NOAO Newsletter - September 1994 - Number 39

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NOAO Highlights!

Director's Office

Cerro Tololo Inter-American Observatory

Kitt Peak National Observatory

National Solar Observatory

Global Oscillation Network Group

US Gemini Program

Central Computer Services

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Comments concerning this Newsletter are welcome and will be forwarded to the appropriate editors.

WIYN Achieves 0.45" Seeing (1Sep94)

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WIYN Achieves 0.45" Seeing (1Sep94)
(from NOAO HIGHLIGHTS!, NOAO Newsletter No. 39, 1 September 1994)

WIYN has become a telescope. The optics were installed in April and the first
"optical tests" occurred late one evening in April, as witnessed by a small
group of dedicated eyeballs. In the intervening months,the optics have been
collimated, the support systems tuned up, the primary mirror thermal controls
installed, and some remaining parts of the control system installed and
debugged. Progress in the quality of the images produced by the WIYN
telescope has been extraordinary, and the WIYN telescope is now routinely
producing the best images on Kitt Peak.


                            [Figure not included]

     Images of Jupiter obtained with the WIYN 3.5-m telescope.
     The "before impact" image (left) was obtained in 0.66 arcsec seeing.
     The post SL9 impact image was obtained in 1.35 arcsec seeing.

The main Project objectives over the last few months were to complete optics
installation, evaluate the system performance of the installed optics, tune
the active optics servo loops, continue supporting the installation of the
control system, and prepare the Observatory for facility instrumentation and
commissioning.

Optical system performance and tuning have been the main tasks since the
secondary and tertiary mirrors were installed in late April. Once the optics
were mechanically aligned, a cooled science grade STIS CCD was mounted at one
WIYN Nasmyth port and optical collimation was completed. With the assistance
of Claude Roddier (Hawaii), wave front curvature (WFC) mapping was then
initiated to tune the primary mirror support actuators. A more extensive WFC
mapping effort lead by Nick Roddier (NOAO) ultimately lead to the
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construction of "open loop" lookup tables to control the primary mirror shape, secondary tilt, and system focus as a function of elevation. These initial look-up tables appear to be encouragingly stable and repeatable, reflecting the stability of the WIYN active optics system. This stability will be tested regularly over the next year, and the tables will be updated as necessary.

Based on the analysis of WFC data, it was apparent that the primary and secondary were well-matched, e.g. the total system spherical aberration could be set to zero by spacing the two mirrors properly. To assess the secondary mirror high frequency quality, high resolution, high signal-to-noise out of focus stellar images were acquired with the secondary at its nominal position and then with the secondary rotated 90 deg in its cell. The before and after images were essentially identical, indicating that any residual high frequency optical features are associated with the primary. These features are quite small and should have no impact on the ultimate optical performance of the WIYN. When compared to other telescopes tested in a similar manner by the Roddiers, the WIYN optical system appears to be at least as good if not better than any other 4-m class telescope in the world.

Concurrent with this optical work, the installation of the primary mirror active thermal control system was completed. The thermal system has been active during all subsequent night-time operations. It is quite common to maintain the primary mirror temperature within +/- 0.2 deg C of the ambient temperature all night long, starting shortly after sunset.

Since the end of these parallel efforts, it has been quite common to achieve 0.6-0.7 arcsec images at telescope elevations greater than 20x for short (10-20 s) exposure times in R-band images using the current "open loop" optical system look-up tables. Image quality is degraded at longer exposures times due to poor telescope tracking. Poor tracking is not unexpected at this time since the Project has not yet tuned the telescope pointing and tracking parameters. Tuning telescope pointing and tracking will be the Project's main activity during the next month. Once that is completed, longer duration exposures will be acquired to assess image stability.

[Figure not included]

Left: An early WIYN stellar image obtained with the secondary and tertiary mirrors resting on their hard points. Right: After a round of tuning the support systems, 0.45" FWHM stellar images were obtained. The scale is 0.2"/pixel.

The MOS Nasmyth port wide-field corrector lenses have recently been received from Rayleigh Optical of Tucson and are being tested in the NOAO optical shop. Once accepted, the lenses will be anti-reflection coated, assembled into their cell, and installed at WIYN in early September. The Hydra/MOS instrument team plans to test the MOS port wide-field in late September.

The WIYN Nasmyth port atmospheric dispersion corrector optical contract has been awarded to Rayleigh Optical, and delivery is expected in early 1995. Work on the WIYN port Instrument Adaptor System (IAS) ("guider") continues with the goals of starting IAS assembly in late September and starting IAS installation and testing in early December. The NOAO Mountain Programming Group has begun work on adapting the 4-m Telescope Control System (TCS) Graphical User Interface (GUI) to the University of Wisconsin (UW) Controls Group WIYN TCS, and testing of WIYN GUI prototypes is underway. The first release of the complete WIYN GUI is scheduled for early September.

The WIYN control system has been mostly delivered by the UW Controls Group. Although some detailed control system work remains, the only remaining undelivered major subsystem is the image processing hardware and software necessary for closed-loop guiding. Delivery of that sub-system is scheduled for mid-September. The UW Controls Group is currently engaged in such activities as refining dome control, tuning the main telescope axis servo controls, and supporting the Project staff's tracking/pointing tuning effort.

Preparations for facility instrumentation installation and commissioning are nearing completion. Delivery of major instrument components has begun, and instrument commissioning activities should ramp up to full effort by mid-October.

The current project schedule milestone goals are: (1) complete telescope commissioning activities by 1 October 1994; (2) complete facility instrument commissioning activities by 1 January 1995; (3) complete university instrumentation and IAS commissioning by 1 March 1995; and (4) start WIYN "shared risk" science operations on or about 1 March 1995.

The WIYN Observatory Dedication is scheduled for 15 October 1995.

Dave Silva, Dave Sawyer

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New Light on Dark Matter Halos (1Sep94)

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New Light on Dark Matter Halos (1Sep94)
(from NOAO HIGHLIGHTS!, NOAO Newsletter No. 39, 1 September 1994)

It is generally believed that dark matter halos dominate the potential of spiral galaxies, given the high rotation speeds of the spirals' outer disks. The nature of this dark matter remains unknown, however, with candidates ranging from faint low mass stars or brown dwarfs to exotic elementary particles. To date, no light has been observed from dark matter halos. Penny Sackett (IAS), Heather Morrison (NOAO/Case), Todd Boroson (NOAO), and Paul Harding (Steward), however, have discovered a faint luminous halo around the edge-on spiral galaxy NGC 5907 that appears to match the spatial distribution of its dark matter halo.

Faint halos of Population II stars are observed around many spiral galaxies (including our own galaxy as well), but make a very small contribution to the galactic potential, and are more centrally concentrated than the dark matter halos in any case. There were a number of attempts in the 1980s to test whether dark matter halos were made of a separate population of faint, low mass stars using photographic techniques. However, the limits derived were not sufficiently strong to rule these out as dark matter candidates.

The advent of large-format CCDs and better computational techniques now makes much deeper searches for faint halos possible. Morrison, Boroson, and Harding obtained R band images of NGC 5907 using the KPNO 0.9-m telescope with a 2048 X 2048 CCD (Figure 1). A combination of observing techniques designed to obtain very good flat fielding and sky subtraction, plus analytical techniques (including careful error modeling), allowed them to reach reliably 2 magnitudes fainter than previous photographic work. (This work will appear in the October AJ).

[Figure not included]

Figure 1: R band image of NGC 5907

Sackett, Morrison, Harding, and Boroson have reported their discovery of a faint, luminous halo around NGC 5907 in a recent issue of Nature.
This halo is unlike any known luminous component of a spiral galaxy, having an unusually shallow radial profile. Figure 2 shows the comparison of the data with a model that provides a good fit to the data (disk plus halo with an r^-2.26 density law and a 2 kpc core) and a model for disk plus halo with a power-law slope characteristic of Pop II halos (r^-3.5). The r^-2.26 halo model provides a much better fit.

[Figure not included]

Figure 2: Minor axis profile of NGC 5907. Exponential disk model only (dashed), disk plus r^-3.5 halo (dotted), disk plus r^-2.26 halo (solid).

The shallow radial profile of NGC 5907's halo suggests that it formed in a very different way from any other known stellar halo. It must have suffered very little of the dynamical evolution (for example, dissipation or violent relaxation) that produces typical stellar halos. In addition, the similarity of its radial profile to that inferred for dark matter halos suggests that the luminous halo might be connected with NGC 5907's dark matter halo, either as a tracer or because we are observing some of the "dark" matter itself.

The dynamics of NGC 5907, as measured from its HI rotation curve can be well fit by taking the space distribution of disk and halo from the model fit to the surface photometry, and transforming them to mass densities by assigning mass-to-light ratios (M/L) to disk and halo (Figure 3). This suggests that the faint extended light of NGC 5907 may have a radial profile similar to that of its dark matter halo. Depending on the assumed disk M/L, the M/LR for the halo that produces the best fit is in the range 270-540. This range is consistent with the M/LR of a metal-weak M dwarf near the

H-burning limit. However, studies of faint field stars in the Milky Way suggest that its massive halo does not consist solely of such stars. If the dark matter halo of NGC 5907 is similar to that of the Galaxy, it is more likely that NGC 5907's luminous halo may trace its dark matter but have relatively low total mass, itself.

[Figure not included]

Figure 3: Superposed on the H I kinematics (Sancisi and van Albada 1987) is a model rotation curve (heavy line) formed from: (1) an H I disk (dotted), (2) an exponential stellar disk (dashed), and (3) a halo (thin curve) derived from the faint extended light.

Color observations of this faint halo will provide vital information on its stellar makeup. If it is composed of faint low-mass metal-weak stars, its red color would enable deep I-band photometry to show a strong detection of the halo. These data were obtained recently on the Burrell Schmidt.

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Comet Impact Observations from CTIO (1Sep94)

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Comet Impact Observations from CTIO (1Sep94)
(from NOAO HIGHLIGHTS!, NOAO Newsletter No. 39, 1 September 1994)

The much-anticipated collision of Comet Shoemaker-Levy 9 with Jupiter disappointed nobody. The effects, which many astronomers had expected to be negligible, were spectacular and very well-observed, thanks to an unprecedented global observational campaign.

The sequence of observable events for the larger impacts, gathered from many observatories, went something like this. As the nuclei approached Jupiter, the clouds of dust which surrounded them, and made them visible, were stretched out towards Jupiter by tidal forces, and the previous anti-sunward tails, produced by solar radiation pressure on the dust, disappeared. The actual impacts produced rather faint 30-second flashes at 0.95 fm, seen by the Galileo spacecraft; visible-wavelength flashes reflected off the satellites have not been confirmed at the time of writing. Within a couple of minutes, "fireballs" developed which were big enough to rise above Jupiter's limb and be seen directly from Earth: some of these were incredibly bright, brighter than Jupiter, between 2 and 10 fm. Spectra revealed emission lines due to CO and other species. These fireballs faded over tens of minutes, by which time a cloud at the impact site began to rotate into view. The clouds were very large, more than 10^4 km across, even when new, and were probably generated in situ by the effects of the fireballs as they spread laterally, predominantly to the south of the impact points. The largest impacts showed spectacular rings, presumably atmospheric shock waves of some sort, spreading out from the impact points in the first hour after impact. The oldest impact-generated clouds are a week old at the time of writing and show little sign of fading. They are dark at visible wavelengths and are very conspicuous. In the infrared, they are bright against the dark planet at wavelengths absorbed by methane, indicating a very high altitude, above most of the methane absorption: residual CH4 absorption can be used to estimate cloud altitudes. HST and ground-based images reveal a complex dark core and an extended crescent-shaped halo to the south of each impact site.

Not all of the 20 impacts produced such dramatic effects. Several of the fragments seen in the pre-impact images produced no observable effects at all, while others of similar pre-impact brightness were spectacular. Intriguingly, most of the fragments which "fizzled" were displaced away from the linear alignment of the other fragments in pre-impact images.

CTIO played an important part in this campaign, despite bad luck with both the weather and the faintness of the impacts that were visible from there. John Spencer, Darren DePoy, Jay Frogel, and Nick Schneider, using the OSIRIS camera at the 4-m, obtained some of the first images of the persistent cloud at the first impact site (fragment "A") in the hours after the impact, at 2.3 um, and continued to image the development of the clouds as they accumulated over the following week. OSIRIS also obtained 1-2.5 um spectra with a resolution of 500 of several of the impact sites: these show CH4 absorption above the clouds and will provide estimates of cloud altitude (see Figure 1 for an example).

[Figure not included]

Sang Kim, Christophe Dumas, Jay Elias, and Richard Elston used the IRS 1-5 um spectrometer at the 1.5-m telescope, and among other things detected CH4 v=3 emission from the "A" impact site, which will constrain physical conditions at this site in the hours after impact (see Figure 2).

[Figure not included]

IRS 5-um spectra of the "D" site showed very strong continuum emission and several molecular species, and many other spectra were obtained. CCD imaging by Brad Schaefer and Fred Ringwald at the 0.9-m telescope and Charles Ford at the Lowell 0.6-m telescope showed the development of the dark impact clouds in the visible, and the 0.4-m telescope provided spectacular visual views of the impact sites. Prior to the event, Pat Seitzer had been providing astrometry of the comet fragments using the Curtis Schmidt telescope. One of the last pictures taken of the comet is shown in Figure 3. This was taken the night of 10/11 July, when the comet was less than a degree from Jupiter; the image is the sum of several exposures which were shifted, added, and corrected for scattered light from the planet.

[Figure not included]

John Spencer (Lowell Obs.), Jay Elias (CTIO)

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NSO Observations of the 10 May Annular Eclipse of the Sun (1Sep94)

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NSO Observations of the 10 May Annular Eclipse...(1Sep94)
of the Sun
(from NOAO HIGHLIGHTS!, NOAO Newsletter No. 39, 1 September 1994)

Sac Peak

Several groups had very successful runs at the Vacuum Tower Telescope (VTT) and Hilltop Lab. There were intermittent clouds throughout the eclipse, but there was enough clear sky so that the various experiments could be carried out successfully. There was a large crowd of tourists - estimated between 250 and 300 - who gathered for the event, as well as many reporters. Keil and Simon from the Air Force group at Sac Peak gave public lectures in connection with the eclipse.

[Figure not included]

Figure 1. Phases of the 10 May 1994 eclipse as seen by an H-alpha patrol telescope at the National Solar Observatory on Sacramento Peak, assembled by Craig Gullixson.

Experiments included the measurement of UV radiation from the Sun and the sky throughout the eclipse by a group from Phillips Lab. Vector magnetograms were obtained at the Hilltop Lab throughout the eclipse. Keil, Balasubramaniam, Smaldone (Univ. of Naples) and Rimmele (Kiepenheuer Inst.) obtained excellent spectral and white-light images of the lunar limb at various heliocentric positions on the solar disc. Despite passing clouds that interrupted the experiments, images were obtained during about 70% of the available time during the first half of the eclipse with the narrow band filter at the VTT. Komm and Mattig (Kiepenheuer Inst., Freiburg, Germany) obtained center-to-limb observations with the echelle spectrograph at the VTT during the second half of the eclipse. These observations were aimed at determining vertical and horizontal velocity and intensity/temperature fluctuations as a function of height in the solar photosphere. The lunar limb will be used to derive the point-spread function to correct for scattered light.

Kitt Peak

Alan Clark (Univ. of Calgary), in collaboration with a team of NSO staff: Hartmann, Jaksha, Lindsey, Livingston, Plymate, and Rabin, with REU summer student Shella Keilholz (Univ. of Missouri) assisting with data analysis, used the McMath-Pierce Solar Telescope to obtain high-resolution spectral limb profiles of infrared lines of CO and H. It is not known how CO can exist at the high temperatures found in the solar atmosphere. These observations were designed to study the vertical distribution of CO as an aid in determining how the CO is cooled. Even though the eclipse was not quite annular at Kitt Peak, these observations used the distant "knife-edge" of the lunar limb to circumvent the usual limitations on angular resolution dictated by seeing and telescope diffraction. In spite of some clouds during the eclipse, observations show a vertical resolution of about 0.1", about 10 times better than is possible with direct observations. Preliminary analysis of the observations shows the distribution of emission from CO molecules in the chromosphere to be sharply limited to heights low in the chromosphere.

[Figure not included]

Figure 2. Solar limb profiles determined from the nearly annular solar eclipse of 10 May 1994 from the McMath-Pierce Solar Telescope. The top panel shows the profile of the continuum at 4.67 um. Proceeding downward, profiles are plotted for ^12/CO, ^13/CO, and (bottom) for the Pfund-beta line of hydrogen.

Jacques M. Beckers

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Ultrafaint H-alpha Emission from Intergalactic H I Clouds and Galaxy Halos (1Sep94)

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Ultrafaint H-alpha Emission from Intergalactic...(1Sep94)
H I Clouds and Galaxy Halos
(from NOAO HIGHLIGHTS!, NOAO Newsletter No. 39, 1 September 1994)

Megan Donahue (STScI), Greg Aldering (Minnesota), and John Stocke (Colorado) went looking for H-alpha emission in all the wrong places. Their initial program was to search for faint H-alpha emission arising from surface photoionization of intergalactic 21-cm clouds, an approach that offers the most sensitive probe available of the metagalactic ionizing radiation field at the present epoch. Their observations set interesting constraints on the properties of this radiation field, but the clouds themselves remained invisible. Donahue and her collaborators, however, did find H-alpha emission coming from an extended halo around the galaxy NGC 4631, a place they didn't expect.

From the start, Donahue, Aldering, and Stocke knew that any emission coming from the intergalactic H I clouds was likely to be extremely faint, so they used a telescope and techniques maximally suited for detection of low surface-brightness, highly extended, emission-line sources. Surprisingly, the telescope of choice is not the 4-m, but the Burrell-Schmidt, equipped with a 2048 X 2048 CCD. This system features a field of view of over one square degree, large (2 arcsec) pixels, and a sufficiently fast beam so that the bandpass and throughput of the narrow-band filters were not adversely affected by the converging angles of the light rays. Taking advantage of dark, stable nights, and using the "shift-and-stare" technique for constructing night sky super-flats, they were sensitive to H-alpha emission at surface-brightness levels unprecedented in an imaging experiment. (Similar limits have been achieved in Fabry-Perot experiments by Reynolds and others, but with limited spatial information.)

Donahue, Aldering, and Stocke expected to detect or to set significant limits on faint, low-surface-brightness emission from the surfaces of the H I clouds, which had previously been identified in 21-cm emission. Indeed, they obtained interesting upper limits for the Leo Ring, a clearly intergalactic cloud not directly associated with any single galaxy. Their current surface-brightness detection limit for the Leo Ring is u H-alpha &lt 102 mR (for comparison, this is over 10^7 times fainter than the Orion nebula). This limit corresponds to a background ionizing intensity of JO(13.6eV) &lt 1.2 X 10^-22 erg s^-1 cm^-2 sr^-1 Hz^-1 or an ionizing flux at the face of the cloud of 5.6 X 10^4 photons cm^-2 s^-1.

This upper limit is consistent with estimates of the local ionizing background from quasar counts, the "proximity" effect in local Lyman-alpha forest clouds, models to reproduce the sharp edges in the H I-profiles of disks, and extrapolations from the far-UV background. New data acquired this spring will either decrease this limit by a factor of 2-3 or reveal a detection. Donahue, Aldering, and Stocke, however, did not expect to detect H-alpha emission between two H I spurs extending nearly 30 kpc from the disk of the well-studied edge-on galaxy N4631. Nor did they expect to detect a halo of low surface-brightness H-alpha emission, nearly 10 kpc thick, around the same galaxy. Although extensive H-alpha images have been made of N4631, none of them had the field of view or the sensitivity to low surface brightness emission that were achieved by using the Burrell Schmidt and excellent night sky flats.

The processed H-alpha image with the H I 21 cm contours from Rand and van der Hulst (1993, AJ, 105, 2098) is shown in the figure. In producing the image, bright objects such as stars and the interiors of the galaxies were masked out, and show up as sharp white features in the figure.

[Figure not included]

The entire image was then median-filtered on 2 X 2 arcmin scales. The scattering halos of extremely bright stars are still present in the images, and show up as boxy shapes with a rectangular imprint. These data were taken with the old filter-holder, which vignetted the field on the corners, so edge-effects are visible in a circular ring along the outer borders of the field (the new filter wheel eliminates this problem). The image has not been continuum-subtracted, but the continuum R and B images do not show emission at such large scale heights, except for extremely faint emission in the tidal tail that accounts for less than 50% of the counts detected in the narrowband filter. The emission measures seen in light grey in the inverse grey-scale image are approximately 0.1 cm^-6 pc, dark grey in the tidal tail between the H I tails corresponds to 0.3-0.5 cm^-6 pc; black corresponds to emission measures of 0.9 cm^-6 pc. The emission measures are too high to arise from metagalactic photoionization alone, since at such high levels, H-alpha would have been detected easily from the H I spurs and the Leo Ring. Therefore, most of the heating of the thick H-alpha halo must be internal to the galaxy.

Since no other edge-on galaxy has been imaged to such sensitivity and wide angular scale in H-alpha, we do not know whether such extended H-alpha features are common, or somehow generated in N4631 tidally. Certainly the 30 kpc "tidal tail" feature detected between the two H I spurs (seen in the 21-cm map of Rand and van der Hulst has a tidal origin, since no explosive scenario can eject gas that far from a galaxy. Such observations have interesting consequences for the possible nature of absorption lines from "Lyman-alpha forest" at low redshift. If detectable ionized gas can exist at moderate radii, then it might not be far-fetched to expect that gas with extremely low H I column density, as detected in absorption against low-redshift background quasars by HST, might be still farther away from the galaxy, and yet still associated with it.

The Burrell-Schmidt CCD system provided a new view of edge-on galaxies and new limits on the local metagalactic ionizing flux. Similar techniques directed at revealing faint extended emission around other targets will show whether spiral galaxies have larger cross-sections than we thought, as well as provide the first reliable estimate of the local metagalactic ionizing background.

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Gemini South Site Preparation Begins (1Sep94)

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Gemini South Site Preparation Begins (1Sep94)
(from NOAO HIGHLIGHTS!, NOAO Newsletter No. 39, 1 September 1994)

The Gemini Board visited Cerro Pachon on 21 May and were able to see that major site preparation work had already begun for the southern Gemini telescope. The primary reason for this early start on Cerro Pachon, which will be the second of the two Gemini sites to be fully developed, is to obtain test borings of the subsurface material in order to design the telescope pier and foundations. The service access road to the summit of Cerro Pachon from the Quebrada San Carlos has been completed. The first Gemini employee to be stationed in Chile, Paul Gillette, arrived in La Serena with his family on 6 July. Paul will provide local supervision and co-ordination of work in Chile on behalf of the Gemini project. Further details will appear in the various reports by the Gemini project.

