NOAO Newsletter - September 1992 - Number 31

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Director's Office

Cerro Tololo Inter-American Observatory

Kitt Peak National Observatory

National Solar Observatory

Global Oscillation Network Group

Central Computer Services

Engineering and Technical Services

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

US Gemini Project Office (1Sep92)

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US Gemini Project Office (1Sep92)
(from the Director's Office, NOAO Newsletter No. 31, 1 September 1992)

The Gemini project is undergoing a multi-tiered scientific review during the summer and early fall. The goal is to achieve consensus among the partner scientific communities about the scientific and performance requirements of the telescopes and the first-light configuration of foci and instruments. The intention is to obtain approval of these choices from the interim Gemini board at their November meeting. At that time, the telescope configuration for first light will be frozen, so that the project can proceed with a vigorous detailed design effort. Prioritizing the instrument complement may be more of an ongoing process, although the project will be given guidelines this fall on the committees' order of preference.

You may have thought that the Gemini telescope concepts were relatively well defined, so why is there all this review activity? Based on the preliminary Science Requirements Document and a wish list for a full complement of versatile instruments, the project engineers engaged in preliminary design studies of the telescope systems. They then undertook a detailed costing exercise, based on the concepts developed and estimates from vendors for various components of the observatory. As expected, there were both areas of technical challenge and a total price tag for the full wish list that exceeded somewhat the ceiling that Congressional funding mandated. The aim of the current cycle of reviews is therefore to identify areas where a modification of requirements can reduce technical risk, to prioritize capabilities so that the most important ones are accomplished, and to identify ways to get the most scientific return on a fixed budget.

The (international) Gemini Science Committee met in June in Tucson, and got their first exposure to the budget limits and trade-off options. Their recommendation was for an impartial expert review team to examine the Gemini project team's design and management strategy, along with the budget estimates, to provide the project director with advice on areas where technical improvements or cost savings were possible. That expert team, consisting of Alec Boksenberg (UK), Bev Oke (Canada), and Fred Chaffee (US), met in Tucson during the week of 13 July. Their recommendations were presented informally to the project prior to their departure and as a written report to the Director.

During August and September, the National Science Advisory Committees are meeting in their respective countries. The US optical, IR, and joint committees met in Tucson on 13 and 14 August. They developed a strong consensus on the choice of final focal ratios and the order of their implementation at first light. The US advisory committees then provided a US position to the US project scientist for a week-long meeting of the Gemini project scientist and national project scientists in Tucson starting 24 August. The purpose of the project scientists meeting was to use the project engineering team work and previous recommendations as resources in forming a detailed recommendation for consideration at the Gemini Science Committee meeting on 14-16 September in Tucson.

The perspective advanced to the US Science Advisory Committee is that the telescopes be designed to be identical, so that they can ultimately support the same full complement of instruments if desired. There is

also theintention in the current planning to maintain support for telescope improvements and instrument development during the operations phase, so that the two facilities can be brought up to full capability over time. The active discussion for the present, then, is the first-light configuration that results from the construction-phase activities. The purpose of the US Gemini project office at NOAO is to support the involvement of US astronomers in the project; one such means is through these policy advisory activities. Your input on the priorities being established is valued, important, and welcome any time.

Richard Green, US Project Scientist

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Doug Rabin Tenured (1Sep92)

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Doug Rabin Tenured (1Sep92)
(from the Director's Office, NOAO Newsletter No. 31, 1 September 1992)

It is a pleasure to announce that at its teleconference on 13 July 1992, the AURA Executive Committee approved the Observatory Advisory Committee's recommendation that Douglas Rabin be granted tenure in AURA/NOAO. That decision, and the reviews leading up to it, were based on Rabin's innovative research program in leading the development of the Solar Near Infrared Magnetograph. The strong wavelength dependence of Zeeman splitting allows determination of the true magnetic field strength, and is leading to a new understanding of the distribution of field within magnetic flux tubes. Rabin was also cited for serving the needs and concerns of the NSO user community and for his involvement in the national and international solar astronomy communities through NASA, LEST, and the IAU Solar Infrared meeting.

Rabin is a valued colleague within NSO and NOAO, and we are pleased at this recognition of his contribution.

Richard Green

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NOAO Preprint Series (1Sep92)

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NOAO Preprint Series (1Sep92)
(from the Director's Office, NOAO Newsletter No. 31, 1 September 1992)

The following preprints were submitted during the period from 1 May to 31 July 1992. Please direct all requests for copies of preprints to the NOAO author marked with an asterisk.

Number	Author(s)	Title
431	*Boroson, T.A., Meyers, K.A.	"The Optical Properties of IR-Selected and Mg II Broad Absorption Line Quasars"
432	*Livingston, W.C.	"A 4-m McMath Telescope for the Infrared"

433	*Jacoby, G.H., Branch, D., Ciardullo, R., Davies, R.L., Harris, W.E., Pierce, M.J., Pritchet, C.J., Tonry, J.L., Welch, D.L.	"A Critical Review of Selected Techniques for Measuring Extragalactic Distances"
434	Lellouch, E., *Belton, M., de Pater, I., Paubert, G., Gulkis, S., Encrenaz, T.	"The Structure, Stability, and Global Distribution of Io's Atmosphere"
435	*Rabin, D., Dowdy, Jr., J.F.	"Pervasive Variability in the Quiet Solar Transition Region"
436	*Rabin, D.	"A True-Field Magnetogram in a Solar Plage Region"
437	*Restaino, S.R.	"Wavefront Sensing and Image Deconvolution of Solar Data"
438	*Suntzeff, N.B., Schommer, R.A., Olszewski, E.W., Walker, A.R.	"Spectroscopy of Giants in LMC Clusters. III. Velocities and Abundances for NGC 1841 and Reticulum and the Properties of the Metal-Poor Clusters"
439	*Fowler, A.M., Herring, J.	"A Low-Cost 256 x 256 PtSi Infrared Array for Astronomical Applications"
440	*Walker, A.R.	"The LMC Cluster NGC 1466: Photometry of the RR Lyraes, and a Color Magnitude Diagram"
441	*Keil, S., Kuhn, J., Lin, H., Reardon, K.	"Simultaneous IR and Visible Light Measurements of the Solar Granulation"
442	*Koutchmy, S., Restaino, S.R.	"Toward High Spatial Resolution IR Solar Observations"
443	*Smartt, R.N., Koutchmy, S., Noens, J.-C.	"Near-IR Solar Coronal Observations with New-Technology Reflecting Coronagraphs"
444	Dyck, H.M., Benson, J.A., *Ridgway, S.T., Dixon, D.J.	"The Infrared Angular Diameter of a Orionis"
445	*Williger, G.M., Babul, A.	"Pressure-Confined Lya Clouds: Simulation Results vs. Observations"
446	Eason, E.L.E., *Giampapa, M.S., Radick, R.R., Worden, S.P., Hege, E.K.	"Spectroscopic and Photometric Observations of a Five-Magnitude Flare Event on UV Ceti"
447	Goble, L.W., *Poczulp, G., Roddier, N.	"Results of Testing the 3.5M WIYN Telescope Primary Mirror and Its Support, Thermal Control, and Active Optics Systems"
448	*Massey, P.	"The Massive Star Content of the Galaxy and Magellanic Clouds: Methods and Madness"
449	*Smartt, R.N., Zhang, Z., Smutko, M.F.	"Coronal Loop Interaction in the Post-Flare Phase"
450	*Ellis, T., Drake, R., Fowler, A.M., Gatley, I., Heim, J., Luce, R., Merrill, K.M., Probst, R., Buchholz, N.	"The Simultaneous Quad-Color Infrared Imaging Device (SQIID): A Leap Forward in Infrared Cameras for Astronomy"
451	*Ridgway, S.T.	"Solar Optical Interferometry"

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Non-NOAO Preprints (1Sep92)

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Non-NOAO Preprints (1Sep92)
(from the Director's Office, NOAO Newsletter No. 31, 1 September 1992)

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
*Blanco, V.M.	"The Magellanic Clouds and Their Supernova"
*Eggen, O.J.	"The Kinematics of Young Disk Population Supercluster Members"
Elston, R., *Silva, D.R.	"The Extended Giant Branch of M32"
Fatianov, M.P., Makarov, V.I., Mikhailutsa, V.P., Kim, I.S., Koutchmy, S., Stepanova, T.V., *Zirker, J.B.	"Coronal Large-Scale Structures in Odd and Even 11-Year Solar Cycles"
*Geisler, D., Claria, J.J., Minniti, D.	"Washington Photometry of Open Cluster Giants: Nine Old Disk Clusters in the Third Galactic Quadrant"
Gredel, R., Reipurth, B., *Heathcote, S.R.	"An Optical/Infrared/Millimetre study of HH90/91"
*Heathcote, S.R., Reipurth, B.	"Kinematics and Evolution of the HH 34 Complex"
*Howard, R.F.	"How Growth and Decay of Sunspot Groups Depend on Axial Tilt Angles"
Kastner, J.H., Weintraub, D.A., Zuckerman, B., Becklin, E.E., McLean, I., *Gatley, I.	"Variation in the Near-Infrared Surface Brightness Distribution of the Bipolar Nebula OH231.8+4.2"
Komm, R.W., *Howard, R.F., Harvey, J.W.	"Rotation Rates of Small Magnetic Features from 2- and 1-Dimensional Crosscorrelation Analyses"
McWilliam, A., *Geisler, D., Rich, R.M.	"Abundance Analysis of Three Giants in the Metal-Poor Globular Cluster NGC 2298"
Morse, J.A., Hartigan, P., Cecil, G., Raymond, J.C., *Heathcote, S.R.	"The Bow Shock and Mach Disk of HH 34"
Mould, J.R., Akeson, R.L., Bothun, G.D., Huchra, J.P., Roth, J., *Schommer, R.A.	"The Velocity Field of Clusters of Galaxies within 100 Mpc. II. Northern Clusters"
*Neidig, D.F., Kiplinger, A.L., Cohl, H.S., Wiborg, P.H.	"Simultaneous Multiwavelength Observations at High Time Resolution"
*Neidig, D.F.	"Consequences of Chromospheric Irradiation in White-Light Flares: an Observer's Point of View"
*Neidig, D.F., Wiborg, P.H., Gilliam, L.B.	"Physical Properties of White-Light Flares Derived from Their Center-to-Limb Distribution"
*November, L.J.	"Exploiting Spatial Transformations of the Light State for Precise Ellipsometry"
Reipurth, B., *Heathcote, S.R., Roth, M., Noriega-Crespo, A., Raga, A.C.	"A New Herbig-Haro Flow in the HH 1/2 Complex and Its Binary Energy Source"
Saizer, P., Starrfield, S., Ferland, G.F., Wagner, R.M., Truran, J.W., Kenyon, S.J., Sparks, W.M., *Williams, R.E., Stryker, L.L.	"A Multiwavelength Study of Nova QU VUL 1984"
*Schommer, R.A., Bothun, G.D.,	"Measuring Galaxy Distances from Optical

Williams, T.B., Mould, J.R.	Rotation Curves"
*Suntzeff, N.B., Phillips, M.M., Elias, J.H., Cowley, A.P., Hartwick, F.D.A., Bouchet, P.	"On the Origin of the Cowley and Hartwick Sample of Suspected CH Stars in the Large Magellanic Cloud"
*Walker, A.R.	"A BV Color Magnitude Diagram for the Galactic Globular Cluster NGC 1851"
Welty, A.D., *Barden, S.C., Huenemoerder, D.P., Ramsey, L.W.	"BF Orionis: Evidence for an Infalling Circumstellar Envelope"
West, E.A., *Balasubramaniam, K.S.	"Crosstalk in Solar Polarization Measurements"
*Zirker, J.B.	"Systematic Motions of the Photospheric Network"

John Cornett, Elaine MacAuliffe, Vicki Miller,
Shirley Phipps, Cathy Van Atta

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Important Announcement: CTIO 4-m Telescope (1Sep92)

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Important Announcement: CTIO 4-m Telescope f/8...(1Sep92)
Secondary Temporarily Out of Service Starting 1 June 1993
(from CTIO, NOAO Newsletter No. 31, 1 September 1992)

Barring unexpected developments, the f/8 secondary will be sent out for repolishing toward the end of the spring 1993 scheduling semester (June, July) and then for several months in the following semester. This affects the last two months of the period for which proposals are due this coming 30 September. The date for recommissioning this focus will be several months into the following semester and will be announced before the corresponding proposal deadline (31 March 1993, for the period starting August 1993).

As is described in an accompanying article, the purpose is to correct spherical aberration and other optical problems which are severely affecting the telescope's image quality.

During the time that the f/8 secondary is out of service, we will not be able to offer the R-C spectrograph, echelle spectrograph, Rutgers Fabry-Perot, or f/8 direct imaging. The available instruments on the 4-m will be: all IR instruments, Argus, prime focus direct imaging.

Jack Baldwin

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More CTIO Phone Changes (1Sep92)

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More CTIO Phone Changes (1Sep92)
(from CTIO, NOAO Newsletter No. 31, 1 September 1992)

Once again, we have made (or had done to us) a variety of changes to the CTIO phone and FAX system. We now have the capability to direct-dial CTIO extensions (both La Serena and Tololo) from the outside. To direct-dial a CTIO extension from the US, dial:

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            011 (56-51) 20-5XXX
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where XXX is the CTIO extension number. Some useful extensions are:

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            4-m console:           400, 401
            1.5-m console:         464, 466
            1.0-m console:         472
            0.9-m console:         469
            Schmidt:               474

            Director's Office:     217, 215
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The main switchboard number, 22-5415, continues unchanged and can be used for those cases where you cannot find the person you want or do not know the extension.

