NOAO Newsletter - June 1993 - Number 34

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Director's Office

AURA Corporate Office

Cerro Tololo Inter-American Observatory

Kitt Peak National Observatory

National Solar Observatory

Global Oscillation Network Group

Central Computer Services

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

The US Gemini Project Office (1Jun93)

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The US Gemini Project Office (1Jun93)
(from the Director's Office, NOAO Newsletter No. 34, 1 June 1993)

At its meeting on 16 April, the AURA Board affirmed the importance of the US Gemini Project Office in NOAO by passing the following resolution:

"Resolved, that the AURA Board of Directors urges AURA to establish a US Gemini Office as a separate office within the National Optical Astronomy Observatories (NOAO) on a status that is on par with Kitt Peak National Observatory (KPNO), Cerro Tololo Inter-American Observatory (CTIO), and the National Solar Observatory (NSO)."

AURA also provided guidance to NOAO on the functioning of the US Gemini Project Office in this context:

"NOAO's US Gemini Office is the focus for US involvement in the international Gemini project ("Gemini"). Specifically, the office shall:

1. advocate and represent US interests in Gemini;

2. inform the US astronomy community about Gemini;

3. provide the US Gemini Project Scientist to represent the US as member of the Gemini Science Committee;

4. coordinate US-funded effort in support of Gemini objectives;

5. support Gemini, as appropriate, in Gemini-funded work in the US;

6. propose a plan for the US role in Gemini operations including

   o how the US community will gain access to Gemini telescope time, and

   o roles and responsibilities of Gemini and NOAO in Gemini South;

7. accept US roles in time allocation and Gemini operations;

8. carry out other tasks that support the interests of the US astronomy community in Gemini.

The office reports to NOAO as a division on the same level as the observatories such as CTIO and NSO. The AURA Board maintains oversight through the Observatories Advisory Committee. The Observatories Visiting Committee will periodically review the performance of the office."

The head of this division of NOAO is the US Gemini Project Scientist, currently Fred Gillett in acting capacity. As mentioned elsewhere in this Newsletter, Jay Gallagher is working with the office as Associate US Gemini Project Scientist. Larry Daggert serves as US Gemini Project Manager. Peggy Wiggins coordinates administrative support. If you wish to communicate about the Gemini Project to the US Project Office, the e-mail address is usgpo@noao.edu.

The immediate goals of the US Gemini Project Office are to expand two-way communication with US astronomers, to maintain active involvement with the Gemini Project in providing scientific oversight, and to facilitate US participation in defining and building the focal plane instruments for the telescopes. As always, we would appreciate your advice on the best way to accomplish those goals.

Richard F. Green

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NOAO Preprint Series (1Jun93)

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NOAO Preprint Series (1Jun93)
(from the Director's Office, NOAO Newsletter No. 34, 1 June 1993)

The following preprints were submitted during the period 1 February 1993 to 30 April 1993. Please direct all requests for copies of preprints to the NOAO author marked with an asterisk.

Number	Author(s)	Title
503	*Veilleux, S.	"The Line-Emitting Gas in Active Galaxies: A Probe of the Nuclear Engine"
504	*Toner, C.G., LaBonte, B.J.	"Direct Mapping of Solar Acoustic Power"
505	Hull, W.C., *Dunn, R.B., Small, M.J.	"A 256-Channel Digital Wavefront Reconstructor"
506	*Sarajedini, A.	"A Survey of Galactic Globular Clusters for Blue Straggler Stars"
507	*Sarajedini, A.	"A CCD Color-Magnitude Diagram for the Globular Cluster IC 4499"
508	*Livingston, W., Kopp, G., Gezari, D., Varosi, F.	"Observations of Seeing at 0.5 and 12.4 um"
509	*Suntzeff, N.B., Phillips, M.M., Elias, J.H., Cowley, A.P., Hartwick, F.D.A., Bouchet, P.	"On the Origin of a Sample of Suspected CH Stars in the Large Magellanic Cloud"
510	*Forbes, F.F.	"Cast Tenzaloy Aluminum Optics"
511	*Boroson, T.A., Salzer, J.J., Trotter, A.	"A New Survey for Low Luminosity Emission-Line Galaxies"
512	*Kuhn, J.R.	"Unbound Dwarf Spheroidal Galaxies and the Mass of the Milky Way"
513	*Penn, M.J., LaBonte, B.J.	"The Source of Five-Minute Period Photospheric Umbral Oscillations"
514	*Zirker, J.B.	"Photospheric Vortices and Coronal Heating"
515	*November, L.J.	"Local-Coherence Averaging for Nonisoplanatic Imaging"
516	Barr, L.D., *Livingston, W.C.	"Mirror Seeing Control in Thick, Solid Mirrors and the Planned Upgrade of the McMath-Pierce Solar Telescope"
517	*November, L.J.	"In Situ Calibration for Precise Polarimetry"
518	*Komm, R.W., Howard, R.F., Harvey, J.W.	"Meridional Flow of Small Photospheric Magnetic Features"
519	*Toner, C.G., Jefferies, S.M.	"Accurate Measurement of the Geometry for a Full-Disk Solar Image and Estimation of the Observational Point Spread Function"
520	*Morrison, H.L.	"The Local Density of Halo Giants"
521	*Lauer, T.R., Faber, S.M., Groth, E.J., Shaya, E.J.,	"Planetary Camera Observations of the Double Nucleus of M31"

Campbell, B., Code, A.,
Currie, D.G., Baum, W.A.,
Ewald, S.P., Hester, J.J.,
Holtzman, J.A., Kristian, J.,
Light, R.M., Lynds, C.R.,
O'Neill, Jr., E.J., Westphal, J.A.

522 *Jefferies, S.M., Christou, J.C. "Restoration of Astronomical Images by Iterative Blind Deconvolution"

523 *Smartt, R.N., Zhang, Z., Smutko, M.F. "Post-Flare Coronal Loop Interaction"

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Non-NOAO Preprints (1Jun93)

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Non-NOAO Preprints (1Jun93)
(from the Director's Office, NOAO Newsletter No. 34, 1 June 1993)

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.

Author(s)	Title
*Abt, H.A.	"Institutional Productivities"
Brosius, J.W., Davila, J.M., Thompson, W.T., Thomas, R.J., Holman, G.D., Gopalswamy, N., White, S.M., Kundu, M.R., *Jones, H.P.	"Simultaneous Observations of Solar Plage with SERTS, the VLA, and the Kitt Peak Magnetograph"
Casey, B.W., Mathieu, R.D., *Suntzeff, N.B., Lee, C.-W., Cardelli, J.A.	"The Spectroscopic Orbit and Subsynchronous Rotation of the Herbig Ae/Be Star TY Cra"
*Duvall, T.L., Jefferies, S.M., Harvey, J.W., Osaki, Y., Pomerantz, M.A.	"Asymmetries of Solar Oscillation Line Profiles"
Edwards, S., *Merrill, K.M., Probst, R., Gatley, I.	"Angular Momentum Regulation in Low Mass Young Stars Surrounded by Accretion Disks"
*Harvey, K.L., Nitta, N., Strong, K., Tsuneta, S.	"The Relationship of X-Ray Bright Points to the Photospheric Magnetic Fields"
*Harvey, K.L., Strong, K., Nitta, N., Tsuneta, S.	"Lifetimes and Distribution of Coronal Bright Points Observed with Yohkoh"
*Howard, R.F.	"Some Factors Affecting the Growth and Decay of Plages "
*Jefferies, S.M., Pomerantz, M.A., Duvall, T.L., Harvey, J.W.	"Helioseismology From South Pole: Surprises From Near the Solar Surface"
Kirshner, R.P., Jeffery, D.J., Leibundgut, B., Challis, P.M., Sonneborn, G., *Phillips, M.M., Suntzeff, N.B., Smith, R.C., Winkler, P.F., Winge, C., Hamuy, M., Hunter, D.A., Roth, K.C., Blades, J.C., Branch, D., Chevalier, R.A., Fransson, C., Panagia, N., Wagoner, R.V., Wheeler, J.C., Harkness, R.P.	"SN 1992A: Ultraviolet and Optical Studies Based on HST, IUE, and CTIO Observations"
Kotilainen, J., Ward, M.J., *Williger, G.M.	"Broadband Imaging of X-Ray Selected Seyfert Galaxies"

Kudritzki, R.P., Lennon, D.J., Becker, S.R., Butler, K., Gabler, R., Haser, S., Hummer, D.G., Husfeld, D., Pauldrach, A.W.A., Puls, J., Voels, S., Walborn, N.R., Heap, S.R., *Bohannan, B., Conti, P., Garmany, C.D., Baade, D.	"Hot Stars and the Hubble Space Telescope"
Lawrence, J.K., Topka, K.P., *Jones, H.P.	"Contrast of Faculae Near the Disk Center and Solar Variability"
Morris, P.W., Brownsberger, K.R., Conti, P.S., *Massey, P., Vacca, W.D.	"Spectrophotometry of Wolf-Rayet Stars. I. Continuous Energy Distributions"
Morse, J.A., *Heathcote, S.R., Cecil, G., Hartigan, P., Raymond, J.C.	"The Bow Shock and Mach Disk of HH 111V"
Scheick, X., *Kuhn, J.R.	"Diffuse Light in A2670: Smoothly Distributed?"
Soderblom, D.R., *Pilachowski, C.A., Fedele, S.B., Jones, B.F.	"The Evolution of the Lithium Abundances of Solar-Type Stars. II. The Ursa Major Group"
Thompson, W.T., Neupert, W.M., Jordan, S.D., *Jones, H.P., Thomas, R.J., Schmeider, B.	"Correlation of He II Lyman Alpha with He I 10830 A, and with Chromospheric and EUV Coronal Emission"
White, O.R., Rottman, G.J., Woods, T.N., Knapp, B.G., *Keil, S.L., Livingston, W.C., Tapping, K.F., Donnelly, R.F., Puga, L.C.	"Change in the UV Output of the Sun in 1992 and its Effect in the Thermosphere"

Ann Barringer, John Cornett, Elaine MacAuliffe, Jane Marsalla, Shirley Phipps, Cathy Van Atta

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Jay Gallagher to Serve as Associate US Gemini Project Scientist (1Jun93)

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Jay Gallagher to Serve as Associate US Gemini...(1Jun93)
Project Scientist
(from the AURA Corporate Office, NOAO Newsletter No. 34, 1 June 1993)

AURA is pleased to announce that Jay Gallagher (U. of Wisconsin, Madison) will become the Associate US Gemini Project Scientist on an interim basis until January 1994. In that role, he will work with the US Gemini Project Office at NOAO in Tucson to strengthen US community involvement in the international Gemini Project. In the next few months he will establish vehicles for better informing US astronomers about opportunities for scientific participation in Gemini and the technological progress of the Project. He will also seek to improve communications from the US community back to the Gemini Project by developing mechanisms for receiving comments on Gemini-related scientific or technical issues at the US Gemini Project Office. This Office operates in parallel with national Gemini Offices in the other Gemini partner countries to maintain dialogues between national scientific communities and the Gemini Project.

In carrying out these tasks Gallagher will look forward to hearing comments about the Gemini Project from US astronomers and to informing the US community about the Project. You are therefore likely to see him at the AAS and other professional meetings, or find him giving presentations about Gemini. You will also be receiving more written information about the Gemini observatories from the US Gemini Project Office by late summer. Gallagher will maintain his base of operations in Madison and can be contacted on Gemini matters most effectively via e-mail at either the US Gemini Office (usgpo@noao.edu) or Wisconsin (gemini@jayg.astro.wisc.edu).

Gallagher will be collaborating with Fred Gillett of NOAO, who is the Acting US Gemini Project Scientist, and with other NOAO staff who are helping with the US Gemini Office. AURA is supporting Gallagher's activities in response to the need of US astronomers to have closer contact with the Gemini Project as it builds two 8-m telescopes with superb imaging capabilities, excellent thermal background characteristics, and effective instruments.

Goetz Oertel

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AURA Welcomes New Board Members (1Jun93)

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AURA Welcomes New Board Members (1Jun93)
(from the AURA Corporate Office, NOAO Newsletter No. 34, 1 June 1993)

We are pleased to welcome Joseph Miller as the new institutional director representing the University of California. The Board also elected two directors-at- large: Cleon Arrington (Georgia State U.) and Robert Rosner (U. of Chicago).

Our thanks go to outgoing board members: Harry Albers (San Diego State U. Foundation), 1987-93; Robert Kraft (U. of California), 1987-93; and Robert MacQueen (Rhodes College), 1984-93.

Goetz Oertel

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Boston University Joins AURA (1Jun93)

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Boston University Joins AURA (1Jun93)
(from the AURA Corporate Office, NOAO Newsletter No. 34, 1 June 1993)

On 16 April the Board of Directors voted to admit Boston University (BU) as AURA's twenty-third member. BU has a growing and diversified program. Its faculty and students use AURA facilities. We welcome our new member and look forward to a closer association.

Lorraine Reams

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Victor Blanco Retires (1Jun93)

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Victor Blanco Retires (1Jun93)
(from CTIO, NOAO Newsletter No. 34, 1 June 1993)

Victor Blanco is retiring from the CTIO staff, on which he had served since 1967. For the first fourteen of these years, he served as Director and was instrumental in building up CTIO from an obscure field station in the Chilean Andes into a world-class observatory. Betty Blanco also played a key role in the development of the observatory, in various capacities. For those of us who worked for Victor as Director or with him as a scientific colleague, or who had the Blancos as "padrinos," their departure represents the end of an era. The following remarks by Bob Williams, delivered on the occasion of Victor and Betty Blanco's farewell party, reflect the feelings of all of the staff.

Jay Elias

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Victor and Betty Blanco Farewell (1Jun93)

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Victor and Betty Blanco Farewell (1Jun93)
(from CTIO, NOAO Newsletter No. 34, 1 June 1993)

Tonight we are gathered together to celebrate and thank Victor and Betty Blanco for their achievements and their contributions to this observatory and our lives. In one way or another, they have touched all of us. Rarely in the life of an organization can one attribute the success over such a long time to one individual as CTIO can to Victor.

We feel sadness and a sense of loss because we will no longer have Victor and Betty among us. However, we also feel tremendous pride and fulfillment from our all having been participants in the work that constituted the greater part of their lives.

