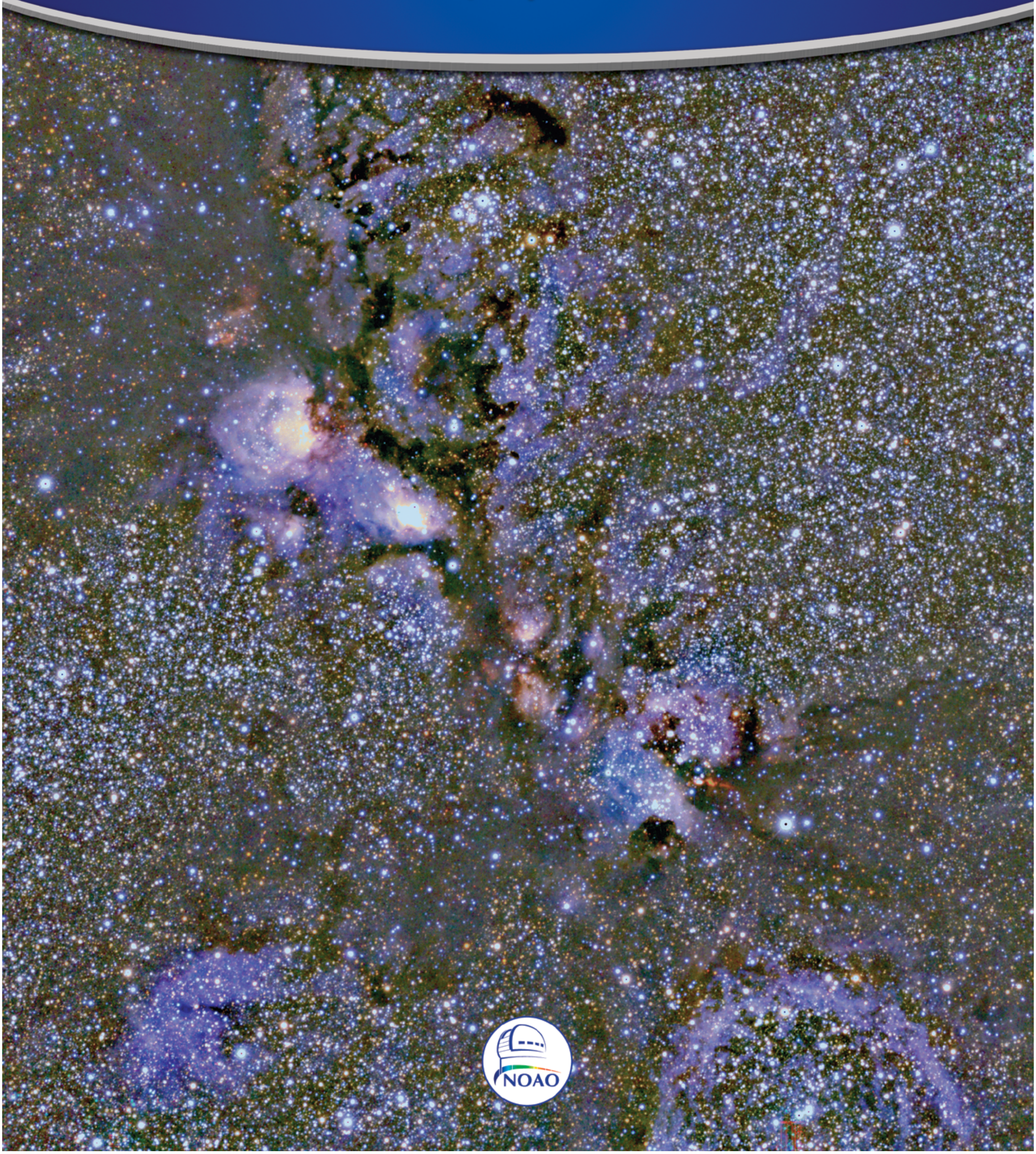
NOAO NEWSLETTER

Issue 102, September 2010



NOAO Newsletter

NATIONAL OPTICAL ASTRONOMY OBSERVATORY

ISSUE 102 — SEPTEMBER 2010

Science Highlights

System Science Capabilities

System Observing: Telescopes & Instruments

NOAO Operations & Staff

On the Cover

The image of NGC 6334 was produced with the NOAO Extremely Wide-Field Infrared Mosaic imager (NEWFIRM) during commissioning on the Blanco 4-m telescope at Cerro Tololo Inter-American Observatory (CTIO). The color composite uses 30 J-band, 15 H-band, and 15 K-band exposures taken on the night of 24 May 2010 (UT) during moderately poor seeing. The sequences use dithering to fill in the mosaic gaps and offsets to a nearby background region for sky subtraction. After trimming the edges, the field of view is 28 arcmin with 0.4-arcsec-pixels. The exposures were processed by the NOAO NEWFIRM Science Pipeline. The color rendering uses blue for shorter and red for longer infrared wavelengths.

Many NOAO engineering, science, and management personnel contributed to producing this picture, which involved installing the camera at CTIO (mechanical, instrument, and software), observing, and data processing.

News about the *Newsletter*

With this issue of the *Newsletter*, we begin another important change. It will no longer be a combination newsletter serving both NOAO and NSO. Henceforth, each organization will publish their own newsletter to better reflect their priorities and missions and establish separate identities within the astronomical community.

As a reminder, with the last issue we changed our format to make the *Newsletter* more useful and informative by making the sections subject-oriented. They are:

Science Highlights—This will remain, as it has been, a place for highlighting scientific accomplishments in astronomy/astrophysics.

System Science Capabilities—This includes articles about the telescopes and instruments under development and the plans for enhancing the US ground-based optical/infrared system of telescopes. These articles will pertain to the facilities provided to the US astronomical community by the Cerro Tololo Inter-American Observatory, Kitt Peak National Observatory, Gemini Observatory, SMARTS and SOAR consortiums, Telescope System Instrumentation Program, and Renewing Small Telescopes for Astronomical Research (ReSTAR) program. As appropriate, news about the Large Synoptic Survey Telescope (LSST) and the Giant Segmented Mirror Telescope (GSMT) projects will be here.

System Observing: Instruments & Telescopes—This section contains everything readers will need to know to propose for observing time with the above mentioned facilities.

NOAO Operations & Staff—This includes the NOAO director's article and articles about the operations/management of and the people involved with the National Observatory.

We continue to encourage our readers to view the *Newsletter* online (*www.noao.edu/noao/noaonews.html*). We send out an electronic notification when the *Newsletter* is posted online, generally several weeks before hard copies reach all our readers. If you are receiving a paper copy but would prefer not to, please let us know at *editor@noao.edu*.

The NOAO *Newsletter*
is published semi-annually by the
National Optical Astronomy Observatory
P.O. Box 26732, Tucson, AZ 85726
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Publication Notes

This *Newsletter* is presented with active links online at

www.noao.edu/noao/noaonews.html

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The NOAO/XMM Cluster Survey

Christopher J. Miller (University of Michigan) & Nicola Mehrtens (University of Sussex)

Galaxy clusters consist not only of galaxies, but also of a hot intracluster medium (ICM) of ionized gas that emits X-rays, as well as a dark matter component that does not emit any radiation. Divided by mass, the stars and galaxies make up only 5% of the total mass of a galaxy cluster, while 15% or more is in the smooth gas component. Like the rest of the Universe, most of the mass in clusters exists in the unseen and unknown dark matter.

Not surprisingly, one of the best tools to find and study galaxy clusters is via their X-ray photons. Riccardo Giacconi pioneered the use of rockets and space telescopes to find and study astronomical X-ray sources, for which he was awarded a share of the Nobel Prize in Physics in 2002. Today, there are multiple X-ray telescopes orbiting above the Earth, providing a wealth of new X-ray data every day (e.g., Chandra, XMM-Newton, Suzaku).

In 2001, Miller and collaborators embarked on an effort to find galaxy clusters in publicly available XMM imaging data and create the XMM Cluster Survey (XCS—Romer et al. 2001; Sahlén et al. 2009). In 2005, they were awarded an NOAO Survey program to collect the required optical follow-up for hundreds of these XCS clusters (PI: Miller), and in 2007, began working to combine the new NOAO imaging data with the Sloan Digital Sky Survey (SDSS) to create the largest and deepest joint X-ray/optical cluster catalog.

The major research effort was led by Nicola Mehrtens, a PhD student at the University of Sussex, UK. NOAO awarded 38 nights over three years (October 2005 through March 2008) for this program. One hundred fifty-four XMM fields were observed and nearly 500 cluster candidates were identified using the Mayall 4-m telescope in Tucson and the Blanco 4–m telescope in La Serena. Mosaic CCD imaging was taken in two filters (SDSS r and z), and the data were reduced using IRAF and Sextractor (Bertin and Arnouts 1996). The processed images are being delivered to the NOAO Science Archive facility for public access.

The figure on the next page highlights the images and color magnitude diagrams for a few of the clusters found. The blue contours are the X-ray flux, while the green ellipses are the originally identified X-ray candidate clusters. Below each color composite image are the color magnitude diagrams and the infrared cluster redshifts. The algorithm to measure the cluster redshifts was developed by Nicola Mehrtens and is actually a hybrid of the Red Sequence technique by Gladders and Yee (2000) and the maxBCG technique by Koester et al. (2007). The data and algorithm provide cluster redshifts accurate to $\Delta z = 0.07$ out to $z = 1$.

Now that the imaging data have been processed and the catalogs are in hand, the team has begun work on the scientific analysis. The goals of the NOAO/XCS (NXS) and XCS are to enable studies of cluster evolution and precision cosmology. The XCS provides a significant number of clusters with enough X-ray flux to measure gas temperatures, which correlate tightly with cluster masses when the clusters are in a state of hydrodynamic equilibrium. What is yet unknown is whether and how this correlation evolves with redshift. If the cluster masses can be inferred (as well as the scatter on the mass-observable relationship), cluster counts become an excellent cosmological tool.

