# 2009B Observing Proposals Due 31 March 2009

*Dave Bell*

Standard proposals for NOAO-coordinated observing time for semester 2009B (August 2009–January 2010) are **due by Tuesday evening, 31 March 2009, midnight MST**. The facilities available this semester include the Gemini North and South telescopes, Cerro Tololo Inter-American Observatory (including SOAR), Kitt Peak National Observatory, and community-access time with Keck, Magellan, and MMT.

Proposal materials and information are available on our Web page (*www.noao.edu/noaoprop/*). There are three options for submission:

**Web submissions**—The Web form may be used to complete and submit all proposals. The information provided on the Web form is formatted and submitted as a LaTeX file, including figures that are "attached" to the Web proposal as encapsulated PostScript files.

**Email submissions**—As in previous semesters, a customized LaTeX file may be downloaded from the Web proposal form, after certain required fields have been completed. "Essay" sections can then be edited locally and the proposal submitted by email. Please carefully follow the instructions in the LaTeX template for submitting proposals and figures.

**Gemini's Phase I Tool (PIT)**—Investigators proposing for Gemini time **only** may optionally use Gemini's tool, which runs on Solaris, RedHat Linux, and Windows platforms, and can be downloaded from *www.gemini.edu/sciops/P1help/p1Index.html*.

Note that proposals for Gemini time may also be submitted using the standard NOAO form, and that proposals requesting time on Gemini plus other telescopes **MUST** use the standard NOAO form. PIT-submitted proposals will be converted for printing at NOAO and are subject to the same page limits as other NOAO proposals. To ensure a smooth translation, please see the guidelines at *www.noao.edu/noaoprop/help/pit.html*.

The addresses below are available to help with proposal preparation and submission:

| | |
|---|---|
| Web proposal materials and information | *www.noao.edu/noaoprop/* |
| Request help for proposal preparation | *noaoprop-help@noao.edu* |
| Address for thesis and visitor instrument letters, as well as consent letters for use of PI instruments on the MMT | *noaoprop-letter@noao.edu* |
| Address for submitting LaTeX proposals by email | *noaoprop-submit@noao.edu* |
| Gemini-related questions about operations or instruments | *usgemini@noao.edu* |
| | *www.noao.edu/gateway/gemini/support.html* |
| CTIO-specific questions related to an observing run | *ctio@noao.edu* |
| KPNO-specific questions related to an observing run | *kpno@noao.edu* |
| Keck-specific questions related to an observing run | *keck@noao.edu* |
| MMT-specific questions related to an observing run | *mmt@noao.edu* |
| Magellan-specific questions related to an observing run | *magellan@noao.edu* |

# Community Access Time Available in 2009B with Keck, Magellan, and MMT

*Dave Bell*

As a result of awards made through the National Science Foundation's Telescope System Instrumentation Program (TSIP) and a similar earlier program, telescope time is available to the general astronomical community at the following facilities in 2009B:

**Keck Telescopes**
A total of fourteen nights of classically scheduled observing time will be available with the 10-meter telescopes at the W. M. Keck Observatory on Mauna Kea. All facility instruments and modes are available. For the latest details, see *www.noao.edu/gateway/keck/*.

**Magellan Telescopes**
A total of ten nights will be available for classically scheduled observing programs with the 6.5-meter Baade and Clay telescopes at Las Campanas Observatory. For updated information on available instrumentation and proposal instructions, see *www.noao.edu/gateway/magellan/*.

**MMT Observatory**
Fifteen nights of classically scheduled observing time will be available with the 6.5-meter telescope of the MMT Observatory. Previous requests have disproportionately used our allocation of dark and grey time, so bright-time proposals are particularly encouraged. For further information, see *www.noao.edu/gateway/mmt/*.

A list of instruments that we expect to be available in 2009B can be found at the end of this section. As always, investigators are encouraged to check the NOAO Web site for any last-minute changes before starting a proposal.

# A New NOAO Survey Program

*Tod R. Lauer*

A new NOAO survey program has been initiated, with observations beginning in semester 2009B. Eleven proposals were submitted in response to the announcement of opportunity for new survey programs.

NOAO surveys are observing proposals that require the generation of a large, coherent data set in order to address their scientific research goals. Surveys may run for up to three years and can receive larger blocks of time than are usually awarded in the standard observing time allocation process.

In return for the large allocation of resources, the survey teams are required to deliver their reduced survey data products to the NOAO Science Archive (NSA) for follow-on investigations by other interested astronomers. A key part of the evaluation of the survey proposals is the likelihood that interesting follow-on investigations can be done with the data products that will not be conducted as part of the primary scientific goals of the survey team itself.

The Survey TAC grades the proposals in three categories, with the final grades comprising a weighted sum of 50% for quality of the primary scientific goals, 25% for the archival research value of the data products, and 25% for the credibility of the survey management plan.