Victor arrived at CTIO in July 1967 from the Naval Observatory. Most of the present recinto had not yet been bought. It did not extend down to Cisternas, nor up to the top of the present compound. Most of these buildings which surround us here did not exist; only the front part of the scientific office building. On Tololo the peak had been flattened so it could receive telescopes, but the only operating telescope was the 0.9-m. The 1.5-m telescope was under construction.

The observatory had a small staff. Oscar Saand Enrique Figueroa had not yet arrived at CTIO. And, some of the current, younger employees had not even been born yet! However, already in La Serena on the staff were people such as Teo Ponce, Juan Cerezo, Jorge Briones, Manuel Miranda, Sergio Pizarro, Juanita Munoz, Anibal Miranda, Juan Cortes, Ricardo Gonzales and others. Thus, Victor took a fledgling organization and, more than any other person, turned CTIO into one of the premier research observatories in the world.

Victor's secret of success at Tololo was based on two elements: people and equipment. For people, Victor found such capable and loyal staff members as Oscar Saaand Enrique Figueroa. Most important, he found Betty and immediately granted her matrimonial tenure.

The change that Betty brought to Victor's life was dramatic. Those who have known Victor both before and after Betty's arrival have told me that Victor became a totally different person with her by his side. Suddenly, his life was filled with sparkle! His scientific productivity went up, and they developed a very successful scientific collaboration. Victor found a new value in human relationships. Everyone agrees that he became a new person after he met and married Betty.

It is difficult to pinpoint the importance of Victor to CTIO because his value goes far beyond the achievements that one can quantify. Yes, one can point to the 4-m telescope, and to a present staff of 145 people. But, how does one quantify inspiration? How does one quantify vision? And wisdom? Victor displayed all of these characteristics over a long period of time, during which

he built up a superb organization and infrastructure. The culmination was the construction of the 4-m telescope. It was such a telling achievement that none of the Directors that have followed Victor have been able to improve on Victor's success: the 4-m telescope is still our largest telescope.

Of all the accomplishments of Victor, and there are many, if I had to single out what I believe to be his most important, it is that he instilled the spirit of teamwork within the staff. Tololo is famous the world over for having unity throughout the organization. Unlike most other organizations, CTIO is truly one unit, working together, where everyone supports the efforts of the others. The Divisions do not struggle with each other for power. It was Victor's leadership and character which first molded this tradition. The team spirit still permeates CTIO to this day. This feature has made it easier for Pat Osmer and me, Victor's successors, to serve the observatory. I personally owe a great debt to Victor for having created the unique spirit of Tololo, since this has been a source of much of my happiness in working here.

Of course, as important as an individual like Victor is, he alone cannot create success in the observatory. The workers must do that. Victor directed the music, but all of you have played the notes. On this occasion, therefore, I would like to salute the workers of Tololo----in Telops, Contabilidad, ETS, Operations, and Scientific Staff. All of you have made this observatory great! Please accept our thanks--the thanks of all the Directors who have served CTIO.

As we now end the era of the Blancos, we can look back with satisfaction. Victor and Betty must feel tremendous fulfillment in seeing all around them what they have helped to create. The rest of us are fortunate since we get to stay here and enjoy what they have worked to bring about. We look forward to their returning to visit us in the future. But, for the time being they will now go to the United States to fill their lives with activities which they enjoy: bicycling, woodwork, cats, opera, good food and wine, and looking for the Green Flash a la puesta del sol.

Victor and Betty, when you do see the Green Flash in Florida, do remember Tololo and remember us. For certain, we will remember both of you forever. Thanks so much for all that you have done for this observatory!

Bob Williams

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CTIO Instrumentation (1Jun93)

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CTIO Instrumentation (1Jun93)
(from CTIO, NOAO Newsletter No. 34, 1 June 1993)

Summer is traditionally a period where progress on instrumentation projects is slow, and this year was no exception. Approximately two thirds of CTIO's ETS resources normally go to the support and maintenance of existing instruments and telescopes, so when vacations cut into the available work force, work on new instrumentation grinds nearly to a halt. This summer was made more difficult by the untimely failure of the newly commissioned Reticon 1200 x 400 CCD which, after exhaustive testing in the detector lab, was replaced by the old Reticon CCD, necessitating a complete replacement and re-wiring of the chip mount (see the accompanying article for more details).

Although no instrumentation projects were completed during this quarter, there were nevertheless a few small successes. The new IRAF user interface for the Arcon CCD controllers was tested on the telescope and, after taking care of the usual number of small bugs, performed well enough to begin being used by visiting astronomers on the Curtis Schmidt telescope. The Arcon project group also provided important software support to the successful tests of a mini-mosaic at KPNO. Good progress was also made on the completion of the hardware for Arcon 3.2, which is expected to be controlling one of the Tektronix 1024 x 1024 CCDs by early May.

A milestone occurred when the optical elements for the new 4-m telescope prime focus corrector were finally completed and shipped to Chile. Work on the optics was nearly finished when one of the elements was broken accidentally in the commercial optical shop in late 1991. This misfortune, along with problems

encountered when it finally came time for the manufacturer to glue some of the elements together, set back the project completion date by more than a year. Once the lenses arrive in Chile, they will be mounted in the new prime focus pedestal, with telescope tests scheduled for approximately mid-year.

The f/7.8 secondary is scheduled to be removed from the 4-m telescope in June for repolishing. In anticipation of this, work continued on the analysis of the considerable data which have been gathered on the optical performance of both the secondary and the 4-m primary. Substantial effort also has gone into setting up and finalizing contracts for the measuring and polishing of the secondary once it is shipped to the United States.

Mark Phillips

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CCD News (1Jun93)

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CCD News (1Jun93)
(from CTIO, NOAO Newsletter No. 34, 1 June 1993)

CCDs on 0.9-m Telescope:
The demands for our single Tek 2048 CCD on the various telescopes are sufficiently high that it is proving increasingly difficult to make it available on the 0.9-m, our smallest imaging telescope. In addition, we are trying to reduce the number of CCD changes at the 0.9-m and to use only ARCON-operated CCDs, which should improve reliability and decrease the burden on support personnel.

We are examining various options. One would be to permanently schedule a Tektronix 1024 at the 0.9-m. These CCDs have poor UV response, which would mean that most UV work would have to be moved to the 1.5-m, and wide-field programs would suffer (in the past five months the Tek 2048 has been scheduled for 44 percent of the nights at the 0.9-m). A second option is to install the STIS Tek 2048 in an ARCON dewar and make this (and the Tek 1024) the only CCDs available for the 0.9-m. The STIS Tek 2048 is a coated, front-illuminated CCD. It has three times the area of the Tek 1024, will do UBVRI, but has peak QE of 45 percent rather than the 75 percent of the thinned Teks. This CCD and a Tek 1024 thus would complement each other very nicely.

We will have a clearer idea of what we can and cannot support by late July; watch the next issue for details.

The Short Career of Reticon #3:
In Newsletter No. 33 we reported the performance of Reticon #3 CCD, which at that time had just replaced Reticon #2 in an Air Schmidt dewar, for use with the three 4-m spectrographs. Reticon #3 was measured to have very high QE, particularly in the blue where it was found to be a factor of two better than Reticon #2. Unfortunately, this is no longer the case. There appears to have been some deterioration in the ITO (Indium Tin Oxide) bias flashgate, and the QE-pinned condition is no longer achievable. We have thus re-installed Reticon #2 and returned Reticon #3 to the manufacturer for evaluation. Many people will have, of course, assumed the availability of Reticon #3 when calculating exposure times on their Semester II observing time applications. An appraisal of exposure times is part of the technical evaluation of all proposals, and this information is available to the Time Assignment Committee. In some cases, the Tek 1024 plus Folded Schmidt camera is now a better option. As in previous semesters, those people who are successful in gaining time on the 4-m spectrographs will be advised of the particular camera/detector assigned to their project along with the letter advising the time allotment.

Tek 2048 System Non-Linearity:
Peter Stetson found that his photometric data, obtained last December at the 1.5-m with the Tek 2048 CCD, shows evidence for non-linearity of the CCD system, at the level of almost 2 percent per magnitude. Photometric users have already been advised; the only other use of this CCD has been with the Echelle spectrograph long camera where a non-linearity of this size is unlikely to be of great significance. The non-linearity is best corrected as the first data processing step; anyone with Tek 2048 data taken over the past year should contact the undersigned if they are uncertain of how to proceed. To a good

approximation the raw data can be linearized by the relation

$$I = I(raw)* [A + B*I(raw)/32767]$$

where A=1 and B=-0.03 (until 11 March 1993). From 11 March until 6 April 1993, B=-0.023. Since the response of this CCD is relatively flat, to a very good approximation processed frames can also be corrected by the same formula, after adding the bias level to each datum. We use the (local) IRAF task IRLINCOR, which can be obtained on request. Alternatively, for photometry, a correction can be applied to the derived magnitudes of stars. The CCD FET bias voltages have now been re-optimized, and the Tek 2048 is now linear to about 0.1 percent.

New CCDs:
We have received a thinned Loral 800 x 1200 CCD from the Steward Observatory-NOAO collaboration. This CCD is AR coated and has impressive QE, peaking over 90 percent and exceeding 50 percent from 3500-9300 A. This CCD will replace the EEV CCD at the 1.5-m spectrograph, but due to pressure from other projects this will not take place for another 3-4 months. We also anticipate receiving a thinned Loral 3072 x 1024 CCD. This will be optimized for the blue and will go in a modified Air Schmidt dewar, for use with the 4-m spectrographs. This is a quite complicated installation and will use an ARCON controller.

Alistair Walker

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Photometry News (1Jun93)

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Photometry News (1Jun93)
(from CTIO, NOAO Newsletter No. 34, 1 June 1993)

Unfortunately, it's all bad. Our best phototube appears to have died after a long and productive life. The Hamamatsu R943-02 photomultiplier in cold box 71 is undergoing major surgery to see if it can be revived. The tube has been in use for at least ten years and for the last five has been our most popular one. It has always been very stable and sensitive. However, problems began appearing in February. It showed sudden increases in count rate as well as high dark counts. After finding a faulty preamplifier, we believed the problem to be solved. However, subsequent lab tests showed strong hysteresis effects, i.e. continually increasing count rates upon exposure to a constant light source (see Newsletter No. 10). A night of engineering on the 1-m in March confirmed this. At a rate of about 100,000 counts per second (cps), the counts increased by ~1% in 3 minutes. Subsequently, the rate of increase diminished, with a total increase of 1.6% in 10 minutes. This effect decreased as the intensity of the light source decreased, until no detectable hysteresis was found for a rate of about 30,000 cps. These tests were performed with a Beta light source during the day. At night, data for a large number of standard stars indicated that the tube had lost about 0.7 magnitudes of sensitivity compared to all previous observations. Also, the magnitude zeropoint varied by several tenths of a magnitude over the night. Interestingly, reductions showed that accurate COLORS could still be obtained, at least for faint stars. However, the symptoms were severe enough that the tube has been removed from further use while it is being overhauled in an effort to restore it.

On the succeeding night, our other Hamamatsu, in cold box 50, was installed and tested in a similar fashion. Again, evidence for hysteresis was detected, albeit at a smaller level. Again using the Beta light, at a rate of 85,000 cps, counts rose by 1% in 3 minutes and by 2.7% in 17 minutes. No increase was found in 5 minutes at 60,000 cps. A bright star with 120,000 cps showed a 1% increase in 5 minutes. However, the reduced photometry of a large number of standards showed that the magnitude zeropoint was very close to previous values and rms errors were comfortably small in both magnitude and color.

We are currently contacting Hamamatsu to try and remedy this situation. In the meantime, cold box 71 is out of commission, while cold box 50 can be used with caution. We will also install a new Hamamatsu in another cold box.

Doug Geisler

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IR News: Return of OSIRIS? (1Jun93)

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IR News: Return of OSIRIS? (1Jun93)
(from CTIO, NOAO Newsletter No. 34, 1 June 1993)

By late July, we will know how smoothly OSIRIS runs on the CTIO telescopes and will have (weather permitting) actual performance figures. We will also have a firmer idea of the schedule for completion of the NICMOS Imager. We consider it likely that these circumstances will make it desirable to come to some arrangement with OSU extending OSIRIS's availability at CTIO. If you intend to submit an IR imaging or spectroscopy proposal, you should check the next Newsletter to see what will be available and when.

Jay Elias

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Announcement of CTIO/ESO Workshop (1Jun93)

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Announcement of CTIO/ESO Workshop (1Jun93)
(from CTIO, NOAO Newsletter No. 34, 1 June 1993)

We are pleased to announce that the Third CTIO/ESO Workshop will be held in La Serena, Chile from 25-28 January 1994. The topic will be "The Local Group of Galaxies," with a focus on intercomparison of the members of the Local Group as well as on the Local Group as a unit. The purpose of this workshop will be to improve our general understanding of galactic formation, galactic structure and dynamics, star formation history, and evolution of the ISM through comparison of the wide range of environments available among the Local Group galaxies. The format will include both oral presentations and poster presentations. For more information as details become available, please e-mail csmith@noao.edu or alayden@noao.edu, or write to us c/o CTIO (Casilla 603, La Serena, Chile).

Chris Smith, Andy Layden

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Filters for CCD Imaging and Spectroscopy (1Jun93)

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Filters for CCD Imaging and Spectroscopy (1Jun93)

(from CTIO, NOAO Newsletter No. 34, 1 June 1993)

Since the last edition of the CTIO Facilities Manual, several new filters have been added to our collection of imaging filters. A smaller number of, mostly very old, filters have deteriorated to such an extent that they have had to be retired from service. In addition, new measurements of the transmission curves for the vast majority of our filters have been completed recently, although a few remain to be traced. An up-to-date filter catalog is given below. In this listing lambdac and delta lambda are the wavelength midway between the two half-power points and the FWHM of the filter pass band respectively, and Tmax is the peak transmission of the filter; these quantities are given as zero when recent measurements are not available. Please note that, to avoid vignetting with the Tek2048 CCD, filters of at least 4 x 4 inches must be used at the 4-m prime focus and of at least 3 x 3 inches at all other locations. For the Tek1024 and smaller CCDs 2 x 2 inch filters can be used at all locations without vignetting.

