Gemini Classical and Queue Observing Opportunities for Semester 2009A

Verne V. Smith

Semester 2009A runs from 1 February 2009 to 31 July 2009, and the NOAO Gemini Science Center (NGSC) encourages the US community to propose for Gemini observing time during 2009A. The Gemini Observatory provides unique opportunities in observational and operational capabilities, such as the ability to support both classically and queue scheduled programs. In an effort to increase interactions between US users and the Gemini staff, as well as observing directly with the telescopes and instruments, **NOAO strongly encourages US proposers to consider classical programs, which can be as short as one night, on the Gemini telescopes.**

US Gemini observing proposals are submitted to and evaluated by the NOAO Time Allocation Committee (TAC). The formal Gemini Call for Proposals for 2009A will be released in late August 2008 (before the mailing of this *Newsletter* issue), with a US proposal deadline of Tuesday, 30 September 2008. As this article is prepared well before the release of the Call for Proposals, the following list of instruments and capabilities are only our expectations of what will be offered in semester 2009A. Please watch the NGSC Web page (*www.noao.edu/usgp*) for the Gemini Call for Proposals, which will list clearly and in detail the instruments and capabilities that will be offered.

NGSC anticipates the following instruments and modes on Gemini telescopes in 2009A:

Gemini North:

- Near-infrared Integral Field Spectrometer (NIFS).
- Near Infra-Red Imager (NIRI) and spectrograph with both imaging and grism spectroscopy modes.
- Altair adaptive optics (AO) system in Natural Guide Star (NGS) mode, as well as in Laser Guide Star (LGS) mode. Altair can be used with NIRI imaging and spectroscopy and with NIFS IFU imaging and spectroscopy, as well as NIFS IFU spectral coronagraphy.
- Michelle, mid-infrared (7-26 microns) imager and spectrometer, which includes an imaging polarimetry mode.
- Gemini Multi-Object Spectrograph (GMOS-North) and imager. Science modes are multi-object spectroscopy (MOS), long-slit spectroscopy, integral-field unit (IFU) spectroscopy and imaging. Nod-and-shuffle mode is also available.
- All of the above instruments and modes are offered for both queue and classical observing, except for LGS which is available as queue only. **It is important to note that classical runs are now offered to programs that are one night or longer, and which consist of integer nights.** The offer of one-night classical runs opens up the possibility of many more Gemini programs being eligible for classical observing, if the program Principle Investigators (PIs) want to use this mode.
- Details on use of the Laser Guide Star (LGS) system can be found at *www.gemini.edu/sciops/ObsProcess/ObsProcIndex.html* , but a few points are emphasized here. Target elevations must be >40 degrees and proposers must request good weather conditions (Cloud Cover=50 percent, or better, and Image Quality=70 percent, or better, in the parlance of Gemini observing conditions). Proposals should specify "laser guide star" in the resources section of the observing proposal. Because of the need for good weather, LGS programs must be ranked in Bands 1 or 2 to be scheduled on the telescope.
- Time trades will allow community access to the high-resolution optical spectrograph, HIRES, on Keck, as well as to the Suprime-Cam wide-field imager and the infrared imager and spectrograph (MOIRCS) on Subaru.
- Gemini Near-Infrared Spectrograph (GNIRS) commissioning during 2009A. The repair and refurbishment of GNIRS continues in Hilo and it is planned that sometime during 2009A the spectrograph will be deployed on Gemini North to undergo commissioning on this telescope. GNIRS will not be available as a general user instrument in the 2009A Call for Proposals, however, its commissioning on Gemini North may affect the telescope schedule.

Gemini South:

- Thermal-Region Camera Spectrograph (T-ReCS) mid-infrared (7-26 microns) imager and spectrograph.
- Gemini Multi-Object Spectrograph (GMOS-South) and imager. Science modes are multi-object spectroscopy (MOS), long-slit spectroscopy, integral-field unit (IFU) spectroscopy and imaging. Nod-and-shuffle mode is also available.
- Phoenix, the NOAO high-resolution infrared spectrograph (1-5 microns) is expected to be available during 2009A, although the likely appearance of both FLAMINGOS-2 and the multi-conjugate adaptive optics system CANOPUS on the telescope may impact the scheduling of Phoenix. Users should keep an eye on either the Gemini Web site (*www.gemini.edu*) or the NGSC site (*www.noao.edu/usgp/*) for the most up-to-date information about Phoenix.
- Near-Infrared Coronagraphic Imager (NICI). With the planned beginning of the science campaign in semester 2008B, NICI is expected to be available for general user proposals in 2009A. NICI will be scheduled as a shared-risk instrument and can only be used in on-axis coronagraphic imaging mode.
- All modes for GMOS-South, T-ReCS, Phoenix, and NICI are offered for both queue and classical observing. **As with Gemini North, classical runs are now offered to programs with a length of at least one or more of integer nights**.

