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NOAO is operated by the (AURA), Inc. under cooperative agreement with the National Science Foundation

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

Directors for CTIO and NSO (1Sep93)

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Directors for CTIO and NSO (1Sep93)
(from the Director's Office, NOAO Newsletter No. 35, 1 September 1993)

I am very pleased to announce the selection of new directors for NSO
and CTIO. Jacques Beckers will assume the position of Director of NSO
in October of this year. Malcolm Smith will become Director of CTIO in
November.

Beckers and Smith are, of course, well known to the astronomical
community. Beckers is returning to NOAO from the European Southern
Observatory, where he was responsible for the design of the
interferometer that will be incorporated into the Very Large Telescope
facility. He has also served as Director of the Multiple Mirror
Telescope, and earlier in his career was a staff member at the
Sacramento Peak Observatory. Beckers says that he is very much looking
forward to returning to solar physics, which is the area in which he
began his career.

Smith is currently serving as Director of the Joint Astronomy Centre in
Hawaii. The JAC operates the largest telescopes in the world dedicated
to astronomy at submillimeter and infrared wavelengths.  Smith was a
staff member at CTIO in the early 1970s, and so he, too, is coming back
to the observatory where he launched his career. Smith plans to return
to optical research, with emphasis on work on quasars. His experience
in running a multi-national facility will be especially valuable in
working with the Gemini project as it initiates construction on Cerro
Pachon.

John Leibacher will remain Director of NSO until Beckers arrives. John
will then return to the NSO scientific staff, and he will continue to
serve as Project Scientist for the Global Oscillations Network Group
(GONG). Bob Williams will become Director of STScI in August. Mark
Phillips will be the Acting Director of CTIO until Smith assumes his
new position.

I am greatly indebted to the search committees for these two positions,
and I would like thank:

        CTIO Search Committee
        James Liebert, Chair
        Bruce Carney
        James Hesser
        Ruth Peterson
        Robert Schommer
        Craig Wheeler
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NSO Search Committee
Robert MacQueen, Chair
Jeff Kuhn
Douglas Rabin
Robert Rosner
John Thomas

for their very successful efforts. Both committees identified a number of genuinely outstanding candidates, and both Beckers and Smith are exceptionally talented individuals. They will provide the kind of strong leadership that NOAO requires in challenging times.

Sidney C. Wolff

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Bob Williams (1Sep93)

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Bob Williams (1Sep93)
(from the Director's Office, NOAO Newsletter No. 35, 1 September 1993)

At the end of July, Bob Williams left CTIO to take up his new position as Director of STScI. Bob was a superb director of CTIO--in the judgment of the CTIO staff, the user community, the external review committees, and myself. He was an effective advocate for CTIO and its programs, but he also took the time to understand the issues facing other components of the NOAO program. His efforts to work with senior staff throughout NOAO to forge a consensus about programs and priorities were a key factor in shaping the way that NOAO has developed. Despite the difficulties of accommodating simultaneously to budget reductions and to the challenges of initiating such major new programs as Gemini, GONG, and WIYN, we have forged a stronger, more purposeful, and more united observatory over the past six years. Bob deserves a good portion of the credit for this achievement.

Perhaps even more important than his direct contribution to the management of NOAO and CTIO is the impact that Bob has had on the scientific environment at CTIO. His unwavering commitment to research and his infectious enthusiasm for it have influenced everyone who works with him. A director's actions often speak louder than words, and Bob's actions reminded us every day that science must be at the center of everything we do.

While we all regret losing Bob, at the same time I am pleased that the experience he gained at NOAO and his achievements here have qualified him to move on to a position that is even more challenging and that will have an even greater impact on the future of US astronomy. As we offer Bob our thanks for what he has achieved at CTIO, we must also offer him our support for the future.

Sidney C. Wolff

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Farewell to Pat Osmer (1Sep93)

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Farewell to Pat Osmer (1Sep93)
(from the Director's Office, NOAO Newsletter No. 35, 1 September 1993)

Patrick Osmer is leaving NOAO to assume the chairmanship of the astronomy department at the Ohio State University as of 1 October. Pat has served NOAO for 24 years in many important capacities. He came to CTIO as a research associate in 1969 and became an assistant astronomer the following year. In 1981, he was chosen Director for a five-year term. Upon its completion, he moved to Tucson to join the KPNO scientific staff. With only a brief interval of opportunity to pursue his research, Pat took on the task of leading the preparation of the NOAO proposal to build two 8-m telescopes, as Deputy Director of NOAO. When US participation in the Gemini Project partnership began, Pat acted as its first Project Scientist, bringing international consensus to the goals of the project as embodied in the Science Requirements Document.

Pat Osmer commands the respect of the astronomical community for his productive research collaborations on the population of high-redshift quasars, for his maintenance of high standards of research and service critical to the unique role of CTIO in US astronomy, and for his leadership in defining and bringing to fruition the international scientific partnership of Gemini.

We treasure Pat's wisdom, patience, good humor, and diplomacy as a scientific and management colleague. All of us at NOAO wish Pat and his family success and fulfillment in this new stage of life and career.

Richard F. Green, Sidney C. Wolff

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US Gemini Project Scientist (1Sep93)

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US Gemini Project Scientist (1Sep93)
(from the Director's Office, NOAO Newsletter No. 35, 1 September 1993)

The National Optical Astronomy Observatories is seeking an individual to lead the participation of the US astronomical community in the Gemini 8-m Telescopes Project. Gemini is an international project involving the United States, the United Kingdom, Canada, Chile, Argentina, and Brazil. The Gemini telescopes will set new standards in image quality, infrared performance, and technical sophistication.

The US Gemini Project Scientist will direct the US Gemini Project Office within NOAO. This office manages certain work packages that are being carried out in the US. It also coordinates communications between the Gemini Project and the community and is responsible for the dissemination of information about technical issues and opportunities to participate directly in the Project. The US Gemini Project Office supports the participation of US astronomers and technical experts on scientific advisory committees and technical working groups. The US Project Scientist is a member of the international Gemini Science Committee, represents US interests to the international project, and helps assure that the scientific requirements are being met by the technical implementation. He or she will maintain an advisory structure of interested US astronomers to formulate community policies and positions with respect to the Gemini Project.

The US Gemini Project Scientist will be an Associate Director of NOAO. He or she will be expected to conduct an active research program. Qualifications include a PhD in astronomy, astrophysics, or a related discipline, demonstrated leadership skills, a proven research record, and experience with similar projects and/or instrument development.

We take affirmative action to employ women, minority group members, and protected classes of handicapped persons, disabled veterans, and veterans of the Vietnam Era. If you qualify and would like to be considered under our Affirmative Action Program, please let us know. Submission of this information is voluntary.

By 15 October 1993, please send curriculum vitae and the names of three people who may be contacted for references to Director, NOAO, P.O. Box 26732, Tucson, Arizona 85726.

Sidney C. Wolff

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New NOAO Newsletter Editor (1Sep93)

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New NOAO Newsletter Editor (1Sep93)
(from the Director's Office, NOAO Newsletter No. 35, 1 September 1993)

Beginning with the 1 December issue, the NOAO Newsletter will have a new editor: Tod Lauer, who is an Assistant Astronomer at KPNO. Tod and Taft Armandroff have edited this issue jointly. The change in editors is part of a rearrangement of duties at NOAO Tucson. Taft, who has been editor for the past four years, will assume scientific leadership of the KPNO O/UV program.

Tod is committed to maintaining the quality of the Newsletter with emphasis on keeping the community up to date on the observing opportunities and new capabilities offered by NOAO. He will also be looking at ways to redesign the Newsletter to make it more useful. Tod would welcome any comments or questions you have about the NOAO Newsletter. He can be reached via e-mail (tlauer@noao.edu).

Sidney C. Wolff

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Cooperative Agreement Renewal Proposal (1Sep93)

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Cooperative Agreement Renewal Proposal (1Sep93)
(from the Director's Office, NOAO Newsletter No. 35, 1 September 1993)

AURA operates NOAO under a Cooperative Agreement with the National Science Foundation. The current five-year agreement extends until the end of the 1994 fiscal year. The AURA and NOAO staffs have collaboratively prepared a proposal to the NSF for renewal of the cooperative agreement for another five-year period.

The occasion of the proposal provides the opportunity to assess the recent accomplishments of the Observatories and to articulate the vision that forms the basis for long-term planning. The Executive Summary of the proposal comprises a compact statement of achievements and goals, and is reproduced below in its entirety. We value your comments and suggestions.

Richard F. Green, Sidney C. Wolff

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Executive Summary of Cooperative Agreement Renewal Proposal to NSF (1Sep93)

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Executive Summary of Cooperative Agreement...(1Sep93)
Renewal Proposal to NSF
(from the Director's Office, NOAO Newsletter No. 35, 1 September 1993)

"Let there be a place where every US astronomer may observe and learn about the universe..."

That is the vision of the national observatories as Leo Goldberg saw it: access to world-class instrumentation, granted based on merit, not institutional affiliation. Does this democratic vision still make sense? Or should the field be left exclusively to researchers at institutions that have facilities of their own? In solar physics and radio astronomy, this is not a serious question because the national observatories play a dominant role and privately funded facilities are few and far between. In optical astronomy, however, it is an issue because outstanding privately-funded telescopes exist and are being built with apertures of up to 10-m.

The debate is intense and occasionally heated. To many, the National Optical Astronomy Observatories (NOAO) are of central importance as the only avenue by which they can pursue their science. Others see NOAO as a useful complement for the private facilities they have access to. Still others consider NOAO as superfluous and as an unwelcome competitor for Federal funds. Fortunately, most colleagues take statesmanlike views that recognize that private and national facilities both are essential.

AURA believes that national and private observatories are both necessary and play important and complementary roles. Many AURA members have direct access to superb facilities, others depend upon NOAO, and many use both types of facilities. As a place where both interests meet, AURA is in a unique position. Chartered to advance astronomy, AURA seeks to serve the whole astronomy community. As trustee and advocate for the mission of NOAO, AURA works with the broader community through workshops and written communication as it develops guidance for NOAO. As a result, NOAO today works more closely with other institutions in the USA and abroad than ever before, it serves the community with world-class instrumentation, it builds strength for the future through joint projects, and it is leaner and more cost-effective than before.

The NOAO staff takes pride in their accomplishments during the current Cooperative Agreement period. They have maintained a vigorous scientific research program and have brought to fruition many innovative, versatile and reliable user instruments. They have provided an unparalleled level of service and dedication to the users of NOAO facilities. The availability of those facilities enables excellence in research to be maintained by top- caliber individuals in many different types of institutions. The top graduates of the programs training astronomers are now widely based in universities and research labs throughout the country, and only a minority have direct access to research quality telescopes through private observatories. The NOAO observatories, which represent millions of dollars of capital invested for the general use of the community, provide the leverage that makes the NSF grants program effective for observers and students. The use of pooled community resources to support the work of individual investigators is a very economical and effective method for the acquisition and distribution of data.

The evolution of NOAO in the mid-1990s will be managed to achieve five basic long-term goals. The first is the integration of the night-time program into a broader context of national facilities including the US share of Gemini. At a mechanistic level, this process involves achieving compatibility with and influencing the development of the Gemini protocols for observatory, telescope and instrument control and user interface. NOAO is prepared to take an active role in partnership with the US community in developing instruments for Gemini. It will develop integrated observing strategies, which will be required for efficient use of the scarce resource of 8-m time. Accurate astrometric positions of very faint objects can be produced from the very large format CCD mosaic imagers being developed. The new prime focus correctors for both 4-m telescopes will allow high-quality survey work to be carried out in preparation for 8-m spectroscopy. Similarly, spectroscopic discovery work on 2-m and 4-m class telescopes will provide the necessary basis for higher dispersion studies requiring the 8-m apertures.

A second major goal is success in the initiatives for solar astronomy. The GONG network will be collecting data and opening its archive during the period of this Cooperative Agreement. The program to measure the Radiative Inputs of the Sun to the Earth (RISE) will be addressing a critical aspect of global change monitoring by measuring subtle changes in the Sun's radiative input to the Earth.

Revitalizing the infrastructure represents a third long-term goal. The greatest scientific impact is anticipated to come from a concerted effort to improve the image quality and performance of the observatory telescopes. Diagnosis and cure of optical aberrations, observatory thermal control, adaptive optics, and modernization of the pointing and tracking capability of the current telescopes will increase their effective light-gathering efficiency. Initiative funding or collaboration might allow replacement of old, small-aperture telescopes with modern high-performance systems. With WIYN coming on line and SOAR in advanced planning and preparation, both night-time sites will add significant capability to meet the pressing demand for 4-m class time. A 4-m class solar infrared telescope for the McMath-Pierce Facility will be pursued.

Priority will be given to a major upgrade in the instrumentation program. Facility-class instruments based on large-format arrays require larger cryogenic enclosures and a higher degree of complexity to maintain versatility. The demands of the Gemini Project for stringent engineering standards, thorough qualification and acceptance testing, and adequate documentation for instruments provided by the partner countries must drive the NOAO instrumentation program to a higher level of performance and management efficiency. The close comparison with national efforts in the Gemini partner countries shows us that such a step is required for the US to remain competitive. Expansion of the solar instrumentation program to address the unique challenges of the science remains an important goal.

In the coming years, the entire community will be grappling with the difficulty of the inadequacy of support for all the active programs and talented individuals pursuing research in astronomy. NOAO will form closer partnerships with the astronomy community to share the benefits of technology developments. If it becomes increasingly difficult to maintain stand-alone capability in a wide range of specialties, an emphasis on complementarity maintained by agreement among private and public observatories and a sharing of expertise would add strength to the entire astronomy enterprise in the US.

Specific technical goals will move the nighttime program toward integration with Gemini and advance the solar physics initiatives. NOAO plans to participate in both IR and optical detector development programs that will lead to the procurement of detector arrays and controllers for Gemini. It is also developing innovative observing techniques and new approaches to scheduling and archiving. Combined with the intention to exercise Gemini telescope control protocols on the NOAO nighttime telescopes, NOAO will work with Gemini to guide and develop the operations model for the Gemini Observatories.

The plans for the next five years include implementing the adaptive optics system and further developing all-reflecting coronagraphs for Sacramento Peak, implementing near and mid- infrared cameras for the McMath-Pierce Facility on Kitt Peak and initiating technology developments and facility improvements that would lead to a 4-m solar telescope to fully exploit an IR potential, rebuilding the fiber positioner and bench spectrograph to move from the Mayall to the WIYN telescope on Kitt Peak and replacing the bench spectrograph capability at the 4-m, developing the 8000 x 8000 pixel CCD mosaic system at Kitt Peak, completing the cryogenic echelle spectrometer (PHOENIX), developing a moderate resolution IR spectrometer for KPNO and CTIO, and driving the development of 1024 x 1024 indium antimonide IR array detectors.

The high level of productivity from, and demand for time on, NOAO telescopes is driven by a vigorous and innovative program of modernization and instrument development. The degree to which the management sets realistic long-term goals and the technical staff is able to carry them out can be assessed from examining the plan set out in the last Cooperative Agreement proposal. Six major initiatives were proposed.

The first was for NOAO to move forward in proposing a pair of national 8-m telescopes. NOAO did submit a proposal, which resulted ultimately in the initiation of the Gemini Project, in which the US community has a 50% share of two 8-m telescopes, one in each hemisphere, with outstanding image quality and control of thermal background. That project now has fully committed funding and is proceeding rapidly with engineering design.

The second initiative was for LEST, the Large Earth-Based Solar Telescope. The full concept was not ultimately supported in the US, but the Adaptive Optics program at Sacramento Peak carries the legacy of the thrust toward high resolution solar imaging.

Access to 4-m class telescopes was to be expanded through cooperative ventures with university consortia. The WIYN 3.5-m telescope, developed by Wisconsin, Indiana, Yale and NOAO, is headed for first light near the end of 1993. The SOAR consortium of North Carolina, Columbia and NOAO/CTIO is planning for a 4-m telescope to be placed on Cerro Pachon near the southern Gemini 8-m site.

A synoptic monitoring program with dedicated instrumentation was proposed to study stellar activity cycles. The instrument itself was not developed, but a synoptic program continues actively at the McMath-Pierce facility, and would be part of the proposed "Big Mc."

A distributed interferometric array of modest aperture telescopes was proposed. The Advanced Development Program could not support that program, but Steve Ridgway is a collaborator with the IOTA consortium of university scientists building such an array on Mt. Hopkins. NOAO is hosting part of the group as visitors currently.

Finally, the GONG network development was highlighted as a major priority; deployment will begin soon.

Instrumentation goals were met and exceeded. The infrared (IR) group proposed to obtain 256 square arrays and to deploy them in a Cryogenic Optical Bench (COB) and other cameras. The simultaneous four-color infrared array imager, SQIID, was implemented with 256 square PtSi arrays, and the IR imager (IRIM) was fitted with a HgCdTe array, while COB is being deployed with an InSb array. NOAO is collaborating with the USNO and Hughes Santa Barbara Research Corporation to develop 1024 square InSb arrays for the next generation of instruments.

A cryogenic echelle was proposed, and is now in fabrication. That capability is critical to determination of chemical abundances in the extended atmospheres of red giant stars and in probing the interstellar medium in dusty regions.

Mid-infrared array development and deployment was outlined, but was not accomplished.

Both CTIO and KPNO proposed and built multi-fiber coupled spectrographs, with the second-generation Hydra positioner in regular use and about to be rebuilt for the WIYN telescope.