The NXS differs from other cluster-based studies in a number of ways. The most important is the use of a well-measured X-ray selection function. X-ray observatories are challenging experiments, and the probability that a candidate is a true cluster becomes a systematic uncertainty in the scientific results. Another factor is the large size and redshift coverage of the XCS. Previous X-ray-based cluster surveys used either small homogeneous or large heterogeneous samples of clusters. The former leaves behind large statistical uncertainties while the latter leaves large systematic uncertainties. The XCS will be a large and homogeneous sample, thus minimizing the effects of both statistical and systematic errors.

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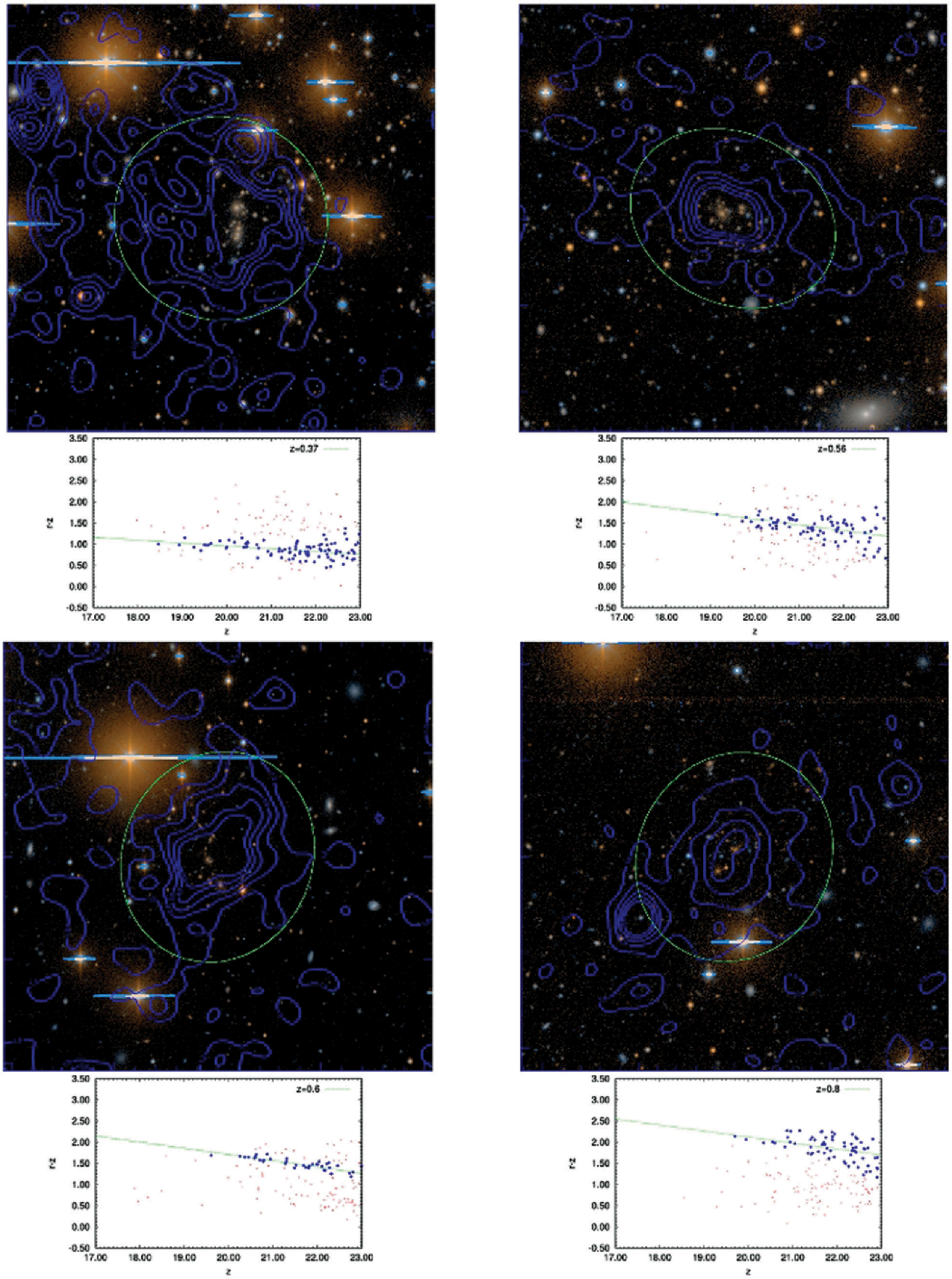
The NOAO/XMM Cluster Survey continued



Amateur, NOAO, HST, and Chandra Observers Team Up to Search for Supernova Progenitor

Howard E. Bond (Space Telescope Science Institute), Alessandra Aloisi (STScI), Catharine D. Garmany (NOAO), Bethan James (STScI), Jack Newton (Puckett Observatory), Tim Puckett (Puckett Observatory), Sangmo Tony Sohn (STScI), Roeland P. van der Marel (STScI), Gijs Nelemans (Universiteit Nijmegen), Rasmus Voss (Max-Planck-Institut für extraterrestrische Physik), Mikkel Nielsen (Universiteit Nijmegen)

A team of Arizona-based amateur astronomers, an NOAO observer at Kitt Peak National Observatory (KPNO), and users of the Hubble Space Telescope (HST) and the Chandra X-Ray Observatory have combined their efforts in search of a progenitor star for an unusual and potentially important supernova (SN). The supernova, of Type Ib, was discovered in the Arp 299 system of interacting galaxies.

The supernova was discovered by amateurs Jack Newton and Tim Puckett, during the course of their Puckett Observatory Supernova Search. Using automated telescopes in Georgia and Arizona, this team images about 800 galaxies every clear night. The new star was identified by Newton on the morning of 24 January 2010 when he blinked CCD frames taken the previous night with his 16-in telescope in Portal, AZ. The Puckett team promptly notified the community of the discovery through the Central Bureau for Astronomical Telegrams (Newton & Puckett 2010), and it was designated SN 2010O.

SN 2010O exploded in a spectacular pair of interacting galaxies, cataloged as NGC 3690, also called Arp 299. Due to its active star formation, Arp 299 is a "supernova factory," having produced eight known supernovae (SNe), including SN 2010O, in the past 20 years.

Supernovae come in two flavors, classified according to the absence (Type I) or presence (Type II) of hydrogen in their spectra. Type II SNe are now understood as being due to core collapses in massive young stars, usually occurring when the stars have evolved to become luminous red supergiants. Among the H-deficient Type I SNe, there are three subclasses: Ia (having Si II absorption), Ib (no Si II absorption, but He is present), and Ic (no Si II or He). Type Ia SNe are not associated with young stars and are believed to be white dwarfs in binaries that reach the Chandrasekhar limit and explode. However, the Type Ib and Type Ic SNe do appear to be core collapses, occurring in massive stars that have lost their H envelopes (and He in the Type Ic ones) before the explosion. Until recently, however, the observational evidence supporting this picture in the form of actual images of stars that then subsequently exploded as SNe was scant.

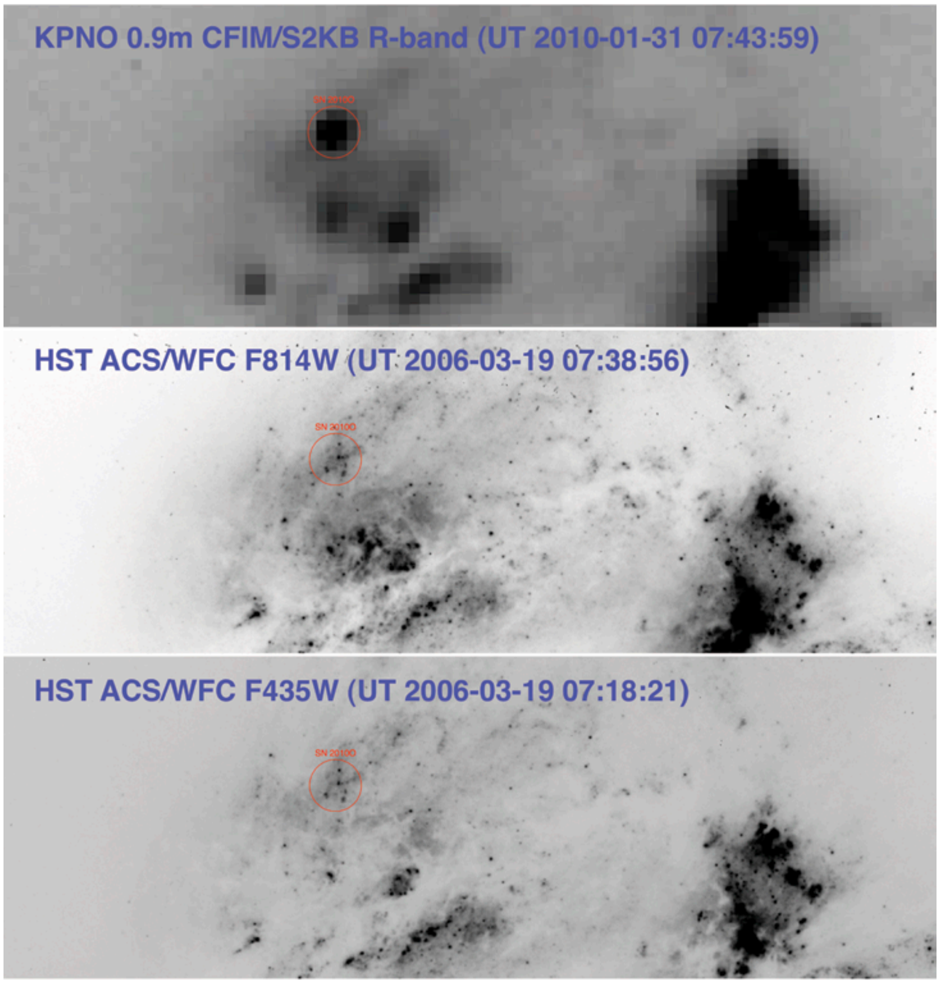


Figure 1: (Top) A portion of the KPNO image, with SN 2010O circled in red. The middle and bottom images are the pre-explosion HST frames, taken with the Advanced Camera for Surveys in 2006.

The situation has changed dramatically since the early 1990s, primarily due to the advent of HST high-resolution imaging and Hubble's ever-increasing archive of deep images of nearby galaxies. The current status of searches for SN progenitors has been reviewed by Smartt (2009). There are now enough detections of resolved progenitor stars in pre-explosion images to confirm unambiguously that most Type II SNe do in fact arise from red supergiants.