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Detailed information on all of the above instruments and their respective capabilities is available at *www.gemini.edu/sciops/instruments/instrumentIndex.html*.

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Gemini Observing Opportunities for Semester 2009A continued

The percentage of telescope time devoted to science program observations in 2009A is expected to be greater than 80 percent at Gemini North and greater than 70 percent at Gemini South.

We remind the US community that Gemini proposals can be submitted jointly with collaborators from other Gemini partners. An observing team requests time from each relevant partner. Multi-partner proposals are encouraged because they access a large fraction of the available Gemini time, thus enabling larger programs that are likely to have substantial scientific impact. Please note that all multi-partner proposals must be submitted using the Gemini Phase I Tool (PIT).

Note that queue-proposers have the option to fill in a so-called "Band 3" box, in which they can optimize their program execution if it is scheduled on the telescope in Band 3. Historically, it has been found that somewhat smaller than average queue programs have a higher probability of completion if they are in Band 3, as well as if they use weather conditions whose occurrences are more probable. Users might want to think about this option when they are preparing their proposals.

Efficient operation of the Gemini queue requires that it be populated with programs that can effectively use the full range of observing conditions. Gemini proposers and users have become increasingly experienced at specifying the conditions required to carry out their observations using the online Gemini Integration Time Calculators (ITCs) for each instrument. NGSC reminds you that a program has a higher probability of being awarded time and being executed if ideal observing conditions are not requested. The two conditions that are in greatest demand are excellent image quality and no cloud cover. We understand the natural high demand for these excellent conditions, but wish to remind proposers that programs that make use of less than ideal conditions are also needed for the queue.

There is continuing need for proposals that can be run under the poorest conditions. To help fully populate the queue, a category for poor weather proposals has been established. Poor weather programs may be submitted for any facility instrument: for these proposals, neither the PI nor the partner country will be charged for any time used. For additional information, please see the link at: *www.gemini.edu/sciops/ObsProcess/ObsProcCfP_background.html*

NOAO accepts Gemini proposals via either the standard NOAO Web proposal form or the Gemini PIT software. We note to proposers who plan to use the PIT that NOAO offers a tool that allows one to view how their PIT proposal will print out for the NOAO TAC (please see *www.noao.edu/noaoprop/help/pit.html*).

Feel free to contact me (*vsmith@noao.edu*) if you have any questions about proposing for US Gemini observing time.

Suitable 2009A Gemini Queue Programs May Be Offered Classical Time

Verne V. Smith, Todd Boroson & David Silva

The two Gemini telescopes provide several unique and powerful capabilities to US observers, including full-sky coverage with 8-meter telescopes, excellent mid-infrared sensitivity, and the ability to support flexible queue-scheduled programs (including targets of opportunity or synoptic observations) at any level of available science observing time. Although Gemini can support 100 percent queue observing, it was not envisioned that the observing time should in fact be all queue; Gemini can also be used in classical observing mode. Historically, about 10-20 percent of the US time on Gemini has gone to classically scheduled programs.

The evolution to largely queue-scheduled telescopes has placed Gemini in a unique position within the ground-based optical/infrared "system" of telescopes available to US observers, in that it has led to a rather small number of users having actually traveled to the telescopes, observed with them directly, or even visited the Gemini offices. Direct usage of the telescopes and instruments, as well as close interactions between the users and the Gemini staff astronomers, is mutually beneficial to the user community and Gemini staff. Because of such benefits, NOAO encourages US users to consider applying for classical observing on the Gemini telescopes if their proposed programs are suitable. The only restriction on classical requests is that they cover integer nights with a one-night minimum.

In addition to interaction with the staff and direct usage of the telescopes, classical observing has other advantages for certain programs. It allows modifications of the program in real time and the ability to choose the sequence of the observations, and can result in increased efficiency. The principle investigator (PI) can verify what is being done, for instance with critical positioning, when he or she is in the control room.