Since it is possible to reach extensions directly, we expect to be cutting back CTIO switchboard hours in the near future. An operator will always be available during regular working hours, but there will probably be reductions in the late evening and on weekends and holidays.

Because of this new capability, it is now possible to send FAXes directly to the machine on extension 342 (local number 20-5342). As a result, the dedicated number announced in the June 1992 Newsletter (local number 21-4458) will be removed from service for FAXes after 15 September; please do not use it any more.

The FAX on Tololo (20-5462) can now also be accessed directly. PLEASE DO NOT use this FAX to send visitor questionnaires or other material that has to be processed by the Scheduling Office; the La Serena FAX should always be used for such material.

Finally, the Santiago Office FAX number has also been changed. To direct dial from the US, use:

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            011 (56-2) 209-6568
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Jay Elias, Enrique Figueroa

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Staff/Visitor Comings and Goings (1Sep92)

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Staff/Visitor Comings and Goings (1Sep92)
(from CTIO, NOAO Newsletter No. 31, 1 September 1992)

There will be a few changes in the landscape of faces that one normally sees around La Serena in the coming months. The one departure that will be keenly felt by all of us is the re-location of Lisa Wells, our data reduction specialist, to NOAO/Tucson. Wells has been at CTIO for the past five years, serving as one of the primary interfaces between visiting astronomers and IRAF. She has been the most valuable person in the observatory for those people who are not very familiar with IRAF, once they have come off the mountain with data. For those of us who know IRAF, she has been equally valuable as a force that holds us together via volleyball games and social events. Wells will be leaving CTIO the first week of September to work with the data reduction group at KPNO, and we wish her every success in Tucson.

In August Richard Elston arrives in La Serena to take up his new position on the scientific staff as Assistant Astronomer. Elston is now a post-doctoral research associate at Carnegie Observatories in Pasadena, before that he served as a post-doc for three years in Tucson at KPNO. Although his specialty is IR instrumentation and observing techniques, Elston has been involved in a wide variety of research

projects utilizing both optical and IR observations. He has concentrated on the processes of galaxy formation and evolution and was involved in the IR survey work which resulted in the discovery of the population of high-redshift (z = 0.7) luminous red galaxies. He will continue this research at CTIO and will assume an important role in the development of our IR instrumentation.

In addition to the above changes in the permanent scientific staff at CTIO, there will be a number of short-term visitors at CTIO who are spending research leaves from their home institutions. Two of these people, Hagai Netzer and Gary Ferland, are interested in active galactic nuclei and will be collaborating with Jack Baldwin. Netzer is at Tololo for two months, from mid-July to mid-September, and Ferland is spending an entire year as a Visiting Resident Astronomer beginning in September. A third visitor, Nelson Caldwell (SAO/Mt. Hopkins), will be resident at CTIO for five months from August-December. Nelson was a staff member here five years ago before going to Tucson, and it is a pleasure to welcome him back.

Bob Williams

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CTIO Instrumentation (1Sep92)

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CTIO Instrumentation (1Sep92)
(from CTIO, NOAO Newsletter No. 31, 1 September 1992)

Several of our large projects have made progress during the last quarter. The 4-m dome venting project is nearing completion and should in fact be done by the time this issue of the Newsletter appears. Most of our projects for improving dome seeing are being finished, and we are now concentrating on improving the 4-m optics; our plan for this is discussed in an accompanying article.

The development of the prototype array controller (Arcon 2.1) is now completed, and we are now proceeding with re- packaging and production (Arcon 3), as outlined below. The completion of the prototype means that we are able to re- open the Curtis Schmidt for CCD observations, albeit for a limited number of nights (30 per semester). This policy is also explained below.

In other areas, mechanical work on the new PFCCD unit is proceeding. While we expect that this instrument will be available during the coming semester, we cannot guarantee availability. Prospective observers should therefore write proposals based on the properties of the existing PFCCD.

Work at the prime focus will also be affected by completion of the new corrector. The individual elements have all been fabricated, and should soon be cemented, after which they will be shipped to Chile for mechanical assembly and testing.

Jay Elias

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4-m Telescope Optics Upgrade Project (1Sep92)

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4-m Telescope Optics Upgrade Project (1Sep92)
(from CTIO, NOAO Newsletter No. 31, 1 September 1992)

Our program of seeing improvement projects at the 4-m telescope is now drawing to a close. We are switching our efforts to a comprehensive plan aimed at significantly improving the telescope's optical performance. Over a period of approximately two years, we are planning to use about 15% of our instrumentation manpower and 40% of our projected instrumentation budget to carry out four projects: repolish f/8 secondary, image analyzer, improve f/8 secondary alignment mechanism, active control of primary mirror support. These projects will concentrate on the f/8 focus, but they also should lead to better images at the prime and f/30 foci.

The Problems
The motivation for this series of projects lies in the following table, which shows the effects of different optical problems at the f/8 focus. The results are based on many, many nights of testing using the curvature sensing, Shack-Hartmann and Hartmann screen techniques. We have received a great deal of expert outside help in these tests, and for this we are extremely grateful to Allain Gilliote, Ray Wilson and Lothar Noethe (ESO), Claude Roddier (U. of Hawaii), and Fred Forbes and Nick Roddier (NOAO). The different techniques give good agreement, so we believe that the results are quite reliable.

The individual contributions to the overall optical performance at the f/8 focus (expressed in terms of the 80% encircled image diameter d80), and the planned cures, are:

Aberration	d80 (arcsec)	Planned Cure
Spherical	0.51	Repolish Secondary
Coma	0.23	Improved Secondary Alignment
Astigmatism	0.28-0.56	Active Primary Support
3, 4 psi terms	0.25	Active Primary Support
High-freq. errors	0.67	Repolish Secondary
Quadratic Sum	0.9-1.0	

The astigmatism varies by a factor of two as a function of telescope position. The coma is presently fairly small, but we have gone for considerable lengths of time with it at least twice as large. For a 2-D Gaussian image, FWHM = 0.67 d80, so the overall image sizes are in reasonable agreement with the best measured FWHM values of about 0.7 arcsec. For comparison, the total low-frequency errors in the CFHT and NTT are, respectively, d80 = 0.33 and 0.075 arcsec, while the corresponding figures for high frequency errors are d80 = 0.30 and 0.125 arcsec. Our telescope's optical performance therefore is, and always has been, at least two times poorer than today's standards. This is a fundamental problem which needs to be solved.

The Cures
Since the various aberrations have effects of similar size which add up more-or-less in quadrature, we need to make a considerable improvement in each area before we can expect a significant overall gain. The final column in the preceding table shows the planned cure for each problem area.

The f/8 secondary will be repolished to have the correct conic constant to provide best focus (no spherical aberration) at the present position of the cassegrain instruments. This will also correct serious high-spatial-frequency errors in its figure which apparently were caused by "print-through," during polishing, of a number of light-weighting holes which were bored into the back of the mirror blank. We are in the process of making a final decision on where and how to have this refiguring work done, so there is some uncertainty about how long it will take. Our best estimate is 4-6 months. Since we need to announce this sort of shutdown way in advance, we have scheduled it to begin on 1 June 1993, two months before the end of the semester for which proposals are due this coming 30 September. This gives us six months to firm up our schedule and still be able to announce a reopening date in time for the following proposal deadline.

In deciding how to approach the remaining problems, we were heavily influenced by ESO's New Technology Telescope (NTT) and benefitted greatly from the help and advice of Ray Wilson and Lothar Noethe of the NTT team. It had become clear to us during the previously mentioned

series of optical tests that we could never hope to maintain our telescope in good condition unless we had some sort of image analyzer permanently mounted and available for routine checking of the telescope's condition. We are now in the process of grafting a Shack-Hartmann system onto our existing cassegrain-focus offset guider. We are using the NTT analysis software, which is the only hard-to-do part of the system, and which was very generously given to us by ESO. The Shack-Hartmann lenslet array will be a copy of the ones developed for the VLT, while the detector will be an adaptation of CTIO's CCD acquisition-TV cameras.

Once we had decided to have the image analyzer, we naturally started to inquire whether we could carry out a useful amount of active-optics correction in spite of having an old-fashioned thick primary mirror. The answer is that we clearly can.

The first step will be to improve the focus/collimation system of the secondary mirror so that we can automatically move the mirror to remove coma resulting from bad collimation. We have elected to simply replace the existing, cumbersome mechanism for tilting the mirror around its vertex with one which is accurately encoded and precisely movable under computer control. This is the easiest thing to implement given the existing mechanical configuration, and our optical tests show that the collimation in fact is stable as a function of telescope position; the collimation errors appear as singular events, perhaps associated with rotating the telescope's flip top end. However, there will also be provision for very occasional daytime adjustments of the mirror's centering by means of manually operated jack screws, to deal with cases where the required secondary tilt is out of range.

The surprising (to us) result is the ease with which we can apply the NTT's new technology approach to the primary mirror support system. This is because the existing axial support system provides most of what we need. It consists of three hard points and 33 "air bags" (see figure below). The latter are simple pneumatic pistons which provide axial force on the mirror in direct proportion to the air pressure fed into them. The air pressure is presently varied to account for the changing cos(z) term as the telescope changes its zenith distance z, but the pressure to all of the bags is varied in unison under control of a pair of mechanical pressure regulators. The modification which cries out to be made is to replace these old regulators with 33 individual, computer-controlled regulators so that each air bag (= force actuator) can be controlled separately.

[figure not included]

Our primary mirror is twice as thick as the NTT mirror, and hence roughly eight times stiffer. This led Wilson and Noethe to suggest bending it in its eigenmodes, rather than trying to force it into the shapes corresponding to the standard optical aberrations as is done with the NTT. The motivation is that the mirror can be bent the same amount with less than 1/4 the force, producing a corresponding gain in dynamic range. The lowest frequency eigenmodes are in any case the ones most easily induced by imperfect support.

Noethe and Xiangqun Cui (ESO) used a combination of thin plate theory and finite element calculations to investigate the feasibility of this approach. The maximum force needed to correct each aberration must be added to the nominal force needed to hold up the mirror against gravity, so for the existing push-only actuators the dynamic range is from 0 to 2*(nominal force). The following table shows, for each azimuthal symmetry, the typical coefficient of the existing aberration, the maximum force needed to correct the aberration, and the fraction of the system's dynamic range (at the zenith) that would be used up.

Aberration	Coefficient (nm)	Maximum Force (N)	Fraction of Dynamic Range
r4	3000	4128	0.98
r2cos2psi	800	156	0.04
r3cos4psi	1300	1453	0.34
r4cos3psi	300	973	0.23

Thus with the existing configuration and capabilities of the actuators we easily can correct the present wavefront errors having 2psi, 3psi and 4psi azimuthal symmetry, up to a zenith distance of about 60 (where the dynamic range is half the zenith value). The 0 (spherical aberration) term, however, is beyond our range and will have to be cured by some other means (repolishing the secondary).

The other result from the work of Noethe and Cui is that the forces supplied by the individual actuators do not even have to be controlled to especially high accuracy. Randomly distributed force errors of 1 percent lead to an astigmatism (cos 2psi) coefficient of only 35 nm, which is less than the 50 nm measurement error in the results from the image analyzer. This means that we can control the air pressure to each actuator with low-cost "smart" pressure regulators. Our default option is a $200 unit built by Mamac Systems which maintains an output air pressure to within the required 1 percent of whatever value is set by an input DC voltage. We plan to connect 33 of these units ($6600 total) to 33 D-A converters in a small computer. The software in that computer would simply interpolate the value and orientation of each aberration from a look-up table which gives pre-measured values as a function of hour angle and declination, sum up the desired forces at each actuator, and then load the D-A converters. We estimate that once the image analyzer is working, it should take only about an extra two to three months of programming effort to develop this simple, open-loop active-optics system.

Our general aim is to close down the f/8 focus for roughly six months starting 1 June 1993, and during that period to have the mirror repolished, install the new alignment mechanism, and install the image analyzer. Then during an extended aluminization run during the following winter (June or July 1994), the active primary support system would be installed.

Jack Baldwin, Brooke Gregory,
Gabriel Prez, Jay Elias

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Array Controller Update (1Sep92)

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Array Controller Update (1Sep92)
(from CTIO, NOAO Newsletter No. 31, 1 September 1992)

Another major milestone has been passed in the process of building the Arcon, our new array controller (see Newsletter No. 29, page 15). For tests made at the Schmidt telescope in early June, the prototype controller (Arcon2.1) was equipped with a quad-channel video card, which simultaneously reads all four amplifiers of a Thomson CCD. The signals are digitized by four ADCs operating in parallel and then passed to the Sun computer via a single optical fiber link.

The Arcon tests were a complete success. The 1024 x 1024 CCD could be read out in 11 seconds. Unscrambling the quad image, presently done as an IRAF task, takes a few more seconds. Meanwhile, the picture can be viewed on the Real Time Display in de-scrambled form. Each CCD output amplifier has a slightly different bias level and gain calibration. These differences are currently visible on the real time display, but standard reduction procedures produce final pictures indistinguishable from those obtained when the CCD is read out through a single amplifier. Future releases of the display software will automatically adjust bias and gain to minimize visual differences. Crosstalk or other undesirable effects were not detected.

