K P N O

O P E R A T I O N S

Time of Many Changes

Richard Green

Phil Massey will be leaving Kitt Peak and NOAO at the end of September to take up an astronomer position at Lowell Observatory in Flagstaff. Phil joined KPNO in 1984, and has filled an invaluable role as 4-meter Telescope Scientist. His attention to the full range of performance issues for the telescope, including the extraordinarily important details of interfaces, guiders, and GUIs, has been critical in maintaining the scientific data quality. The telescope engineering and operations teams respect Phil enormously for his exacting standards and his clear priorities that operational performance be only enhanced and not jeopardized. We were also kept on our toes by "astronomer in residence" reports by Phil originating not from Kitt Peak, but from other observatories. The comparisons showed us the way to several improvements in operations. Phil's critical look at operations investments in general formed the basis for spirited scientific staff discussions and honest assessments of our priorities. Those of us who have benefited over the years from Phil's dedication to the telescope and to the observatory are grateful for the outcome, and his impact on our science.

We are still trying to regain our operational equilibrium following the retirements of three of KPNO's core team: Bob Barnes, Jim De Veny, and Bill Schoening. Bob joined Kitt Peak in 1963, Jim in 1967, and Bill in 1968. From beginnings as telescope operators, and research and laboratory assistants, they each developed indispensable expertise and knowledge of the instrument suite and observatory operations. As an observer, you know the confidence you felt when Jim would set up the spectrograph for you, or Bill got you going with CCD imaging. I have been extremely fortunate as Kitt Peak Director to enjoy that same degree of confidence that the KPNO finances and resource tracking were in Bob Barnes' expert hands. We are fortunate that Jim and Bill will continue to be available on a part-time basis. These three epitomize the skill and dedication that made Kitt Peak premier in scientific productivity. On behalf of generations of observers, I offer thanks and well wishes for active and enjoyable retirement.

With George Jacoby (see "New Director for WIYN") and Phil Massey turning to other positions, there are major responsibilities at Kitt Peak to be filled. The task of watching over the 4-meter will be divided between Steve Ridgway as Telescope Scientist and Nigel Sharp as Operations Scientist. Steve will concentrate on system performance, delivered

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Reminders about Observing Opportunities

Richard Green

As detailed here and in the Observational Programs section, a number of enhanced or changed observing opportunities are now available at KPNO. Three superb infrared instruments are available for use on the 4-m and 2.1-m—SQIID, FLAMINGOS, and Phoenix. As reported previously, ONIS will no longer be offered, and IRIM is available only for narrow-band work or as a backup for scheduling conflicts. The WIYN queue is no longer in operation for the majority of programs; synoptic and target-of-opportunity programs may still be proposed, as well as observations for a "2-hour" queue. The 0.9-m and Coudé Feed telescopes are not open for proposal-based access. As a reminder, the WIYN integral field unit, DensePak, provides an alternate to Hydra for the bench spectrograph. Good luck with your proposals!

image quality, and upgrade planning, while Nigel will monitor day-to-day issues and focus on instrument and other focal plane interfaces and software. Chuck Claver will retain his responsibility for mountain-wide delivered image quality and hands-on optical alignment. Buell Jannuzi will take over from George as Mosaic Instrument Scientist; George continued in that capacity through completion of this summer's upgrades. To assure both organization and continuing scientific usefulness of the Kitt Peak filter collection, Bruce Bohannan has agreed to take on the job of Filter Scientist. The eight-day weeks prevailing throughout NOAO facilitate the staff taking on these additional responsibilities.

New Director for WIYN

Richard Green

The WIYN Consortium is pleased to announce that George Jacoby will become director of the WIYN Observatory as of September 18th. The Search Committee was impressed with George's credentials, as stated in their recommendation:

George Jacoby has been appointed the first director of the WIYN Observatory.