In an effort to increase the fraction of classical programs within the US share of time, NOAO may identify a subset of Gemini programs submitted as queue mode that would benefit from classical scheduling. The PIs of these programs would be contacted about the possibility of switching to classical mode. If they accepted classical, the PI plus one other observer if needed would have all of their travel expenses paid by NOAO. These visits to the telescopes and offices would be of benefit to both the US users and the Gemini staff and will help all of us in planning for the long-range scientific and operational goals for Gemini.

Comments or questions about this plan can be addressed to Verne Smith, Director of the NOAO Gemini Science Center, via email (*vsmith@noao.edu*) or telephone (520-318-8453).

The Personal Contact Option for the Gemini HelpDesk

Verne V. Smith & Ken Hinkle

The NOAO Gemini Science Center (NGSC) would like to announce an additional option as part of the Gemini HelpDesk system for US users. The current Gemini HelpDesk is a Web-based interface (*www.gemini.edu/sciops/helpdesk/*) through which you can send questions or make requests for information about Gemini to NGSC. Although using the Web is a quick and easy way to submit questions, we are now adding the option of contacting a person at NGSC directly, if this is your preference.

Astronomers at US institutions may now either use the Gemini HelpDesk or email questions and requests directly to *gemini-help@noao.edu*. Emails sent to this address will be handled initially by Ken Hinkle, Sally Adams, and Verne Smith, who will work with users to answer questions. Ken can also be contacted by phone at 520-318-8298. In some cases, your questions may be answered directly; in other cases, they may be forwarded to another NGSC astronomer or directed to the Web-based HelpDesk, if that is the best option. We can also help you enter your request into the HelpDesk system.

This new option is not a substitute for the current HelpDesk, but rather an addition that may be useful for certain types of questions or for those users who feel inclined to deal directly with NGSC staff.

The Joint Subaru/Gemini Conference "Cosmology Near and Far: Science with WFMOS"

Katia Cunha & Arjun Dey

Members of the Gemini and Subaru astronomical communities met in May to discuss a vast array of science cases that would be enabled by the future deployment of two new instruments on the Subaru telescope: the Gemini Wide-Field Multi-object Spectrograph (WFMOS) and the HyperSuprime Camera (HSC). The meeting, titled "Cosmology Near and Far: Science with WFMOS" (*www.naoj.org/Information/News/wfmos2008/*) was held in Waikoloa, Hawaii, and was hosted jointly by the Subaru and Gemini observatories.

This gathering provided a venue for the Gemini and Subaru communities to discuss not only key programs such as Galactic Archaeology and Dark Energy Survey Science, but also smaller principle investigator-led research projects enabled by WFMOS that cut across a wide array of science topics. In a panel discussion session held at the end of the meeting, Subaru and Gemini representatives discussed the impact on their respective user communities in undertaking such large and expensive projects, but it was acknowledged that the scientific potential of this relatively unique and highly-multiplexed capability was enormous.

The conceptual design studies for WFMOS are currently underway (see the WFMOS update article in this section), and 2009 represents the decision point for both Subaru and Gemini on whether or not to proceed with WFMOS. The observatories are expanding the cross-section between their user communities by jointly organizing the next Gemini Science Meeting to be held in Kyoto, Japan in May 2009 (*www.gemini.edu/node/10981*).

All the presentations made at the Waikoloa meeting may be found on the Web (*www.naoj.org/Information/News/wfmos2008/*). This meeting was co-sponsored by the US National Optical Astronomy Observatory, the Japan Society for the Promotion of Science, the UK Science and Technology Facilities Council, and Astronomy Australia Limited.

Participants at the joint Subaru/Gemini WFMOS Science conference in Waikoloa, Hawaii, May 2008.

The Gemini/Subaru Wide-field Fiber Multi-Object Spectrograph (WFMOS): An Update

Arjun Dey, Katia Cunha & Verne V. Smith

The Wide-Field Multi-Object Spectrograph (WFMOS), which will be deployed on the Subaru telescope as a collaborative project of the Gemini and Subaru communities, is being designed to provide an unmatched combination of multi-object spectroscopy and field of view. Capable of simultaneously targeting over 3,000 objects in a single 1.5-degree field, WFMOS will enable astrophysical investigations of unprecedented scale. Its initial key scientific goals are to provide stringent constraints on the redshift evolution of the equation of state of dark energy, unravel the formation history of our own Galaxy, and undertake the high-redshift equivalent of the Sloan Digital Sky Survey galaxy surveys. In addition to these large survey programs, a wide variety of smaller, principle investigator (PI)-driven projects will be possible with the unique capabilities provided by WFMOS.