With the success of this test the project to make a prototype controller has been declared finished. We are now building production controllers (Series Arcon3) as rapidly as possible. We expect the first of these controllers to appear in routine use on Tololo before the end of this year. Resources permitting, the transition to Arcon controllers on Cerro Tololo should largely be completed by the end of calendar year 1993.

A related project at KPNO has resulted in the construction of "HARCON," a Hybrid of the Arcon and the present KPNO controllers. These tests were also successful and are discussed elsewhere in this Newsletter.

Alistair Walker, Roger Smith,
Dan Smith, Tom Ingerson

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IR Array News (1Sep92)

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IR Array News (1Sep92)
(from CTIO, NOAO Newsletter No. 31, 1 September 1992)

Pt:Si. We have done some more tests of the Pt:Si plus echelle combination (see Newsletter No. 27), this time in better weather, and with both the folded Schmidt and long cameras. We have also experimented with alternative cross- dispersers in an effort to improve efficiency. We will continue to make this instrument set-up available, but if there is little or no interest we may retire it in order to use the dewar for lab tests of other arrays.

The Pt:Si dewar can be used on the echelle with either a standard J or H filter. Changes from one to the other can be done during the day but are not encouraged; contact Jay Elias for details. The following table gives some information on the properties of the instrument.

Camera	Filter	Orders on Chip	Coverage per Order
Long (R=33,000)			
	J(1.15-1.35 um)	1-2	45 A
	H(1.45-1.80 um)	1	60 A
Folded Schmidt (R=12,000)			
	J(1.15-1.35 um)	4	130 A
	H(1.45-1.80 um)	6	170 A

These values are all somewhat approximate. Sensitivity at H, with the folded Schmidt, gives about 3:1 signal to noise in half an hour for H=+7.3. Sensitivity at J will be about a magnitude better, and with the long camera about a magnitude worse. One should also note that the coverage is, in all cases, less than the free spectral range of the echelle (which is about 300 A at J and 500 A at H), so that even when multiple orders fit on the chip, wavelength coverage is not continuous.

Anyone with questions about using this set-up should contact Jay Elias (jelias@noao.edu).

HgCdTe. We have received the engineering grade NICMOS III array and the bare multiplexer sample from Rockwell. Once resources permit, we will start operating the engineering-grade array under Arcon; design of the imager dewar for the science grade array should begin during the coming quarter. Watch the next Newsletter for information on availability.

InSb. We are extensively re-writing the instrument manuals for the IR Imager and IR Spectrometer and will begin distributing them through our Tucson office starting in late September or October (i.e. they will not be available in time to help writing proposals). Users are reminded that the software (and software manual) used for array control is the same as that used at KPNO for the InSb instruments. Copies of the software manual can be obtained through KPNO, although the CTIO office will probably stock a limited supply.

Jay Elias, Brooke Gregory

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CCD Imaging on Curtis Schmidt Telescope (1Sep92)

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CCD Imaging on Curtis Schmidt Telescope (1Sep92)
(from CTIO, NOAO Newsletter No. 31, 1 September 1992)

The CTIO array controller, Arcon, has developed to the point where we are now able to make it available directly to observers on the Curtis Schmidt telescope (see accompanying article for more Arcon details). However, the Schmidt itself was not originally designed for observations of this sort, and the mechanical and electronic upgrades needed to turn it into a modernized telescope will not be done in the immediate future. Specifically, pointing is done by means of setting circles of limited precision, and the CCD manual focus mechanism is quite cumbersome.

We are therefore making the telescope available with the Thomson 1024-2 CCD for a limited number of nights, approximately 30 per semester in addition to engineering time. In allocating time, both the complexity of the program and the experience of the observer will be taken into account. Complex programs are ones which involve many different focus settings or precise positioning or re-positioning.

One should note that precise offsets are easier to do than precise absolute positions, especially in right ascension, where one can offset to an accuracy of several arcsec by turning the telescope drive off and on.

It is also important to realize that the standard BVRI filters are NOT all parfocal, and therefore that any program involving imaging in several colors at the same position will be quite inefficient.

Service Observing
We will no longer do service observing for programs which are reasonably carried out by regular observers. We will continue to offer this option--subject to feasibility--for programs requiring only a few observations of a straightforward nature. People requesting service observing should, as always, clearly indicate this fact on the observing time request.

Plates
The Curtis Schmidt continues to be available for programs using photographic plates.

Jay Elias, Mark Phillips,
Bob Schommer, Bob Williams

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Data Reduction Support Changes (1Sep92)

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Data Reduction Support Changes (1Sep92)
(from CTIO, NOAO Newsletter No. 31, 1 September 1992)

With Lisa Wells's departure (see story above), we are re-examining the way in which we provide support for astronomers' data reduction needs. Over the last several years, the computing facilities available on the mountain for data reduction have increased, and visiting astronomers are also, on average, more familiar with IRAF, and more interested in trying to get initial stages of their data reduction done while on the mountain.

At the present time, we have only one data reduction specialist on the mountain, Mauricio Navarrete. Observers who have been fortunate enough

to observe during his shifts are undoubtedly familiar with the assistance he provides. We have decided to convert one of the regular night assistant positions into a second data reduction specialist position in order to provide this service for both weekly shifts. This ensures that a knowledgeable person will be available at all times on the mountain to help with questions relating to both data reduction and the Sun computers, particularly in the evenings and on weekends, when people in La Serena can be hard to find. After a search for qualified candidates and a competition among the local staff, one of the current night assistants, Nelson Saavedra, has been provisionally selected to fill this position.

Visitors needing help with any aspect of the Sun computers or the data reduction software while working on Cerro Tololo should consult Saavedra or Navarrete. Like all the other specialists in the Observer Support section, they are based in the Observer Support office located in the 4-m building. Electronic mail addressed to IRAFHELP will also reach them. It may be worth adding what many Tololo visitors have already discovered, namely that several of the other night assistants are also quite knowledgeable about IRAF, CTIO data reductions, and other computer-related matters. Help with data reduction in La Serena will continue to be provided by Mario Hamuy.

As a result of the above changes, for the near future one of the two weekly mountain shifts will not have a full-time night assistant assigned to the 0.9-m telescope. However, for that shift the data reduction specialist and other Observer Support people will be available to help astronomers start observing at the beginning of each night, and whenever problems occur. In particular, they will be prepared to devote special attention to each visiting observer at the start of every run, to ensure that the observer is comfortable with the telescope control program and all observing procedures.

Steve Heathcote, Jay Elias,
Bob Williams, Oscar Saa

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Is It Really Raining? Now You Can Confirm Your Suspicions(1Sep92)

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Is It Really Raining? Now You Can Confirm Your...(1Sep92)
Suspicions
(from CTIO, NOAO Newsletter No. 31, 1 September 1992)

We now have (almost) daily weather satellite photos for Chile and the West Coast of South America available on Tololo. These are being captured by a satellite receiver system and printed on a laser machine up on the mountain. This system was placed in operation by the mountain electronic technicians, headed by Hugo Vargas.

The system is currently using an inexpensive set of hardware, hooked into a spare 386 PC on the mountain. This hardware/software requires human intervention to capture and print a picture, and the electronic technicians or observer support personnel try to capture one or two pictures a day. Because of more pressing demands on the hardware and observer support, we cannot guarantee a picture every day (someone may actually want to use that spare PC for the ASCAP!).

We have loaded samples of these images into the Sun via floppy disks and Kermit, but this is an inefficient procedure. We are working on batch processes and a link into the mountain computer network to reduce the workload on the mountain staff. This should also permit observers to display pictures on their workstation directly.

In the meantime, we advise astronomers to trust their own observational skills. When the white flakes are falling from the sky or the raindrops are landing on the windshield, the weather satellite usually DOES show clouds. When the weather systems are large, as often happens this time of year, the pictures are often discouraging, but at least they provide grist for dinner table conversations. You may also receive

predictions from interested members of the support staff. To date,
these are provided free of charge. Enjoy!

Bob Schommer

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CTIO Telescope/Instrument Combinations (1Sep92)