The situation is not so good for the H-deficient Type Ib and Type Ic SNe that occur in young populations. As summarized in Smartt's review,

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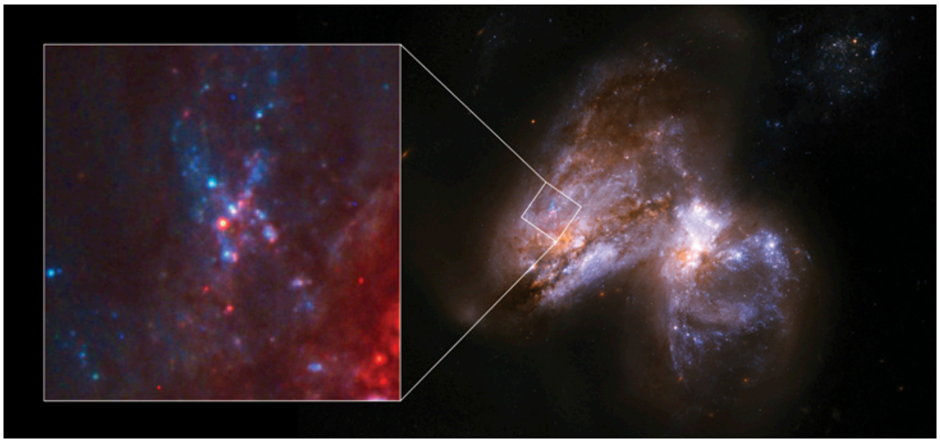

Figure 2: The image on the right-hand side shows the interacting galaxy pair Arp 299 (NGC 3690) in Ursa Major, as observed with the Hubble Space Telescope and Advanced Camera for Surveys in March 2006. Active star formation has been triggered by this galactic collision; eight supernovae, including SN 20100, have been detected in Arp 299, which lies at a distance of about 50 Mpc (150 million light-years). The inset on the left is taken from images obtained with HST's new Wide Field Camera 3 on 24 June 2010; it shows SN 20100 as the bright, reddish star at the center. The angular size of the inset is 8 × 8 arcsec, or about 1.8 × 1.8 kpc at the distance of Arp 299. The supernova lies about 0.35 arcsec, or about 80 pc, southeast of the pair of compact young clusters described in the text. (Image credits: wide-angle view: NASA, ESA, the Hubble Heritage (STScI/AURA)-ESA/Hubble Collaboration, and A. Evans; inset: NASA, ESA, and H. Bond.)

there are 10 Type Ib or Type Ic SNe that had pre-outburst deep images, but not one of them had a detected progenitor.

There are two main evolutionary scenarios to account for H-deficient core-collapse SNe: (1) they arise from massive Wolf-Rayet (WR) stars that have lost their H envelopes through stellar winds before the explosion occurred, or (2) they come from lower-mass stars that have lost their H through mass transfer in close binaries.

There is extensive pre-explosion imaging of Arp 299 available in the HST archive, ranging from the ultra-violet (UV) to the optical and near-infrared (IR). Moreover, the galaxy has been observed by the Chandra X-ray satellite before the SN outburst. After the discovery announcement for SN 2010O appeared, a team of astronomers using the Nordic Optical Telescope obtained spectra showing it to be of the relatively rare Type Ib (Mattila et al. 2010). This finding opened up the possibility of an unprecedented multi-wavelength search for a Type Ib progenitor, using the archival HST and Chandra data.

The first step is to locate the SN site as precisely as possible in the space-based images. This is not feasible with the amateur images, which do not have the necessary depth and resolution required for registration with HST frames. The team, therefore, used the WIYN 0.9-m telescope on Kitt Peak to obtain deeper CCD images, with the best ones being acquired by Katy Garmany on January 31.

Figure 1 (top) shows a portion of the KPNO image, with SN 2010O circled in red. The middle and bottom images are the pre-explosion HST frames, taken with the Advanced Camera for Surveys in 2006. The team was excited to see that a blue object, most probably a compact star cluster, lies very close to the SN position. Based on the UV/optical/IR spectral-energy distribution of the cluster, combined with theoretical models, Roeland van der Marel estimated the cluster's age to be 14 Myr, implying a turnoff mass of 14 M_{sun} (see Bond et al. 2010 for further details). Such a relatively low mass would favor the close-binary scenario, rather than a more massive WR progenitor. Further support of an interacting-binary origin comes from the Chandra pre-explosion observations, which reveal that there was a transient X-ray source located near the SN position in 2005, but not in 2001 (Nelemans et al. 2010).

Based on these findings, the team proposed for new HST observations, which they hoped to obtain while the SN was still detectable. Images were acquired on 24 June 2010 using the new Wide Field Camera 3 (WFC3) and U, B, and I filters. Figure 2 shows a color rendition of our WFC3 images. SN 2010O is the bright, reddish star at the center. Lying about 0.35 arcsec to the northwest (upper right) is the compact cluster discussed above (which, at the higher resolution of WFC3, actually resolves into two clusters of contrasting colors).

Unfortunately, the SN proved not to lie at the location of the compact clusters, but it is still possible to say something about the progenitor based on the colors of the pre-outburst light at the true explosion site. The team is also investigating the precise location of the transient X-ray source to see whether we can argue that it was a progenitor binary. But in the meantime, our work demonstrates the power of combining the small telescopes of amateurs, the facilities at Kitt Peak, and the space-based observatories to shed new light on the explosions of massive stars.

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A Path to Understanding Stellar Multiplicity

Andrei Tokovinin

Binary stars are excellent tools for measuring stellar properties (such as their distances, masses, radii, and evolution) or studying processes like accretion, mass transfer, tides, and so on. A major challenge, however, is to understand binary formation to the point of modeling the distributions of orbital periods and mass ratios among different stellar populations. Despite voluminous data on many individual binary systems, they remain poorly studied as a class.

Our nearest stellar neighbor, α Centauri, is a triple system. This is not a rare coincidence, considering that 10% to 15% of solar-type stars belong to systems with three or more components. Hierarchical multiples add complexity to the puzzle of binary formation, but offer extra clues for solving it. Multiple stellar systems are difficult to discover. For example, α Cen would be considered to be a binary if it were located at 100 pc, or a single star if it were beyond 500 pc. If obtaining unbiased statistics of binaries is already difficult, doing this for triples and quadruples seemed, until recently, hopeless.

Modern observational techniques, publicly available all-sky surveys, and the current interest in exoplanets open a new window for statistical studies of stellar multiplicity and, for the first time, hold the promise to reach unbiased statistics of stellar systems with two, three, or more components. A good start on this problem can be made with the nearby G-type dwarfs, which are the easiest and most studied sample to work with. There are about 5000 G-dwarfs in the Hipparcos catalog with parallaxes larger than 15 mas. A large sample size is essential for getting a representative number of binaries and hierarchical systems; a survey that only goes out to 25 pc is just too small [1].

Observing all 5000 stars with the combination of methods needed for detecting all binaries and multiples (Figure 1) is a frightening prospect. Fortunately, part of this work is already done. Radial velocities of many of the dwarfs were measured repeatedly over several years. A brighter subset is also being monitored with high precision to search for exoplanets, ensuring secure detection of all stellar companions with periods up to a few years. Wide companions wait to be discovered by data mining of existing surveys. High-resolution imaging with adaptive optics (AO) and speckle interferometry has been done on many targets, providing data on intermediate separations.

New triple and quadruple systems will be discovered mostly as additional components in known binaries. For example, a spectroscopic binary may have a faint and distant satellite, or a wide binary may turn into a quadruple when each of its components is resolved into a close pair. By concentrating on binaries and observing only unexplored corners of the parameter space, a reasonable degree of completeness can be reached with a moderate effort. The selection effects will be tolerably small and well quantified, enabling their correction in the final statistical analysis. Collection of all existing data and several "pencil surveys" of G-dwarfs should be sufficient for reaching this large goal.

The first survey has targeted 33 wide visual-binaries, searching for inner subsystems with separations from 5 to 100 AU. Imaging with the AO instrument NICI at Gemini South has revealed seven such subsystems around 66 observed components, or a fraction of 12% [2]. Only one of these close inner pairs was known previously—a sign that this is indeed unexplored territory. This result was obtained during only one night; with five more nights, the whole sky can be covered, allowing for more robust statistics of such subsystems. The distribution of the mass ratio in the inner subsystems appears to be uniform, in line with the current theories of star formation that predict the "brown dwarf desert" (that is, an observed paucity of companions that have masses intermediate between stars and planets). However, deriving a mass-ratio distribution from only seven pairs is a stretch; more data are needed.

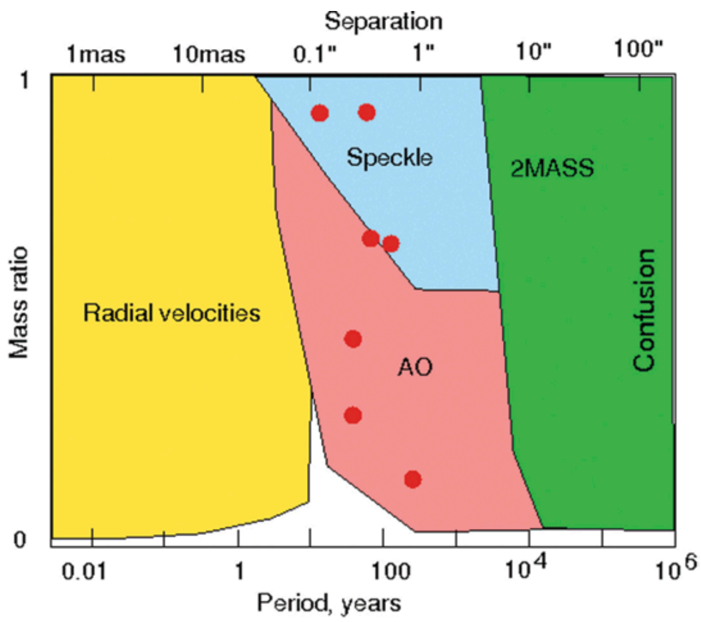

Figure 1: Parameter space of binary and multiple companions around a G2V star at 60 pc. Orbital periods range from 1 day to ~1 Myr (horizontal axis), and companion mass ratios range from 0 to 1 (vertical axis). Companions that have periods of up to several years can be detected as spectroscopic binaries, given a sufficient time span of the RV data. Adaptive optics covers the intermediate period range (the subsystems detected with NICI at Gemini [2] are marked by red circles), while speckle interferometry complements AO at high mass ratios. At larger separations, data mining of existing surveys, like 2MASS, is promising, although it becomes increasingly difficult to distinguish true companions from background stars. Astrometric detection (not shown here) is complementary to AO and spectroscopy at periods from 1 to 50 years.