The survey selected for 2009B is, "*The Carnegie Spitzer IMACS Survey,*" Prinicipal Investigator Daniel Kelson (OCIW). This survey will use NEWFIRM at both the KPNO and CTIO 4-meter telescopes in conjunction with low-resolution optical spectroscopy obtained with the Magellan IMACS instrument to probe the evolution of galaxies and large-scale structure from $z < 1.5$ to the present. The survey sample is selected from a large 3.6-micron Spitzer survey covering 15 square degrees in three fields. The selection criterion allows close tracking of the stellar mass of galaxies over the redshift interval being probed. The survey yields ~500,00 galaxies with $m_{AB} < 21.0$ at 3.6 microns. NEWFIRM will provide J, H, and $K_S$ photometry, which is critical to fill in the spectral energy distribution of the galaxies between the optical bandpass of the IMACS low-resolution spectroscopy and the Spitzer photometry.

# Evolution of the NOAO Time Allocation Process (Everything You Always Wanted to Know about the TAC)

*Letizia Stanghellini*

The NOAO time allocation process is a system-based process for allocating telescope time on facilities available to the US community through NOAO. Proposals are submitted to the NOAO Telescope Allocation Committee (TAC), based on science, and requesting as many telescopes and instruments as required for the successful completion of the science goals. In the last few years, the capabilities accessible through the NOAO TAC have greatly expanded, and we now offer a suite of 18 telescopes, including several 8-meter-class telescopes, providing more than 50 instruments and observing modes. This large selection of observing modes and capabilities allows proposers to choose the best match between science and observations, and it lets the NOAO TAC select the most meritorious science from the proposed programs.

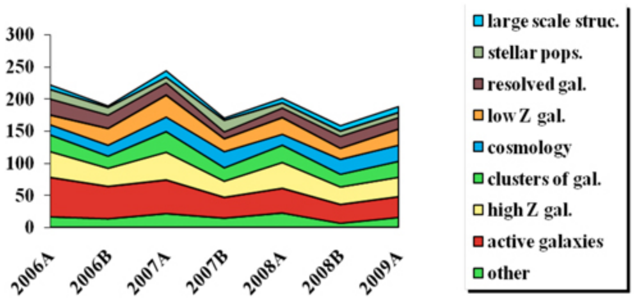


Figure 1a: Proposals submitted by science category (extragalactic astronomy).

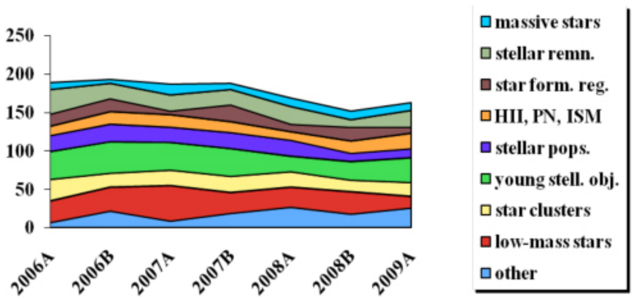


Figure 1b: Proposals submitted by science category (Galactic astronomy and resolved stellar populations).

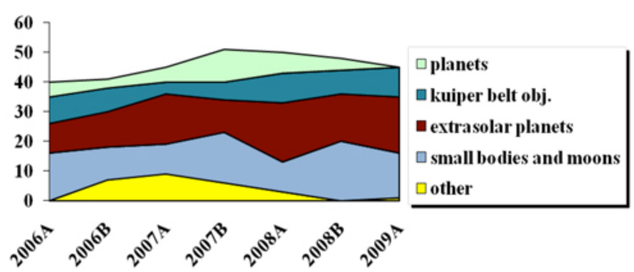


Figure 1c: Proposals submitted by science category (solar systems).

In each of the past three years, NOAO has received approximately 1000 proposals. In order to monitor the proposal selection, we ask the proposing teams to choose a science category from among a list of nine extragalactic, ten Galactic and resolved stellar populations, and five solar systems ones. The science categories are used primarily to match the proposal to the reviewers. Semester after semester, we receive approximately the same mix of science topics, as seen in figures 1a–1c. The spread across the categories is the basis for panel recruitment, and the constancy of that spread reassures us that the five-semester tenure in the NOAO TAC is a good match to the expectations. There are notable exceptions of course—see the recent rise of extrasolar planet proposals in figure 1c—that are taken into account each semester by adjusting the panel recruitment accordingly.

The proposal pressure, measured as nights requested over the nights available, depends mainly on aperture size. Figure 2 shows the proposal pressure in 2009A, which was typical for telescopes offered through the NOAO TAC. The high subscription rate of Kitt Peak's Mayall 4-meter (KP-4m) telescope, due to the recent deployment of the NEWFIRM wide-field infrared imager, demonstrates that new capabilities increase demand. The low oversubscription of the Magellan telescopes likely is due to small number statistics.

