

U S G P

U.S. GEMINI PROGRAM

Status of the Gemini Telescopes

Bob Schommer

News from the frontlines continues to be very positive. The TACs have met and telescope time apportioned, and the QuickStart queue results posted on the Gemini Web site. As of this writing (mid-July), the first demonstration science program on Gemini North has begun (with Hokupa'a and QUIRC), and successful data have been taken over several nights (see accompanying article). The 10- μ m demonstration science effort is to occur in August with OSCIR, and the first QuickStart observations for the community are scheduled for September. The performance of the Gemini North telescope system in the early July runs has been very good, and efficiencies and system overheads are being evaluated. Pointing tests with a new model show an rms scatter of 0.6". While there are good and not so good moments, the prognosis looks very encouraging for the early science efforts.

The 75% of the telescope time that is assigned to engineering will also be used to commission NIRI, the University of Hawaii 1-5 μ m imager and grism spectrometer (see accompanying instrumentation article). These on-telescope tests begin in August. Many interactions must be analyzed, as this is the first facility instrument Gemini will implement. Near the end of the semester, GMOS should be delivered, and testing of that facility instrument on Gemini North should occupy parts of early 2001. The Gemini North AO system, ALTAIR, is expected a few months later.

On Gemini South, the telescope is being fully wired and assembled, and windshake and dome tests are proceeding. The secondary is due to be aluminized at CTIO in early August, and first light is expected in September or October. The commissioning instrument is the NOAO infrared camera Abu, returned from the SPIREX program at the South Pole. The Gemini South science start is scheduled for June 2001. The first instruments are expected to be an 8-25 μ m thermal camera, T-ReCS, and two shared visitor instruments—FLAMINGOS, provided by the University of Florida team led by Richard Elston, and Phoenix, a 1-5 μ m high-resolution spectrograph from NOAO, with instrument scientist Ken Hinkle leading the effort.

The Gemini personnel and science staffs continue to be assembled, and the first astronomers are arriving in Chile; two Gemini fellows and a staff astronomer have recently docked in La Serena. While they and the telescope have experienced a chilling (and snow covered) Chilean winter, the southern effort remains significantly ahead of schedule.

How to Contact the US Gemini Program

The Web	http://www.noao.edu/usgp
Questions	gemini@noao.edu
E-mail a staff member	first initial+last name@noao.edu

Gemini Demonstration Science Programs

Bob Schommer, R. Blum, and Patrice Bouchet

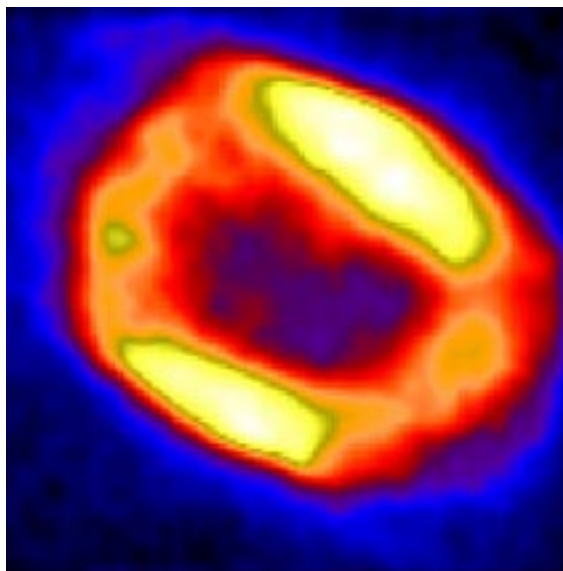
Over the past several months, two international teams have been assembled, led by Phil Puxley and François Rigaut of the Gemini Observatory. These teams are exploring the science capabilities of the Gemini telescopes with the two visitor instruments provided by the University of Hawaii and the University of Florida. These instruments are available for the QuickStart first semester, but their performance on the Gemini telescope was only known from predictions and extrapolations. The teams have targeted two science programs, the Galactic Center and a 10- μm deep field, and will devote about a week of observations to each target. The data will be made available to the international community as soon as feasible; updates of the system performance will be placed on the Web sites and in instrument manuals in time for the September proposal cycle for the 2001A semester.

The Galactic Center Demonstration Science team completed a successful first run (during 1–9 July 2000) using the University of Hawaii Hokupā'a adaptive optics system and the QUIRC near-infrared imager on the Gemini North 8-m telescope. The team, led by François Rigaut of Gemini, obtained H (1.65 μm) and K-band (2.2 μm) images over nearly a square degree (the FOV of QUIRC is 20 arcsec).