Another pencil survey tests the discovery of wide and faint binary components in the 2-Micron All-Sky Survey (2MASS) point-source catalog. Here the problem is confusion with background stars. The approach is to select only components within a 20" radius that could be associated with the main G-dwarfs on the basis of their IR photometry. Second-epoch images in the V and K filters were taken in February–March 2010 with the A Novel Double-Imaging Camera (ANDICAM) instrument on the Small and Moderate Aperture Research Telescope System (SMARTS) 1.3-m telescope. As expected, about half of the candidates turned out to be unrelated stars. The unbiased mass-ratio distribution, down to the hydrogen-burning limit (Figure 2), can be derived from the remaining genuine binaries.

Subsystems with short periods are best discovered by radial velocity (RV) monitoring. Such data are missing for the components of visual binaries

continued

A Path to Understanding Stellar Multiplicity continued

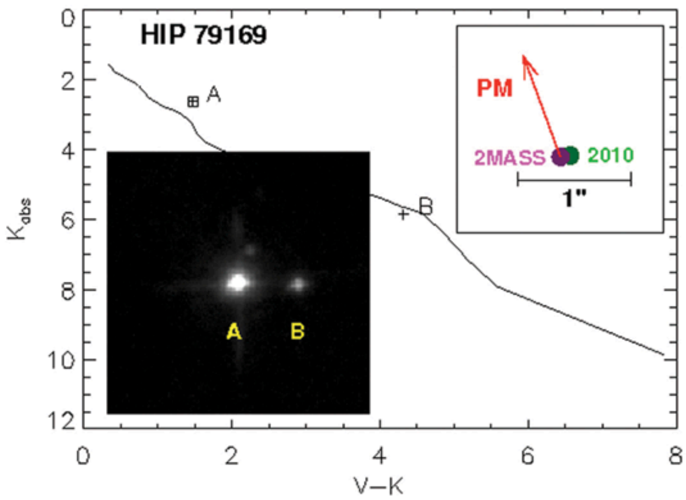

Figure 2: A new low-mass companion B at 9.4″ from HIP 79169 (G3V, distance 60 pc) that was found in the 2MASS catalog. Imaging with ANDICAM in 2010 in the K and V bands has confirmed that it is co-moving with the primary (proper motion would have changed the relative position by 1″ in 10 yr if it were a background star) and that it is located on the Main Sequence. Among the 114 such new companions tested in this program, 40 are true (physical), 50 are background stars, and 24 still have uncertain status.

that are often explicitly avoided in the RV surveys. On the other hand, many close binaries in the sample have already been discovered, e.g., in [3], but lack sufficient data for determining spectroscopic orbits. To fill these gaps, RV monitoring of selected components is being done at the SMARTS 1.5-m telescope with the fiber echelle. This project is done in collaboration with D. Latham and W. Torres from Harvard Smithsonian Center for Astrophysics, who surveyed the northern part of the sample. The arrival of the new echelle CTIO High-Resolution Spectrometer (CHIRON) in 2011 will make this work more productive.

Speckle interferometry fills the gap between close (spectroscopic) and wide (resolved) binaries. This method is very efficient (up to 200 stars per night) and can resolve binaries with separations of 20–30 mas at 4-m telescopes—better than AO at 8-m telescopes (40 mas). On the other hand, visible-light speckle can detect only binaries with mass ratios greater than ~0.5, while AO imaging in the infrared is sensitive to low-mass companions as well. The two methods are complementary. During speckle runs at the Blanco and SOAR telescopes in 2008–2009 [4], 48 close binaries were resolved for the first time, 21 of which are inner subsystems in known wider pairs, and many belong to the G-dwarf sample (Figure 3). Measurements repeated over several years will allow determination of the orbits for these new close pairs.

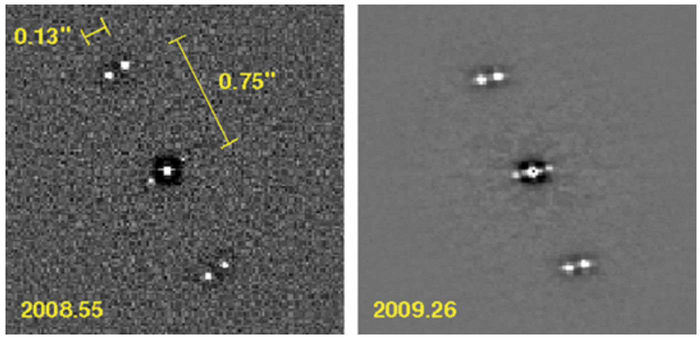

Figure 3: The G9V dwarf HIP 78842 at 42 pc from the Sun was observed by speckle interferometry at the Blanco telescope in 2008 [4]. The secondary companion B was resolved into a 0.13″ pair, designated as Ba and Bb. Autocorrelations of the triple star with six peaks around the center are shown. The re-observation at the Southern Astrophysical Research (SOAR) 4.1-m telescope in 2009 reveals clockwise rotation of wide and close pairs (orbital periods 150 and ~10 yr). There is also a physical companion, C, at 9.6″. RV observations are still needed to establish the true multiplicity of this system, which has four components known so far.

The increased sample of known multiple stars and the completeness of their discoveries has more than statistical benefits. The knowledge of the true multiplicity status and orbital elements is used in many different ways. For example, some targets in the sample have not yet reached the Main Sequence; measurements of their masses and luminosities calibrate the pre-main sequence evolutionary tracks. The chances of discovering rare and interesting objects are proportional to the sample size. Detailed studies of such an object—be it a binary with extremely high eccentricity, a star with unusual colors, or a triple system on the verge of dynamical break-up—bring new insights and advance astronomy.

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ReSTAR—Phase 1

Bob Blum, David Sprayberry & Jay Elias

In late 2009, the NSF awarded NOAO $3M to address the high-priority initiatives recommended by the Renewing Small Telescopes for Astronomical Research (ReSTAR) committee. ReSTAR, a community-based response to the Senior Review of NSF facilities, detailed many science projects that could be accomplished by a renewal of existing federal and non-federal assets. The full ReSTAR report is available online (*www.noao.edu/system/restar/*).

The original ReSTAR program developed by NOAO following the committee recommendations envisioned approximately $10M in each of three phases. The initial phase (Phase 1) included an emphasis on optical and near-infrared spectroscopy as well as a host of science and technology development activities, for example, development of time-domain capabilities including operations modes and community support.

Given an award of $3M, NOAO selected high priority projects from the original Phase 1 proposal to accomplish as much as possible with no guarantee of further funding. After soliciting input from NOAO oversight committees, NOAO settled on a program with three main projects to be launched in 2010. These are to obtain access to existing spectroscopic facilities in the near term to respond to community desires, build a moderate-resolution, multi-object spectrograph in collaboration with The Ohio State University (OSU), and upgrade key detectors and controllers at the NOAO 4-m telescopes. This program is being executed in 2010 and is partially supported by NOAO base funds.

Palomar Access to Optical and Infrared Spectroscopy

Given the importance the ReSTAR committee placed on increasing access to optical and near-infrared spectroscopy, NOAO sought and obtained nights at Palomar on the Hale 200-in telescope. Caltech Optical Observatory and NOAO entered into a three-year agreement starting in 2010A to provide community access through the NOAO Time Allocation Committees. A 1/16 share in the Hale was agreed upon, which resulted in approximately 23 nights per year. The initial year (2010A and 2010B) includes use of the Palomar TripleSpec near-infrared spectrograph and the optical Double Spectrograph. Both provide long-slit, moderate-resolution spectroscopy. Further details are available on the NOAO Web site (*www.noao.edu/gateway/hale/*).

NOAO staff members are gaining expertise in the use of these facilities to support community users. Caltech is providing support while observers are at Palomar. The instruments available during the second and third years of this agreement may be expanded, so users are encouraged to check the NOAO Web pages periodically to see the supported instrumentation at any given time.

KOSMOS Spectrograph

The optical spectrograph is a copy of the Ohio State Multi-Object Spectrograph (OSMOS) design, modified slightly for use on the Mayall 4-m telescope. The OSMOS clone is named KOSMOS (Kitt Peak Ohio State Multi-Object Spectrograph). KOSMOS will have an approximately 12-arcmin (diameter) field of view and 1-arcsec slits. Spectral resolutions providing full, simultaneous broad-band coverage up to about 2000 will be provided. In addition, limited wavelength ranges can be served at resolutions up to about 5000 with additional Volume-Phase Holographic (VPH) gratings. The baseline plan has two CCD packages in separate Dewars to maximize sensitivity in blue and red spectral regimes. The red channel device should provide the opportunity to use the nod-and-shuffle technique to improve observing efficiency (see below in the discussion of the Hydra South upgrade).

The spectrograph design and integration are being done at OSU, and NOAO is producing the mechanical pieces, integrating the detector-controller package, and developing the instrument control software. The initial design phase was completed and the design review was held 2–3 August 2010 in Columbus, Ohio. KOSMOS remains on track for delivery and commissioning on the Mayall telescope in the late summer/early fall of 2011 (see the March 2010 *Newsletter* for more details on the instrument or go to *www.noao.edu/ets/kosmos/*).

By the next *Newsletter* issue, integration of the instrument in Columbus and planning for science access to KOSMOS should have begun. A determination will have been made as to what disperser and filter complement will fit within the overall budget. Look for details on all of this, and more, in that issue.