[Figure not included]

No, this is not another Shoemaker-Levy 9 impact, but the start of work at Cerro Pachon to level the site in preparation for construction of Gemini South.

Malcolm Smith

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NOAO Nighttime Infrared Program Plan (1Sep94)

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NOAO Nighttime Infrared Program Plan (1Sep94)
(from Director's Office, NOAO Newsletter No. 39, 1 September 1994)

As a follow-up to the NOAO 2000 Workshop held in March, comprehensive planning for the development, upgrading and deployment of infrared instrumentation for the nighttime telescopes has been initiated. The long-term goal is to provide substantial imaging and spectroscopic capabilities for both CTIO and KPNO, based on the anticipated production of large-format InSb arrays developed through the ALADDIN program. The steps to that goal include upgrades of existing instruments and development of new spectrographs for both sites. The NOAO 2000 plan places central emphasis on support of the Gemini program. New instrumentation will be designed to be compatible with Gemini protocols. IR instrumentation deployed at CTIO can thereby be shared with Gemini South to expand its first-light capabilities. The instrumentation resources in Tucson will be allocated in an integrated manner to produce major new instrumentation for both sites, while upgrades will be implemented by a combination of Tucson and site-dedicated personnel.

Current Instrumentation

At the present time, instruments deployed at CTIO comprise the following:

IR Spectrometer (256 X 256 InSb)
New IR Imager (256 X 256 HgCdTe)

Instruments deployed at KPNO:

CRSP (256 X 256 InSb)
IRIM (256 X 256 HgCdTe)
COB (256 X 256 InSb)
SQIID (4 X 256 X 256 PtSi)

Future Instrumentation and Upgrades

1) The CTIO f/14 tip/tilt system. The hardware for the f/14 project will be completed before the end of 1995, although full implementation of tip/tilt

may not be complete until 1996.

2) New IRIM at CTIO, upgraded to 512 X 512 InSb. The upgrade of IRIM (currently with the NICMOS HgCdTe array) to 512 X 512 InSb will produce a camera with a plate scale of ~ 0.15"/pixel appropriate to exploit the anticipated image quality at f/14 tip/tilt. Commissioning of the upgraded camera is planned for the second half of 1995.

3) An upgraded SQIID. SQIID will be upgraded to either 512 X 512 InSb or 1024 X 1024 InSb depending on the yield of arrays. It will be tested on the telescope at KPNO before shipment to CTIO, probably toward the end of 1996. The imaging capability formerly provided by SQIID at KPNO will be replaced by GRASP, as described below.

4) A new Medium Resolution Infrared Spectrometer (IRS). The design of a new IRS to be deployed at CTIO will be similar to that submitted in the NOAO proposal for the IR spectrograph for Gemini. The construction of this instrument will probably be phased to follow that of GRASP.

5) An upgraded COB. COB will be upgraded to either 512 X 512 InSb or 1024 X 1024 InSb, depending on array availability, sometime in 1995.

6) Phoenix. The 1 to 5 um high-resolution spectrometer, will be completed in 1995. The allocation of resources to the timely fabrication of this instrument will be the first implementation of the new management plan for NOAO nighttime instrumentation resources.

7) GRASP. GRASP is an extension of the SQIID concept, with four separate channels for the J, H, K, and L bands. Each channel will be operated either in imaging mode - as is presently done with SQIID - or as a low-resolution spectrometer, with the entire atmospheric window observed in each channel. GRASP will offer simultaneous, complete spectral coverage from 1.1 to 4.1 um or simultaneous J,H,K,L imaging. Implementation of GRASP will require four arrays of at least 512 X 1024 format. The development of GRASP is planned to phase in as the construction of Phoenix is completed.

ALADDIN Array Deployment

COB will be the first instrument to have an Aladdin array installed and will also serve as the prototype for large array control. Current plans call for the next installation to be fitting the CTIO IR imager with a 512 X 512 InSb array. Phoenix will be implemented with a 512 X 1024 InSb array, then SQIID will be upgraded with either 512 X 512 or 1024 X 1024 InSb depending on the array yield. Finally, GRASP will be deployed with either 512 X 512, 512 X 1024 or 1024 X 1024 arrays depending on the yield. Upgrades to the L band for broad-band imaging in both SQIID or GRASP may be deferred until later.

Input

This long-term plan represents the best effort of the CTIO and KPNO staffs to define a vital forward look for infrared instrumentation, centrally developed and deployed to achieve a relatively balanced complement at the two sites. Close interaction with the Gemini Project will ensure compatibility, and the ability to share new instrumentation with Gemini South. The next step is to match this vision with your expectations. Does this plan support your scientific objectives for the use of NOAO telescopes? Does it place you, as an NOAO user, in a competitive position relative to those with regular access to a different suite of national or independent telescopes? We will discuss these plans through the formal channel of the Users Committees, and we also welcome your comments at any time.

Richard Green, Jay Elias, Richard Elston, Ian Gatley

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Mark Phillips Receives AURA Science Achievement Award (1Sep94)

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Mark Phillips Receives AURA Science Achievement...(1Sep94)
Award
(from Director's Office, NOAO Newsletter No. 39, 1 September 1994)

Mark Phillips has received the 1994 AURA Science Achievement award for his outstanding contribution to understanding the spectra of supernovae. Mark has been the cornerstone of a very successful CTIO program to monitor galactic novae and extragalactic supernovae.

Following the outburst of SN 1987A in the LMC, Mark's work was crucial in ensuring that CTIO took maximum advantage of that unique scientific event. Mark quickly took responsibility for much of the spectroscopic monitoring of the outburst.

This initial work contributed to a broader interest in supernovae, especially those of type Ia. With Mario Hamuy and Nick Suntzeff, Mark has been in charge of a team of CTIO staff that has obtained light curves in different colors and spectroscopy of most of the supernovae that have been observable in the Southern hemisphere. The search for supernovae, which was a joint program with the University of Chile, was highly successful, and the database has proved particularly valuable in understanding the characteristics of the Type Ia supernovae.

One of the most important results of the supernova search has been the finding that SN Ia's are not all of the same luminosity at maximum light, as had been thought, but rather have a dispersion in that maximum luminosity of about one magnitude. From the spectroscopic data, Mark has been able to establish a criterion based on Si line widths that is a luminosity discriminant. Through this technique, SN Ia's can be calibrated for use as standard candles.

Our congratulations go to Mark for making a significant contribution through his systematic approach and important results.

Richard Green, Goetz Oertel, Malcolm Smith, Sidney Wolff

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AURA Service Awards (1Sep94)

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AURA Service Awards (1Sep94)
(from Director's Office, NOAO Newsletter No. 39, 1 September 1994)

Each year, AURA makes an award for outstanding service to NOAO. Traditionally, this award has been given to a single individual for exceptional contributions. This year the award recognizes the achievements of a team of people - the members of the NOAO 3.5-m Mirror Group, who have prepared the primary mirror for the new WIYN Telescope. The 3.5-m mirror was fabricated and polished at the Steward Observatory Mirror Lab. The 3.5-m team assisted with the polishing and fabricated the mirror cell, the active support system, and the thermal control system. The primary mirror assembly is now an optical system that can produce the best images of all the large optical telescopes in the world. The innovative optical supports reshape the surface of the mirror to the produce correct figure and remove any aberrations. Wavefront testing by Claude Roddier of the University of Hawaii has established that the WIYN Telescope, in the absence of atmospheric seeing, could produce images of 0.04 arcsec. The active supports virtually eliminate coma, a major source of aberrations in most telescopes, and the remaining wavefront errors are some 40% less than the best produced elsewhere. The active thermal control system not only maintains a uniform temperature throughout the mirror, but also holds the mirror at an overall temperature just below that of the ambient nighttime air, thereby eliminating "mirror seeing." In the absence of atmospheric seeing, the WIYN Telescope mirror would produce images nearly a factor of 10 better than are possible with the Mayall 4-m primary mirror. This major improvement demonstrates the advances in technology that have occurred in the last 20 years.

The spectacular performance of the WIYN mirror was achieved through teamwork, and this award especially recognizes the spirit that characterized the work of the 3.5-m Mirror Group. Everyone participated in the design process, in fabrication, in assembly, and in the test programs. Everyone got their hands dirty. The willingness to help wherever and whenever needed exemplifies the best in team spirit and cooperation. The performance of the 3.5-m primary mirror system greatly exceeds the design specifications, and this team effort has put KPNO and NOAO on the brink of a new era in telescope performance.

Contributing to the success of the 3.5-m mirror effort over the last five years are the following individuals:

Larry Stepp designed the mirror cell, the lateral supports and the prototype axial supports, and managed the team until he joined the Gemini Project.

Larry Goble designed the thermal control system for the mirror and mirror cell including an innovative thermoelectric heat exchanger which will improve efficiency on the mountain. He designed a new light weight axial support mechanism to replace the prototype units, participated in system assembly, testing and installation on the mountain, and designed the shipping container for the mirror.

Nick Roddier designed the servo control system for the mirror supports, wrote the control algorithm that bends the mirror to the desired shape, and participated in the system assembly, testing and installation on the mountain.

Dave Dryden designed, fabricated, and installed much of the electronic hardware and printed circuit boards used in the support system. He also designed, fabricated, calibrated, and installed the 1,000 thermal sensors system used for the prototype testing of the mirror.

Gary Poczulp was responsible for the system tests conducted on the mirror support and thermal control systems, and also worked as an optician during initial polishing of the mirror blank to a sphere for testing and then again during the aspherizing on the stressed lap polisher. He has been responsible for all of the mirror handling while it was in the NOAO mirror lab.

Lee Macomber fabricated many of the parts for the mirror assembly, and helped to assemble the mechanical parts and to refurbish the 4-m polishing machine after years of neglect.

Ron Harris also fabricated many of the parts, helped to assemble the mechanical system, and installed much of the plumbing to the support system.

Scott Benjamin designed, prepared detail drawings for, and assembled parts and has significantly contributed to the success of the system.

John Kapp contributed to the effort necessary to assemble the axial and lateral support systems as well as the thousand other tasks that needed to be done in a timely fashion. When it came to getting hands dirty he was always there.

Richard Wolff led the system design upgrade, fabrication, assembly and test efforts after the initial spherical tests were completed, and was responsible for the schedule, budget, and day to day activities of the 3.5-m staff.

The 3.5-m mirror was the last large mirror to be polished by John Richardson, who initially worked on polishing the mirror to a sphere in the NOAO shops and then collaborated with Steward Mirror Lab staff to achieve the final mirror figure. A plaque will be mounted on the WIYN mirror cell that reads "In memory of John H. Richardson, Master Optician, 1936-1993. His skill in producing large astronomical optics helped push back the frontiers of astronomy."

Goetz Oertel, Caty Pilachowski, Sidney Wolff

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Farewell to Matt Johns (1Sep94)

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Farewell to Matt Johns (1Sep94)
(from Director's Office, NOAO Newsletter No. 39, 1 September 1994)

Matt Johns has left NOAO to tackle his next challenge. He had come from the MDM Observatory to NOAO at the start of 1989 to assume the responsibilities of WIYN Telescope Project Manager. During the course of the next five and a half years, his conscientious management was key to bringing the telescope structure, optics and buildings together on schedule and on budget. Matt's thorough competence and unassuming manner inspired the well deserved confidence of the WIYN Scientific Advisory Committee, the WIYN Board, and his scientific and management colleagues in all the partner institutions. The WIYN telescope is clearly well on its way to meeting its scientific performance goals.

We are grateful to Matt for a job well done, and wish him every success in his efforts with the Magellan Project. Matt can take just pride in his legacy of the two best imaging telescopes on Kitt Peak.

Richard Green, Caty Pilachowski, Sidney Wolff

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Director - Kitt Peak National Observatory (1Sep94)

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Director - Kitt Peak National Observatory (1Sep94)
(from Director's Office, NOAO Newsletter No. 39, 1 September 1994)

The National Optical Astronomy Observatories (NOAO) is conducting a search for Director of the Kitt Peak National Observatory (KPNO). The KPNO Director will be expected to oversee the scientific operation of facilities on Kitt Peak, to take the leading role in developing programs designed to enhance the scientific capabilities and productivity of Kitt Peak facilities, to provide innovative and effective support to the user community and, in cooperation with them, to help formulate a long range plan for the development of KPNO and NOAO facilities as the Gemini telescopes come into operation.

Candidates should have a distinguished record of achievement in astronomy, demonstrated leadership and management capabilities, and a commitment to serving the KPNO community of observers. The Director of KPNO will be expected to remain an active research scientist.

Applications for this position should be sent by 15 November 1994 to:

Robert O'Connell
Chair of the Search Committee
c/o NOAO Director's Office
P.O. Box 26732 Tucson, AZ 85726

Applications should be accompanied by a curriculum vitae and publications list, along with the names of at least three people from whom confidential evaluations can be sought. Further information can be obtained from Sidney Wolff, Director of NOAO at 602-325-9282 or from Robert O'Connell at 804-924-7494 (Univ. of Virginia).

Sidney C. Wolff

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News from AURA: Mont Megantic Board Member Named (1Sep94)

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News from AURA: Mont Megantic Board Member Named (1Sep94)
(from Director's Office, NOAO Newsletter No. 39, 1 September 1994)

We are pleased to announce that Jean-Rene Roy, Universite Laval, will serve as the institutional representative of the Observatoire du Mont Megantic on the AURA Board of Directors. Welcome!

Goetz Oertel

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News from AURA: The AURA Corporate Office Has Moved! (1Sep94)

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News from AURA: The AURA Corporate Office Has Moved! (1Sep94)
(from Director's Office, NOAO Newsletter No. 39, 1 September 1994)

Please note that the AURA Corporate Office has moved to another suite within the same building. We are now in Suite 550. Our street address and phone/fax numbers remain the same.

For ready reference, our address and phone numbers are:

AURA
Suite 550
1625 Massachusetts Avenue, N.W.
Washington, DC 20036
phone: (202) 483-2101
fax: (202) 483-2106

Lorraine Reams

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Engineering and Technical Services: Aladdin - 1024 x 1024 InSb FPA Project (1Sep94)

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Engineering and Technical Services:...(1Sep94)
Aladdin - 1024 X 1024 InSb Array Project
(from Director's Office, NOAO Newsletter No. 39, 1 September 1994)

We have completed the warm wafer testing on the development lot of readouts and it has been a great success. We now have yield statistics on the readout design and processing. In summary the development lot yielded 37% perfect (i.e. no bad rows or columns) quadrants (there are four quadrants per readout die) and 27% good quadrants (less than 2 bad rows/columns total). Because of grouping, due to wafer quality and processing issues, we obtained 7 perfect 1024 X 1024 readout die (~8.7%), 9 good die (~11.2%), and another 4 which have one quadrant with 3 bad rows/columns. This gives us an overall useful yield of 25%. Several of the die were packaged for cold testing at NOAO and SBRC. We have completed our testing from LN2 down to 30K and the readout functions as designed. We have tested both the PMOS and NMOS output drivers and see very little performance difference at the bare readout level. The final decision as to which is the better choice will have to await hybrid testing. The gain uniformity is better than 1% and the noise at the readout level is comparable to the 256 InSb device. A meeting was held at SBRC in

June on the Readout Development Phase of the contract and it was decided to go to the next phase which is producing a limited number of hybrids for further evaluation. These are expected to be in test before the end of the summer and at the telescope soon thereafter. Watch the ALADDIN ftp directory for the first images.

A paper, "Next Generation in InSb arrays: ALADDIN, the 1024 X 1024 InSb focal plane array readout evaluation results" was presented at the SPIE Conference in San Diego in July. The paper presents the first test data on the bare readout. A copy of the paper can be obtained by contacting Carol Gregory, cgregory@noao.edu. Work is continuing on a plan whereby the community can participate with NOAO in a production run at SBRC of Aladdin focal plane arrays. More will be forthcoming on this effort.

Carol Gregory

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NOAO Preprint Series (1Sep94)

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NOAO Preprint Series (1Sep94)
(from Director's Office, NOAO Newsletter No. 39, 1 September 1994)

The following preprints were submitted during the period 1 May 1994 to 30 July 1994. Please direct all requests for copies of preprints to the NOAO author marked with an asterisk.

593 *November, L.J., "The Temporal Parameter Space of a Multielement Resonator"

594 *D'Silva, S., "Acoustic Mode Mixing in Sunspots"

595 *Wells, L.A., Phillips, M.M., Suntzeff, N.B., Heathcote, S.R., Hamuy, M., Navarrete, M., Fernandez, M., Weller, W.G., Schommer, R.A., Kirshner, R.P., Leibundgut, B., Willner, S.P., Peletier, R.F., Schlegel, E.M., Wheeler, J.C., Harkness, R.P., Bell, D.J., Matthews, J.M., Filippenko, A.V., Shields, J.C., Richmond, M.W., Jewitt, D., Luu, J., Tran, H.D., Appleton, P.N., Robson, E.I., Tyson, J.A., Guhathakurta, P., "The Type Ia Supernova 1989b in NGC 3627 (M 66)"

596 Postman, M., *Lauer, T.R., "Brightest Cluster Galaxies as Standard Candles"

597 *Penn, M.J., Kuhn, J.R., "Ground-based Detection of an IR [Si X] Coronal Emission Line and Improved Wavelengths for the IR [Fe XIII] Emission Lines"

598 *Morrison, H.L., Boroson, T.A., Harding, P., "Stellar Populations in Edge-on Galaxies from Deep CCD Surface Photometry I - NGC 5907"

599 *Zirker, J.B., Cleveland, F.M., "Searching for Nanoflares"

600 *D'Silva, S., Duvall, T.L., "Time-Distance Helioseismology in the Vicinity of Sunspots"

601 *Layden, A.C., "The Metallicities and Kinematics of RR Lyrae Variables. I. New Observations of Local Stars"

602 *Massey, P., Lang, C.C., Degioia-Eastwood, K., Garmany, C.D., "Massive Stars in the Field and Associations of the Magellanic Clouds: the Upper Mass Limit, the Initial Mass Function, and a Critical Test of Main-Sequence Stellar Evolutionary Theory"

603 *Williams, W.E., Toner, C., Hill, F., "Test of a Data Merging Algorithm Based on the Modulation Transfer Function"

604 Sackett, P.D., *Morrison, H.L., Harding, P., Boroson, T.A., "A Faint Luminous Halo that May Trace the Dark Matter Around Spiral Galaxy NGC 5907"

605 *Keller, C.U., Graf, W., Rosselet, A., Gschwind, R., Wild, U.P., "First Light for an Astronomical 3-D Photon Detector"

606 *Corbin, M.R., Francis, P.J., "The Emission-Line Properties of the QSO Population at z ~ 2"

607 *Fowler, A.M., Bass, D., Heynssens, J., Gatley, I., Vrba, F.J., Ables, H.D., Hoffman, A., Smith, M., Woolaway, J., "Next Generation in InSb Arrays: ALADDIN, the 1024 X 1024 InSb Focal Plane Array Readout Evaluation Results"

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Non-NOAO Preprints (1Sep94)

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Non-NOAO Preprints (1Sep94)
(from Director's Office, NOAO Newsletter No. 39, 1 September 1994)

Preprints that were not included in the NOAO preprint series but are available from staff members are listed below in alphabetical order by first author. Please direct all requests for copies of these preprints to the NOAO author marked with an asterisk.

*Abt, H.A., "Current Burst in Astronomical Publications"

*Eggen, O.J., "Stellar Populations at the South Galactic Pole"

Elvis, M., Wilkes, B.J., McDowell, J.C., *Green, R.F., Bechtold, J., Willner, S.P., Oey, M.S., Polomski, E., Cutri, R., "Atlas of Quasar Energy Distributions. I. The Data"

Georgobiani, D., *Kuhn, J.R., Beckers, J.M., "Using Eclipse Observations to Test Scintillation Models"

*Hamuy, M., Phillips, M.M., Maza, J., Suntzeff, N.B., Della Valle, M., Danziger, J., Antezana, R., Wischnjewsky, M., Aviles, R., Schommer, R.A., Kim, Y.-C., Wells, L.A., Ruiz, M.T., Prosser, C.F., Krzeminiski, W., Bailyn, C., Hartigan, P., Hughes, J., "SN 1992k: A Twin to the Subluminous Type Ia SN 1991bg"

*Hamuy, M., Phillips, M.M., Maza, J., Suntzeff, N.B., Schommer, R., Aviles, R., "A Hubble Diagram of Distant Type Ia Supernovae"

Kellermann, K.I., Sramek, R.A., Schmidt, M., *Green, R.F., Shaffer, D.B., "Radio Structure of Radio Loud and Radio Quiet Quasars in the Palomar Bright Quasar Survey"

*Kuhn, J., Hudson, H., Lemen, J., McWilliams, T., Milford, P., "Precise Measurements of Solar Limb Shape and Brightness Changes"

McMillan, R., Ciardullo, R., *Jacoby, G.H., "Ionized Gas and Planetary Nebulae in the Bulge of the Blue SO Galaxy NGC 5102"

Muglach, K., Solanki, S.K., *Livingston, W.C., "Preliminary Properties of Pores Derived From 1.56 Micron Lines"

Strauss, M.A., Cen, R., Ostriker, J.P., *Lauer, T.R., Postman, M., "Can Standard Cosmological Models Explain the Observed Abell Cluster Bulk Flow?"

Tripp, T.M., Bechtold, J., *Green, R.F., "Spectral Energy Distributions of the Brightest Palomar-Green Quasars at Intermediate Redshifts"

Uitenbroek, H., Noyes, R.W., *Rabin, D.M., "Imaging Spectroscopy of the Solar CO Lines at 4.67 um"

Zepf, S.E., *Geisler, D., Ashman, K.M., "The Richness of the Globular Cluster System of NGC 3923: Clues to Elliptical Galaxy Formation"

Ann Barringer, John Cornett, Elaine Mac-Auliffe,
Jane Marsalla, Shirley Phipps, Cathy Van Atta

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CTIO Instrumentation News (1Sep94)

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CTIO Instrumentation News (1Sep94)
(from CTIO, NOAO Newsletter No. 39, 1 September 1994)

This quarter has been notable for the amount of progress in areas of collaboration between the La Serena and Tucson instrumentation groups. Additional work in ETS over the past quarter has been concentrated on finishing the IR Imager for an engineering run scheduled in August, finishing the construction of the components and software for the 4-m Active Primary Support system, and continuing work on Arcon production and CCD implementation.

o The CTIO IR Spectrometer came back from Tucson where it was reincarnated with a new 256 X 256 InSb detector system operating with WILDFIRE. This was a joint KPNO/CTIO effort with the participation of Jerry Heim and Nick Buchholz of the Tucson IR group and Richard Elston and Manuel Lazo of CTIO. The instrument met its deadline set by the encounter of Comet Shoemaker-Levy 9 with Jupiter and saw continuous use on the 1.5-m telescope during the event. Another article in this section describes the refurbished instrument in some detail.

o The new CTIO IR Imager (256 X 256] Rockwell NICMOS HgCdTe) is scheduled to begin visitor use during September. Jerry Heim and Nick Buchholz helped us bring up that detector system under WILDFIRE during their visit for the installation of the IRS. If all goes well, we will by then be in a position once again to offer IR imaging (0.9-2.5 um) and spectroscopy (0.9-5.0 um) with our own instrumentation and we will gratefully return OSIRIS to its creators at Ohio State.

o Diana Kennedy of the Mountain Programming Group in Tucson visited the Arcon software group for a couple of weeks to plan her project to interface Arcons to the WIYN telescope control system and instruments.