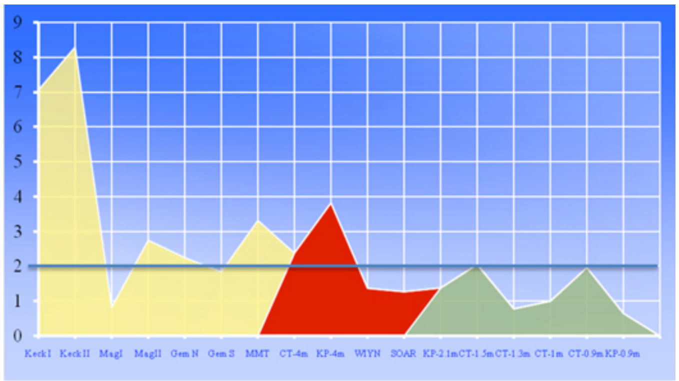


Figure 2: NOAO proposal pressure in 2009A. The horizontal line indicates the 2:1 oversubscription.

Each semester we hold a panel review for proposal selection. There are seven subject panels (three Galactic, three extragalactic, and one solar systems) whose members are carefully selected within the North American—United States, Canada, and Mexico—astronomical community. We make good use of the expected mix of subjects, as seen in figure 1, and we endeavor to represent the astronomical community within each panel, tracking seniority, diversity, and technical expertise. In 2006, AURA held an ad-hoc review panel to discuss how proposals, in particular those requesting the Gemini telescopes, were handled by NOAO. The outcome of the review was very favorable to the NOAO TAC. The panel recommended that reviewers be chosen who have broad scientific expertise, and that panel chairs be chosen preferen-

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*Evolution of the NOAO Time Allocation Process continued*

tially from the broad community rather than from NOAO. NOAO responded to these recommendations from the review panel, and now we routinely have five or six of the seven panel chairs from outside the NOAO staff each semester.

Proposal assignment is based on scientific expertise, but there are other criteria that should be applied as well. In particular, personal conflicts-of-interest are cleared before proposal assignment. Secondarily, all proposals requesting each of the public-access times to the external telescopes (MMT, Keck, and Magellan) go to a single panel of the appropriate discipline (Galactic, extragalactic, or, obviously, the only solar systems panel) so the resulting rank list is sizeable. Gemini proposals are split roughly evenly across panels and, together with the other 8-meter-class telescope proposals, are discussed with special attention within each panel, as recommended by the AURA review.

Panel members have typically three and a half weeks to read and grade proposals. During this time, each panelist is encouraged to disclose all conflicts with proposals he or she is reviewing, including conflicting proposals submitted to the same TAC. We are always available during this interim to reassign proposals and act in the best interests of the proposed science. Each proposal is assigned to a Lead Reviewer, but it is read by all panel members (five in each panel) and graded by all. Preliminary grades are not used to triage proposals, because our TAC reviews all submitted proposals. Most fall semesters we also hold a Survey TAC, which now functions as a regular TAC panel, with the difference that its membership is based on the Letters of Intents to avoid conflicts and select the best science match. We plan to introduce the option of applying for Gemini time in Survey programs, as recommended by the AURA review.

The TAC meetings are held at Tucson NOAO headquarters. The collegial atmosphere of the NOAO patio and nearby restaurants is very conducive to the TAC deliberations, where astronomers can see their friends and colleagues informally at breaks and lunches. While the feedback that I get from the panels is very positive about the logistics and spirit of the TAC, we are working at capacity, and an external site might be the choice to compact the schedule and workload for the support team. A science and policy orientation is held before each panel group meets—our current schedule groups the three Galactic, the three extragalactic, and the solar systems panels on different dates—and includes a question and answer session and brief presentations from the KPNO, CTIO, and NGSC directors, which are focused on the novel observing modes and instruments.

The actual panel review is a complex process with the very simple goal of realizing the best science possible given the current set of proposals and capabilities. In order to focus on their many charges and duties, panel chairs are exempted from discussing and grading proposals, which is different from many other TACs. Although the large number of telescopes and instruments offered by NOAO can increase TAC entropy, the benefit of undistracted, knowledgeable chairs has proved an ideal solution for the NOAO TAC. Parallel Galactic (and extragalactic) panels typically deal with slightly different areas of astronomy, according to the member expertise. For example, Galactic subjects are subdivided into (1) star forming regions, young stellar objects, and massive stars; (2) star clusters, stellar populations, and abundances; and (3) stellar remnants, low-mass stars, and chemical evolution. Each panel has enough scientific breadth to deal with other panel subjects for the occasional personal conflict. These subdivisions foster excellent science discussions in all panels. The solar systems panel gets too few proposals to be split successfully into multiple panels; in this case, we make sure that the panelists can deal with the occasional personal conflict of other members. Chairs of parallel panels meet privately on the second TAC day to resolve intra-panel issues, such as the occasional panel chair conflict (a parallel chair would sit on the panel of the conflicted chair to bring the panel consensus to the Merging TAC).