> *George Jacoby brings a record of successful project and operations management, as well as a strong scientific reputation. George was project scientist (along with Taft Armandroff) for NOAO's CCD Mosaic imagers; these instruments are now the most heavily subscribed, and run with good reliability and stability. That project required coordination among several technical groups, both in Tucson and La Serena. George also served as the IRAF program scientist, successfully defending the program, and managing the scientific priorities of a six-person software operations group. He also served limited terms as 4-meter telescope scientist, WIYN telescope scientist, and co-director of KPNO. George Jacoby brings scientific reputation and management experience. As George put it, the dedication of one energetic individual can make a big difference to WIYN right now. We concur.*

To the WIYN Board of Directors, President Bob Mathieu announced,

> *I think we have done very well, and I look forward to a bright future for the WIYN Observatory under George Jacoby's leadership.*
>
> *I would like to express my appreciation to Jeff Alberts, Richard Green, Kent Honeycutt, and Jeff Kenney for serving the Board so well as the Search Committee during the course of this long process. With luck it will be a while before we again see Room 263 at the O'Hare Best Western!*

A major responsibility for the new director is focusing WIYN's development resources and partner talent into a successful (i.e., funded!) plan for new instrumentation. That need was highlighted by the five-year performance review committee, and was one of the strongest motivations for appointing a director. I very much look forward to working with George as he molds the scientific future of the telescope that, in the reviewers' words, "delivers the best images over a wide field of view of any continental US facility."

FLAMINGOS on Kitt Peak, Maybe!

Jay Elias, Richard Elston, and Richard Green

FLAMINGOS is coming to Kitt Peak. No, this is not a statement about bird life—with bad grammar—but rather an announcement of the possible availability of the University of Florida Wide-Field IR Imager/Spectrometer in Semester 2001A. The availability of FLAMINGOS will be defined after the first engineering run in late August. Information necessary to submit an observing proposal to use this instrument will be available on the NOAO Web page no later than September 6th.

FLAMINGOS is a wide-field IR imager and multi-slit spectrometer designed and built by Richard Elston (Florida), with some collaboration and support from NOAO. The imaging mode is provided by a fairly conventional optical train, consisting of a refractive collimator, filters, cold stop, and a camera which images the focal plane onto a 2K × 2K HgCdTe detector. The instrument can be used on both the 2.1-m and 4-m telescopes; pixel scale and field of view values for each telescope are summarized below:

FLAMINGOS Imaging Parameters

Telescope	4-m	2.1-m
Arcsec/Pixel	0.30	0.60
Field of View (arcmin)	10×10	20×20

J, H, and Ks filters will be available for imaging. Because the filters are located in a fast beam, narrow-band filters, which will not work very well over the full field, will not be provided.

The cold stops are on a wheel, so that an optimized cold stop is available for each telescope. The image quality of the optics (as designed and toleranced) is well matched to typical image quality on the 4-m, and is about 2 pixels FHWM over most of the field (a little worse at the corners). Imaging on the 2.1-m will mostly *not* be seeing-limited.

The spectroscopic mode is provided by a cold slit mask placed at the telescope focal plane, which is inside the dewar, and by a grism placed after the cold stop. The slit masks are mounted in a wheel in a separate "sub-dewar" within the instrument. The sub-dewar can be warmed up and cooled down quickly, allowing the masks to be changed during the day. The wheel holds several slit masks (enough for a reasonable night's program), in addition to permanently mounted long slits.

The highest resolution available is R~3000, which is sufficient to cover most of an atmospheric "window" with the slit at the center of the focal plane. Lower resolution modes will provide full coverage even for off-center slit locations. A complete listing of the resolution/wavelength combinations that will be provided will be included in the Web posting.

Interested readers will have noted that no information on performance is given above. This is because FLAMINGOS has not yet been tested on the telescope. The first engineering run will take place August 21–23 on the 2.1-m telescope. This run will be with an engineering-grade array, which appears to be almost science grade. Based on the success of the engineering run and the performance of the instrument, we—KPNO and Florida, jointly—will make a decision regarding availability of the

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instrument. This information will be available on the NOAO Web site no later than September 6. Information on performance sufficient to allow proposal writing will also be provided.

Note that if the instrument is offered, spectroscopic modes may initially be unavailable on one or both telescopes (in particular, the multi-slit mode). Part of the engineering run will be devoted to establishing the procedures needed to produce useful slit masks, including mapping celestial coordinates to focal plane coordinates to detector (pixel) coordinates.

Rough estimates of imaging performance suggest that FLAMINGOS' sensitivity for individual targets will be slightly worse than SQIID. Because of its larger format array, FLAMINGOS will be the preferred instrument for mapping large areas. For smaller areas, such as individual targets, SQIID would likely be the better choice. A better idea of the trade-offs will be available once the engineering run has been completed.