In March 2005, an international team led by the Anglo-Australian Observatory (and including NOAO; Johns Hopkins, Oxford, Durham, and Portsmouth universities; and the Canadian Astronomy Data Center) completed a feasibility study of the WFMOS for both the Gemini and Subaru Observatories (*www.gemini.edu/files/docman/science/aspen/WFMOS_feasibility_report_public.pdf*). This study was favorably reviewed by an independent committee appointed by the Gemini Observatory, and by the Gemini Science Committee and the Gemini Board. The committee report concluded that "WFMOS offers the most transformative science opportunities" of any of the future Gemini instruments. In August 2005, the Gemini Board recommended that Gemini Observatory proceed with a conceptual design study of WFMOS (*www.gemini.edu/index.php?option=content&task=view&id=145*).

Due to the large cost and size of the instrument, Gemini was encouraged to explore possible partnerships with the Subaru Observatory and the Japanese community to share telescope time and resources in making WFMOS a reality. Since the Subaru Observatory was in the process of designing a large prime-focus corrector for an ambitious new wide-field imager, the HyperSuprime Camera, a cost-saving opportunity was identified if the two wide-field instruments could share the corrector.

Hence, in September 2005, the Gemini Observatory issued an announcement of opportunity for two conceptual design studies of WFMOS on the Subaru telescope (*www.gemini.edu/index.php?option=content&task=view&id=148*). The design studies are currently under way. Two teams have been chosen for the study, one led by the Anglo-Australian Observatory (Sam Barden, PI) and the other by California Institute of Technology (Richard Ellis, PI). Both teams include large international collaborations, and are working in concert with members of the Subaru community to investigate the scientific potential of WFMOS. In parallel, the Subaru Observatory has commissioned a design study for the prime-focus corrector and is examining telescope and facility modifications needed to accommodate WFMOS and HyperSuprime Camera. The groups are also investigating the impact of both instruments on the telescope and operations.

Independent of the proposed collaborative development of WFMOS, Gemini and Subaru have already initiated a program to share telescope time starting in 2006B using existing instrumentation at these observatories. Subaru and Gemini have also jointly organized two science meetings – "Probing the Dark Universe with Subaru and Gemini," in November 2005, and "Cosmology Near and Far: Science with WFMOS," in May 2008 (see accompanying article) – to explore the wide range of astrophysics enabled by both HyperSuprime Camera and WFMOS working in concert.

The conceptual design studies for WFMOS are scheduled to be completed by March 2009. If the conceptual design studies are favorably reviewed by Subaru and Gemini, and if the two observatories can identify the resources to build WFMOS and reach an equitable and mutually beneficial agreement for its development and operation, WFMOS will proceed to a build phase. The incredible scientific promise of both WFMOS and HyperSuprime Camera will—we hope—motivate the observatories to collaborate on these instruments, for the mutual benefit of the Gemini and Subaru communities. We look forward to the successful completion of the concept studies.

Kyoto Joint Subaru/Gemini Science Conference in May 2009

The Subaru and Gemini observatories have announced a jointly sponsored science meeting to be held 18-21 May 2009 at Kyoto University, Kyoto, Japan. The two main goals of the conference are to promote a mutual understanding of both communities via the presentation of research results from the two observatories, and to highlight the international nature of astronomy. Other goals include:

- Better understanding of the Subaru and Gemini instruments and science programs
- Fostering scientific collaborations
- Defining key areas of 'niche science' for both observatories

In addition to the joint science meeting, a Gemini Users Meeting will be held on May 22 at the same venue. For additional information, see *www.gemini.edu/node/10981*. We encourage interested US astronomers to plan to attend this broad international science meeting.