The Demo Science team will reduce the data set (including narrow-band images in the 2.3- μm CO bandhead to be taken at the end of July and beginning of August) and release it to the Gemini community in mid-October. Science topics that will be addressed with the data set include the star formation history in the Galactic Center, the distribution of late-type stars and the dynamical relaxation in the nuclear cluster, variability of the IR counterpart to the radio source SgrA* (commonly thought to be associated

with the central black hole), and investigations of the stellar content of the SgrA* stellar cluster (see for example, Ghez et al. 1998, *ApJ*, 509, 678), to name just a few.

Led by Gemini scientist Phil Puxley, the second Demonstration Science program will focus on producing deep 10- μm images of four SCUBA/ISO sources using the University of Florida's OSCIR 8-25 μm imager/spectrometer. These observations will begin in August. The science goals include identifying the sources and detecting structure and morphology.



The first successful engineering run on Gemini North in June for OSCIR demonstrated that both guiding and chopping work effectively. For this 10- μm image of the planetary nebula NGC 7027, Gemini North executed precise 10 arcsec "chopping" at 3 Hz. The field of view here is about 9 arcsec on a side.

US Gemini Instrumentation Program Update

Taft Armandroff and Mark Trueblood

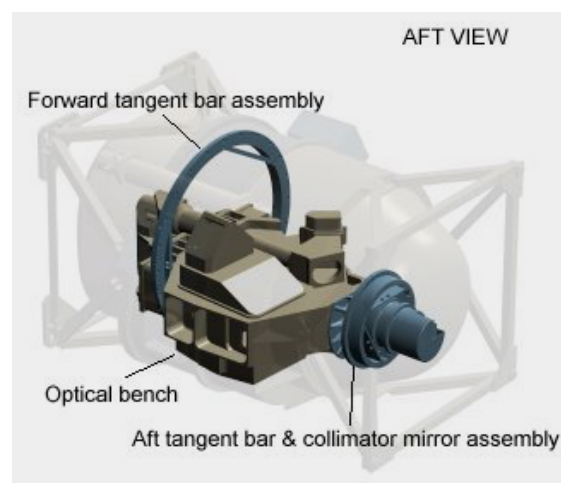
USGP activities to provide instrumentation for the Gemini telescopes, both in-house at NOAO and in the wider community, continue to progress. This article gives status updates as of late July.

NIRI is a 1-5 μm imager with three pixel scales, designed and built by Klaus Hodapp and his team at the University of Hawaii. In *NOAO Newsletter* No. 62, we described a series of NIRI cold cycles to carry out tests and check fixes to problems discovered in previous cycles. Since that time, all significant NIRI issues have been successfully resolved. NIRI passed its Pre-Ship Acceptance Test in Honolulu in May. NIRI was then shipped to the Gemini Northern Operations Center in Hilo and set up in the instrument lab. A team of controller and detector experts from NOAO traveled to Hilo in June and successfully resolved problems with ringing in the NOAO-supplied NIRI array controller. Delivery of the one frame-per-second upgrade to the NIRI controller by NOAO is planned for early fall. On-telescope final acceptance testing of NIRI is planned on Mauna Kea in August.

T-ReCS, the Thermal Region Camera and Spectrograph, is a mid-infrared imager and spectrograph for the Gemini South telescope, under construction at the University of Florida by Charlie Telesco and his team. The majority of the T-ReCS optics have been received and inspected, including the critical diamond-turned mirrors. Also, mechanical parts fabrication is nearing completion and mechanical assembly has begun. A USGP Quarterly Review of T-ReCS took place on July 18. The team plans acceptance testing on Gemini South in May 2001.

GNIRS, the Gemini Near-Infrared Spectrograph, is a long-slit spectrograph for the Gemini North telescope that will operate from 1 to 5 μm and will

offer two plate scales and a range of dispersions. The project is being carried out at NOAO in Tucson under the leadership of Neil Gaughan (Project Manager) and Jay Elias (Project Scientist). GNIRS held a Pre-Fabrication Review on May 11 and 12. The review committee examined the GNIRS team's progress on mechanical design, mechanical analysis, thermal analysis, software design, and prototyping efforts in the areas of cold motors, mechanism drives, and lens mounts; they delivered a positive report. The project is now completing the detailed design stage, while initial fabrication has begun for those sub-assemblies for which design is complete. The critical optics have been ordered and somewhat over one-third have been delivered and accepted. GNIRS delivery is planned for July 2002.



The Gemini Near InfraRed Spectrograph (GNIRS) passed Pre-Fabrication Review, and fabrication of some sub-assemblies has begun at NOAO.

NICI, the Near Infrared Coronagraphic Imager, is funded by monies directed via a proposal from the NASA Origins Program to NOAO. NICI will provide a 1-5 μm infrared coronagraphic imaging capability on the Gemini South telescope. Mauna Kea InfraRed (MKIR) was the successful competitive bidder for the NICI conceptual design study and the only respondent to an RFP for building the instrument. As described in *NOAO Newsletter* No. 62, a conceptual design review of MKIR's concept for NICI, followed by a procurement review of their proposal, was conducted on April 18 and 19. Currently, MKIR is honing its concept for the instrument and its project plan, based on feedback from the review committee. NOAO and MKIR are negotiating the contract for NICI procurement.