The Optical/UV group proposed deploying 2048 square CCDs if they could be produced and expanding to mosaics for larger formats. Large- format arrays from Tektronix and Loral are in routine use on the mountains, and mosaics are under development. New generation controllers have been developed as outlined, and will replace the existing systems this year.

Sun/IRAF workstations were to go to the mountain, and have indeed fully replaced the FORTH systems for data acquisition and reduction. Despite the enormous increase in the rate of data accumulation, the upgrade of the data systems still allows astronomers to go home with reduced data.

A new telescope control system was planned, and executed for the Kitt Peak 2.1-m and 4-m telescopes; the other telescopes and divisions will gradually be similarly upgraded.

Solar infrared arrays for magnetic field mapping were deployed as proposed.

A major effort was identified for improvement of image quality; significant progress has been achieved at CTIO and the other sites will follow.

Considering that the purchasing power of NOAO declined continuously over the period of performance, the staff is justified in taking pride in that level of accomplishment. Nevertheless, the management is committed to finding new ways of increasing productivity and accountability, while maintaining a creative environment.

NOAO exists to advance US astronomy through scientific discovery. NOAO users, staff and facilities have played central roles in many of the major findings of the last decade. These discoveries represent a qualitative change in the type of problems that can be addressed because of the use of new technologies in detectors and focal plane instrumentation. Because of the high quantum efficiency and photometric accuracy of optical detectors, large collaborative programs at the National Observatories and university and other private facilities have begun to produce a picture of the large-scale distribution of galaxies and perturbations to the Hubble expansion. The possibility of large-scale streaming motions and the controversies over their reality, direction, and origin are prompting further major investigations and redshift surveying. Infrared array detectors have allowed examination of the stellar populations and excited nebular components of high-redshift radio sources. The build-up of the chemical elements at the early epochs in cosmic time can be traced through quasar absorption-line studies. Extremely deep optical images reveal a population of very blue galaxies at faint magnitudes, thought to be undergoing an episode of intense star-formation activity. Many more observations are required before the question can be answered as to whether the old stellar population of the Milky Way represents a universal pattern of star formation and chemical enrichment with cosmic time.

Infrared arrays allow direct probing of the environments of individual protostellar objects and the depths of the clouds of molecules and dust that enshroud nascent star clusters. Direct determinations of the initial mass functions and the physical structures of the disks and jets of forming stars lead to fundamental advances in the understanding of the process of star formation. The infrared also allows access to spectral features with great sensitivity to local magnetic field strength, which has allowed direct determination of the strength and direction of the magnetic field on the solar surface. The true magnetic field strength has been measured in solar plages and shows spatially coherent and correlated variations of field strength and area filling factor. The causes of this phenomenon are not understood and are leading to a deep review of models of the field production and evolution.

A concerted observational and theoretical effort is underway to understand the internal dynamics of the Sun and the origin of the solar cycle. GONG will provide the most accurate determination of the internal rotation rate of the Sun ever obtained. It is unique in providing data to explore the solar internal thermal structure and convection. High-degree helioseismology will map horizontal flows as functions of depth and heliographic position in the convection zone. The absorption of acoustic wave energy by sunspots and the possible emission of waves by flares may elucidate the subsurface structure of sunspots and active regions. Other techniques may be used to map the global pattern of convection in the Sun.

Another major driver for current uses of ground-based telescopes is synergism with space-based observations. All-sky surveys by ROSAT and EUVE require significant programs of ground-based follow-up; imaging and spectroscopy with the Hubble Space Telescope often are combined with complementary observations from the ground. The microwave background measurements of COBE have focused attention on the observable consequences of a limited range of allowable spectra of primordial density fluctuations. NSO's Kitt Peak Vacuum Telescope continues to provide major support for the Yohkoh Satellite and is preparing to support SOHO.

Scientific discovery is made possible only through a prudent management of resources to support the community's needs for facilities. AURA not only helps NOAO chart the course to the future but also helps NOAO deal with budgetary and other adversities. AURA helps NOAO meet the challenge to serve a community that is characterized by a wide variety of interests and diversity of views that are often held with great conviction. That challenge is especially great today, when opportunities for advancing astronomy outstrip the resources to realize them.

To ensure the best and most effective use of funds, AURA provides critical but supportive oversight for NOAO through the AURA Board's Observatories Advisory Committee and through periodic reviews by an independent visiting committee. AURA encourages excellence in service to the community and in science at NOAO through annual awards to its staff. It helps build bridges between NOAO and the academic community through an AURA Visiting Professor program.

NOAO's share of the annual cost of all of AURA's activities amounts to an "overhead" of about 1.5 percent on NSF funds for NOAO. That very low overhead is made possible, in part, because Board members donate time to AURA. AURA contributes significantly to NOAO by donating the use of AURA-owned property in Chile and elsewhere.

AURA proposes to continue to operate NOAO for the National Science Foundation under a COOPERATIVE agreement. That term symbolizes that AURA views itself as a partner with the NSF in ensuring the best use of NSF funds in serving the US astronomy community at NOAO.

This proposal comprises NOAO activities in ground-based IR-optical astronomy that benefit the US astronomy community and its traditional allies in Canada and in Chile. Also included are US activities in support of the international Gemini project. This proposal excludes management of Gemini. Because that project serves the science communities of all Gemini partner countries, it will be the subject of a separate cooperative agreement.

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NOAO Preprint Series (1Sep93)

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The following preprints were submitted during the period 1 May 1993 to 31 July 1993. Please direct all requests for copies of preprints to the NOAO author marked with an asterisk.

Number	Author(s)	Title
524	*Jacoby, G.H., Kaler, J.B.	"Improved Observations of Faint Planetary Nebulae in the Magellanic Clouds"
525	*Zirker, J.B.	"Coronal Heating"
526	*Williams, R.E., Philllips, M.M., Hamuy, M.	"The Tololo Nova Survey: Spectra of Recent Novae"
527	*Armandroff, T.E., Da Costa, G.S., Caldwell, N., Seitzer, P.	"The Dwarf Spheroidal Companions to M31: A Color-Magnitude Diagram for And III"
528	*Fowler, A., Heynssens, J.	"Evaluation of the SBRC 256 x 256 InSb Focal Plane Array and Preliminary Specifications for the 1024 x 1024 InSb Focal Plane Array"
529	*Gatley, I., Merrill, K.M.	"The Impact of Two Dimensional Infrared Arrays on Astronomy"
530	*Heynssens, J., Fowler, A.	"Valley Oakes/Cincinnati Electronics 256 x 256 InSb Array Evaluation"
531	*Walker, A.R.	"A Color-Magnitude Diagram for the LMC Cluster Hodge 11"
532	*Giampapa, M.S., Basri, G.S., Johns, C.M., Imhoff, C.L.	"A Synoptic Study of H Line Profile Variability in the T Tauri Star SU Aurigae"

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Non-NOAO Preprints (1Sep93)

Non-NOAO Preprints (1Sep93)
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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
Bocchialini, K., Koutchmy, S., Vial, J.C., *Zirker, J.B.	"Analysis of the Chromospheric Proxies of Coronal Bright Points"
Ciardullo, R., *Jacoby, G., Dejonghe, H.B.	"The Radial Velocities of Planetary Nebulae in NGC 3379"
**Davis, L.E., Gigoux, P.	"PHOTCAL: The IRAF Photometric Calibration Package"
**Davis, L.E.	"New Software for the IRAF Stellar Photometry Package"
*Eggen, O.J.	"Degenerate Stars in the Hyades Supercluster"
**Fitzpatrick, M.J.	"The IRAF Radial Velocity Analysis Package"
**Fitzpatrick, M.J.	"SPPTOOLS: Programming Tools for the IRAF SPP"
Guhathakurta, M., Fisher, R.R., *Altrock, R.C.	"Large Scale Coronal Temperature and Density Distributions, 1984-1992"
*Hamuy, M., Maza, J., Phillips, M.M., Suntzeff, N.B., Wischnjewsky, M., Smith, R.C., Antezana, R., Wells, L.A., Gonzalez, L.E., Gigoux, P., Navarrete, M., Barrientos, F., Lamontagne, R., Della Valle, M., Elias, J.H., Phillips, A.C., Odewahn, S.C., Baldwin, J.A., Walker, A.R., Williams, T., Sturch, C.R., Baganoff, F.K., Chaboyer, B.C., Schommer, R.A., Tirado, H., Hernandez, M., Ugarte, P., Guhathakurta, P., Howell, S.B., Szkody, P., Schmidtke, P.C., Roth, J.	"The 1990 Calan/CTIO Supernova Search"
Hartigan, P.A., Morse, J.A., *Heathcote, S.R., Cecil, G., Raymond, J.C.	"Observations of Entrainment and Time Variability in the HH 47 Jet"
Hillenbrand, L.A., *Massey, P., Strom, S.E., Merrill, K.M.	"NGC 6611: A Cluster Caught in the Act"
Laor, A., Bahcall, J.N., Jannuzi, B.T., Schneider, D.P., *Green, R.F., Hartig, G.F.	"The Ultraviolet Emission Properties of Five Low-Redshift Active Galactic Nuclei at High Signal to Noise and Spectral Resolution"
Lee, M.G., *Geisler, D.	"Metal Abundances for a Large Sample of Globular Clusters in M87"
McMillan, R., Ciardullo, R., *Jacoby, G.	"Planetary Nebulae as Standard Candles. IX. The Distance to the Fornax Cluster"
Meech, K.J., *Belton, M.J.S., Mueller, B.E.A., Dickson, M.W., Li, H.R.	"Nucleus Properties of P/Schwassmann-Wachmann 1"
Morse, J.A., *Heathcote, S.R., Hartigan, P., Cecil, G.	"Spectrophotometric Evidence for Velocity Variability in the HH 34 and HH 111 Stellar Jets"
Mould, J.R., Xystus, D.A., Da Costa, G.S., *Schommer, R.A.	"The Age of the Large Magellanic Cloud Cluster NGC 1953"
*November, L.J.	"Design of Precise Ultraviolet Imaging Polarimeters that Rely on In Situ

Calibration"

*Phillips, M.M. "The Absolute Magnitudes of Type Ia Supernovae"

**Seaman, R. "Managing an Archive of Weather Satellite Images"

*Smartt, R.N., Koutchmy, S. "Recent Developments in Coronagraph Instrumentation"

**Tody, D. "IRAF in the Nineties"

**Valdes, F. "SPECFOCUS: An IRAF Task for Focusing Spectrographs"

**Valdes, F. "The IRAF/NOAO Spectral World Coordinate Systems"

*Zirker, J.B., Engvold, O., Zhang, Y. "Flows in Quiescent Prominences"

** Available in the preprints directory on pandora.

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

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Preprint FTP Archive (1Sep93)

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Preprint FTP Archive (1Sep93)
(from the Director's Office, NOAO Newsletter No. 35, 1 September 1993)

ftp pandora.tuc.noao.edu (or 140.252.1.24), cd preprints

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CTIO Instrumentation (1Sep93)

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CTIO Instrumentation (1Sep93)
(from CTIO, NOAO Newsletter No. 35, 1 September 1993)

Another important milestone in the ArCon CCD controller project was achieved in May with the successful completion and testing of ArCon 3.2, which was set up to control one of CTIO's two Tektronix 1024 x 1024 CCDs. This combination was used for 10 nights of essentially trouble-free observations with the Folded Schmidt camera on the 4-m telescope R-C Spectrograph. The Tek1024 #2 CCD, like several others in use at CTIO, has four good output amplifiers, and thus is able to be operated in quad readout mode with the ArCon controllers--which in turn results in a substantial increase in observing efficiency for the astronomer. After some further optimizing of the ArCon 3.2/Tek1024 #2 combination, work has proceeded on ArCon 3.3, which is scheduled to be mated to the Tektronix 2048 x 2048 CCD sometime in August.

The new Large Format Prime Focus CCD camera (LF PFCCD) performed flawlessly in its first visitor usage in June, allowing observations to be made for the first time at the prime focus of the 4-m telescope with the Tektronix 2048 x 2048 CCD. For this run, the LF PFCCD was used behind the triplet corrector, but hopefully in September the new Prime Focus Atmospheric Dispersion Compensating (PF ADC) corrector will be available. For this same September run, the Tek2048 CCD should also be under the control of ArCon 3.3, providing more efficient, reliable operation and also improved data quality.

The f/7.8 secondary mirror was removed from the 4-m telescope in early-June and immediately shipped to Contraves Goerz for optical testing. These tests should be completed by the end of July, at which point the secondary will be shipped to Kodak for ion polishing. Fingers were crossed as the secondary left the mountain by truck for Santiago, but within a few days word was received that the mirror had arrived at Contraves without mishap! In the meantime, work continues intensively on improvements to the secondary mirror support system that will allow more precise and efficient alignment of the mirror, and also on a Shack-Hartmann image analyzer which will be mounted in the Cassegrain guider to allow frequent monitoring of the performance of the 4-m optics.

Mark M. Phillips

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IR News (1Sep93)

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IR News (1Sep93)
(from CTIO, NOAO Newsletter No. 35, 1 September 1993)

This issue we have a lot of news regarding the IR instrumentation. Major changes are (finally) taking place in what we can offer our users--read the following articles carefully to understand your options.

OSIRIS Continues

CTIO has reached an agreement with the Ohio State University to extend the visit of the Ohio State Infrared Imaging Spectrometer (OSIRIS) through the first nine months of 1994. This amounts to all of first semester and roughly the first two months of the second semester. OSIRIS has now actually been used successfully on the 4-m telescope, and we expect it to work satisfactorily for visitors as well.

The terms of the agreement are slightly different than for the current second semester (1993). There are two aspects that are of general interest. First of all, CTIO personnel will be assuming greater responsibility for support of the instrument. This means specifically that CTIO scientific staff or observer support people will be providing visitor checkout, and also that the mountain electronics crew will have been trained to diagnose and repair (by board swapping) any failures that may occur. Support for major failures will continue to be provided by OSU; while this means in principle that a night or more could be lost, the history of the instrument at Flagstaff suggests that this is unlikely.

The other new condition of the agreement is that OSU has been guaranteed three weeks of time on the 1.5-m telescope with the instrument, primarily during the first semester. The time will be used to carry out an NSF-funded galaxy survey. It is our opinion that the increased opportunities for other observers - both on the 4-m and on the 1.5-m - more than justify the terms of the agreement. OSU will provide a written description of the program of observations to be carried out, which will be reviewed by the CTIO staff.

One other detail that affects users is that optimum use of OSIRIS requires installation of a cold Lyot stop designed for the specific telescope. In order to minimize such installation work, the instrument will be scheduled on the same telescope during several consecutive light runs. Tentatively, we expect that it will start the semester on the 1.5-m (where it will have been used since December) and will shift over to the 4-m around mid-semester (probably May or June; this will depend on demand) and will likely remain there until it returns to the US. We may be able to obtain some flexibility by using it on the 1.5-m with the 4-m Lyot stop, since the performance reduction in this configuration is modest, but users are warned that it may be difficult or impossible to schedule proposals with tight date restrictions.

OSIRIS Performance Update

OSIRIS has now had its first run on the 4-m, scheduled as a visitor instrument. Set-up and operation went fairly smoothly, with only one minor failure. Furthermore, there were several clear nights, so that we have actual sensitivity measurements:

On the 4-m, in 10 minutes one can detect (5-sigma) stars of K=18.5 to 19. H sensitivity will be slightly better, and J sensitivity perhaps half a magnitude better again. Although a K' filter is present, there is very limited experience with it. Because the OSIRIS cold stop has been carefully matched to the telescope, it is not clear that the K' filter offers significant gains in sensitivity.

The cross-dispersed option has also been exercised. This provides simultaneous JHK spectra at low resolution. The low limit is set by the blocking filter, which is required to avoid problems with the grism second order in the K band; the lower limit is approximately 1.18 microns. For shorter wavelength work, one can use a 0.9-1.1-micron filter, although spectral coverage is again limited by the free spectral range of the OSIRIS grating, which is blazed for 6.6 microns.

Unlike the CTIO instruments, there is no dichroic in OSIRIS. The only way to guide therefore (other than trusting the telescope tracking) is with the offset guider. As used with OSIRIS, the field of view of the TV camera is very small (5 arcsec); this makes searching for guide stars very slow. Anyone with OSIRIS time is strongly advised to come with accurate (1 arcsec or so) offsets to guide stars!

IR Imagers Out of Service

Because of the continued availability of OSIRIS, we are able to take our other IR imagers out of service, as they provide smaller formats or reduced efficiency. As of this writing, the 58 x 62 IR Imager and the Pt:Si Imager are no longer available. This policy does mean that L-band imaging is no longer possible at CTIO--although L-band photometry is, with similar efficiency, using the single-channel photometer. We will, reluctantly, provide the Imager for anyone with a continuing program who requires L-band images, and who provides a justification for the need acceptable to the TAC.

Work on CTIO's HgCdTe Imager has now progressed far enough for us to lay out a plausible schedule for completion. It is currently our expectation that the instrument will be completed around the middle of first semester, and that it will be fully commissioned by the start of second semester 1994. Watch the March 1994 Newsletter for further details.

IR Spectrometer to be Upgraded

We are also taking advantage of the OSIRIS visit to upgrade the CTIO IR Spectrometer to use a 256 x 256 InSb array. The existing optics should provide acceptable performance for a larger array with smaller pixels, although we will continue to have only a relatively short length of usable slit. This upgrade is being done cooperatively with KPNO, who will produce a copy of the WILDFIRE control electronics to run the 256 x 256 array, and will assist with the array installation.