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CTIO Telescope/Instrument Combinations* (1Sep92)
(from CTIO, NOAO Newsletter No. 31, 1 September 1992)

```
4-m Telescope:
 ARGUS fiber-fed Spectrograph   + Blue Air Schmidt Camera   + Reticon CCD [26]
         "                      + Red Air Schmidt Camera    + GEC CCD [25,26]
 R-C Spectrograph               + Blue Air Schmidt Camera   + Reticon CCD [26]
         "                      + Red Air Schmidt Camera    + GEC CCD [25,26]
         "                      + Folded Schmidt Camera     + Tek(a) CCD [25,26]
 Echelle Spectrograph           + Blue Air Schmidt Camera   + Reticon CCD [26]
         "                      + Red Air Schmidt Camera    + GEC CCD
                                                                [22,25,26]
         "                      + Folded Schmidt            + Tek(a) CCD
                                                                [22,23,25,26]
                                                            + Pt:Si [27,31]
         "                      + Long Cameras              + TI, or Tek(a) CCD
                                                                [23,25,26]
                                                            + Pt:Si [27,31]
 Prime Focus Camera           + TI or Tek(a) CCD
         "                    + Photographic Plates [23]
 Cass Direct                  + TI, or Tek(a) CCD
         "                    + Pt:Si IR Imager (f/30 or f/7.5) [23,27]
 Rutgers Imaging Fabry-Perot  + TI or Tek(a) CCD [25,26]
 ASCAP Photometer [24,25,28]
 IR Photometer (InSb and/or bolometer)
 IR Spectrometer + SBRC array [21,22,28]
 IR SBRC Array Imager [21,28]

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]
         "            + Pt:Si IR Imager [23]
 Rutgers Imaging Fabry-Perot     + TI or Tek(a) CCD [25]
 ASCAP Photometer [24,25,28]
 IR Photometer (InSb and/or bolometer)
 IR Spectrometer + SBRC array [21,22,28]
 IR SBRC Array Imager [21,28]
 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]
       "          + Pt:Si IR Imager [23]
 Filar Micrometer(b)

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

Curtis Schmidt:
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 Photographic Plates (Direct or Prism)
 Pt:Si IR Imager [23,27]
 Thomson CCD (Direct or Prism)(c) [21,22,28,30,31]

*   Numbers 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 23; also see subsequent issues,
    especially 26 and 28. Information on telescope control and guiders is
    in 21, 22, 24.

(a) Tek CCDs available first semester 1993:
    -   VEB-run (1.5-m and 4-m only): 1 512 x 512, 27 um pixels; 1 1024 x
        1024, 24 um pixels, 0-1 2048 x 2048, 24 um pixels
    -   Arcon-run (0.9-m,1.5-m, 4-m) 1 1024 x 1024, 24 um pixels, 0-1 2048 x
        2048, 24 um pixels.
    (See 28, 29, 30 for details on Tek 2048 detectors and conversion to
    Arcon; there will always be at least 1 2048 x 2048 available with some
    controller.)

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

(c) CCD on Curtis Schmidt limited to 30 nights (approximately) observing
    during first semester 1993. See accompanying article.
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CTIO Scientific Staff Responsibilities (1Sep92)

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CTIO Scientific Staff Responsibilities (1Sep92)
(from CTIO, NOAO Newsletter No. 31, 1 September 1992)

The responsibilities assigned to each member of the scientific staff at CTIO are reviewed every six months or so. We try to ensure that every aspect of the observatory that is related to visiting astronomers acquiring data and producing publishable scientific results is ultimately put under the purview of astronomers on the scientific staff. Any questions that you have about any equipment, service, or procedures may then be directed to the responsible persons. The attached list summarizes the current assignments. Feel free to contact the designated staff members if you have questions about things in their area of responsibility.

Telescopes/Instruments:		
Telescopes Optics, Guiders, Control Systems:		
	4-m	J. Baldwin
	1.5-m, 1-m, 0.9-m	R. Schommer, S. Heathcote
Cassegrain Spectrographs		S. Heathcote, R. Schommer
Argus:		
	Technical	T. Ingerson
	Scientific	N. Suntzeff
1.5-m Echelle:		
	Technical	T. Ingerson
	Scientific	N. Suntzeff
Rutgers Fabry-Perot		R. Schommer
Direct CCD Imaging (except Curtis Schmidt)		A. Walker
CCD on Curtis Schmidt		A. Walker, R. Schommer
Optical Photometers		D. Geisler
Infrared Instruments:		
	Technical	B. Gregory
	Scientific	J. Elias, R. Elston
Photographic Cameras		N. Suntzeff
CCDs		A. Walker
2D-Fruttis		S. Heathcote
Acquisition TVs		A. Walker
Computers/Software:		
Computers:		
	Hardware	T. Ingerson
	Software	S. Heathcote

Networking/Communications	T. Ingerson
IRAF	S. Heathcote
Miscellaneous:	
Cerro Pachon Site Survey	N. Suntzeff
Telescope Seeing Improvements	J. Baldwin
Measuring Machines	N. Suntzeff
Photographic Facilities/Services	N. Suntzeff
Telescope Scheduling	D. Geisler (until 10 Dec 1992) J. Elias, R. Elston (after 10 Dec 1992)
SOAR & 8-m Telescope Projects	R. Schommer
Colloquium Chairman	R. Schommer
Library	O. Eggen
TAC Members	N. Suntzeff (Chair) R. Schommer (until 10 Dec 1992) J. Elias (after 10 Dec 1992)
ETS Manager	B. Gregory
ACTR Members	J. Elias (Chair, until 1 Sept 1992) M. Phillips (Chair, after 1 Sept 1992) J. Baldwin B. Gregory S. Heathcote T. Ingerson (after 1 Sept 1992) R. Schommer N. Suntzeff A. Walker

Bob Williams

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Requests for CTIO Telescope Time 1 August 1992 - 31 January 1993(1Sep92)

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Requests for CTIO Telescope Time 1 August 1992 -...(1Sep92)
31 January 1993
(from CTIO, NOAO Newsletter No. 31, 1 September 1992)

Telescope	Nights Req.	Nights Sched.	# Req./ # Sched.	# of Prop.	# Sched.	Total #/ # Sched.	# Staff Nights	% Staff Nights
4-m Dark	272	90	3.0	79	38	2.1	17	19
Bright	180	73	2.5	45	22	2.0	26	36
1.5-m Dark	182	92	2.0	38	27	1.4	16	17
Bright	142	75	1.9	23	14	1.6	10	13
1.0-m Dark	71	89	0.8	10	8	1.3	5	6
Bright	102	51	2.0	9	8	1.1	0	0
0.9-m Dark	113	88	1.3	19	16	1.2	18	20
Bright	127	79	1.6	17	11	1.5	7	9
Schmidt	106	90	1.2	13	10	1.3	2	2

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WIYN Construction Slews to the Next Target (1Sep92)

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WIYN Construction Slews to the Next Target (1Sep92)
(from KPNO, NOAO Newsletter No. 31, 1 September 1992)

Fall visitors to the mountain will note that construction of the WIYN enclosure has proceeded at a rapid pace! In the late spring the foundations and pier were poured, and in June the structural steel for the base of the enclosure and the control building was erected. The ring beam and structural steel for the moving portion of the enclosure were installed in late July, and the insulating outer skin is scheduled to be added in mid-August. During the remainder of the year, the contractor will be installing mechanisms and finishing the interior. Construction of the enclosure and control building should be complete by early January.

L&F Industries in California is also making good progress on the fabrication of the telescope mount. All the major steel weldments have been released and are in various stages of fabrication. Detailed design work continues on a myriad of small parts including design of the secondary and tertiary mirror cells and supports. Shop assembly of the mount at L&F should be complete early next year. Following acceptance tests, the telescope will be disassembled, shipped to Kitt Peak, and installed in the WIYN enclosure during 1993.

Progress at NOAO on the primary mirror is reported in the article below. Delivery of the secondary mirror blank from Schott is expected imminently. The blank will be stress relieved, and pucks for the support fixtures will be bonded to the glass, and then the mirror blank will be shipped to Contraves USA for polishing and testing. The testing will make use of NOAO's 100-inch Hindel sphere, which has already been shipped to Contraves.

The tertiary mirror blank, also fabricated by Schott, has been machined, with delivery expected in August. We will soon be soliciting proposals for its polishing. In the next couple of months we expect to finalize the design for the wide field corrector.

Design of the telescope control system is underway at the University of Wisconsin, and a critical design review will be held in October. The "Instrument Adaptor" is in the process of being designed. Over the next few months NOAO will be developing detailed plans to move the Hydra fiber positioner and the bench spectrograph from the 4-m to the WIYN telescope during the summer of 1994. Plans for the commissioning and early operations phases of the telescope are being developed for discussion with the WIYN Board of Directors.

Procedures for applying for observations from the WIYN telescope will, of course, be announced in the Newsletter.

Matt Johns, Caty Pilachowski

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Report from the 3.5-m Mirror Project (1Sep92)

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Report from the 3.5-m Mirror Project (1Sep92)
(from KPNO, NOAO Newsletter No. 31, 1 September 1992)

As part of NOAO's contribution to the WIYN Telescope, the 3.5-m Mirror Project is to deliver the primary mirror to the telescope. The mirror blank, a borosilicate honeycomb casting from the University of Arizona

Mirror Laboratory, was received by NOAO in 1989 and has been employed for tests that will be useful in general for large mirror development. By September of 1990, the mirror's surface had been polished to a sphere, and the mirror has been used since then to develop techniques for controlling the temperature of the mirror and for actively supporting the mirror to obtain the best figure.

The engineering group has investigated two approaches for actively controlling the surface. The first, known as the wavefront approach, uses an influence matrix for the 66 support system actuators which is derived numerically from finite element analysis. The second, known as the modal approach, decomposes the influence matrix with empirically derived coefficients into specific deformation modes, and does the calculation for only those modes known to contain useful signal. (This method is equivalent to the wavefront method if one includes the maximum number of modes.) With both methods, a mirror figure accurate to 1/20 wave (rms) can be obtained in a small number of iterations. The best figure obtained in a single iteration is about 1/16 wave.

Tests of the mirror figure using both a Hartmann screen and a scatterplate interferometer have been completed and compared. The Hartmann test provides an independent optical test method during aspherizing that does not use a null lens.

Larry Daggert and the 3.5-m Mirror Group

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Deadline for Observing Proposals (1Sep92)

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Deadline for Observing Proposals (1Sep92)
(from KPNO, NOAO Newsletter No. 31, 1 September 1992)

This is a reminder that observing proposals for the spring 1993 semester (February-July 1993) are due on or before 30 September 1992. The current version of the proposal form can be obtained from the Observing Support Office (602-325-9279); the TeX version of the observing proposal may be obtained by sending e-mail to Nigel Sharp (nsharp@noao.edu).

Fifteen copies of each proposal must be received on time in order to be considered for telescope time. We cannot accept proposals sent by telecopier or electronic means. Last semester several proposals were received after the deadline, and we urge you to allow an adequate length of time for delivery of your proposal to us; remember, "overnight" services may not be overnight.

David De Young

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A New Focal Ratio for the 4-m (1Sep92)

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A New Focal Ratio for the 4-m (1Sep92)
(from KPNO, NOAO Newsletter No. 31, 1 September 1992)

In the past, infrared instruments at the 4-m utilized either the f/30 chopping secondary (photometry, CRSP), or the f/8 R-C secondary (IRIM). Use of either IRIM or CRSP at the 4-m entailed modifications to the internal optics to accommodate the change from f/15 operation at the 1.3-m and 2.1-m telescopes. During the course of designing the present generation of IR array instrumentation (SQIID, COB, PHOENIX), we decided that conversion of the 4-m to f/15 would be more cost effective and yield better instrumental performance than providing focal ratio conversion optics in each instrument. The original design of the 4-m included an f/12 Cass focus which was never implemented, although the mirror blank and mechanical fixtures were fabricated and placed in storage on the mountain. These have been modified and recycled into an f/15 configuration which is being installed on the telescope during the summer shutdown. Starting this fall semester, expect to use this new focal ratio for all infrared instruments at the 4-m.

Dick Joyce

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Instruments Available on Kitt Peak Telescopes Spring 1993 (1Sep92)

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Instruments Available on Kitt Peak Telescopes...(1Sep92)
Spring 1993
(from KPNO, NOAO Newsletter No. 31, 1 September 1992)

This list summarizes the instruments that will be available on KPNO telescopes for the February 1993 - July 1993 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 is nominal choice)
   CryoCam (after installation of an 800 x 1200 Ford chip anticipated
     this summer)
   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)
   PF Camera + photographic plates
   PF Camera + grism + photographic plates
   IR Cryogenic Spectrometer (CRSP)
   Fourier Transform Spectrometer (FTS)
   Simultaneous Quad Infrared Imaging Device (SQIID)
   IR Imager (IRIM)

2.1-m Telescope:
   GoldCam (CCD Spectrometer)
   CCD Direct Imaging (T1KA is nominal choice)
   Coude Spectrograph + (camera 5 or 6) + CCD (normally used with C/F)
   Fiber Optic Echelle (FOE) + CCD (normally used with C/F)
   IR Imager (IRIM)
   IR Cryogenic Spectrometer (CRSP)

Coude Feed (C/F):
   Coude Spectrograph + (camera 5 or 6) + CCD
   Fiber Optic Echelle (FOE) + CCD

1.3-m Telescope:
   Mark III (Optical) Photometer + (1P21, S20, or GaAs Coldbox)
   Simultaneous Quad Infrared Imaging Device (SQIID)
   Otto (1-5 m InSb IR photometer: JHKLM)
   Bolometer (2-20 m Ge:Ga)
   IR Cryogenic Spectrometer (CRSP)
   IR Imager (IRIM)

0.9-m Telescope:
   CCD Direct Imaging (primarily T2KA; other chips block scheduled)
   White Spectrograph and GoldCam CCD Spectrometer (WhiteCam)
   Automated Filter Photometer (AFP2) + (1P21, S20, or GaAs Coldbox)
   CCD Photometer (CCDPHOT)

Burrell Schmidt:
   Direct or objective-prism + CCD (S2KA is nominal choice)
   Direct or objective-prism + photographic plates

Reduced-Availability Instruments:
   All Telescopes: Visitor Instruments
   4-m: Cassegrain CCD Imaging
   2.1-m: White Spectrograph + photographic plates
   0.9-m: Black Spectrograph + photographic plates

David De Young

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CCDPHOT: CCD Photometry Made Fast and Easy (1Sep92)

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CCDPHOT: CCD Photometry Made Fast and Easy (1Sep92)
(from KPNO, NOAO Newsletter No. 31, 1 September 1992)

CCD photometry has been practiced at the 0.9-m for the better part of a decade. However, even the observation of a single standard star may result in ten million numbers, rather than the one number (the magnitude!) that the astronomer wants.

In order to make CCD photometry faster and more accessible, the IRAF group has developed in collaboration with Kitt Peak staff astronomers a software package called CCDPHOT, which is now available for general use at the 0.9-m telescope. The CCDPHOT package combines telescope and instrument control, CCD data acquisition, star list management, CCD reductions, and photometric reductions in an efficient manner so that CCDs can be used for all-sky photometry of single stars, or two- or three-star differential photometry. (A brief overview of the software can be found in a paper presented by Tody and Davis in Astronomical Data Analysis Software and Systems I, ed. D.M. Worrall, C. Biemesderfer, and J. Barnes, p. 484). CCDPHOT allows the observer to define a filter system, select the size and position of the region of the chip to be read out, set various CCD and photometric reduction options, program an observing sequence, and see instrumental magnitudes and quick-look reduced magnitudes in "real-time." The program keeps a detailed log of these operations which appears both on the terminal and in a file. There is also a summary of the results which is recorded in a separate file. These files can be edited, printed out on the site, and sent to a home institution by e-mail.

The current instrumental configuration includes the T2KA CCD normally used at the 0.9-m telescope, a small, fast, and accurate shutter, and special filter holders to install 2 x 2 filters in the large filter wheel used at the 0.9-m. The T2KA CCD provides relatively good UV response, and the small shutter allows precise photometry of bright standard stars with short integration times. A corner of the CCD is used in order to obtain the shortest possible readout time and minimize system overhead. The maximum size of the subregion read out and processed by CCDPHOT, currently set at 512 x 512 pixels, is dictated both by the requirement for real-time processing and by the need for a small, fast shutter, not the software. The duty-time for readout and changing filters has been kept short, but has not yet been tested in this final instrumental configuration.

The CCDPHOT package will be tested with real observations during three observing runs in December. We hope that the improved sky subtraction available with CCDPHOT will allow more photometric observations to be carried out during grey or bright time. With the 0.9-m telescope and this chip, users can expect to achieve 1% statistics on a 15th mag star

(U=B=V=R=I=15) in 45 sec each in U and I, and 15 sec each in B, V, and R. For a moon phase of 10 days, these times increase only slightly: 60 sec in U and I, and 25 sec in B, V, and R. Brighter stars will of course be affected less by moon light, and there is no increase in exposure times for stars brighter than 13th even in full moon.

The advantages of CCDPHOT over the standard photoelectric photometer is the high DQE of the CCD and the fact that the sky is measured simultaneously. In addition, the ability to use the system as a two- or three-star photometer means it is possible to do comparative photometry relative to other stars in the field under marginal or non-photometric conditions. All stars must fit within the 512 x 512 pixel region mentioned above; this corresponds to a region 5.8 arcmin on a side.

CCDPHOT is available for proposals for observations in the spring semester, and a user's guide will be available shortly.

Caty Pilachowski, Tom Kinman, Lindsey Davis

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The Return of IRIM: New and Improved (1Sep92)

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The Return of IRIM: New and Improved (1Sep92)
(from KPNO, NOAO Newsletter No. 31, 1 September 1992)

A glance at the instrumentation listing elsewhere in this Newsletter shows the infrared camera IRIM once more available at the 4-m, 2.1-m, and 1.3-m telescopes in spring 1993. It will return to the mountain equipped with a 256 x 256 HgCdTe array. In addition, new optics will provide a scale of 0.55 arcsec per pixel at the 4-m and 1.7 arcsec per pixel at the 1.3-m. The revised filter complement is as follows: broadband J, H, and "short" K (2.0-2.3 um), narrowband 2.12 H2, 2.16 Br g, 2.22 continuum, and 2.36 CO filters.

Capabilities for polarimetry and focal plane occulting of bright sources, which were ad hoc additions to the original instrument, will no longer be available. These are being incorporated in improved form in our second generation cameras.

We do not yet have hard performance data for the array or the camera system. We expect performance similar to that reported by Hodapp et al. (1992, PASP, 104, 441).

Ron Probst

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CRSP Changes for Fall 1992 (1Sep92)

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CRSP Changes for Fall 1992 (1Sep92)
(from KPNO, NOAO Newsletter No. 31, 1 September 1992)

Two events scheduled for this summer should result in changes to the Infrared Cryogenic Spectrometer operation. The first is the installation of an f/15 secondary at the 4-m, giving f/15 operation at

all three telescopes on which CRSP operates. This should yield
approximately the same pixel scale (0.9 arcsec) as before, while
illuminating most of the array in the cross-dispersion dimension.

The second event comes about due to the IRIM upgrades discussed
elsewhere in this Newsletter. Since IRIM is getting a larger format
detector (see previous article), the ex-IRIM array is available for
installation in CRSP. This detector has a number of potential
advantages, including highly desirable cosmetic quality, no QE gradient
along the columns, and a somewhat more linear behavior. The residual
image effect seen with the present CRSP array is much smaller (or
perhaps absent) in the IRIM array, so it may be possible to operate
without the nuisance of the vgate cycle before each picture.

Finally, for those who may wish to correct previously obtained CRSP
data for detector non-linearity, a recent lab test (possibly the last
with the old detector) showed that data < 13000 ADU could be linearized
by the third-order function

ADU' = ADU [0.999 + 7.06 E-06 * ADU + 2.19 E-10 * ADU**2]