Two important CCD chips have received attention during this period. A new Tek2048 (#4) of excellent quality has been put into use on an Arcon controller. (See the accompanying article.) Also, the thinned Loral 3K X 1K is entering the late stages of implementation on the Blue-optimized Air Schmidt Camera.

Brooke Gregory

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Spectroscopic CCD Availability (1Sep94)

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Spectroscopic CCD Availability (1Sep94)
(from CTIO, NOAO Newsletter No. 39, 1 September 1994)

By the end of the calendar year (more or less), CTIO will have finished converting its most-used spectroscopic CCDs to the Arcon controller. Specifically, the Loral 3K X 1K installation in the Blue Air Schmidt camera is currently underway, and the chip should have been fully tested and commissioned by early December. The Loral 1200 X 800 chip installation on the 1.5-m spectrograph should be completed toward the beginning of first semester 1995.

At that time, the only remaining uses of the VEB controllers will be for two little-used detectors, namely the GEC in the Red Air Schmidt Camera and the TI chip (used mainly with the blue long camera on the BME and 4-m echelle). While we recognize that these chips are still superior for certain applications, we feel that the operational burden of keeping both the VEB controllers and the LSI-11 computers functioning for these rather limited uses is not justified, especially because budget limitations have forced us to accept staff reductions on the mountain. We therefore will discontinue offering the TI and GEC detectors, effective first semester 1995 (1 February). We will of course support the GEC chip in the 1.5-m spectrograph until it is replaced by the 1200 X 800 Loral, whether or not this occurs prior to 1 February 1995.

As a result, only the Blue Air Schmidt + Loral 3K and the Folded Schmidt + Tek 1K combinations will be available on the 4-m R-C spectrograph. The latter is recommended for use in the red (beyond 7000 Angstrom) as the Loral is expected to fringe badly at this point. If detailed information on the Loral performance is needed to write your proposal for first semester 1995, contact Steve Heathcote or Bob Schommer after 15 September for further information. Final camera/detector assignments for the period will be made at the time of scheduling in late November, when performance should be well-established. We will also take various precautions to enable us to recover from a major failure of the Loral.

For most users of the 4-m echelle spectrograph, the best configuration will be the red or blue long cameras + Tek 2K. The Folded Schmidt + Tek 1K may also be useful. A decision on whether to offer the Blue Air Schmidt + Loral on the 4-m echelle will be taken once engineering tests have established whether it offers significant performance advantages over the long cameras. This may not be known until late 1994; again Steve Heathcote and Bob Schommer should be contacted for the latest information.

Only the long cameras + Tek 2K will be available on the 1.5-m bench-mounted echelle. The only combination available with Argus will be the Blue Air Schmidt + Loral 3K. Direct imaging work is unaffected, since we are already scheduling only the Arcon-based detectors (Tek 2K, Tek 1K, and Thomson) for these applications.

The retired VEB-based combinations will be missed, and it is our intention to eventually replace them with better detectors, run by Arcons. Provisionally, the TI would be replaced by a blue-sensitive Loral 1200 X 800 (or larger if available). This would provide higher resolution than the Tek 2K on the echelle (mainly in the blue), and may also have applications at the 4-m prime focus. We intend to install the best available detector in the Red Air Schmidt. At the present moment this would be our second Tek 1K chip. This would provide a larger format, higher quantum efficiency, and lower read noise than the GEC chip. The replacement work will not be completed during the first half of 1995, and conceivably not until early 1996. We should have a much better idea of schedules and the availability of real (as opposed to virtual) chips early next year, prior to the deadline for second-semester proposals. We recognize that a few users may have to postpone projects for a year, or undertake them with reduced efficiency, but we were increasingly concerned that we could not continue to support the discontinued configurations at an acceptable level of reliability.

CTIO Staff

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CCD News (1Sep94)

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CCD News (1Sep94)
(from CTIO, NOAO Newsletter No. 39, 1 September 1994)

Our second Tektronix (SITe) 2048 CCD was commissioned during June and has subsequently seen use at the 0.9-m and 4-m telescopes. For historical reasons our two Tek 2048 CCDs are known as #3 and #4; the CCD being described here is #4. The new CCD is nearly perfect. It has no imaging area defects, excellent charge transfer, all four amplifiers operate with low noise, full-well is almost double that of #3, and dark rate is very low. Various parameters are given in the table below. The QE figures are preliminary, and the actual values may be even better, especially in the UV. The CCD is operated by an Arcon CCD controller, which reads all four amplifiers simultaneously and can deliver a 5 e- rms read-noise picture in 30 seconds. For spectroscopic applications a read-noise of 3 e- rms is possible, with a read-time of only one minute.

As announced previously (Newsletter No. 38, p. 20), for semester 2 1994 Tek 2048 #3 will be dedicated to the 0.9-m telescope. Tek 2048 #4 will see use for direct imaging at the 4-m and 1.5-m, and on the Echelle spectrographs of these telescopes.

```
    Tek 2048 #4

CCD size:      2048 X 2048
Pixel size:    24 um
QE (3000 A):   25%
QE (4000 A):   60%
QE (5000 A):   75%
QE (6000 A):   75%
QE (7000 A):   75%
QE (8000 A):   65%
QE (9000 A):   30%
Full well:     300000 e-
Gain, RN:      4.0 e-/adu, 4.8 e- RN, 30s readout
               2.9 e-/adu, 4.0 e- RN, 34s readout
               2.0 e-/adu, 3.5 e- RN, 40s readout
               1.3 e-/adu, 3.2 e- RN, 50s readout
               1.0 e-/adu, 3.0 e- RN, 60s readout

Dark:     Less than 3 e-/pixel/hour
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Alistair Walker

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CTIO IR Spectrometer Commissioned (1Sep94)

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CTIO IR Spectrometer Commissioned (1Sep94)
(from CTIO, NOAO Newsletter No. 39, 1 September 1994)

The CTIO IR Spectrometer was successfully recommissioned with a 256 X 256 InSb array during the last two weeks of July. Engineering runs were carried out on both the 4-m and 1.5-m telescopes, as well as observations of Comet Shoemaker-Levy 9 impacting Jupiter (on the 1.5-m telescope). Scientific results are described elsewhere; in this article we concentrate on describing the instrument performance. Because of the Newsletter deadlines, the performance described here is based primarily on the earlier run, which was on the 1.5-m telescope.

The IRS upgrade project was carried out jointly by staff at KPNO and CTIO. It is our expectation that most (though not necessarily all) major CTIO infrared instrument projects will be carried out in this way, with technical staff in Tucson contributing a proportion of the resources needed to carry out the project. In this particular case, the mechanical modifications of the IRS were done in Chile, with Andres Montane as the mechanical engineer. The modifications were needed to mount the new array and to reduce light leaks and scattered light inside the instrument. We were also able to enlarge the usable slit slightly. Fabrication of the WILDFIRE electronics for the new array was carried out in Tucson under the supervision of Jerry Heim. The electronics also provide control of the IRS stepper motors. The instrument was shipped to Tucson for installation of the new array. Manuel Lazo (from the Tololo electronics staff) travelled to Tucson to assist with the installation. Richard Elston was the CTIO scientist in charge overall; he also was heavily involved in the details of the installation and commissioning. The additional software needed for WILDFIRE to run the instrument, drive the motors, and communicate with the telescope was provided by Nick Buchholz. Both Buchholz and Heim travelled to Chile for the commissioning.

In addition to the people listed above, many others contributed to the success of the upgrade. We would like to mention particularly Rolando Rogers, from CTIO ETS, who helped with final commissioning, the La Serena mechanical shop, whose ability to make random bits of black-painted metal at the last minute was critical, Paul McIntyre and Rich Land of the Tucson IR group, who worked on construction and testing of the new electronics, and last but not least both Clark Enterline and Hernan Bustos, whose ability to deal with the bureaucracies of two governments helped the instrument on its travels.

Instrument Description

Past users will already be familiar with most aspects of the instrument (and those who are not may also find helpful information in the article by DePoy et al. 1990: PASP 102,1433). The IRS is a cryogenic spectrometer with a beam size of approximately 62 mm. It is operated at f/30, and therefore can be used on the 1.5-m and 4-m telescopes only. Two gratings can be installed in the instrument at any one time, allowing the user a certain flexibility. A filter wheel holding up to eight blocking filters allows for order selection. The main internal change from the previous incarnation of the instrument is that the detector is now a 256 X 256 SBRC InSb array, replacing the old 58 X 62 array.

The new array has smaller pixels (30 um vs. 76 um), which leads to a corresponding decrease in pixel size on the sky (since the optics have not been changed). One other change that has been made is a slight increase in physical slit length. As a result, the total usable slit length in pixels is much greater, about 50 pixels. The pixel scales are 0.94 arcsec/pixel on the 1.5-m telescope, and 0.32 arcsec/pixel on the 4-m telescope. Anamorphic demagnification increases these values in the dispersion direction for the higher resolution gratings, by 30% or so. The smaller pixels provide a much better match to typical image quality on the telescopes, while reducing overall background. The old array electronics have been largely replaced as well. The new WILDFIRE electronics interface to the telescope Sparcstations; this system should be familiar already to users of the KPNO IR instruments.

The IRS is mounted on a dichroic box, which allows viewing of the main field with one of the CTIO CCD TV's while observing. This simplifies acquisition and guiding, provided the object is visible or there are visible reference stars nearby. On the 4-m, the automatic guider can be used to acquire guide stars over a larger field; the guide probe can also be set to move automatically to compensate for small telescope offsets (for example, moving an object along the slit or moving off to sky). This capability does not exist on the 1.5-m telescope.

Acquisition of objects can also be done using the instrument in imaging mode, either using zero order of the grating or a mirror mounted on the grating table. (At this time the optical quality of the mirror is unacceptable with the new, smaller pixels; we hope to replace it soon. The image quality in the grating zero orders is good, and sensitivity is adequate for all but the very faintest objects.) One can view through the slit, or through a large hole (diameter approximately 45 pixels) for initial acquisition.

Currently Available Gratings

Although only two gratings can be installed in the IRS at any given time, CTIO has a larger number of gratings available. Installation and removal of gratings is a process that requires warming up and cooling down the instrument. As this procedure takes roughly two days, users must specify the grating or gratings they will use at the time they request telescope time; changes in grating configurations once the telescopes have been scheduled may not be possible.

All of the gratings can be used in the "I" band (0.9-1.1 um) although the 12 l/mm grating has a very limited free spectral range by that point, as it is being used in 6th order.

Grating Resolution (pixels)

Grating l/mm	Blaze^a (um)	J(1.2um)	H(1.6um)	K(2.2um)	L(3.5um)	M(4.7um)
632	2.4	9800	5370	8370	N. A.^b	N. A.^b
210	4.2	3860	5350	4830	3760	5240
75	4.5	1800	1800	1650	1320	1760
75	1.9	900	600	825	1320^d	N. A.^c
12	6.7	365^e	390^e	400^e	N. A.^c	N. A.^c

a Blaze is given as for IRS configuration, not Littrow.
b Grating cannot be used at this wavelength as ruling is too fine.
c Background count rates are too high to permit use at this wavelength; array saturates in minimum read time.
d Not recommended; grating is being used off-blaze.

e Free spectral range at this resolution does not fill entire array.

Other Parameters

The blocking filters contained in the filter wheel are usually for the J, H, and K windows, plus one for the combined L and M windows, plus either an I blocker or a blocker for the combined I and J windows, which is used with the 632 l/mm and 75 l/mm 1.9 micron blaze gratings. Finally there is a Ks filter, which is used for acquisition in imaging mode.

Several slits are available. These include slits of 0.35 mm width (2 pixels), 0.50 mm width (3 pixels), and wider slits (1 and 2 mm) that are useful for setting spectra zero-points. The usable slit length is almost exactly 50 pixels. In addition, there is a large hole intended for acquisition; its field and pixel scale are roughly the same as those on the old CTIO IR Imager.

Measured Performance

The second table lists measured sensitivities for gratings. The figures are for the 1.5-m telescope, using a wide slit. Signal levels for a slit matched to the resolution (2.0 arcsec) were 85% of these values on the night we measured performance; this value is probably typical for the 1.5-m.

For gratings not measured, the sensitivity should scale approximately as resolution, to within about 30%. Sensitivities within individual bands also vary, in large part because in any given window the resolution in wavelength is constant, so the photon rate goes as lambda^-3.

Sensitivity on the 4-m telescope should be roughly 6 times higher, without allowance for light losses at the slit. A 2-pixel slit is 0.7 arcsec; in typical seeing of 0.8 arcsec FHWM this should lead to light losses of somewhat less than 50% at the slit.

Background levels are given in the following table, for wavelengths in the K, L, and M bands. At shorter wavelengths, the background is entirely due to airglow lines, so that the concept of "average" background is not particularly useful. At the lower resolutions, it is probably reasonable to use a count rate similar to that in the K band for estimating H-band exposure times. Count rates in the J-band will be several times smaller. For the highest resolutions, there is enough space between the strong airglow lines to consider ignoring them, although strong lines still occupy some 20% of the spectrum, and one should make sure in advance that key features don't coincide with strong airglow lines.

Electrons/Sec/Pixel for 10th Mag Star^a

Grating	1.08um	1.25um	1.65um	2.20um	3.50um	4.65um
210 l/mm	60	30	40	50	30	8
75 l/4.5um	130	175	165	170	70	25

a Gain is 15 electrons/ADU. Sensitivities are determined summing all pixels with signal perpendicular to the dispersion (usually three).

Background Count Rates (e-/sec/pixel)

Grating	2.20um	3.50um	4.65 um
210 l/mm	4	6 X 10^4	2 X 10^5
75 l/4.5 um	20	6 X 10^4	7 X 10^5

Please note that the rates given above are per pixel, whereas the count rates for an object are given summed along the slit, and thus involve several pixels (typically three). We also don't understand why the 3.5 um background with the 210 l/mm grating isn't lower; it's not clear whether this is real or a mistake of some sort in carrying out the tests.

The minimum background is the internal background within the instrument, which is a combination of low-level light leaks and dark current.
The internal background ranges from 5-10 e-/sec/pixel, and is mainly due to dark current from the array. Read noise for the array is roughly 30 e-; this is achieved with multiple reads of the array.

Well size is about 120,000 e- with the normal array bias, but the array is becoming non-linear at lower count rates. We recommend keeping maximum counts/pixel below 5,000 ADU (75,000 e-) in order to keep linearity corrections reasonable. For high-background applications, the bias can be increased to give a larger well depth (240,000 e-) at the expense of higher dark current (roughly 100 e-/sec).

Note that for the read noise and background levels quoted above, the integration time at which noise from accumulated internal background equals read noise is roughly 3 minutes.

For most applications, the improvement in signal to noise over the previous array at the same resolution (not the same grating) will be a factor of 2-3. Spectral coverage is of course 4 times greater, so that for projects requiring coverage of more than one feature, gains in efficiency can be as much as a factor of 20. Since the new array does not suffer from the persistence problems that the old array had, and also appears much more stable, the reliability of results on faint objects is likely to be further enhanced.

Sample Results

The article on Comet Shoemaker-Levy 9 shows an example of a 3 um spectrum obtained with the IRS. In the figure below, we show some examples of long-slit spectra of the Galactic Center, where the slit was approximately centered on IRS 16. The scale along the slit is 0.9 arcsec/pixel, while the scale along the dispersion direction is about 30 km/s/pixel (the exact value differs from line to line). One easily sees the complex velocity structure in the hydrogen lines in the immediate vicinity of IRS 16; this structure is not seen in the H2 S(1) line, and is present only weakly in the [Fe II] 1.644 um line.

[Figure not included]

Planning Proposals

If you are planning on submitting a proposal to use the IRS, the most important decision (once you have decided on the science) is your choice of gratings. The two factors that affect this are wavelength coverage and resolution. If you need data at or beyond 3 um, then you must use either the 75 l/mm, 4.5 um blaze grating or the 210 l/mm grating. If not, then you are probably better off using one of the gratings blazed for shorter wavelengths, as they have somewhat higher efficiency and don't have order overlap problems in the I and J windows. In particular, the 632 l/mm grating is probably preferable to the 210 l/mm grating for high resolution applications, unless the difference in spectral coverage turns out to be important. The 75 l/mm, 1.9 um blaze grating is probably preferable to the 12 l/mm grating unless you really need to cover a spectral window out to its extreme limits: for example, at K the 75 l/mm grating provides somewhat more than 0.3 um coverage, which would allow you to observe from the He I line at 2.058 um out past the first CO bandheads. Another possible low-resolution option is the cross-dispersed grating (read below).

Coming Attraction: Cross-Dispersed Grating

We are in the process of ordering a low-resolution grating that incorporates a prism cross-disperser. This combination could be installed as one of the two gratings in the instrument; the other choice would be another grating, run without cross-disperser. The cross-disperser would put several orders of the grating on the array, providing full spectral coverage from roughly 0.9 um to 2.5 um, at a resolution of about 500 (slightly greater than the present 12 l/mm grating). The usable slit length would be reduced because of the multiple orders on the array, to about 30 pixels. This grating would replace the 12 l/mm grating (one could get back the longer slit using a J, H, or K blocking filter for coverage of one order at a time).

We would expect gains in efficiency of roughly a factor of 2 (because K spectra usually take longer than J and H when done separately). It might also be more attractive than the 75 l/mm, 1.9 um blaze grating for some applications. While it ought to work, we are not in a position to guarantee availability, let alone specify performance.

Therefore, anyone whose program requires the cross-dispersed grating should contact one of us in late September to find out the status of the grating and may be advised to wait until second semester 1995. Anyone whose program would benefit from the cross-dispersed grating should specify both it and a back-up on their observing proposal, and should provide calculations of exposure times, etc. appropriate to the back-up configuration.

Richard Elston, Jay Elias, Brooke Gregory

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CTIO IR Imager Status (1Sep94)

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CTIO IR Imager Status (1Sep94)
(from CTIO, NOAO Newsletter No. 39, 1 September 1994)

Work on the new CTIO Imager continues on schedule. This instrument will also use the WILDFIRE controller. We have taken advantage of the visit by Jerry Heim and Nick Buchholz described the in preceding article to bring up the 256 X 256 HgCdTe (Rockwell NICMOS III) array in the Imager.

As indicated in previous Newsletter issues, we expect that the performance of the CTIO IR Imager will be very similar to that of OSIRIS in imaging mode, especially since the plate scales are nearly the same. Anyone who needs more detailed information about performance in order to write a proposal for time (i.e. has specific questions) should contact one of the undersigned.

Note: although we refer to the instrument as "the" CTIO IR Imager, it is not the old IRIM with a new array, but a completely new instrument (except that we are recycling much of the old analog electronics). The old IR Imager dewar has not, however, faded into retirement; it has instead been shipped to Tucson to participate in the ALADDIN (large InSb array) project.

Jay Elias, Richard Elston, Brooke Gregory

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Thesis Support at CTIO: Rules & Regulations (1Sep94)

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Thesis Support at CTIO: Rules & Regulations (1Sep94)
(from CTIO, NOAO Newsletter No. 39, 1 September 1994)

As mentioned in the previous Newsletter, the CTIO policy on providing travel support for graduate student thesis observations has been modified. Specifically, CTIO will provide "full" travel support (discount air fare to Chile plus accommodation and travel assistance within Chile) for qualifying student observers who observe either alone or accompanied by their thesis advisor. This represents a modification of the previous policy, where support was provided only to unaccompanied observers. The nature of the support itself has not been changed. Support is restricted to one run per semester.

To qualify for the support, the student must be from a US institution, should be the principal investigator on the telescope time proposal (exceptions should be clearly justified), and should identify the observations on the proposal as thesis observations. Only time awarded by the TAC qualifies for support; DD time normally does not. In addition, the student's advisor must provide a letter at the time the proposal is submitted which contains at least the following (see the proposal instructions):

o The student's observing experience.

o The student's academic standing (e.g. is this an accepted thesis?).

o The relationship of the proposal to the overall thesis plans: what other telescopes are being used, how much more CTIO time is likely to be needed, any other information that may be helpful to the TAC.

If we receive a proposal which appears to be a thesis, but which is missing some of the required information, we will contact the PI in an attempt to obtain the missing letter or information (as we already do). However, it is ultimately the proposer's responsibility to provide the required letter, and incomplete proposals will not be treated as qualifying theses. Please also note that, continuing past practice, only programs identified as thesis work at the time of submission can qualify.

Malcolm Smith, Jay Elias

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Requests for CTIO Telescope Time (1Sep94)

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Requests for CTIO Telescope Time...(1Sep94)
August 1994 - January 1995
(from CTIO, NOAO Newsletter No. 39, 1 September 1994)

Telescope	Nights Req.	Nights Sched.	Reqd./ Sched.	Vistr. Nights	%Vistr. Nights	Staff Nights	%Staff Nights	Eng. & Maint.
4-m Dark	253	83	3.0	67	80	16	19	23
Bright	138	51	2.7	39	76	12	23	25
1.5-m Dark	135	97	1.4	82	86	13	13	9
Bright	132	67	2.0	67	97	2	3	9
1-m Dark	62	52	1.2	52	100	--	--	5
Bright	41	30	1.3	30	100	--	--	--
0.9-m Dark	151	97*	1.5*	86	88	11	11	--
Bright	59	63*	0.9*	53	84	10	15	12
Schmidt	122	85	1.4	76	89	9	10	5

* Statistics for 0.9-m do not include a correction for 13% of time allocated to MACHO Project.

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CTIO Telescope/Instrument Combinations (1Sep94)

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CTIO Telescope/Instrument Combinations^* (1Sep94)
(from CTIO, NOAO Newsletter No. 39, 1 September 1994)

4-m Telescope:

```
     ARGUS Fiber-Fed Spectrograph + Blue Air Schmidt Camera + Loral 3K CCD^a
     R-C Spectrograph             + Blue Air Schmidt Camera + Loral 3K CCD^a
         "                        + Folded Schmidt Camera   + Tek 1K CCD [25,26]
     Echelle Spectrograph         + Blue Air Schmidt Camera + Loral 3K CCD^a
         "                        + Folded Schmidt          + Tek 1K CCD
                                                              [22,23,25,26]
         "                        + Long Cameras            + Tek 2K CCD
                                                              [23,25,26,39]
     Prime Focus Camera           + Tek^b CCD [36,39]
         "                        + Photographic Plates^c [23,38]
     Cass Direct                  + Tek^b CCD [39]
     Rutgers Imaging Fabry-Perot  + Tek^a CCD [25,26]
     ASCAP Photometer [24,25,28]
     CTIO IR Imager               + 256 X 256 HgCdTe [39]
     CTIO IR Spectrometer         + 256 X 256 InSb [37,39]
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1.5-m Telescope:

```
     Cass Spectrograph                  + Loral 1200 X 800 CCD^a
     Bench-Mounted Echelle Spectrograph + Long Cameras    + Tek 2K CCD[22,23,39]
     Cass Direct                        + Tek^b CCD [39]
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```
     Rutgers Imaging Fabry-Perot        + Tek^b CCD [25]
     ASCAP Photometer [24,25,28 ]
     CTIO IR Imager                     + 256 X 256 HgCdTe [39]
     CTIO IR Spectrometer               + 256 X 256 InSb [37,39]

1-m Telescope:
     Cass Spectrograph                  + 2D-Frutti^d
     ASCAP Photometer [24,25,28]

0.9-m Telescope:
     Cass Direct                        + Tek 2K CCD [39]

0.6-m Telescope:
     ASCAP Photometer [24,25,28]

Curtis Schmidt:
     Photographic Plates (Direct or Prism)^c
     STIS 2K CCD (Direct or Prism)^e
```

* Numbers in boldface following an instrument indicate the most recent Newsletter(s) containing relevant articles. If there is no number, the 1990 edition of the Facilities Manual fully up to date. The most recent general summary of CCD characteristics is in 33; see also 26 and 28. Information on telescope control guiders is in 21, 22, 24, 32.

a Loral 3K and Loral 1200 X 800 both expected for 1995. See this issue [39] for details
b Tek CCDs available first semester 1995 on 4-m and 1.5-m telescopes: Arcon-run only: Tek 1K#2, 24 um pixels, Tek 2K#4, 24 um pixels. [33,34,39]
c Limited availability of specified plate types; user must supply non-standard types or large quantities [38].
d 2-D Frutti limited to continuing long-term programs. Not available after 1995.
e STIS 2048 X 2048 should be available on Schmidt early in semester. QE similar to Thomson, but FOV of 68' (2.0 arcsec pixels).