This upgrade requires relatively little CTIO manpower, but the people involved are largely the same as for the HgCdTe Imager, and hence final commissioning of the upgraded instrument will not occur until after the Imager has been commissioned. It is likely that the upgraded IRS will not be available until about the time OSIRIS leaves--i.e. second half of second semester 1994. The IRS will not be available in any form first semester because of the upgrade.

IR Photometer Lives

We will continue to offer single-channel IR photometry on the 1.5-m and 4-m telescopes, with both the InSb detector (D-3) and bolometer (D-1). For work at longer wavelengths, this is the only southern hemisphere facility open to US astronomers, and we do not plan to remove it from service at any time in the near future. In fact, in order to eliminate our dependence on the aging Data General computers currently used for the system, we intend to convert to a PC-based data acquisition system in the next year or so.

J. Elias, R. Elston, B. Gregory

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CCD News (1Sep93)

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CCD News (1Sep93)
(from CTIO, NOAO Newsletter No. 35, 1 September 1993)

ArCon Implementation

As predicted in Newsletter No. 34, the Tek 1024 #2 CCD was converted to operation with a new ArCon CCD controller (ArCon 3.2) in early May. It was subsequently successfully used (12-22 May) at the 4-m telescope, with the R-C spectrograph and Folded Schmidt Camera. On 14 July ArCon 3.2 was installed at the 0.9-m, for a continuous six-week period. At the same time operation of the filter wheels was changed to a STD bus controller. Both the STD bus computer and the Telescope Control System computer are fully integrated with the ArCon.

An astronomer operates an ArCon CCD controller from a Sun SparcStation 10 computer, via an IRAF-based user interface. This user interface is very similar to the KPNO "ICE" interface, and is easy to operate. A second Sun computer is available in the control room; if desired this computer can be used for IRAF reductions instead of the IRAF reduction window on the Data Acquisition computer. Both Instrument and Software Manuals are available from the CTIO FTP Archive (see article in this Newsletter); be cautioned that over the next few months the Software Manual in particular will be frequently updated as enhancements and modifications are made.

Initial feedback from observers has been very positive. Users who have learned to dread the appearance of "MUX TIMEOUT" messages when using the old VEB controllers will be pleased to learn that the ArCon hardware appears to be ultra- reliable. We summarize some of the advantages of the ArCon CCD controllers over the old VEB controllers, in no particular order:

o Quad channel readout for CCDs with multi-amplifiers.
o Unsigned 16 bit data (0-65535) allows greater dynamic range.
o Dc coupled preamp means no memory of image in overscan.
o Real time display with saturated pixels in red.
o Direct data interface to Sun/IRAF.
o Faster readout in single channel mode for most CCDs.
o Freedom from fixed pattern noise at fast read rates.
o Greatly increased hardware reliability.
o Similar observing environment at CTIO and KPNO.

The conversion of our CCDs to ArCon operation is unfortunately a rather slow process, due to the need to schedule the CCDs we have, implement new CCDs, and also to convert instruments to operate in the new (Sun, ArCon, IRAF) environment. In addition, we are taking the opportunity to simultaneously update the motor controllers on some instruments, using STD Bus computers. At present we have the following ArCons; all these CCDs have four working amplifiers:

o ArCon 2.1, Thomson #1 CCD, used at the Schmidt telescope.
o ArCon 3.1, Thomson #2 CCD, used as Lab. development system.
o ArCon 3.2, Tektronix 1024 #2 CCD.
o ArCon 3.3, Tektronix 2048 #3 CCD (scheduled for August 1993).

Beyond this, our plans are as follows. The completion dates are approximate, and depend on the available manpower:

o ArCon 3.4, Nicmos III IR array (mid 1994)
o ArCon 3.5, Tektronix 1024 #1 CCD (late 1993)
o ArCon 3.6, Tektronix 2048 #2 (STIS) CCD (late 1993)

o ArCon 3.7, Loral 3K CCD (early 1994)

For the next few months, predicting whether or not a given observer will get an ArCon-based CCD is not easy. It is likely that all future 0.9-m observers, excepting those requesting the TI CCD, will be scheduled with a Tek 1024 or 2048, operated with an ArCon controller. Direct imaging with ArCon CCDs will start at the 1.5-m as soon as a STD bus motor controller is built for that telescope, presently scheduled for November. Direct imaging at the 4-m prime focus, and all 4-m and 1.5-m Echelle long camera runs should use the ArCon-based Tektronix 2048 in the future. The remaining CCDs, used for 4-m R-C spectroscopy, 1.5-m spectroscopy, and with the Rutgers Fabry-Perot, are scheduled to be converted to ArCon operation during 1994.

4-m Prime Focus Imaging with the Tek 2048

For the period 11-23 June the Tektronix 2048 CCD was installed for the first time at the 4-m prime focus, with the Large Format PFCCD camera. The blue triplet corrector was used, while the instrument control employed a hybrid arrangement (old VEB controller for the CCD, new STD bus instrument controller operated stand-alone for the motors). After a few hiccups due to poor connections between the prime focus cage and the motor-controller terminal, all worked reasonably reliably. Considerable field curvature was apparent; the resulting defocus could be minimized (as an example, 1.0 arcsec FWHM center, 1.1 arcsec FWHM corners) by focussing approximately mid-way center-to-edge of the CCD. DAOPHOT II with a quadratically-varying PSF did a good job of fitting the profiles.

Ray tracing by Brooke Gregory indicates that the great majority of the field curvature is due to the triplet corrector, and the curvature of the CCD has only a minor effect. This is good news, since it implies that the new ADC corrector should produce images with no defocus over the whole CCD. Future PFCCD runs are scheduled to use the ADC corrector and ArCon CCD controller, and results from this combination will be reported in the next Newsletter.

Alistair Walker, Steve Heathcote

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Requests for CTIO Telescope Time (1Sep93)

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Requests for CTIO Telescope Time (1Sep93)
(from CTIO, NOAO Newsletter No. 35, 1 September 1993)

1 August 1993 - 31 January 1994

Telescope		Nights Req.	Nights Sched.	# Req./ # Sched.	#. of Prop.	# Sched.	Total #/ # Sched.	# Staff Nights	% Staff Nights
4-m	Dark	222	88	2.5	69	28	2.4	17	19
	Bright	133	69	1.9	38	21	1.8	12	17
1.5-m	Dark	174	94	1.9	42	24	1.8	15	16
	Bright	127	72	1.8	27	16	1.7	9	13
1-m	Dark	31	60	0.5	6	4	1.6	--	--
	Bright	70	30	2.3	7	3	2.3	--	--
0.9-m	Dark	112	93	1.2	20	15	1.3	16	17
	Bright	95	55	1.7	16	12	1.3	20	36
Schmidt		104	79	1.3	18	14	1.3	5	6

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CTIO FTP Archives (1Sep93)
(from CTIO, NOAO Newsletter No. 35, 1 September 1993)

ftp ctios1.ctio.noao.edu (or 139.229.2.1), cd ctio

argus                    Directory containing Argus information.
bench_echelle            Directory containing 1.5-m BME information.
cat4m                    File containing CTIO 4-m prime focus plate catalog.
ctioforms                Directory containing TeX template for CTIO e-mail
                          proposals [33].
filters                  Directory containing CTIO filter library [34].
manuals                  Directory containing CTIO instrument manuals [32].
standards                Directory containing standard star fluxes from Hamuy
                           et al., 1992, PASP, 104, 533, and Hamuy et al., 1994
                           (in preparation) [29].

[] NOAO Newsletter issues containing latest information on this entry.
                                                                  Steve Heathcote
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CTIO Telescope/Instrument Combinations (1Sep93)

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CTIO Telescope/Instrument Combinations* (1Sep93)
(from CTIO, NOAO Newsletter No. 35, 1 September 1993)

4-m Telescope:
   ARGUS fiber-fed Spectrograph  + Blue Air Schmidt Camera  + Reticon CCD [33]
           "                     + Red Air Schmidt Camera   + GEC CCD [25,26]
   R-C Spectrograph              + Blue Air Schmidt Camera  + Reticon CCD [33]
           "                     + Red Air Schmidt Camera   + GEC CCD [25,26]
           "                     + Folded Schmidt Camera    + Tek(a) CCD [25,26]
   Echelle Spectrograph          + Blue Air Schmidt Camera  + Reticon CCD [33]
           "                     + Red Air Schmidt Camera   + GEC CCD [22,25,26]
           "                     + Folded Schmidt           + Tek(a) CCD [22,23,
                                                               25,26]
           "                     + Long Cameras             + TI, or Tek(a) CCD
                                                               [23,25,26]
   Prime Focus Camera            + TI or Tek(a) CCD
           "                     + Photographic Plates [23]
   Cass Direct                   + TI or Tek(a) CCD
   Rutgers Imaging Fabry-Perot   + TI or Tek(a) CCD [25,26]
   ASCAP Photometer [24,25,28]
   IR Photometer (InSb and/or bolometer)
   OSIRIS (HgCdTe Imager/Spectrograph) [33,35]

1.5-m Telescope:
   Cass Spectrograph             + GEC CCD (with UV-Fluorescent Coating)
   Bench-Mounted Echelle Spectrograph  + Blue Air Schmidt Camera  + Reticon CCD
                                                                     [22,23,26]
           "                     + Red Air Schmidt Camera         + GEC CCD [22,
                                                                     23]
           "                     + 700 mm Camera                  + TI or Tek(a)
                                                                     CCD [22,23]
   Cass Direct                   + TI or Tek(a) CCD
        "                        + Photographic Plates [23]
   Rutgers Imaging Fabry-Perot   + TI or Tek(a) CCD [25]
   ASCAP Photometer [24,25,28]
   IR Photometer (InSb and/or bolometer)
   OSIRIS (HgCdTe Imager/Spectrograph) [33,35]
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   Filar Micrometer(b)

1-m Telescope:
   Cass Spectrograph             + 2D-Frutti
   ASCAP Photometer [24,25,28]
   Filar Micrometer(b)

0.9-m Telescope:
   Cass Direct                   + Tek(a) CCD [30]
   Filar Micrometer(b)

0.6-m Telescope:
   ASCAP Photometer [24,25,28]
   Filar Micrometer(b)

Curtis Schmidt:
   Photographic Plates (Direct or Prism)
   Thomson CCD (Direct or Prism)(c) [21,22,28,30,31]

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

(a) Tek CCDs available first semester 1994:
    -     VEB-run (1.5-m and 4-m only): 1 512 x 512, 27 um pixels; 1 1024 x
          1024, 24 um pixels.
    -     ArCon-run (0.9-m, 1.5-m, 4-m) 1 1024 x 1024, 24 um pixels, 1 2048 x
          2048, 24 um pixels.
    (See 33 and 35 for details on conversion to ArCon controller.)

(b) Filar micrometer limited to long-term programs.

(c) CCD on Curtis Schmidt limited to 30 nights (approximately) observing per
    semester. See 32.
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New Leadership for KPNO (1Sep93)

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New Leadership for KPNO (1Sep93)
(from KPNO, NOAO Newsletter No. 35, 1 September 1993)

Late last winter, Dave De Young informed me that he had decided not to seek reappointment as Director of KPNO. Dave has now been involved in the administration of KPNO for almost ten years. With increasing responsibilities, he has found that an ever larger fraction of his time must be devoted to administrative activities. In his letter to me, Dave said that while he found these duties to have been challenging, educational, and rewarding, he wished to have time to place a greater emphasis on research.

Given our experience with past recruitments for senior personnel, I would not expect a new director to be in place for at least a year. Fortunately, Kitt Peak has a staff that is both talented and committed to the observatory and its goals. Three staff members have agreed to assume responsibility for leading Kitt Peak during this transition period. George Jacoby will assume primary responsibility for mountain operations and the telescope scheduling process. Todd Boroson will oversee the KPNO instrumentation and engineering programs. Caty Pilachowski will be responsible for downtown administrative functions and the preparation of reports to the NSF, program plans, and other required paperwork. This team has been in place for about two months, and Caty, George, and Todd are working effectively together and with the rest of the staff. I very much appreciate their willingness to undertake these new responsibilities.

Dave De Young will continue to chair the KPNO TACs and to serve on the NOAO management committee. His perspective and past experience will be extremely valuable as NOAO makes major changes in management structure throughout the organization.

Sidney C. Wolff

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KPNO Leadership Speaks Out! (1Sep93)

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KPNO Leadership Speaks Out! (1Sep93)
(from KPNO, NOAO Newsletter No. 35, 1 September 1993)

Kitt Peak National Observatory has much to be proud of. Our telescopes are among the most productive in the world; our small telescopes provide unique capabilities and are competitive with larger facilities elsewhere. Our instrumentation, including Hydra, our "stable" of CCDs, and our infrared instruments SQIID, COB, IRIM, and CRSP, are outstanding. We assist more visitors to achieve successful observing runs than any other observatory in the US to yield an unrivaled level of scientific productivity.

Nonetheless, KPNO must look to the future at a time when the Gemini telescopes are the premier facilities available to the national community. KPNO must take an active role in the development of instrumentation for and support of the Gemini telescopes. We must continually upgrade our present facilities and expand our programs to meet the increasing and changing needs of the astronomical community. We must continue to develop and make available to the community state-of-the-art instrumentation which allows all astronomers to compete effectively with those at other observatories.

Over the last months and years, the KPNO staff has begun to tackle many of the issues critical to our future. The WIYN Telescope is nearing completion, our instrumentation program, both optical and IR, has new instruments underway that will greatly expand our capabilities. We have already begun a queue scheduling program, we are now archiving data on a limited basis, and we are resurrecting our remote observing experiments, which started in the early 1980s, with the availability of 1990s technology. We are committed to a program to improve the imaging quality of all Kitt Peak telescopes, with a goal to achieve images limited only by the seeing of the site itself.

Queries, requests, comments, complaints, advice, and good luck wishes can be addressed to any or all of us on any subject, or even simply to the KPNO Directors' Office (or just to kpno@noao.edu). We will see that your message reaches the right person.

Wish us luck!

George Jacoby, Todd Boroson, Caty Pilachowski

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WIYN Moves Toward Operation in 1994 (1Sep93)

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WIYN Moves Toward Operation in 1994 (1Sep93)

(from KPNO, NOAO Newsletter No. 35, 1 September 1993)

The WIYN Project is on schedule for early scientific operations and shared-risk observing in late 1994; much progress has been made since the report in the June Newsletter. The alt-azimuth telescope mount was shipped to Kitt Peak in mid-May. Teams from the WIYN Project, NOAO/KPNO, and the manufacturer, L&F Industries, were involved in the on-site assembly. Installation of the major structure took place in the week of 17-22 May. The telescope drives, limit switches, brakes, and encoders were also installed during that period. Dummy weights for the primary and secondary mirror assemblies were used to balance the Optics Support Structure in elevation, and the azimuth, elevation, and instrument rotator axes were tested.

The current effort at the Observatory centers around cabling and preparing for installation of the controls. The University of Wisconsin delivered the telescope servo amplifiers and power supplies in June and tested them under manual control. At that time ethernet cabling was installed throughout the building. Installation of the telescope control computers is scheduled for August, after which time closed loop testing of the drives will begin.

The NOAO Primary Mirror Group continues fabrication and assembly of the mirror cell and supports. The mirror supports are being assembled as parts arrive from suppliers. Work on the electronics and controls for the active supports is well underway and on schedule. Plans for integrating the mirror assembly with the WIYN telescope are being coordinated with the WIYN Project staff. Work on the thermal control has centered primarily on the assembly of the chiller that supplies conditioned water to the heat exchangers in the cell.

Contraves is polishing the 1.2-m secondary mirror for WIYN. By mid-June a 5 wave peak-valley surface finish was achieved using profilometry to guide the figuring. A metrology mount and test optics have been fabricated, and interferometric testing is expected to start in July. In the meantime, fabrication of the secondary mirror cell is well underway at NOAO and is expected to be complete prior to delivery of the mirror.

Work on the 1.1-m tertiary mirror at Kodak is nearing completion pending results of the final tests. The mirror was initially polished to 1 wave peak-to-valley on Kodak's large planetary polisher and then placed in their ion polisher for two finish runs. Delivery is expected in July or August.

The tertiary mirror cell design is complete and ready for fabrication following completion of the secondary mirror cell. Both the secondary and tertiary mirrors will be supported using a common pressure/vacuum system. For the secondary, the space behind the mirror will be partially evacuated to support its weight. An air bag will be provided for the tertiary. The pressure/vacuum system has been prototyped and is under test at NOAO.

The tertiary mirror assembly is supported by the primary mirror cell through the central hole in the primary mirror. A rotator and tilt mechanism allows the telescope beam to be directed to any one of three instrument ports. This mechanism and associated structure is being fabricated by L&F Industries with delivery expected in August.

The design of the 1 degree wide-field corrector for use with the Multi-Object Spectrometer (MOS) has been finalized, and fabrication is scheduled to start in August. The MOS will be semi-permanently mounted on one of the two Nasmyth instrument rotators.

The other Nasmyth focus will be available for various other instruments including a CCD imager. Science instruments at that focus will mount on an adapter box (IAS) that will provide target acquisition, guiding, atmospheric dispersion compensation, wavefront sensing for active optics, and spectral calibration sources. A critical design review on the IAS was held 28 June.

Under the current schedule, telescope commissioning will start early in CY 1994. Planning for the commissioning and operations phases is underway.