For those using the IRAF ctio.irlincor task, the three coefficients are
0.999, 0.231, and 0.235.

Dick Joyce

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The IRS Goes Into Retirement (1Sep92)

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The IRS Goes Into Retirement (1Sep92)
(from KPNO, NOAO Newsletter No. 31, 1 September 1992)

As announced in this Newsletter a year ago (No. 27, p. 32), the
Intensified Reticon Scanner (IRS) has gone into retirement. After
serving the needs of spectroscopy at the 0.9-m telescope for nearly
thirteen years, the instrument has been surpassed by advancing CCD
technology. Its final nights on the telescope were a bit taxing for
everyone concerned, and they demonstrated the difficulties of
maintaining aging instruments. The runs were marred by cooling system
difficulties and intermittencies in the control electronics.

Observers wishing to do spectroscopy at the 0.9-m should now request
"WhiteCam," a combination of the GoldCam CCD dewar attached to the
White Spectrograph. (See the article in the last issue of the
Newsletter.) The current chip in the Gold Camera dewar is a
Ford 3 K x 1 K with 15 um pixels. Prospective observers should request
the Gold Camera Instrument Manual and the White Spectrograph Supplement
for technical information.

There are some restrictions at the 0.9-m with this instrument. WhiteCam
works with a fixed north-south slit. The longest slit available with
the current decker is 8.4 arcmin with a scale of 1.8 arcsec/pixel on
the chip.

David De Young

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The Mini-Mosaic: 16 Million Pixels Coming Your Way (1Sep92)

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The Mini-Mosaic: 16 Million Pixels Coming Your Way (1Sep92)
(from KPNO, NOAO Newsletter No. 31, 1 September 1992)

Anyone who stopped by the NOAO display at the Columbus AAS meeting knows that we are well on the way to having larger CCDs. Is a 2048 x 2048 CCD too small for you? We are aiming to make CCDs as large as the photographic plates that we used ten years ago! The first step in this development is to build a simple mosaic imager. Because CCDs are made on 4-inch diameter silicon wafers, they will not be made larger than 2.5 x 2.5 inches in the foreseeable future. Thus, the only way to make bigger ones is to learn how to put them together into a mosaic.

To this end we have begun a project to produce a 2 x 2 array of Loral Fairchild 2048 x 2048 CCDs. These chips have 15 um pixels which correspond to 0.28 arcsec at the 4-m prime focus and 0.43 arcsec at the f/7.5 focus of the 0.9-m telescope. The fields of view are 19 arcmin on an edge at the 4-m and 29 arcmin on an edge at the 0.9-m. The chips themselves have already been fabricated from a design developed by John Geary (SAO). They are two-side buttable; that is, they have nothing (or very little) around the edge of the imaging area on two sides. This permits mounting them very close together - our goal is 500 um. We have contracted with Mike Lesser (Steward Obs.) to thin the chips and mount them into two 2 x 2 arrays, which we call "mini-mosaics." One of these will go to CTIO, and one will go to KPNO.

Although we can not yet describe the properties of the imagers in detail, we have just received an unthinned prototype which we expect to have running in a few weeks. This will be tested on the 0.9-m this fall, and we expect delivery of the first thinned mini-mosaic by the end of 1992. The hope is to make it available at KPNO by the fall 1993 semester. The mini-mosaic fits in a universal dewar so it is, in theory, usable anywhere that a universal dewar will go. It will be read out in quadrants, of course, so the readout time will not be any longer than a single 2048 x 2048 CCD.

If all this goes smoothly, the next step will be to construct a 4 x 4 array of similar chips. We estimate that this will take another two years. Watch this space for details.

Todd Boroson, Rich Reed

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CCD Controllers: The Next Generation (1Sep92)

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CCD Controllers: The Next Generation (1Sep92)
(from KPNO, NOAO Newsletter No. 31, 1 September 1992)

The KPNO CCD controllers are now 12 years old, and for the past few years CTIO and KPNO have been working collaboratively to develop the "next generation" controllers. The first on- the-telescope tests of the new system at Kitt Peak were carried out on the 2.1-m telescope on 8 June. We expect to replace all our current controllers with the new ones over the next year. The user interface will remain that of ICE for the present.

The advantages of the new system over the old include high speed readouts, improved dynamic range, and quad readout. Astronomers will immediately realize a factor of 2 decrease in the time spent reading out the chip. In addition, many of our CCDs have low (&lt 5 electrons) read-noise and very deep full-well capacities (&gt 200,000 electrons). With the current controllers we are limited to 15-bit A/D converters, and hence must set the gain either to under-sample the read-noise or to give up dynamic range; with the "real" 16-bit A/D converters of the new controllers, we gain a factor of 2 in dynamic range for the same

read-noise sampling. Finally, quad readout (the ability to simultaneously read out through four amplifiers) will yield another factor of 4 speed-up in the time it takes to read out a single CCD with four working amplifiers; it is also crucial for effective operation of our planned "mini-mosaic" of four 2048 x 2048 CCDs. With modern electronics we can achieve these gains at low cost, with low power dissipation, and use inexpensive and reliable fiber-optic links.

This first version of the KPNO "Hybrid ARray CONtroller," dubbed the "HARCON," is based very closely on the CTIO ARCON, but adapted to interface to the KPNO analog electronics. It uses a VME-based Transputer plug-in board to talk to a Sun workstation, and a high-speed fiber-optic link for the data and command path to the controller electronics located at the telescope. The present control software has been developed exclusively at CTIO and runs unmodified on the KPNO Sun workstations.

The picture below was obtained with the T1KA CCD and HARCON on the 2.1-m telescope and shows a narrowband image of the planetary nebula Abell 72. Readout noise and data integrity appear to be uncompromised with the HARCON when compared with the classic KPNO controllers.

[figure not included]

Andy Rudeen, George Jacoby

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Two Important Kitt Peak Committees (1Sep92)

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Two Important Kitt Peak Committees (1Sep92)
(from KPNO, NOAO Newsletter No. 31, 1 September 1992)

Two committees that affect the lives of all Kitt Peak observers are the Telescope Allocation Committee (TAC) and the Kitt Peak Users' Committee.

All proposals for the 4-m, 2.1-m and 1.3-m telescopes are discussed in detail by the either the Dark or Bright TACs, and after each proposal is discussed it is given a final grade by each member of the TAC. The TAC also recommends the number of nights to be given to proposals that can be scheduled. In addition, the two TACs also assign grades to all the small telescope proposals. The actual recommendation of time on the small telescopes (the Coud Feed, the 0.9-m, and the Burrell Schmidt) is the responsibility of the in-house "small telescope" TAC, currently Taft Armandroff, Tom Kinman, Phil Massey, and Caty Pilachowski.

TAC members serve three-year terms, and we list below the latest membership list of the two TACs:

Dark Time
T. Boroson (NOAO/KPNO)
C. Hogan (U. of Washington)
D. Hunter (Lowell Obs.)
R. Kennicutt (U. of Arizona)
R. Weymann (Carnegie Inst. of Washington)
M. Whittle (U. of Virginia)

Bright Time
J. Black (U. of Arizona)
S. Edwards (Smith College)
R. Elston (Carnegie Inst. of Washington)
F. Gillett (NOAO/KPNO)
C. Sneden (U. of Texas)
D. Terndrup (U. of Ohio)

David De Young serves as the non-voting chairman of both the Dark Time and Bright Time TACs.

The Kitt Peak Users' Committee is instrumental in discussing issues of concern to users; a summary of topics discussed at the most recent

meeting can be found in the March 1992 issue of the Newsletter. Membership on this committee also changes; if you have issues of concern that you wish to be raised at one of these meetings, please contact any of the members listed below.

KPNO Users' Committee
H. McAlister (Chairman, Georgia State U.)
404-651-2932
hal%chara@gsu.edu

W. Keel (U. of Alabama)
205-348-5050
wkeel@ua1vm.bitnet

F. Owen (NRAO)
301-338-4700
fowen@aoc.nrao.edu

A. Saha (STScI)
301-338-4700
saha@stsci.bitnet

J. Salzer (Wesleyan U.)
203-347-9411, ext. 2827
slaz@parcha.astro.wesleyan.edu

A. Tyson (Bell Labs, NJ)
201-582-6028
tyson@physics.att.com

R. Wyse (Johns Hopkins U.)
301-338-5392
wyse@stsci.bitnet

David De Young

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Breakdown of Fall 1992 Scheduled Nights (1Sep92)

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Breakdown of Fall 1992 Scheduled Nights (1Sep92)
(from KPNO, NOAO Newsletter No. 31, 1 September 1992)

The first table below gives the statistics on nights scheduled for science on the Kitt Peak telescopes for the 1 August 1992-31 January 1993 period. As usual, all of our telescopes were oversubscribed.

Telescope		Nights Req.	Nights Sched.	# Req./ # Sched.	# of Prop.	# Sched.	Total #/ # Sched.	# Staff Nights	% Staff Nights
4-m	Dark	223	66	3.4	65	24	2.7	16	24
	Bright	160	66	2.4	48	22	2.2	9	14
2.1-m	Dark	134	82	1.6	32	19	1.7	8	10
	Bright	101	65	1.6	25	16	1.6	10	15
Coude Feed		189	141	1.3	28	23	1.2	29	21
1.3-m		244	145	1.7	44	25	1.8	46	32
0.9-m	Dark	142	93	1.5	26	19	1.4	18	19
	Bright	91	57	1.6	18	12	1.5	7	12
Schmidt		94	52	1.8	17	10	1.7	5	10

	4-m	2.1-m	C/F	1.3-m	0.9-m	Schmidt
Nights assigned by the TAC for	122	136	126	131	145	52

observing programs						
Director's discretionary nights for observing programs	9	10	15	13	5	0
Engineering, checkout, and special nights	13	18	10	20	22	5
Seasonal closures, aluminizations, and shutdown nights	40	20	33	20	12	11
Totals	184	184	184	184	184	68*

* Note that only half the time on the Burrell Schmidt belongs to Kitt Peak; in addition, the Schmidt is scheduled only during dark time.

We are occasionally asked what fraction of the available time goes for purposes other than science. In the second table we show a detailed accounting of how time was allocated on our telescopes. The top two categories make up the science nights; the top line ("TAC observing programs") shows the number of nights assigned using the strict grade ranking given by the TAC, while the second line shows the number of nights assigned to proposals selected by the Director to ensure that a balance of science is achieved.

The next two lines show nights allocated for all "non-science" observing. Engineering nights are nights assigned on the schedule as "T&E" (Testing and Evaluation); these nights are usually used for new instrument development. Some of these nights are also used for generating pointing maps and repairing the telescope electronics. Pointing and electronics nights are often scheduled as the first-half of a night, and if not needed, they are returned to the observer scheduled the second half. Similarly, "checkout" nights are usually scheduled for the first half night at the start of an observing block with a complicated or new instrument; this time is also often returned to the scheduled observer for the second half of the night and hence used for science. "Special" nights in this case include "Family night," a half-night scheduled during full moon once every few years to allow the families of Kitt Peak employees to journey to the mountain and see what it is all about; this category also includes the once a month half night on the 0.9-m used for KPNO public nights. The final line shows the number of nights used for aluminizing mirrors and for the annual summer shutdown during our bad weather months. This "shutdown" period means that the telescope can be partially disassembled for maintenance and repair; it is our policy during the summer months, however, to keep either the 4-m or 2.1-m closed but operational in case of an important astronomical event.

David De Young

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CoudÃ© Request Night in January (1Sep92)

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Coude Request Night in January (1Sep92)
(from KPNO, NOAO Newsletter No. 31, 1 September 1992)

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 6 January 1993 with the T1KA 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 David De Young. 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.

David De Young

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New Telescope Control System Arrives at the CoudÃ© Feed (1Sep92)

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New Telescope Control System Arrives at the Coude...(1Sep92)
Feed
(from KPNO, NOAO Newsletter No. 31, 1 September 1992)

Long time users of the Coude Feed telescope will recall the great improvement in performance of the telescope when the last new control system was installed in 1987: the telescope pointed well and was incredibly well-behaved compared to the FORTH operating system. We are hopeful that the "new" new control system installed at the Feed this summer will achieve similar success!

The new control system is similar in architecture to the 2.1-m system. The telescope is actually controlled by a Heurikon computer, and the human interface to the program is provided by windows, implemented using the "OPEN LOOK" standard on an NCD terminal. The advantages of the new system are 1) much improved pointing and tracking, 2) a graphical user interface which we hope will be easier to learn and faster to use, 3) better access to star caches and catalogs, 4) compatibility with other telescopes on the mountain, and 5) better maintainability.

The new telescope control system includes the basic functions needed to observe at the Coude Feed telescope, including opening and initializing the telescope, entering coordinates and selecting stars from star caches, acquiring stars, "zeroing" the coordinates, tracking, guiding, and setting the grating. Star caches from the retiring control system have been recovered and are available still with the new star cache utility. A user's manual ("A Quick Guide to the New Coude Feed Control System") is available in the KPNO Operations Support Office and at the telescope. On-line help is also available right on the screen during operations using a variety of help buttons and keystrokes--no need to fumble through the manual!

The switch controlling the grating drive motor power has been rewired. The grating switch in the control room works exactly as before except that the grating will not `jump' when the motor is turned on or off. No longer will users have to toggle this switch in order to get an exact grating position!

Several Coude Feed observers in the spring and summer generously consented to test the new system, and we have streamlined the user interface and ironed out many of the wrinkles our guinea pigs uncovered. Their comments and suggestions led to substantial improvements to the control system, and we appreciate their help.

D'Anne Thompson, Kim Gillies, Caty Pilachowski

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Do You Know What Day It Really Was at the 2.1-m? (1Sep92)

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Do You Know What Day It Really Was at the 2.1-m? (1Sep92)
(from KPNO, NOAO Newsletter No. 31, 1 September 1992)

Have you taken a "date critical" observation at the 2.1-m telescope during the past few years? If so, you should be aware that the telescope control system (TCS) was supplying the local date (Mountain Standard Time) between January 1989 and June 1992. Thus the FITS/IRAF keyword "DATE-OBS" for observations taken in this time period will be that of the local date, rather than the UT date that is standard on all of the other telescopes at KPNO. This keyword was changed on 27 June 1992 to specify the UT date. (The current draft of the FITS standard recommends usage of Universal Time in both the `DATE' and `DATE-OBS' keywords.)

If you were one of the users of the new TCS during its testing phase at the Coude Feed this spring, your data is similarly affected. However, after 11 June 1992, FITS and IRAF headers written at the Coude Feed contain the UT date.

Bob Marshall

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Computers and the Mountain (1Sep92)

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Computers and the Mountain (1Sep92)
(from KPNO, NOAO Newsletter No. 31, 1 September 1992)

Last summer we began to upgrade the data acquisition computers on Kitt Peak by replacing the venerable DEC 11/73s with the various Sun computers which had previously been used primarily for data reduction. This decision was driven not only by maintenance headaches but also by the desire to use 2048 2048 CCDs in something approaching an efficient manner. This first step also involved new data acquisition software, "ccdacq" in IRAF's ICE package. While the reviews of these improvements were favorable, we also heard cries for more computing power and more disk space!

This summer will see the completion of this plan with the installation of more powerful Sun computers at almost all of the telescopes. Our overall philosophy is to integrate telescope control, instrument control, data acquisition, and data reduction into a common window-based environment that will allow flexible and effective use by, most often, two astronomers and a telescope operator. Three criteria underlie our plan: the number of different computer platforms shall be minimized; we shall provide sufficient computing and disk capacity for the 90% situation, not the median; and we shall have spares for all systems. At most telescopes two computer display consoles, each driven by a separate cpu, will have a number of windows open to instrument control, data acquisition, and data reduction for use by the observers. The arrangement of these windows will be left to the requirements and desires of the observers.

We continue to use Sun computers, but we have moved to Sun's SPARC technology as the MC68000-based CPUs in our old Sun 3 PCs are now orphaned. In general, we will be installing Sun SS-IPXs to complement the existing SS-2s. The smallest disk configuration is 2.2 Gbytes, with 5.2 Gbytes to be available at the 4-m. Each telescope will have Exabyte and nine-track tape drives; a DAT will be available at the 4-m and at a computer to be located in the administration building.

We will upgrade to SS-10-30s at most of the telescopes later in the year to provide adequate computing capacity for the large format CCDs, including the soon-to-be `mini-mosaic.' All of these steps will still only for a little while the cries for more computing power and more disk space!

Bruce Bohannan, Steve Grandi, Jim Davis,
James Hutchinson for a cast of thousands

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When Dew Gets in Your Eyes (1Sep92)

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When Dew Gets in Your Eyes (1Sep92)
(from KPNO, NOAO Newsletter No. 31, 1 September 1992)

Historically, Kitt Peak has used 90% humidity as an upper limit for telescope operation. There are, however, two difficulties with this criterion: (1) we really do not have a reliable way to measure humidity, particularly when it is below freezing, and (2) humidity is not what we want to know in order to keep water from condensing on the optics or on anything else that might drip onto the optics. The quantity to measure is the dewpoint.

We are now experimenting with a dewpoint hygro-thermometer which we have installed near the 2.1-m telescope. (A second one will soon be located on the catwalk level of the 4-m). This device measures the dewpoint to an accuracy of 0.5 degrees RMS by chilling a mirror to the point where water begins to condense, just what we want to prevent happening to our telescope optics. (Under freezing conditions the error increases to two degrees RMS.) What we are now evaluating is the amount of "depression"--the difference between air temperature and the dewpoint, not the astronomer's attitude--which we should tolerate for safe operation. Our goal is to find a quantitative measure which will determine when we should open and when we should close so that we can maximize telescope time without causing damage to our optical coatings.

Alex Macdonald, Paul Harding, Bruce Bohannan

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Room and Board Charges on Kitt Peak (1Sep92)

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Room and Board Charges on Kitt Peak (1Sep92)
(from KPNO, NOAO Newsletter No. 31, 1 September 1992)

Through cost reduction measures and increased efficiency, KPNO has been reasonably successful in compensating for inflation in our room and board costs. The last increase in the amount charged to visitors for room and board occurred eight years ago, in 1984. During that time the cost of living has risen approximately 40 percent. With the costs of providing meals and lodging to our visitors steadily increasing, it is no longer possible for us to provide these services without raising our rates. After a review of our costs and of the rates at other US observatories, we have established new rates which better balance our expenses and which are comparable to meal and lodging charges at other observatories.

Effective 1 October 1992, the price for lodging and meals on Kitt Peak will be increased from $40.00 per night (single occupancy) to $50.00 per night.

The new breakdown of dorm and meal charges is as follows:

Dormitory Rooms (price includes all meals):