We have also replaced and expanded the stock of colored glass order sorting filters available for spectroscopy. The following new filters are available for the 4-m R-C and Echelle spectrographs and for the 1.5-m spectrograph: Schott BG39, BG38, WG335, WG360, GG385, GG455, GG495, OG550, RG610, RG695. In addition the following are available for the 4-m R-C and Echelle spectrographs only: GG420, OG515, OG570, OG590, RG665. All these filters have been anti-reflection coated to maximize transmission within the filter passband.

The CTIO filter catalog together with complete transmission curves for the individual filters is available in the ctio ftp archive. They can be retrieved by connecting to ctios1.ctio.edu (139.229.2.1) using anonymous as user name and supplying your e-mail address as password. The filter data will be found in the directory /pub/manuals/filters; consult the file README in that directory for further instructions.

Filter Name	Size (in)	LamC ()	FWHM ()	Tmax (%)	Filter Set	Comments
	2x2	0	0	00.00	B std PFCCD	
	2x2	0	0	00.00	C Washington #3	
	2x2	0	0	00.00	I 34 PFCCD	
	2x2	0	0	00.00	M Washington #3	
	2x2	0	0	00.00	T1 Washington #3	
	2x2	0	0	00.00	T2 Washington #3	
	2x2	0	0	00.00	V std PFCCD	
	3x3	0	0	00.00	C Washington	
	3x3	0	0	00.00	M Washington	
	3x3	0	0	00.00	T1 Washington	
	4x4	0	0	00.00	B Harris	
	4x4	0	0	00.00	C Washington	
	4x4	0	0	00.00	M Washington	
	4x4	0	0	00.00	R Harris	
	4x4	0	0	00.00	T1 Washington	
	4x4	0	0	00.00	V Harris	
3085/75	1Dia	3085	75	38.50	Comet Set	
3510/300	2x2	3510	300	33.60	u2 Strmgren #1	
3515/290	2x2	3517	280	35.11	u1 Strmgren #1	
3520/300	2Dia	3520	296	37.50	u Strmgren #2	
3525/320	2x2	3525	320	36.00	u Strmgren #3	
3530/400	2x2	3539	386	28.01	u Gunn-Thuan #1	
3565/630	4x4	3565	630	75.27	U Liq CuSO4	
3565/670	3x3	3565	670	75.14	U Liq CuSO4 2	
3570/660	2x2	3570	660	84.34	U Liq CuSO4 1	
3572/665	2x2	3572	665	82.50	U Liq CuSO4 2	
3575/670	2x2	3575	670	82.90	U Liq CuSO4 3	
3590/660	2x2	3590	660	87.20	U Liq CuSO4 4	1m guider box
3650/100	1Dia	3651	79	44.00	Comet Set	
3650/600	2x2	3641	470	34.56	U CTIO ("new")	
3650/643	3x3	3650	643	71.25	U Liq CuSO4 1	
3656/167	2x2	3656	170	53.00	Argus-Echelle	
3700/110	2x2	3698	97	46.95		red leak 9000
3727/21	2x2	3735	24	30.39		
3727/44	2x2	0	0	00.00	H beta set	
3727/45	2x2	3727	40	28.06		ghost images?
3765/45	2x2	3770	43	24.52		
3767/44	2x2	0	0	00.00	H beta set	
3780/181	2x2	3790	190	50.00	Argus-Echelle	
3800/110	2x2	3797	110	34.85		
3870/50	1Dia	3877	39	25.00	Comet Set	
3912/196	2x2	3910	130	48.00	Argus-Echelle	2 faces coated
3980/400	2x2	3987	398	47.95	v Gunn-Thuan #1	
4054/214	2x2	4064	220	46.00	Argus-Echelle	
4060/70	1Dia	4061	75	46.50	Comet Set	
4100/160	2Dia	4126	172	59.11	v Strmgren #2	
4100/160	2x2	4110	160	60.00	v Strmgren #3	

4110/190	2x2	4125	182	44.99	v Strmgren #1	
4166/83	1Dia	4167	90	63.00	DDO set	
4207/233	2x2	4222	230	48.00	Argus-Echelle	
4257/73	1Dia	4260	77	77.00	DDO set	
4260/65	1Dia	4278	70	44.50	Comet Set	
4324/1050	2x2	4300	1050	73.00	B Harris #1	
4324/1056	2x2	4324	1056	71.00	B Harris #3	
4324/1156	2x2	4324	1156	72.00	B Harris #2	
4340/980	3x3	4341	980	60.33	B Harris #1	
4345/980	3x3	4345	980	60.85	B Harris #2	
4363/20	2x2	4358	19	31.16		
4372/255	2x2	4390	250	68.00	Argus-Echelle	
4380/1086	2x2	4380	1086	77.00	B-14	
4390/1060	2x2	4390	1060	78.00	B-3	
4390/1109	2x2	4390	1109	77.00	B-15	
4410/1109	2x2	4410	1109	78.00	B-16	
4440/1125	2x2	4440	1125	79.00	B-13	
4517/76	1Dia	4516	77	75.00	DDO set	
4551/280	2x2	4563	275	72.00	Argus-Echelle	
4650/190	2x2	4654	173	55.09	b Strmgren #1	
4685/44	2x2	4685	38	78.00	H beta set	1 face coated
4686/15	2x2	4685	13	29.77		
4695/15	2x2	4692	15	34.60		
4700/190	2Dia	4724	190	69.12	b Strmgren #2	
4705/175	2x2	4705	175	79.30	b Strmgren #3	
4745/309	2x2	4745	330	82.00	Argus-Echelle	2 faces coated
4845/65	1Dia	4846	69	74.00	Comet set	
4857/12	2x2	4858	14	51.73		
4861/26	2Dia	4854	27	56.00		
4861/44	2x2	4865	42	79.00	H beta set	1 face coated
4861/50	2x2	4872	53	58.66		
4862/14	2x2	4860	14	66.00		
4866/12	2x2	4859	15	48.34		
4880/70	2x2	4888	70	64.79		
4886/186	1Dia	4890	195	76.00	DDO set	
4900/650	2x2	4893	254	89.17	g Gunn-Thuan #1	
4905/44	2x2	4905	42	78.00	H beta set	1 face coated
4949/44	2x2	4952	42	84.00	H beta set	1 face coated
4955/341	2x2	4950	350	83.00	Argus-Echelle	2 faces coated
4993/44	2x2	4993	44	83.00	H beta set	1 face coated
5000/70	2x2	4994	77	63.41		
5007/22	2x2	5007	20	69.65	old Fabry-Perot	
5007/44	2x2	5002	41	77.60	H beta set	1 face coated
5013/14	2x2	5015	17	64.63	old Fabry Perot	LMC Redshift
5024/15	2x2	5026	16	43.63		internal fringes
5029/43	2x2	0	0	00.00	Fabry-Perot	
5032/15	2x2	5032	15	41.50		internal fringes
5037/44	2x2	5037	40	83.00	H beta set	1 face coated
5040/15	2x2	5038	16	36.58		
5049/15	2x2	5049	14	38.15		internal fringes
5057/15	2x2	5057	14	39.28		internal fringes
5081/44	2x2	5084	42	82.00	H beta set	1 face coated
5100/100	1x1	5098	88	61.00		0.75Dia useful
5117/895	2x2	5117	895	81.39	g Gunn-Thuan #2	
5118/900	3x3	5118	900	81.39	g Gunn-Thuan	
5125/44	2x2	5124	41	83.00	H beta set	1 face coated
5140/90	1Dia	5137	87	62.00	Comet set	
5145/80	2x2	5152	80	60.69	3c	
5169/44	2x2	5167	43	80.00	H beta set	1 face coated
5186/379	2x2	5180	390	85.00	Argus-Echelle	2 faces coated
5200/	.75	5187	95	64.00		
5213/44	2x2	5213	45	80.50	H beta set	1 face coated
5257/44	2x2	5257	42	79.50	H beta set	1 face coated
5362/895	3x3	5362	895	76.80	V Harris #1	
5370/900	3x3	5370	900	75.64	V Harris #2	
5378/1018	2x2	5378	1018	91.00	V Harris #3	
5380/1000	2x2	5380	1000	91.00	V Harris #1	
5400/100	2x2	5415	114	46.58		
5409/948	2x2	5409	948	90.50	V Harris #2	
5435/1081	2x2	5435	1081	72.00	V-14	
5439/420	2x2	5450	420	80.00	Argus-Echelle	
5460/1118	2x2	5465	1118	74.60	V-16	
5461/	1x1	5447	96	55.00		
5470/1114	2x2	5470	1114	74.00	V-15	
5500/200	2x2	5514	224	62.76	y Strmgren #1	
5500/240	2Dia	5513	238	74.45	y Strmgren #2	
5500/240	2x2	5500	260	80.00	y Strmgren #3	
5718/470	2x2	5730	470	78.00	Argus-Echelle	
5755/20	2x2	5758	20	60.19		
5800/100	2x2	5796	108	56.35		
5877/14	2x2	5877	16	75.62	old Fabry-Perot	
5890/40	2x2	0	0	00.00	Fabry-Perot	
5894/14	2x2	0	0	00.00	Fabry-Perot	

5900/350	2x2	5924	268	62.01	x Gunn-Thuan #1	
5915/40	2x2	0	0	00.00	Fabry-Perot	
5950/40	2x2	0	0	00.00	Fabry-Perot	
5997/40	2x2	0	0	00.00	Fabry-Perot	
6027/531	2x2	6030	480	82.00	Argus-Echelle	2 faces coated
6087/40	2x2	0	0	00.00	Fabry Perot	
6100/100	2x2	6101	103	53.66		
6301/10	2x2	6294	13	75.00	old Fabry-Perot	
6330/100	1Dia	6342	93	65.15	633fs10-25	internal fringes
6371/601	2x2	6470	630	86.50	Argus-Echelle	2 faces coated
6440/1520	2x2	6440	1520	86.00	R Harris #1	
6454/1451	2x2	6454	1451	85.00	R Harris #2	
6420/1180	2x2	6420	1180	68.00	R-13	
6465/1300	2x2	6465	1300	57.00	R-10	bubbles
6475/1600	3x3	6475	1600	81.70	R Harris #1	
6477/1235	2x2	6477	1235	59.74	R-11	broken corner
6477/75	2x2	6477	72	82.00	H alpha set	
6484/1532	2x2	6484	1532	86.00	R Harris #3	
6493/1445	3x3	6493	1445	77.00	R Harris #2	
6500/1330	2x2	6500	1330	92.00	I 33 PFCCD	
6510/1300	2x2	6510	1300	90.00	R 34 PFCCD	
6520/75	2x2	6520	73	74.00	H alpha set	
6552/40	2x2	0	0	00.00	Fabry-Perot	
6559/5	2x2	6557	7	56.12	old Fabry-Perot	
6560/110	2x2	6591	118	62.28	Corion	
6563/110	2x2	6562	120	62.66	3C	
6563/12	2Dia	0	0	00.00	Fabry-Perot	
6563/16	1x1	6573	15	79.00		
6563/17	2x2	6560	20	77.41	old Fabry-Perot	bad corner
6563/75	3x3	6554	68	90.00		
6563/75	4x4	6559	70	83.50		
6563/78	2x2	6563	82	85.00	H alpha set	
6563/85	1x1	6586	103	83.00		bad corner
6571/15	2x2	0	0	00.00	Fabry-Perot	
6575/14	2x2	6571	18	74.12	Old Fabry Perot	LMC Redshift
6584/15	2x2	0	0	00.00	Fabry-Perot	
6586/40	2x2	0	0	00.00	Fabry-Perot	
6600/100	2x2	6593	118	62.08	#1	
6600/110	2x2	6593	118	62.08	#2	
6600/110	2x2	6597	108	57.25	3c	
6600/75	3x3	6592	65	88.00		
6600/75	4x4	6593	64	86.00		
6606/75	2x2	6606	76	84.00	H alpha set	
6618/20	2x2	0	0	00.00		2 faces coated
6636/20	2x2	0	0	00.00		2 faces coated
6649/76	2x2	6648	78	87.00	H alpha set	
6654/20	2x2	0	0	00.00		2 faces coated
6672/20	2x2	0	0	00.00		2 faces coated
6680/100	2x2	6687	112	87.59	CFA set	
6693/76	2x2	6689	81	87.00	H alpha set	
6700/350	2x2	6696	316	61.71	r Gunn-Thuan #1	
6705/5	1x1	6702	7	42.00		
6716/13	2x2	6716	13	55.00		
6718/20	2x2	0	0	00.00		
6718/5	1x1	6719	6	46.00		
6724/34	2x2	6726	36	82.71	old Fabry-Perot	
6724/7	2x2	0	0	00.00		
6727/1015	2x2	6727	1015	93.83	r Gunn-Thuan #2	
6728/1000	3x3	6728	1000	93.83	r Gunn-Thuan	
6731/13	2x2	0	0	00.00		
6731/6	2x2	6733	7	50.61	old Fabry-Perot	
6732/20	2x2	0	0	00.00		
6732/5	1x1	6737	10	32.00		
6737/76	2x2	6738	87	83.00	H alpha set	
6757/684	2x2	6760	650	87.00	Argus-Echelle	2 faces coated
6781/78	2x2	6779	88	77.00	H alpha set	
6820/100	2x2	6820	100	87.00	CFA set	
6826/78	2x2	6825	85	78.00	H alpha set	
6840/120	2x2	6903	130	63.40		
6840/90	1Dia	6848	90	76.80	Comet set	
6850/80	2x2	6899	134	61.59		
6860/80	2x2	6888	128	62.09		
6871/78	2x2	6864	83	85.00	H alpha set	
6890/100	2x2	6890	100	83.00	CFA set	
6916/78	2x2	6914	80	82.00	H alpha set	
6961/79	2x2	6962	85	82.00	H alpha set	
7000/175	1Dia	7125	175	82.00	Comet set	
7007/79	2x2	7007	81	75.00	H alpha set	
7053/79	2x2	7046	77	77.00	H alpha set	
7080/100	2x2	7080	100	83.00	CFA set	
7099/80	2x2	7101	82	78.00	H alpha set	
7146/80	2x2	7139	76	80.00	H alpha set	
7193/780	2x2	7180	800	80.00	Argus-Echelle	