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A New CTIO Observing Proposal Form (1Sep94)

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A New CTIO Observing Proposal Form (1Sep94)
(from CTIO, NOAO Newsletter No. 39, 1 September 1994)

CTIO has converted its electronic observing proposal system to one that is a near-duplicate of the system introduced at KPNO last semester. Instructions for retrieval and submission of the new form are given below. As this form is being introduced somewhat at the last minute, we will accept proposals on the old form (and if e-mailed, to the old ctiosked e-mail address) for this semester only. We have run tests on the system, and it all seems to work. Nevertheless, we encourage proposers to follow two basic precautions:

1) Print your proposal out before you send it in. If it comes out looking terrible it won't look any better when we print it out here, and we are not going to be able to fix it up for you. We will work (within our limitations) to properly print out proposals that print out OK for you but not for us. In this regard, please exercise restraint in modifying the form! If you don't know for sure what you are doing, don't do it.

2) If you try anything ambitious in the way of figures, please don't wait until the last day to e-mail your proposal. First of all, if there are incompatibility problems, we may need time to work them out. Second, our e-mail link to the US is a satellite link that is normally good for about 4 kbytes/sec. You can work out for yourself the consequences of a horde of people trying to send megabytes of text on the same day.

We provide the observing proposal instructions below, which are also sent you electronically when you request the new form, and a blank copy of the new form. (Included at the back of this Newsletter.) If you don't want to submit by e-mail, this can be filled out by typewriter.

Any questions about the new form or procedures can be sent to me (jelias@noao.edu) or to ctioprop-help@noao.edu.

Additional Procedure Changes

We are also making two additional changes in the way we handle proposals. The first, which we effectively implemented some time ago, is to provide acknowledgment of receipt by e-mail rather than by regular mail. We will send acknowledgment by regular mail - to the principal investigator - only in those cases where e-mail acknowledgement is not possible. Second, the letters granting and not granting time, together with the supplementary information, will be sent only to the principal investigator. It will be the PI's responsibility to advise the collaborators of the fate of the proposal, and to ensure that the visitor questionnaires and travel information are returned on time to CTIO.

Jay Elias

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CTIO Observing Proposal Instructions (1Sep94)

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CTIO Observing Proposal Instructions (1Sep94)
(from CTIO, NOAO Newsletter No. 39, 1 September 1994)

Observing time at Cerro Tololo Inter-American Observatory is allocated via peer review twice a year. Proposals must be received by 31 March for the following August through January, and by 30 September for February through July.

Proposal forms may be obtained either electronically (see below) or by writing the CTIO Director's Office, Casilla 603, La Serena, Chile or Chile Office, NOAO, P.O. Box 26732, Tucson AZ 85726-6732. Electronic submission is encouraged using the LaTeX version (only) of the form. Use anonymous ftp to ctio.noao.edu (139.229.2.3), log in as "anonymous" (password=your e-mail address), cd pub/ctioforms, mget *, bye. The README file describes the various files. Alternatively, the files will be automatically e-mailed to you if you send a (blank) e-mail message to ctioprop-request@noao.edu. Prepare your proposal following the instructions, referring to the sample proposal as needed. Encapsulated PostScript (eps) figures may be included through a two-step process; follow the example given. Run LaTeX on your proposal, adjusting your file as needed until there are no significant errors and you are happy with the look of the output document. Please make sure you check your proposal by printing out the final version; we process proposals as received and make no attempt to clean them up. E-mail the LaTeX version (NOT the PostScript or dvi version) to ctioprop-submit@noao.edu. You will receive an automatic acknowledgement, along with instructions to e-mail any eps figures. Send questions to ctioprop-help@noao.edu. Complete electronic submissions, including figures, must be received before midnight ChST on 31 March or 30 September.

For paper submissions, complete the form and send one copy each to:

1) CTIO Director's Office, Casilla 603, La Serena, Chile (airmail only) or Mariategui 2432, Providencia, Santiago, Chile, telephone 2047394 (courier service only - allow 4 working days minimum for delivery).

2) Chile Office, P.O. Box 26732, Tucson AZ 85726 or 950 N. Cherry Ave., Tucson AZ 85719.

Paper versions must be received in La Serena by the end of the working day on 31 March or 30 September. Vagaries of the Post Office and "courier" delivery services are, alas, unpredictable, so please allow sufficient time for us to receive the proposal on time. We do not accept proposals by telefax. Do not send duplicate paper and/or electronic submissions.

Instructions

Ph.D. Thesis. The faculty advisor must send a letter citing (a) the amount of the graduate student's observing experience, (b) the student's academic standing, including whether the project has been accepted as a PhD thesis, and (c) how this particular observing proposal fits into the overall thesis plans. Is other telescope time being used as part of the thesis, and how many additional runs on what telescopes will be required to finish the thesis? This letter must be received by the proposal deadline. A similar letter must be provided for any proposal where a graduate student is PI or will be sole observer. This letter may be e-mailed to ctioprop-letter@noao.edu. For letters only, telefax is acceptable.

Observing runs. Specifying as generous a range as possible for "acceptable dates" will facilitate scheduling your run. See the most recent March or September issue of the Newsletter for a complete list of telescope and instrument combinations; these are also listed in the current version of the LaTeX template. Visitor instruments. If you are planning to bring a visitor instrument, you must send a separate letter (CTIO Director's Office) or e-mail (ctioprop-letter@noao.edu) prior to 15 October or 15 April to describe the instrument and its interfacing requirements more fully than what is possible on the form.

Scientific Justification. Please try to limit yourself to one page of prose; figures and references may run to a second page. Do not use type fonts smaller than 12 characters per inch. Remember that the TAC is composed mostly of specialists in fields other than yours. Explain the context and significance of your program clearly.

Questions? E-mail ctioprop-help@noao.edu or call the CTIO Director's Office (56-51-22-5415 or Fax 56-51-20-5342).

Special Note: The actual LaTeX commands in the CTIO proposal form are almost the same as in the KPNO proposal form, and in fact a KPNO file will produce an acceptable CTIO proposal if the ctioprop.sty file is used for the documentstyle. Since telescopes, instruments and policies do differ at the two sites, please read the CTIO instructions carefully before using the kpnoprop.tex file to produce a CTIO proposal.

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Science Proposals for the 3.5-m WIYN Telescope (1Sep94)

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Science Proposals for the 3.5-m WIYN Telescope (1Sep94)
(from KPNO, NOAO Newsletter No. 39, 1 September 1994)

KPNO will accept proposals for the WIYN "shared-risk" observing period to begin no sooner than 1 March 1995, extending through 31 July 1995. The deadline for proposals will have the normal KPNO spring semester proposal deadline of 30 September 1994. Proposers should use the standard KPNO observing proposal form, with an additional attachment to provide details for queue observations (available electronically with the KPNO Proposal Form or on paper from the KPNO Director's Office). Proposals for the observing period 1 August 1995 - 31 January 1996 will be due on 31 March 1995.

The shared-risk observing phase is a shakedown period during which NOAO will begin scientific operations using observers' programs to complete the commissioning of the telescope, operations plan and instrumentation. "Shared-Risk" is defined as follows: NOAO will accept proposals for WIYN observations, and will attempt to complete approved programs in an expedient manner and to provide scientific grade data. NOAO cannot guarantee, however, that approved observations will be completed. Nevertheless, NOAO will work to assure that any data that are obtained and released during this period are of the highest scientific quality. User input will be critical during this stage as we dynamically refine the WIYN science program. We expect the shared-risk phase will begin no earlier than 1 March 1995 and last for approximately 6-8 months. NOAO expects to be allocated between 9 and 12 nights per month by the WIYN Consortium. Most science observations will be done in queue/service mode to allow us to maximize the data quality while achieving our technical goals with a minimal impact on and from observers. We also hope that the availability of the queue observing mode and the opportunity to obtain data for small programs will permit broader access by the community to KPNO facilities. Operating in a queue mode also allows NOAO to develop new observing strategies for application to the Gemini 8-m telescopes. A few projects with special or unusual requirements may also be scheduled in the traditional manner with observers present on the mountain.

NOAO will support the two major WIYN facility instruments, the WIYN CCD Imager and the Hydra Multi-Object Spectrograph (MOS) formerly available at the 4-m. At this writing (mid-July), neither instrument has been commissioned. For the purposes of observing proposals, it should be assumed that: (1) the WIYN/MOS/Hydra system throughput is at least as good as the 4-m/Hydra system throughput; and (2) the WIYN CCD Imager DQE characteristics are at least as good T2KA. For further information about WIYN instrumentation, check the NOAO Mosaic homepage (http://www.noao.edu), or previous issues of the Newsletter.

Observing programs of all lengths will be accepted for review. Long Programs (which require more than 2 hours of telescope time) will be reviewed by the normal external KPNO TACs and ranked by scientific merit.

Short Programs (those requiring less than 2 hours of observing time) will be reviewed by an internal KPNO TAC. The goal of a typical Short Program might be to obtain a small dataset to complete a larger project or assess the feasibility of a particular type of observation before the submission of a Long Program proposal. Individual Short Program principal investigators or co-investigators will be allocated at most six (6) hours (i.e. a maximum of three separate Short Program proposals) of WIYN telescope time during "shared risk" operations.

Successful observations will be made available to the program principal investigator as quickly as possible. Typically, datasets will be sent to the principal investigator in FITS format on Exabyte or DAT tapes within seven (7) working days of completing their program. Small datasets may be transmitted to the principal investigator via ftp. To protect proposers' access, such datasets will not be available from NOAO via anonymous ftp. Instead, such transfers will be from NOAO to a site designated by the principal investigator.

Detailed WIYN proposal information and the WIYN attachment to the standard KPNO proposal form are available electronically as described below, or by contacting the KPNO Director's Office. Updated information about WIYN "shared risk" operations will be published in the December NOAO Newsletter.

Further information about WIYN science operations, including the latest instrument characteristics information, may be obtained via the NOAO Mosaic home page (/http://www.noao.edu) or anonymous ftp from ftp.noao.edu in the directory wiyn/sciops/shared. Questions about the WIYN proposal process should be directed to the KPNO Directors Office (kpno@noao.edu); questions about expected instrument performance of MOS/Hydra should be directed to Sam Barden (sbarden@noao.edu) or Taft Armandroff (tarmandroff@noao.edu); questions about the WIYN imager should be directed to Dave Silva (dsilva@noao.edu) or Taft Armandroff; questions about WIYN operations status and queue observing should be directed to Dave Silva.

Caty Pilachowski, Dave De Young, Dave Silva,
Sam Barden, Taft Armandroff

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FORD 1K X 3K CCD Available at the CoudÃ© Spectrograph (1Sep94)

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FORD 1K X 3K CCD Available at the Coude...(1Sep94)
Spectrograph (from KPNO, NOAO Newsletter No. 39, 1 September 1994)

We now have a FORD CCD (F3KB) for use on the Coude Spectrograph. The good news is that it is quite good cosmetically, has excellent charge transfer characteristics, high quantum efficiency, and good linearity and dynamic range. However, there appears to be some mechanism within the device which causes a spill-over of photons and/or electrons into neighboring pixels, limiting the best focus to approximately 2.5 pixels FWHM. Fortunately, the impact for use at the Coude Spectrograph is not severe, as we can get about 2.8 pixels FWHM for a 300 um slit width on camera 5. The resolution profiles are very well fit by a Gaussian. Focus varies slightly across the field of view and is most probably attributable to the camera 5 optics. Daryl Willmarth will realign the optics this summer to see if this focus variation can be minimized.

In addition, F3KB does fringe redward of about 7000 Angstrom. Flat fielding of the fringe pattern is probably achievable at the 0.5% level. Fringing is not a problem blueward of 7000 Angstrom.

The general characteristics of the F3KB device are given in the table below, along with TI5 characteristics for comparison:

CCD Name:	F3KB	TI5
Pixel Size:	15 X 15 um	15 X 15 um
Format:	1024 X 3072	800 X 800
Noise:	7.5 e- RMS	8 e- RMS
Gain:	2.5 e-/ADU	4.3 e-/ADU
Preflash:	Not needed	30 to 100 e-
Linearity:	1.5 X 10^5 e- (0.5%)	5 X 10^4 e- (1%)
Dark Current:	6 e-/hr pixel	1 e-/hr pixel

The quantum efficiency for both F3KB and TI5 devices are shown in the figure. Note that the response of F3KB in the blue is 50% higher than that of TI5.

[Figure not included]

F3KB will be available for shared risk use this fall for those who desire to use it in place of the CCD assigned for their run on the schedule. For observing proposals for the spring 1995 semester, we ask that F3KB be used in all cases if possible. We will, however, keep TI5 available for any applications which absolutely require the resolution capability of that CCD over the F3KB or for any ultra-high signal to noise observations in the red.

Sam Barden, Daryl Willmarth, Di Harmer

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A New Grating for CRSP (1Sep94)

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A New Grating for CRSP (1Sep94)
(from KPNO, NOAO Newsletter No. 39, 1 September 1994)

Due to the improved performance and larger spectral coverage of the 256 256 InSb array in CRSP, one may now obtain complete coverage of a given spectral band with a single grating setting. This makes the 50 l/mm grating 4 redundant. The intermediate resolution grating 3 provides almost complete coverage of the J and K bands, but its efficiency in the H band is very low because one is operating well off the blaze.

To fill this void, we are ordering a new grating 4, which will have a 200 l/mm ruling, blazed at 3 um. In the H band (m = 2), this grating should yield a dispersion of 0.0012 um/pixel, or a two-pixel resolving power of 670, at much higher efficiency than possible with grating 3. As an added bonus, this grating will provide approximately the same resolving power in the I band (0.9-1.2 um) in 3rd order, without the order overlap problems encountered with gratings 1, 2, and 3 in 4th order.

The grating is expected to arrive in early September and should be installed for the fall observing season. When it is installed, the instrument manual in the NOAO anonymous ftp area kpno/manuals will be updated appropriately.

Dick Joyce

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KPNO Observing Proposals for Spring 1995: Part I - How to Get the Proposal Form (1Sep94)

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KPNO Observing Proposals for Spring 1995:...(1Sep94)
Part I - How to Get the Proposal Form
(from KPNO, NOAO Newsletter No. 39, 1 September 1994)

Observing time at Kitt Peak National Observatory is allocated via peer review twice a year, and proposals for the period 1 February-31 July 1995 are due by 30 September 1994. KPNO accepts proposals either on paper or in electronic form using the LaTeX template available over the network. A paper copy of the proposal form may be obtained from the KPNO Director's Office:

```
Phone:    (602) 325-9279
Fax:      (602) 325-9360
E-mail:   kpno@noao.edu
Mail:     KPNO Director's Office
          P.O. 26732, Tucson AZ 85726-6732.
```

We do, however encourage electronic submission of proposals using the LaTeX version (only) of the form. To obtain the LaTeX form, use anonymous ftp to ftp.noao.edu (or 140.252.1.24) in the kpno/kpnoforms subdirectory. Retrieve all files with mget *, and refer to the README file for instructions. Alternatively, the files will be automatically e-mailed to you if you send a (blank) e-mail message to kpnoprop-request@noao.edu.

To ensure that your electronically submitted proposal will be in a format which you wish to have evaluated by the TAC, we strongly urge that you generate a hardcopy of your proposal for proofreading before submitting it.

Pat Patterson

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KPNO Observing Proposals for Spring 1995: Part II - How to Write a Successful Proposal (1Sep94)

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KPNO Observing Proposals for Spring 1995:...(1Sep94)
Part II - How to Write a Successful Proposal
(from KPNO, NOAO Newsletter No. 39, 1 September 1994)

Each semester, KPNO receives typically 270 proposals for observing time. Of those of you who apply for time, some 64% are successful, but more than a third of all investigators receive no time at all. The KPNO Telescope Allocation Committee provides comments on proposals which are turned down, but often the difference between a successful proposal and one which is not is hard to define, particularly for those which fall in the "grey" area of good proposals which don't quite make it onto the schedule. Often the TAC comments only that the significance of the project to the general field could be better justified.

To improve your chances of success, consider the philosophy behind the KPNO allocation process. KPNO receives an extraordinarily diverse range of proposals, and each of the two subcommittees of the TAC is only a few individuals. We select TAC members to include expertise in the areas in which we receive large numbers of proposals, and we augment the TAC with individuals with a broad range of experience to cover the other fields. For many proposals, at most one member of the TAC is a specialist in the field; for a few, no member is. Many proposals dive too quickly into details without providing the TAC with the overview needed to understand the broader issues in the field. (This is especially true of proposals from astronomers who work in the space sciences, in which proposals are often reviewed by panels of experts.) It is not sufficient to tell the TAC that the observations are important. They need help to understand why, and the burden of providing a clear explanation falls on the proposer.

Caty Pilachowski

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KPNO Observing Proposals for Spring 1995: Part III - Cuurrent TAC Membership (1Sep94)

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KPNO Observing Proposals for Spring 1995:...(1Sep94)
Part III - Current TAC Membership
(from KPNO, NOAO Newsletter No. 39, 1 September 1994)

The membership of the KPNO telescope Time Allocation Committees for the fall of 1994 is given below.

Bright TAC

Dave De Young (Chair, non-voting)
Chris Impey (Arizona)
Scott Kenyon (CfA)
Pat McCarthy (OCIW)
Ian Gatley (KPNO)
Don Terndrup (Ohio State)
Caty Garmany (JILA)

Dark TAC

Dave De Young (Chair, non-voting)
Tim Heckman (JHU)
Tod Lauer (KPNO)
Craig Hogan (Washington)
Heather Morrison (CWRU)
Mario Mateo (Michigan)
Ray Weymann (OCIW)

David De Young

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KPNO Observing Proposals for Spring 1995: Part IV - Facts and Fiction About the TAC Process (1Sep94)

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KPNO Observing Proposals for Spring 1995:...(1Sep94)
Part IV - Facts and Fiction About the TAC Process
(from KPNO, NOAO Newsletter No. 39, 1 September 1994)

The recent KPNO user survey included several questions about the telescope time allocation process. Responses to this section of the survey revealed, in some cases, significant misunderstandings about some aspects of the TAC process. This article is an attempt to clarify these issues.

Membership

Some respondents believed that the TACs are composed largely of KPNO scientific staff members. In fact the opposite is the case. Each TAC has only one member from the KPNO staff; the remaining members are all from outside institutions. Although the TAC Chair is filled by a KPNO staff member, the Chair is a non-voting position, and the Chair does not take part in the discussion of the proposals. The term of membership for all voting members is now 5 semesters, with only a minority of the membership changing at any one time in order to retain a "corporate memory" on the committee. Members are chosen primarily on the basis of their scientific expertise, but some familiarity with the KPNO facilities is also desirable. Nominations for replacement members are solicited from the TAC, members of the general astronomical community, and NOAO scientific staff. Candidates are selected by the TAC Chair in consultation with the NOAO and KPNO Directors. Considerable effort is made to balance the committee expertise in stellar, galactic and extragalactic astronomy. Planetary and solar system proposals are sent to two external referees as well as being reviewed by the committee.

Process

It is important to note that every proposal for every telescope is discussed in the TAC meetings. Before the TAC meetings grades are obtained from each TAC member for every proposal to be considered by that TAC. TAC members are then given the average initial grades for each proposal, but they are not given the individual grades submitted by other committee members. After each proposal is discussed, the committee is asked if any member wishes to change her or his grade in light of the discussion. If this occurs, a new average grade is calculated in real time for subsequent use. Because the 4-m and 2.1-m telescopes are the most heavily oversubscribed, every proposal for these telescopes is assigned a "lead reviewer". This person is a TAC member who is responsible for obtaining added background material about the proposal and who is charged with leading the discussion of the proposal during the meeting. The lead reviewer process not only provides focus and direction for the discussion; it also helps ensure that all the relevant issues concerning the proposal will be brought forward.