```
   Single Occupancy   $50.00 per night
   Double Occupancy   $47.00 per night

Meals Only (for those not requiring lodging):
   Breakfast       $5.00
   Lunch           $7.00
   Dinner          $9.00
   Night Lunch     $6.00

David De Young
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Access to On-line Solar Data (1Sep92)

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Access to On-line Solar Data (1Sep92)
(from NSO, NOAO Newsletter No. 31, 1 September 1992)

This article describes changes that will affect access to files
containing solar data stored on an anonymous FTP disk at NOAO. This
includes the Sac Peak Coronal Maps, Kitt Peak Vacuum Telescope
magnetograms, and various GONG data products.

The VAXcluster at NOAO currently consists of three VMS/VAXen: DRACO,
ROBUR, and VELA. During June or July, the disk containing the NSO's
anonymous FTP disk will be moved from DRACO to VELA. Soon afterwards,
DRACO will be retired from service and the VAXcluster will consist of
ROBUR and VELA.

This equipment change will require both an outage of several days and
an address change for those who access the disk via FTP. (There is no
change of address if accessed via NSI/DECnet, alias SPAN.) However,
since ROBUR is already part of the VAXcluster with DRACO, the new FTP
address can be used to access the disk before the disk is moved. Of
course, after the hardware change the new FTP address will be
required.

The new procedure for accessing the disk via INTERNET using FTP is as
follows:

   host: robur.tuc.noao.edu or 140.252.1.10
   ftp login: anonftp
   ftp password: guest

followed by
   cd gong
 for GONG files or
   cd kpvt
 for Kitt Peak Vacuum Telescope files or
   cd spcm
 for Sac Peak Coronal Maps.

Access via NSI/DECnet (alias SPAN) has not changed:
   noao::ga0:[ftp.gong], or
   5355::ga0:[ftp.gong]
      ;i.e., ga{zero}.

Substitute `kpvt' for `gong' to access the Kitt Peak Vacuum Telescope
files or substitute `spcm' for `gong' to access the Sac Peak Coronal
Maps.

If you have questions regarding these changes or if you encounter
problems trying to access files on the disk, please contact Jim Pintar
(jpintar@solar.stanford.edu, or pintar@noao.edu, or phone 602-325-9272).

Jim Pintar
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NSO Observing Proposals (1Sep92)

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NSO Observing Proposals (1Sep92)
(from NSO, NOAO Newsletter No. 31, 1 September 1992)

The deadline for submitting observing proposals to the National Solar Observatory for the first quarter of 1993 is 15 October 1992. Forms and information may be obtained from R.N. Smartt, P.O. Box 62, Sunspot, NM 88349, for the Sacramento Peak facilities (sp@sunspot.noao.edu) and J.W. Brault, 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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Update: Daily Coronal Images Available from NSO/SP (1Sep92)

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Update: Daily Coronal Images Available from NSO/SP (1Sep92)
(from NSO, NOAO Newsletter No. 31, 1 September 1992)

1. An error occurred in the first version of the readme file referred to in the announcement that appeared in the June 1992 issue of the Newsletter. The correct position of the solar poles is as follows: the first row represents the SOUTH pole, and the 61st row represents the NORTH Pole.

2. Two IDL procedures for viewing the images are available in the idl subdirectory under spcm.

3. A new procedure for accessing the data has been instituted. See the article on "Access to On-line Solar Data" elsewhere in this Newsletter.

Dick Altrock

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NSO Daily Images Available by FTP from Solar Terrestrial Dispatch (1Sep92)

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NSO Daily Images Available by FTP from Solar...(1Sep92)
Terrestrial Dispatch

(from NSO, NOAO Newsletter No. 31, 1 September 1992)

Sac Peak coronal scans and Ca K images, and Kitt Peak magnetograms and He I 10830 A images are available as "GIF" plot images through the Solar Terrestrial Dispatch (STD). STD, in cooperation with the University of Lethbridge, is a supplier of time-critical solar and geophysical information to the scientific and public community. Numerous solar services are available through the Internet to those who require solar and/or geophysical information. An anonymous FTP service has been set up to provide solar-related services to the professional scientific community from the site "xi.uleth.ca" (IP number 142.66.3.29). To login, use the username "anonymous". At the "password:" prompt, use your e-mail address.

The coronal green Fe XIV (5303 A) and red Fe X (6374 A) lines, as measured by the Sac Peak Emission Line Coronal Photometer, are available in the directory "pub/solar/Corona". The file names are of the form "corMMDD.gif" where MM and DD represent the month and day of the observations. The file "00-index.txt" contains a full description of the images. The data are taken with a photomultiplier at 0.15 solar radii above the solar limb through a 1.1 arcminute aperture.

The Kitt Peak magnetograms, He I 10830 A images, and Sac Peak Ca K images are available in the directory "pub/solar/Images". The file names are of the form "YYMMDDxn.gif" where x is h for the Helium images, d for the magnetograms, and k for the Calcium K images. n is a sequence number for the day. Here also, the file "00-index.txt" contains a full description of the images.

Other GIF images and services are available; e.g. H and white light images, GOES x-ray time series... Questions should be directed to: oler@rho.uleth.ca, or: coler@solar.stanford.edu.

Dick Altrock, Cary Oler, John Leibacher

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Scientist Wins Top Air Force Awards (1Sep92)

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Scientist Wins Top Air Force Awards (1Sep92)
(from NSO, NOAO Newsletter No. 31, 1 September 1992)

The Air Force Association, Los Angeles Chapter 147, has announced that Don Neidig, Astrophysicist in the Phillips Laboratory at NSO/Sac Peak, will receive the 1992 General Bernard A. Schriever Scientist of the Year award. Don's selection was based on his research in solar flares and solar activity forecasting studies. In May, Don received the 1992 Loeser Memorial Award of the Geophysics Directorate, Phillips Laboratory, for his career effort in solar observations and analysis. The Loeser award is the highest honor bestowed by the Geophysics Directorate for scientific achievement.

Steve Keil, Dick Altrock

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The Advanced Stokes Polarimeter (1Sep92)

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The Advanced Stokes Polarimeter (1Sep92)
(from NSO, NOAO Newsletter No. 31, 1 September 1992)

The Advanced Stokes Polarimeter (ASP) was used for the first time for scientific observations during March 1992 at NSO's Vacuum Tower Telescope (VTT) in Sunspot, New Mexico. The ASP is a joint project between the High Altitude Observatory of the National Center for Atmospheric Research (Boulder, Colorado) and the National Solar Observatory/ Sacramento Peak. This new instrument is designed to measure the full vector magnetic field at several heights in the solar atmosphere with high angular resolution. It is the first instrument to deliver quantitative information on the vector magnetic field that is limited primarily by our ability to resolve solar features when observed through the Earth's atmosphere. Prior instruments delivered either qualitative images of high resolution, or quantitative information with much lower angular resolution.

The initial results from successful observing runs in March and June of 1992 indicate the instrument to be performing as well as or better than anticipated, and new scientific results on the structure of the magnetic fields in and around sunspots have already been obtained. The instrument will be opened to community use in 1993, once operations become more routine.

The ASP is integrated into the VTT adaptive optics (AO) system, so that the ASP will benefit from the improvement of the image quality when the new AO system becomes available.