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7193/80   2x2  7192 72   76.00     H alpha set
7240/75   2x2  7237 77   83.00     H alpha set
7288/82   2x2  7286 90   84.00     H alpha set
7336/82   2x2  7335 80   83.00     H alpha set
7384/84   2x2  7380 91   81.00     H alpha set
7433/84   2x2  7427 76   83.00     H alpha set
7482/84   2x2  7475 85   83.00     H alpha set
7500/100  2x2  7512 147  58.00
7531/84   2x2  7532 85   81.00     H alpha set
7580/85   2x2  7589 91   76.00     H alpha set
7630/85   2x2  7630 81   80.00     H alpha set
7680/84   2x2  7677 84   81.00     H alpha set
7689/907  2x2  7720 860  88.00     Argus-Echelle
7700/110  2x2  7708 108  64.00
7730/85   2x2  7726 83   80.00     H alpha set
7781/86   2x2  7775 83   71.00     H alpha set
7832/86   2x2  7830 88   77.00     H alpha set
7883/86   2x2  7881 89   73.00     H alpha set
7935/88   2x2  7930 93   71.00     H alpha set
8050/1500 2x2  0    0    70.00     I Kron-Cousins #2
8050/1500 2x2  0    0    70.00     I Kron-Cousins #3
8050/1500 3x3  0    0    70.00     I Kron-Cousins #1
8050/1500 3x3  0    0    70.00     I Kron-Cousins #2
8050/1500 4x4  0    0    70.00     I Kron-Cousins
8100/110  2x2  8106 123  67.00
8100/1500 3x3  8100 1500 93.00     i Gunn-Thuan
8102/1505 2x2  8102 1505 93.89     i Gunn-Thaun #2
8200/900  2x2  8186 943  90.00     i Gunn-Thaun #1
8227/1865 2x2  8227 1865 71.65     I-11
8259/1058 2x2  8260 1080 86.00     Argus-Echelle
8200/1640 2x2  8200 1640 76.00     I-10
8200/1640 2x2  8200 1640 76.00     I-13               bubble
8300/110  2x2  8306 128  61.00
8542/18   2x2  0    0     0.00     Fabry-Perot
8585/100  2x2  0    0     0.00     Fabry-Perot
8920/1249 2x2  8920 1080 88.00     Argus-Echelle      2 faces coated
9532/20   2x2  9536 20   45.00
9695/1492 2x2  9670 1380 81.00     Argus-Echelle
9900      2x2  0    0    95.30     z Gunn-Thaun #2    45% &gt 8435
9900      3x3  0    0    95.50     z Gunn-Thaun       57% &gt 8490


Daniel Maturana, Ricardo Gonzalez,
Steve Heathcote, Bob Schommer
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Observing Request Statistics: August 1993 - January 1994 (1Jun93)

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Observing Request Statistics:...(1Jun93)
August 1993 - January 1994
(from CTIO, NOAO Newsletter No. 34, 1 June 1993)

The requests for second semester 1993 are unusual because the 4-m f/8 secondary,
normally used about half the time, is scheduled to be out of service for
refiguring during most of the semester. It is thus not surprising that there
has been a significant drop in the 4-m requests compared with the previous year,
just over 20%, although the telescope continues to be heavily oversubscribed.
(It should be noted that the relatively small drop with regard to the first
semester is a product of the normal seasonal pattern, where the 4-m sees
greatest demand second semester and the 1.5-m sees greatest demand first
semester.) What is striking is the parallel drop in requests on the smaller
telescopes, probably due to the fact that many 4-m projects also use small
telescope time.

4-m Telescope
 # of Requests     # of Nights Requested
 Dark  Bright         Dark    Bright       Instrument    Nights   %
   1      2            3       5            ASCAP          8    2.3
  16      8           57      24            Argus         81   22.8
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1	0	5	0	CF/CCD	5	1.4
18	3	54	10	CS/CCD	64	18.0
3	3	8	12	Ech/CCD	20	5.6
0	4	0	15	IR/Imager	15	4.2
0	1	0	4	IR/IRS	4	1.1
25	0	79	0	PF/CCD	79	22.3
2	0	4	0	PF/Plates	4	1.1
1	1	4	3	RF-P	7	2.0
1	0	4	0	Visitor	4	1.1
1	16	4	60	OSIRIS	64	18.0
-	--	-	--		--	----
69	38	222	133		355	100.0

	Now	Last Semester	Semester Before Last
No. of Requests	107	108	124
No. of nights requested	355	362	452
Oversubscription	2.23	2.18	2.77
Average request	3.32	3.35	3.64

* 159 nights available

1.5-m Telescope

# of Requests		# of Nights Requested				
Dark	Bright	Dark	Bright	Instrument	Nights	%
2	2	9	1	ASCAP	20	6.6
24	1	103	6	CF/CCD	109	36.2
13	6	46	31	CS/CCD	77	25.6
0	4	0	21	Ech/CCD	21	7.0
0	2	0	7	IR/IRS	7	2.3
0	3	0	9	IR/Phot	9	3.0
1	0	8	0	PF/CCD	8	2.7
2	2	8	13	RF-P	21	7.0
0	7	0	29	OSIRIS	29	9.6
-	-	-	--		--	---
42	27	174	127		301	100.0

	Now	Last Semester	Semester Before Last
No. of Requests	69	68	61
No. of nights requested	301	366	324
Oversubscription	1.80	2.09	1.91
Average request	4.36	5.38	5.31

* 167 nights available

1.0-m Telescope

# of Requests		# of Nights Requested				
Dark	Bright	Dark	Bright	Instrument	Nights	%
5	5	29	60	ASCAP	89	88.1
1	2	2	10	CS/2DF	12	11.9
-	-	-	--		--	----
6	7	31	70		101	100.0

	Now	Last Semester	Semester Before Last
No. of Requests	13	19	19
No. of nights requested	101	164	173
Oversubscription	0.57	0.92	1.02
Average request	7.77	8.63	9.1

* 177 nights available

0.9-m Telescope

# of Requests		# of Nights Requested				
Dark	Bright	Dark	Bright	Instrument	Nights	%
20	16	112	95	CF/CCD	207	100.0

	Now	Last Semester	Semester Before Last
No. of Requests	36	41	36
No. of nights requested	207	258	240
Oversubscription	1.21	1.54	1.41
Average request	5.75	6.29	6.66

* 171 nights available

Schmidt Telescope

# of Requests	# of Nights Requested	Instrument	%
14	77	CF/CCD	74.0
4	27	Plates	26.0
-	--		----
18	104		100.0

No. of Requests 18
No. of nights requested 104
Oversubscription 0.58
Average request 5.78

0.6-m Telescope

# of Requests	# of Nights Requested	Instrument	%
2	34	ASCAP	100.0

No. of Requests 2
No. of nights requested 34
Oversubscription 0.19
Average request 17.0

Jay Elias

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The WIYN Report: Progress on the New 3.5-m Telescope (1Jun93)

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The WIYN Report: Progress on the New 3.5-m Telescope (1Jun93)
(from KPNO, NOAO Newsletter No. 34, 1 June 1993)

The WIYN enclosure was "substantially complete" in mid-March. The contractor is currently working on a final punch list of items to be corrected. In the meantime, KPNO personnel have installed and grouted the lower sole plate for the telescope. The upper sole plates are in position and will be grouted after installation of the telescope fork assembly.

The telescope mount has been fully assembled at L&F Industries' plant in Los Angeles. During March shop tests it was discovered that the pillow blocks supporting the elevation axle were slightly misaligned. The instrument rotators were also found to exhibit excessive friction at low rotation rates. L&F is correcting these problems and hopes to disassemble the mount at the end of April in preparation for final painting and shipment to Kitt Peak. The mount will be installed in the WIYN Observatory this spring, hopefully prior to summer shutdown of the other KPNO telescopes.

Polishing of the 3.5-m primary mirror at the Steward Observatory Mirror Lab was completed in March. The work was a joint effort involving SOML and NOAO personnel. The final figure achieved over the clear aperture is superb: 22.9 nm RMS and 310.8 nm peak-to-valley. The largest remaining aberration is astigmatism. With the astigmatism term removed, the final figure achieved is 15.7 nm RMS and 188 nm peak-to-valley.

The mirror and cell have been returned to NOAO, and work is in progress converting the cell for installation in the telescope. New axial mirror supports have been designed, prototyped and tested. Sixty-six of the units (plus spares) are currently being fabricated. The supports will be able to apply controllable forces to warp the mirror and correct for slowly varying changes in the figure, such as astigmatism. The intent is to correct the residual, low-order polishing errors, thermal distortions and force errors in the supports themselves using an image analyzer to provide the necessary feedback from the focal plane.

The primary mirror lateral supports are also under review for possible modifications at the same time the rest of the cell and thermal controls are being made ready for installation in the telescope. Work on the mirror support and thermal system controls is proceeding in parallel with the mechanical effort.

The secondary mirror is being polished by Contraves in their Pittsburgh facility. This effort is underway and is expected to produce a finished mirror in October 1993.

The tertiary mirror is being polished by Kodak in a two step process. Grinding and initial polishing to about 1 wave peak-to-valley were performed on a

large planetary polishing machine. This completed, the optic is scheduled to go into Kodak's ion polishing machine for final figuring.

Work continues on controls and instrumentation for the WIYN Observatory. The University of Wisconsin is fabricating the control system and expects to begin installation this summer. At NOAO, engineering and design of the modifications necessary to move the Multi-Object Spectrograph and Hydra fiber-optic positioner from the 4-m telescope to WIYN are underway. The design of the CCD Imager and filter wheel assembly is progressing at Indiana.

Matt Johns, Caty Pilachowski

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Summer 1993 Queue Scheduling Program: A Progress Report (1Jun93)

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Summer 1993 Queue Scheduling Program: A Progress...(1Jun93)
Report
(from KPNO, NOAO Newsletter No. 34, 1 June 1993)

Although it is too early to even guess at the final numbers, it appears that the summer queue scheduled observations will have drawn a substantial response. The goal of the program is to obtain data in a queue scheduled mode, in which the order of observations is dynamically determined according to factors such as the seeing, the transparency, and the scientific ranking of the program. This increases the efficiency of the telescope and allows the most highly ranked proposals to be more certain of success than if they were assigned specific nights. Our aim in running this pilot program is to learn about the detailed issues and procedures inherent in taking data in this manner.

The first issue that we encountered was how to "advertise" the program. Early on in this program it was decided that we would perform the additional experiment of doing as much of the administrative work electronically as possible. Thus, it was easy to monitor the response to various announcements by looking at the rate of requests for the information package or the proposal forms. We tried four different forums for announcing the program. First, we put a lengthy article into the previous Newsletter. Second, we placed a short notice into the Multiwavelink electronic bulletin board. Third, we submitted a short article to the AAS Newsletter. Fourth, we sent out e-mail to about 500 observers who had received telescope time at Kitt Peak in the last two years. By far the majority of requests came in from the e-mail distribution. At the time of writing we have received 87 requests for the proposal form, and 54 of them were received in the week following the e-mailing.

As of the date of writing, two weeks before the proposal deadline (30 April), we have received two proposals. While this is admittedly a small number, we believe that most people wait until the last few days to submit proposals. For instance, more than two-thirds of the 271 proposals received before the 31 March deadline for fall 1993 telescope time were received during the last two days.

Now that we have made the commitment, the hard work begins. We are starting to put together procedures for the observations. Some issues are how the flat fields, bias frames, and standard star exposures are to be obtained, as well as a uniform processing routine for doing at least the preliminary data reduction. We are beginning to arrange schedules for the training of some of the observing technicians on the mountain so that they will be able to assist in taking the observations. We are looking into queue scheduling software that is used at other telescopes. We also are hoping to have our "bare- bones archiving" system, a.k.a. "save-the-bits," in place at the start of the queue scheduled observations.

The observations will be starting just about the time the next Newsletter's articles are being written, so we hope to be able to provide a more detailed and complete summary of the preparation for the project at that time.

Todd Boroson, Taft Armandroff,
Caty Pilachowski, David De Young

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CCD News (1Jun93)

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CCD News (1Jun93)
(from KPNO, NOAO Newsletter No. 34, 1 June 1993)

This is a good opportunity to bring readers of the Newsletter up to date on our CCD plans, even though there are no specific new capabilities to report.

On the mosaic imager front, we have successfully run our mini-mosaic, a 2 x 2 array of butted Loral 2048 x 2048 CCDs (15 um pixels), several times now on the 0.9-m and once on the 4-m telescope. Readout time with our version of the new CTIO ARray CONtroller is 150 seconds. The output image is 4096 x 4096 and requires 32 Mbytes of storage in integer mode. The chips currently in the device are thick, but we are awaiting delivery of a number of thinned chips from Mike Lesser (Steward Obs.). The current schedule has us getting a thinned mosaic to the telescope for engineering tests in the fall, with a second one, destined for CTIO, to come on line by the end of the year. Come see what a one-half degree field of view looks like at our poster at the Berkeley AAS meeting. We hope to be able to make this imager available to users in spring 1994.

The thinned 3K x 1Ks and 800 x 1200s from our first Loral foundry run are just now beginning to arrive in significant numbers. One 800 x 1200 has gone into CryoCam; a new throughput curve for that instrument is shown below. One very good 800 x 1200 has been sent to CTIO. For that chip we measured a peak QE of 96% at 6000 . We have received three usable 3K x 1Ks also. One of these will go to CTIO, and one may go to NSO. Our hope is to have three good 3K x 1Ks in use by the fall; two will be installed in Universal Dewars and will be available at the 4-m and Coud Feed for spectroscopic applications, and the other will replace the mediocre quality 3K that we put in GoldCam over a year ago. Users of GoldCam will be pleased to note that we will reduce the amplitude of the fringing in the red (at the cost of slightly reduced UV sensitivity).

[figure not included]

One other CCD related news item is the arrival of the HARCON controllers. The Hybrid ARray CONtroller is a modified version of CTIO's transputer-based CCD controller. It features low power, a high degree of versatility, and high speed operation. The hardware for ten of these controllers is almost complete, and we will be installing them at all the KPNO CCD sites during the summer. The software is lagging a bit behind, and so it may be well into the semester before the CCDs are actually switched over to the new controllers. With the versatility of the new systems, we will spend some of our development time working on features such as higher-speed readout, nondestructive repetitive reads for lower noise, and anti-blooming microcode. Watch this space for further details.