The CTIO Hydra South Upgrade

The Hydra South MOS controller and CCD will also be upgraded. The NOAO TORRENT controller upgrade will again replace a long-serving Arcon system. The Hydra upgrade plan calls for a red-sensitive CCD replacement that will allow nod-and-shuffle. The detector package and Dewar will both be new as will the software interface. This work will be done at CTIO and will begin in late 2011 when the demands on the technical group in Chile have lessened (currently owing to the imminent arrival of the Dark Energy Camera and the completion of the SOAR Adaptive-optics Module).

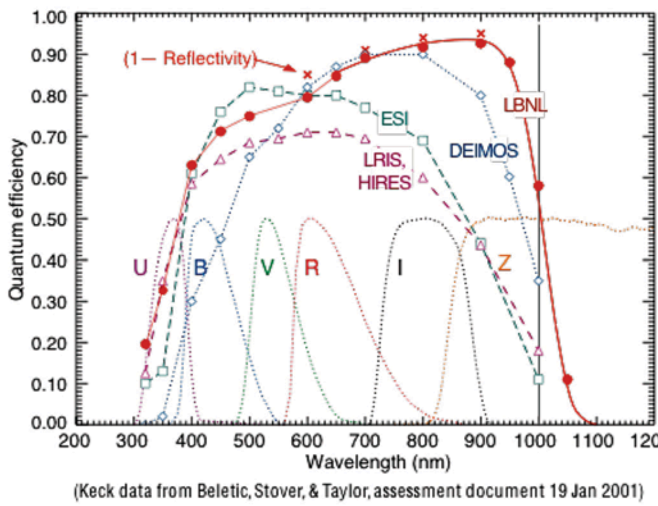


Figure 1: Proposed CCD choice (LBNL) for the Hydra South and KOSMOS instruments. The device has excellent red sensitivity and allows nod-and-shuffle. These features will provide qualitatively new science to be done with Hydra on the CTIO Blanco 4-m telescope.

continued

Re-STAR—Phase 1 continued

The Hydra upgrade will not only improve the reliability of operation and reduce readout times, but will result in significant new science opportunities. The new CCD planned for the spectrograph is a Lawrence Berkeley National Laboratory (LBNL) device with much improved red and far-red QE over the current device (see Figure 1). It will also allow for nod-and-shuffle. A new class of observations aimed at fainter sources will be enabled. This device is the same one as will be obtained for the KOSMOS spectrograph.

Kitt Peak Mosaic 1 Upgrade

In an effort to provide users with substantially faster readout times and improve reliability and maintainability, NOAO is upgrading the CCD and controller packages on two key systems: the Hydra South multi-object spectrograph (MOS) at the Blanco 4-m telescope and the Mosaic 1 imager at the Mayall 4-m telescope.

The Mosaic 1 upgrade has passed final review and is being implemented. Mosaic 1 arrived in Tucson in June following many years of service at Kitt Peak. The instrument will return to the telescope in October 2010 for first light with eight new e2v CCDs with high quantum efficiency (QE) two-layer coatings providing excellent response from 350 to 900 nm. The QE curves provided by e2v for each device are shown in Figure 2.

The imager will use new NOAO MONSOON controllers (and later be upgraded to similar but more energy-efficient NOAO TORRENT controllers), which will improve its reliability and readout performance, the latter by a factor of eight over the venerable Arcon controllers currently in use. See the following article for more details. NL

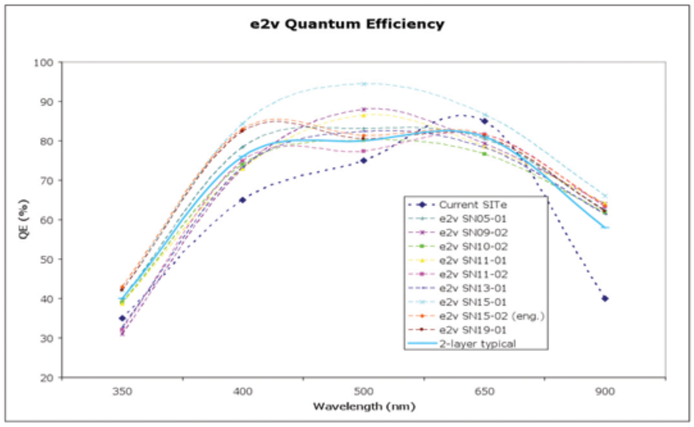


Figure 2: Mosaic 1 upgrade QE curves for each new e2v two-layer coated device. The current SITe CCD curve is shown (dotted curve) as well as an e2v "typical" two-layer device (showing the Mosaic 1 devices are excellent quality).

Mosaic 1.1—Bringing Better Imaging to Kitt Peak

Steve B. Howell & Dave Sawyer

The Kitt Peak Mosaic imager used at the 4-m and 0.9-m telescopes is being upgraded as part of the Renewing Small Telescopes for Astronomical Research program. (See previous article.) The original instrument had its last run in early June 2010 under the guidance of then Kitt Peak Director, and longtime Mosaic user, Buell Jannuzi. Since that run, the Mosaic instrument has been trucked to NOAO headquarters in Tucson where the Mosaic upgrade team has disassembled the instrument and is implementing the upgrades. The new instrument, Mosaic 1.1, will reuse much of the Dewar and optics from the original instrument, but the new CCDs require a new focal plane and internal wiring. The new MONSOON controller and computers for Mosaic 1.1 are already being used and well into development for use at the 4-m telescope on Kitt Peak. Along with the new internal Dewar parts, the filter track is undergoing cleaning and some much needed maintenance.

Lab tests of the new e2v CCDs have been performed to allow electronic optimization and measurement of the typical CCD parameters. Mosaic 1.1 will read out, using two amplifiers per CCD, in about 20 seconds with a default gain of 0.9 e/ADU and 4–5 electrons of read noise. With the 18-bit resolution of the MONSOON images, the full dynamic

continued

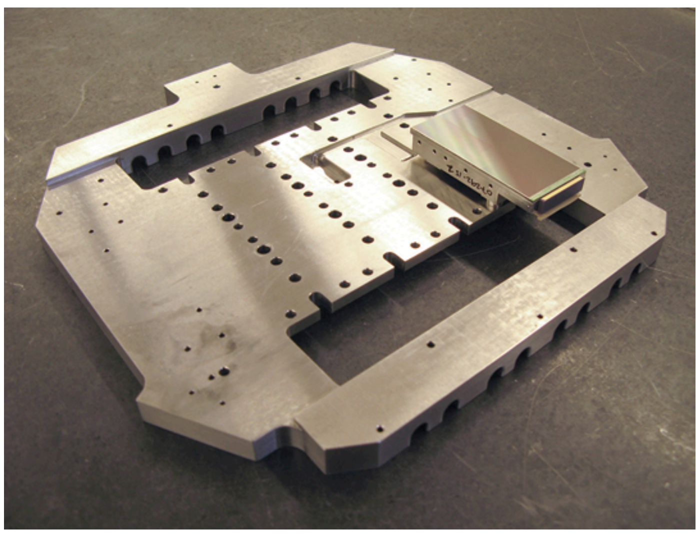


Figure 1: The new Mosaic 1.1 focal plate for mounting eight 2K ´ 4K e2v CCDs. A CCD mechanical sample is shown installed in one of the positions. The slots in the focal plate allow access to connectors on the backside of the CCDs, and the grooves visible along the edge of the plate are wire guides. (Image credit: Bill Ditsler, Ken Don, and Dave Sawyer/NOAO/AURA/NSF.)

Mosaic 1.1— Bringing Better Imaging to Kitt Peak continued

range of the e2v CCDs, with better than 200 Ke- full-well capacity per pixel, is sampled. An optional, low-gain mode that provides half the gain of the default mode at a lower read noise of 3–4 electrons, but a slower readout time (35 sec), will be provided for narrowband imaging. The detectors are being arranged in the focal plane according to their performance and cosmetic characteristics, which are generally very good.

Assembly of the new Mosaic focal plane with eight science-grade CCDs began on August 4, with running of the full up 8K ´ 8K system in the Tucson instrument lab scheduled for August 26. Software development and testing is well underway. The shutter and filter assembly has been overhauled, and functional testing was in early August. System integration and testing is on schedule to begin in early September.

The Mosaic 1.1 instrument is on track for installation at the Mayall telescope for commissioning in October, with shared-risk observing starting on 5 November 2010. NL

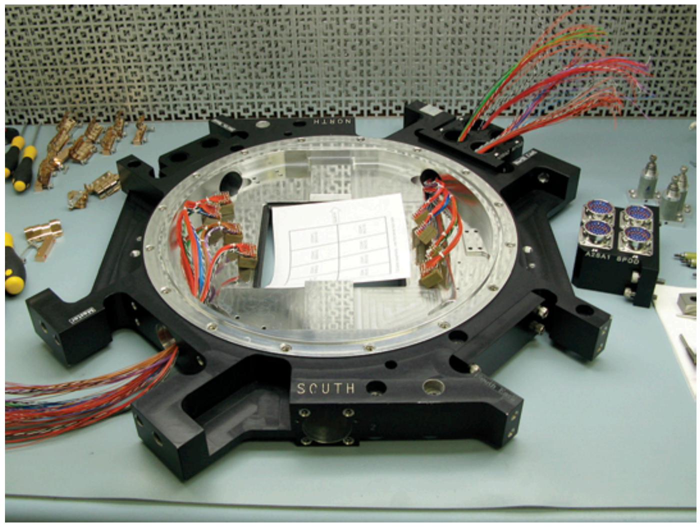


Figure 2: The front plate assembly of the Mosaic Dewar after mechanical modifications have been completed and wiring is underway. A new connector pod to interface the Dewar to the MONSOON controller can be seen to the right of the housing. A paper schematic of the new CCD layout, seen in the center of the image, is in the location of the focal plane and is covering the opening for the Dewar window. (Image credit: Bill Ditsler, Ken Don, and Dave Sawyer/ NOAO/AURA/NSF.)