Bruce Lites, High Altitude Observatory

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Liquid Crystal Polarimeter Provides Fast Zeeman Imaging at NSO/SP (1Sep92)

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Liquid Crystal Polarimeter Provides Fast Zeeman...(1Sep92)
Imaging at NSO/SP
(from NSO, NOAO Newsletter No. 31, 1 September 1992)

The liquid crystal polarimeter was assembled and tested at the NSO/SP Vacuum Tower Telescope, during an observing run 9-16 March as part of the Air Force-funded Liquid Crystal Filter (LCF) project. The system provides a complete set of polarization spectral images and can be operated in many spectral lines using the tuning properties of the Universal Birefringent Filter (UBF) (4000 A to 7000 A). The system was successfully demonstrated for use in vector magnetometry of active regions. The complete polarization and spectral sampling from multiple lines will be used to derive related physical information: magnetic filling factor and electric current distribution, as a function of atmospheric height.

The system consists of a polarimeter section, which is placed before the UBF, and a spectral analyzer section which is placed immediately following the UBF in the light beam. The polarimeter modulates the light at 1-20 kHz to give nearly simultaneous polarization spectral images by temporal integration in two exit CCD channels. A sequence of 16 image pairs taken with combinations of settings in the polarimeter and spectral analyzer sections provides a complete polarization and spectral sample, giving automatic gain correction for the CCD field effects. The modulator control system provides multiple frequency modulation of fast ferro-electric and slower tunable nematic liquid crystals, for use with normal CCDs or for use with video recording. One complete polarization spectral sequence requires 30 seconds in each wavelength, due to the limitation of the CCD readout time. With the video upgrade, a complete sample will be obtained in less than one second. The electronics section was designed and built by Larry Wilkins.

The system provided initial vector magnetograms in a strong-field complex region in 4 lines: Mg B 5173 A, Ca I 6103 A, Fe I 5247.8 A, and Fe I 5250.2 A. Initial tests showed the feasibility for studying electric fields using the linear Stark effect by operating the system in the Balmer lines Ha, Hb, Hg, Hd, as well as in other hydrogenic species available in the visible. The system may have adequate sensitivity and speed to study fast transient electric-field phenomena, using the quadratic Stark effect or electric-beam impact polarization.

Laurence J. November

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Seeing Monitors Installed at the Evans Facility and the Vacuum Tower Telescope (1Sep92)

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Seeing Monitors Installed at the Evans Facility...(1Sep92)
and the Vacuum Tower Telescope
(from NSO, NOAO Newsletter No. 31, 1 September 1992)

A non-telescopic method of determining the quality of seeing has been developed for large angular-diameter objects, such as the Sun. In this method the concept of thermodynamic fluctuations is used to relate the observed intensity fluctuations (solar scintillations) to the RMS angular diameter of the atmospheric seeing cells and the telescopic angle of arrival fluctuations. Because the seeing monitors are non-telescopic, the seeing measurements do not interfere with the telescope operation. The seeing monitor detector at the Evans Facility is mounted on the spar adjacent to the large coronagraph aperture. At the Tower Telescope, the detector is placed at the vacuum periscope feed, which provides an unvignetted view of the Sun directly from the coelostat mirrors. Analog outputs are provided from the monitors where one volt represents an RMS seeing angle of one arcsecond. Software is available at each facility for digitizing and recording the seeing time dependence, as well as camera threshold triggering at a given seeing level. The method is applicable to nighttime measurements, using the full moon as a source. However, more sensitive detectors would be required.

E. J. Seykora, East Carolina University

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Perkin Elmer Computer (1Sep92)

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Perkin Elmer Computer (1Sep92)
(from NSO, NOAO Newsletter No. 31, 1 September 1992)

After many years of service, the Perkin Elmer Computer at the Vacuum Tower Telescope was turned off and laid to rest on 29 June. The VTT computer system is now operating a 68030 processor board for telescope and instrument control and another 68030 for data control. This change has allowed us to switch from the nine-track tapes to Exabyte tapes. Both the computers and the tape drives are now located on the rotating observing table.

Dick Mann, Fritz Stauffer

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UPS (1Sep92)

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UPS (1Sep92)
(from NSO, NOAO Newsletter No. 31, 1 September 1992)

On 8 June a new 75 KVA Uninterruptable Power System (UPS) was installed in the Vacuum Tower Telescope. This new system will allow up to 45 minutes of observing time during a power outage. In addition, under circumstances of an extended power outage, we will now be able to operate the Vacuum Tower Telescope using power from the Sac Peak generators.

Dick Mann, Robert Rentschler, Will Rogers

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Summer Students at NSO (1Sep92)

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Summer Students at NSO (1Sep92)
(from NSO, NOAO Newsletter No. 31, 1 September 1992)

The long-standing tradition of training both undergraduates and graduates in solar research continues this summer. Under the NOAO/NSO Summer Research Assistant (SRA) and the Research Experience for Undergraduates (REU) programs, we have thirteen students this summer, nine at Sac Peak and four in Tucson.

Zachary Baquet (Vassar College), under the supervision of Ray Smartt and Steve Keil, is working on Coronal Dynamics and Loop Interactions.

Bryan Deeney, a senior in physics and astronomy at Villanova University, is working with Mark Giampapa on the analysis of spectroscopic observations of late-type stars obtained at the McMath telescope. Specifically, he is characterizing the variability of lines arising from the hot chromosphere in a rare class of M dwarf stars in order to gain insights on the structure of magnetic regions in these objects. In addition, he is studying the variability of spectroscopic features that arise in the strong winds of young stars known as T Tauri stars. The results will yield clues to the origins of the powerful outflows in these stars that are still in the process of formation.

Carsten Denker, a graduate student from Universitats-Sternwarte, Gottingen, is working under Richard Radick and Sergio Restaino. His project is to compare the relative performance of the Shack-Hartmann wavefront sensor versus the focal volume wavefront technique, using data obtained simultaneously with both of these techniques.

Steve Doinidis (New Mexico State U.) is working with Dick Dunn on modeling the performance of an adaptive mirror to be used in the NSO adaptive optics system at the VTT. He is also modeling the mechanical and thermal behavior of the entrance window at the VTT.

Melissa Dryer, a junior in physics and astronomy from the University of Iowa, is working with Stuart Jefferies to analyze a new technique for deconvolving a digital image from both a single convolution and an ensemble of differently blurred images. The technique is unique in the fact that it does not need any a priori information on either the objects being investigated or the degrading point spread functions. She is evaluating the performance of a current suite of algorithms using simulated speckle images.

Mohamed Lazrek, a graduate student from the University of Nice, is working on a study of temporal window effects and their deconvolution from solar oscillation spectra with Frank Hill. He is simulating temporal observing windows with various duty cycles, periodicities, and degrees of randomness, and then fitting a peak "observed" with the windows. He is also testing a method of deconvolving the window spectrum from the oscillation spectrum.

Karin Muglach, a graduate student from the Institute for Astronomy, University of Graz, Austria, is working with Bill Livingston on observational problems in solar magnetism. Following up on a flux tube model of S. Hassan, they are using the InSb diode `Babo' to search for predicted oscillations in magnetic field strength. For this purpose they are using the infrared, g = 3, line of Fe l 15648. Their sample indicates that 10- and 20-minute periods may exist. More observations will be needed to substantiate this. Another project is to measure fields outside of active regions and plage. Muglach is also examining the field oscillation data for velocity effects.

Catherine Petry (Northern Arizona U.) and her advisor K.S. Balasubramaniam are working on the influence of magneto-optic effects on the polarized radiative transfer of the Fe I infrared spectral line at 15648.5 A and the resulting inference of the vector magnetic field.

Garrett Sales (San Joaquin Delta College) is working with Jim Moore and Larry Wilkins on the Hilltop Automation and aspects of the design of a CCD controller for the new Tektronix 1024 x 1024 chip.

As part of the Air Force-sponsored Solar Activity Modeling Initiative, several excellent data sets have been acquired in order to understand the dynamical behavior of active regions with the narrowband (~~ 20 mA) bi-dimensional spectroscopy method. Peter Sauerbrei (U. of Iowa) and Joanna Thomas (Whitman College) are intensely involved with some of these flare data sets obtained during a MAX'91 observing run last April, in an effort to find the temperature and velocity evolution, respectively, in the course of a flare. Linh Hong (U. of California at Davis) is working on the problem of inferring the magnetic field and other thermodynamic parameters for the same active regions using non-linear, least-square optimization fits. Erika Meyer (Caltech) is attempting to determine the instrumental polarization matrix for the JHU-APL/NSO Vector Magnetograph. She will also work on the observed polarization-to-magnetic field calibration of that instrument. Peter Sauerbrei, Joanna Thomas, Linh Hong and Erika Meyer are being advised by Steve Keil and K.S. Balasubramaniam.

For the second year in succession, students of the University of Texas, El Paso (UTEP) and University of Texas, San Antonio (UTSA) are at NSO/Sacramento Peak this summer, supported under a UTEP/NSF REU Summer program. The students from UTEP are William Bates, Michael Dahlberg, Roberto del Real, Izaguirre John Medrano, Amir Simon and Guenther Strunk, and those from UTSA are Dana McCarty and Robert Steele. These students are involved in a host of engineering projects relevant to observatory instrumentation. Their projects are being directed under the leadership of David Nemir and Jim Meyers, Department of Electrical Engineering, UTEP, and Jim Moore and several technical and scientific staff of NSO/Sacramento Peak.

In addition to the college and graduate students, Krista Steenbergen, from Shawnee Mission High School, is working with George Simon, Lou Gilliam and Brian Armstrong on meteorological conditions of Sac Peak over the last 30 years as derived from flare patrol data sets.

K.S. Balasubramaniam, Bob Howard

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Kitt Peak Vacuum Telescope Magnetographs (1Sep92)

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Kitt Peak Vacuum Telescope Magnetographs (1Sep92)
(from NSO, NOAO Newsletter No. 31, 1 September 1992)

Early this year, the Kerr cell, which is used to modulate circular polarization for the KPVT magnetographs, failed after about ten years of operation. The failed unit was one of three which were purchased at the same time from a company which no longer exists. The first of the two spare cells failed in early April (thus giving an estimate of shelf life), and the final unit is being used carefully and sparingly. Preparations have been made to recharge the failed units with purified nitrobenzene, and alternative technologies for modulating polarization are being tested. However, until one or both of these tasks produces a working and replaceable modulator, NSO/KP magnetograph operations will remain restricted as discussed below.

After a few days of experimentation ending about 10 April 1992, daily full-disk magnetograms have been obtained only with the new NASA/NSO Spectromagnetograph (Jones et al., 1992, Solar Physics 139, 211) in Fe I 5507 (not Fe I 8688 as has been prior standard practice); the lower Kerr voltage at 5507 presumably places less stress on the remaining operable cell. Magnetic observations have been restricted to one full-disk magnetogram per day. The current software does not correct for Land g-factor so that in principle all 5507 flux values should be multiplied by 0.8. However, to prolong the Kerr cell life, we have not performed planned experiments to determine polarization crosstalk and to correlate the new data with the Diode Array Magnetograph. Thus absolute fluxes from the KPVT synoptic data should be treated with more than customary caution from early April until further notice.
Full-disk He I 10830 spectroheliograms arecurrently being taken on a daily basis with both instruments, and most cooperative and campaign observations are being obtained in 10830 with the Spectromagnetograph.

Harry Jones

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Requests for NSO Telescope Time, January - June 1992 (1Sep92)

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Requests for NSO Telescope Time, January - June 1992 (1Sep92)
(from NSO, NOAO Newsletter No. 31, 1 September 1992)

Telescope	Days Req.	Days Sch.	No. Req./ No. Sch.	No. Prop.	No. Sch.	Total No./ No. Scheduled
Sac Peak(1)						
ESF Coronagraph(2,4)	637	475(3)	1.34	21	20	1.05
ESF Coelostat(4)	245	188(3)	1.30	7	7	1.00
VTT	253	168(3)	1.50	22	21	1.04
Kitt Peak						
FTS(5)	99	80	1.20	16	13	1.20
McMath	189	147	1.30	21	14	1.50
KPVT(6)	271	182	1.50	6	4	1.50
McMath Nighttime	199	147	1.40	21	21	1.00

(1) Hilltop statistics have not been included because they represent simply continuous operation of its several instruments as conditions allow. The exception is the Vector Magnetograph, which is not yet operated on a routine basis.

(2) Since multiple experiments are run in the ESF, sometimes simultaneously, the column under "days scheduled" is the cumulative number of days for the

two quarters for four basic instruments.

(3) The numbers under "days scheduled" are days available less maintenance for VTT, and a corresponding reduction for the ESF factored by the number of instruments.

(4) ESF programs include daily (data for forecasting centers, etc.), standby and bumping programs. It follows that, if certain programs (could include maintenance) are not run, this might reflect lack of available time, or lack of appropriate solar conditions.

(5) NSO is able to support approximately 80 days at the FTS each semester. The exact number depends upon the degree of support required to complete the experiment requested.

(6) The KPVT operates daily to provide full-disk magnetograms and He I 10830 A images. In addition, a few individual investigator runs are occasionally scheduled. The number of proposals submitted for the KPVT does not include data requests.