Todd Boroson, Rich Reed, Tom Wolfe

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IRIM in Action: Performance Information and User Evaluation (1Jun93)

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IRIM in Action: Performance Information and User...(1Jun93)
Evaluation

(from KPNO, NOAO Newsletter No. 34, 1 June 1993)

As anticipated in NOAO Newsletter No. 31 (September 1992), the infrared camera IRIM has been returned to service at the 1.3-m, 2.1-m, and 4-m telescopes, equipped with a 256 x 256 NICMOS 3 HgCdTe array through a collaboration with Tony Tyson (Bell Labs). I summarize here some performance information for the camera and initial user reactions. For more complete information, including specifics on filters, star and sky signal levels, and detector performance, request the updated IRIM manual from rprobst@noao.edu.

The array has a rather nonflat response, with +-25% variations at low spatial frequency across the device. There are about 250 nonresponsive pixels scattered across the array, typically in small clumps. Some users have ultimately rejected up to 700 pixels, but this will depend on the science application. The response linearity falls smoothly with signal level to about 85% of full well capacity, then declines rapidly. Read noise is about 30 electrons. Dark current and well capacity vary with bias, for example 0.5 electron/sec and 140,000 electrons at 400 mV, and 2 electron/sec and 270,000 electrons at 800 mV. Quantum efficiency improves by a factor of two from 60 K to 77 K, and we presently operate at 77 K. There is a "charge retention" effect in which a small portion of incident signal from a given exposure appears to survive many subsequent reset cycles, declining slowly. The practical importance of this phenomenon depends on the original signal level and the general background level on the device. Other users of these devices have reported a variation in sensitivity within a pixel (D. Allen, AAO Newsletter No. 63; and private anecdotal remarks). I have not confirmed this explicitly for the KPNO array, but have noted that point source photometry seems unexpectedly erratic.

The instrument was reconfigured with deep detections on the 4-m in mind, and initial user reaction in this application has been very enthusiastic. The first three hours of 4-m science observing produced confirmation of variability in a faint QSO (R. Elston, NOAO) and detection of a high-redshift galaxy cluster around a radio source (M. Dickinson, U. of California, Berkeley). Besides the desirable detector characteristics (high QE pixels and lots of them), the combination of our new f/15 IR secondary for the 4-m and a short-cutoff K' filter (2.0-2.3 um) gives a sky background 1 to 1.5 mag fainter than formerly on this telescope, with corresponding decrease in integration time for a given sensitivity. Source detections at K ~ 22 have been achieved with two hours' integration. Similar results, scaled for aperture, have been obtained on the 2.1-m. Judging from the proposals for fall 1993, word has travelled fast!

Ron Probst

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Infrared Group News: Something Old, Something New, Something Borrowed, Something Blue (1Jun93)

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Infrared Group News: Something Old, Something New...(1Jun93)
Something Borrowed, Something Blue
(from KPNO, NOAO Newsletter No. 34, 1 June 1993)

This is a general update on goings-on in the infrared program over the last several months, and our program plan into fall 1993.

In detector R&D, 256 x 256 InSb arrays from Santa Barbara Research Center have been turned on and extensively characterized in laboratory test dewars. A fully operational "science grade" device has been installed and used at the telescope in the Cryogenic Optical Bench. As part of this exercise, a peculiarity in the noise pattern of the device was traced to low level contaminants introduced during post-manufacture storage by the vendor; working closely with SBRC, this was verified and a reliable cure found, which lowered the overall noise level measurably. The R&D team has also turned on a NICMOS 3 HgCdTe array and delivered it to the telescope in IRIM, as noted above.

The instrumentation program continues to benefit directly from detector efforts. Following the reappearance of IRIM with its new 256 x 256 array, its former

58 x 62 InSb array was relocated to the spectrometer CRSP. This device is better behaved than CRSP's previous array and has led to performance improvements. The SBRC InSb procurement produced a second 256 x 256 array with enough operable area to be of interest for CRSP, and this device will be installed in late summer. It will deliver 135 rows spatially and a full 256 pixels spectrally. Both CRSP and IRIM are being upgraded with new electronics to run in a workstation environment, familiar to users of SQIID. This will get them off the aging 11/73 systems, which are fast approaching oblivion, and provide much greater power and flexibility for data acquisition and real time analysis.

Regarding projects in progress, the electronics upgrade project is called WILDFIRE and will ultimately produce units for five instruments and three telescopes in all. Its first telescope implementation will be in late April at the 1.3-m. Fall 1993 will see the installation and testing of WILDFIRE at all telescopes with facility IR instruments, a not inconsiderable exercise. The high resolution grating spectrometer Phoenix is well along in detailed design, and we will begin to cut metal in May. The major optical components have all been contracted out as well. The Cryogenic Optical Bench, a second generation IR camera emphasizing a great variety of spatial and spectral filtering modes, has been to the telescope most recently with a 256 x 256 SBRC InSb array. This instrument has had some difficulties, including a redesign of a portion of the optics to suppress ghosting. Problems remaining are mostly in achieving acceptably precise control of mechanical moving parts. Following upcoming observing runs to exercise it in high background modes with WILDFIRE, we will do an extensive disassembly this fall to address mechanical issues. We expect it to be available for general use in spring 1994.

SQIID, COB, and Phoenix all use closed-cycle cooler systems in place of liquid cryogens. The 1.3-m and 4-m have both been plumbed and commissioned with SQIID, and the 2.1-m is scheduled for cooler installation this fall.

Finally, "something blue": the venerable single-channel InSb photometer Blue Toad has been retired from the active instrument list. It went out with a (scientific) bang, a successful observation of a stellar occultation by Uranus in mid-April. As a side benefit, we now know the latitude, longitude, and elevation of the 2.1-m to within a few meters courtesy of NASA and the GPS satellite network.

Ron Probst for the IR Group

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Better Images Coming Your Way at the 0.9-m (1Jun93)

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Better Images Coming Your Way at the 0.9-m (1Jun93)
(from KPNO, NOAO Newsletter No. 34, 1 June 1993)

The field accessible with Tektronix 2048 x 2048 CCDs at the 0.9-m f/7.5 focus is an impressive square 23 arcmin on a side. The Mini-Mosaic, currently under development, will have an even larger field with the added bonus of smaller pixels to better sample the observed point spread function (PSF). However, observers who have been blessed with good seeing and who have carefully examined their 2048 images may have noticed that stars become elongated near the corners of the current field of view. Such a variation is inherent to the Ritchey-Chretien design of the 0.9-m telescope at f/7.5. In essence, there are two optical problems: (1) astigmatism, and (2) focal plane curvature. (Physical CCD non-flatness does not significantly contribute to the observed PSF variations, at least with our current Tektronix chips.) The observed variations primarily compromise photometry that attempts to fit a constant PSF to stars across the entire field.

In order to overcome this problem, Liang Ming has designed a two-element corrector for the 0.9-m f/7.5 focus. His modelling of the uncorrected optical system accurately reproduces the spatially variant PSF currently seen. This PSF variability disappears when the new corrector is included in the model, and the theoretical images are well behaved over the entire CCD and guider fields of view.

The fused silica for the corrector has been procured, and we are currently

obtaining bids for fabrication and anti-reflection coating. The coating material will be MgFl. The corrector will be mounted in the guider on a sliding assembly so that it can be inserted/removed from the beam as desired. All f/7.5 observers interested in a stable point spread function will want to use the corrector. The corrector is not designed to be used with the f/13.5 secondary and will be removed from the beam when that secondary is used. It may also prove desirable to remove the corrector for f/7.5 projects where minimizing scattered light is more important than PSF constancy.

In parallel with the implementation of the corrector, we are working on improving the 0.9-m "dome seeing." Recent changes at the 0.9-m include: (1) turning off the selsyns, (2) turning off the heater and disconnecting the hot water heater in the bathroom, and (3) trying to alert observers of the "right way" of keeping doors open and closed in order to best ventilate the dome with the dome fans activated. An effort is also being made to keep the optics well collimated and aligned.

We are in the process of finalizing a schedule for bringing the corrector into use. It is our goal to make the corrector available by mid-October. We will provide updates in future issues of the Newsletter.

Taft Armandroff, Dave Silva, Phil Massey

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Big Filters and Shutter for the Schmidt (1Jun93)

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Big Filters and Shutter for the Schmidt (1Jun93)
(from KPNO, NOAO Newsletter No. 34, 1 June 1993)

At present, the Schmidt CCD system uses a sliding filter bolt containing 2-inch x 2-inch slots and a small shutter, all recycled from the original 4-m prime focus CCD system. With the 2048 x 2048 CCD (S2KA) that has become the workhorse detector at the Schmidt, the corners of the chip are vignetted by the filter and shutter assemblies. In addition, because there are no mechanical stops (i.e. detents), filter positioning is not as repeatable as would be desired, which occasionally leads to low-level flat fielding problems. In order to overcome these difficulties, a new 4-inch x 4-inch filter wheel and shutter are being constructed for the Schmidt CCD system. They will be copies of the filter wheel and shutter in use at the 4-m and 0.9-m telescopes. A dedicated set of 4-inch UBVRI filters is being fabricated for the Schmidt, as well as 2-inch inserts for filters not available in the 4-inch size. The set of 4-inch interference filters procured for use at the 4-m and 0.9-m will, of course, be available for use at the Schmidt.

An added benefit of this system upgrade is that the filter position will, for the first time, be readable and controllable from the CCD software (ICE). Thus, Schmidt observers will find that their headers actually contain the correct filter information, which will make processing the images much easier. (Currently observers must manually edit in the filter position for each image header.)

It is somewhat difficult to predict the completion time of this project due to the sharing of resources between this project and other larger projects. At present, December appears to be the most likely completion date. Watch the Newsletter for additional information.

Taft Armandroff, Phil Massey

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New Washington Filters (1Jun93)

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New Washington Filters (1Jun93)
(from KPNO, NOAO Newsletter No. 34, 1 June 1993)

KPNO now has Washington filters (C, M, T1, T2, 51) in both 2-inch square and 4-inch square sizes. The C, M, T1, T2 filters are particularly useful for metallicity measures of G and K giants, while the 51 filter (also occasionally used in the DDO system) allows discrimination between dwarfs and giants in field star studies where foreground dwarfs are a problem.

Heather Morrison, Ed Carder

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The Fast Two-Axis Secondary Imager (1Jun93)

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The Fast Two-Axis Secondary Imager (1Jun93)
(from KPNO, NOAO Newsletter No. 34, 1 June 1993)

FTAS (Fast Two-Axis Secondary) is a small R&D prototype infrared imager designed for fast correction of atmospheric wavefront tilt. It was undertaken in the KPNO Infrared program, in coordination with members of the Gemini instrument group. An existing dewar, NEWT, was modified to carry one of the 256 x 256 PtSi arrays, with an image scale of 0.06 arcsec/pixel. A fast CCD camera is employed to monitor the instantaneous position of a reference star, and to generate an error signal for closed loop servo control of the image position.

FTAS is currently configured to operate at the 2.1-m telescope, where the image motion is removed by tilting the telescope secondary. In several telescope tests, FTAS has removed 80-90% of the tilt power. Under conditions of good seeing (uncorrected FWHM at 2.2 m of about 0.7 arcsec) the corrected image has achieved a FWHM of 0.3-0.35 arcsec. Under those conditions the image quality is limited by residual optical aberrations in the telescope.

FTAS may evolve in the future through further image improvements at the 2.1-m telescope, use with the Phoenix IR spectrograph, and modification for operation at the 4-m telescope.

A report describing the project and initial telescope tests is available from the undersigned.

Steve Ridgway

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Interferometry at Kitt Peak (1Jun93)

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Interferometry at Kitt Peak (1Jun93)
(from KPNO, NOAO Newsletter No. 34, 1 June 1993)

FLUOR (Fiber Linked Unit for Optical Recombination) is a "traveling"
interferometry laboratory, which employs single mode optical fibers to connect
existing telescopes for interferometric operation. It is an R&D project
initiated at the Observatory of Meudon and implemented initially at Kitt Peak
in a collaborative effort. During a successful shakedown at the McMath,
interference fringes at 2.2 um were obtained on bright stars with the two
auxiliary telescopes, and the visibility calibration scheme was verified.

We are now moving FLUOR to the ground floor of the old 0.4-m telescope.
Visitors to the mountain will notice a 30-m appendage on the 0.4-m building;
this is an above-ground tunnel which will house the optical delay line that
compensates for path differences through the two telescopes. This summer, we
will carry out tests of interferometric combination of the 0.9-m and 0.4-m
telescopes. If everything goes well, the 50-m baseline will enable us to fully
resolve sources larger than 0.009 arcsec. At this stage of development the
technique is limited to relatively bright sources, and we will be attempting to
obtain precision angular diameters for a variety of evolved stars.

Details of the project through the McMath phase have been published. Please
contact ridgway@noao.edu for reprints and/or a bibliography.

Steve Ridgway, Vincent Coude du Foresto,
Max Boccas

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Dianne Harmer, New Supervisor of Observing Support (1Jun93)

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Dianne Harmer, New Supervisor of Observing Support (1Jun93)
(from KPNO, NOAO Newsletter No. 34, 1 June 1993)

We are pleased to announce that Dianne Harmer has become the Supervisor of
Observing Support on Kitt Peak. Harmer's presence on the mountain will not be
new for many of you as she has worked for KPNO since January 1991 as an
instrument support associate, providing instrument support and startup
assistance for GoldCam and the Coud. In her new position as Supervisor of
Observing Support, she will provide an important communication channel
between the mountain staff and visiting astronomers. She will supervise
instrument installation, telescope operators, and the observing technicians
who provide assistance for observers.

Before coming to KPNO, Harmer worked from 1985 to 1990 at the United Kingdom's
Ministry of Defense and from 1967 to 1985 at the Royal Greenwich Observatory
where she assisted in instrument development and support.