It is likely that this process will be used for the WIYN telescope as well. After the proposals for a given telescope are discussed and any regrading is done, the TAC is then asked to recommend the number of nights a proposal should be given if it can be scheduled. This number is a recommendation only, and it may be modified as the schedule for that telescope is developed.

Areas of Concern

Historically, the TAC has focussed on a few major areas of concern, virtually independent of changes in committee membership. The first and foremost of these is, of course, scientific merit. Because the committee is rather small and must cover a wide range of astrophysical expertise, it is essential that proposals make very clear just what scientific questions will be addressed by the proposed observations. The committee often wishes to see these goals placed in a larger context; i.e., how these questions relate to major unresolved astrophysical questions. Vague generalities such as "increasing our understanding" are not sufficient; the committee looks for specific questions that will be unambiguously addressed by the observations. Another issue of concern is the description of a clear path from the taking of the data through the reduction and analysis that will permit answers to be obtained. Other questions that often arise are whether or not similar programs have been done or are being done elsewhere, and if previous observing programs have resulted in the data being published in a timely manner.

Conflicts of Interest

This is an extremely important and delicate issue, and great care is exercised to make the TAC discussions as fair and impartial as possible. Lead reviewers are not given proposals where any PI or Co-I is located at their home institution. TAC members are not permitted to grade proposals from their home institution or from any of their collaborators (and, obviously from themselves). TAC members are asked to leave the room during discussion of their proposals and proposals of their collaborators. These procedures are also followed if any TAC member has any other conflict of interest for any reason.

We hope this description will help clarify the TAC process. The TAC procedures are continually being scrutinized and modified in an effort to provide the best system we can devise. We welcome any comments and suggestions you may have concerning the KPNO telescope time allocation process.

David De Young

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Hydra Modifications for WIYN (1Sep94)

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Hydra Modifications for WIYN (1Sep94)
(from KPNO, NOAO Newsletter No. 39, 1 September 1994)

On 5 July 1994, Hydra was removed from the 4-m telescope for the last time, after serving as a workhorse instrument for the past 3 years. In the 200 nights that it was scheduled (about 1/4 of the available 4-m nights), we estimate that the instrument collected 30,000 spectra of astronomical targets (assuming about a 25% cloud-out factor).

Even as this Newsletter goes to press, Hydra is undergoing a radical metamorphosis to make it optimally suited for use on the WIYN telescope. To those familiar with the instrument, the WIYN version will appear quite different from that used on the Mayall. The focal plate assembly, which includes the fiber mountings and steel focal plate on which the fibers are placed, is completely new. We are replacing the stepped focal plate with a warpable plate to take advantage of the concentricity between the WIYN exit pupil and focal surface radius of curvature. We expect the new fiber pivot guards will eliminate the occasional fiber to fiber tangling which has caused a few wake up calls late at night. The blue fiber cable will have 3 arcsecond fibers while the red cable has a fiber aperture of 2 arcseconds. The calibration screen has been replaced with a screen located above the fiber positioner and the number of hollow cathode tubes has been increased to improve the flux level. Guiding of the telescope will also now utilize the Field Orientation Probes themselves instead of independent offset guide probes. An artist's rendition of the new instrument is shown in the figure.

[Figure not included]

The Bench Spectrograph is undergoing slight modifications which include: a) a stiffer camera axis to improve wavelength setup reliability; b) new grating cells for the available gratings; and c) a new dedicated CCD and controller (ARCON). The new CCD will be a SITe (formerly Tektronix) 2048 device similar to T2KB. We have also made a concerted effort to eliminate potential background light sources from the spectrograph room at WIYN, which should improve the quality of low signal data over that obtained at the 4-m.

Commissioning of the new Hydra at WIYN will commence this fall and continue through the winter. If all goes well, we expect to release Hydra for shared-risk science observing in the spring of 1995. We look forward to a long and very productive tenure at WIYN.

Sam Barden, Taft Armandroff

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Instruments Available on Kitt Peak Telescopes...(1Sep94)

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Instruments Available on Kitt Peak Telescopes...(1Sep94)
Spring 1995 (from KPNO, NOAO Newsletter No. 39, 1 September 1994)

The instruments listed below will be available for visitor use on KPNO telescopes during the February - July 1995 observing season. Proposals for this period are due 30 September 1994. Instruments which are noted as "reduced availability" are scheduled only in instances of high scientific merit (i.e., in the top third of those awarded time). Visitor instrumentation is welcome at KPNO and can be scheduled if the instrument: a) is unique; b) is required for a project of very high scientific merit; c) conforms to block scheduling; and d) has small impact on KPNO operational and engineering resources.

4-m Telescope:
- R-C Spectrograph + CCD (T2KB)
- Echelle + UVFast, Red Long, or Blue Long Camera + CCD (T2KB)
- PF Camera + direct CCD (T2KB)
- IR Cryogenic Spectrometer (CRSP)
- Cryogenic Optical Bench (COB)
- IR Imager (IRIM)
- Fourier Transform Spectrometer (FTS) [Note 2]
- PF Camera + Photographic Plates [Notes 1,3,4]
- CryoCam (with 800 X 1200 Loral chip) [Note 1]

WIYN Telescope:
- Hydra + Bench Spectrograph (T2KC) [Note 5]
- CCD Imager (TBD) [Note 5]

2.1-m Telescope:
- GoldCam CCD Spectrometer (F3KA)
- CCD Direct Camera (T1KA)
- Cryogenic Optical Bench (COB)
- IR Cryogenic Spectrometer (CRSP)
- IR Imager (IRIM) [Note 1]

Coude Feed:
- Coude Spectrograph + Camera (5 or 6) + CCD (F3KB or TI5)

1.3-m Telescope:
- Simultaneous Quad-color Infrared Imaging Device (SQIID)
- Cryogenic Optical Bench (COB)
- IR Cryogenic Spectrometer (CRSP)
- MkIII Optical Photometer + GaAs Coldbox [Notes 1,4,6]

0.9-m Telescope:
- CCD Direct Camera + CCD (T2KA)
- CCD Photometer (CCDPHOT) (T5HA)

Burrell Schmidt:
- Direct or Objective Prism + CCD (S2KA)
- Direct or Objective Prism + Photographic Plates [Note 3]

Notes:
1) Reduced Availability
2) Service observing only
3) Visitors must provide their own photographic plates
4) Limited to programs in progress
5) Shared-risk operation
6) No long-term programs

Caty Pilachowski

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Instruments to Retire from Service (1Sep94)

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Instruments to Retire from Service (1Sep94)
(from KPNO, NOAO Newsletter No. 39, 1 September 1994)

As part of KPNO's long-term effort to control and even reduce costs while continuing to provide both competitive instrumentation and a broad range of scientific capabilities, we are retiring several of our older, less used instruments. The reason for these retirements is to reduce the overall workload to permit KPNO technical staff to maintain the highest possible performance standards for our most popular and most productive instruments. We continue to strive to reduce operating costs by increasingly specializing each telescope to serve a more limited range of scientific programs. Nonetheless, KPNO continues to offer a broad range of observing capabilities through our ensemble of telescopes.

Effective 1 February 1995, the status of the following instruments will change:

4-m Cryogenic Camera - Reduced availability

4-m Fourier Transform Spectrometer - Service Observing Only

2.1-m Fiber Optic Echelle Spectrograph - Visitor Instrument (see accompanying article)

2.1-m White Spectrograph - Retired

Infrared Instrumentation - Restricted to particular telescopes

If these instrumentation changes cause substantial hardship to your observing program, please contact us and we will try to help find viable alternatives to meet your needs.

As the WIYN telescope comes on line, we will be reviewing further the best approaches to CCD direct imaging. KPNO currently offers optical imaging capabilities on four telescopes: the 4-m, the 2.1-m, the 0.9-m and the Burrell Schmidt. WIYN will add a fifth telescope to this list, with good image quality and a field of view and plate scale similar to that available at the 2.1-m. We would appreciate guidance from our users as we grapple with this issue. Comments may be sent to me at kpno@noao.edu or to the KPNO Users Committee Chair John Salzer.

Caty Pilachowski

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Retirement of the Fiber Optic Echelle (1Sep94)

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Retirement of the Fiber Optic Echelle (1Sep94)
(from KPNO, NOAO Newsletter No. 39, 1 September 1994)

Seven years ago, KPNO and Larry Ramsey (Penn State) initiated a discussion which led to the use of the Fiber Optic Echelle (FOE) on the Coude Feed and 2.1-m telescopes. Since then, the FOE has been used to obtain data for a variety of projects where simultaneous observation of chromospheric indicators (Ca II H and K, H`, Li 6707, Ca II IRT) were required. The image stability provided by the fiber optics also made the instrument valuable for high precision radial velocity projects. A special fiber optic scrambler was used to obtain velocities measurable at the 1 m/s level in the search for stellar oscillations.

Shrinking demand for the instrument, reduced mountain support resources, and Larry Ramsey's involvement in more important responsibilities have resulted in our inability to keep the FOE upgraded as a low resource impact instrument. Hence, it is now necessary to restrict the use of the FOE by adjusting its status from that of facility instrument to visitor instrument after the fall 1994 observing semester.

Those interested in using the FOE should contact Larry Ramsey (lwr@astro.psu.edu) for information on its future status.

Sam Barden, Caty Pilachowski, Larry Ramsey

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IRIM to be Withdrawn (1Sep94)

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IRIM to be Withdrawn (1Sep94)
(from KPNO, NOAO Newsletter No. 39, 1 September 1994)

The infrared camera IRIM will very probably be withdrawn as a facility instrument following the spring 1995 extragalactic observing period; i.e., about 1 June 1995. Proposals for use of IRIM should not assume its continued availability beyond this time. Proposers are encouraged to consider the capabilities of other IR facility instruments (COB, SQIID, CRSP) when planning observing strategies for the longer term.

IRIM was the first KPNO IR facility camera, beginning service with a 58 X 62 InSb array in 1987. In this configuration it supported stellar, galactic, and extragalactic observing programs, including high resolution IR speckle imaging, for several years. In 1992 it was refurbished with a 256 X 256 NICMOS 3 array, obtained through an agreement with Tony Tyson (ATT Bell Labs), and new optics to optimize the pixel size for deep imaging on the 4-m telescope. It has been frequently scheduled for this purpose since. Fall 1993 marked its conversion to the Wildfire IR controller system, now common to all KPNO IR array instruments. It remains a simple, rugged workhorse platform for IR imaging. Although it goes once more to meet its makers in the lab, it may emerge again to serve the community in yet another guise.

Ron Probst

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HST Filters Added to 4-inch Collection (1Sep94)

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HST Filters Added to 4-inch Collection (1Sep94)
(from KPNO, NOAO Newsletter No. 39, 1 September 1994)

Thanks to the efforts of Ed Olszewski (Steward Obs.), we have obtained a set of two HST filters, F555W and F814W. Both filters are 4 X 4 inches and are now available for use on our restricted filter list (those for use only on Kitt Peak).

As a reminder, the filter databases can be accessed via anonymous ftp to ftp.noao.edu under the directory kpno/filters.

Sam Barden, Jim De Veny, Ed Carder

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New Manual on Spectroscopic Multiplexing at the 4-m (1Sep94)

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New Manual on Spectroscopic Multiplexing at...(1Sep94)
the 4-m (from KPNO, NOAO Newsletter No. 39, 1 September 1994)

A new manual, "Multi-Slits At Kitt Peak - A Manual for Designing and Using

Entrance Masks for Low/Moderate-Resolution Spectroscopy" by J. De Veny and P. Massey is available via anonymous ftp to ftp.noao.edu in the subdirectory kpno/manuals or from the documentation section (Instrument manuals available by ftp) on the KPNO Mosaic home page. This document describes the multi- slit capability and the steps to prepare and use masks for multi-object spectroscopy with the RC Spectrograph and Cryogenic Camera at the 4-m telescope. Prospective users may also refer to the article "Spectroscopic Multiplexing at the 4-m" in NOAO Newsletter No. 37 (March 1994).

Jim DeVeny

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Comet Shoemaker-Levy 9 at Kitt Peak (1Sep94)

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Comet Shoemaker-Levy 9 at Kitt Peak (1Sep94)
(from KPNO, NOAO Newsletter No. 39, 1 September 1994)

Last fall, KPNO solicited proposals for observations of the impact of Comet Shoemaker-Levy 9 on Jupiter using telescopes on Kitt Peak. Two programs were scheduled, one at the 4-m and one at the 2.1-m. The 4-m observers were Edward A. Cohen from JPL, Ken Hinkle from NOAO, Gordon Bjoraker and Pedro Sada from Goddard Space Flight Center, and Keith Noll from the Space Telescope Science Institute, using the Fourier Transform Spectrometer to look for spectroscopic signatures of gases exhumed from the lower Jovian atmosphere by the impact. On the 2.1-m astronomers Clark Chapman, Carol Neese, Bill Merline, Don Davis, and Steve Howell from the Planetary Sciences Institute, and Phil Massey from NOAO attempted to determine the size distribution of the impact fragments by observing the flashes from the back side of Jupiter reflected off both sunlit and eclipsed moons of Jupiter, using an optical CCD detector with high time resolution. Observing time on the 0.9-m and 1.3-m telescopes was also allocated to KPNO staff.

Sadly (and predictably) our summer monsoon arrived on schedule, and little observational data was obtained. A brief period of clear weather did allow observations of the collision of fragment V, but the impact was minor.

Our public program, however, was a great success. We took reservations for up to 60 vehicles to visit the mountain on the night of 16 July. Counting staff and volunteers, we hosted a crowd of nearly 300. We set up our own small telescopes, opened the 0.9-m to the public, and the Tucson Amateur Astronomy Association brought up many more telescopes. A live video feed was provided from the 4-m FTS guide camera, as well as a "network" console to show what other observatories were finding. While the weather was too poor for science observations, brief breaks in the clouds did provide good viewing for our public visitors, and a good time was had by all.

Caty Pilachowski

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Summer Shutdown 1994 (1Sep94)

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Summer Shutdown 1994 (1Sep94)
(from KPNO, NOAO Newsletter No. 39, 1 September 1994)

With the excitement of the Great Comet Collision behind us, the KPNO summer shutdown is now underway. Preparations actually began months ago, and work will continue well into the fall. At the 4-m, we are refurbishing the electronic and mechanical systems in the guider and instrument rotator, repairing the secondary flip mechanism, replacing oil drain lines from the hydrostatic bearings, realuminizing the primary mirror, refurbishing the primary mirror support system, upgrading the computers, completing the upgrade of the control system, and finally, repairing a damaged axial bearing. If time permits, the KPNO Engineering staff will also replace the mount for the declination encoder; we expect this replacement to improve the 4-m pointing accuracy in declination. In addition to major work at the 4-m, we are implementing minor repairs and upgrades at the other domes. Of greatest significance to observers at the 0.9-m telescope will be the installation of vents in the dome to improve air flushing in the telescope enclosure. We hope this to yield a substantial improvement in seeing at the 0.9-m telescope. After the telescopes reopen in late August, work will continue at a slower pace through the fall semester. KPNO staff will support a maintenance shutdown of the NSO facilities on Kitt Peak in early September. We expect to aluminize the 4-m secondary mirrors in the fall, and to replace the 0.9-m secondary mirror supports in December.

Caty Pilachowski

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Fulfilling KPNO's Mission for Education (1Sep94)

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Fulfilling KPNO's Mission for Education (1Sep94)
(from KPNO, NOAO Newsletter No. 39, 1 September 1994)

Our users are well aware of the success with which KPNO provides observing opportunities and access to outstanding instrumentation to a large community of astronomers, but KPNO's educational service is less well known. For example, during the observing year 1 August 1992 through 31 July 1993, KPNO supported thesis observations for 39 different graduate students from 23 different institutions. Only about 100 PhD degrees are granted in all fields of astronomy each year in the US; KPNO is thus supporting a large fraction of all theses in optical and IR astronomy. Some 20% of the observers who travel to Kitt Peak are either graduate or undergraduate students.

In addition to KPNO support of student research programs, the Observatory also hosts 100,000 public visitors each year on the mountain. We are expanding our public visitor program, moving the old No. 3 0.4-m telescope to a new site adjacent to the Visitor Center, remodeling the Visitor Center, and upgrading the exhibits inside. Most of this renovation is funded by donations, and many of our Visitor Center staff and tour guides are volunteers. We are especially grateful to Ash Dome for donating the dome for the new public telescope. Kitt Peak is a popular tourist destination in Tucson, and we hope to reach even more visitors with our new programs.

All in all, about 22% of the KPNO budget can be ascribed to educational activities, mostly through support of student observing programs. The opportunities we can assist our academic colleagues to provide to their students are an important contribution to science education in the US. We welcome student observers under the guidance of their faculty mentors, and urge you to include students in your observing programs.

[Figure not included]

Caty Pilachowski

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KPNO Summer Students - 1994 (1Sep94)

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KPNO Summer Students - 1994 (1Sep94)
(from KPNO, NOAO Newsletter No. 39, 1 September 1994)

KPNO is pleased again to host our five Summer Students, funded through the National Science Foundation's Research Experience for Undergraduates Program. The students are working with staff members on individual research projects as well as participating in a student observing program organized by Nigel Sharp at the Burrell Schmidt telescope.

Chris Gottbrath, a junior at Depauw University, is working with Ata Sarajedini to look for dust in the globular cluster M2.

Stuart Norton, a junior at Wesleyan University, is working with Lisa Wells to study the ejecta from SN1993J using spectra obtained at Kitt Peak.

Cynthia Phillips, a Senior at Harvard University, is working with Beatrice Mueller on observations of comets. She has been determining the brightness of pre-impact fragments of Comet Shoemaker-Levy 9, as well as obtaining post-impact images of Jupiter. Phillips is also studying the rotation of Comet Encke.

Christine Pulliam, a senior at the University of Texas at Austin, is working with Ken Hinkle to analyze the 1-5 um spectrum of Arcturus obtained with the 4-m FTS to determine the abundances of C, N, and O, and several isotopic ratios.

Wing-Sy Wong, a senior at Harvard/Radcliffe University, is working with Dave De Young to analyze HST images of the active galaxy NGC 6251.

Caty Pilachowski

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High Resolution Spectroscopy Conference in Tucson (1Sep94)

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High Resolution Spectroscopy Conference in Tucson (1Sep94)
(from KPNO, NOAO Newsletter No. 39, 1 September 1994)

A Workshop on "High Resolution Spectroscopy with Very Large Telescopes" is being sponsored jointly by the University of California Observatories/Lick Observatory, the National Optical Astronomy Observatories and the University of Texas/McDonald Observatory. It will be held in Tucson on 13-15 October 1994.

The first session of the workshop will be a review of the performances of some of the the new optical or IR High Resolution Spectrographs that either are being used or will be used with very large telescopes (8-10m aperture). The workshop will then focus on the new scientific opportunities for fundamental advances in a wide variety of fields that will come with the advent of this new equipment.

The workshop will take place at the Radisson Suites Hotel in Tucson (special rate $79/night including breakfast and lunch). The workshop registration fee will be $150. Attendance will be restricted by the available space to 80 persons. The deadline for hotel reservations in order to get the special rate will be 2 September 1994.

We aim to summarize each section of the meeting and publish the results in the P.A.S.P. These reports will be written by the those indicated below by the word "summary." Reprints of these summaries will be made available to all participants.

Regretfully, we cannot offer to cover either travel or accommodation expenses.

Currently, the program includes the following speakers:

Introduction: Kraft (UCO/Lick)

Instrumentation:
     Angel (Arizona)
     Dekker (ESO)
     Hinkle (NOAO)
     Pilachowski (NOAO) (Summary)
     Tull (Texas)
     Vogt (UCO/Lick)

Stellar Physics:
     Basri (Berkeley)
     Demarque (Yale) (Summary)
     Hatzes (Texas)
     Kudritzki (Munich)
     Landstreet (Western Ontario)
     Liebert (Arizona)

Stellar Populations and Abundances:
     Carney (UNC)
     Lambert (Texas)
     Smith (Texas)
     Sneden (Texas) (Summary)
     Suntzeff (NOAO)

SNR and ISM:
     Chevalier (Virginia)
     Danly (STScI)
     Meyer (Northwestern)
     Kennicutt (Arizona) (Summary)

AGN/QSO:
     Bechtold (Arizona)
     Sargent (CalTech)
     Shull (Colorado) (Summary)
     Wampler (ESO)
     Wolfe (San Diego)

Meeting Summary:
     Trimble (Irvine/Maryland) (Summary)

On behalf of the workshop scientific organizing committee:

Robert P. Kraft (U.C. Santa Cruz)
Chris Sneden (Texas)
Sidney C. Wolff (NOAO)
Richard Green (NOAO)
Tom Kinman (KPNO/NOAO)
Caty Pilachowski (KPNO/NOAO)

For details about the scientific program e-mail kinman@noao.edu. For other information (e.g., registration) e-mail jmarsalla@noao.edu.

Tom Kinman

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Kitt Peak Joins the World Wide Web (1Sep94)

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Kitt Peak Joins the World Wide Web (1Sep94)
(from KPNO, NOAO Newsletter No. 39, 1 September 1994)

Kitt Peak now has a World Wide Web home page that can be browsed with Mosaic through the NOAO address. Try connecting to

http://www.noao.edu/noao.html

Observers may want to check out the KPNO and NSO User Handbook that is now available through this connection. This will of course be updated each semester with the current booklet information.

The KPNO pages provide general information to prospective observers along with timely information needed for observing at KPNO. A link also connects the reader to another page dealing with items more appropriate for the mountain environment to support actual observing runs.

We expect to be constructing this information over the next couple of months. If you have any comments or suggestions we would like to hear from you. Please send e-mail to kpno@noao.edu.

Caty Pilachowski, Jeannette Barnes

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Retrieving Information Anonymously (1Sep94)

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Retrieving Information Anonymously (1Sep94)
(from KPNO, NOAO Newsletter No. 39, 1 September 1994)

As noted in numerous articles in this Newsletter, one may obtain a wide selection of archival material, from observing forms to instrument manuals, from the NOAO anonymous ftp area. See the CCS Section of this Newsletter for a comprehensive listing of the NOAO subdirectories within this area. In general, all subdirectories will have a README file listing the contents of the directory and any special instructions pertaining thereto. The retrieval procedure is straightforward:

```
ftp ftp.noao.edu (or 140.252.1.24)
login as anonymous
use your e-mail address as the password
cd    &lt directory&gt
bin   (set binary mode)
mget  &lt files&gt
bye  (exit from ftp)
```

A couple of hints: a) it is a good idea to retrieve the README file as well as the desired file(s) to get the latest information on changes or updates; b) the binary flag bin must be set for binary files such as compressed PostScript documents (those with a .ps.Z extension). Setting the binary flag on for text files seems to have no adverse effects.