At the end of the panel review, we hold the Merging TAC where the scientific program recommendation to the NOAO director is finalized. I chair the Merging TAC; the other Merging TAC members are the panel chairs, including the Survey panel chair, and the KPNO and CTIO directors who participate to clarify scheduling issues. A separate merging TAC is held to build the Gemini schedule, and is chaired by NOAO Gemini Science Center Director Verne Smith. During the merging TACs, the merged ranked lists of proposals are discussed and adjusted if needed. Proposals requesting more than one telescope (see figure 3) are discussed to make sure they either get all the requests, or that there is sufficient scientific potential in partial allocation. Multi-telescope proposals are more than 10 percent of the total proposals. We try to allocate the full requests by the proposers, if the TAC ranks the proposal highly, and cut nights only in exceptional circumstances. The Merging TAC also finalizes the long-term recommendations; long-term status is approved exclusively when scientifically justified. The final product of each merging TAC is a suite of ranked lists, one for each telescope, to be reviewed and approved by the NOAO director before they are given to the schedulers. Schedulers of all telescopes offered strive to follow TAC recommendations.

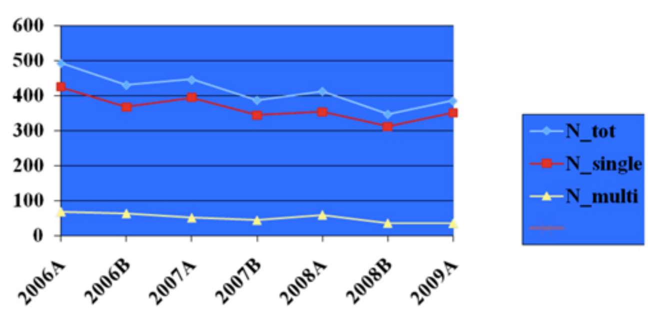


Figure 3: Number of single- or multi-telescope proposals.

Figures 4a and 4b show the proposal size for programs requesting small-aperture (<5 meters) and large-aperture (>5 meters) telescopes, respectively, in the past few semesters, including survey programs. For small apertures, most of the science programs consist of medium-size observing runs (three to six nights), while most large-aperture programs are very short, with almost no large-telescope programs scheduled for more than five nights. This is not a science selection effect, as similar plots on proposed science would look very similar. Instead, this is due to sociological effects (the perception that large-telescope time is very hard to get) and also to the fact that no survey programs so far have been implemented to observe with Gemini and the other large telescopes. We would like to remind proposers that while the nights with Keck and other Telescope System Instrumentation Program telescopes are very oversubscribed, the relatively large allotment of public US Gemini time allows larger programs to be suc-

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*Evolution of the NOAO Time Allocation Process continued*

cessful, and teams are encouraged to submit larger programs for these telescopes when justified by the science goals.

The NOAO TAC provides critical feedback to all proposers (the “comments”). The contents of these comments are drafted by the lead reviewer, discussed during the panel review, checked again by the panel chair to make sure that they captured the panel discussion, and checked finally once again after all schedules have been completed. Proposers should be aware that past comments are available to panel members on resubmitted proposals, and proposals that incorporate answers to previous TAC comments are typically well received. We endeavor to produce the best and fairest comments for all proposals and to have all proposals reviewed fairly and competently. My personal experience with managing the TAC is that the level of scientific discussion is very high, but occasionally the comments have not risen to the same level. New steps have been taken to improve the comments even further.

While managing about a thousand proposals a year, we only receive one or two complaints over the approved scientific program. Of course, as a primary investigator, I totally understand that sometimes the TAC might seem like a black box, which produces an unsatisfactory outcome (when our great proposals are denied time!). For all our colleagues who have felt that way, I warmly suggest you take a look at the oversubscription rates, and also that you each volunteer for the NOAO TAC, or talk to your colleagues that are or have recently been NOAO TAC members (TAC membership is published every semester in this *Newsletter*). Once you sit on the TAC, you will better understand its workings and, hopefully, feel more confident about the fairness of its outcome.

Once the TAC process is complete, another complex set of activities begin: scheduling the highest ranked proposals. This scheduling process will be described in the next issue of the *NOAO/NSO Newsletter*.

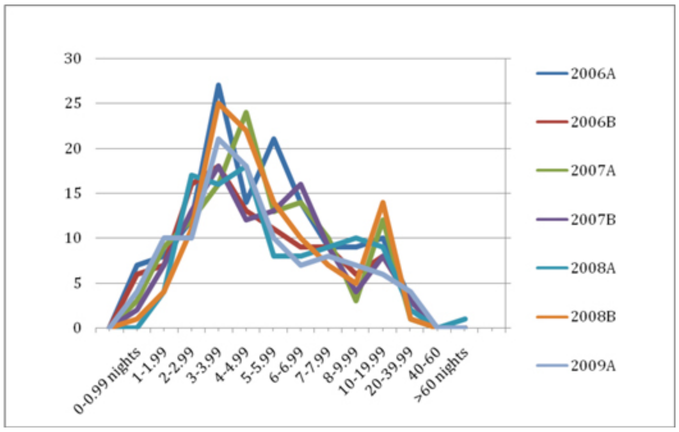


Figure 4a: Size of scheduled programs, small apertures.