Bruce Bohannan

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The Mountain Goes X (1Jun93)

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The Mountain Goes X (1Jun93)
(from KPNO, NOAO Newsletter No. 34, 1 June 1993)

The start of the fall observing semester will bring X windows as the standard

window environment on the Sun computers on the mountain. While the windows
will look pretty much as they did in the past, observers should get copies of
the latest revisions of the CCD Data Acquisition Manual, the new IR Observing
Manual, and the new User's Guide to Mountain Computers. Current versions of
these manuals can be obtained by anonymous ftp from "orion.tuc.noao.edu"
(140.252.1.22) in the kpno/manuals/ directory.

Bruce Bohannan, Rob Seaman

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New User's Guide for Mountain Computers (1Jun93)

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New User's Guide for Mountain Computers (1Jun93)
(from KPNO, NOAO Newsletter No. 34, 1 June 1993)

A new guide to the Sun computers on the mountain, "Using the Mountain
Computers on Kitt Peak," is now available from the Kitt Peak Support Office
or by anonymous ftp from "orion.tuc.noao.edu" (140.252.1.22), from the
subdirectory kpno/manuals. In outlining the philosophy of computer use on the
mountain for data acquisition and quick look data reduction, this manual
presents those aspects of unix and IRAF which are unique to Sun workstations
and the window environment. It also serves as a reference for the most
commonly used commands in unix and IRAF, including the IRAF Control Environment
(ICE), and common reduction procedures.

Lisa Wells

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Observing Time Request Form (1Jun93)

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Observing Time Request Form (1Jun93)
(from KPNO, NOAO Newsletter No. 34, 1 June 1993)

The user-friendly TeX version of the KPNO observing time request form is
available for anonymous ftp from gemini.tuc.noao.edu (140.252.1.11) in
subdirectory pub as file kpno.tex. Note that the CTIO and NSO forms are also
there. We are, of course, happy to continue to send forms out by electronic
mail. As usual, requests for the form, comments about the form, and possible
TeX problems associated with the form should be sent to nsharp@noao.edu or
NOAO::NSHARP (5355::NSHARP).

Nigel Sharp

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Pandora, the Library Sun Workstation (1Jun93)

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Pandora, the Library Sun Workstation (1Jun93)
(from KPNO, NOAO Newsletter No. 34, 1 June 1993)

The library Sun workstation, Pandora, is now available to visitors and staff as a resource for many library, network, and database services. Pandora currently provides access to several Internet databases including NED, Simbad, XWAIS, ADS, an Oxford dictionary/thesaurus, the University of Arizona library online catalog, and other library catalogs around the world; a variety of CD-ROM databases; the IAU circulars; several different newsletters; weather information and maps; and more. The user interface is simple and easy to use--in most cases the user simply needs to select a menu item with the mouse. Online help is available, and printed documents and manuals are nearby. Anyone can log into Pandora using the login "library"--no password is needed. We will continue to add functionality to Pandora's menu. Over the next few months we plan to add online versions of the NOAO Newsletter and GONG Newsletter, access to the STScI image database, catalogs of our sky survey plate collection, Mermilliod's star cluster database (BDA), PC/DOS capabilities, and much more. We would especially like to encourage our visitors to come and use Pandora and to offer their comments and suggestions. If there is a particular service that you think would be useful, please let any of us know, or you can send an e-mail message to "library@noao.edu".

Cathy Van Atta, Jeannette Barnes, Caty Pilachowski

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Oversubscription at the 4-m and 0.9-m Telescopes (1Jun93)

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Oversubscription at the 4-m and 0.9-m Telescopes (1Jun93)
(from KPNO, NOAO Newsletter No. 34, 1 June 1993)

The oversubscription for the fall 1993 observing season for these two telescopes was one of the worst in recent history, and it is an unfortunate fact that many excellent observing proposals could not be granted time. This oversubscription rate is a direct result of a reduction in available observing time for these telescopes, and this in turn is an immediate consequence of the reduced funding levels that KPNO has experienced during the last ten years.

As was announced in previous Newsletters, it is the goal of KPNO to continue to improve the performance of all telescopes on the site so that the image quality and observing efficiency will be the best that the site itself can deliver. A major part of this program is an upgrade of the 4-m telescope control system, and a significant portion of this multi-year project will take place during the summer 1993 shutdown. Shutdown dates were announced in the NOAO Newsletter, where it was stated that the telescope will be closed for approximately four months. This extensive shutdown period is required because the engineering and technical staff now available to perform the renovation has been reduced to the point where work must be carried out in series and not in parallel. For example, many of the tasks requiring electronic technicians must be done one after another because reduced manpower levels forbid their being performed simultaneously. These constraints necessarily mean that any given project will take longer to complete.

At the 0.9-m it has become clear that data from the large format CCDs are being compromised because of limitations near the edges of the field. The need for a corrector for this telescope was seen some time ago, and a project was initiated to design, produce and install a corrector at this telescope to solve this problem. This project has proceeded as planned, but it soon became apparent that the installation of the corrector could not be done during summer shutdown in 1993. The reason again is that there were simply not enough technical personnel available to install the corrector and to perform summer shutdown work on the 4-m at the same time. Hence the corrector will be installed at the 0.9-m in the fall of 1993, causing this telescope to be closed to observing programs for about three weeks.

We very much regret that the continued budget constraints at KPNO have now reached the point where highly rated scientific projects cannot be carried forward.

David De Young

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Availability of the New IR Grating (1Jun93)

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Availability of the New IR Grating (1Jun93)
(from NSO, NOAO Newsletter No. 34, 1 June 1993)

The dual-grating spectrometer (see December 1992 Newsletter) is up and running. PHOTOMETRY, the data logging program, now has IR and visible options, allowing one to switch grating constants. Mechanical change-over requires just a few minutes. A quantitative evaluation in terms of efficiency, resolution, and optimum order selection is still in progress, but the system is available for use. To demonstrate the system capability at 4.6 um in the vicinity of the CO lines, two spectrum scans taken in early March are reproduced: (a) a 4096 point scan in the photosphere (disk center) and (b) a 1024 point scan in a sunspot umbra.

Bill Livingston, Keith Pierce

[figures not included]

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512 Channel Magnetograph Retired After 20 Years of Service (1Jun93)

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512 Channel Magnetograph Retired After 20 Years...(1Jun93)
of Service
(from NSO, NOAO Newsletter No. 34, 1 June 1993)

Just short of its twentieth birthday, the 512 channel magnetograph is being retired. This has been the major focal plane instrument at the Kitt Peak Vacuum Telescope. The telescope and instrument were originally designed by Bill Livingston, Dale Schrage, Don Trumbo and others in 1972 to support solar observations made on board the Skylab space station during 1973 and 1974. The goal was to provide seeing-limited maps of the longitudinal magnetic field on a daily basis during that mission and subsequently. Following the discovery that coronal holes (sources of high-speed solar wind) were detectable in maps of the Helium 10830 A line, maps with this line were added to the daily observing program in 1974. The name of the instrument refers to the number of spatial positions mapped simultaneously along the slit of a spectrograph.

The program and instrument have been highly productive. The bibliography of refereed papers using data from the facility numbers nearly 500. Among the discoveries with the instrument are the existence of an intermittent, mixed polarity magnetic field over the entire solar surface, a magnetic field canopy extending above photospheric magnetic concentrations, and gigantic two-ribbon events in the 10830 A chromosphere associated with filament eruptions and coronal mass ejections. Several theses were based on data from the instrument.

Until recently, the instrument probably produced more data than any other one

on Kitt Peak. It was used every clear day for more than nineteen years and generated 16 Mbytes each day for a total of nearly 100 Gbytes. Progress in recording technology is such that at first only one full disk observation would fit on a 2400 foot, seven-track tape. When 1600 bpi nine-track tapes became available, five observations would fit on a tape. Now the archive of data is being converted to Exabyte tapes, and the entire set of observations will fit in a small cardboard box.

Support for the facility has been provided by NOAA since 1974 and NASA since 1976. The observations are made available in nearly real time to the Space Environment Laboratory of NOAA in Boulder, Colorado. The data are also now placed on an anonymous ftp disk for general community access. All of the data are in the public domain, and some products are published monthly by NOAA.

Technological improvements, science imperatives, and servicing difficulties have made the instrument obsolete. It has been replaced by a spectromagnetograph which provides better measurements of more quantities. When it was designed, the 512 channel magnetograph was state of the art. A new company, Reticon, was beginning to offer linear arrays of diode light sensors. Their product line did not include what we needed, so they designed a 512 element array with 25 x 600 um pixels to meet our needs. Two of these arrays were placed in the focal plane of the spectrograph on the red and blue wings of a spectrum line so that circular polarization strength could be measured. Reduction of the 2 x 60 x 512 samples per second was done using an assembly language program and a Varian 620f computer-a hot machine in the early 1970s. The program very nearly consumed all the capability of the computer. A few years ago, the Varian (the last one on Kitt Peak) was replaced with a DEC 11-73 and the program rewritten in FORTH. However, it was necessary to add a custom 68020 processor to match the capabilities of the venerable Varian.

The 512 channel magnetograph is an example of a successful program. We expect that the new spectromagnetograph, which has replaced it, will continue the tradition.

Jack Harvey

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Expanded NSO/SP Daily Coronal Scans by E-mail (1Jun93)

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Expanded NSO/SP Daily Coronal Scans by E-mail (1Jun93)
(from NSO, NOAO Newsletter No. 34, 1 June 1993)

NSO/SP will now make available current daily scans of the Ca XV 5694 A Fe XIV 5303 Aand Fe X 6374 A corona by e-mail. These consist of calibrated photoelectric intensities at 0.15 Ro above the limb from a 1.1 arcmin aperture at every three degrees around the limb. As the data are reduced each day (Monday through Friday), an 11-line file is produced for each ion (33 lines for each observation day). These will be e-mailed automatically. A detailed description of the format will also be sent once. If you wish to subscribe to this service, send a request to raltrock@noao.edu or NOAO::RALTROCK.

Dick Altrock

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Advanced Stokes Polarimeter Available for User Community (1Jun93)

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Advanced Stokes Polarimeter Available for User...(1Jun93)
Community
(from NSO, NOAO Newsletter No. 34, 1 June 1993)

The Advanced Stokes Polarimeter (ASP), developed by the High Altitude Observatory, NCAR, in a joint program with NSO/Sacramento Peak, was installed at NSO's Vacuum Tower Telescope in March of last year. It is designed to provide previously unattainable information about the magnetic structure and evolution of sunspots and active regions, magnetic activity during the growth and decay of solar flares, and the nature of flux tubes.

The ASP has provided the first high-angular-resolution, quantitative measurements of the strength and direction of the magnetic field, at several heights in the solar atmosphere. The three high-speed cameras (five arrays total) each acquire 60 images per second, while the optical system compensates for image motion. Initial runs of the ASP have produced quantitative information with unprecedented resolution. It has already provided new information on the structure of the magnetic field in and around sunspots. A small sunspot revealed a penumbra threaded by "spines" of higher field strength and greater vertical alignment than the background penumbral field, while the magnetic field outside the sunspot showed a primarily vertical orientation.

The ASP is now available for use by visiting observers. Observing proposals for its use should be submitted to the NSO/SP TAC. HAO scientists and engineers can provide some guidance and assistance in ASP operation, data reduction and analysis.

[figure not included]

Figure Caption: This image was recorded with the Advanced Stokes Polarimeter used at the NSO/SP Vacuum Tower Telescope for magnetic field measurements of a sunspot with high sensitivity. Shown here is the magnitude of the line-of-sight field. Other images are available to illustrate the magnitude and orientation of the transverse field. Such observations will provide previously unattainable information about the magnetic structure and evolution of sunspots and active regions, magnetic activity during the growth and decay of solar flares, and the nature of flux tubes.

Bruce Lites, Kim Streander,
David Elmore, Ray Smartt

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1993 Summer Student Program (1Jun93)

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1993 Summer Student Program (1Jun93)
(from NSO, NOAO Newsletter No. 34, 1 June 1993)

The 1993 Research Experience for Undergraduates (REU) and the Summer Research Assistant (SRA) Programs at NSO are off to a good start. A total of seventeen students have been selected to work at the two NSO sites. Each student will be spending about twelve weeks at NSO, working on specific projects as assigned by the scientific staff.

In addition to the regular REU/SRA programs, students are being supported by GONG, Bartol, the USAF funded Liquid Crystal Filter and NATO Eclipse Grant, the Polar Grant, and ONR.

Eleven students from the Department of Electrical Engineering, University of Texas, El Paso (UTEP) will be working on several engineering projects at NSO/Sacramento Peak, each for a period of about twelve weeks. These students are being sponsored by a separate REU program funded through UTEP.

Sac Peak Students:

Pemiietro N. Bernesconi
Advisor: K. S. Balasubramaniam
Academic Status: Graduate Student (SRA)
Institution: Institute of Astronomy, Zurich

Olivier Bouchard
Advisor: Larry J. November
Academic Status: Junior (Grant, USAF)
Institution: Institut d'Astrophysique, Paris

Andrew Dombard
Advisor: Jeff Kuhn
Academic Status: Senior (REU)
Institution: Haverford College

Dan Enger
Advisor: Donald Neidig
Academic Status: Graduate Student (SRA)
Institution: University of Texas, Dallas

Stephen A. Gallo
Advisor: Ray Smartt
Academic Status: Senior (REU)
Institution: SUNY, Binghamton

Open
Advisor: Matthew Penn

Jennifer Ann Regan
Advisor: K. S. Balasubramaniam
Academic Status: Senior (REU)
Institution: Miami University

Bernard D. Reger
Advisor: Stephen L. Keil
Academic Status: Senior (REU)
Institution: SUNY, Binghamton

Gordon Richards
Advisor: Jack Zirker
Academic Status: Senior (REU)
Institution: Princeton University

Thomas Straus
Advisor: Larry J. November
Academic Status: Graduate Student (SRA)
Institution: University of Florence

Tucson Students:

Brent Ballard
Advisor: Stuart Jefferies
Academic Status: Senior (REU)
Institution: Miami University

Pamela D. Baugus
Advisor: Jack Harvey
Academic Status: Junior (REU)
Institution: Rhodes College

Jennifer Heath
Advisor: Charlie Lindsey
Academic Status: Junior (Grant, NSF, ATM)
Institution: Whitman College

Douglas Hott
Advisor: Mark Giampapa
Academic Status: Senior (REU)
Institution: Bradley University

Lance Lones
Advisor: Frank Hill
Academic Status: Senior (GONG)
Institution: University of California, San Diego

Mark W. Robison
Advisor: Stuart Jefferies
Academic Status: Senior (Grant, University of Delaware/NSF)
Institution: University of Minnesota

Donald Stanchfield
Advisor: Robert Howard
Academic Status: Graduate Student (Grant, ONR)
Institution: University of Rochester

K.S. Balasubramaniam, Ramona Elrod

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IR Solar Observing from NSO/SP (1Jun93)

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IR Solar Observing from NSO/SP (1Jun93)
(from NSO, NOAO Newsletter No. 34, 1 June 1993)

Several successful observing runs using the VTT/Echelle and the Evans Solar Facility Littrow spectrograph have proven the utility of these instruments for near IR (1-2.5 um) spectroscopy using a HgCdTe array camera. This instrument is based on a Rockwell TCM 1000C 128 x 128 pixel array. It has a high (&gt 70%) QE over the 1-2.5 um range and large (3 x 10E7 electrons) well depth. The read noise is about 1500 electrons, and the fastest read time is approximately 0.4 s. This camera is being made available to outside observers on a trial, limited, shared-risk basis. The instrument is currently not supported by NSO, but is available via a cooperative agreement between NSO, Michigan State University and the Wyoming Infrared Observatory. Potential users should contact Jeff Kuhn (jkuhn@noao.edu) for details on the camera and scheduling opportunities.