The current thinking is that FLAMINGOS will be shared between Kitt Peak and Gemini South. The tentative agreement is that the instrument will spend six months per year at each site, with a rotation schedule based on access to key regions of the sky. FLAMINGOS will be available at Kitt Peak typically from mid-December through late May. That plan allows access to M31 and companions (for first half-nights), Orion and other star formation regions in the Northern Galactic plane, and the North Galactic Polar Cap. We will therefore solicit proposals each semester; the half-year cycle places about one-third of the time in the B semester and about two-thirds of the time in the A semester.

Upgrades to KPNO Mosaic CCD Imager

George Jacoby, for the Mosaic Upgrade Team

NOAO is currently upgrading the hardware on the Kitt Peak Mosaic CCD imager to improve the performance and reliability of the system. Significant hardware changes were made to the four controllers to read each of the eight CCDs from two amplifiers (16-channel mode) instead of only one amplifier (8-channel mode). This would reduce the readout time by 40%. Unfortunately, two of the CCDs have secondary amplifiers that do not perform adequately and, because the readout rate is limited by the slowest CCD, we must continue to work in the slower 8-channel mode.

In addition, the power supplies on the four Arcon controllers have been replaced to enhance their rated output. This change will improve the longevity of the supplies and allow for better stabilized thermal control of the CCDs.

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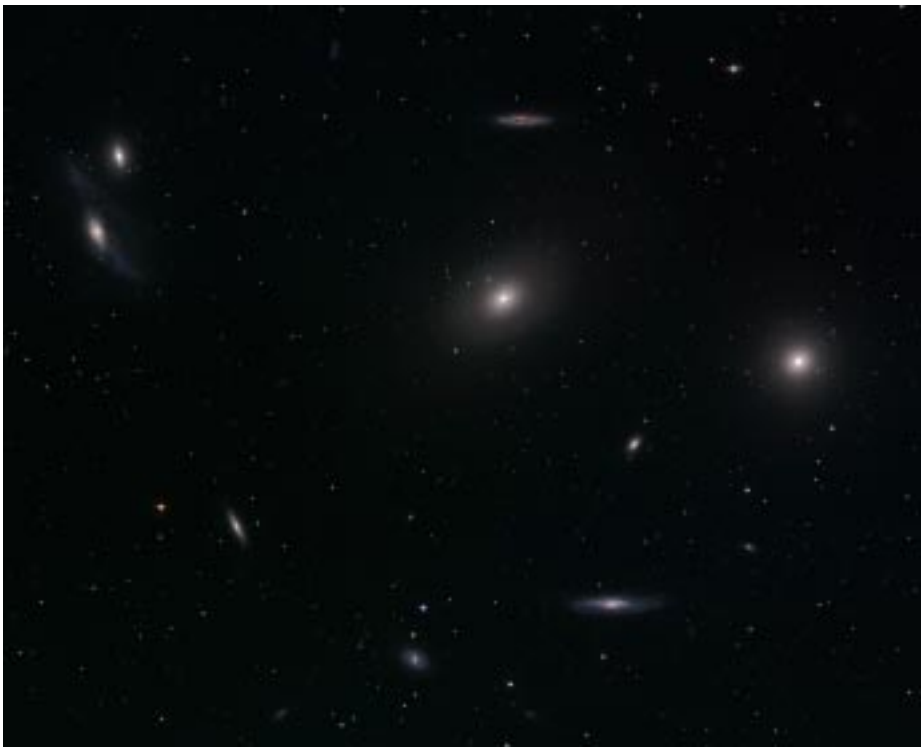
Margaret Edmondson Fellowship

Anna Katherina Vivas (Yale) is the recipient of the first Margaret Edmondson Fellowship. Kathy will be in Tucson in September, working with Abi Saha on WIYN instrument characterization and stellar population studies.

KPNO Operations



The KPNO Mosaic CCD camera is used for a variety of wide-field galactic and extra-galactic research and surveys. This 0.8 × 1 degree Mosaic image of the Virgo Cluster, including the giant S0 galaxy, M86, and the giant elliptical, M84, was taken by George Jacoby with the KPNO 0.9-m telescope.

As an improvement to our operations, bar codes are being added to the edges of each optical filter to identify them uniquely. As each filter is loaded into the filter track, its code will be scanned and sent to the acquisition computer to verify that the proper filter is loaded in the desired track position, and to eliminate typing the special filter ID that is needed for subsequent processing.

A new version of the manual should be available, by the time you read this article, from the Mosaic Web page (*http://www.noao.edu/kpno/mosaic*).