The current contents of the kpno directory are:

README	File describing contents of this directory.
filters	directory containing the KPNO optical filter libraries and other filter information. Subdirectory filters/plots contains transmission data arranged by KPNO filter number.
hydra	Directory containing hydra information. Refer to the README file within this directory for changes associated with the WIYN conversion.
kpnoforms	Directory containing LaTeX template for KPNO Observing Time Request.
manuals	Directory containing KPNO instrument manuals.
obssched	Directory containing KPNO telescope schedules.
platelogs	Directory containing photographic plate catalog for KPNO 4-m PF camera.

question   Directory for KPNO user questionnaire.

reference   Directory containing wavelength reference files.

sqiid   Directory of scripts for the reduction of SQIID data.

Dick Joyce

Kitt Peak Goes X (1Sep94)

Kitt Peak Goes X (1Sep94)
(from KPNO, NOAO Newsletter No. 39, 1 September 1994)

As of the last week of August, the observers' workstations at the KPNO telescopes have been permanently switched over to X-windows. The familiar Sunview, gterm and imtool of ICE data acquisition have been replaced by olvwm, xgterm and ximtool. IRAF has been updated to version 2.10.3 to support the new plumbing required by xgterm and ximtool. ICE itself has also been updated (to version 1.6), including a few more features that are described in the ICE manual.

Early returns indicate that this will be a popular configuration. The dual monitors at the 4-m and 0.9-m telescopes are fully supported - ximtool automatically appears on the right hand monitor when you log in. Xgterm provides all of the highly desirable features such as a full screen cursor that have been sorely missed in the vanilla xterm windows. The window manager olvwm was selected to allow a natural migration path from Sunview to Motif. The olvwm window manager is identical to the standard olwm (Sun's Open Look window manager) in basic usage but provides a virtual screen capability plus a number of Motif-like extensions that are missing from olwm.

Access to a selection of the more popular X clients is provided through the rootmenu. NCSA mosaic appears automatically at login with its own menu of handy astronomical information, including documentation tailored for the KPNO observing environment. The IRAF xtapemon client also appears on the screen to help you monitor the status of your tape jobs as you yearn to go to bed in the morning.

Please let us know what you think!

George Jacoby, Rob Seaman,
Doug Tody, Bruce Bohannan

Digitized Sky Survey Images (1Sep94)

Digitized Sky Survey Images (1Sep94)
(from KPNO, NOAO Newsletter No. 39, 1 September 1994)

This is just a little reminder that digitized sky survey images with complete astrometric calibrations are available to NOAO observers in need of accurate coordinates. The images are available under a joint NOAO/STScI agreement, and are obtained from the two surveys that were used to generate the HST Guide

Star Catalog: the southern SRC J survey and the Palomar "quick V survey." In addition, extractions can also be obtained from the original POSS E plates. Proper motion may be a significant consideration in the latter, however.

Requests for these extractions should be sent to Tod Lauer (NOAO) e-mail lauer@noao.edu specifying the field center coordinates and equinox, the field size (limited to 1x per side), and the choice of plate material. At this time we are glad to accept requests from observers awarded time in the upcoming fall 1994 semester with a deadline of 30 September. The requested images should be available via anonymous ftp by 15 October.

Tod Lauer

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Nine-Track Tapes and the IRS!? (1Sep94)

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Nine-Track Tapes and the IRS!? (1Sep94)
(from KPNO, NOAO Newsletter No. 39, 1 September 1994)

What do nine-track tapes and the Internal Revenue Service have in common? What they have in common is 15 April. We all know what that date means with respect to the IRS, but what does it have to do with nine-track tapes? Read on...

15 April 1995, is the day selected by the Central Computer Services Department at NOAO-Tucson to recycle the remaining nine-track tapes held in their stacks for visitors. On that day all nine-track tapes (including T-tapes used on the mountain) that belong to non-NOAO staff members will be recycled or discarded. There will be NO warnings or e-mail reminders! If you have any data stored at NOAO that you are concerned about please contact Jeannette Barnes jbarnes@noao.edu immediately so arrangements can be made for acquiring the data. We have no resources for copying tapes so please take this into consideration if you have data stored at NOAO that you need to preserve.

On 15 April, CCS officially brings to an end the last phase of the backup service that it provided to the astronomical community through the nine-track tape media. As a reminder, on 15 August 1994, the nine-track T-tapes were discontinued as a backup medium on the mountain, and backup tapes in general are no longer held for visitors at the downtown offices. We can not stress enough to observers to make their own backup copies of their data - the safety of the data is the observer's responsibility!

The "Save-the-Bits" project will continue to archive raw data automatically at the telescopes for archival purposes, and will replace the functionality provided by the now-outdated nine-track tape technology.

Jeannette Barnes, Bruce Bohannan, Steve Grandi

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Meditations on Magnetic Media: Exabyte, DAT and Nine-Track (1Sep94)

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Meditations on Magnetic Media:...(1Sep94)
Exabyte, DAT and Nine-track

(from KPNO, NOAO Newsletter No. 39, 1 September 1994)

With the arrival of a DAT tape drive at the Burrell Schmidt telescope this summer, each dome at KPNO is now equipped with both an Exabyte and a DAT.

As we celebrate this event, let us take the opportunity to once more lecture on the subject of magnetic media. If you bring your own Exabyte (8mm) or DAT (4mm DDS) tapes to use to write your data, bring only computer grade (certified for Digital Data Storage) tapes. Audio grade tapes are not acceptable and have caused many observers grief over the past few years.

DAT tapes should be 60m tapes (some of our tape drives can't handle 90m tapes). Exabyte tapes should be 112m (160m Exabyte tapes are becoming available, but our drives can't handle them). KPNO orders the following types of tapes for use at the telescopes: Sony QG112MAa Exabyte tapes and Sony DG60MAa DAT tapes.

If you want to import data on tape to use during your run, please use lowest-common-denominator recording techniques. For Exabytes, record in 8200 mode (as opposed to 8500 mode) with no compression. For DAT tapes, record 60m DDS tapes with no compression (neither DDS-DC nor any other style).

One final word: as you may have deduced from other articles in this Newsletter, the era of nine-track tapes at KPNO is practically over. Don't be surprised if nine-track drives start disappearing from the domes in the near future.

Steve Grandi, Bruce Bohannan

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Requests for KPNO Telescope Time (1Sep94)

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Requests for KPNO Telescope Time...(1Sep94)
1 August 1994 - 31 January 1995
(from KPNO, NOAO Newsletter No. 39, 1 September 1994)

Telescope	Nights Req.	Nights Sched.	Reqd./ Sched.	No. of Props.	Number Sched.	Total#/ Sched.	Staff Nights	%Staff Nights
4-m Dark	147	66	2.2	40	19	2.1	10	15
Bright	116	73	1.6	33	20	1.7	9	12
2.1-m Dark	169	61	2.8	34	16	2.1	15	24
Bright	127	75	1.7	27	15	1.8	3	4
Coude Feed	182	131	1.4	24	19	1.3	20	15
1.3-m	197	118	1.7	36	21	1.7	24	20
0.9-m Dark	164	76	2.2	25	14	1.8	5	7
Bright	129	55	2.3	17	8	2.1	10	18
Schmidt	104	71	1.5	17	9	1.9	1	1

KPNO received 231 proposals from visitors and staff combined. Of these, 20 were long-term proposals and three were granted long-term status. One proposal which had previously been granted long-term status was also scheduled.

Lloyd Wallace

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From the NSO Director's Office (1Sep94)

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From the NSO Director's Office (1Sep94)
(from NSO, NOAO Newsletter No. 39, 1 September 1994)

As this Newsletter goes to press I have learned about a severe threat to the continued existence of the solar research team of the USAF Phillips Laboratory/Geophysics Directorate (PL/GP) at Sac Peak. Present planning foresees a termination of this program in October 1995. Unless this preliminary decision, made at the highest levels in the US Air Force, is reversed, this would deal a severe blow to geophysics research and to the solar research program at Sac Peak. In addition to contributing to NSO/SP with their high quality solar research program, the PL/GP provides 25% of the operations budget of the observatory and in addition supports a number of instrumentation and other initiatives in the community and within NSO. Anyone interested in more information on how to help should contact Steve Keil or Don Neidig.

An illness in May caused by a most nasty but (judging from the press it received) very influential bacterium forced me to cancel the NSO Users Committee meeting which was scheduled to occur during the Solar Physics Division meeting in Baltimore. Instead the committee met by telecon on 3 June after I had recovered sufficiently. Most of the meeting was spent in discussions of the report of the Observatory Visiting Committee, the NSO Management Plan, the Draft NSO Future Directions Plan and the 1995 Program Plan. The Committee's reaction to the Future Directions Plan was positive. The committee focussed on the problems facing the adaptive optics program which is under-funded and progressing slowly. Suggestions ranged from involving other partners in the effort to trying to attract additional resources. The Users' Committee stressed again the importance of pursuing the development of adaptive optics as a user facility within NSO. The Committee will meet again in Tucson in November.

We are presently interviewing candidates for the Assistant Scientist position at NSO/KP. This is the first new scientist position in Tucson in many years. The person selected will have as primary obligation the support of Kitt Peak observing. In June the Director of the Mathematical and Physical Sciences Directorate visited Kitt Peak, including the solar facilities and laboratory capabilities at the McMath-Pierce complex. The 10 May annular and partial solar eclipse drew a lot of public and scientific attention at both Kitt Peak and Sac Peak. At Sac Peak this was heightened by the dedication of the nearby Apache Point Observatory scheduled to occur to coincide with this celestial event.

NOAO and NSO have signed a Memorandum of Understanding with the Kiepenheuer Institute in Germany for the joint construction of a fast read-out CCD system. Collaborations with other institutes will be sought in situations where both will win. Another collaboration is presently being explored with the Instituto de Astrofisica de Canarias (IAC) involving an upgrade of the Correlation Tracker.

Ground-breaking at the Learmonth, Australia GONG site in June followed a successful GONG '94 meeting in Los Angeles in May and a briefing on the status of the GONG project at NSF on 8 June. GONG is getting close to its deployment and excitement is high and growing.

Jacques M. Beckers

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Seeing Studies at the McMath-Pierce (1Sep94)

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Seeing Studies at the McMath-Pierce (1Sep94)
(from NSO, NOAO Newsletter No. 39, 1 September 1994)

In the continuing effort to understand and improve the seeing at the McMath-Pierce Solar Telescope, new temperature probes and seeing monitors are being installed. Pairs of microthermal sensors are situated just above the main telescope light path in the tunnel to sample the turbulence in order to discover the time variant sources of micro turbulence which can degrade the solar image. It is planned to minimize the turbulent flow based on these findings. In order to check the effectiveness of our efforts, two Seykora seeing monitors will be mounted, one above and one inside of the McMath-Pierce telescope. These monitors do not require accurate tracking but have been shown to produce seeing information comparable to the Brandt solar limb motion monitor. Finally, mirror seeing is under investigation through the study of mirror self-heating over several hours of solar observation.

Fred Forbes

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New Solar Atlas for the Thermal Infrared (8 to 21 um) (1Sep94)

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New Solar Atlas for the Thermal Infrared...(1Sep94)
(8 to 21 um) (from NSO, NOAO Newsletter No. 39, 1 September 1994)

"An Atlas of the Sunspot Spectrum from 470 to 1233 cm^-1 (8.1 to 21 um) and the Photospheric Spectrum from 460 to 630 cm^-1 (16 to 22 um)" is now available. Lloyd Wallace, with help from Peter Bernath, has prepared this, which is yet another IR atlas based on the FTS archives. The umbral component is especially rich in SiO and H2O. Some 2550 lines of the former and 2047 of the latter are identified. From the SiO lines the temperature of the spot umbra is estimated to be 3200 K, corresponding roughly to spectral class M4V. Other solar lines include a couple hundred of OH, the Mg 530.99 cm^-1, and H 524.61 cm^-1.

Other atlases of the series are: "An Atlas of the Photospheric Spectrum from 8900 to 13600 cm^-1 (7350 to 11230)," "An Atlas of the Solar Spectrum in the Infrared from 1850 to 9000 cm^-1 (1.1 to 5.4 um)," and "An Atlas of a Dark Sunspot Umbral Spectrum from 1970 to 8640 cm^-1 (1.16 to 5.1 um)." Interested workers may obtain copies free of charge from NSO/Tucson.

Bill Livingston

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Staff Changes at NSO/Tucson (1Sep94)

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Staff Changes at NSO/Tucson (1Sep94)
(from NSO, NOAO Newsletter No. 39, 1 September 1994)

The NSO/Kitt Peak staff is sorry to say farewell to Paul Hartmann. Paul has been an Instrument Observing Specialist since 1990, supporting both the KPVT and the McMath-Pierce telescope. Paul left NSO in June for a position with Michigan-Dartmouth-MIT Observatory.

We were fortunate to fill Paul's position with Teresa Bippert-Plymate. Teresa worked for NSO as a Data Clerk in 1987 while attending the University of Arizona and most recently worked as a Research Technician for Steward Observatory while pursuing graduate studies. Join us in welcoming Teresa back to the NSO.

Jeremy Wagner

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Modification to Window of SP/VTT (1Sep94)

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Modification to Window of SP/VTT (1Sep94)
(from NSO, NOAO Newsletter No. 39, 1 September 1994)

During the day, the edge of the window on the SP/VTT has always heated up relative to the center of the window because the temperature of the turret, which has the cell for the window built into it, tracks the diurnal change in temperature more rapidly than the window itself. This introduces a "turned up edge" of several waves in the transmitted wavefront. Many experiments have been made over the years in an attempt to reduce this effect. The most successful was actively cooling the edge of the window, the cell and bezel with liquid coolant. This worked in the past with a 10-cm thick glass window that was slightly smaller than the cell, allowing coolant to be circulated around the edge of the window. Unfortunately, the glass window had considerable polarization, and it was replaced with a borrowed 4-cm thick fused-silica window of better quality. The replacement was larger than the cell, requiring a complete rebuild of the mount, which included a scheme for applying a mount to the edge to reduce the tensile load caused by the vacuum pressure by about 10%. Unfortunately the edge of the window could no longer be liquid cooled effectively, leading to another series of unsuccessful experiments to try to insulate the edge and lower the thermal input.

Recently we had a second fused-silica window edged from 90-cm to 86-cm, once again allowing use of the original cell and allowing the coolant to be in very good thermal contact with the edge.

The window and coolant system have been reinstalled. The temperature sensors, which will complete the system, will be installed during an August maintenance period. This project should substantially improve the window performance during the day.

Richard B. Dunn

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NSO Summer Student Program (1Sep94)

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NSO Summer Student Program (1Sep94)
(from NSO, NOAO Newsletter No. 39, 1 September 1994)

Scott Beardsley (University of Wisconsin) is assisting Thomas Rimmele in analyzing time sequences of granulation images to evaluate algorithms that have been proposed for tracking solar images. The algorithms to be compared are 2-D cross-correlation using FFT's, sum of absolute difference and the areal quad-cell approach. We also intend to simulate the use of a binary ferro-electric liquid cristal device in an optical correlator and compare the performance that can be expected from such a device with that of digital approaches. The algorithms will be compared in terms of their performance in different seeing conditions. In particular the performance when tracking images of extremely low contrast will be examined.

Howard Beckley (Colorado School of Mines) is working with K.S. Balasubramaniam and Steve Keil on calculating velocity and magnetic field flows in solar active regions using data from the NSO/SP/VTT narrow band filter (NBF) observations. The results of this research will lead to finding drivers of active region energy build-up leading to solar flares.

Eric Burgh (University of Michigan) is assisting Matt Penn in a project to study the Jupiter/Comet Shoemaker-Levy 9 encounter. The project will collect three types of data; imaging data in the blue continuum, imaging data in two near-infrared methane absorption lines and nearby continuum, and slit spectra across the Jovian equator at 1.56 microns. Burgh is involved in all phases of the experiment; he will be helping with the actual observations, reducing and calibrating the data, and analyzing the data for scientific content.

Steve Doinidis (New Mexico State University) is working with Dick Dunn on the development of the adaptive optics system at NSO/SP. He is determining both analytically and experimentally the value of the weight tables that will be loaded into the "Digital Reconstructor", which is a hardware matrix multiplier that processes the data stream from the wavefront sensor. It computes the offsets to the actuators on the adaptive mirror so that its surface will fit the wavefront. For the experimental data he is using the 12-actuator mirror and the Dyson white-light interferometer that forms the "test bed" for the project.

Sally Donaldson (1994 Tufts University graduate going to the University of Maryland in the fall) is working with Frank Hill on the analysis of the GONG site survey data from the six selected GONG sites, plus Tucson, Kitt Peak and Sac Peak. She is also investigating the oscillations of the observed magnetic fields, with a six hour time sequence, obtained at a one minute intervals, with the GONG prototype instrument.

Dali Georgobiani (graduate student from Abastumani Observatory in Tbilisi, Republic of Georgia) under the supervision of Jeff Kuhn has been developing a model for solar scintillation during an eclipse, and applying it to data obtained during the last annular eclipse. She is also computing the effects of magnetic fields on heat flow in the solar interior using numerical MHD models.

Leisa Glennie (University of Arizona) is working with Jack Harvey on the reduction and analysis of daily full-disk images of the Sun. The images show the Sun in a 10 band centered on the Ca II K line and are intended to help identify the sources of solar irradiance variations. In addition to reduction and archiving of the data, Glennie is experimenting with image restoration algorithms to improve the photometric quality of the data.

Neil Jones (California Institute of Technology) is working with Doug Rabin on the reduction and analysis of data from the Near Infrared Magnetograph (NIM). This instrument probes the structure of intense magnetic flux tubes in the deep solar photosphere through high-resolution spectropolarimetry of Zeeman-sensitive Fe I lines near 1565 nm. The original design of NIM provided only for circular polarimetry, from which the strength, but not the direction, of the magnetic field can be inferred. Now that the instrument has been augmented to measure all states of polarization, Jones is extending and improving the software to make use of this new information.

Shella Keilholz (University of Missouri/Rolla) is working with Charlie Lindsey and Doug Rabin on analysis of infrared CO-line occultation spectra made at the McMath-Pierce Solar Telescope during the nearly annular solar eclipse of May 10, 1994 over Kitt Peak. The observations were made in support of a program by Alan Clark (University of Calgary) to determine the distribution of CO line emission in the solar chromosphere. Shella has developed software useful for general dark-current drift analysis and compensation. She has also created utilities for recognizing defective pixels based on distributions of various pixel parameters and is developing schemes for correcting image defects due to defective pixels.

Stefan Ljungberg (Royal Institute of Technology, Sweden) is working with K.S. Balasubramaniam and Steve Keil on NSO/SP/VTT data obtained during observations of the 10 May 1994 eclipse to derive stray and scattered light functions. Stray and scattered light functions influence the accuracy of the measured velocity and magnetic field signatures. This project will estimate the correction factors and in turn will help to derive accurate velocity and magnetic field patterns for solar active region evolution analysis.

Ernie Nix, who teaches science at the Cloudcroft High School in Cloudcroft, NM is working at Sacramento Peak with Steve Keil as part of the New Mexico Science and Technology Education Program (STEP) for high school faculty. The aim of the STEP program is to keep teachers current on research techniques and objectives so they can in turn keep their courses current. Nix is working on velocities and acceleration mechanisms in coronal mass ejections, using data from the NSO/SP advanced reflecting coronagraph.

Sara O'Brien (University of Arizona) is working with Mark Giampapa to reduce and analyze a time-series of high resolution, H-alpha spectra of young stars and M dwarf stars (with unique chromospheric properties) as obtained with the McMath-Pierce solar-stellar spectrograph. The line profiles will be studied to determine if periodic variability is present. In addition, radial velocities for a small sample of so-called "weak" T Tauri stars in the Ophiuchus star formation region will be determined.

Reed Riddle (University of Arizona) is rereducing the 1987 South Pole data under the direction of Stuart Jefferies. He has generated new flatfielding and secondary image removal procedures which are better than those used in the original reduction of this data. The new reduction will lead to a solar oscillation power spectrum that has better signal-to-noise characteristics and extends to higher spatial frequencies than our original spectrum of the data. This will allow for a better comparison with our 1988 and 1990 data sets in the search for solar cycle related changes in the solar oscillation power spectrum.

Dennis Strelow (recent grad in computer sciences from the University of Wisconsin) is working this summer with Don Neidig and Jack Zirker. They are analyzing a 7-day time series of magnetograms and whitelight images of a spot group, taken in 1990 at Big Bear Solar Observatory. The group shows some remarkable shearing motions and Dennis will attempt to correlate these with flare productivity in the group. Dennis will also work on some whitelight flare data for correlation with gamma ray emissions.

Meredith Wills (Harvard University) is working with Harrison Jones on comparing the full set (magnetic, velocity, continuum intensity, equivalent width, and central line depth) of daily full-disk spectromagnetograph images with spacecraft measurements of solar irradiance variations.

K. Balasubramaniam, Dick Dunn, Mark Giampapa, Jack Harvey, Frank Hill, Stuart Jefferies, Harry Jones, Steve Keil, Jeff Kuhn, Charlie Lindsey, Don Neidig, Matt Penn, Doug Rabin, Thomas Rimmele, Jack Zirker

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NSO/SP and KIS Camera Project (1Sep94)

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NSO/SP and KIS Camera Project (1Sep94)
(from NSO, NOAO Newsletter No. 39, 1 September 1994)

NSO and Kiepenheuer Institut fuer Sonnenphysik have signed an MOU for a high-speed data acquisition system using a 10 frame/second 1K 1K Thompson CCD camera. The data acquisition system is camera independent and can be configured for other cameras. A system will be implemented at Sac Peak using the RISE 1K 1K camera. KIS will buy the development system which will stay at Sac Peak. A copy of the working system will be purchased and the software copied to the system for KIS. The camera system will be useful for high time resolution spectral filtergrams and good seeing frame selection.

Fritz Stauffer, Thomas Rimmele

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NASA to Renovate Cloudcroft Facility (1Sep94)

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NASA to Renovate Cloudcroft Facility (1Sep94)
(from NSO, NOAO Newsletter No. 39, 1 September 1994)

An agreement has been reached for the National Solar Observatory to renovate the Cloudcroft 48" telescope facility to house a 3 meter mercury mirror telescope. NASA owns the telescope and will utilize it to look for space debris. NSO will be responsible for contracting out the renovation and maintaining the facility during NASA's use.

The Cloudcroft facility is ideal for their experiments. It is a very dark location and the telescope building and pier appear excellent for their application. NASA expects to install the telescope in the next 6 months and stay as long as 5 years. Eventually, they hope to relocate the telescope to an equatorial site.

