Web pages for details.
- A laser guide star (LGS) is available for use with Altair. Tip-tilt natural guide stars must be available (R < 18 within 25 arcsec). See Altair Web pages for details.
- A new field lens provides much improved performance at off-axis positions from the WFS star. See the Altair Web pages for details.

Telescope - Gemini North