Report of a Classical Gemini-Subaru Exchange Program Observing Run

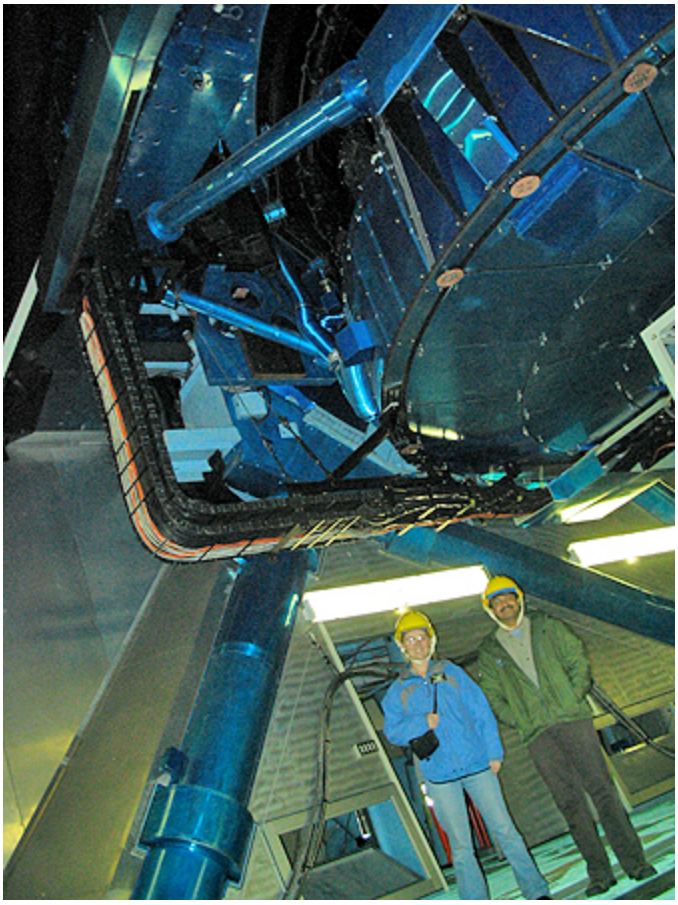
Moire Prescott (University of Arizona)

The copious Lyman-alpha (Lyα) emission of Lyα nebulae and their association with other galaxy populations, such as Lyman Break Galaxies and Submillimeter Galaxies, has led to the suggestion that Lyα nebulae are sites of ongoing massive galaxy formation sitting in overdense regions of the Universe.

Through the 2008A Gemini-Subaru Time Exchange Program, my collaborators Nobunari Kashikawa (National Astronomical Observatory of Japan), Yuichi Matsuda (Kyoto University), PhD advisor Arjun Dey (NOAO), and I were awarded one night at the Subaru Observatory. We used the SuprimeCam wide-field optical imager to complete a one-square-degree intermediate-band imaging survey of the environment of one of the largest Lyα nebulae known (Dey et al. 2005, ApJ, 629, 654). Unlike most other large Lyα nebulae, which have been found in narrowband surveys of known galaxy overdensities, the Dey et al. Lyα nebula was found at z~2.7 without any a priori knowledge of its surroundings. This provided an unbiased test of the association between large Lyα nebulae and overdense environments. Subaru/SuprimeCam was an ideal match for our program, combining a large aperture, wide-field coverage, and a high throughput intermediate-band filter centered on the z=2.7 Lyα emission line.

In early April, Arjun Dey and I flew to Hawaii for our one-night run at Subaru. To avoid the height of festival tourist season in Hilo, where the Subaru base facility is located, we were assigned to summit observing and spent the night prior to our run halfway up Mauna Kea at Hale Pohaku. The support astronomer for SuprimeCam, Dr. Miki Ishii, accompanied us to the summit to begin calibrations and introduced us to the telescope operator, Alanna Garay. While waiting for sunset, we donned construction helmets and walked through the labyrinthine network of hallways and elevators, thoughtfully labeled in English and Japanese, to pay a visit to the telescope. The Subaru dome is immense, but the telescope itself is tucked so snugly into its chamber, it is difficult to appreciate just how big the 8.2 meters of glass and the brilliant blue 22.2-meter telescope structure really are.

We encountered a few dome and rotator issues during evening twilight, but thanks to the support provided by Garay and Ishii, and the 0.6-1.1 arcsec seeing throughout the night, we succeeded in completing our one-square-degree survey on schedule. Prior to the run, we had submitted an operations file specifying all the observing commands to be used during the run. During the observations, the file can be edited by the operator or support astronomer in real time to tweak a position, change an exposure time, repeat an observation, or skip an entire section of the program, as necessary. We found the net result to be a remarkably efficient observing system that preserved the flexibility we needed to adapt to changing weather conditions and scientific priorities.



Moire Prescott and Arjun Dey under the Subaru telescope.