ReSTAR—Looking Forward

Todd Boroson

The program to address the recommendations of the Renewing Small Telescopes for Astronomical Research (ReSTAR) committee was envisioned as comprising three three-year phases, each of which would include elements of infrastructure improvement, new instrumentation, and increased community access. Activities in the first phase (fiscal years 2009–2011) are well under way as noted in the two previous articles. As a result, NOAO asked the ReSTAR committee to reconvene in order to provide an update on community needs and goals for the second phase of NOAO's program. The committee carried out this charge in a two-day meeting held in Washington, DC, in July. The meeting was also attended by several of the NSF/AST staff. The full report of the ReSTAR update study will be published on the NOAO Web site.

The committee reviewed priorities for capabilities on telescopes with apertures of 2–5 m. While NOAO's Phase 1 projects have begun to address the low and medium resolution needs for spectroscopy, the committee restated their expectation that the wide-field imaging instruments already under development at the time of their initial report would be completed. They also discussed the need for high-dispersion spectroscopy and wide-field multi-object spectroscopy.

A second area of focus was on the availability of time and the observation modes possible on telescopes in this aperture range. They noted that building new instruments that would have to be shared among a small number of telescopes was a particularly inefficient strategy. This problem is the worst in the Southern Hemisphere. They also lamented the lack of planning that has gone into strategies for following up surveys—especially those that will make time-domain discoveries.

One approach to acquiring more telescope time for the community is the establishment of new public-private partnerships. One model for this is the three-year agreement between NOAO and Caltech to provide nights on the Palomar Hale 200-in telescope, but other models could be based on longer-term commitments and could have the added goal of strengthening the infrastructure at these facilities. The committee discussed the pros and cons of different types of such arrangements, including those that would involve foreign partners.

The ReSTAR committee endorsed NOAO's plan for an open solicitation for partners in the second phase. Following their recommendation, NOAO is planning to distribute a draft announcement of opportunity with an invitation to attend a meeting for discussion of the solicitation. Through a final solicitation and proposal review by a non-conflicted panel, a selection will be made of partners who might provide telescope access, instrumentation, or some other capability to the broad community. Announcements of these activities will be made through *Currents*, the NOAO electronic newsletter.

Dark Energy Camera Filters

Alistair Walker (NOAO) & Darren DePoy (Texas A&M University)

The Dark Energy Camera (DECam), anticipated to be available for general community use on the CTIO Blanco 4-m telescope early in 2012, will be delivered with five 62-cm diameter filters: Sloan Digital Sky Survey (SDSS) g,r,i,z, and Y. The filters will be utilized for the Dark Energy Survey (DES) and available for general use. The passbands will closely resemble a 10 cm × 10 cm set purchased recently (see *www.ctio.noao.edu/decam/*), and Asahi Spectra expects to deliver the DECam filters with very similar passbands by December 2010.

If funding is available, NOAO will purchase extra filters. The broadband filters identified as highest priority by an ad-hoc group of community and NOAO scientists are SDSS u, Johnson B and V, and Washington C. The filter passbands for all these filters were originally defined by Schott colored glass combinations, but such glasses are not practical in the large size needed for DECam, thus, it will be necessary to realize these filters by the multi-layer interference film process. Although the passband center wavelength can be accurately reproduced, the passbands will have steeper edges than the colored glass filters. An illustration showing this difference can be found at *www.asahi-spectra.com/opticalfilters/astronomical_filter.html*.

The expert group also recommended that we obtain some narrowband filters (R ~ 80) covering the more popular emission lines (e.g., H-alpha 656.3 nm, [O III] 500.7 nm), and possibly a DDO-51 filter (R ~ 35). However, narrowband filters in general will perform poorly on DECam due to a pronounced shift in central wavelength as a function of off-axis distance, this being a consequence of the fast F-ratio and the nontelecentric optical design of the corrector. We have considered building narrowband filters covering a smaller, but still very significant field (e.g., one-degree diameter) for which the center wavelength shift would be reduced compared to the full field. However, because the DECam filters are sited far from the focal plane, the size of a filter to cover a one-degree diameter field without vignetting is still very large, some 40 cm in diameter. At the present time, making such a large filter with adequate control of passband uniformity has not been demonstrated.

With the DECam CCDs having high sensitivity from 400 nm to 1000 nm, very wide filters such as a "g+r" and an "i+z" could allow very deep imaging. The DECam optical corrector was not designed to be achromatic, however an analysis shows that the change in focus with wavelength is very small longwards of ~500 nm, so an "r+i" filter would work very well, but a "g+r" filter would have degraded image quality. Designing the optimal passband for any very wide filter would require careful simulation of the image quality, sky background, and the brightness and spectral energy distribution of the target objects.

Other NOAO instruments (e.g., the NEWFIRM wide-field infrared imager) have benefited from community users purchasing their own filters. Some of these filters are available with no restrictions for community use, while others are only available for collaborative projects with the filter owners. Anyone interested in purchasing their own DECam filters and needing more detailed information, or anyone with comments on the above, should contact Alistair Walker (*awalker@ctio.noao.edu*).

Mosaic II Imager Retirement

Alistair R. Walker

The CTIO Mosaic II Imager on the Blanco 4-m telescope will be retired when the Dark Energy Camera (DECam) is installed on the Blanco telescope. DECam is now entering an intensive phase of testing, and the present schedule shows the completion of commissioning and science verification just prior to the start of the 2012A semester, whereupon the instrument becomes available for general observing. The installation and commissioning phases will occupy the preceding four months, approximately; therefore, Mosaic II will be decommissioned about September 2011. These dates are nominal and may be revised as DECam testing proceeds and installation and commissioning plans evolve.

Compared to Mosaic II, DECam will have fewer filters: SDSS g,r,i,z, and Y. If at all possible, we will be purchasing some extra filters. However, the design of DECam and the high cost of the large filters restrict the options, and at the present time, prospective users should not assume the availability of any filters in addition to those just mentioned. A short article, "Dark Energy Camera Filters," found elsewhere in this *Newsletter* provides additional information. **We advise anyone with Mosaic II science projects dependent on filters other than SDSS g,r,i,z, and Y to try to finish up in 2011A or early 2011B. The SOAR Optical Imager (SOI) is recommended for small-field programs and has a large complement of available filters.**

For questions about the Mosaic II Imager, contact Andrea Kunder (*akunder@ctio.noao.edu*); for SOI questions, contact Sean Points (*spoints@ctio.noao.edu*); and for DECam questions, contact Alistair Walker (*awalker@ctio.noao.edu*).

The Laser for SAM—Integration Has Started in the Lab

Brooke Gregory & Nicole van der Bliek

To realize its full potential, the SOAR Adaptive Module (SAM) needs a laser guide star (LGS). The features in the SAM module for the LGS have been completed: the LGS wavefront sensor (WFS) module has been integrated and aligned and is soon to be tested in the SAM module.

We are now in the middle of development of the laser system itself. Briefly, the SAM Laser System consists of: a Laser Box containing the laser and optics for beam forming and diagnostics; the Beam Transfer Optics to bring the laser light from the Laser Box up to the secondary of SOAR; and a Laser Launch Telescope (LLT), mounted behind the SOAR secondary, to expand and focus the beam and send it skyward.

All laser optics have been received, fabrication of the system is nearly complete, and integration is about to begin. The next system to be integrated in the lab is the Laser Box. The LLT has been assembled and fit tested with electronics and optics and is going back to the workshop to be anodized. Following that, integration of the three subsystems will take place on the SOAR telescope. We currently project the on-telescope integration to begin in October.

NOAO-Gemini Data Workshop

Thomas Matheson (NOAO) & Nancy Levenson (Gemini)

During the third week of July, NOAO and Gemini offered a workshop on Gemini data reduction. The goal was to provide users of the Gemini telescopes with an opportunity to interact with staff from Gemini and the US National Gemini Office (NGO). The users could learn data reduction directly from instrument scientists and get personalized help with their own data.

There were over sixty attendees, mainly from US institutions (Figure 1). There were also several participants from other Gemini partner countries, including Brazil, Canada, and Chile. Most of the attendees were graduate students, but there were also post-docs and some faculty members. There was even a highly motivated high-school science teacher. NOAO was able to provide some travel support, chiefly for graduate

Figure 1: Attendees at the NOAO-Gemini Data Workshop. (Image credit: Pete Marenfeld/NOAO/AURA/NSF.)

continued

students from US institutions. Eight members of the Gemini staff were present along with five people from the US NGO, two from the Canadian NGO, one from the Chilean NGO, and five others from the NOAO staff. This total included three members of the Gemini Data Reduction Working Group.

The first day provided a generic overview of astronomical data reduction. Steve Howell (NOAO) described how CCDs work and the basics of calibration. Dick Joyce (NOAO) presented a similar talk on infrared (IR) detectors, highlighting the differences with optical CCDs. There were two talks on software, with an overview of IRAF from Frank Valdes (NOAO) and a description of Gemini IRAF from Kathleen Labrie (Gemini). Tod Lauer (NOAO) presented a high-level view of how astronomical images are formed and processed, including the importance of considering the Fourier domain. Abi Saha (NOAO) then discussed photometry and showed many of the pitfalls that users need to avoid. This was followed by a talk on adaptive optics from Julian Christou (Gemini). Tom Matheson (NOAO) gave a presentation on low-resolution optical spectroscopy, focusing on the need for, and use of, good calibrations. Finally, Emma Hogan (Gemini) and Marie Lemoine-Busserole (Gemini) presented tutorials on the Gemini HelpDesk and the Gemini Science Archive, respectively.

The next two days were devoted to the specifics of data reduction for Gemini instruments. Rodrigo Carrasco (Gemini), the instrument scientist for the Gemini Multi Object Spectrograph (GMOS) for Gemini South (Figure 2), described how to work with GMOS imaging, long-slit data, and multi-slit data. He went through the specific Gemini IRAF commands and showed how to proceed at each step. Reduction of the nod-and-shuffle mode with GMOS came next, with presentations by Kathy Roth (Gemini), the GMOS instrument scientist for Gemini North. We finished the day with Richard McDermid (Gemini), the Near-Infrared Integral Field Spectrograph (NIFS) instrument scientist, who explained reduction of GMOS integral field unit (IFU) data.

Figure 2: Rodrigo Carrasco (GMOS-S instrument scientist; left) confers with Jose Gallardo (Universidad de Chile, Chilean National Gemini Office).
(Image credit: Pete Marenfeld/NOAO/AURA/NSF.)