FLAMINGOS 2 is a concept for a near-infrared multi-object imaging spectrograph for the Gemini South telescope, developed by Richard Elston and his team at the University of Florida. The FLAMINGOS 2 concept builds on the heritage of the FLAMINGOS imaging spectrograph (FLAMINGOS will be offered as a visitor instrument on Gemini). FLAMINGOS 2 has been developed in response to the "Gap Filler" opportunity for Gemini South, wherein the relatively rapid deployment of a near-infrared spectroscopy and imaging capability is sought. A conceptual design review of FLAMINGOS 2 was held on April 28. A parallel review was conducted for a competing instrument, IRIS-2g (proposed by the Anglo-Australian Observatory). The Gemini review committee judged FLAMINGOS 2 to be more suitable for Gemini's needs and aspirations. Currently, the International Gemini Project, USGP, and Florida are discussing strategies for procuring FLAMINGOS 2, subject to Gemini's financial and programmatic constraints.

US Gemini SAC Meets in Pasadena

R. Schommer and C. Pilachowski

The US Gemini Science Advisory Committee, which advises the US Gemini Program on issues related to the Gemini Observatory, met at the Observatories of the Carnegie Institution of Washington in Pasadena in May. The primary issues for discussion included a review of NOAO's allocation process for Gemini telescope time and plans for Gemini instrumentation.

The US SAC offered congratulations to the International Gemini Observatory on the upcoming start of scientific observing. Committee member Suzanne Hawley writes, "We were very pleased to see the large number of excellent US Demo Science and Quick-Start proposals for Gemini time during this first shared-risk semester. The community is clearly very interested in using the Gemini telescopes early and often! The proposal response is especially gratifying for those working behind the scenes to get the telescopes up and running with visitor instruments as early as possible."

The SAC urged NOAO to continue its efforts to provide a level of Gemini investigator support consistent with the quality of service that NOAO already provides to users of its other facilities. The SAC wished particularly to see improvement in the documentation for observers, including instrument calibration requirements; definition of standard,

continued

How to obtain more information on these instrument projects.

Gemini	http://www.us-gemini.noao.edu/sciops/instruments/instrumentsIndex.html
NIRI	http://kuponon.ifa.hawaii.edu/WEB/NIRI/NIRI1.html
T-ReCS	http://t-recs.astro.ufl.edu/
GNIRS	http://www.noao.edu/ets/gnirs/
FLAMINGOS	http://www.astro.ufl.edu/~elston/flamingos/flamingos.html

recommended calibration procedures; and a grid of calibration stars for AO instruments. It is understood that documentation on instrument performance will improve as experience is gained.

Concerning instrumentation, the US SAC found that the ongoing instrumentation program offers compelling and exciting scientific opportunities to the Gemini community. This program comprises the instruments under construction (NIRI, GNIRS, GMOS, Michelle, HROS, T-ReCS, and NICI), as well as visitor instruments and proposed instruments such as a wide-field, IR, multi-object spectrograph MOS, and a high-stability laboratory spectrograph. The SAC urged continued support for this suite of instruments as the highest priority of the Gemini instrumentation program, both to allow productive use of telescope time and to establish a broad-based user community for Gemini.

The SAC also reviewed Gemini plans for a Multi-Conjugate Adaptive Optics (MCAO) system, which would provide adaptive optics correction with stable point-spread functions over fields of view on the order of $1'$. Such a system would provide exciting scientific opportunities for the US community. The US Gemini SAC encouraged the Gemini Observatory to convene

a science workshop to consider the MCAO science capabilities and instruments, with wide input from all Gemini communities. (This international workshop will be held in October, jointly with the Center for Adaptive Optics.)

There was also sentiment among the US SAC that a workshop should be held on the role of Gemini in the next decade. With the recent release of the US, Canadian, and Australian decadal reviews, and the coming and current satellite (Chandra, SIRFT, MAP) and millimeter wavelength facilities (e.g., ALMA), the possible strategy for 8-m and larger telescopes in the next decade, both for AO and for wide-field survey science, has become a significant topic.

Finally, we wish to convey our thanks to both Suzanne Hawley and Buell Jannuzi, who are rotating off the US Gemini SAC after several years of service. We are grateful to them, for the US community has gained much from their wisdom and commitment to Gemini. We also welcome Bob Williams, a new member of the US Gemini SAC. The full membership of the US Gemini SAC can be found at <http://www.noao.edu/usgp/org/ussac.html>.



US SAC members Robert Joseph (Hawaii), Larry Ramsey (Penn State), and Suzanne Hawley (Washington) continue discussions during lunch in Pasadena.