Rex Hunter

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Evans Spectroheliograms in SP FTP Site (1Sep94)

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Evans Spectroheliograms in SP FTP Site (1Sep94)
(from NSO, NOAO Newsletter No. 39, 1 September 1994)

The daily CaK and H-alpha spectroheliograms made at the Evans Solar Facility are available at ftp.sunspot.noao.edu in the directory /pub/shg in gif images. SELSIS images for the current week are also available in /pub/shg/sel. The pictures are made by frame grabbing a video image of the negative on a light table. The gif images are scaled to fill the 8 bit range, the y direction is compressed to make the Sun circular, and the CaK data has a gamma = 2 applied. Prints from the original negatives are available upon request.

Fritz Stauffer, Matt Penn

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NSO Observing Requests and WWW (1Sep94)

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NSO Observing Requests and WWW (1Sep94)
(from NSO, NOAO Newsletter No. 39, 1 September 1994)

The NSO observing request forms are available from the NSO/SP WWW server at http://www.sunspot.noao.edu/General/ObsRequest.html. This document gives access to a postscript file, the TeX forms, and to an interactive based form. The interactive form has text boxes, clickable entries, etc. and appears as the observing request. After the form is filled out, the user can select the form to be mailed to SPO or Tucson, and then submit the request. A TeX form is returned to the user for their own copy.

Fritz Stauffer

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Cross-dispersion Project at the McMath-Pierce Solar-Stellar Spectrograph (1Sep94)

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Cross-dispersion Project at the McMath-Pierce...(1Sep94)
Solar-stellar Spectrograph
(from NSO, NOAO Newsletter No. 39, 1 September 1994)

The mechanical design for this major upgrade to our nighttime facility has been completed. Machining of the parts is now underway. The housing for the multi-element transfer lens has been completed. The optical components for the transfer lens are being manufactured by Tucson Optical Research Corporation (TORC) and should be completed in about six weeks.

The initial test results for the large format 1024 3072 CCD arrays that are being delivered by the NOAO Instrumentation Program have proven disappointing in terms of resolving high spatial frequencies. The limiting resolution is degraded by a factor of 1.8 compared to the resolution achieved by our current TI 800 800 CCD. Previous tests at the coude feed found the same result. The source of the degradation is unknown but some tests to identify the cause are proceeding. Since high spectral resolution is a scientific driver for our solar-stellar program, we cannot accept these chips until the resolution problem is solved. We will keep you informed of progress on this issue.

Mark Giampapa

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NSO Telescope/Instrument Combinations (1Sep94)

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NSO Telescope/Instrument Combinations (1Sep94)
(from NSO, NOAO Newsletter No. 39, 1 September 1994)

Vacuum Tower Telescope (SP):
- Echelle Spectrograph
- Universal Spectrograph
- Horizontal Spectrograph
- Universal Birefringent Filter
- Fabry-Perot Interferometer Filter System
- Advanced Stokes Polarimeter
- Slit-Jaw Camera System
- Correlation Tracker
- Branch Feed Camera System
- Horizontal and Vertical Optical Benches for visitor equipment
  - Optical Test Room

Evans Solar Facility (SP):
- 40-cm Coronagraphs (2)
- 30-cm Coelostat
- 40-cm Telescope
- Littrow Spectrograph
- Universal Spectrograph

Spectroheliograph
Coronal Photometer
Dual Camera System

Hilltop Dome Facility (SP):
H-alpha Flare Monitor
White-Light Telescope
20-cm Full-Limb Coronagraph
White-Light Flare-Patrol Telescope (Mk II)
Sunspot Telescope
Fabry-Perot Etalon Vector Magnetograph
Mirror-Objective Coronagraph (5 cm)
Mirror-Objective Coronagraph (15 cm)

McMath-Pierce Solar Telescope Facility (KP):
160-cm Main Unobstructed Telescope
76-cm East Auxiliary Telescope
76-cm West Auxiliary Telescope
Vertical Spectrograph: IR and visible gratings
Infrared Imager   Image Stabilizers
1-m Fourier Transform Spectrometer
Stellar Spectrograph System
3 Semi-Permanent Observing Stations for visitor equipment

Vacuum Telescope (KP):
Spectromagnetograph
High-l Helioseismograph

Razdow (KP):
H-alpha patrol instrument

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Global Oscillation Network Group (1Sep94)

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Global Oscillation Network Group (1Sep94)
(from GONG, NOAO Newsletter No. 39, 1 September 1994)

The Global Oscillation Network Group (GONG) Project is a community-based activity to develop and operate a six-site helioseismic observing network for at least three years, to do the basic data reduction, to provide the data and software tools to the community, and to coordinate analysis of the rich data set that should result. The Project is looking forward to deployment of its first sites in 1994 and a fully operational network and data management and analysis center in 1995. GONG data will be available to any qualified investigator whose proposal has been accepted, however, active membership in a GONG Scientific Team will allow early access to the data and the collaborative scientific analysis that the Teams have already initiated. The GONG Newsletter provides status reports on all aspects of the Project and related helioseismic science.

This year's annual GONG Meeting - "Helio- and Astero-Seismology from the Earth and Space: GONG '94" - took place in Los Angeles on 16-20 May hosted by Roger Ulrich (UCLA), Ed Rhodes (USC), and Werner Dppen (USC). It was extremely well attended, and the proceedings will be published by the Astronomical Society of the Pacific. The 145 participants had the opportunity to enjoy Mt. Wilson in the snow, after which Ed Rhodes was rumored to have indicated that he was eager to host the annual meeting again sometime after 2014. One of the high points of the meeting was an impromptu, after dinner recollection of the discovery of the "five-minute" oscillations by Bob Noyes, and Franz-Ludwig Deubner's confession of how he first encountered this intriguing phenomenon. The participants all signed the eye-catching poster that Roger Ulrich's son Scott had designed for the meeting, and Arvind Bhatnagar presented it to Bob Leighton, whose seredipitous discovery "enabled" the whole discipline of helioseismology.

[Picture not included]

In late June, GONG organized a workshop at the University of Sydney, Australia, to encourage research interest in helioseismology in Australia.

This was done in association with establishing a GONG site at Learmonth, Western Australia. The workshop was sponsored by the IPS Radio and Space Services (our host organization at Learmonth), and the School of Mathematics and Statistics of the University of Sydney, with support from the NSF and the Australian government (DITRD). The 35 participants from seven Australian universities were subjected to a hard week's lectures and discussion, but there are signs that they survived and that the meeting was a success.

During the workshop, Jim Kennedy, David Cole (Director of the IPS Radio and Space Services) and John Leibacher had the opportunity to present an overview of GONG's activities to Edward Perkins, the US Ambassador to Australia, who had recently visited the Learmonth Solar Observatory.

Sites

We are continuing to press forward on the preparation of all six sites. If all goes well, much of the site work will be performed with funds committed during the current fiscal year so that the sites will be ready for deployment of the GONG instruments beginning this Winter. The sites are currently in various stages of readiness, with Learmonth, Australia, and El Teide in the Canary Islands leading the pack.

The first official ground breaking for GONG took place during the third week in June at the IPS Radio and Space Services' Learmonth Solar Observatory. John Leibacher, Jim Kennedy, and Frank Hill were in attendance, representing the Project. The neck of the champagne bottle was lopped off with the blade of a shovel, and work was allowed to get under way "officially." Since then, Asset Services has proceeded with the grading of the site and the foundation excavations. Arden Petri, the Project's mechanical designer, has traveled to the site to perform the tasks of the Project's "Advance Team," the first of three teams involved in the deployment of our instruments. He witnessed the concrete pour, and supervised placement of the critical instrument mounting fixtures. If the contractor remains on schedule, this site will be ready to receive an instrument in September, well in advance of the February target date.

The first site to receive a station (excluding Tucson, of course) will actually be El Teide in the Spanish Canary Islands. That site will also be ready well in advance of the arrival of the station, slated for December. The permitting and licensing process is now well in hand, and we expect to select a contractor by the end of August, or early September. The current schedule predicts that our Advance Team will be visiting the Canaries in the latter part of September, and site preparation will be complete by mid-October.

Jim Kennedy visited Mauna Loa in mid-July to oversee the "leveling of the lava" at and around the GONG site. With sleet and rain spinning off of a hurricane hovering less than two hundred miles away, he witnessed a classic "cut-and-fill" job as the machinery prepared the site in conjunction with land preparation for NOAA's new LIDAR facility.

The Project has obtained the services of an engineering firm to help prepare the bid packages for site preparation at Big Bear Lake. Core samples have already been obtained along the causeway to allow detailed specification for the dredge-and-fill operation required to make a pad for the instrument. Things are also proceeding smoothly on the permitting front, although one critical permit application cannot be submitted until the preliminary engineering study has been completed, and drawings prepared. Nevertheless, it appears unlikely that these obstacles will keep us from beginning work this fall.

In India we have established that the Udaipur Solar Observatory itself will be our general contractor. Work on their new campus, on which our instrument will be located, is now under way and progressing well. A package of updated prints was recently released to them to facilitate their planning.

In Chile, our colleagues at CTIO are in the process of putting together detailed cost estimates for our site preparations. Here again, the observatory staff will provide general contracting services. Since NSO and CTIO are part of the same observatory system, the act of "letting the contract" is just a simple transfer of funds within the organization.

The GONG Project was pleased to host Cristina Soares (IAC), in Tenerife, as the most recent GONG scientific site visitor. Cristina spent three months with us in Tucson, and reduced a set of Taiwanese Oscillation Network (TON) data. The Project is happy to congratulate Jesus Patron Recio on the completion of his thesis, entitled "Tridimensional Distribution of Horizontal Velocity Flows under the Solar Surface." Jesus has returned to Tenerife, and will defend his work in September.

Instrument

Supplementary help from three additional instrument makers, and continuing overtime from project staff, has just about put our mechanical production effort over the top. During the last three months we benefited from help from Duane Miller, Martin Robertson, and Russ Cole. This allowed us to complete all of the remaining camera rotator parts and the assembly of all of the light-feed turrets, as well as three of the six remaining production Lyot/Michelson ovens. Once certification of the ovens and light-feed turrets has been completed, we will have enough of the major mechanical instrument elements to start bringing up the Doppler analyzers in the first three shelters. This allows us to commence end-to-end tests of the Doppler imagers as soon as electronic systems are available. Camera rotators are currently being assembled, and instrument cover parts are still in production; these items will be added to the systems as they become available during the course of testing.

The electronics group has finished building and checking out the cables in the field shelters. With that huge task behind us, our efforts are now concentrated on component and systems certification. All of the production data-system boards have been certified and are being installed in their chassis for system tests. The balance of the instrument-control boards are at various stages in the production process. At the time of this writing, the last four boards are about to be released for full production. Populated and tested versions of these last boards should be available to us by mid August when testing of the first three integrated systems is scheduled to get under way.

In the last Newsletter we noted that we had experienced an "anomalously low yield" in our production dual memory boards. At that time, we had reason to believe that the problem was likely bad components rather than any sort of fundamental board-manufacturing problem. In the end, our worst fears were realized when we discovered serious flaws in the production boards. After considerable consultation with the vendor, and a plant visit, we were able to identify the problem and have 50 more memory boards made quickly. We are pleased (and relieved) to report that the new lot has recently arrived and that all of the boards passed the certification tests.

The two real-time programmers assigned to the instrument group have basically completed the data acquisition software. This code is now under strict configuration control; the majority of changes being made are bug fixes, or relate to minor items such as the comment fields of the data header-block parameters. This has provided a "resource wedge" for the component certification activities discussed above. With the help of Jean Goodrich, on temporary loan to us from Jim Pintar's DMAC operation, certification code has been written to test all of the electronic boards which are directly accessible via the VME bus.

We have also made a start on the development of the instrument's user interface. Shane Walker, a student at the University of Arizona, has been hired to help us implement the graphical user interface for the instrument control software. This interface will be the "window on the GONG instrument" for our hosts at the field sites, allowing the status of the instrument and data systems to be evaluated at a glance. The display will also show the most recent intensity and magnetogram image, a running "strip chart" of the mean velocity signal, and log message window. A second "strip chart" window can be opened on demand to display selected instrumental parameters as a function of time. An IRAF window will also be available for other custom reductions and displays, such as velocity and modulation images. Good progress has been made on this work, and we hope to run a beta-test version in early August.

On the optics front, assembly of Lyot Filters has resumed. Two units are already available (one of which is in service at the prototype), and Jack Harvey and Roberta Toussaint are committed to having three more assemblies finished and tuned by mid August when field integration begins. The last looming concern with optics is the 4.5 interference prefilters: we have still only received two of the ion-assisted filters from the vendor. Another production run is in progress, but attempts to move the passband during annealing destroyed one filter and caused uniformity problems in another. We are continuing to work closely with the vendor. Our backup plan calls for going into integration with conventional (temperature sensitive) interference filters.

Much of the month of June, as well as the first few days of July, was taken up with an extended observing run at the prototype. Typically the prototype instrument's time has been divided between software development and engineering checkout, punctuated every ten days to two weeks by a four-day observing run. With development winding down, and with the long, clear spring days in Tucson during June, we suspended that schedule and let the instrument run. As the accompanying chart shows, the run lasted 24 days, 11 June through 4 July. Of these, we were able to obtain data worth reducing on 20 days. We had two days of instrumental down time. The first of these was due to a software problem: eleven days into the run, the instrument was no longer able to acquire the Sun without manual intervention. This was traced to an error in the time used to make ephemeris calculations. An inaccurate clock was inadvertently being read, rather than the precision GPS-derived time that provides the time base for the rest of the instrument. The second day of down-time was self inflicted: we chose to use a clear day to reinstall and align the magnetogram modulator and associated electronics, which had been unavailable when the run began.

[Figure not included]

Data System

The baseline pipeline algorithm development phase of the Project is drawing to a close as the deployment nears. The big merging test is still underway; as of mid-July about 40% of the images from the first realization of 108 artificial site days had been processed to time series. Work also continues on the subtle issue of calibrating the modulation transfer function to degree l.

The last major algorithm task is the installation of an a-coefficient expansion into the determination of the frequencies in some regions of the spectrum. This matter was discussed in LA, where it was decided that it was pointless to attempt to fit every peak in the region of the spectrum where the modes are essentially local rather than global. Current observations indicate that this transition takes place around l = 190, so the current plan is to fit every peak below that point, and to fit a-coefficients to entire ridges above. There will be a region of overlap in which both methods are used. In addition, year-long time series and power spectra will be produced for modes with l &lt 20, where the lifetimes are long.

As the baseline development work winds down, resources will become available to allow the Project to address issues that had to be skipped over to assure functionality of the minimum pipeline processing. Items include temporal filters, the low-frequency analysis, spatial aliasing, non-spherical harmonic decomposition, and feature tracking. The choice of directions will be made with the input of the DMAC User's Committee (DUC).

The membership of the DUC changed at the LA meeting. Tuck Stebbins, Roger Ulrich, and Joergen Christensen-Dalsgaard rotated off the committee as their two-year terms ended. They provided an invaluable service to the Project. Tuck is especially to be commended for his yeoman work as the Chair of the DUC, and he was awarded one of the coveted Hero Of GONG (HOG) awards in LA. Stepping into Tuck's shoes is Dave Hathaway, who has agreed to chair the DUC for the next two years. Also joining for two-year terms are Sylvain Korzennik, and Mike Thompson. Tim Brown and Todd Hoeksema will continue for the last year of their three-year terms. The DUC met again on 26 July in Boulder, in conjunction with a mini-workshop on inversions.

Last fall, the Data Storage and Distribution System (DSDS) embarked on a major project to upgrade its computer systems and software. This effort was completed as planned in June. The DSDS now consists of two Sun SPARC10s running SOLARIS 2.3 using ORACLE's database management system with a new design for the file catalog. The users' machine was upgraded to a DECstation 5000. The number of possible simultaneous users has been increased from two to eight. The anonymous `ftp' disk area and space available for network distributions of data products was also increased significantly. The database on the SPARC10s that supports the cartridge volume and file catalogs was converted from Ingres to ORACLE. The redesign of the file catalog provided a significant increase in performance beyond that derived from the workstation upgrade.

At this point the DSDS is operational. Future DSDS software activities will be maintenance and enhancements. One of these enhancements will provide a mechanism for reporting the errors that may occur when the data products are produced, communicating this information to the scientific community, and providing a systematic solution for managing the reprocessing that will replace the affected data products. The Project anticipates that during the next year as the community increases its use of the DSDS for obtaining data products additional enhancements and modifications may be required.

During the previous quarter, the DMAC calibrated and produced site-day l-~ spectra and 4-minute averages for 13 prototype data days: 29 March; 24, 30 April; 27, 31 May; and 11-16, 18, 22 June. In addition, there are eleven days of raw data beginning on 23 June that are currently being reduced. The interval from 11 June through 4 July was a continuous observing run during which the prototype operated routinely. It was cloudy 17-21 June; however, raw data were recorded each day. Also during the quarter, the Field Tape Reader processed nine raw data cartridges from the prototype instrument that contained 37 site-days. The off-site copy and storage facility copied ten cartridges containing data products.

The development of the data reduction pipeline is proceeding. Those involved spend their time writing software, reducing data, and diagnosing various problems which range from software bugs through functional problems with the reduction algorithms to problems with the raw data.

To explore the spatial frequency range of the instrument, an l-~ spectrum to lmax = 500 was produced. Two features are clearly evident: the ridges are visible well beyond the nominal range used by the Project (lmax= 250) and spatial aliasing can be seen beginning at l = 250. (The first traces of spatial aliasing can be seen at l = 200 with a very sensitive examination of the spectra.)

The Project also made some progress in understanding the low-l noise in the l-v spectra. It was discovered that at least for l = 0, the noise could be suppressed by discarding mode coefficient time samples whose magnitude was greater than 3.5 times the `rms' of the time series. Subsequent investigation revealed that most of the anomalous samples can be associated with guider faults (signals from the instrument that the guider was not functioning for some period of time during the one-minute recording interval). Combining anecdotal evidence from observers at the prototype site led to the conclusion that birds, which seem to congregate in large numbers in the fields near the prototype, cause most of the guider faults by occasionally flying between the Sun and the light feed. The guider trips when the intensity falls below a threshold. This was confirmed by video tape of the signal sent to the video monitor in the prototype. This tape also included a remarkable series of frames showing part of an airplane as it approached the runway at a nearby airport.

GONG is now making project information available to the World Wide Web (WWW) via an Http server on the DSDS Users' Machine, helios.tuc.noao.edu (140.252.8.105). The GONG "Homepage" may be accessed directly at: http://helios.tuc.noao.edu/homepage.html, or through hyperlinks in the NOAO Homepage, or the NSO Homepage.

The GONG Homepage provides links to introductory documents describing the instrument, GONG sites, the DMAC and the DSDS. There are additional documents available containing up-to-date project status, information on scientific programs and membership optimal access is via WWW and a browser such as NCSA Mosaic, however, access through Lynx seems to work just fine for users without access to an imaging display.

Programmatics

After initial indications that the total, current year budget for GONG might be as low as $2.3M, the news just kept getting better and better. Although March brought us word that our "final" budget would be $2.6M, our allocation was further increased to $2.75M in May. Though less than the $2.85 we had requested for FY 1994, this will allow us to pursue our site preparation activities aggressively, while purchasing adequate computing power to support the three-station network we expect to have running as soon as March 1995.

This good budget news has also allowed us to move forward to fill two open positions presently on our books. We are currently recruiting a Senior Associate in Research to work closely with Jack Harvey with activities relating to assembling, testing, and evaluating the six field instruments, performing quality assurance checks on the incoming data, and diagnosing instrumental problems in the field during the operation of the network. The second position we hope to fill is that of an electrical engineer with a strong background in programming to assist with integration and deployment of the field instruments. This second position ultimately derives from the position vacated by our friend and colleague Warren Ball, whose untimely stroke deprived us of his skills and experience back in April 1993. Since then, we have been forced to keep these funds in reserve in the event that the worst budget predictions had been realized. The research associate job is currently posted and we are accepting applications.

With all of the usual budgetary caveats, the schedule for the deployment remains unchanged with the Big Bear instrument being brought on-line in Tucson early this fall, and the Tenerife and Learmonth stations being shipped late this year, and becoming operational early in 1995. The Mauna Loa, Udaipur, and Cerro Tololo would be deployed during the spring and finally the Big Bear would be relocated from Tucson to BBSO. We really are in the home stretch!

John Leibacher and the GONG Team

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The Gemini Instrumentation Program - The US View (1Sep94)

The Gemini Instrumentation Program - The US View (1Sep94)
(from USGP, NOAO Newsletter No. 39, 1 September 1994)

The last Gemini Newsletter (June 1994) contained an article detailing the development of the instrumentation program for the Gemini telescopes. The complement of "first light" instruments has been designed to satisfy the scientific desires of the astronomical communities of the Gemini partner countries and exploit the unique capabilities of the Gemini telescopes. Along with the list of instruments, the Gemini Project, in collaboration with the Gemini Science Committee, developed an allocation plan, in which the monetary value of each country's allocation is roughly proportional to its participation in the project. This plan, for the instruments themselves and the allocations to the countries, was approved by the Gemini Board in May and is as follows:

Chile:	CCD Electronics
United States:	Near-IR Imager Near-IR Spectrograph 8-30 um Imager Optical Detectors/ Acquisition Cameras IR Arrays/Controllers
Canada:	MOS (X2) (collaboration) CFHT Fiber Feed
United Kingdom:	MOS (X2) (collaboration) HROS

Although there are certainly astronomers in the US who are interested in each of the instruments, I believe that this is a particularly propitious allocation for the US. First, the emphasis of Gemini in the US has been predominantly in the IR, where Gemini is aimed at providing unique capabilities in areas of spatial resolution and low emissivity. Second, state-of-the-art detectors, in both ranges of the IR represented as well as in the optical, come almost exclusively from US vendors. Most of the communications received by the US Gemini Program (USGP) that expressed interest in participating in the instrumentation program mentioned specifically the infrared instruments.

So, who will build these instruments (and how will those decisions be made)? The goal of the USGP is to maximize the participation of the community, while ensuring that the instruments provided for the Gemini telescopes are of the highest quality and greatest capability. All this while requiring them to be built for a fixed price - which has been estimated by the project as amounting to about 65% of the cost to build the instruments they want!

Some of the US-allocated instruments already have constraints on them. The Near-IR Imager will be built by the University of Hawaii, and a design study is now underway. The Optical Detectors/ Acquisition Cameras were directed by the Gemini Board to an international consortium organized by the USGP. This consortium is encouraged to involve the international communities in procurement of CCDs through collaborative foundry runs. This effort will be started in the next few months and information about participation will be widely circulated. In the case of the IR detectors and controllers, it was deemed appropriate to delay the initiation of the procurement so that requirements could be factored in by the groups building the instruments in which these detectors and controllers would be used.