In closing, after six years with the NOAO Mosaic project, I will be taking on a different set of responsibilities in mid-September. Effective with this last newsletter article from me, Buell Jannuzi will assume the duties of the Kitt Peak Mosaic scientist. You can reach Buell at *bjannuzi@noao.edu*, or by phone at 1-520-318-8353.

The NOAO Mosaic Upgrade Team consists of Marco Bonati, Bill Ditsler, Dave Dryden, Mike Fitzpatrick, Buell Jannuzi, Bob Marshall, Rich Reed, Roger Smith, Doug Tody, Frank Valdes, and Tom Wolfe.

How to Contact Kitt Peak National Observatory

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

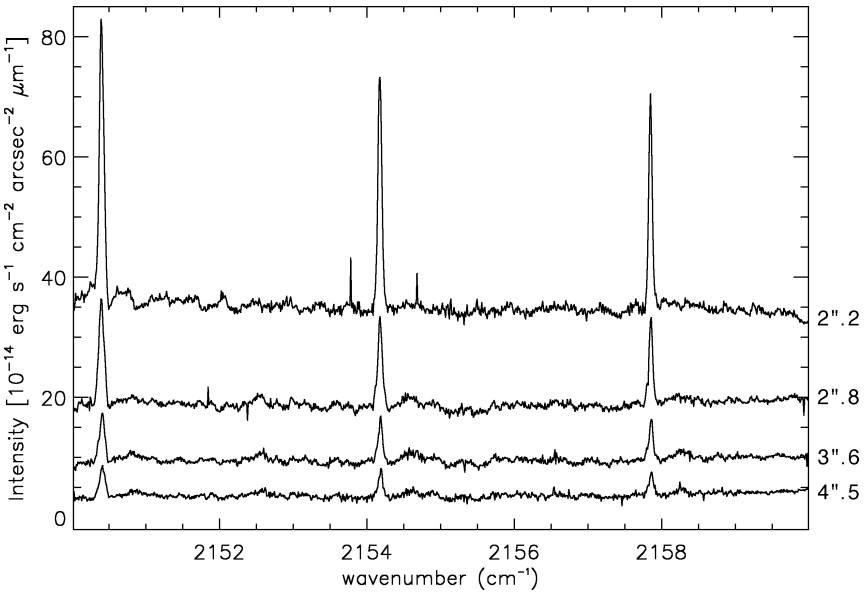
Phoenix Continues at Kitt Peak

Ken Hinkle

Phoenix, which is to be offered as a first-light instrument at Gemini South, will be available on the KPNO 2.1-m and Mayall 4-m telescopes in February and March 2001 before shipment to Chile. By January, Phoenix will be fitted with a new InSb array, which will improve the instrument's sensitivity. Observers are encouraged to apply for KPNO time with Phoenix for projects that can be completed within this time frame or for observations that will enhance the use of Phoenix at Gemini South.

Use of Phoenix on Gemini South is expected to begin in June 2001, with Phoenix to be delivered to Gemini South in May 2001. As previously announced, work on Phoenix to prepare it for Gemini South will be completed by January 2001. As a result, we are pleased to be able to offer Phoenix on the Kitt Peak 2.1-m and 4-m telescopes in February and March 2001. It may also be possible to schedule Phoenix into the April bright period, April 1-15, if permitted by the shipping deadline.

As part of the loan arrangement to Gemini South, Gemini will loan NOAO an InSb array. We anticipate installing this new detector in the 2000B semester. The array will be in the instrument in the 2001A semester for on-telescope calibration before shipment to Gemini. Obviously, this is a major benefit to Kitt Peak users in the 2001A semester. The sensitivity of Phoenix observations on all but the brightest sources in the 1-3 μm region was limited by the current detector (see *NOAO Newsletter,* No. 59).



Phoenix in long-slit mode is used to map the physical conditions in the shell surrounding o Ceti. A set of 4.6-μm CO spectra recorded at the positions (top to bottom) marked in arcsec west of the star. The CO emission results from resonant scattering in the circumstellar shell. These spectra, obtained with Phoenix on the KPNO 4-m in October 1998, will appear in "Mira's Wind Explored in Scattering Infrared CO Lines" by N. Ryde, B. Gustafsson, K. Eriksson, and K. H. Hinkle (*Ap. J.*, in press).