Matt Johns, Caty Pilachowski

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Welcome to the NOAO WIYN Scientist (1Sep93)

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Welcome to the NOAO WIYN Scientist (1Sep93)
(from KPNO, NOAO Newsletter No. 35, 1 September 1993)

Recent visitors to Kitt Peak have witnessed great progress in the construction of the WIYN telescope and observatory, as noted in the previous article. As the facility nears completion (early scientific operations should commence in late 1994!), we must pay increased attention to planning the detailed scientific program for the telescope, including time allocation, scheduling of NOAO's program, development of observing procedures, implementation of a queue scheduling program, and commissioning of instruments to be used on WIYN.

Accordingly, we welcome David Silva as the new WIYN Scientist in support of NOAO's WIYN scientific program. Silva received his Ph.D. from the University of Michigan in 1990, and has been a post-doc at KPNO since then. His experience with wide field imaging and spectroscopy will be of great value in his new position. Silva's primary responsibility will be the support of KPNO's scientific program on the WIYN telescope.

Caty Pilachowski

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Hydra to Undergo Metamorphosis for WIYN Telescope (1Sep93)

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Hydra to Undergo Metamorphosis for WIYN Telescope (1Sep93)
(from KPNO, NOAO Newsletter No. 35, 1 September 1993)

As alluded to in the March 1993 NOAO Newsletter, Hydra will undergo some modifications during its move over to the WIYN telescope. That move will be taking place during the spring, summer, and fall of 1994. This is a summary of the instrumental changes that will be made and a cursory schedule of the decommissioning from the Mayall 4-m and the commissioning onto the WIYN.

Hydra is a multi-object fiber positioner and spectrograph first constructed to allow the simultaneous observation of up to 100 objects over the 45 arcmin field of view at the Mayall 4-m telescope. Since the instrument began regular operation during the spring observing semester of 1992, it has been requested in proposals for a total of more than 360 nights over two years and has been scheduled for 146 nights during that same time period. An initial driver for the WIYN telescope was to provide fiber-fed MOS capability in greater supply than would be possible at the 4-m. NOAO's share of WIYN observing is 40%. MOS observing will share this time with direct imaging.

Why modify Hydra as it moves over to the WIYN? First of all, Hydra will be mounted onto a Nasmyth focus at the WIYN as opposed to the Cassegrain focus at the 4-m. This means that instead of lying nearly horizontal during use, the instrument will always be in a vertical orientation. The current mechanism for accessing the focal plate will not work in the vertical position. Instead of negator springs and rails, the new Hydra will utilize a hinge mechanism for such access.

The second major change involves the design of the telescope. To minimize resolution-throughput losses of a fiber-fed spectrograph, the fiber input end should be positioned on the telescope focal surface and pointed toward the telescope exit pupil. The Mayall telescope was optically designed long before the advent of fiber optic use in astronomical instruments, and considerations of matching the field curvature radius to the pupil distance were not of significant concern. Hence, Hydra's focal plate at the 4-m consists of a "stepped" plate to approximate the curvature of the focal surface while keeping the fibers normal to a flat plane for better alignment with the pupil. Considerable attention was given during the design of the WIYN telescope to keep it "concentric" where we refer to concentric as meaning that the radius of field curvature is concentric with the distance to the telescope exit pupil. Although the final WIYN design isn't perfectly concentric, it is very close. So close that the desired position for a fiber should be normal to the curvature of the focal surface rather than normal to a flat plane.

We tested the ability of the gripper to position a fiber onto such a curved surface. The tests indicated that our current gripper design was inadequate and that we would either need to allow a tip-tilt motion for the gripper, or position the fibers onto a flat plate and then warp that plate to match the curvature of field. Further investigation led us to conclude that it was much simpler to warp the focal plate than to implement gripper tip-tilt articulation. The selected design uses a vacuum to draw the focal plate against a spherical backstop producing a curve that very closely matches the theoretical focal surface.

Since we must rebuild the entire focal plate assembly to accommodate the hinge access and warpable plate, we have the opportunity to make other enhancements to the instrument which should vastly improve its performance and reliability. Fiber cable management around the focal plate is one such item. The current Hydra positioner occasionally encounters a misplaced button. In most cases, the displaced button is the result of entangling of that fiber with a neighboring fiber outside the radius of the pivot blocks. To eliminate this, we are incorporating long channeled grooves as a replacement to the current pivot scheme. At WIYN, each fiber will be completely isolated from other fibers beyond the edge of the focal plate down to where the fibers are clamped and not allowed to move underneath the focal plate assembly.

Due to flexibility in the pivot redesign process and as a consequence of the desire of the WIYN consortium to be able to add a small number of fibers beyond the current 200, we designed the focal plate assembly and pivots to be capable of accommodating up to 288 fibers. Twelve of these positions will be occupied by field orientation probes (the current instrument only has six such probes available), 96 positions will be filled by the current blue fiber cable, another 96 will hold the fibers from a newly constructed red fiber cable, and the remaining 84 spots are available for future growth.

As mentioned above, the current blue cable will be transported over for use on the WIYN. The plate scale is such that these fibers will subtend nearly 3 arcsec on the sky rather than the 2 arcsec subtended when in use on the 4-m. It was felt that 3 arcsec blue fibers would accommodate most observations where atmospheric dispersion might become an issue since the WIYN wide field corrector will not have any atmospheric dispersion correction. Sky limited observations in the blue should not suffer significantly since there are few sky emission lines to worry about and since continuum sky subtraction is usually much easier than line subtraction. In the red, however, atmospheric dispersion is relatively small while sky subtraction issues are significant (especially redward of 6000 A). We felt that a 3 arcsec fiber size for the red was unacceptable. The new red cable will consist of 200 micron fibers instead of the 310 micron fibers in the current red and blue cables. These new red fibers will subtend 2 arcsec on the WIYN telescope and will also provide slightly better resolving power in the spectrograph than the blue fibers.

Additional items underway in the modifications include replacement of the ILS camera that views the field orientation probes (FOPS). A more sensitive ICCD camera will be installed. In actuality, we will start using an ICCD for the FOPS this fall. In addition, the gripper TV camera is being upgraded to the newer generation of ICCD cameras that have been installed around the mountain this summer. Since there are no offset guide probes on the MOS port at WIYN, we are developing guiding algorithms that will utilize the FOPS as probes. The increase of the number of such probes to 12 was done to minimize the impact of FOPS selection on target acquisition.

The calibration screen will be removed from the positioner unit and relocated in the instrument mount/spacer assembly. Effort is underway to determine the best screen material to improve the detected flux of the calibration lamps. Both Th-Ar and Cu-Ar tubes will be mounted simultaneously and selected via the computer. We are also investigating the use of an etalon in front of a quartz lamp (similar to that at the MMT) to provide relative (not absolute) fiber to fiber wavelength calibration. Flat fielding will continue to be carried out in a similar fashion as at the 4-m by viewing a dome spot illuminated by quartz lamps at the top of the telescope.

Automation is a key goal at the WIYN to allow rapid adjustments for queue scheduling and for remote observing by the WIYN consortium universities. As a consequence, much effort will go into upgrading the software to allow communication and integration between the positioner, spectrograph, data acquisition, and telescope software and computers. Enhancements are underway in the controller electronics to allow computer control of the vacuum system, calibration lamps, and the monitoring of various important aspects (eg. temperature, TV status, etc.).

Unfortunately, grating availability for the bench spectrograph will be more restricted than at the 4-m. Borrowing R-C gratings will be difficult given the new scheduling constraints that will exist at the WIYN. We have however acquired some duplicates of the R-C gratings for permanent use at the WIYN. In addition, the 316 line/mm echelle grating will move over to the WIYN for use with Hydra. See the table below for a list of the gratings that will be available. Both the Simmons camera and the new all-refractive camera will also be available for use at the WIYN. Although both 6 inch collimators will be moved to WIYN, the large collimator will not be available since it will be utilized in a future fiber fed echelle at the 4-m.

It appears that Hydra will need to be decommissioned from the 4-m telescope around June of 1994. We will do our best to keep it operational until the latest date possible. Once Hydra is decommissioned, the positioner will undergo the modifications required to mount the new focal plate assembly. Hardware modifications are expected to take most of the summer. By September, Hydra should be ready for installation onto the WIYN telescope and the process of commissioning initiated. It is anticipated that full time scientific availability should resume during the spring of 1995.

Hydra/Bench Characteristics at WIYN

Full unvignetted field diameters	60 arcmin
Fiber diameters	3 arcsec (blue fibers) 2 arcsec (red fibers)
Fibers available	96 blue fibers 96 red fibers 12 field orientation probes 84 locations for future fibers
Minimum fiber separation	37 arcsec
Configuration time	20-25 minutes
Estimated positioning accuracy	0.22 arcsec (20 um)

Grating	316 line/mm, blaze angle 7 d (B&L 181) 600 line/mm, blaze angle 13.9 d (B&L 420) 860 line/mm, blaze angle 30.9 d (KPC-24) 1200 line/mm, blaze angle 21.1 d 316 line/mm echelle, blaze angle 63.4 d
Cameras	All-refractive bench camera (285 mm focal length) Simmons camera (381 mm focal length)
Collimators	6 inch f/6.7 paraboloid 6 inch f/6.7 spheroid
Detector	2048 x 2048 thinned Tektronix CCD (24 um pixels)

Sam Barden, Taft Armandroff

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A New Chip for GoldCam (1Sep93)

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A New Chip for GoldCam (1Sep93)
(from KPNO, NOAO Newsletter No. 35, 1 September 1993)

We have recently replaced the mediocre Ford 3K x 1K CCD in GoldCam with one of much better performance. The old chip suffered from a large number of traps in the imaging area which compromised regions of the spectrum and necessitated a preflash, increasing the effective noise. The new chip solves these two problems. The only traps are below pixel 600, where the focus starts to deteriorate seriously. The read noise is 8.5 electrons, and no preflash is needed. The sensitivity of the new chip is quite similar to the CCD it replaced. So far, measurements have only been made with grating 240 which gives spectral coverage from 3500 to 7000 A. The total telescope/instrument/CCD throughput peaks with this grating at 5000 A where the system has 11.5% total efficiency.

The two remaining problems with this system are the fringing, which remains significant in the red, and the resolution, which remains no better than 2.8 pixels FWHM. The fringing is due to the poor anti-reflection properties of the coating in the red. While we had hoped to decrease the amplitude of the fringing by depositing a thicker coating, an error in the calibration of the coating process left us with one quite similar to the coating on the previous chip. This can be remedied by removing the chip and depositing an additional layer of the coating material. We plan to do this in the fall. This will somewhat reduce the UV sensitivity of the chip. The second remaining problem is the resolution. Although we have been very careful with the positioning of all the optics and the detector, the best focus images have gone from around 1.8 pixels FWHM with the old TI CCD to 2.8 pixels FWHM with each of the two Ford chips. We are still trying to understand this better, but we now believe this is a result of mis-spacing the optics in the camera. We will work on this further in the fall also.

Todd Boroson, Rich Reed, Di Harmer

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The Cryogenic Optical Bench: A Multifunction IR Camera for Kitt Peak (1Sep93)

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The Cryogenic Optical Bench: A Multifunction IR...(1Sep93)
Camera for Kitt Peak
(from KPNO, NOAO Newsletter No. 35, 1 September 1993)

The Cryogenic Optical Bench (COB) is a 1-5 micron IR camera with multiple cold spectral and spatial filtering capabilities. These can be combined and reconfigured while observing to adapt the instrument to a variety of functions. It is available for "shared risk" observing at the 1.3-m, 2.1-m, and 4-m in spring semester 1994.

COB currently uses a 256 x 256 InSb array from Santa Barbara Research Center. Pixel scale is 0.9 arcsec at the 1.3-m, 0.5 at the 2.1-m, and 0.3 at the 4-m. Operating modes at present are:

o   Broadband imaging at 1.0 micron, J, H, K, and K' (2.0-2.3 microns);

o   Narrowband imaging at 1-4 microns, including 1-2% filters at 1.08, 1.25, 1.28, 1.64, 1.99, 2.12, 2.16, 2.22 (4%), 2.36, 2.38, 3.08, 3.30, 3.35, 3.40, 4.00, 4.05 microns;

o   Polarimetry in broadband filters and two micron narrowband filters;

o   Imaging at resolution ~500 in the two micron window using a tunable Fabry-Perot and the narrowband filters as order sorters;

o   Occultation of a central bright source for imaging and polarimetry, with a variety of focal plane spots;

o   Long slit spectroscopy at resolution ~300 in the J, H, and K bands with a grism and focal plane slit;

o   Polarimetry with the grism at J, H, and K.

We have used the instrument extensively in several of these modes at the 1.3-m and are quite pleased with its performance. This includes imaging in the various modes and spectroscopy in the two micron window. We have operated with the three micron narrowband filters during the daytime in May; this was quite practicable, and we are eager to see what background conditions will be in the winter. However, there are combinations which have not been "turned on" at the telescope, and so we have no practical experience to share in these modes. It is not yet possible to operate in broadband L, and we are working on the speed and well depth issues involved for operation beyond three microns with wide bandpasses. We are also continuing to broaden the filter inventory.

As a rough guide to performance, dark current and read noise are at levels permitting background limited operation in all filter combinations. The background limit is reached comfortably in seconds to tens of seconds in the broadband filters, tens to hundreds of seconds in the narrowband filters, about three minutes with the Fabry-Perot or grism, and about 50 milliseconds in the three micron filters. Data taking modes include multiple readout, to reduce read noise in low background configurations, and fast coadding, to avoid a data deluge at high backgrounds. Observer interface is via a workstation with easy access to the data within IRAF for real-time reduction and analysis.

We emphasize that while the spectroscopic mode has great utility, COB is not a spectrometer. The resolution is fixed at a modest value, and there is no spectroscopic capability beyond 2.5 microns. Purely spectroscopic proposals will be better served by CRSP in its new, large-format configuration.

In general, "shared risk" implies that every reasonable effort will be made to provide an instrument which meets its performance goals. It may require more hands-on operation, and be less user friendly, than a fully commissioned facility instrument. Unforeseen problems may require the observer to downscale significantly the program objectives or switch to an alternative program or backup instrument. With COB in particular, technically challenging proposals may have backup modes utilizing a reconfiguration of the instrument. For example, narrowband imaging can be accomplished by use of the Fabry-Perot, by long slit mapping with the grism, or with fixed filters, with tradeoffs in spectral resolution, sensitivity, and integration time. In addition to scientific issues, shared risk proposals should address how the observations will aid in defining instrument performance and operating protocols.

Prospective proposers are encouraged to contact Ron Probst, Mike Merrill, or Ian Gatley (e-mail: lastname@noao.edu) for more detailed discussion prior to proposal submission. See also the following articles for comments on choice of appropriate instrument.

Ron Probst for the infrared group

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Filter Change for IRIM (1Sep93)

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Filter Change for IRIM (1Sep93)
(from KPNO, NOAO Newsletter No. 35, 1 September 1993)

The infrared camera IRIM has space for only a limited number of filters. Presently these are broadband J, H, "special" K (2.00-2.30 microns), and narrowband 2.12, 2.16, 2.22, and 2.36 microns.

The "special" K filter allows improved sensitivity for continuum sources by excluding the thermal part of the background. However, this filter does not include the CO bandhead seen in giants and included in the traditional K filter (2.0-2.4 microns). In response to several requests for standard K and an evident lack of interest in the 2.36 micron filter, the latter will be removed and the former installed in IRIM for spring 1994. The filter complement will then be:

o broadband J, H, K (2.0-2.4 microns), special K (2.0-2.3 microns)

o narrowband 2.12 (1.5% BW), 2.16 (1.5% BW), 2.22 (4% BW)

Ron Probst

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IR Cameras: Decisions, Decisions (1Sep93)

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IR Cameras: Decisions, Decisions (1Sep93)
(from KPNO, NOAO Newsletter No. 35, 1 September 1993)

The alert reader, counting on fingers, will have noticed that there are three IR cameras available for spring semester 1994. The following table compares some important instrument parameters.

Instrument	COB	IRIM	SQIID
Detector type	256 x 256 InSb	256 x 256 HgCdTe	256 x 256 PtSi
QE	90% @ JHK &lt =80% 3+ um	30,40,45%@J,H,K ---	7,5,3%@J,H,K 1% L'
Well depth, e-	-200,000	-250,000	-1,000,000
Cosmetics*	good	fair	superb
Filters	wide variety (see above)	J H K K'; 2.12, 2.16, 2.22 narrow	J H K L' all simultaneous
Scale @ 1.3-m	0.93 "/pix	1.96 "/pix	1.36 "/pix
2.1-m	0.5	1.09	---
4-m	0.3	0.60	0.40

* "cosmetics" is a judgement taking into account response uniformity, bad pixels, recovery from saturation, and electrical stability APART from QE.

All three instruments will be converted to the operating system called "Wildfire" during fall 1993, so the system efficiencies external to the dewars will be the same. So, how does one choose?

SQIID is recommended for 1.3-m programs requiring modest sensitivity and spatially extensive coverage, and/or for which simultaneity of data is desirable. Our experience is that its very high response uniformity, stability, fast recovery from saturation, large well depth, and low number of defects are very advantageous for programs expecting large dynamic range variations (e.g. mapping star forming regions) or smooth, spatially extended low level variations (e.g. colors of galaxy envelopes) if the integration times are reasonable. These factors, plus the simultaneity of data, "buy back" a lot of the apparent QE disadvantage. With the appearance of IRIM and now COB, SQIID's ecological niche on the 4-m has narrowed to programs which are confusion (resolution) limited rather than sensitivity limited and for which the simultaneity of data is a strong advantage.