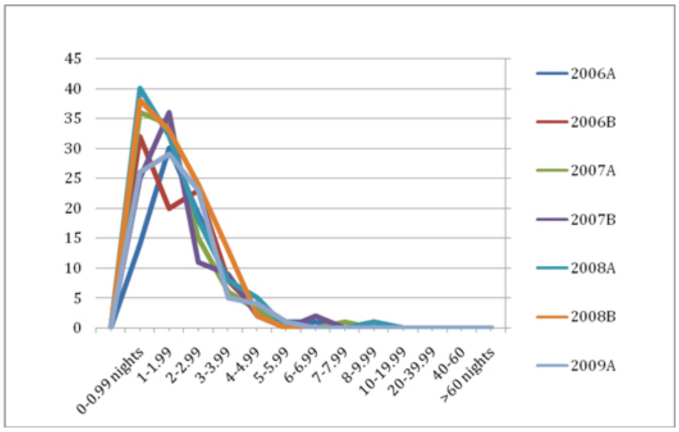


Figure 4b: Size of scheduled programs, large apertures.

# Observing Request Statistics for 2009A Standard Proposals

| | No. of Requests | Nights Requested | Average Request | Nights Allocated | DD Nights (*) | Nights Previously Allocated | Nights Scheduled for New Programs | Oversubscription for New Programs |
|---|---|---|---|---|---|---|---|---|
| **GEMINI** | | | | | | | | |
| GEM-N | 122 | 124.24 | 1.02 | 53.48 | 0.8 | 0 | 53.48 | 2.32 |
| GEM-S | 65 | 82.52 | 1.27 | 44.7 | 0 | 0 | 44.7 | 1.85 |
| **CTIO** | | | | | | | | |
| CT-4m | 48 | 174 | 3.62 | 68 | 0 | 6 | 62 | 2.81 |
| SOAR | 21 | 53.39 | 2.54 | 49 | 0 | 3 | 46 | 1.16 |
| CT-1.5m | 13 | 65.5 | 5.04 | 24.4 | 0 | 5 | 19.4 | 3.38 |
| CT-1.3m | 11 | 25.6 | 2.33 | 20.5 | 0 | 6 | 14.5 | 1.77 |
| CT-1.0m | 10 | 42 | 4.2 | 81 | 0 | 0 | 81 | 0.52 |
| CT-0.9m | 19 | 74.55 | 3.92 | 29.3 | 0 | 5 | 24.3 | 3.07 |
| **KPNO** | | | | | | | | |
| KP-4m | 54 | 198.5 | 3.68 | 47.5 | 0 | 4.5 | 43 | 4.62 |
| WIYN | 24 | 76.5 | 3.19 | 40 | 0 | 0 | 40 | 1.91 |
| KP-2.1m | 33 | 174.5 | 5.29 | 117 | 0 | 0 | 117 | 1.49 |
| KP-0.9m | 3 | 13 | 4.33 | 10 | 0 | 0 | 10 | 1.3 |
| **Keck, Magellan, MMT** | | | | | | | | |
| Keck-I | 34 | 49.5 | 1.46 | 8 | 0 | 0 | 8 | 6.19 |
| Keck-II | 31 | 44.5 | 1.44 | 7 | 0 | 1.5 | 5.5 | 8.09 |
| Magellan-I | 3 | 3.3 | 1.1 | 3 | 0 | 0 | 3 | 1.1 |
| Magellan-II | 6 | 11 | 1.83 | 4 | 0 | 0 | 4 | 2.75 |
| MMT | 15 | 36.5 | 2.43 | 10.5 | 0 | 0 | 10.5 | 3.48 |

*Nights allocated by NOAO Director

# CTIO Instruments Available for 2009B

| Spectroscopy | Detector | Resolution | Slit |
|---|---|---|---|
| **CTIO BLANCO 4-m** | | | |
| Hydra + Fiber Spectrograph | SITe 2K×4K CCD, 3300-11,000Å | 700-18,000, 45,000 | 138 fibers, 2" aperture |
| R-C Spectrograph [1] | Loral 3K×1K CCD, 3100-11,000Å | 300-5000 | 5.5' |
| **SOAR 4.2-m [2]** | | | |
| OSIRIS IR Imaging Spectrograph [3] | HgCdTe 1K×1K, JHK windows | 1200, 1200, 3000 | 3.2', 0.5', 1.2' |
| Goodman Spectrograph [1,4] | Fairchild 4K×4K CCD, 3100-8500Å | 1400, 2800, 6000 | 5.0' |
| **CTIO/SMARTS 1.5-m [5]** | | | |
| Cass Spectrograph | Loral 1200×800 CCD, 3100-11,000Å | <1300 | 7.7' |
| Fiber echelle spectrograph | SITe 2K×2K CCD, 4020-7300Å | 20,000-42,000 | 2.4" fiber |