That leaves the Near-IR Spectrograph and the Mid-IR Imager. The builders of those two instruments will be chosen through competitions, organized, through the request of the NSF, by the USGP. There are more details on this process in the accompanying article on recent activities of the USGP. A similar procurement process will be carried out for the Mid-IR imager. The announcement of opportunity for this latter procurement will probably be released around the beginning of 1995.

Todd Boroson

Recent Activities of the US Gemini Program (1Sep94)

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Recent Activities of the US Gemini Program (1Sep94)
(from USGP, NOAO Newsletter No. 39, 1 September 1994)

IR Spectrograph Procurement

The United States, as a partner in the international Gemini partnership, will be making the recommendation to the Gemini Project as to whom should be contracted to build the US-allocated Near-Infrared Spectrograph. The National Science Foundation has directed the USGP to establish and manage the competitive selection process, by which this occurs. As this is a substantial award for any US institution wishing to compete and a key facility-class instrument for Gemini users, the process has undergone a great deal of review by the US Science Advisory Committee, the National Science Foundation and the Gemini Project to assure that the process is fair to all competitors and will yield the most capable scientific instrument possible.

The USGP issued an Announcement of Opportunity, which was widely distributed and advertised to the US community in late May. The Announcement outlined the Spectrograph Science Requirements, defined by the international Gemini Science Committee, and programmatic issues such as the 4 year contract span. Furthermore, the Announcement described the procurement goal: to select the contractor with the most scientifically capable, high quality instrument proposal who can perform the work required (design through commissioning) for a fixed-price not to exceed the budget of $2.2 million dollars. Since we really want a Spectrograph, which under usual circumstances would cost more than this budget allows, it was decided to offer Gemini guaranteed observing time to the successful contractor to entice proposers to look for ways to subsidize or otherwise reduce the price charged to Gemini.

Letters of intent to propose were solicited and the Request for Proposal was delivered in late July to those who expressed an interest. Proposals will be due in October and the successful proposer should be under contract in early 1995. The proposal evaluations and recommendation will be made by an independent committee appointed by the NSF.

Outreach

One of our jobs in the USGP is to keep the US astronomical community informed about the developing Gemini designs and the progress the Project is making towards actually building the two telescopes. Towards this goal, a display was presented at the Minneapolis American Astronomical Society meeting in early June which summarized the current technical and programmatic status of the Gemini Project. We look forward to having the next meeting of the AAS in Tucson in January where we plan to present an update.

For those of you unable to see us in person at the meetings you can now access information about the Gemini Project on their recently opened NCSA Mosaic home page on the World Wide Web. The USGP is working to add our own home page, accessible thru hyperlink from the Gemini and NOAO home pages, which will carry billboard style recent announcements and other current features. The locator for the Gemini home page is: http://www.gemini.edu/

To support those in the US community interested in more detail about Gemini designs and operations plans, we announced an opportunity for a limited number of persons to attend the first Gemini System Review. This System Review, held for three days in late July, focused on system-level performance and interactions of the various subsystems as well as operational scenarios. A review team was assembled from within and outside of the Project and consisted of both engineers and scientists. The Project intends to have two of these large reviews a year.

Kathy Wood

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Scientific Drivers for Innovative Operations (1Sep94)

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Scientific Drivers for Innovative Operations (1Sep94)
(from USGP, NOAO Newsletter No. 39, 1 September 1994)

Over the next six months, the Gemini Science Committee and the US Gemini Science Advisory Committee will shift their attention from the instrument complement to questions associated with operations. One might think that operations is a fairly mundane topic without great impact on the scientific productivity of a telescope, but for Gemini that will not be the case. The Gemini telescopes are designed to take advantage of the best natural conditions on Mauna Kea and Cerro Pachon, both excellent sites. The stringent performance requirements mean that the image quality and background will reflect the site conditions to a much greater extent than existing telescopes. Thus, there will be more variation in the instantaneous conditions as delivered by the telescope.

If you build your telescope and instruments to take advantage of the best ten to twenty percent of the atmospheric conditions, you don't schedule it by letting each astronomer go to the telescope for three nights. You expect a distribution in the quality of the atmospheric conditions and, hopefully, a similar distribution in the requirements of the accepted proposals. The trick is to match up these two distributions. This is done most effectively through some queue scheduling system in which the most highly ranked scientific program consistent with the current environmental conditions is carried out. In this way the time is used most effectively for two reasons. First, the programs which require good conditions are carried out while the conditions are suitable. Second, programs are carried out in order of scientific priority.

Obviously, not all programs are suitable for queue scheduling, and not all telescopes are set up to make good use of this system. In the case of the Gemini telescopes, a major advantage is the Cassegrain cluster concept, which allows up to four instruments to be mounted simultaneously on the telescope. An observer can switch between any two of these instruments in a matter of a few minutes. In addition, the control software for the telescope will be compatible with a queue approach, whether that queue is an optimized list encompassing a number of programs or a list of objects from a single program.

A second approach that will be seriously examined is a remote observing capability. Because travel to Mauna Kea and Cerro Pachon is quite expensive, and because humans do not work very efficiently at these high altitudes, it may be advantageous not to go to the telescope, but to interact with it (and an operator at the telescope) through some high bandwidth link. There are various degrees of remote observing, from a low bandwidth "eavesdropping" mode, which might allow additional collaborators to participate in the observations, to a duplicate control room set up at some convenient site.

Discussions of the desirability of these and other options for observing modes are just beginning. Costs, as well as scientific return, will be examined, and we will undoubtedly be performing some experiments using existing facilities to better understand the requirements of running telescopes in these ways. If you have thoughts on these observing mode issues, or would like to participate in a community-wide discussion of how to best use the Gemini telescopes, please send e-mail to usgpo@noao.edu.

Todd Boroson

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NOAO and the World Wide Web (1Sep94)

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NOAO and the World Wide Web (1Sep94)
(from CCS, NOAO Newsletter No. 39, 1 September 1994)

The NOAO home page for the World Wide Web has a different look these days. If you have not noticed you may want to connect to:

http://www.noao.edu/noao.html.

There are links to all of the NOAO observatories and related projects, plus a page for general NOAO activities. Also see the "Special Science Events" pages that allow our staff to bring you the latest in their fields of expertise.

The World Wide Web is becoming an important tool for disseminating information within the astronomical community, if not the world. If you have not familiarized yourself with the various ways to explore the Web, this is probably a very good time to do so, as more and more astronomical information comes on line. In particular, Mosaic is a very popular browser for various hardware platforms. Our pages are typically designed and checked with Mosaic, but other browsers, such as Cello or Lynx, will work fine.

We are interested in your comments and suggestions. Please send e-mail to:

jbarnes@noao.edu or rwolff@noao.edu.

Jeannette Barnes, Richard Wolff

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Comings and Goings Within CCS (1Sep94)

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Comings and Goings Within CCS (1Sep94)
(from CCS, NOAO Newsletter No. 39, 1 September 1994)

CCS has had some staff changes over the past few months.

Lisa Wells left NOAO in August after working for CTIO for five years, and then for Kitt Peak and CCS for two years. Lisa has been active in user support, especially IRAF, and has become a familiar face to visitors that need data reduction assistance. But Lisa has not gone too far away - she is now a graduate student in the Astronomy Department at the University of Arizona. Best of luck to you, Lisa. We will probably be seeing lots of you as a visiting astronomer to the NOAO Observatories as you pursue the latest supernova!

Jeannette Barnes is now working for the AAS 1/2 time as a user support coordinator for electronic manuscript submissions to the AAS-affiliated journals. Prospective authors may contact her with questions regarding electronic manuscript submissions and the AASTeX package by sending e-mail to aastex-help@aas.org. Jeannette will continue with her support duties at NOAO but on a 1/2 time basis. You can still find her in her same office, room 86.

David Bell has joined CCS as a Software Support Consultant. David will be receiving his PhD in astronomy from the University of Illinois in the next few months. He has been an IRAF user and general computer consultant at the UIUC for the past five years while he has been working on his degree. David is available to assist visitors and staff with general computer problems, including IRAF questions and assistance. David can be reached by e-mail at dbell@noao.edu, and his office is in room 90.

Three new staff members have joined the Mountain Programming Group this year.

Diana Kennedy started in March and is responsible for the deployment of the CTIO Arcon software at Kitt Peak. She also provides software support for telescope pointing. Previous to NOAO Diana worked in Tucson at IBM designing and writing microcode, and has taught mathematics at the University of Arizona and at Rutgers. She has a BS and MA in Mathematics and a MS in Computer Science. She also served two years in the Peace Corps in Cameroun.

David Mills started on 31 May, and was hired into a one year position to implement the WIYN GUI and to help with WIYN commissioning. He has 15 years of experience with astronomical software. His previous position was at the University College London where he worked with STARLINK, the IUE project, and the Utrecht Echelle Spectrograph at the WHT on La Palma. David has also worked with the UCL Echelle spectrograph (AAT), a research project using transputers, the European Space Operations Centre, the Hipparcos and Giotto satellites, the Clarke Lake Radio Observatory, and data from Voyager. His degree is a BSc in Astronomy from the University College London.

John Hughes started in February in a half-time position. He is responsible for the programming for the NSO South Pole project, which was done in OS/2. He will travel to the South Pole as part of the team for two months beginning in November. John has ten years of experience (mainly as a consultant) with a variety of computing environments. Some of the projects he has worked on include: pagers, FAX communication, Mt. Graham site testing, 6803 devices, dBase IV programming, documentation for NASA, and machine tool control. This fall John is completing his BA in Philosophy (with a minor in Linguistics) at the University of Arizona, and is interested in AI and knowledge theory.

Steve Grandi, Bob Marshall

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1994 Software Conference Update (1Sep94)

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1994 Software Conference Update (1Sep94)
(from CCS, NOAO Newsletter No. 39, 1 September 1994)

The Fourth Annual Conference on Astronomical Data Analysis Software and Systems (ADASS) will be held in Baltimore, Maryland, 25-28 September 1994, at the Omni Inner Harbor Hotel. The Conference is being hosted by the Space Telescope Science Institute. Additional sponsors include the National Optical Astronomy Observatories, the Smithsonian Astrophysical Observatory, the National Research Council of Canada, the National Radio Astronomy Observatory, the National Aeronautics and Space Administration, and the National Science Foundation. Several corporations, including Research Systems Inc. (RSI), Silicon Graphics, Hughes-STX, Sun Microsystems, and Sybase have also contributed funding or are loaning equipment to the conference. The ADASS Conference provides a forum for scientists and programmers concerned with algorithms, software, and software systems employed in the reduction and analysis of astronomical data.

This year's Conference will highlight the following special topics: astronomical data modeling and analysis, design and development of graphical user interfaces, network information systems, and parallel and distributed processing.

The Conference program will include invited and contributed talks. Contributed posters and demos will be on display throughout the Conference. As of this date 109 abstracts have been submitted (the deadline for submissions was 15 July). One evening and the afternoon of the last day are reserved for special interest discussions called BOFs, or Birds of a Feather sessions. Currently scheduled BOFs include IRAF and IDL user's group meetings, an IRAF Site Manager's discussion, and discussions on Graphical User Interfaces, FITS, and Data Acquisition.

The invited speakers for this year's Conference include Bob Brown (Space Telescope Science Institute), Joan Centrella (Drexel University), Kerry Champion (Sybase, tentative), Milo Medin (NASA Science Internet), Graham Hill (Dominion Astrophysical Observatory), Doug Tody (NOAO), Juri Toomre (University of Colorado), Jean-Luc Starck (Service d'Astrophysique, Centre d'Etudes Saclay), and David van Buren (Infrared Processing and Analysis Center). In addition, two special talks will be presented: a status report on NRAO's AIPS++ Project by Richard Simon, and an overview of NASA MO&DA funding and the implications for support of software development by Guenter Riegler.

Two tag-along workshops are planned for Thursday, 29 September, the day after the conference.

A tag-along workshop on electronic preprints will investigate existing electronic preprint services, to better understand the problems associated with electronic preprints, to better understand what the community wants in the way of these services, and to draw some conclusions about ideal electronic preprint services and how the community should proceed. People interested in participating should register using the ADASS registration form. A nominal fee of $25 (with ADASS registration) or $50 (electronic preprints workshop only) is being charged. For more information about this day-long meeting please contact Bob Hanisch (hanisch@stsci.edu).

The second tag-along is an IRAF Developers' Workshop, which will be held at STScI. This one-day workshop will feature several short presentations and in-depth discussions of issues related to software development in the IRAF environment. The workshop will focus on active development projects and recent work, with the goal of getting IRAF developers everywhere to share their successes/failure/plans with each other. This workshop is intended mainly for individuals who are actively developing software within IRAF. Meeting room space constraints will limit attendance to no more than 35 people. Anyone interested in attending this workshop should contact Dick Shaw (shaw@stsci.edu).

Preliminary Conference materials have been mailed to everyone on the conference mailing list. Information is also available by anonymous FTP to the node ra.stsci.edu in the directory pub/adass. The abstract and early registration deadlines were 15 July. Registrations are still being accepted but at a higher registration fee ($135).

As we get ready for ADASS IV, which is coming up quickly, plans for ADASS V are already underway. The ADASS V Conference will be held in Tucson, 22-25 October 1995. So mark your calendars!

Further information about ADASS IV can be obtained by sending e-mail to softconf@stsci.edu or by browsing the World-Wide Web home page http://ra.stsci.edu/ADASS.html. Betty Stobie, the Chair of the Local Organizing Committee, can be reached by phone at (410) 516-8671 or by FAX at (410) 516-6864.

Doug Tody, George Jacoby, Jeannette Barnes

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ADASS III Electronic Proceedings (1Sep94)

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ADASS III Electronic Proceedings (1Sep94)
(from CCS, NOAO Newsletter No. 39, 1 September 1994)

The electronic version of the Proceedings for the Astronomical Data Analysis Software and Systems III Conference, held in Victoria, 13-15 October 1993, is now available on-line through Mosaic. The printed volume, A.S.P. Conference Series Volume 61 (Dennis R. Crabtree, R.J. Hanisch, and Jeannette Barnes, Editors), was expected to be available in July, and ADASS III Conference participants were to be mailed a copy of the printed Proceedings at that time. We are grateful to the Astronomical Society of the Pacific, who have published the printed volume, for allowing us to participate in this experiment in electronic publishing. You can get to the ADASS III Proceedings through the ADASS home page, available through two avenues - then follow the links to the Proceedings page:

http://cadcwww.dao.nrc.ca/ADASS/adass.html
or
http://iraf.noao.edu/ADASS/adass.html

A copy of the printed volume can also be ordered from the A.S.P. office in San Francisco through the Mosaic pages, or by sending a FAX inquiry to them directly at (415) 337-5205. Comments about the electronic proceedings can be sent to the editors at adass-eds@dao.nrc.ca.

The editors for the electronic Proceedings are Daniel Durand, Jeannette Barnes, and Dennis R. Crabtree.

The Editors

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IRAF Update (1Sep94)

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IRAF Update (1Sep94)
(from CCS, NOAO Newsletter No. 39, 1 September 1994)

This past quarter saw an internal release of IRAF version 2.10.3 as well as the first test release of the X11 support utilities. Due to the upcoming public V2.11 release, IRAF version 2.10.3 is intended as an in-house release only and is now in routine use at the Tucson headquarters. V2.10.3 has also been installed on Kitt Peak for testing, and will become the default version of IRAF on Kitt Peak in the fall semester. The X11 support package utilities, xgterm and ximtool, are now being used both downtown and on the mountain by staff and visitors within the X environment. The fall observing season will see the mountain go entirely to X using V2.10.3 and the X11 support utilities. See the accompanying article in this Newsletter for more information on the conversion of the observing environment on Kitt Peak to X11.

Once testing of the X11 support package and the ports to Solaris and OSF/1 (see below) are completed, preparation of the IRAF version 2.11 release will begin. Although no date has been set for this release, our target is by the end of the year. V2.11 will be available for all supported platforms. It will include all the new science software included in the in-house V2.10.3 release plus the X11 support package including xgterm, ximtool, and xtapemon, and additional systems support such as the FITS image kernel and a variety of bug fixes and feature enhancements. Note that much of this software is available now in add-on or unbundled form for people who want to use (or help test!) the software prior to the V2.11 release.

The IRAF port to Sun's Solaris 2.3 operating system was completed in early July and was undergoing testing and checkout at the time that this article was written in late July. We expect the port to be in distribution by the time this Newsletter is mailed; look in the IRAF network archive in the iraf/v210/SSOL directory. Due to the timing of the Solaris release we were forced to break our rule about V2.10.3 being an internal release, so the initial Solaris/IRAF release is Solaris/IRAF V2.10.3BETA. This version lacks some of the support and testing planned for the V2.11 release in the fall, but nonetheless it is a full port and a fully supported platform. The initial release supports the SunSoft Fortran and ANSI C compilers and includes shared library support. GCC/F2C support will follow with V2.11. Solaris versions of xgterm and ximtool are included. Now that the Solaris port has been completed, work is getting underway on the port to the DEC Alpha running OSF/1.

The Frequently Asked Questions (FAQ) list for IRAF is now available over the World Wide Web by connecting to http://iraf.noao.edu/faq/FAQ.html. It can also be found in the iraf/docs directory on iraf.noao.edu as the file FAQ.

Two new user documents are available in PostScript form in the iraf/docs directory on iraf.noao.edu. The new documents are a cookbook for Echelle reductions, A User's Guide to Reducing Echelle Spectra With IRAF, by Daryl Willmarth and Jeannette Barnes, May 1994 (file name ech.ps.Z), and a new guide for cleaning images with IRAF, Cleaning Images of Bad Pixels and Cosmic Rays Using IRAF, by Lisa Wells (file name clean.ps.Z).

Members of the IRAF group will be attending the Astronomical Data Analysis Software and Systems Conference in Baltimore this September. See the accompanying article in this Newsletter for more information on the ADASS Conference. Several papers highlighting the latest developments in IRAF systems and science software will be presented, and we will have a demo of the IRAF software, including the new GUI applications. An IRAF Site Manager's meeting will be held during the Conference. An IRAF Developer's Workshop will be held at STScI on the day following the ADASS conference.

For further information about the IRAF project, please contact Jeannette Barnes, Central Computer Services.

Doug Tody, Jeannette Barnes

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NOAO FTP Archives (1Sep94)

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NOAO FTP Archives (1Sep94)
(from CCS, NOAO Newsletter No. 39, 1 September 1994)

The various FTP archives for the NOAO can be found in the following FTP
directories. All archives are provided on Sun or DECstation servers, so
please log in as anonymous and use your e-mail address as the password.
Alternate addresses are given in parentheses.

ftp ctios1.ctio.noao.edu (139.229.2.1), cd ctio
     CTIO archives - Argus and 1.5-m BME information, 4-m PF plate catalog,
     TEX template for e-mail proposals, filter library, instrument manuals,
     and standard star fluxes.

ftp ftp.sunspot.noao.edu (146.5.2.1), cd pub
     Directory contains SP software and data products - coronal maps, active
     region lists, sunspot numbers, SP workshop paper templates, information
     on international meetings, SP observing schedules, NSO observing
     proposal templates, Radiative Inputs of the Sun to the Earth (RISE)
     newsletters and SP newsletters (The Sunspotter).

ftp ftp.noao.edu (140.252.1.24), cd to one of the following directories:
     aladdin (gemini.tuc.noao.edu) - Information on the Aladdin, program
     which is a collaboration between NOAO and the US Naval Observatory to
     develop a 1024 X 1024 InSb infrared focal plane at the Santa Barbara
     Research Center.

catalogs - Directory of astronomical catalogues. At this time only the
     Jacoby et al. catalog, "A Library of Stellar Spectra," and the
     "Catalogue of Principal Galaxies" are here.

fts (argo.tuc.noao.edu, cd pub/atlas) - Directory contains solar FTS
     high-resolution spectral atlases.

gemini (gemini.tuc.noao.edu) - Information from the Gemini Project.

gong (helios.tuc.noao.edu, cd pub/gong) - Directory contains GONG
     helioseismology software and data products - velocity, modulation and
     intensity maps, power spectra.

iraf (iraf.noao.edu) - IRAF network archive containing the IRAF
     distributions, documentation, layered software, and other IRAF related
     files. It is best to login to iraf.noao.edu directly to download large
     amounts of data, such as an IRAF distribution.

kpno (orion.tuc.noao.edu) - KPNO directory contains filter information,
     hydra information, new LaTeX observing form templates, instrument
     manuals, KPNO observing schedules, platelogs for 4-m PF, user
     questionnaire, reference documents (wavelength atlases), and sqiid
     scripts for data reduction. See the article in the KPNO section for
     additional information.

kpvt (argo.tuc.noao.edu) - Directory contains various KP VTT solar data
     products - magnetic field, He I 1083 nm equivalent width, Ca II K-line
     intensity.

noao (gemini.tuc.noao.edu) - Miscellaneous databases, report from Gemini
     WG on the high resolution optical spectrograph.

nso (orion.tuc.noao.edu) - Directory contains NSO observing forms.

preprints - NOAO preprints that are available electronically.

sn1987a - An Optical Spectrophotometric Atlas of Supernova 1987A in the LMC.

starform_project (mira.tuc.noao.edu, cd pub/sfproject) -
     Directory contains progress reports and information on when/where to
     obtain SQIID star formation project data.
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tex - LaTeX utilities for the AAS/ASP.

utils - Various utilities but only contains some PostScript tools at this time.

weather (gemini.tuc.noao.edu) - weather satellite pictures.

wiyn (orion.tuc.noao.edu) - WIYN directory tree containing information relating to the WIYN telescope, including information relating to the NOAO science operations on WIYN.

The following numbers are available for the machines mentioned above:

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argo.tuc.noao.edu        = 140.252.1.21
ctios1.ctio.noao.edu     = 139.229.2.1
ftp.noao.edu             = 140.252.1.24
gemini.tuc.noao.edu      = 140.252.1.11
helios.tuc.noao.edu      = 140.252.8.105
iraf.noao.edu            = 140.252.1.1
mira.tuc.noao.edu        = 140.252.3.85
orion.tuc.noao.edu       = 140.252.1.22
ftp.sunspot.noao.edu     = 146.5.2.1
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Questions or problems may be directed to the following:

Steve Heathcote (sheathcote@noao.edu) for the CTIO archives,

Frank Hill (fhill@noao.edu) for all solar archives,

Steve Grandi (grandi@noao.edu) or Jeannette Barnes (jbarnes@noao.edu) for all others (and they will direct your questions as needed).

Jeannette Barnes

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