On the third day, Knut Olsen (NOAO) showed how to reduce imaging and spectroscopic data from the Near-Infrared Imager (NIRI) on Gemini North. Knut took the bold move of actually reducing the data in front of the crowd, so that they got to see each step as it happened, including the inevitable glitches of data reduction. Richard McDermid then continued his IFU discussion, but this time describing reduction of NIFS data. Marie Lemoine-Busserole also gave a brief overview of reduction for mid-IR instruments.

All of these tutorials and presentations, as well as sample data that were used in the tutorials, are available at the workshop Web site (*www.noao.edu/meetings/gdw/*). In addition, Kathleen Labrie prepared packages (available at the Web site) that will enable a complete install of IRAF and Gemini IRAF for the more popular operating systems. This software represents a "snapshot" of a current installation. It is not a full, supported package and is not guaranteed to work on every system, but the overwhelming majority of workshop attendees who used the software were able to get IRAF installed.

The fourth day of the workshop was devoted to providing one-on-one help to users to reduce their own data. Individual users were able to get specific answers from Gemini instrument scientists (Figure 3). In addition, Kathleen Labrie and Emma Hogan were able to provide help with many Gemini IRAF issues. Despite the long hours and full schedule of the previous days, most people stayed until the end of the last day working on their own data.

Figure 3: Tom Matheson (NOAO; standing) looks on as Richard McDermid (Gemini; left) discusses the finer points of NIFS reduction with Mike Crenshaw (Georgia State University). (Image credit: Pete Marenfeld/NOAO/AURA/NSF.)

Both NOAO and Gemini plan to continue to hold such workshops. Given the enthusiasm shown by the attendees, it is clear that there is a strong interest in learning how to work with Gemini data. We hope to build on the success of this workshop to develop a new generation of observers who will fully utilize the capabilities Gemini has to offer.

IRAF V2.15 Release Plans

Mike Fitzpatrick

An Alpha release of the new IRAF v2.15 system was made available this past spring for user and developer testing; shortly, this version will be made available for general release. IRAF v2.15 is a cumulative patch of all applications since the last major release. More importantly, this release adds full support for 64-bit Linux and Mac OSX platforms in the core system as well as several dozen external packages. We've also taken the opportunity of a major release to simplify the installation and build procedures required.

Users of 64-bit IRAF v2.15 platforms will be able to reduce large (>2 GB) files and will see a 10–15% performance increase using the native binaries. Although IRAF tasks generally do not require large amounts of memory, pointer addressing issues on platforms with more than 2 GB of RAM and problems caused by having to install 32-bit compatibility libraries have also been resolved with this port.

The 64-bit port was done to minimize the amount of code that needs to be changed; however, fundamental changes to the system interfaces mean developers will still need to examine and update their code for the new release. A document describing needed modifications is available to assist developers, and it is possible still to use a 32-bit package on a 64-bit platform until code is updated. However, NOAO will make available modified versions of most external packages until outside package maintainers are able to release v2.15-compatible versions of their own. The new build procedures also mean that the core system and external package code are checked more strictly for errors at compile time, leading to more robust code for everyone.

Users should also be aware that the platform naming conventions also have changed in this release: the *linux* architecture now encompasses all 32-bit Linux distribution, and *macosx* is now used for a Universal 32-bit binary for OSX systems. The *macintel* architecture now refers explicitly to OSX/Intel 64-bit systems because this will be the hardware of all future Mac systems, and *linux64* is the architecture for all 64-bit Linux distributions. Both users and developers may need to adjust their environment settings for the new system.

The installation of IRAF has also been simplified in this release. A single distribution file is all that is needed for any platform, and a skeleton tree of external packages now within the core source tree means a single command is able to download and activate an external package for a site/user. In general, v2.15 focuses on simplifying the installation issues of a single-user system rather than the system-wide installation approach required of previous versions. A complete description of the new installation procedures and details of system changes will be available as part of the release documentation.

An extended test period for IRAF v2.15 was required because the fundamental changes to the system needed to be tested, not only against the system code we can check (e.g., image interpolators), but also against the science code used by applications (e.g., sky subtraction by task *foo*) for which we have no explicit tests. Additionally, we wanted to allow time for developers to upgrade their code. A firm release date under these conditions is not possible; however, we expect a final v2.15 release to be available within weeks of this *Newsletter*.

The formal release of IRAF v2.15 and follow-up support will be announced at the project Web sites *iraf.noao.edu* and *iraf.net*.

2011A Observing Proposals Due September 30; Survey Proposals Due September 15

Dave Bell

Standard proposals for NOAO-coordinated observing time for semester 2011A (February 2011–July 2011) are **due by Thursday, 30 September 2010, midnight MST**.

Proposals for new Survey programs are due by 15 September 2010 and require a letter of intent to have been sent in by 15 August 2010.

The facilities available this semester include the Gemini North and South telescopes, Cerro Tololo Inter-American Observatory (including SOAR), Kitt Peak National Observatory, and community-access time with Keck, Magellan, MMT, CHARA, and the Hale Telescope. Community-access time is not available for Survey proposals.

Proposal materials and information are available on the NOAO proposals Web page (*www.noao.edu/noaoprop/*). There are four options for submission:

Web submissions—The Web form may be used to complete and submit all proposals. The information provided on the Web form is formatted and submitted as a LaTeX file, including figures that are "attached" to the Web proposal as encapsulated PostScript files.

File upload—A customized LaTeX file may be downloaded from the Web proposal form, after certain required fields have been completed. "Essay" sections can then be edited locally and the proposal submitted by uploading files through a Web page at *www.noao.edu/noaoprop/submit/*.

Email submissions—A customized LaTeX file may be downloaded from the Web proposal form, after certain required fields have been completed. "Essay" sections can then be edited locally and the proposal submitted by email. Please carefully follow the instructions in the LaTeX template for submitting proposals and figures. Please use file upload instead of email if possible.

Gemini's Phase I Tool (PIT)—Investigators proposing for Gemini time **only** may optionally use Gemini's tool, which runs on Solaris, RedHat Linux, and Windows platforms and can be downloaded from *www.gemini.edu/sciops/observing-with-gemini/proposal-submission*.

Note: Proposals for Gemini time may also be submitted using the standard NOAO form, and proposals that request time on Gemini plus other telescopes **MUST** use the standard NOAO form. PIT-submitted proposals will be converted for printing at NOAO and are subject to the same page limits as other NOAO proposals. To ensure a smooth translation, please see the guidelines at *www.noao.edu/noaoprop/help/pit.html*.

The addresses below are available to help with proposal preparation and submission:

Web proposal materials and information	www.noao.edu/noaoprop/
TAC information and proposal request statistics	www.noao.edu/gateway/tac/
Web submission form for thesis student information	www.noao.edu/noaoprop/thesis/
Request help for proposal preparation	noaoprop-help@noao.edu
Address for submitting LaTeX proposals by email	noaoprop-submit@noao.edu
Gemini-related questions about operations or instruments	gemini-help@noao.edu www.noao.edu/usgp/noaosupport.html
CTIO-specific questions related to an observing run	ctio@noao.edu
KPNO-specific questions related to an observing run	kpno@noao.edu
Keck-specific questions related to an obvserving run	keck@noao.edu
MMT-specific questions related to an observing run	mmt@noao.edu
Magellan-specific questions related to an observing run	magellan@noao.edu
Hale-specific questions related to an observing run	hale@noao.edu

Proposal Form Changes for 2011A

Spectroscopy on Mayall/Blanco vs. Hale/SOAR—For runs requesting the RC Spectrographs at KPNO or CTIO, an option is now available to indicate whether the Double Spectrograph at the Hale 200–in telescope or the Goodman Spectrograph at SOAR are acceptable alternatives.

Thesis Student Info Form Online—A supplementary form is now required for proposals where the observations requested will constitute a significant fraction of a student's PhD thesis research. The form is available at *www.noao.edu/noaoprop/thesis/* and replaces the previous requirement for an emailed "thesis letter." The form should be completed by the student's advisor no later than Monday, 4 October 2010.

System-Wide Observing Opportunities for Semester 2011A: Gemini, Keck, Magellan, MMT, and Hale

Knut Olsen, Dave Bell & Verne V. Smith

Semester 2011A runs from 1 February 2011 to 31 July 2011, and the NOAO System Science Center (NSSC) encourages the US community to propose for observing time using all of the ground-based, open-access, system-wide facilities available during this semester. This article summarizes observing opportunities on telescopes other than those from KPNO, CTIO, WIYN, and SOAR.

The Gemini Telescopes

The US user community has about 50 nights per telescope per semester on the Gemini North and Gemini South telescopes, which represents the largest piece of open-access observing time on 8-m-class telescopes. The Gemini Observatory provides unique opportunities in observational and operational capabilities, such as the ability to support both classically- and queue-scheduled programs.

In an effort to increase interactions between US users and the Gemini staff, as well as observing directly with the telescopes and instruments, **NOAO strongly encourages US proposers to consider classical programs, which can be as short as one night, on the Gemini telescopes. NOAO will cover the travel cost to observe at Gemini for up to two observers.**

US Gemini observing proposals are submitted to and evaluated by the NOAO Time Allocation Committee (TAC). The formal Gemini "Call for Proposals" for 2011A will be released in early September 2010 (close to the publication date of this *Newsletter* issue), with a US proposal deadline of Thursday, 30 September 2010. As this article is prepared well before the release of the Call for Proposals, the following list of instruments and capabilities are only our expectations of what will be offered in semester 2011A. Please watch the NSSC Web page (*www.noao.edu/nssc*) for the Gemini Call for Proposals, which will list clearly and in detail the instruments and capabilities that will be offered.