IRIM and COB show comparable performance in their region of overlap, broadband imaging. Dark current and read noise in each are quite low. Both have the sensitivity advantage of a high QE detector compared to SQIID. COB has a much larger filter complement and capability beyond 2.5 microns which IRIM lacks, so it is the default instrument when either feature is fundamental to the program. For broadband imaging, consider the pixel size vs. the scientific goals. IRIM's pixel size on the 4-m is a better match to present levels of 2 micron seeing, probably giving it the edge for sensitivity limited programs. If the problem is resolution limited, COB has smaller pixels on the 2.1-m than IRIM on the 4-m. For sheer field of view, IRIM on the 1.3-m wins hands down.

The bottom line? If you have been using either SQIID or IRIM and find it satisfactory for your program, keep right on using it. If you need the spectral resolution or long wavelength coverage afforded by COB, it is the only choice. For broadband imaging in need of more sensitivity than SQIID can provide, look at the tradeoffs of pixel size vs. field of view, sensitivity, and appropriate telescope with IRIM and COB. If either COB or IRIM are suitable for your program, please say so; this gives greater flexibility in scheduling, which is always helpful and occasionally decisive.

Ron Probst

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CRSP Upgrade Underway (1Sep93)

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CRSP Upgrade Underway (1Sep93)
(from KPNO, NOAO Newsletter No. 35, 1 September 1993)

With the final Cryogenic Spectrometer (CRSP) observing run of the spring semester completed, we are beginning the upgrade described in the March 1993 Newsletter. The efforts include: 1) modification of the Digital Control Unit to operate with a SPARC host computer; 2) replacement of the 58 x 62 InSb array with a 256 x 256 InSb array; 3) construction of a new triplet camera to provide unvignetted coverage with the larger array.

This is a significant undertaking, since the same electronics upgrades will also be made to SQIID and IRIM. We anticipate that the CRSP upgrade will be completed in time for a scheduled engineering run on 18 October, shortly before the first scheduled visitor use on 28 October. A draft version of the operating manual may be available by the latter date, although the performance and operating procedures may still be preliminary at that time.

The new camera assembly has the same focal length (53 mm) as the old, so the spectral and spatial resolution per pixel will be increased by a factor of 2.5. The spatial coverage will remain unchanged, being limited by the slit, and the spectral coverage with the high resolution gratings will increase by about 60%. Laboratory tests of the detector give a full well of about 100K electrons, dark current of about 1 e-/s, and single read noise &lt 30 e- at a bias of 600 mv; operation at larger bias gives significantly increased dark current, but also increased well capacity. We may employ low or high bias modes for low and high background observations, respectively.

Observers scheduled for the fall semester should e-mail me for progress reports on the upgrade. It is unlikely that we will turn on the instrument in the lab much before 1 October.

Dick Joyce

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Improvements at the 4-m: A Report from the Front (1Sep93)

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Improvements at the 4-m: A Report from the Front (1Sep93)
(from KPNO, NOAO Newsletter No. 35, 1 September 1993)

As reported in the March 1993 Newsletter, the twenty-five year old electronics at the KPNO 4-m telescope are currently undergoing a major update. When the telescope returns to service on 4 October, the following principal changes will have been made:

1) The Dec and RA axis servo control systems and drive amplifiers will have been replaced. This will allow much tighter computer control of the telescope drives, including computer slew for the first time, and more accurate tracking, guiding, and pointing.

2) New electronics will be installed to control all telescope and dome (but not instrument) functions (e.g.: focus, mirror covers, balance, dome rotation and shutter, rotator). This will improve the reliability of the entire telescope system and provide for much better diagnostic reports should failures occur.

3) The 11 year old Dec PDP-11 computers and FORTH software will be replaced by a VxWorks/C-based system. This new telescope control system will be run through a modern X-window Graphical User Interface (GUI) that can be operated from any X-computer on the network. This provides the option for future remote observing and control. The new system offers much finer control of the telescope, much better software maintenance, and an industry-wide solution to real-time hardware control. Observers will appreciate the easy-to-use GUI that allows them to control instrumentation from their data-taking workstation.

4) The oil bearings will be cooled to ambient temperature, thereby removing the single largest heat source from within the dome. (See March 1993 Newsletter article on "The View at 10 Microns".)

George Jacoby, Bruce Bohannan,
Scott Bulau, D'Anne Thompson

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Queue Scheduling: A Progress Report (1Sep93)

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Queue Scheduling: A Progress Report (1Sep93)
(from KPNO, NOAO Newsletter No. 35, 1 September 1993)

Two new queue scheduling programs are underway at Kitt Peak National Observatory. The first is our Summer Queue Pilot Program, an experiment designed to give us some experience with all aspects of running a queue scheduled observing program. Regular readers may recall that we accepted e-mail applications for this program up until 30 April. Proposals were accepted for three telescope/ instrument combinations: the 2.1-m with GoldCam, the 0.9-m with T2KA direct, and the Coud Feed with Camera 5/Grating A/T2KB. Observing programs on each of these telescopes were to be carried out for a period of approximately two weeks between 15 July and 15 September.

We received 49 proposals for this program. Nine of these were for the

Coude Feed, thirteen were for the 2.1-m, and the remaining 26 were for the 0.9-m. In our announcement of this opportunity, we tried to distinguish this program from service observing. While it is true that staff observers will be making the observations in place of the proposers, the order that they will be made depends on priority according to judgment of the scientific justification. The advantage of this approach is that the more highly ranked proposals have a better chance of obtaining their observations successfully than if they were just given some specific nights on the telescope. In addition, calibration exposures and setup time can be shared among programs, leading to greater overall absolute efficiency. The distribution of sizes of program proposed is shown in the figure below. To compute these sizes we have added appropriate overhead for setup on each new object and readout time for each exposure. It can be seen that the range extends from very small programs which would be difficult to schedule in the regular mode to the more usual programs which represent several nights of observing. These requests represent oversubscription ratios of 1.0, 2.1, and 1.5 for the Coud Feed, 0.9-m, and 2.1-m respectively. These ratios assume that all the time will be clear and usable. If, as past experience would indicate, only one-third of the time is usable, these ratios should be multiplied by 3.

The second program represents an attempt to begin queue scheduling some of the proposals given time by the usual route. Five proposals for the 0.9-m telescope and CCD imaging which were highly ranked by the TAC were selected for the fall queue observations. The total number of nights recommended by the TAC for these programs was increased by 30%. This number of nights has been scheduled on the 0.9-m during October and November for the queue execution of these observing projects. The PIs involved, whom we thank for allowing us to schedule in this way, are Paul Hodge, Dan Maoz, Eugene de Geus, Annette Ferguson, and Paul Francis. We look forward to getting feedback from these proposers and from those who get data from the summer experiment so that we can understand whether queue scheduling helps us better meet the needs of the community.

[figure not included}

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

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Queue to Return for Spring Semester (1Sep93)

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Queue to Return for Spring Semester (1Sep93)
(from KPNO, NOAO Newsletter No. 35, 1 September 1993)

We will continue offering queue scheduled observing in the spring 1994 semester on the 2.1-m telescope with GoldCam, on the 0.9-m telescope in direct imaging mode using the T2KA chip, and at the Coud Feed with the F3KB CCD. Queue scheduling will be offered only with these telescope and instrument combinations and only for a portion of the available observing time. The fraction of time devoted to queue scheduled observations will depend on the demand for such an observing mode and the availability of resources to provide this service. At the 2.1-m, observations will be taken by KPNO staff members working with the 2.1-m LTO, and at the 0.9-m and Feed observations will be taken by KPNO staff. As discussed in previous articles on queue scheduling (see Newsletter No. 33), remember that you are more likely to get your data in a queue scheduled mode, and queue scheduling can result in more science per unit time.

If you are proposing for time on one of these telescopes with the instruments described above, and if you wish to have your program considered for queue scheduling, simply write the word "queue" on the first page of the observing form in the space following the words "None of these". If your queue proposal is accepted, you will be notified that it is part of the queue program shortly after the initial TAC letters are sent, and we will contact you about the precise parameters for the observations requested. Further information about the spring queue scheduling program can be obtained by sending a request to queue-help@noao.edu. We hope you will be interested in participating in this program and will wish to realize the economies and efficiencies made possible by queue scheduling.

George Jacoby, Todd Boroson

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Observing Run Lengths: Ask for What You Want! (1Sep93)

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Observing Run Lengths: Ask for What You Want! (1Sep93)
(from KPNO, NOAO Newsletter No. 35, 1 September 1993)

How did your last observing run go? Lost nights to weather? Was the run too short to accomplish what you really needed? We remind observers that KPNO has long established guidelines for minimum run lengths on all telescopes, which we really do want to follow! But the pressure on the TAC to recommend scheduling as many programs as possible is great, and we know that proposal writers also shave down the number of nights requested to the absolute minimum to improve their chances of getting time. The result is that many, if not most, observers are unable to complete their programs during the time scheduled and must apply for additional time to finish their observations, further increasing the pressure for telescope time.

We encourage all observers to request the number of nights they think they will really need to complete their programs. If you ask for 3 nights, but really need 5 (the minimum run length on the 0.9-m, Coude Feed, 1.3-m, and Burrell Schmidt), you will probably be scheduled for 3. If you need 5 nights, please do us (and yourself) a favor, and ask for them. If you need more than the minimum, ask! We do get requests for, and even schedule, runs of 12 or more nights.

As a reminder, the guidelines for minimum run length are:

4-m:	3 nights
2.1-m:	4 nights
1.3-m:	5 nights
Coude Feed:	5 nights
0.9-m:	5 nights
Burrell Schmidt:	5 nights

George Jacoby, Caty Pilachowski, Todd Boroson

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Instruments Available on Kitt Peak Telescopes Spring 1994 (1Sep93)

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Instruments Available on Kitt Peak Telescopes...(1Sep93)
Spring 1994
(from KPNO, NOAO Newsletter No. 35, 1 September 1993)

This list summarizes the instruments that will be available on KPNO telescopes for the February - July 1994 observing season. Proposals for this period are due by the end of September. Two classes of instruments exist: "Primary Instruments" for regular block scheduling and "Reduced-Availability Instruments" that are only scheduled in instances of very high scientific merit. Visitor equipment will be scheduled only if it a) is unique, b) is required for a project of very high scientific merit, c) conforms to block scheduling, and d) has small impact on KPNO operational and engineering resources.

Primary Instruments:

4-m Telescope:
- R-C Spectrograph + CCD (T2KB)
- CryoCam (with new 800 x 1200 Ford chip)
- Hydra fiber feed (blue or red cable) + Bench Spectrograph + CCD (T2KB)
- Echelle + (UVFast, Red Long, or Blue Long camera) + CCD (T2KB)
- PF Camera + direct CCD (T2KB)
- IR Cryogenic Spectrometer (CRSP)
- Cryogenic Optical Bench (COB)
- Simultaneous Quad Infrared Imaging Device (SQIID)
- IR Imager (IRIM)
- Fourier Transform Spectrometer (FTS)(3)

2.1-m Telescope:
- GoldCam (CCD Spectrometer)
- CCD Direct Imaging (T1KA)
- Fiber Optic Echelle (FOE) + CCD
- Cryogenic Optical Bench (COB)
- IR Imager (IRIM)
- IR Cryogenic Spectrometer (CRSP)

Coude Feed (C/F):
- Coude Spectrograph + (camera 5 or 6) + CCD (F3KB)

1.3-m Telescope:
- Simultaneous Quad Infrared Imaging Device (SQIID)
- Cryogenic Optical Bench (COB)
- IR Cryogenic Spectrometer (CRSP)
- IR Imager (IRIM)

0.9-m Telescope:
- CCD Direct Imaging (T2KA)
- CCD Photometer (CCDPHOT)

Burrell Schmidt:
- Direct or objective-prism + CCD (S2KA)
- Direct or Objective-Prism + photographic plates(2)

Reduced-Availability Instruments:
- All Telescopes: Visitor Instruments
- 4-m: Cassegrain CCD Imaging
- 4-m: PF Camera + photographic plates(1,2)
- 2.1-m: White Spectrograph + photographic plates(2)
- 1.3-m: Mark III (optical) Photometer + GaAs coldbox(3)

(1) Limited to programs that have already been started.
(2) Visitors must provide their own photographic plates.
(3) No long-term proposals.

George Jacoby

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Current Membership on Telescope Time Allocation Committees (1Sep93)

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Current Membership on Telescope Time Allocation...(1Sep93)
Committees
(from KPNO, NOAO Newsletter No. 35, 1 September 1993)

Service on these committees is normally for a term of three years;

occasionally a term is for two years. The tasks of these committees are so arduous that no one should be asked to serve longer, yet a multi-year appointment is desirable because it provides "memory" on the committee from semester to semester. TAC members are chosen by mutual agreement between the chairman and the new member after consultation with current committee members, KPNO staff, and the NOAO Director. Terms are chosen so that only a third of the committee changes each time, thus providing as much continuity as possible. In addition to members from outside the Observatory, each committee includes one KPNO scientific staff member.

Starting last semester, TAC comments were sent to the PIs of all proposals that were not scheduled. This new procedure appears to be useful, and we plan to continue to provide these comments in the future.

The current TAC membership is as follows:

Dark Time
D. De Young (KPNO, non-voting Chair)
T. Heckman (Johns Hopkins U.)
C. Hogan (U. of Washington)
H. Morrison (KPNO)
J. Mould (Caltech)
R. Weymann (Mt. Wilson/Las Campanas)
M. Whittle (U. of Virginia)

Bright Time
D. De Young (KPNO, non-voting Chair)
J. Black (Steward Obs.)
S. Edwards (Smith College)
R. Elston (CTIO)
I. Gatley (KPNO)
C. Sneden (U. of Texas)
D. Terndrup (Ohio State U.)

David De Young

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CoudÃ© Request Night on 26 October (1Sep93)

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Coude Request Night on 26 October (1Sep93)
(from KPNO, NOAO Newsletter No. 35, 1 September 1993)

For many years we have had a program by which you could ask us to obtain for you a limited amount of spectroscopic data on the Coude Feed telescope. This semester the request night is scheduled for 26 October 1993 with the F3KB CCD. The selection of camera and gratings will depend upon the requests received. Requests are limited to two hours per investigator per semester, including set-up, flat fields, and standards.

Requests for observations should be submitted to the KPNO Directors' Office; a letter will do, please do not use the standard proposal form. Include the names of the object(s), finding charts, coordinates, and any other details needed to carry out the program. Requests will be reviewed internally for feasibility and merit.

Sam Barden, Caty Pilachowski

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KPNO Plans for Comet-Jupiter Collision (1Sep93)

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KPNO Plans for Comet-Jupiter Collision (1Sep93)
(from KPNO, NOAO Newsletter No. 35, 1 September 1993)

The expected collision of comet Shoemaker-Levy (1993e) with Jupiter on 21.5 July 1994 is expected to present rare and unusual opportunities to ground-based observers even though the impact sites themselves will not be directly observable from the earth. Passage of the fragments and dust of the already disrupted nucleus through the magnetosphere followed by a series of impacts into the atmosphere of the planet are expected to cause significant changes on a range of timescales that will yield new information on magnetospheric processes, atmospheric chemistry and dynamics, comet nucleus structure and chemistry. Normally the facilities at KPNO are closed during the summer months for engineering and maintenance tasks. However, because of the uniqueness of this event we are planning to make a selection of KPNO facilities available for a short time period around the time of the collisions. These plans will be announced at a later time, probably October-November, after the range of observing possibilities becomes clearer. Observers who are interested in competing for time on KPNO facilities to observe this event are invited to contact Mike Belton at KPNO (belton@noao.edu) who will coordinate this effort.

Mike Belton, George Jacoby

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Finding Out Where Your Objects Are (1Sep93)

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Finding Out Where Your Objects Are (1Sep93)
(from KPNO, NOAO Newsletter No. 35, 1 September 1993)

For a number of programs, particularly spectroscopic, your observing efficiency will be much improved if you come to Kitt Peak with accurate coordinates for your objects. Thanks in large part to the efforts of the Mountain Programming Group, most of the Kitt Peak telescopes point to better than "a few" arcsec RMS around the sky, and can of course offset to sub-arcsec precision once guiding. Thus the olden days of hunting around to see objects just at the limits of visibility on the TV screen in order to center on the slit of a spectrograph are pretty much over; center something bright and let the telescope do its thing! For observations with Hydra, the multiobject fiber-fed spectrograph at the 4-m, adequate preparation requires measuring sub-arcsec positions for sometimes thousands of objects before your run.

Depending upon your needs we have five schemes to help you out. Further details can be obtained from our December 1992 Newsletter, or by contacting the undersigned.

1) Guide Star Catalog. If you simply require coordinates for "bright" stars (V&lt 15-16) in relatively uncrowded regions, chances are good that your object is in the Space Telescope Guide Star Catalog (GSC). Kitt Peak maintains the GSC available on-line via CD-ROM along with FORTRAN routines ("FINDER") to help you out. The GSC provides quite accurate relative positions (good to &lt =0.2 arcsec) and is based upon recent epoch plate material (1985), so proper motion is not a problem.