Jeff R. Kuhn

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Ellerman Bombs: a Thesis (1Jun93)

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Ellerman Bombs: a Thesis (1Jun93)
(from NSO, NOAO Newsletter No. 34, 1 June 1993)

Tamara E. Payne passed her thesis defense by unanimous vote of the doctoral committee on 1 April. Payne is a graduate student in astronomy at New Mexico State University and is currently enrolled in the USAF Palace Knight program at the Phillips Laboratory, NSO/Sacramento Peak. Her dissertation topic is a multiwavelength study of solar Ellerman bombs, including high-resolution, multi-spectral-line optical images utilizing the focal volume reconstruction method, Yohkoh soft X-ray images, and VLA microwave images at several frequencies.

Donald F. Neidig

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Challenge!! (1Jun93)

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Challenge!! (1Jun93)

(from NSO, NOAO Newsletter No. 34, 1 June 1993)

NSO/SP scientists are participating in The Challenge Program offered by the Cloudcroft, New Mexico public school system. This program is sponsored by the State of New Mexico for students in grades five through twelve. The thrust of the program is to enrich the science and mathematics curricula available to the students. The program includes special lectures that will provide more up-to-date information than is available from textbooks, and also allow l earning experiences outside the classroom and some in-depth research opportunities (mentorships) for selected students.

In November 1992, Polly Walker, Coordinator of the Challenge Program at the Cloudcroft Schools, met with Sac Peak scientists to plan a series of science talks, projects, tours and demonstrations for the students. Several of the NSO/SP scientists have given talks and demonstrations, including several aspects of solar physics, properties of light and wave motion, and elements of optics and detector electronics. These activities have met with enthusiastic response from the participating students. This program continues throughout the school year.

Jack B. Zirker

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NSO/SP CORONALERTS Available by ftp (1Jun93)

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NSO/SP CORONALERTS Available by ftp (1Jun93)
(from NSO, NOAO Newsletter No. 34, 1 June 1993)

NSO/SP CORONALERTs are now available by anonymous ftp to ftp.sunspot.noao.edu. They are in directory pub/corona.maps. The latest alert is in file CORONALERT, and previous alerts are in CORONALERT.SAVE. They are still available by e-mail subscription. A short description follows.

Daily observations at Sacramento Peak are obtained with the Emission Line Coronal Photometer in Fe XIV (5303 A), Fe X (6374), and Ca XV (5694 A). Most alerts are concerned with Ca XV emission, since this 3 MK line is associated with regions that have a high potential for energetic flares. Ca XV alerts will show the emission over the last 14 days; alerts will only be sent on days on which the emission was moderate or higher (&gt 1.25 millionths). Coronal Holes as seen in Fe XIV may also be reported. Comments or requests to be added to the distribution list should be sent to raltrock@noao.edu or NOAO::RALTROCK.

Dick Altrock

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Instrument Control and Data Reduction Upgrades at the FTS (1Jun93)

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Instrument Control and Data Reduction Upgrades...(1Jun93)
at the FTS
(from NSO, NOAO Newsletter No. 34, 1 June 1993)

At the Solar FTS, the DEC PDP-11/44 data and CAMAC interface hardware have been retired and replaced with a 68030-based VMEbus system for data acquisition and

a Sun SPARC IPX workstation for reduction and analysis.

The acquisition system ("xx", pronounced "Dos Equis") contains a Heurikon module with a Motorola 68030 CPU, 4 Mbytes of RAM plus 24 Mbytes to buffer the incoming data, an Ethernet interface, a 1024 x 768 pixel color graphics display, and input/output modules to interface with the existing FTS electronics. The acquisition program, written in C, runs under the "VxWorks" real-time operating system. The same type of CPU module and operating system are in use elsewhere on Kitt Peak, as telescope controllers.

The acquisition system's user interface is menu-driven and can be accessed through a terminal or through a window on the Sun workstation. The observer enters setup parameters in a spreadsheet-style screen, which updates its display of information (such as resolution and scan time) as new parameters are entered.

The use of large memory buffers allows both the current scan data and the sum of previous scans to be stored in RAM. This allows the current scan, if it is defective for some reason, to be subtracted from the sum, possibly saving several hours worth of data. This has been a greatly desired feature at the FTS and has already saved several scans.

The data and header files are written to the Sun workstation's disk through a dedicated Ethernet link. The workstation ("Corona") is a Sun SPARCstation IPX with dual Ethernet ports, and 3 gigabytes of hard disk space on its three drives. Running an updated version of "GRAMMY", Corona is capable performing up to 4-million-point transforms in under 3 minutes. The resultant spectra can then be displayed using "DECOMP" or an IRAF package known as "ISAAC". In most cases the transform is done and ready to be looked at before the next scan is ready to start.

Along with the 11/44, gone are the days of carrying nine-track tapes down to Tucson to have them transformed and hoping for spectra to arrive in the mail a few weeks later. With the new system, by the end of a run, the transforms are done, the data are written to Exabyte tape, and the observers can go home WITH THEIR DATA!

The project to re-archive all of the past FTS scans is in full swing, and compact disks (CD ROMs) full of FTS data are being cut. Each disk contains 600 Mbytes of data, and we hope to get the entire archive, from 1976 to the present, on about 36 CDs! The files on these disks are in FITS format and contain the newest "type 6" header keywords. An IRAF program called FTSDBM has been written that allows users to search all of the data in the archive using parameter queries. This program allows the user to locate quickly particular scan types in the archive. FTSDBM also keeps a low-resolution (2048-point) image of each spectrum on-line to be examined by the archive searcher.

Any questions concerning the new FTS system should be addressed to Claude Plymate (cplymate@noao.edu).

Jim Brault, Shelby Gott, Dyer Lytle,
Claude Plymate, Lourdes Ramirez

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Solar X-Ray Observations (1Jun93)

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Solar X-Ray Observations (1Jun93)
(from NSO, NOAO Newsletter No. 34, 1 June 1993)

A recent flight of a soft X-ray (64 A) solar telescope aboard a Black Brandt rocket, launched from White Sands Missile Range, produced excellent high-resolution images of the solar disk and inner corona. The Principal Investigator, Leon Golub (Smithsonian Astrophysical Observatory), was supported by a team from SAO including two graduate students. The photographic images were processed by Lou Gilliam and Todd Brown at NSO/SP. Unfortunately, the payload parachute failed to deploy upon re-entry, resulting in significant damage, although it appears that at least some of the system is recoverable. Fortuitously, the film record remained intact. The flight did confirm the new electronic imaging, data processing and transmission systems that Leon's

group have developed for use on the anticipated SWATH satellite experiment, for which SP will provide a small, white-light coronagraph.

Ray Smartt, Leon Golub, the SAO Team

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NSO/KP Operational and Instrumentation Activities (1Jun93)

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NSO/KP Operational and Instrumentation Activities (1Jun93)
(from NSO, NOAO Newsletter No. 34, 1 June 1993)

Work continues on the replacement of the aging motor generators at the McMath-Pierce and KP Vacuum Telescopes with Rotary Uninterruptable Power Supplies (RUPS) systems. Two 25 KVA RUPS were ordered last fall. The new system is designed to run both facilities from one RUPS if the other is down due to failure or preventive maintenance. Work will be completed by the end of this summer.

The DEC PDP 11/44 and CAMAC were retired at the FTS (see article by J. Brault et al. for details) and replaced by a Heurikon and Sun SPARC workstation.

The PDP 11/73 that ran the CCD controller was retired when ICE was installed. The 11/73 is now available as a spare system for the TCP/Photometry system.

The new infrared/visible gratings system has been installed and tested in the main spectrograph (see article by Pierce and Livingston).

Work was recently begun in the NOAO shops on the fabrication of the mechanical components of the 10830 A Filtergraph. The fabrication effort will becompleted this summer.

Some time ago backlash and pointing problems with the east and west auxiliary telescopes were traced to wear of the bull gears in the telescope-drive systems. New gears were ordered last fall and have recently arrived. Installation is planned for this summer's telescope shutdown. Great improvement in the functioning of the auxiliary telescopes is anticipated.

A large turbo pump, purchased by JPL, was recently installed on the 6-meter-path White cell at the solar FTS. It is anticipated that the new vacuum system will greatly assist in the removal of contaminants in the laboratory multi-pass absorption cell.

Optical design work is underway on the cross dispersion of the echelle grating in the stellar spectrograph.

The intensified CCD replacement for the aging ISIT camera used for guiding at the stellar spectrograph will arrive by the end of this summer. The new system is being developed and built by the KPNO OUV group.

Jeremy Wagner

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A Better Mc (1Jun93)

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A Better Mc (1Jun93)
(from NSO, NOAO Newsletter No. 34, 1 June 1993)

As a first step in the proposed 4-m upgrade of the McMath-Pierce telescope, a "proof of concept" development project is under consideration. The present 1.6-m quartz No. 2 (concave) mirror would be replaced by a same-diameter thin aluminum mirror, cooled and "actively" supported. According to a preliminary design by Larry Barr, this mirror would be both axially supported and temperature controlled by air jets. Lateral support would be a simple band. Mirror figure would be adjusted by a symmetric array of slowly driven mechanical couples.

To understand the constraints imposed by seeing, a free-atmosphere image monitor would be installed on top of the telescope structure. Its output would be a "site-seeing" parameter independent of the influence of Kitt Peak terrain and the telescope building. As for internal seeing, the conclusion of earlier studies by Coulman indicates that the principal cause of internal deterioration is air turbulence at the tunnel-heliostat interface. This area might be sealed off, and remedy effected, by some kind of web-like cloth paneling. The success of the existing wind-fence indicates the potential for control of air flows by such means. Perhaps a tubular suspension of similar material could be extended from the heliostat yoke inward for some distance.

Laser beam and internal micro-thermal sensors, already in place, would be activated and begin the daily recording of the telescope environment. Finally, image measurements at 2 um would be undertaken to evaluate the requirements for an IR adaptive optical system to fully correct images in "good" seeing.

Larry Barr, Fred Forbes, Bill Livingston

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Change in Schedule of McMath-Pierce Nighttime Operations (1Jun93)

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Change in Schedule of McMath-Pierce Nighttime...(1Jun93)
Operations
(from NSO, NOAO Newsletter No. 34, 1 June 1993)

As our resources continue to diminish, we must find ways to reduce our overhead costs for providing community access to the facilities. The present quarterly basis for proposal submission and review, and telescope scheduling, has added a measure of flexibility which is unique within NOAO. However, it is clear that a semester schedule would significantly reduce the administrative burden to a level which is commensurate with our present resources. A schedule which is in synch with the rest of Kitt Peak would also be easier for the Operations and Support office to manage.

The NSO will therefore modify the scheduling of the nighttime program from its present quarterly frequency to a semester basis, with the semesters and proposal submission deadlines coinciding with those of KPNO. As part of the transition from the current quarterly schedule to the new semester schedule, the deadline for proposals for an expanded fall quarter extending from 1 October 1993, to 31 January 1994, is 15 July 1993. Proposals for the spring semester (1 February 1994 to 31 July 1994) will be due on 30 September 1993.

Mark Giampapa, John Leibacher

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NSO Observing Proposals (1Jun93)

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NSO Observing Proposals (1Jun93)
(from NSO, NOAO Newsletter No. 34, 1 June 1993)

The deadline for submitting observing proposals to the National Solar Observatory for the fourth quarter of 1993 is 15 July 1993. Forms, information and a Users' Manual may be obtained from:

R. N. Smartt
P.O. Box 62
Sunspot, NM 88349
(sp@sunspot.noao.edu)

for the Sacramento Peak facilities and

J. W. Brault
P.O. Box 26732
Tucson, AZ 85726
(nso@noao.edu)

for the Kitt Peak facilities. At your request, a TeX or UNIX roff version can be e-mailed.

Dick Altrock

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NSO Telescope/Instrument Combinations (1Jun93)

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NSO Telescope/Instrument Combinations (1Jun93)
(from NSO, NOAO Newsletter No. 34, 1 June 1993)

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- 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 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):
     Ha patrol instrument

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GONG Update (1Jun93)

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GONG Update (1Jun93)
(from GONG, NOAO Newsletter No. 34, 1 June 1993)

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 and provide the data and software tools to the community, and to coordinate analysis of the rich data set that should result. The project is currently looking forward to an operational network and data management and analysis center in 1994. 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.

GONG continues to make good progress towards full scientific operations. The Annual Meeting took place in Tucson early in April with sixty-two participants, from twenty-nine institutions, representing eleven countries. Representatives from all six sites participated in a separate meeting following the Annual Meeting. Next year's meeting will take place in Los Angeles, and it is being organized by the University of California, Los Angeles and the University of Southern California.

The Instrument Team continued work on the production of the final field instruments, testing and debugging hardware and software at the prototype site, and observing with the prototype. During the first quarter of 1993, development of the prototype GONG instrument continued to wind down as activity shifts to production of the final field instruments.