| Imaging | Detector | Scale ("/pixel) | Field |
|---|---|---|---|
| **CTIO BLANCO 4-m** | | | |
| Mosaic II Imager | 8K×8K CCD Mosaic | 0.27 | 36' |
| ISPI IR Imager | HgCdTe (2K×2K 1.0-2.4mm) | 0.3 | 10.25' |
| **SOAR 4.2-m [2]** | | | |
| SOAR Optical Imager (SOI) | E2V 4K×4K Mosaic | 0.08 | 5.25' |
| OSIRIS IR Imaging Spectrograph | HgCdTe 1K×1K | 0.33, 0.14 | 3.2', 1.3' |
| Goodman Spectrograph [4] | Fairchild 4K×4K CCD | 0.15 | 7.2' diameter |
| **CTIO/SMARTS 1.3-m2 [7]** | | | |
| ANDICAM Optical/IR Camera | Fairchild 2K×2K CCD | 0.17 | 5.8' |
| | HgCdTe 1K×1K IR | 0.11 | 2.0' |
| **CTIO/SMARTS 1.0m [8]** | | | |
| Direct Imaging | Fairchild 4K×4K CCD | 0.29 | 20' |
| **CTIO/SMARTS 0.9-m [9]** | | | |
| Direct Imaging | SITe 2K×2K CCD | 0.4 | 13.6' |

[1] The R-C Spectrograph should be out-performed by the Goodman Spectrograph on SOAR, in general. A comparison guide is available.

[2] There will be a 2-month SOAR shutdown in Oct-Nov for mirror realuminization. The science fraction for the remainder of the semester will be no less than 70%.

[3] The spectral resolutions and slit lengths for the OSIRIS imaging spectrograph correspond to its low-resolution, cross-dispersed, and high-resolution modes, respectively. In the cross-dispersed mode, one is able to obtain low-resolution spectra at JHK simultaneously.

[4] The Goodman Spectrograph is expected to be available in single-slit mode. Imaging mode is also available, but only with U,B,V,R filters.

[5] Service observing only. The Fiber Echelle is a new capability, see the NOAO Proposals Web pages and this *Newsletter* for more information.

[6] Some modes of the Spartan IR imager may be available. Please consult the NOAO Proposals Web pages for the latest information.

[7] Service observing only. Proposers who need the optical only will be considered for the 1.0-m telescope unless they request otherwise. Note that data from both ANDICAM imagers is binned 2 × 2.

[8] Classical observing only. Observers may be asked to execute up to 1 hr per night of monitoring projects that have been transferred to this telescope from the 1.3-m telescope. In this case, there will be a corresponding increase in the scheduled time. No specialty filters, no region of interest.

[9] Classical or service, alternating 7-night runs. If proposing for classical observing, requests for 7 nights are strongly preferred.

# Gemini Instruments Expected to Be Available for 2009B

| GEMINI NORTH | Detector | Spectral Range | Scale ("/pixel) | Field |
|---|---|---|---|---|
| NIRI | 1024×1024 Aladdin Array | 1-5µm<br>R~500-1600 | 0.022, 0.050, 0.116 | 22.5", 51", 119" |
| NIRI + Altair (AO- Natural or Laser) | 1024×1024 Aladdin Array | 1-2.5µm + L Band<br>R~500-1600 | 0.022 | 22.5" |
| GMOS-N | 3×2048×4608 CCDs | 0.36-1.0µm<br>R~670-4400 | 0.072 | 5.5'<br>5" IFU |
| Michelle | 320×240 Si:As IBC | 8-26µm<br>R~100-30,000 | 0.10 img, 0.20 spec | 32" × 24"<br>43" slit length |
| NIFS | 2048×2048 HAWAII-2RG | 1-2.5µm<br>R~5000 | 0.04 × 0.10 | 3" × 3" |
| NIFS + Altair (AO- Natural or Laser) | 2048×2048 HAWAII-2RG | 1-2.5µm<br>R~5000 | 0.04 × 0.10 | 3" × 3" |

| GEMINI SOUTH | Detector | Spectral Range | Scale ("/pixel) | Field |
|---|---|---|---|---|
| Phoenix | 512×1024 Aladdin Array | 1-5µm<br>R<70,000 | 0.085 | 14" slit length |
| GMOS-S | 3×2048×4608 CCDs | 0.36-1.0µm<br>R~670-4400 | 0.072 | 5.5'<br>5" IFU |
| T-ReCS | 320×240 Si:As IBC | 8-26µm<br>R~100, 1000 | 0.09 | 28" × 21" |
| NICI | 2×1024×1024 Aladdin III InSb | 0.8-5.5µm<br>Narrowband Filters | 0.018 | 18.4" × 18.4" |

| EXCHANGE | Detector | Spectral Range | Scale ("/pixel) | Field |
|---|---|---|---|---|
| MOIRCS (Subaru) | 2×2048×2048 HAWAII-2 | 0.9-2.5µm<br>R~500-3000 | 0.117 | 4' × 7' |
| Suprime-Cam (Subaru) | 10×2048×4096 CCDs | 0.36-1.0µm | 0.2 | 34' × 27' |
| HIRES (Keck) | 3×2048×4096 MIT-LL | 0.35-1.0µm<br>R~30,000-80,000 | 0.12 | 70" slit |

*Please refer to the NOAO Proposal Web pages in March 2009 for confirmation of available instruments.