2) POSS plates and the Grant Machine. Positions of objects down to a stellar magnitude of 21 can be readily measured on the two-axis Grant Machine and the glass copies of the POSS. The usual accuracy achieved

is a little bit better than an arcsec.

3) CCD frames and IRAF's "finder/tfinder" routines. If you have selected your objects from wide-field CCD frames, then IRAF's "nlocal" package "prototype" routine TFINDER will provide a very easy way to measure accurate coordinates. TFINDER uses information you supply on the plate scale and orientation of the CCD frames to predict the location of GSC stars on the frames; it then allows you to interactively refine these guesses. The resulting coordinates of your program objects can be determined to the same accuracy as the GSC itself; i.e., about 0.2 arcsec.

4) Digitized Sky Survey Images. Space Telescope is continuing to provide to Hydra users the digitized scans of the "Quick V" (1985) survey used in producing the Guide Star Catalog. These scans contain stars as faint as V=19 and come with an accurate "plate solution" as part of the header information. Routines in STSDAS (available to run with IRAF) can then be used to take x and y positions and output accurate celestial coordinates, all within the privacy of your own workstation. Tod Lauer has agreed to coordinate requests to Space Telescope in support of Kitt Peak observing runs; e-mail him directly (tlauer@noao.edu). Requests should specify field size (limited to 1 degree per side), the coordinates of the center of the field (including equinox), and what plate material (Quick V, POSS E, or SRC).

5) Mix and Match. If you have small-field CCD images for which you need accurate positions, it may be necessary to measure "secondary reference stars" using either (1) or (4) and then use these as the "plate solution" for your frame.

In order to make use of any of the NOAO facilities significantly in advance of an observing run, you should write to Caty Pilachowski. Additional advice can be obtained from the Astrometry Subdivision of the Hydra crew (pmassey@noao.edu, tarmandroff@noao.edu).

Phil Massey

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Computer Upgrades Completed at Kitt Peak (1Sep93)

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Computer Upgrades Completed at Kitt Peak (1Sep93)
(from KPNO, NOAO Newsletter No. 35, 1 September 1993)

The major computer upgrade for data acquisition and reduction begun three summers ago is essentially completed with work carried out during summer shutdown 1993. The overall goals of this upgrade were:

o To provide a computing environment which permits effective data acquisition with large format detectors, both IR and optical.

o To allow effective data reduction so that astronomers can assess the quality of their observations in nearly real-time and could, if desired, complete the first steps of data reduction at the telescope.

At most sites two separate computers are available. The primary machine has the fastest cpu available in the dome, most of the disk and tape resources and is used for data acquisition and reduction. The secondary machine has a modest amount of disk space for local applications and is intended as a console for an astronomer doing data reduction. Cross-mounting disks between the two computers, so that the cpu on the secondary computer could be dedicated to data reduction, proved unacceptable because of slow access of disks between machines and confusion about which machine one was on and where the observations were stored.

We now have a mixture of Sun SPARCstation 10s, SPARCstation 2s, and IPXs as the primary and secondary machines with a SS-10 and a SS-2 for spares. System RAM at all telescopes has been increased to minimize page swapping with large format CCDs and mosaics. Disks have been concatenated using Sun's MetaDisk to provide some 4.5 Gbytes of contiguous disk space for storage of observations where large format CCDs are the rule. All domes have nine-track, Exabyte and DAT magnetic tape devices available (the Coud Feed observer shares the 2.1-m DAT drive).

Installation of the X windows environment has been delayed until some time during the fall semester pending completion of Ximtool and release 2.10.3 of IRAF with its modifications for X-based applications.

Bruce Bohannan, Steve Grandi
(for a cast of thousands)

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Kitt Peak to "Save-the-Bits" (1Sep93)

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Kitt Peak to "Save-the-Bits" (1Sep93)
(from KPNO, NOAO Newsletter No. 35, 1 September 1993)

Starting with the Summer Queue Scheduling Experiment, and continuing (we hope) into the fall Semester, all images taken with CCDs on KPNO telescopes will automatically be saved onto Exabyte tapes. A copy of each raw CCD frame will be routed over Ethernet to a Sun workstation in the Admin Building, where the headers will be cataloged and indexed, and the data written to tape. The tape will contain images interspersed from all CCDs in operation. The process should be "transparent" to observers!

This tape archive may provide some minimal form of backup for observers' data, but at this early stage in the experiment we cannot guarantee that the system will be reliable. Observers should still expect to be responsible for saving their own data via tape or other media. In an emergency, we may be able to recover lost data, but cannot always be sure of doing that. If things go smoothly, we hope that this project will replace the T-tape backup procedure (see following article) next summer.

Until we gain more experience with data archiving through these initial experiments, we unfortunately cannot make the data available to the community. In any case, a proprietary period in which the original investigators have sole access to the data will apply. We hope to learn more about the general nature of data collected on Kitt Peak telescopes through this experiment, and to take advantage of the archive to monitor and evaluate detector and telescope performance.

Caty Pilachowski, Rob Seaman, Bruce Bohannan

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Magnetic Tape Storage (1Sep93)

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Magnetic Tape Storage (1Sep93)
(from KPNO, NOAO Newsletter No. 35, 1 September 1993)

Visitors to NOAO often leave magnetic tapes behind as backups following observing runs on Kitt Peak (T tapes) or data reduction sessions at the NOAO Tucson offices. The current policy is that these tapes will be recycled after six months unless the observer notifies us otherwise. Visitors have been encouraged to verify their personal tape copies as soon as possible upon their return to their home institutions and make any backup copies that they deem necessary. We would like to reaffirm that the current policy is that tapes left behind at NOAO as backups will be recycled after six months with no notification to the visitor. As a courtesy we have been attempting to notify visitors when their backup tapes are ready to expire, but visitors should not rely on this service. We still have many old tapes hanging in our tape library that are signed out to non-NOAO staff. On 1 July 1994 we plan to recycle or discard tapes that have a date on them prior to 1990. No warnings of any kind will be issued. If visitors or prior NOAO staff members have tapes that may be dated earlier than 1990 and are concerned about keeping the data, please contact us as soon as possible. We have tried in the past to contact as many people about the old tapes as possible, but it has become increasingly time consuming to do this. And we cannot hold onto these tapes forever. So we have arbitrarily set these dates to help clean up our computer areas. If you have any concerns about these policies, please contact jbarnes@noao.edu.

Jeannette Barnes, Bruce Bohannan, Steve Grandi

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KPNO Plate Collection (1Sep93)

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KPNO Plate Collection (1Sep93)
(from KPNO, NOAO Newsletter No. 35, 1 September 1993)

Over the past several years, there has been an increase in the requests for use of plates taken with the telescopes on Kitt Peak, and especially for 4-m telescope plates. A large number of these plates are still in the possession of the person who exposed them.

We would like to get these plates back into the KPNO storage vault so others can use them when needed. An additional reason for returning plates is that they must be treated to stop the spread of "Goldspot" disease. As you may know, this disease has caused the loss or severe deterioration of many plates. We would like to save the most we can before all are lost. If you have any KPNO plates or know the whereabouts of plates, please contact us so we can arrange for their return. Call or e-mail Bill Schoening at 602-325-9348 (schoen@noao.edu).

Letters will be sent later this year to observers who are listed as having plates if they are not returned. If you need a shipping box to return plates, please contact us and we will send one to you.

Sidney C. Wolff

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Occultations No Longer Supported (1Sep93)

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Occultations No Longer Supported (1Sep93)

(from KPNO, NOAO Newsletter No. 35, 1 September 1993)

Due to a declining demand and changes in telescope operating system software, we will no longer support the FORTH occultation software. The code that has been used for many years here is a FORTH program running on DEC 11/24 or 11/44 computers. As our telescope control systems get upgraded with new machines, the ability to run this code has disappeared, and there are no plans to rewrite it.

George Jacoby

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The 10 Micron Camera Goes on the Road (1Sep93)

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The 10 Micron Camera Goes on the Road (1Sep93)
(from KPNO, NOAO Newsletter No. 35, 1 September 1993)

In the March 1993 issue of the Newsletter, we described the 10 micron camera that NOAO purchased to help us identify heat sources in the domes as part of our program to reduce dome seeing effects. The camera provides a real-time temperature image that can be saved on standard VHS video tape or IBM format 3.5" floppy diskettes.

The camera visited CTIO in March 1993 to survey the 4-m, 1.5-m, 1-m, and 0.9-m telescopes. Below is a picture of the CTIO 4-m demonstrating that the recent work to cool the oil bearings was successful. (Compare this picture to the KPNO 4-m image in the March Newsletter to see several amazing differences which we leave to the reader to spot!) It is from pictures like this that we learn where to concentrate our efforts. Consequently, KPNO has installed oil cooling equipment which should be operational by the time you read this.

[figure not included]

We are now comfortable with transporting the camera to other observatories that are interested in improving their thermal environment. Contact us for information on making arrangements for a thermal camera visit.

George Jacoby, Dave Silva

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1993 KPNO Summer Students (1Sep93)

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1993 KPNO Summer Students (1Sep93)
(from KPNO, NOAO Newsletter No. 35, 1 September 1993)

KPNO is pleased to again play host to students from the Research Experience for Undergraduates Program, funded by the NSF. Six students are working with KPNO staff members this summer.

Anastasia Alexov, a senior at Wesleyan University, is working with Michael Pierce and David Silva. They are studying the distribution of galaxy types in intermediate-redshift galaxy clusters.

Tracey Buettgens, an astronomy and physics major at the University of Rochester, is working with Nigel Sharp. Her project is a study of the galaxy NGC 3310, which has an unusual amount of star formation occurring in its central regions.

Carlos Cortes, a senior at Vassar College, is studying with David De Young. They are calculating the airflow dynamics over the telescope sites at Kitt Peak and Sacramento Peak, using existing topographic data and a Cray supercomputer.

Wendy Forrester, a senior at Smith College, is working with Ata Sarajedini. They are constructing globular cluster color-magnitude diagrams in order to study the clusters' blue straggler population.

Amy Lesser, a physics and philosophy major at Mt. Holyoke College, is doing a project with Alain Porter. She is using ground-based and satellite data to investigate active galactic nuclei, in particular 3C 345.

Lynn Weller, a senior at the University of Arizona, is working with Caty Pilachowski. They are studying lithium abundances in a young open cluster.

Caty Pilachowski

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New Higher Resolution HeNeAr Atlas (1Sep93)

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New Higher Resolution HeNeAr Atlas (1Sep93)
(from KPNO, NOAO Newsletter No. 35, 1 September 1993)

As observers push for higher resolutions and more accurate wavelength scales to do measurements such as radial velocities, a need was felt for a higher resolution atlas of the HeNeAr spectrum. This would enable blends to be identified and avoided, yielding a truer estimate of the accuracy of the wavelength fit. HeNeAr spectra were obtained with the KPNO 2.1-m Coude spectrograph at a dispersion of 0.35 A per pixel in the 3300 A - 5000 A region, and 0.69 A per pixel from 5000 A to 11100 A.

The new line list will be installed in the next IRAF release, V2.10.3, in the "linelists" directory. It can also be obtained by anonymous ftp from the NOAO machine orion. After logging in: cd kpno, get henearhres. A copy of the wavelength plots can be obtained from the undersigned or the KPNO observing support office.

Daryl Willmarth

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Kitt Peak FTP Archive Expands (1Sep93)

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Kitt Peak FTP Archive Expands (1Sep93)
(from KPNO, NOAO Newsletter No. 35, 1 September 1993)

The FTP area on orion.tuc.noao.edu has been expanded to provide access to more information requested by our users. Most of the data is in the form of compressed PostScript files that can be downloaded and printed on any PostScript LaserWriter. Each directory has a README file to assist the reader with examining the contents of the directory. Some of the information now available includes:

- The entire optical filter library and the transmission data for many filters. At this time transmission data is not available for all filters, but most of the more popular ones are included. Resizing your terminal window for at least 120 columns of data will aid in examining the library listing.

- The new list of high resolution He-Ne-Ar wavelengths by Daryl Willmarth.

- The entire collection of Hydra/Bench Spectrograph user documentation and software.

- The TeX template for the KPNO Observing Time Request form.

- Instrument manuals for: Direct CCD imaging at the 4-m Prime Focus, 2.1-m, and Burrell Schmidt; 4-m echelle and R-C spectrographs, Coude Feed spectrograph, the mountain computer systems manual, and the ICE software manual.

- The complete listing of photographic plates taken at the 4-m Prime Focus. Resizing your terminal window for at least 120 columns of data will aid in examining the listing.

- IRAF scripts for the reduction of SQIID IR images.

Jim DeVeny

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KPNO FTP Archives (1Sep93)

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KPNO FTP Archives (1Sep93)
(from KPNO, NOAO Newsletter No. 35, 1 September 1993)

ftp orion.tuc.noao.edu (or 140.252.1.22), cd kpno

filters	Directory containing the KPNO optical filter library [35] and other filter information
filters/plots	Directory containing filter transmission data arranged by KP filter number [35]
henearhres	Tabulated list of wavelengths from "A CCD Atlas of Comparison Spectra: He-Ne-Ar, 3300 A - 11,100A ," Daryl Willmarth, April 1993 (will appear in IRAF V2.10.3 in the linelists directory) [35]
hydra	Directory containing Hydra information [29,30,32,33]
kpnoforms	Directory containing TeX template for KPNO Observing Time Request [34]
manuals	Directory containing instrument manuals for KPNO [35]
platelogs	Directory containing photographic plate catalog for KPNO 4-m Prime Focus camera [35]
sqiid	Directory containing scripts for the reduction of SQIID data

[] NOAO Newsletter issues containing latest information on this entry.

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Requests for KPNO Telescope Time 1 August 1993 - 31 January 1994 (1Sep93)

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Requests for KPNO Telescope Time (1Sep93)
(from KPNO, NOAO Newsletter No. 35, 1 September 1993)

1 August 1993 - 31 January 1994

Telescope		Nights Req.	Nights Sched.	# Req./ # Sched.	# of Prop.	# Sched.	Total #/ # Sched.	# Staff Nights	% Staff Nights
4-m	Dark	222	57	3.9	69	18	3.8	8	14
	Bright	171	46	3.7	48	15	3.2	0	0
2.1-m	Dark	139	61	2.3	34	14	2.4	17	28
	Bright	138	80	1.7	32	18	1.8	4	5
Coude Feed		177	152	1.2	25	23	1.1	17	11
1.3-m		140	119	1.2	28	21	1.3	16	13
0.9-m	Dark	133	59	2.3	26	13	2.0	9	15
	Bright	108	55	2.0	20	10	2.0	13	24
Schmidt		71	49	1.4	12	9	1.3	1	2

KPNO received 272 proposals from visitors and staff combined. Of these, 18 were long-term proposals and 4 were granted long-term status. Two proposals which had previously been granted long-term status were also scheduled. Five of the proposals for 0.9-m dark time were queue-scheduled for 19 nights.

George Jacoby

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NSO Users' Committee Meets (1Sep93)

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NSO Users' Committee Meets (1Sep93)
(from NSO, NOAO Newsletter No. 35, 1 September 1993)

The NSO Users' Committee held a two-hour telephone conference on 18 March and a meeting in Palo Alto on 12 July, just before the AAS/SPD meeting. The following committee members participated: David Rust (chair), John Leibacher (NSO Director), Drake Deming, Ernie Hildner, Steve Kahler (representing Rita Sagalyn), Bruce Lites, Robin (Tuck) Stebbins, Dick White, Steve Keil and Ray Smartt. Dick Fisher and Steve Saar were absent. Seth Tuttle and Kenneth Schatten represented the NSF at the meetings.

A major topic was the budget, which is being cut by 6% in FY 1993. This is equivalent to about 10% after inflation. It is a real cut, and it means that three NSO people will be shifted to project funding, and another position that will be opening will not be refilled. Approximately 20% of the effort at Sacramento Peak is now devoted to specific, separately-funded projects. Because of the GONG project, an even higher percentage is project specific at Kitt Peak.

The projects, e.g., RISE, GONG, SWATH, were all considered valuable, but the committee was concerned about the implications for NSO users of increased emphasis on project-oriented funding. Should NSO staff be shifted to project support as a way to respond to broad budget cuts? Projects do bring in new resources and therefore generally strengthen the observatory. But, the paradigm wherein the national center develops and operates flagship facilities for research driven by the user community seems to be eroding.

Jeff Kuhn will lead NSO's RISE program. RISE is part of NSF's effort to answer national needs for better understanding of global change. Modest funding for RISE is in the NSF budget for 1994. The committee is strongly supportive of the NSO's participation in RISE.

Of all the programs reviewed, the committee was most concerned about the adaptive optics (AO) effort. The scale of this program seemed short of what is needed to produce a user-friendly system in the Vacuum Tower Telescope. Now it appears that 1994 NSF funding may lead to an AO facility on a par with users' needs.

Bruce Lites emphasized how important AO at the VTT is to the Advanced Stokes Polarimeter, which is now working well and achieving polarization sensitivity of better than 0.1%. In fact, any user of the VTT would be anxious to improve their observations with AO. The committee notes that if only the aberration in the VTT entrance window could be corrected, the images would be much improved. This would require only a relatively slow- moving active corrector, or maybe even just a fixed wavefront corrector lens.