Results from a pilot Subaru/SuprimeCam survey in 2007A showed that the Lyα nebula is associated with a large 20×50 Mpc overdense structure, as traced by the Lyα-emitting galaxy population (Prescott et al. 2008, ApJ, 678, 77), providing strong confirmation of the association between large Lyα nebulae and overdense regions of the Universe. A preliminary analysis of our complete one-square-degree Subaru/SuprimeCam survey hints that the overdense structure may stretch even further.

Detailed Aspects of Technical Reviews for T-ReCS and Michelle

Ken Hinkle, Dick Joyce & Jayadev Rajagopal

Mid-infrared (mid-IR) imaging and long-slit, medium-resolution spectroscopy are provided at Gemini North by Michelle and at Gemini South by T-ReCS. Although Michelle and T-ReCS were manufactured at different times by different groups, and the operational details are slightly different for each, their imaging and medium-resolution spectroscopic capabilities are similar. Michelle and T-ReCS are facility "workhorse" instruments designed to take advantage of the mid-IR optimization of the Gemini telescopes.

Mid-IR observing is intrinsically difficult because both the sky and the telescope itself produce background radiation that is far brighter than nearly all astronomical targets. The background in the best parts of the mid-IR is 0 magnitude per square arcsecond, and it varies both spatially and temporally. The Gemini Mid-IR Resources Web pages contain a nice overview on mid-IR observing prepared by Pat Roche of Oxford University (go to *www.gemini.edu/sciops/instruments/mid-ir-resources/*, then click on "Ground-based mid-IR observing").

To cancel the background for imaging and low-resolution spectroscopy, a nearby position on the sky is observed by tilting the telescope secondary a few times per second. This "chops" the instrument field of view between the target position and an adjacent sky position. Subtracting the pairs of images eliminates the majority of the sky background. However, the telescope is a source of mid-IR radiation and tilting the secondary changes the optical axis and thus the background flux. This results in an additional radiation component from the chopping which must be cancelled by moving ("nodding") the telescope. The detector must be read out before it reaches saturation (typically 20 milliseconds). The read out, chop, and nod frequencies all depend on the background, with limits set by the electronics and telescope.

The Gemini telescopes can guide at only one of the chop positions. Therefore, even if the nod and chop are set to keep all the images on the chip, half the observation is unguided and not suitable for most applications. The chop duty cycle and the time required for the telescope to nod and then stabilize further increases the overhead. The net observing efficiency is thus about 25 percent.

It is important to consult the Gemini instrument Web pages for the exact overheads. For instance the overhead is larger in the Q band and for polarimetry, but smaller for "stare" mode spectroscopy. The limited amplitude of the chopping and nodding add additional complexity to the observation of extended fields. Also note that the ITC does not necessarily assume the correct overhead. It is your responsibility to confirm that the ITC overhead is correct or to enter the correct value. The ITC never includes the telescope pointing/setup time, so 15 minutes must always be added.

The nodding, chopping, and detector readout times are all computed automatically at the telescope, depending on wavelength and conditions. Thus the observer need only request the total time required after including the overhead. The overall configuration of the modes of the mid-IR instruments is similarly straightforward. The challenging aspect of writing (and reviewing) proposals with these instruments arises from the performance limitations discussed above that are imposed by the high background from the telescope and sky. The factors that determine the choice of observing constraint are thus quite different from those which are important at optical wavelengths.

For example, image quality, which is often an important constraint at optical wavelengths, is far less critical in the mid-IR, since the Gemini telescopes deliver near diffraction-limited images under almost all seeing conditions. The factors which limit mid-IR performance are water vapor (WV) and cloud cover (CC). The atmospheric transmission at the short end of the N band and through the entire Q band is determined by water vapor, so moderate to high WV values will saturate the detector in the Si1 and Q band filters. Filters such as Si2 and Si3 in the clean part of the N band can be used under moderate WV conditions, as can the Si4 and Si5 filters, although they are slightly more sensitive to water vapor. Even light cirrus clouds emit significant and time variable IR radiation, making mid-IR observations virtually impossible for all but very bright sources. Clear (CC=50) conditions are essential for observations of faint sources in the N band or any observations in the Q band filters.

For a more detailed discussion, see *www.gemini.edu/sciops/instruments/mir/SPIE_Mason_et_al.pdf*.