# KPNO Instruments Available for 2009B

| Spectroscopy | Detector | Resolution | Slit Length | Multi-object |
|---|---|---|---|---|
| **Mayall 4-meter** | | | | |
| R-C CCD Spectrograph | T2KB/LB1A/F3KB CCD | 300-5000 | 5.4' | single/multi |
| MARS Spectrograph | LB CCD (1980×800) | 300-1500 | 5.4' | single/multi |
| Echelle Spectrograph | T2KB/F3KB CCD | 18,000-65,000 | 2.0' | |
| FLAMINGOS[1] | HgCdTe (2048×2048, 0.9-2.5μm) | 1000-1900 | 10.3' | single/multi |
| IRMOS[2] | HgCdTe (1024×1024, 0.9-2.5μm) | 300/1000/3000 | 3.4' | single/multi |
| **WIYN 3.5-meter[3]** | | | | |
| Hydra + Bench Spectrograph[9] | STA1 CCD | 700-22,000 | NA | ~85 fibers |
| SparsePak[4] | STA1 CCD | 700-22,000 | IFU | ~82 fibers |
| **2.1-meter** | | | | |
| GoldCam CCD Spectrograph | F3KA CCD | 300-4500 | 5.2' | |
| FLAMINGOS[1] | HgCdTe (2048×2048, 0.9-2.5μm) | 1000-1900 | 20.0' | |
| Exoplanet Tracker (ET)[5] | CCD (4K×4K, 5000-5640 Å) | See Note | Fiber (2.5") | |
| **Imaging** | **Detector** | **Spectral Range** | **Scale** | **Field** |
| **Mayall 4-meter** | | | | |
| CCD MOSAIC-1 | 8K×8K | 3500-9700 Å | 0.26 | 35.4' |
| NEWFIRM[6] | InSb (mosaic, 4-2048×2048) | 1-2.3μm | 0.4 | 28.0' |
| SQIID | InSb (3-256×256 illuminated) | JHKs | 0.39 | 3.3' |
| FLAMINGOS [1] | HgCdTe (2048×2048) | JHK | 0.32 | 10.3' |
| **WIYN 3.5-meter** | | | | |
| Mini-Mosaic[7] | 4K×4K CCD | 3300-9700 Å | 0.14 | 9.3' |
| OPTIC[7] | 4K×4K CCD | 3500-10,000 Å | 0.14 | 9.3' |
| WHIRC[8] | VIRGO HgCdTe (2048×2048) | 0.9-2.5μm | 0.10 | 3.3' |
| **2.1-meter** | | | | |
| CCD Imager[10] | T2KB CCD | 3300-9700 Å | 0.305 | 10.4' |
| SQIID | InSb (3-256×256 illuminated) | JHKs | 0.68 | 5.8' |
| FLAMINGOS[1] | HgCdTe (2048×2048) | JHK | 0.61 | 20.0' |
| **WIYN 0.9-meter** | | | | |
| CCD MOSAIC-1 | 8K×8K | 3500-9700 Å | 0.43 | 59' |

[1] FLAMINGOS Spectral Resolution given assuming 2-pixel slit. Not all slits cover full field; check instrument manual. FLAMINGOS was built by the late Richard Elston and his collaborators at the University of Florida. Dr. Steve Eikenberry is currently the PI of the instrument.

[2] IRMOS, built by Dr. John MacKenty and collaborators. Availability will depend on proposal demand and block scheduling constraints.

[3] A new Volume Phase Holographic (VPH) grating, 740 l/mm, is now available for use. Please contact Di Harmer for information.

[4] Integral Field Unit, 80"×80" field, 5" fibers, graduated spacing.

[5] Exoplanet Tracker (ET) is an instrument provided by Dr. Jian Ge of the University of Florida and his colleagues. It enables very high precision measurements of radial velocities for suitably bright enough targets. Details regarding this instrument are available via our instrument Web pages. It is capable of providing Doppler precision of 4.4 m/s in 2 minutes for a V = 3.5 mag. G8V star.

[6] Please see *www.noao.edu/ets/newfirm/* for more information. Permanently installed filters include J, H, and Ks. Please see NEWFIRM Web pages for update on availability/schedulability of other filters.

[7] OPTIC Camera from University of Hawai῾i is anticipated to be available from Aug. through late Oct. through an agreement with Dr. John Tonry (U of Hawai῾i). This instrument may be assigned to those that request to use Mini-Mosaic, if this substitution still meets proposed imaging needs and making such an assignment would further observatory support constraints. Fast guiding mode of operation of OPTIC is now a supported mode for NOAO users of the instrument.

[8] WHIRC, built by Dr. Margaret Meixner (STScI) and collaborators, will be available for use during 2009B (no WTTM). It will be available for shared-risk use with the WTTM module.

[9] STA1 is the offered Bench CCD. A 3300 l/mm VPH grating will be available in shared-risk mode. Following a successful commissioning, the new collimator is in use. Observers should plan for the same dispersion and wavelength range, but with a factor of ~2 increase in throughput. Depending on the configuration, there may be up to a 20% reduction in the instrumental resolution. Observers are encouraged to view *www.wiyn.org/instrument/bench_upgrade.html* for further details to help plan observations.