Additional budget pressure on NSO looms because the Air Force may reduce their support substantially. When the Air Force funding crisis hit last year, many members of the Users' Committee and of the solar community leapt to the AF and NSO's defense. The committee is very concerned about the situation and stands ready to help however they can. Overall, the picture for the rest of 1993 and for 1994 is for flat funding, at best, and for a severe shock to the base program and AF programs, at worst. It was clear to the committee that NSO Director Leibacher has minimized the damage and has even weathered the storm so far by encouraging new, separately-funded projects. The committee is sympathetic with this approach, but it is also concerned about erosion of the base funding.

The committee was happy to hear that two new instruments at Sacramento Peak (SP) are now open to users via application to the TAC. They are the JHU/APL Solar Vector Magnetograph at the Hilltop Dome and the HAO Advanced Stokes Polarimeter at the VTT. In both cases, the NSO staff has been trained in operating the instrument and in reducing the data, but in general, users will be expected to come to SP and obtain their own observations.

Lites reported on the status of the Large Earth-based Solar Telescope (LEST). Unfortunately, NSF turned down the US proposal to participate in LEST, and the German reunification costs have put a hold on all new scientific projects until December 1994. The German government gave 300 K DM to keep the LEST team together, but the LEST council has decided to turn down the burners under the engineering effort until they get a positive decision by the German government to go full ahead. Construction of LEST could start quickly on word of adequate funding. The Users' Committee regrets the delay in LEST, and recognizes that it makes completion of an AO system all the more important for NSO.

The committee discussed the "Better Mc" which is an upgrade of the McMath-Pierce to a cooled aluminum mirror, to facilitate infrared observations. The current plan differs from the Big Mc in that the mirror will be 1.5-m instead of 4-m. Some committee members felt that NSO was wise to start with the smaller mirror, in order to demonstrate the new technology. But others expressed concern that the resources to be devoted to the 1.5-m project might be taken from projects of more interest to the users. The committee would like to review the program at its next meeting to understand it, and how it fits into the overall NSO program, in more detail.

The committee heard a report on a new joint project with the Smithsonian Astrophysical Observatory, called SWATH (Space Weather And Terrestrial Hazards). SP would help design and build a coronagraph for flight in two years on an SDIO satellite. The satellite would also carry a soft X-ray telescope provided by SAO. The committee hopes that the data from the telescopes will be available to NSO users, but it is concerned about the extent of SP's commitment to build space-qualified hardware. We understand that the Smithsonian group, which is experienced with space qualification, will provide substantial help on this aspect of the SWATH program.

The committee commends the 18-year solar spectral variability program at Kitt Peak, directed by Dick White and Bill Livingston. According to them, the program has now served its purpose, and the K-line program at the KPVT and the ESF, and the UARS data, will supplant it. They are to be congratulated on the program's success.

At the meeting in Palo Alto, the committee had a wide-ranging discussion about the mission of the NSO and the priorities for it during the present trying times. It was suggested that a new paradigm for NSO may be needed, the present one being that, above all else, the observatories should continue to offer solar beams to visitors and to outside instrument-building teams. A problem with the existing plan is that the observatory risks offering users outdated or too-specialized equipment. A case can be made, for example, that the CCD cameras are at least ten years behind the times and that the beam at the VTT is seriously affected by the known astigmatism in the entrance window. Necessary modernizations and repairs have been postponed too long.

While the activities of the partners and initiatives, such as GONG, have kept the level of activity at the NSO near the level of past decades, they have also basically changed the character of the institution. Large instrument development projects can no longer be undertaken, carried through quickly, and made available to all comers. Examples of such large projects are the Fourier Transform Spectrometer at KP and the Diode Array at SP.

A particular concern is that, in the present climate, young NSO staff members will not have a chance to try their hand at developing new instruments. If they want to start something in these times, they must seek outside support, either with partners or from mission-oriented agencies. It is possible that `curiosity-driven' science and instrument development by NSO staffers is the true casualty of the funding cuts.

All agreed that NSO must continue to be the flagship solar observatory for the nation. Without the solar facilities at SP and KP, most US solar physicists would have nowhere to observe, and many others would lack vital data to analyze. With the decline of the US space program, NSO's facilities may be more in demand than ever, so the NSO must find a way to carry out its mission, even with flat or declining base budgets.

David Rust (The Johns Hopkins U. Applied Physics Laboratory)

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NSO Observing Requests and Evaluation Forms Now Available on FTP (1Sep93)

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NSO Observing Requests and Evaluation Forms Now...(1Sep93)
Available on FTP
(from NSO, NOAO Newsletter No. 35, 1 September 1993)

NSO observing request and evaluation forms may now be obtained from the anonymous ftp site at ftp.sunspot.noao.edu. See the README file in pub/observing_templates.

Dick Altrock

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RISE/PSPT (1Sep93)

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RISE/PSPT (1Sep93)
(from NSO, NOAO Newsletter No. 35, 1 September 1993)

The NSF has given a green light to the community-based Precision Solar Photometric Telescope (PSPT) program. We now have an honest start to the project with a first-year budget of about $130 K and an expectation for funding at the level of about $150 K/year for six years. Although this is about one-third of the original budget request, NSO will begin developing the PSPT instruments immediately. If additional funds are available next year, we may still realize our goal of a two station network for solar-cycle surface brightness variation studies within two years.

The PSPT instruments are being designed to obtain the highest precision, differential, full-disk surface brightness observations that are possible from a ground-based telescope operating in the blue to near IR part of the visible spectrum. The instruments will utilize a fast readout, 2K x 2K pixel CCD camera and atmospheric seeing monitors with a fast shutter system to achieve high spatial resolution with (a goal of) 0.1%/pixel photometric precision. Observations in Ca K and continuum wavelengths will be obtained with a cadence limited by our (as yet undetermined) data handling and storage capabilities, although we anticipate obtaining complete photometric datasets with at least a two-hour cadence. The PSPT Scientific Advisory Committee consists of P. Foukal (chair), G. Chapman, J. Kuhn (project scientist), B. LaBonte, A. Skumanich, and O.R. White.

Jeff Kuhn

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IR Observing Capabilities at NSO/SP (1Sep93)

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IR Observing Capabilities at NSO/SP (1Sep93)
(from NSO, NOAO Newsletter No. 35, 1 September 1993)

Several rounds of observing tests have been completed with a HgCdTe IR camera system and the NSO/SP Evans Facility and VTT telescopes. The VTT/Echelle and HSG perform nicely for IR spectroscopy out to the K-band. The IR VTT polarization properties are still being analyzed, but it appears that the VTT-induced cross-talk between linear and circular polarization states is roughly consistent with visible-band measurements. The Evans Littrow spectrograph has proven to be very stable and useful out to wavelengths of 1.8 um (now limited by the focus travel of the Littrow lens). The Evans coronagraph has also been used out into the H-band. Instrumental scattered light currently limits broad-band IR coronal observing, but changes in the baffling may soon allow sky-limited coronal IR imaging. The high QE of the HgCdTe detector (approximately 10 times the QE of silicon CCDs at 10830 A) is encouraging news for several spectroscopic experiments. A 79 l/mm grating borrowed from Kitt Peak (now being installed in the Littrow) may also greatly improve the efficiency of IR coronal spectroscopic studies obtained from the Evans Facility. The NSO/SP IR camera system was funded jointly by Michigan State University, Wyoming Infrared Observatory, and Haverford College. It is available on a shared-risk basis on a limited schedule. Interested observers should contact Jeff Kuhn for further information.

Lou Gilliam, Jeff Kuhn, Dick Mann, Matt Penn

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NSO/SP Awarded Subcontract for SWATH Coronagraph (1Sep93)

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NSO/SP Awarded Subcontract for SWATH Coronagraph (1Sep93)
(from NSO, NOAO Newsletter No. 35, 1 September 1993)

NSO has been subcontracted by the Smithsonian Astrophysical Observatory, Center for Astrophysics, to build the structure and optical components of an externally-occulted mirror coronagraph to be included as one of three instruments on the USAF-funded Space Weather and Terrestrial Hazards (SWATH) mission. The other two instruments are short wavelength (63 A and 190 A) normal-incidence imagers. All instruments will use 2048-2 CCDs. Leon Golub is the PI for SAO, and Ray Smartt is the PI on the subcontracted NSO coronagraph effort. Funds for SWATH are being provided by the Ballistic Missile Defense Organization through PL/SX at Hanscom AFB; members of the Phillips Lab Solar Research Branch at Sacramento Peak are included on the SWATH science team and will further act in the management of the coronagraph program. SWATH objectives include simultaneous imaging of outer and inner coronal structure and evolution, detection and studies of coronal mass ejections and flares, and an attempt to monitor space debris in size ranges not observable by ground-based telescopes.

Don Neidig

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Sac Peak Full-Disk Coronal Map GIF Images Available through Anonymous FTP (1Sep93)

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Sac Peak Full-Disk Coronal Map GIF Images...(1Sep93)
Available through Anonymous FTP
(from NSO, NOAO Newsletter No. 35, 1 September 1993)

The Solar Terrestrial Dispatch in cooperation with the USAF Phillips Laboratory and the National Solar Observatory are pleased to announce the availability of pseudo-full-disk solar Fe XIV 5303 A and Ca XV 5694 A coronal map images through anonymous FTP from: XI.ULETH.CA (IP number 142.66.3.29).

Maps are provided on a daily basis at this site in the directory "pub/solar/Corona/Maps" as GIF-image files.

Observations are made at the National Solar Observatory at Sacramento Peak with the Emission Line Coronal Photometer (ELCP). This instrument photoelectrically records the solar corona when fed with the Evans Solar Facility 40-cm Coronagraph. It operates at high precision due to its ability to subtract the sky background from the signal in emission lines through use of a lock-in amplifier oscillating at a rate of 100 kHz between the continuum and lines at 6374 A (Fe X), 5303 A (Fe XIV) and 5694 A (Ca XV), which are formed at approximate temperatures of 1, 2 and 3 MK, respectively. A 1.1 arcmin aperture is scanned around the limb daily from 1.15 to 1.45 solar radii for Fe XIV, 1.13 Ro for Ca XV and 1.15 Ro for Fe X. The output of the ELCP is sensed by a photomultiplier, digitized and recorded every 3 degrees of latitude. Absolute intensities in millionths of the brightness of the center of the disk at each wavelength are obtained by calibrating the system through a neutral density filter. All Fe X, Ca XV and the 1.45 Ro Fe XIV scans are scaled to have at least one absolute zero intensity data point. Fe XIV scans at other radii are adjusted by the amount subtracted from the 1.45 Ro scan.

Pseudo-full-disk maps are produced by joining together 15 days of 1.15

Ro (Fe XIV) or 1.13 Ro (Ca XV) data from the East or West limbs into a synoptic map and projecting it onto a sphere. For the East-limb maps, the scan from the date of the map is at the left side (East) of the map, and the data on the central meridian are from seven days prior to the date of the map. West-limb maps, which show the far-side of the Sun on the day they are produced, have been given an effective date two weeks into the future, so that they may be compared with East-limb maps of the same date. Under this naming convention, both East- and West-limb maps show the Earth-facing side of the Sun. For the West-limb maps, the scan from 14 days before the date of the map is at the left side (East) of the map, and the data on the central meridian are from 21 days prior to the date of the map. Data are incremented from the central meridian at 12.857 degrees per day. For Fe XIV maps, all missing data are interpolated. For Ca XV maps, single missing days are interpolated; two or more consecutive missing days are shown as "N/A" (not available &lt =&gt black). Maps are currently only produced for Fe XIV and Ca XV and are normally available for each Monday through Friday, excluding holidays.

Each image in the "pub/solar/Corona/Maps" directory contains both an Fe XIV and a Ca XV map. The images are identified as "mapMMDDx.gif", where MM is the month, DD is the date, and "x" is "e" or "w". East-limb data are identified in the filenames by postfixing the date with an "e" (e.g., "map0512e.gif" for 12 May). West-limb data are similarly identified with a "w" postfixed to the date (e.g., "map0526w.gif" for 26 May).

These data are freely available with one restriction: If you use the data or some product based on the data in a published paper, we ask that you include an acknowledgement as follows:

NSO data used here are produced cooperatively by USAF/AFMC/PL/GPSS and NSF/NOAO/NSO/SP.

GIF image plots are produced cooperatively by the above and the Solar Terrestrial Dispatch.

For further information, contact thenry or raltrock at NOAO:: or noao.edu.

CAUTION: Contact the above for current information concerning calibration before using these maps for any modeling, etc., applications requiring absolute calibrations.

For questions or problems concerning this service, contact:
Oler@Rho.Uleth.CA, Solar::COler or COler@Solar.Stanford.Edu

Dick Altrock

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NSO Observing Proposals (1Sep93)

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NSO Observing Proposals (1Sep93)
(from NSO, NOAO Newsletter No. 35, 1 September 1993)

The deadline for submitting daytime observing proposals to the National Solar Observatory for the first quarter of 1994 is 15 October 1993. Forms, information and a Users' Manual may be obtained from the Telescope Allocation Committee, P.O. Box 62, Sunspot, NM 88349, for the Sacramento Peak facilities (sp@sunspot.noao.edu) and the Telescope Allocation Committee, P.O. Box 26732, Tucson, AZ 85726, for the Kitt Peak facilities (nso@noao.edu). At your request, a TeX or UNIX roff version can be e-mailed.

Dick Altrock

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Spectroheliograph Fixture on the 13.5-m McMath-Pierce Spectrograph (1Sep93)

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Spectroheliograph Fixture on the 13.5-m...(1Sep93)
McMath-Pierce Spectrograph
(from NSO, NOAO Newsletter No. 35, 1 September 1993)

Call it 1900s technology, but when a visitor recently inquired about imaging Ca K2V with a purity of about 0.05 A, we realized that the conversion of the old spectroheliograph to a stellar instrument resulted in a lost capability. The narrowest K-line filter in our possession has a passband of 1 A.

In response to this need, Keith Pierce has built a moving plate holder-slit assembly which mounts on the photographic exit port of the vertical spectrograph. It takes 4 x 5 inch film, typically Kodak linagraph shellburst. The existing predisperser serves as a prefilter for order selection. Image motion is provided by the telescope drive. With the visible-light grating in the sixth order, dispersion is 8 mm/A. Entrance and exit slits of 0.5 mm required 0.3 seconds per step to nicely expose K2V. Obviously, a linear array would be useful here.

Bill Livingston, Keith Pierce

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Upgrade of the McMath-Pierce Solar-Stellar Spectrograph (1Sep93)

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Upgrade of the McMath-Pierce Solar-Stellar...(1Sep93)
Spectrograph
(from NSO, NOAO Newsletter No. 35, 1 September 1993)

We have completed and reviewed an optical design concept to cross-disperse the solar-stellar spectrograph at the McMath-Pierce Facility. The spectrograph now includes conventional gratings and an echelle grating in a rotatable turret. The echelle grating has been used in the past, in conjunction with interference filters, to isolate a single order. By introducing cross-dispersion for the echelle grating, combined with a large-format CCD array (1024 x 3072), we will achieve a significant increase in the wavelength range that can be observed in a single integration.

The optical elements adopted for the cross-dispersion include two prisms and a removable grism. This configuration essentially yields a "blue" and a "red" system. The blue system utilizes the two prisms alone to achieve generous order separation and good efficiency. The addition of the grism defines the red system. Along with the two prisms, excellent efficiency and adequate order separation are achieved in the red longward of about 5270 A. The detailed mechanical design is now being developed for a design review. We expect that this modification, along with the large-format detector, will be completed by the end of this calendar year.

Mark Giampapa, Dave Jaksha, Jorge Simmons

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IR Postdisperser Available (1Sep93)

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IR Postdisperser Available (1Sep93)
(from NSO, NOAO Newsletter No. 35, 1 September 1993)

Thanks to the efforts of Bill Lenz, Dick Joyce and Dave Stultz (KPNO), Don Jennings, Drake Deming and George McCabe (NASA/GSFC), and Ken Hays (Rockwell Science Center) the 12 um NOAO cryogenic postdisperser is operational and available for infrared solar observing on a limited, shared-risk basis.

The postdisperser combines a single-element BIB detector and a grating housed in a liquid Helium cooled dewar. External adjustment of the grating angle isolates narrow spectral bands (R~200) in the range 8-12 um. The Goddard group has successfully used the system, in combination with the McMath-Pierce Facility and 1-m FTS, to observe the Zeeman-sensitive 12 um emission lines in the solar photosphere.

Due to NSO's limited support resources, the NOAO postdisperser will be scheduled for observing on a "shared risk" basis. In practice this means that if a serious instrument failure should occur, we cannot guarantee that the problem will be addressed during the observing run. However, we have had considerable success with other instruments scheduled in this mode and are now prepared to accept observing proposals requesting the NOAO postdisperser.

Thanks go out to all those involved in developing this exciting instrument and making it available to the solar community.

Ken Hinkle, Doug Rabin, Jeremy Wagner

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NSO FTP Archives (1Sep93)

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NSO FTP Archives (1Sep93)
(from NSO, NOAO Newsletter No. 35, 1 September 1993)

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Kitt Peak
ftp robur.tuc.noao.edu (or 140.252.1.10), cd ga0:[ftp.kpvt]
        Daily solar magnetograms and 10830 A spectroheliograms.
        Carrington synoptic magnetic and 10830 A maps.

ftp argo.tuc.noao.edu (or 140.252.1.21), cd solarc
        Daily K-line images.