Gemini News from the Marseille SPIE Meeting

Ken Hinkle, Ron Probst, Jayadev Rajagopal & Mark Trueblood

The SPIE sponsors a meeting on astronomical telescopes and instrumentation every other year. The latest meeting took place in Marseille, France in June. The four authors attended because of other observatory functions, but here we report on Gemini-related presentations.

Traditionally, each of the major observatories is asked to give a presentation on their instrumentation program. This year's presentation on Gemini instrumentation was given by Joe Jensen. Highlights from Joe's talk, which covered both current and future instrumentation, included recommissioning plans for GNIRS at Gemini North and commissioning plans for FLAMINGOS-2 and NICI at Gemini South. Plans for commissioning the multi-conjugate adaptive optics system for Gemini South (GeMS-Canopus) were also reviewed. Progress on the Gemini Planet Imager (GPI), now in the final design phase, was described. Finally, Joe discussed Gemini's planned construction

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Gemini News from the Marseille SPIE Meeting continued

Mark Chun (University of Hawaii) and Mark Trueblood (NOAO) having a quiet chat after a day's session at the June 2008 SPIE meeting.

of a ground-layer adaptive optics system (GLAO) and the wide-field multi-object spectrograph (WFMOS) project. Further details on many of these projects could be found in the various talks and poster sessions at the meeting.

The sessions on adaptive optics (AO) systems included summary papers on science results. Addressing solar system science with AO, F. Marchis (University of California, Berkeley) noted scheduling advantages of ground-based telescopes as compared to spacecraft. These include temporal continuity (monitoring) for long periods and target-of-opportunity observations for special events. Operationally, speakers stressed the need for accurate differential, nonsidereal tracking, and for high-quality ephemerides for target objects. A.-M. Lagrange (Observatoire de Grenoble) spoke about extrasolar planet detection. She noted that a large number of surveys are under way with 8- to 10-meter telescopes. While existing data sets are heterogeneous, they are now large enough for initial statistical analyses. Pressing needs are to improve and test models of planet formation, and instrumentally for spectroscopy coupled to Extreme AO systems, and lots of telescope time!

Bruce Macintosh (Lawrence Livermore National Laboratory) gave a talk on GPI. He discussed the evolution of the instrument in the final detailed design and reviewed the predicted performance. GPI will use high-order AO employing a MEMS deformable mirror to produce contrast levels of 10^7. An integral-field spectrometer will allow the characterization of young (<2 billion year old) extrasolar giant planets.

Production of apodizing occulting masks with a variable density profile is a technical challenge for GPI and other coronagraphic instruments, which is being vigorously pursued by several vendor-instrument project teams. Sandrine Thomas (University of California Observatories) reported successful laboratory tests of a GPI prototype mask. Test results for similar masks in development for other ground and space instruments were also presented by P. Martinez et al. (European Southern Observatory [ESO]), D. Moody Jr. et al. (Jet Propulsion Laboratory), and M. Beaulieu et al. (Université de Montréal).

R. Smith and collaborators (California Institute of Technology) presented a poster explaining "how flatfielding can hurt you" with CCD detectors, and a pair of papers on a model of and a calibration approach for image persistence in infrared (IR) detectors at low flux levels. G. Finger et al. (ESO) reported on performance and calibration of Hawaii-2RG IR arrays, including a readout technique that extends dynamic range. An ESO-Teledyne group presented initial cryogenic tests of an Array Specific Integrated Circuit (ASIC), an approach with promise of simplifying IR-array electronics. While not Gemini specific, these technologies and methodologies may see use with Gemini instruments.

Steve Eikenberry (University of Florida) delivered a presentation on FLAMINGOS-2, a 1- to 2.5-micron near-infrared imager and multi-object spectrograph that is scheduled for its pre-ship acceptance test in August 2008 (see accompanying instrumentation article). FLAMINGOS-2 will be suitable for use with the GeMS-Canopus system as well as with natural seeing.

Several posters were presented on the GeMS-Canopus effort. GeMS involves the construction of a laser service enclosure (LSE) at the equivalent of the Nasmyth platform. Chas Cavedoni, with a large number of collaborators from the Gemini staff, presented a poster describing the LSE. It is a class-10,000 clean room that is $8 \times 2.5 \times 2.5$ meters in dimension and weighs 5100 kg.