[10] While T2KB is the default CCD for CFIM, use of F3KB may be justified for some applications and may be specifically requested; scale 0.19"/pix, 9.7'×3.2' field. If T2KB is unavailable, CFIM may be offered with T2KA (scale 0.305"/pix, 10.4' field) or with F3KB to best match proposal requirements. *www.noao.edu/kpno/ccdchar/ccdchar.html.*

# Keck Instruments Available for 2009B

| | Detector | Resolution | Spectral Range | Scale ("/pixel) | Field |
|---|---|---|---|---|---|
| **Keck-I** | | | | | |
| HIRESb/r (optical echelle) | 3x MM-LL 2K×4K | 30k-80k | 0.35-1.0µm | 0.19 | 70" slit |
| NIRC (near-IR img/spec) | 256×256 InSb | 60-120 | 1-5µm | 0.15 | 38" |
| LRIS (img/lslit/mslit) | Tek 2K×4K, 2×E2V 2K×4K | 300-5000 | 0.31-1.0µm | 0.22 | 6×8' |
| **Keck-II** | | | | | |
| ESI (optical echelle) | MIT-LL 2048×4096 | 1000-6000 | 0.39-1.1µm | 0.15 | 2×8' |
| NIRSPEC (near-IR echelle) | 1024×1024 InSb | 2000, 25,000 | 1-5µm | 0.18 (slitcam) | 46" |
| NIRSPAO (NIRSPEC w/AO) | 1024×1024 InSb | 2000, 25,000 | 1-5µm | 0.18 (slitcam) | 46" |
| NIRC2 (near-IR AO img) | 1024×1024 InSb | 5000 | 1-5µm | 0.01-0.04 | 10-40" |
| OSIRIS (near-IR AO img/spec) | 2048×2048 HAWAII2 | 3900 | 0.9-2.5µm | 0.02-0.1 | 0.32-6.4" |
| DEIMOS (img/lslit/mslit) | 8192×8192 mosaic | 1200-10,000 | 0.41-1.1µm | 0.12 | 16.7×5' |
| **Interferometer** | | | | | |
| IF (See *msc.caltech.edu/software/KISupport/*) | | | | | |

# MMT Instruments Available for 2009B

| | Detector | Resolution | Spectral Range | Scale ("/pixel) | Field |
|---|---|---|---|---|---|
| BCHAN (spec, blue-channel) | Loral 3072×1024 CCD | 800-11,000 | 0.32-0.8µm | 0.3 | 150" slit |
| RCHAN (spec, red-channel) | Loral 1200×800 CCD | 300-4000 | 0.5-1.0µm | 0.3 | 150" slit |
| MIRAC3 (mid-IR img, PI inst) | 128×128 Si:As BIB array | | 2-25µm | 0.14, 0.28 | 18.2, 36" |
| Hectospec (300-fiber MOS, PI) | 2 2048×4608 CCDs | 1000-2000 | 0.38-1.1µm | R ~1K | 60' |
| Hectochelle (240-fiber MOS, PI) | 2 2048×4608 CCDs | 34,000 | 0.38-1.1µm | R ~32K | 60' |
| SPOL (img/spec polarimeter, PI) | Loral 1200×800 CCD | 300-2000 | 0.38-0.9µm | 0.2 | 20" |
| ARIES (near-IR imager, PI) | 1024×1024 HgCdTe | | 1.1-2.5µm | 0.04, 0.02 | 20", 40" |
| SWIRC (wide n-IR imager, PI) | 2048×2048 HAWAII-2 | | 1.0-1.6µm | 0.15 | 5' |
| CLIO (thermal-IR AI camera, PI) | 320×256 InSb | | H,K,L,M | 0.05 | 16×13" |
| MAESTRO (optical echelle, PI) | 4096×4096 | 28,000 | 0.32-1.0µm | 0.15 | |

# Magellan Instruments Available for 2009B

| | Detector | Resolution | Spectral Range | Scale ("/pixel) | Field |
|---|---|---|---|---|---|
| **Magellan I (Baade)** | | | | | |
| PANIC (IR imager) | 1024×1024 Hawaii | | 1-2.5µm | 0.125 | 2' |
| IMACS (img/lslit/mslit) | 8192×8192 CCD | 2100-28,000 | 0.34-1.1µm | 0.11, 0.2 | 15.5', 27.2' |
| MagIC (optical imager) | 2048×2048 CCD | | BVRI, u'g'r'i'z' | 0.07 | 2.36' |
| **Magellan II (Clay)** | | | | | |
| LDSS3 (mslit spec/img) | 4096×4096 CCD | 200-1700 | 0.4-0.8µm | 0.19 | 8.25' circ. |
| MIKE (echelle) | 2K×4K CCD | 22,000 | 0.32-1.0µm | 0.12-0.13 | 5" slit |
| MIKE Fibers (echelle) | 2K×4K CCD | 16,000 | 0.32-1.0µm | 0.12-0.13 | 20-23', 256 fibers |
| MagE (echellete) | 1024×2048 E2V | 4100 | 0.31-1.0µm | 0.3 | 10" slit |