A few observations were made with the prototype, but the weather continued to be unusually poor so little was obtained. The prototype instrument was used by the engineering and software groups more successfully during this period. Tests of scattered light and vibration sensitivity were made. The scattered light level outside the solar disk is higher than expected, and testing revealed that the major part of the scattering occurs in the 1 A filter and interferometer. Further tests are planned. Vibration of the image at the modulation frequency and an amplitude of 0.05 pixels systematically and detectably degrades the velocity images. An amplitude of 0.01 pixel is undetectable. Fortunately, such an amplitude corresponds to an integrated spectrum of seeing that is unlikely to ever be that bad at any of the observing sites.

A search for a square pixel CCD camera continued without success. One camera produced excellent results but suffered from interference fringes within the CCD structure, and another one was good in all aspects except linearity. Therefore, the baseline camera with rectangular pixels was ordered in production quantity. Various production optics were received and tested. A problem reproducing the prototype instrument light feed mirrors was solved by the vendor after more than six months of effort. The new mirrors are very good in maintaining the polarization state of incoming sunlight. Delays in obtaining the 5 prefilters and Michelson interferometers have occurred. Alternate options are actively being explored.

The numerically controlled milling machine that the project is using to fabricate many of the mechanical parts for the Doppler imagers suffered a major failure followed by an amazing number of errors in the manufacturer's

attempts to fix it. After nearly three months of down time, the machine has been repaired and is back in production. In spite of this, production of the six GONG field instruments has proceeded at a rapid pace. Well over half of the mechanical parts have been fabricated, including all of the parts for the light-feed assemblies and the complex Lyot filter assemblies. The parts for one light feed and one Lyot oven have been successfully assembled into proof units.

The electronic systems include twenty-eight custom printed circuit boards. About half of these have already been routed and proof boards produced. Of the five major electronic chassis, production quantities of two chassis have already been assembled and wired, and work on a third is proceeding. At the current rate of progress, all mechanical and electrical fabrication should be complete late in the fall of this year. Heavy rains in Tucson last winter delayed a planned move of the six field-instrument shelters from their original location near the NOAO shops and offices to a good-horizon site a few kilometers away. This move did occur with no problems over a weekend in early February. Interior fitting of the shelters (electrical and carpentry work) is finished, but heavy rain after the move resulted in some water damage to the floor of one of the shelters.

The Data Management Analysis Center (DMAC) Team has continued to develop the pipeline processing algorithms, and the data access and distribution system. An Exabyte 10i stacker was installed, found to be defective, returned to the vendor, repaired, and recently reinstalled. The device is currently functioning as expected.

While the cartridge preconditioning is still being performed, this function may be discontinued later this year. There is increasing evidence both from internal experience and from outside media experts that this function is not necessary.

There was one data acquisition episode during the quarter which recorded seven data days on five cartridges. These cartridges were processed by the Field Tape Reader. Five of these data days were calibrated, the other two were discarded because of instrument problems and clouds. Ten-minute averages have been computed from the five calibrated data days. Time series and power spectra of mode coefficients will be generated in the near future.

During November 1992, the GONG prototype instrument recorded eight consecutive days of calibratable data. These had been reduced to l-v spectra as separate days. During the past quarter, time series for the eight contiguous days were assembled. Power spectra and l-v spectra have been produced from the eight-day time series. The development of the code and documentation for the copying and off-site storage of DSDS cartridges proceeded rapidly during the past quarter. The code has been developed to the point where it is a functioning prototype. Fifty DSDS cartridges have been copied. A cabinet capable of holding 1600 cartridges has been acquired. The project expects to move the cabinet to the basement of the Vacuum Telescope on Kitt Peak and to begin using this storage facility late in the calendar year.

During the past quarter, a prototype version of the scientific users' interface to the DSDS was assembled after consultation with the DMAC Users' Committee. A workstation was designated as the users' machine. (Remote users log into this system using `telnet'.) Accounts were created on this system for DUC members so that they could log in and evaluate the DSDS users' interface.

At the end of the current fiscal year, the DSDS may change from DECstations to SPARCstations. In addition, the project is considering changing the RDBMS that supports the DSDS catalogs from Ingres to Oracle. An implementation plan for these changes is being developed.

The Data group continues to make progress in developing image quality measures and merging algorithms. The production of an extensive two-week artificial data set continues, with reduced aliasing in the steady flow background velocity field, the correct rotational splitting, and additional modes. The Hankel method of determining image geometry, limb darkening, and the Modulation Transfer Function (MTF) has been tested on actual GONG data. It seems to work well, particularly in the estimate of the MTF. Actual images deconvolved with the estimated MTF show marked improvement with reductions in both scattering and seeing. Since the deconvolution procedure is both computationally expensive and introduces Gibbs phenomena in the images, the current DMAC Pipeline design uses the MTF of each image from each site to correct and then merge the Spherical Harmonic Transforms of the images.

We are currently evaluating a total of 8 different merging methods:
1) Equal weights (no MTF correction)
2) Equal weights (after MTF correction)
3) MTF weighting
4) Sum from 3) + MTF window deconvolution
5) "Sigma" (MTF noise) weighting after MTF correction
6) Sum from 5) + sigma window deconvolution
7) Pick the "best" image (no MTF correction)
8) Pick the "best" image (after MTF correction)

Results using artificial data suggest that methods 3, 5, and 8 do the best job, and are so far virtually indistinguishable from each other.

Progress is also being made in the development of algorithms to detect and discard bad images from the data processing stream. A plan for the final stages of the development of the pipeline has been drafted. Tests have shown that it is desirable to flat field the intensity images before using the Hankel method of radius and MTF determination. The flat fielding can be simply accomplished using the existing calibration data, so it will be relatively simple to incorporate this step into the pipeline. A series of tests of temporal detrending methods is underway. The current method of subtracting a 21-point boxcar running mean has two disadvantages-it has a strong signature in the power spectrum, and it cannot be applied to data strings with temporal lengths of less than an hour. We are thus investigating alternative filters.

The DMAC Users Committee held a regularly scheduled meeting on 29 January. An eight-day run of data from November 1992 has been reduced to power spectra and mode frequencies. This string is of high quality and represents the first time the DMAC has constructed a multi-day spectrum.

GONG project management recently produced an update of the detailed plan for the production and deployment of the six field stations. This plan calls for the full field network to begin operations in December 1994. The effort remaining has been broken down into small enough work packages to accurately model the problem, totaling approximately 1500 tasks.

In early February, this plan was formally peer reviewed by a group of project managers and members of the GONG scientific community drawn from both inside and outside of NOAO. The panel was chaired by Bob Noyes (Harvard U.) and included Rock Bush (SOI/MDI Stanford U.), Larry Daggert (NOAO Engineering and Technical Services), Matt Johns (NOAO WIYN project), Jeff Kuhn (NSO Sac Peak), and Dale Schrage (Los Alamos National Lab.). The reviewers gave the plan high marks and recommended that the NSF take steps to insure sufficient funding for its implementation.

The project has, however, encountered a number of recent setbacks. The extraordinary weather this winter caused a two-month delay in moving the six field-site shelters to the integration site at the University of Arizona's Research Farm. More recently, Warren Ball, the Project Engineer, was felled at work by a stroke. Happily, Warren is recovering. However he is expected to have a long convalescence. In the meantime, his contributions will be sorely missed. Lonnie Cole, a senior engineer with the project, will serve as the Acting Project Engineer in Warren Ball's absence.

In February, the project learned that its FY 1993 budget had been cut by $200K from $2.5M to $2.3M. The NSF has promised to consider restoring the cut late in the year, if NSF year-end money becomes available. In the meantime, the project has severely restricted its non-payroll spending. Major capital purchases of field-station equipment planned for this year have been delayed until next year. Similarly, the planned beginning of site preparations at Big Bear and Hawaii will also be delayed. Payroll spending is also being restricted with the elimination of all planned overtime, as well as the use of additional temporary support from NOAO and external sources. The cumulative effect of these various problems may be a delay in the network deployment by as much as three to six months.

John Leibacher

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Personnel Changes in CCS (1Jun93)

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Personnel Changes in CCS (1Jun93)
(from CCS, NOAO Newsletter No. 34, 1 June 1993)

There have been a few personnel changes in CCS during the past few months.

Lisa Wells, who was at CTIO for several years, has been working half time on Kitt Peak with Bruce Bohannan and half time downtown in CCS for the past six months--providing staff and visitor support in both places. Wells has now

transferred to a full time position downtown in CCS and is working with Jeannette Barnes as a Data Reduction Specialist. Wells will continue to provide staff and visitor support downtown but will also take on additional duties focussed on helping us to write some additional IRAF user documentation. This is a two-year position that is being funded from some NASA grant monies awarded to the IRAF project. Wells has taken up residence in room 90.

Mike Fitzpatrick has been with the IRAF group for nearly five years, working initially on science applications (primarily radial velocity analysis), and more recently on systems programming, systems and site support, and system management for the workstation support program. Throughout this period Fitzpatrick's position has been funded by various NASA grants. Fitzpatrick has been transferred from his NASA-funded position to the permanent position vacated by Steve Rooke last year. Fitzpatrick's title and responsibilities are unaffected by this change.

Jeff Lewis joined the Mountain Programming Group in April. His first project will be the guider software component of the Hydra conversion to WIYN. He has nine years of experience in real-time software, scientific analysis, system software, and user interfaces. He comes to NOAO from the Tucson company Geomet Data Services, where he worked on a project involving real-time remote sensing of lightning strikes. He has instrumentation experience from working at the University of Arizona Optical Sciences IR Lab. He received a B.S. from the UA with a major in Math/Physics and a minor in Computer Science. You can find Lewis in room 179.

Jeannette Barnes, Doug Tody, Bob Marshall

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1993 Software Conference Update (1Jun93)

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1993 Software Conference Update (1Jun93)
(from CCS, NOAO Newsletter No. 34, 1 June 1993)

Plans for the Third Annual Conference on Astronomical Data Analysis Software and Systems (ADASS) to be held in Victoria, British Columbia (Canada), 13-15 October 1993, are well underway. The Conference is being hosted by the Dominion Astrophysical Observatory and the University of Victoria. Additional sponsors include the National Optical Astronomy Observatories, the Smithsonian Astrophysical Observatory, and the Space Telescope Science Institute. 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.

The Program Organizing Committee for ADASS '93 includes Carol Christian (Berkeley), Tim Cornwell (NRAO), Dennis Crabtree (DAO/CADC), Daniel Durand (DAO/CADC), Bob Hanisch (STScI), Rick Harnden (SAO), Doug Rabin (NOAO), Dick Shaw (STScI), Doug Tody (NOAO), and Diana Worrall (SAO).

This year's Conference will highlight the following special topics: Surveys and Catalogs, Multiwavelength Analysis, Networking and Distributed Computing, and Image and Spectral Analysis.

A partial list of invited speakers for the Conference includes Robert Becker (U. of California, Davis), James Condon (NRAO, Charlottesville), Jim Fullton (Clearinghouse for Networked Information Discovery and Retrieval), Joseph Hardin (National Center for Supercomputing Applications), Stephen Kent (Fermi National Accelerator Lab.), Gerard Kriss (The Johns Hopkins U.), Rick Perley (NRAO, Socorro), and Belinda Wilkes (SAO).

A Preliminary Announcement for ADASS '93 was sent by electronic mail to the Conference mailing list in early April. A more detailed announcement, which will include information on hotels, registration, abstracts, etc., will be made available in mid-May, again through electronic mail to the Conference mailing list. The Proceedings of the Conference will be published as part of the Astronomical Society of the Pacific Conference Series.

For further information about ADASS '93, or to have your name added to the Conference mailing list, please send mail to softconf@dao.nrc.ca or send a

FAX to the attention of Dennis Crabtree at 604-363-0045.

Jeannette Barnes, Doug Rabin, Doug Tody

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IRAF Update (1Jun93)

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IRAF Update (1Jun93)
(from CCS, NOAO Newsletter No. 34, 1 June 1993)

The major systems development project for the first quarter of 1993 was the IRAF X11 support package and related system facilities. This work includes not only the Xgterm and Ximtool clients for graphics and image display in the "classic" IRAF style, but also some powerful new system facilities for developing IRAF applications with integrated graphics user interfaces (GUIs) incorporating advanced graphics and image display capabilities as well as standard window system toolkit functions. One will need to obtain and install the IRAF V2.10.3 release to make full use of the capabilities of the new X11 clients and IRAF GUI applications.

Other major system projects planned for this spring include the IRAF mail network, the IRAF V2.10.3 mini-release, and the IRAF port to Solaris, the new Sun operating system. The V2.10.3 release target date has slipped from April to June. As always, the release will be staggered, with the system appearing first on the more popular platforms, starting with SunOS. The ICE-2 data acquisition software will be a major IRAF systems project in the summer and fall. This will include support for the new Arcon CCD controller and for CCD mosaics.

Testing of the IRAF V2.10 releases for VAX/VMS and the Macintosh running A/UX has been completed, and these distributions should be available by the time this Newsletter is printed. The IRAF port to the HP 730 has been completed, and testing is now underway. The Solaris 2 port is still pending, but we hope to complete this about the time of the IRAF V2.10.3 release. It is unlikely that we will release IRAF for Solaris until V2.10.3 is ready for distribution.

Frank Valdes has been extending the FOCAS faint object classification package (currently not a portable IRAF package) to use more of the IRAF system facilities such as the parameter system, multiple image types, and the IRAF virtual operating system. This will allow a VMS version of FOCAS for the first time. He has also begun work on a PSF analysis task to be used for telescope focusing and seeing monitoring. This is a complement to the SPECFOCUS task already available for focusing spectrographs. Lindsey Davis released the new version of IRAF/DAOPHOT containing Peter Stetson's DAOPHOT II algorithms for user testing, added a curve of growth analysis task based on Stetson's DAOGROW algorithm to the PHOTCAL package, and has begun work on revising the DAOPHOT documentation. Mike Fitzpatrick is developing new tasks for exporting and importing IRAF images to or from external binary image formats of various types (other than FITS, which is already well supported in IRAF).

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

Doug Tody, Jeannette Barnes

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