Sacramento Peak
ftp robur.tuc.noao.edu (or ftp 140.252.1.10), cd spcm
        or
ftp ftp.sunspot.noao.edu (or 146.5.2.1), cd pub/corona.maps

fexiv   Directory containing daily pseudo-full-disk maps of the Fe XIV
           solar corona [30], [32]
caxv    Directory containing daily pseudo-full-disk maps of the Ca XV
           solar corona [30], [32]
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idl     Directory containing IDL procedures for displaying the maps [30], [32]

ftp ftp.sunspot.noao.edu (or 146.5.2.1), cd pub/corona.maps

CORONALERT                       current Sac Peak CORONALERT [34]
CORONALERT.SAVE                  Sac Peak CORONALERTs archive [34]

ftp ftp.sunspot.noao.edu (or 146.5.2.1), cd pub

obs_sched                Directory containing observing schedules for
                           NSO/SP facilities
observing_templates      Directory containing NSO observing request forms

[] NOAO Newsletter issues containing latest information on this entry.
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NSO Telescope/Instrument Combinations (1Sep93)

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NSO Telescope/Instrument Combinations (1Sep93)
(from NSO, NOAO Newsletter No. 35, 1 September 1993)

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

Evans Solar Facility (SP):
        40-cm Coronagraphs (2)
        30-cm Coelostat
        40-cm Telescope
        Littrow Spectrograph
        Universal Spectrograph
        Spectroheliograph
        Coronal Photometer
        Dual Camera System

Hilltop Dome Facility (SP):
        Ha 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
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Razdow (KP):
Ha patrol instrument

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GONG Update (1Sep93)

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GONG Update (1Sep93)
(from GONG, NOAO Newsletter No. 35, 1 September 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. Active membership in a GONG Scientific Team will, however, allow early access to the data and the collaborative scientific analysis that the Teams have already initiated. The quarterly 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 with the FY 1993 budget uncertainties resolved, production is in full swing, good prototype data is being acquired, and data processing capability is on track for network operations late in 1994.

Activities involving development of the GONG instrument continue to wind down as production of the field instruments accelerates. Most recent instrument development work centered on using the prototype for solar observations and to test production software and hardware. A few remaining minor mechanical items are moving toward the prototype stage.

The instrument development team shrank when Don Neff could not resist the opportunity to return to the South Pole, this time for a year! We have also suffered from the hopefully temporary loss of the GONG Project Engineer, Warren Ball, to a stroke.

The instrument development team is involved in testing and assembly of optics for the GONG instrument. A very nice development was the receipt of narrow band prefilters (4 A) using an ion-assisted deposition technique for use in the field instruments. The filters are quite impressive. Peak transmission is up to 75%, and scatter is very low. The temperature variation of the peak wavelength is much less than for standard thin film interference filters and bodes well for the long term stability of the filters. Several of these filters have been tested and accepted. Other good news is the completion of an order for 20 mirrors for the production light feed systems. These mirrors have tight tolerances on phase shifts of the reflected polarized light which the vendor was able to meet. The first production 1 A Lyot filter was assembled from the second worst set of crystal optics we have available (the worst set is in the prototype), and it easily meets all of our specifications. The major optics concern now is the Michelson interferometers that are the heart of the GONG instrument. A new vendor, Interoptics, has contracted to provide the interferometers in two batches, the first being due in November.

The first version of the production software was installed at the prototype instrument prior to six weeks of observing in May and June. A number of bugs were discovered and fixed as the run progressed. During most of this observing period, we took magnetograms every hour. The magnetogram observations also provide Doppler images, and it was hoped that these could be inserted into the main time series of Doppler images to avoid introducing a gap every time a magnetogram is taken. The normal and magnetic Doppler images look very similar and are quantitatively similar. However, using our present interferometer they are enough different that using the magnetic Doppler images introduces noise into the time series. This is a scary preview of the difficulties of merging data from different instruments into a single time series. It is possible that the better interferometers we expect to use in the field instruments will allow use of the magnetic Doppler images, but that remains to be seen. In the meantime, an autoregressive filling technique can ameliorate artifacts from the hourly magnetograms.

Until a year ago, it had been planned to use a stabilized laser to provide a Doppler reference signal in each frame of GONG data. This proved impractical when the laser signal could not be made to be as quiet as the Sun within the time and budget constraints of the GONG project. Since the hardware and optics were already designed and built to do the laser monitoring function, we wondered what to do in the absence of a laser. A port where the laser beam was to emerge has been, and will continue to be, used in the initial alignment of the GONG instrument. The port where the laser beam was to be injected is also a location where an unused image of the Sun is emerging which contains all the information of the main image. In particular, it is modulated for the Doppler effect. We intended to use this auxiliary image to help measure linearity of the CCD camera and still plan to do this. However, it is clear that we could put a single detector to collect the entire image and produce a Sun-as-a-star Doppler signal that would be useful for instrument monitoring and low-l observations. No additional software effort is required during reduction because the laser signal processing is already provided.

The performance of the CCD camera system continues to be just barely adequate to meet the goals of the GONG project. Several problems have been tracked down to the electronics that process the video signal. Most of the development team effort is currently centered on improving the performance of this crucial area.

The remaining development to complete the prototype instrument involves a mechanism to hold the objective lens of the instrument and a system that provides a gentle flow of clean air to the optical system. Both of these projects are in construction.

During our summer monsoon season, the prototype instrument is operated so that electronic and mechanical activities take place during one week while software activities take the next week. Observing periods of three days are included in each two week cycle. When the weather improves this fall, a few-week observing run is planned. Due to a late start of the monsoon, we have fortunately been able to observe at the same time as the SOI instrument currently located at Lockheed on two weekends.

As a result of the funding cuts earlier this year, the assembly of mechanical parts has slipped and is now on or near the critical path, sharing this status with the wiring of production electronics chassis. The first production data chassis including a full set of proof printed circuit boards was finished in time for installation at the prototype site during the spring data run. All ten production data chassis are now complete, and testing is underway. In the mean time, the routing of other printed circuit boards has progressed at pace; sixteen of the thirty boards are now routed, and three others are in progress. The critical elements of the new instrument control software were also complete in time for the spring run. It is currently being further tested and refined.

On the data management front, the development of the Field Tape Reader has been completed. Recently, significant changes were made to accommodate the new data acquisition software in the instrument. The performance of the subsystem has been tested, and it was determined that one operator and one workstation could provide more than enough capacity for the network phase of the project. The Field Tape Reader easily processed 21 cartridges containing all the data produced by the prototype instrument during the recent two month data run.

The development of the Off-site Copy Facility is also nearing completion. Remaining development work includes minor code and documentation changes, some additional work to estimate the equipment and personnel needed for the network phase of the project and moving the off-site storage facility (currently in the GONG lab) to the KPVT (probably in late CY 1993). Currently, the OCF is up-to-date in that all except the most recent cartridges stored in the DSDS have been copied and the copies stored in the off-site storage facility.

The prototype instrument recorded two months of data during May and June. Significant instrument changes included new instrument control and data acquisition software, the introduction of magnetograms into the acquisition program, and a deteriorating camera. The DMAC is reducing the data-days that were not severely compromised by weather or instrument problems. Nineteen days (18-21, 24, 25, 27, 29-31 May and 1, 5, 7, 8, 10-13 June) were calibrated and reduced to ten-minute averages and site-day l- spectra. Problems with magnetograms and the camera impaired the calibration and downstream products. Consequently, none of these data will be assembled into multi-day time series. An additional thirteen days (16-28 June) have been calibrated. Ten-minute averages and site- day l- spectra are currently being produced. The quality of these data is much better than that acquired earlier. Consequently, multi-day time series and l- spectra will be produced from this thirteen day sequence in the near future. The scattering correction (which is currently being developed) was applied to two days of November 1992 data. The development of the scattering correction has progressed rapidly and will likely be incorporated into the DMAC's data reduction procedure in the future.

During the past quarter, an internal review was held of the VMICAL reduction stage. This was preceded by the documentation of the software and procedures which currently support this stage. Major functional changes to be incorporated in the future include: smoothing the calibration correction images to minimize the mapping of calibration noise into the oscillation images, correcting for the response of the camera to large changes in intensity, applying a flat field correction to the intensity images to facilitate the extraction of the scattering MTF, and incorporating the extraction of the scattering MTF into VMICAL. In addition, a significant effort will be needed to improve the efficiency (particularly that of the human operators) in order to meet the project's performance objectives for the network phase of the project.

The investigation of alternative detrending filters (which are applied to remove slow velocity trends from the p-mode data stream) was completed. The conclusions of this study will be reported after the results are interpreted and evaluated.

A new version of the user's interface to the DSDS (featuring improved functionality and performance) was installed (locally) on the User's Machine so that it can be evaluated by members of the DMAC Users Committee. The interface will likely be made available for distribution later this year. The procedures for authorizing users to access the various data products were established. In addition, the DSDS can now support distributions of data products via the network and Exabyte cartridges. In summary, all the pieces (at least in usable prototype form) are now in place that make up the user's interface to the DSDS. Currently, there are over 400 cartridges in the DSDS, and the cartridge traffic is in excess of 10 cartridges per day being checked out of and into the DSDS.

The DMAC Users Committee met in conjunction with the Solar Physics Division meeting. Attending were members R. Stebbins (chair), T. Brown, and T. Hoeksema. F. Hill, J. Pintar, and M. Trueblood represented the DMAC project.

Lance Lones (U. of California, San Diego), a summer student, is measuring the rise and decay of atmospheric dust caused by the Mt. Pinatubo eruption as observed by the GONG site survey network.

The project had been operating under highly restrictive spending limitations since NSF cut the GONG budget in February, as a part of the general FY 1993 reductions. Many materials purchases planned for the spring and early summer were put on hold, personnel vacancies and new hires were frozen, support from ETS and CFO was curtailed, and all overtime was canceled. These necessary steps posed a serious risk of forcing a three-month delay in the network delivery schedule. Happily, the project has just received news that much of the cut will be restored. As a result, the project is currently moving ahead with the delayed purchases, two vacant positions and a planned new position have been filled, and CFO and ETS support is resuming. The overall effort is ramping back up to the levels of activity in place before the February cut. At this point, it is not clear how much of the lost time can be made up, however the slippage has stopped and every effort will be made to make up the time over the next few months. If this effort is successful, the deployment of the first network station will be underway in July of 1994, less than a year from now.

John Leibacher and the GONG Team

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NOAO Net News (1Sep93)

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NOAO Net News (1Sep93)
(from CCS, NOAO Newsletter No. 35, 1 September 1993)

NOAO is currently making some information available through three of the most popular Internet mechanisms. Anonymous FTP is available to orion.tuc.noao.edu (KPNO archives), gemini.tuc.noao.edu (NOAO archives), tucana.tuc.noao.edu (IRAF archives), ctios1.ctio.noao.edu (CTIO archives), robur.tuc.noao.edu (Solar and GONG archives), and pandora.tuc.noao.edu (preprint and catalog archives); programs, documents, manuals, etc., have been available this way for some time. We also have a gopher server on gopher.noao.edu; this is primarily used by the Gemini Project, but offerings through this portal are likely to increase. Past issues of the NOAO Newsletter are available for searching via WAIS (Wide Area Information Server) on pandora.tuc.noao.edu.

We are also considering connecting to the World Wide Web. If you are not familiar with WWW, it is the fastest growing information server, with uncountable documents, images, sounds, movies, etc., linked together throughout the Internet world. With X windows, you can explore this world comfortably with the program "xmosaic," available precompiled for a number of machines by anonymous FTP from ftp.ncsa.uiuc.edu in the Mosaic/xmosaic-binaries (source is available as well). There are also some VT100 WWW browsers, though documents with embedded images aren't displayed to best advantage this way.

Meanwhile you will notice that this Newsletter issue is attempting to make our FTP archives more visible to you, with entries near the end of each section summarizing the location of the FTP archives for that division. As part of this effort, many of the FTP archives have been restructured in a more organized fashion. Reorganization may continue, but hopefully not for long, as we lean toward a more sophisticated information provider. All of the FTP archives, except the Solar ones, are on Sun servers, so users should log in as anonymous and use their e-mail address as the password. For the Solar archives, which are on a VAX, log in as anonftp with the password guest.

We would appreciate any words you wish to send our way about the preferred information providers, and, perhaps more importantly, what information you would like to see us provide. Please send your comments to rwolff@noao.edu or jbarnes@noao.edu.

Richard Wolff, Jeannette Barnes

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1993 Software Conference Update (1Sep93)

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1993 Software Conference Update (1Sep93)
(from CCS, NOAO Newsletter No. 35, 1 September 1993)

The Third Annual Conference on Astronomical Data Analysis Software and Systems (ADASS) will be held in Victoria, British Columbia (Canada), 13-15 October 1993. 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.

This year's Conference will highlight the following special topics: Surveys and Catalogs, Multiwavelength Analysis, Networking and

Distributed Computing, and Image and Spectral Analysis.

The Conference program will include invited and contributed talks. Contributed posters and demos will be on display throughout the Conference. One evening and the afternoon of the last day are reserved for special interest discussions called BOFs (Birds of a Feather sessions). Currently scheduled BOFs include IRAF and IDL user's group meetings and an Electronic Publishing workshop organized by Chris Biemesderfer. Anyone wishing to sponsor a BOF should contact the conference organizers at the address below.

The invited speakers for the Conference include Robert Becker (U. of California, Davis), James Condon (NRAO, Charlottesville), John Dreher (NASA/Ames), George Djorgovski (CalTech), Jim Fullton (Clearinghouse for Networked Information Discovery and Retrieval), Joseph Hardin (Nat. Center for Supercomputing Applications), Stephen Kent (Fermi National Accelerator Lab), Gerard Kriss (The Johns Hopkins U.), Rick Perley (NRAO, Socorro), and Belinda Wilkes (SAO).

Retrieval information was e-mailed to the Conference mailing list in June with instructions for acquiring the registration and abstract materials by FTP. The abstract and early registration deadlines were August 6. Registrations will continue to be accepted at a higher registration fee until the Conference. Please see the README file in the pub/adass/register directory on ftp.dao.nrc.ca for further details.

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 (1Sep93)

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IRAF Update (1Sep93)
(from CCS, NOAO Newsletter No. 35, 1 September 1993)

Work is nearing completion on the V2.10.3 patch release of IRAF. As this Newsletter goes to press, V2.10.3 is being installed internally within NOAO and at selected beta test sites to undergo user testing prior to the public release. Details about the V2.10.3 release and the X11 support package, which will be released at the same time, were presented in the last issue of the NOAO Newsletter.

IRAF V2.10 distributions for three additional platforms were released in May and June. The VAX/VMS upgrade to V2.10 was completed along with an extensively revised and updated installation and site manager's guide. The new version of VMS/IRAF includes major enhancements to support networking and tape drive access on VMS systems. HPUX/IRAF V2.10.2 was released for the Series 700 and 800 HP-Apollo workstations. IRAF V2.10.2 for the Macintosh running A/UX (a new port) was released in early May. This brings to a conclusion the initial round of ports and upgrades planned when IRAF V2.10 was released last summer.

The IRAF port to the SunSoft Solaris operating system is the next scheduled port. This project will go forward this summer when the X11 and GUI development work is completed and when testing of the V2.10.3 release is a bit further along. Other IRAF ports currently planned include ports to the DEC Alpha platform under OSF and VMS, and a port to the Intel (PC) platform running some still to be determined version of UNIX.

The X11 and GUI project and the V2.10.3 release will provide many new or upgraded tasks and other software. Most of our efforts currently are going into the preparation of this software. This software, and the new IRAF mail network, will be the topic of the next IRAF Newsletter which will be mailed when V2.10.3 is ready for distribution.

The IRAF group will be attending the Astronomical Data Analysis Software and Systems Conference in Victoria in October (see the accompanying article in this section of the Newsletter). The new IRAF software being developed for the V2.10.3 release will be demonstrated throughout the Conference. Please drop by and say hello if you are there.

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

Doug Tody, Jeannette Barnes

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Additional FTP Archives (1Sep93)

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Additional FTP Archives (1Sep93)
(from CCS, NOAO Newsletter No. 35, 1 September 1993)

IRAF FTP Archives

ftp iraf.noao.edu (or 140.252.1.1)

NOAO FTP Archives

ftp gemini.tuc.noao.edu (or 140.252.1.11)

```
weather     Directory containing weather satellite pictures. [32]
noao        Directory containing miscellaneous information about NOAO.
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Miscellaneous FTP Archives

ftp pandora.tuc.noao.edu (or 140.252.1.24), cd catalogs

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jacobyetal.spec     Directory containing the Jacoby et al. spectral catalog.
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[] NOAO Newsletter issue containing latest information on this entry.

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Performance of the 256 x 256 InSb Chip at NOAO (1Sep93)

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Performance of the 256 x 256 InSb Chip at NOAO (1Sep93)
(from ETS, NOAO Newsletter No. 35, 1 September 1993)

Lab testing has been completed, and the 256 x 256 InSb array is now in the Cryogenic Optical Bench, where it has undergone additional testing in the lab and on the mountain. An additional engineering array is still being tested in the lab to develop techniques for reading the device at 30 frames/second, which is needed for 4 um and 5 um work. At the present time we have achieved 65 millisecond frame rates with an additional 65 milliseconds overhead using the reset-read-read technique with very good results. The significant improvement is that the full well capacity is over 100,000 electrons with 600 mv applied bias. At these bias levels dark current of less than 0.5 electrons/sec is achieved. At higher biases (1 v) we have gotten full well capacities of 250,000 electrons. It may be possible to push that to 300,000 with additional voltage adjustments. The operating voltage levels and clocking techniques used at NOAO can be obtained by contacting the author.

Al Fowler

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