SQIID Begins Science Observations

Mike Merrill

Since the start of science observation in May 2000 at the KPNO 2.1-m, the Simultaneous Quad Infrared Device (SQIID) has been employed 21 nights during 2000A and is scheduled for 73 nights of science observations during 2000B. Before the start of 2000B, we intend to correct the slight focal plane tilt seen in the J channel, establish PAH channel operation, and make assorted software improvements to ease operations. This article outlines the anticipated performance of SQIID for the coming semesters.

The NOAO infrared camera SQIID produces simultaneous images of the same field in the J, H, K, and narrow-band L passbands, using individual 512×512 quadrants of ALADDIN InSb arrays. The observations are generally background (photon statistics) limited. The designated array for each channel is selected for characteristics (read noise, settling time, and dark signal) appropriate to background-limited operation under actual observing conditions for its single filter. SQIID, which serves as its own acquisition camera, is a good match to "point and shoot" observing at the 2.1-m without a telescope operator. The filters are fixed in place; dark slide and window covers are the only moving parts. SQIID employs closed cycle refrigeration instead of liquid cryogens and, in its prior configuration, operated flawlessly for periods as long as 40 days, providing an unparalleled degree of system stability.

SQIID is operated from a Sun workstation through the same NOAO Wildfire system and TCL scripting language employed by Phoenix, IRIM, and CRSP. It is useful to understand that the JHK integration times are identical. Since SQIID is background limited and co-addition is highly efficient, matching the total integration time to the needs of the most demanding channel does not compromise the results in other channels. In like fashion, one can afford to co-add shorter integrations to maintain dynamic range.

SQIID has returned to Kitt Peak with enhanced capabilities. This composite SQIID multi-wavelength IR image of M17, a region of massive star formation known as the Omega Nebula, was formed by K. M. Merrill to illustrate the potential of the new PAH channel. PAH dust emission strongly dominates in this region. The dust is in emission in response to the UV radiation of newly formed hot, luminous stars. The 540-sec composite JK exposures were taken at the KPNO 2.1-m telescope on 11 May 2000. The PAH data are archival COB data.

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The UPSQIID package, a set of IRAF procedures designed to facilitate the reduction of SQIID data sets, is available to process each individual source frame and to combine multiple frames from the individual channels into spatially registered composite images. The UPSQIID package is not an officially released and supported IRAF package. Although specifically targeted for SQIID, the routines are suitable for other image data as well.

For further information contact Michael Merrill (*merrill@noao.edu*, 1-520-318-8319) or visit the SQIID Web site (*http://www.noao.edu/kpno/sqiid/*).

SQIID Performance Characteristics

KPNO Telescope	**2.1-m**		**4-m**	
Plate Scale (arcsec/pixel)	0.68		0.39	
Unvignetted FOV (arcsec)	306x320		176x183	
Estimated limiting magnitude*	point	diffuse	point	diffuse
J	19.43	20.38	20.60	20.94
H	18.55	19.55	19.72	20.07
K	18.00	18.96	19.17	19.52
PAH	12.15	13.10	13.31	13.66

S/N = 3 in 60 sec integration time for a point-source (point: mag) and a diffuse-source (diffuse: mag/square arcsec) (T = 50F; 3mm PWV; midrange OH background)

Channel Characteristics	**J**	**H**	**K**	**PAH**	**Units**
Conversion gain	10	10	10	11	electrons/adu
Applied bias	600	600	700	-	mv
Full well	>2e5	>2e5	>2e5	-	electrons
Dark	<1	<5	<5	-	adu/sec
Read noise	40	40	35	40	electrons rms
Integration time	0.732	0.732	0.732	-	sec miminum
Relative pointing	(5E,2S)	(3E,2N)	(0,0)	-	pixels on sky
Typical extinction	0.15	0.06	0.08	-	mag/airmass
Background (varies)	100	400	740	-	adu/sec/airmass @ 2.1m
10.0 mag star	2.86e4	2.77e4	1.65e4	-	adu/sec @ 2.1m
Filter manufacturer	Barr	Barr	Barr	Barr	
Filter HPshort	1.131	1.535	2.027	3.262	µm
Filter midpoint	1.267	1.672	2.224	3.299	µm
Filter HPlong	1.402	1.809	2.421	3.336	µm
Filter FWHM	0.271	0.274	0.394	0.074	µm

J filter data are estimated from the manufacturer's warm tracing by applying 1.63% shortward shift. Other data are from manufacturer's 77K tracings. Dichoric transparency has not been applied.