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GONG Update (1Sep92)

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GONG Update (1Sep92)
(from GONG, NOAO Newsletter No. 31, 1 September 1992)

The Global Oscillation Network Group (GONG) is a community-based project to conduct a detailed study of solar internal structure and dynamics using helioseismology. In order to exploit this new technique, GONG is developing a six-station network of extremely sensitive and stable solar velocity imagers located around the Earth to obtain nearly continuous observations of the Sun's "five-minute" oscillations or pulsations. GONG is also establishing a major, distributed data reduction and analysis system to facilitate the coordinated scientific investigation of the measurements.

The GONG project has decided not to place a seventh instrument at the Urumqi Astronomical Station in China. The decision was made after studying the differences in performance between the seven-site and the six-site network windows, and estimating the impact of these differences on the scientific goals of the project. The scientific impact was assessed by examining the effect of the window spectrum sidelobes on the relatively strong p modes and the effects of the window spectrum background on the much weaker g modes. In all cases, the six-site network performed completely adequately. Indeed, spatial leakage due to the limited accessible area of the solar surface is likely to be much stronger than any residual temporal leakage.

These results were obtained using windows that had been observed with the GONG Site Survey Instrument. However, the Site Survey Instrument is far less complex than the Doppler science instrument. In an effort to predict the future performance of the network with a more complex (and hence possibly less robust) instrument, and to assess the impact of a seventh site in this situation, the observed downtime was systematically increased at each station by factors ranging from 2 to 10. The network window was then constructed and analyzed in the usual manner. This study showed that the six-site network is satisfyingly robust, even in the extreme case of a tenfold increase in time loss. In the worse case, the fraction of observing time was 85.88%, and the height of the first sidelobe in the power spectrum increased to 0.2%, still far below the sidelobe height in a single-site window. For comparison, the six site survey instruments achieved a combined observing time fraction of 93.63%, and a sidelobe height of 0.04%. To assess the impact of the degraded networks on the science, consider the worst case of a tenfold increase in downtime. Then the relative power of the first sidelobe rises to 2 x 10-3 for the six-site network, and to 1.4 x 10-3 for the seven-site network.

These and other results have led the project to conclude that the

addition of a seventh site at Urumqi is not cost-effective. While the network window would indeed be improved, the six-site window is entirely adequate for the project, and the additional expense in funds, human resources, and data-reduction effort is not justified. It should be noted that this decision has been based entirely on consideration of the integrated performance of the GONG network as a whole, and should in no way be construed as indicative of the utility of Urumqi as a site for other astronomical purposes.

The GONG project would like to extend its warmest thanks and appreciation to the Urumqi group, particularly Xiao Suming and Huang Zhen, who have played very important roles in the testing of the Urumqi site. Because of this substantial contribution to the project, the Urumqi personnel are considered to be permanent members of the GONG project, with full access to the future data products.

Early in the quarter, an internal review was held of the plan for the development of GONG's Data Management and Analysis Center (DMAC). One aspect of this review was the preparation of a document describing the system's objectives and how these objectives would be achieved.

On 26 and 27 May an external review of this plan was held. The external review panel consisted of Robin Stebbins (Chair, JILA), Ron Allen (STScI), Tim Brown (HAO), Richard Grubb (NOAA/SEL), Gareth Hunt (NRAO), and Roger Ulrich (UCLA). Steve Grandi (NOAO/CCS) attended as an observer. The review consisted of presentations by members of the DMAC team with questions, comments, and criticism from the panel. The project was gratified by the contributions of the panel--in particular, by the scope and depth of their inquiry--and was pleased that the panel felt that the plan will satisfy the requirements and objectives of the project. The panel provided the project with a written evaluation of the project's plan and offered several useful suggestions that will significantly improve the project. The project has prepared a response to the panel's list of recommendations.

One of the panel's suggested changes recommended that the project move to a homogeneous workstation environment. The project has accepted this recommendation and has selected Sun Microsystems as the source for future workstation purchases.

During the past quarter significant progress was made developing the Exabyte Catalog for GONG's Data Storage and Distribution System (DSDS). The Catalog has been implemented using the INGRES RDBMS, and most of the operational aspects of the Catalog are now functional. This includes the recovery procedures of daily backups which run automatically every night and the recording of all transactions against the Catalog's database tables.

Good progress has also been made on improving the quality of the calibration of the prototype instrument in spite of a particularly cloudy and wet spring and early summer. In the meantime, work continues on the production units. Two shifts are running in the instrument shop to produce the mechanical parts for the light feed and Doppler analyzer. Designs of the electronic components are being systematically reviewed and frozen so that full-scale production of printed circuit boards can get under way. The current schedule calls for deployment to begin during late 1993 or early 1994.

Rob Hubbard

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Internet FTP Archives at NOAO-Tucson (1Sep92)

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Internet FTP Archives at NOAO-Tucson (1Sep92)
(from CCS, NOAO Newsletter No. 31, 1 September 1992)

We have several machines at NOAO-Tucson that provide archives available via anonymous FTP over the Internet. You can use the FTP program on your local machine to connect to any of these archive machines and then

login as "anonymous" and use your e-mail address as the password.

If you are looking for the IRAF (Image Reduction and Analysis Facility) archives, FTP to iraf.tuc.noao.edu (140.252.1.1).

If you are looking for the KPNO (Kitt Peak National Observatory) archives, FTP to orion.tuc.noao.edu (140.252.1.22) and look in /kpno.

The machine noao.edu (140.252.1.54) no longer supports an archive; all you will find there now is a README file that repeats the information contained in this article.

If you are looking for the WIYN archives, various TeX templates, the KPNO filters file or anything that used to be on noao.edu, FTP to gemini.tuc.noao.edu (140.252.1.11).

If you are looking for the Solar FTS archives, the Kitt Peak Vacuum Telescope archives, the GONG archives, the NSO/Sacramento Peak Fe XIV and Ca XV archives or the SN 1987A archives, FTP to robur.tuc.noao.edu (140.252.1.10). Note that an FTP session with Robur, being a VAX running VMS, "looks" a little different than the typical FTP session with a Sun: login with username "anonftp" and password "guest". Use VMS syntax when specifying directories in the cd command, e.g. "cd [ftp.gong]".

Questions can be directed to Steve Grandi, grandi@noao.edu.

Steve Grandi

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Welcome, Bob Marshall! (1Sep92)

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Welcome, Bob Marshall! (1Sep92)
(from CCS, NOAO Newsletter No. 31, 1 September 1992)

Bob Marshall started work in June as the new Chief Programmer in charge of the Mountain Programming Group. Bob comes to NOAO from the Ohio Supercomputer Center on the campus of Ohio State where he worked on visualization software. Before that, Bob worked for Cranston/Csuri Productions which was in the business of computer animation (and building frame buffers).

Bob is working hard to get up to speed on the myriad projects underway in the Mountain Programming Group from new CCD controllers to new telescope operator interface programs. He and his group (Nick Buchholz, Kim Gillies, Shelby Gott, Lee Groves, Chuck Mahaffey and D'Anne Thompson) write much of the software that keeps the mountain observing!

Bob can be reached at (602) 322-8561 or via e-mail at bob@noao.edu.

Steve Grandi

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IRAF Update (1Sep92)

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IRAF Update (1Sep92)
(from CCS, NOAO Newsletter No. 31, 1 September 1992)

Distribution of IRAF version 2.10 began in late April with the release of V2.10 Sun/IRAF. The Sun/IRAF distribution was updated to IRAF V2.10.0 in early July, adding the completed V2.10 revisions summary and updated installation and site manager's guides, and correcting bugs found during the first two months of the release. Those sites that installed IRAF V2.10 prior to July 8 can upgrade their systems by installing the patch0 and patch1 updates available in the IRAF network archive.

An additional series of patch upgrades (V2.10.1, V2.10.2, etc.) will follow throughout the next year or so containing bug fixes and minor enhancements for the V2.10 IRAF core system and NOAO packages. The first of these patches, patch1, was released on 24 July. Patch1 upgrades IRAF to V2.10.1 and requires that the system first be updated to V2.10.0. The most recent patch level can be determined by examination of the IRAF network archive, or by contacting the IRAF group. Consult the README files given in the archive for further information on these patches.

Releases or upgrades of IRAF V2.10 for the IBM RS/6000, Macintosh systems running A/UX, DEC Ultrix, VAX Ultrix, VAX/VMS, SGI, HP, and so on will follow throughout the coming months. Several of these ports or upgrades have already been completed, but testing is still in progress.

Detailed release notes for IRAF V2.10, the IRAF Version 2.10 Revisions Summary, are available in the IRAF network archive; printed copies are available upon request. The network archive can be accessed via anonymous ftp to the Internet node iraf.noao.edu (140.252.1.1).

The major IRAF system development priorities for the near future are the remaining V2.10 updates for supported IRAF platforms, the establishment of an IRAF news network (will be tied into USENET), continued work on X11 support and the general areas of graphics and imaging, window system support and user interfaces, and further development of the ICE software for integrating IRAF with data acquisition. The issue of window user interfaces in particular has received and will continue to receive a lot of attention.

Lindsey Davis is currently working on incorporating Peter Stetson's DAOPHOT II algorithms into IRAF DAOPHOT, and these additions should become available either as a patch or as an add-on package to IRAF V2.10 later this year. Frank Valdes has been working on a new task called SPECFOCUS, a tool to assist with spectrograph focusing and alignment adjustments.

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

Doug Tody

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1992 Software Conference Update (1Sep92)

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1992 Software Conference Update (1Sep92)
(from CCS, NOAO Newsletter No. 31, 1 September 1992)

The Second Annual Conference on Astronomical Data Analysis Software and Systems (ADASS) will be held in Boston on 2-4 November 1992 (some additional meetings not part of the main conference are planned for 5-6 November). The Conference is sponsored by NOAO, SAO, and STScI, and is being hosted by SAO. The ADASS Conference provides a forum for scientists and programmers concerned with algorithms, software, and software systems employed in the reduction and analysis of astronomical data.

The first two and one half days of the conference will be devoted to contributed and invited papers given in general session, with some users group sessions and special interest group meetings being held during the evenings and on the afternoon of the third day. Some additional "tag-along" workshops are planned for the days following the main conference. Contributed posters and demos will be on display throughout the conference. We expect the Proceedings of ADASS '92, like those of the first conference, to be published as part of the Astronomical Society of the Pacific Conference Series. Since the dates for this meeting encompass Election Day, instructions for casting absentee ballots are included with the registration materials, which were mailed in early May.

The abstract deadline for contributed papers was 3 August. Contributions to the program were invited in the areas of algorithms, software, systems, and related topics, with emphasis on practical solutions to the problems of treating real data. The special topics for this year's conference are next generation systems and languages; user interfaces and data visualization; data acquisition; and databases, catalogues, and archives.

Invited speakers for this year's program include Miguel Albrecht (ESO), Geoff Croes (NRAO), Alan Farris (STScI), Margaret Geller (Harvard-SAO), Jim Gettys (DEC), Andre Heck (Strasbourg), James Himer (Calgary), Mark Johnston (STScI), Bob Kibrick (UCO/Lick), Doug Tody (NOAO), Michael Van Steenberg (NSSDC), and Don Wells (NRAO).

Three "tag-along" workshops are currently planned for 5-6 November, following ADASS II: ROSAT Science Workshop (chaired by Rob Petre, GSFC), Astrophysics Data System Workshop (chaired by Stephen Murray, SAO), and Graphical User Interface Workshop (chaired by Eric Mandel, SAO). If you would like to sponsor a special interest group meeting or tag-along workshop, it may still be possible to do so. Please contact the Local Organizing Committee at SAO or one of the Program Organizing Committee members as soon as possible if you are interested in sponsoring such a meeting.

The early registration deadline for the Conference was 15 July; registrations are still being accepted but at a higher registration fee. Participants interested in displaying exhibits or computer software during the Conference should contact the address below.

If you are interested in registering for this conference, please contact Tricia Buckley at SAO (MS-83, 60 Garden St., Cambridge, MA 02138) or send e-mail to softconf@cfa.harvard.edu (Internet) or 6699::softconf (SPAN). Registration forms are available on-line via anonymous ftp to sao-ftp.harvard.edu; get the file pub/softconf/register. Detailed information on the conference arrangements and program is available upon request.

Jeannette Barnes, George Jacoby, Doug Tody

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SBRC 256 x 256 InSb Preliminary Evaluation Results (1Sep92)

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SBRC 256 x 256 InSb Preliminary Evaluation Results (1Sep92)
(from ETS, NOAO Newsletter No. 31, 1 September 1992)

The IR program has been evaluating the SBRC InSb array to determine its suitability for use in the Cryogenic Optical Bench and other future IR instruments. The preliminary tests indicate that this array is very good, and we have proceeded to procure one for use at Kitt Peak in COB.

The dark currents we measured on our array were in the 2 electrons/sec range using median statistics to reduce the effect of very hot pixels on the calculation. There was somewhat of a bright edge around the array similar to the 58 x 62 InSb array, but we have not tried baking to see if that reduces or eliminates this effect. At these very low dark

current levels it could be due to LED effects in the shift registers and current sources as the high QE of InSb makes it more sensitive to these effects.

The noise we measured was substantially less than quoted by SBRC, but we are using the reset-read-read procedure developed here for reading out IR arrays. I have not yet used our low-noise read technique on this array, but it has been reported to me that it does work. Using the reset-read-read we have gotten 25-30 electrons read noise, and the University of Rochester group has gotten as low as 12 electrons using the low-noise read technique.

We are continuing our evaluation and optimization, but the preliminary results were encouraging enough to procure a science grade device for the Cryogenic Optical Bench. Evaluation of that array at the telescope in COB will be proceeding next semester.

Al Fowler

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