Celine d'Orgeville, again with a large number of co-investigators from Gemini, gave a poster on the GeMS laser guide star facility. This featured the equipment necessary to propagate the laser from the LSE to the laser launch telescope (LLT). The LLT and resulting laser guide star images were also described. Gelys Trancho and Gemini co-investigators described the highly complex operation of the GeMS in a paper on the operation model. GeMS-Canopus requires five laser guide stars and two to four natural guide stars. There was also a paper by I. Lee and collaborators from Lockheed Martin Coherent Technologies, Gemini, and Keck on the 50 W guide star laser required by GeMS. The laser uses diode-pumped solid-state 1064 and 1319 nanometer oscillators with sum-frequency mixing in a non-linear crystal to produce the very high power required by GeMS.

US Participation in the Gemini Planet Finding Science Working Group

When the Gemini Board approved an allocation of up to 50 nights with the Near Infrared Coronagraphic Imager (NICI) for a multi-year planet search campaign, they charged the Gemini Observatory to ensure that the time would be used wisely. In response, the Observatory has formed a Planet Finding Science Working Group (PFSWG) to oversee the NICI campaign.

This group's initial charge is to confirm that NICI is ready for action by comparing the original NICI performance estimates, which were prepared for the campaign call for proposals a couple of years ago, with the on-sky commissioning data provided by the Gemini NICI commissioning team. The PFSWG will also receive input from the campaign team, which is led by Michael Liu (University of Hawaii), Laird Close (University of Arizona), and Mark Chun (University of Hawaii). The PFSWG will then make a recommendation to the Gemini director about readiness to proceed with the NICI campaign. Once the campaign is underway, the PFSWG will annually review the campaign team's progress and make a recommendation about allocating the remaining campaign time.

The members of the PFSWG are Ron Probst, chair (NOAO), Olivier Guyon (Subaru Observatory), Karl Haisch (Utah Valley University), Dave Koerner (Northern Arizona University), Steve Ridgway (NOAO), Pat Roche (University of Oxford), and Raquel Salmeron (Australian National University).

The PFSWG will have another significant responsibility. The Gemini Planet Imager (GPI), the next-generation coronagraphic exoplanet instrument with a high-order AO system and integral field spectrograph, is presently under construction under the leadership of Bruce Macintosh (Lawrence Livermore National Laboratory). A science team will be selected through open competition in 2009 to conduct an extensive survey with GPI. The PFSWG will participate in the proposal review and team selection process for the GPI science campaign once this opportunity is announced by the Gemini Observatory. This task flows naturally from the NICI assessment and survey oversight tasks that the PFSWG is undertaking initially.

— Ron Probst (NOAO) and Joe Jensen (Gemini Observatory)

NGSC Instrumentation Program Update

Verne V. Smith & Mark Trueblood

This article gives a status update on Gemini instrumentation being developed under the oversight of the NGSC, with progress since the June 2008 *NOAO/NSO Newsletter.*

Florida Multi-Object Imaging Near-Infrared Grism Observational Spectrometer-2 (FLAMINGOS-2)

FLAMINGOS-2 is a near-infrared multi-object spectrograph and imager for the Gemini South telescope. FLAMINGOS-2 will cover a 6.1-arcmin-diameter field at the standard Gemini f/16 focus in imaging mode, and will provide multi-object spectra over a 6.1 × 2-arcmin field. It will also provide a multi-object spectroscopic capability for Gemini South's multi-conjugate adaptive optics system. The University of Florida is building FLAMINGOS-2 under the leadership of Principal Investigator Steve Eikenberry.

The effort to cool the MOS cryostat by adding a second cold head appears to have been successful. The University of Florida instrument team has successfully achieved and maintained desired temperatures in the MOS cryostat, permitting integration testing to proceed.

Previous electronic noise issues in the cryostat were resolved, yielding acceptable read noise levels. New noise effects were tracked down to a combination of array controller firmware and software, and a software work-around was developed to remove the image artifacts until the controller firmware could be upgraded. The instrument is now yielding clean images that can be analyzed for image quality, noise, and other test parameters.

Testing of the on-instrument wave front sensor was completed, with analysis of the results remaining to be performed as of this writing.

The pre-ship acceptance test is scheduled to be held in Gainesville in August. Following that test, the Gemini Observatory will produce a punch list of items to be completed before the instrument is shipped to Cerro Pachón. The authors expect it will take the University of Florida team at least a few weeks to complete the punch list before shipping the instrument in early northern autumn.

As of June, the University of Florida team reports that 96 percent of the scheduled work leading to FLAMINGOS-2 final acceptance by Gemini had been completed.