NSSC anticipates the following instruments and modes on Gemini telescopes in 2011A:

***Gemini North*:**

- NIFS: Near-infrared Integral Field Spectrometer.
- NIRI: Near Infrared Imager and spectrograph with both imaging and grism spectroscopy modes.
- ALTAIR adaptive optics (AO) system in natural guide star (NGS) mode, as well as in laser guide star (LGS) mode. ALTAIR can be used with NIRI imaging and spectroscopy and with NIFS integral field unit (IFU) spectroscopy, as well as NIFS IFU spectral coronagraphy.
- Michelle: mid-infrared (7–26 μm) imager and spectrometer, which includes an imaging polarimetry mode.
- GNIRS: Gemini Near Infrared Spectrograph will be undergoing science verification on the Gemini North telescope, **but GNIRS will be available for use in 2011A**.
- GMOS-North: Gemini Multi-Object Spectrograph and imager. Science modes are multi-object spectroscopy (MOS), long-slit spectroscopy, IFU spectroscopy and imaging. Nod-and-Shuffle mode is also available.
- All of the above instruments and modes are offered for both queue and classical observing, except for LGS, which is available as queue only. C**lassical runs are now offered to programs that are one night or longer and consist of integer nights.**
- Details on use of the LGS system can be found at *www.gemini.edu/sciops/instruments/altair/?q=node/10121*, but a few points are emphasized here. Target elevations must be >40 degrees and proposers must request good weather conditions (Cloud Cover = 50%, or better, and Image Quality = 70%, or better, in the parlance of Gemini observing conditions). Proposals should specify "Laser guide star" in the Resources section of the Observing Proposal. Because of the need for good weather, LGS programs must be ranked in Bands 1 or 2 to be scheduled on the telescope.
- Time trades will allow community access to:
  Keck 1: up to 5 nights (HIRES only)
  Subaru: up to 10 nights (all instruments offered).

Gemini South:

- T-ReCS: Thermal-Region Camera Spectrograph mid-infrared (2–26 μm) imager and spectrograph.
- GMOS-South: Gemini Multi-Object Spectrograph and imager. Science modes are MOS, long-slit spectroscopy, IFU spectroscopy and imaging. Nod-and-Shuffle mode is also available.
- Phoenix: the NOAO high-resolution infrared spectrograph (1–5 μm) will not be available during 2011A due to the commissioning activities related to FLAMINGOS-2 and the Gemini Multi-Conjugate Adaptive Optics System (GeMS) on the telescope.
- NICI: Near-Infrared Coronagraphic Imager. NICI is available for general user proposals, although its use is restricted to good seeing conditions.
- FLAMINGOS-2 is being refurbished at the La Serena base facility and likely will not be offered in 2011A.
- All modes for GMOS-South, T-ReCS, and NICI are offered for both queue and classical observing. **As with Gemini North, classical runs are now offered to programs with a length of at least one or more integer nights.**

Detailed information on all of the above instruments and their respective capabilities is available *at www.gemini.edu/sciops/instruments/instrumentIndex.html.*

We remind the US community that Gemini proposals can be submitted jointly with collaborators from other Gemini partners. An observing team requests time from each relevant partner. All multi-partner proposals must be submitted using the Gemini Phase I Tool (PIT).

Note that queue-proposers have the option to fill in a so-called "Band 3" box, in which they can reconfigure their program execution if it is scheduled on the telescope in Band 3. Historically, it has been found that somewhat smaller than average queue programs, as well as programs that use weather conditions whose occurrences are more probable, have

continued

Observing Opportunities for Semester 2011A continued

a higher likelihood of completion if they are in Band 3. Users might want to think about this option when they are preparing their proposals.

Efficient operation of the Gemini queue requires that it be populated with programs that can effectively use the full range of observing conditions. Gemini proposers and users have become increasingly experienced at specifying the conditions required to carry out their observations using the online Gemini Integration Time Calculators for each instrument. NSSC reminds you that a program has a higher probability of being awarded time and of being executed if ideal observing conditions are not requested. **The two conditions that are in greatest demand are excellent image quality and no cloud cover. We understand the natural high demand for these excellent conditions, but wish to remind proposers that programs that make use of less than ideal conditions are also needed for the queue.** Potential users of the RC spectrograph on the CTIO 4-m Blanco telescope might consider GMOS on Gemini South in 90% cloud cover conditions as a possible alternative, or back-up, if their proposal cannot be scheduled on the Blanco.

NOAO accepts Gemini proposals via either the standard NOAO Web proposal form or the Gemini PIT software. NOAO offers a tool that allows proposers to view how their PIT proposal will print out for the NOAO TAC (please see *www.noao.edu/noaoprop/help/pit.html*).

TSIP Open-Access Time on Keck, Magellan, and MMT

As a result of awards made through the National Science Foundation's Telescope System Instrumentation Program (TSIP), telescope time is available to the general astronomical community at the following facilities in 2011A:

- ***Keck Telescopes***
  A total of 12 nights of classically scheduled observing time will be available with the 10-m telescopes at the W. M. Keck Observatory on Mauna Kea. All facility instruments and modes are available. For the latest details, see *www.noao.edu/gateway/keck/*.
- ***Magellan Telescopes***
  A total of four nights will be available for classically scheduled observing programs with the 6.5-m Baade and Clay telescopes at Las Campanas Observatory. For updated information on available instrumentation and proposal instructions, see *www.noao.edu/gateway/magellan/*.
- ***MMT Observatory***
  Three nights of classically-scheduled observing time are expected to be available with the 6.5-m telescope of the MMT Observatory. Previous requests have disproportionately used our allocation of dark and grey time, so bright time proposals are particularly encouraged. For further information, see *www.noao.edu/gateway/mmt/*.

ReSTAR Observing Time on the Hale Telescope

Funding for the Renewing Small Telescopes for Astronomical Research (ReSTAR) proposal was provided by the NSF for FY 2010 and one part of this award was used to procure 23 nights per year, over a period of three years, on the Hale 200-in telescope at Palomar. The 2011A allocation is as follows:

- ***Hale Telescope***
  Ten nights of classically-scheduled observing time will be available with the 200-in Hale Telescope at Palomar Observatory. For more information, see *www.noao.edu/gateway/hale/*.

Lists of instruments that we expect to be available in 2011A can be found immediately following this article. As always, investigators are encouraged to check the NOAO Web site for any last-minute changes before starting a proposal.

If you have any questions about proposing for US observing time, feel free to contact us:
vsmith@noao.edu, kolsen@noao.edu, or *dbell@noao.edu*

Important Notices about CTIO Telescopes/Instruments

Nicole van der Bliek

No New Programs in 2011A on CTIO 1.5-m Telescope

For 2011A, we will not accept new proposals for the CTIO 1.5-m telescope. This is because current long-term programs and planned engineering required for a significant upgrade to the Echelle capability will exhaust the available time on this telescope. Long-term programs that have been accepted already will continue to be executed as planned. We expect to be in a more normal situation for semester 2011B.

SOAR Has New Instruments Coming Online

Several new instruments are currently in the pre-commissioning phase. Therefore, we advise users to check the NOAO proposal Web site for updates on other SOAR instruments.

Mosaic II at Blanco 4-m Telescope Nearing Retirement Age

Users of the Mosaic II at the Blanco 4-m telescope are urged to read the article titled "Mosaic II Imager Retirement" in this *Newsletter*. In particular, users with science projects that depend on filters not available on DECam should be aware of the limited time left before Mosaic II is retired.

NEWFIRM Filters in 2010B and 2011A

The current filter set for NEWFIRM in 2010B consists of the broadband filters J, H, and K_S; the narrowband filters 2.12 µm H_2 and 2.17 µm Br-gamma as well as the five intermediate-band filters for the J and H bands provided by P. van Dokkum (Yale University). Changing filters is a time-consuming procedure that removes NEWFIRM from service and poses some risk to filters and the instrument. If sufficient demand for filters other than those two narrowband and five intermediate-band filters exists, a filter change will be considered in 2011A. For more information, please refer to the "Filter Availability and Policy on Filter Changes" document on the NEWFIRM Web page at *(www.noao.edu/ets/newfirm/documents/NEWFIRM_Filter_Availability_and_Policy.pdf)*.

KPNO Instruments Available for 2011A

Spectroscopy	Detector	Resolution	Slit Length	Multi-object
Mayall 4-m				
R-C CCD Spectrograph	T2KB/LB1A/T2KA/F3KB CCD	300–5000	5.4'	single/multi
MARS Spectrograph	LB CCD (1980×800)	300–1500	5.4'	single/multi
Echelle Spectrograph	T2KB/T2KA/F3KB CCD	18,000–65,000	2.0'	
FLAMINGOS [1]	HgCdTe (2048×2048, 0.9–2.5μm)	1000–1900	10.3'	single/multi
IRMOS [2]	HgCdTe (1024×1024, 0.9–2.5μm)	300/1000/3000	3.4'	single/multi
WIYN 3.5-m [3] (IMPORTANT - Check Web for Update)				
Hydra + Bench Spectrograph [4]	STA1 CCD	700–22,000	NA	~85 fibers
SparsePak [5]	STA1 CCD	700–22,000	IFU	~82 fibers
2.1-m				
GoldCam CCD Spectrograph	F3KA CCD	300–4500	5.2'	
FLAMINGOS [1]	HgCdTe (2048×2048, 0.9–2.5μm)	1000–1900	20.0'	
Imaging	**Detector**	**Spectral Range**	**Scale ("/pixel)**	**Field**
Mayall 4-m				
CCD MOSAIC-Upgraded [6]	8K×8K	3500–9700 Å	0.26	35.4'
SQIID	InSb (3-512×512 illuminated)	JHK_S	0.39	3.3'
FLAMINGOS [1]	HgCdTe (2048×2048)	JHK	0.32	10.3'
WIYN 3.5-m [3] (IMPORTANT - Check Web for Update)				
Mini-Mosaic [7]	4K×4K CCD	3300–9700 Å	0.14	9.3'
OPTIC [7] (No Longer Available)	4K×4K CCD	3500–10,000 Å	0.14	9.3'
WHIRC [8]	VIRGO HgCdTe (2048×2048)	0.9–2.5μm	0.10	3.3'
2.1-m				
CCD Imager [9]	T2KB CCD	3300–9700 Å	0.305	10.4'
SQIID	InSb (3-512×512 illuminated)	JHK_S	0.68	5.8'
FLAMINGOS [1]	HgCdTe (2048×2048)	JHK	0.61	20.0'
WIYN 0.9-m				
CCD MOSAIC-Upgraded [10]	8K×8K	3500–9700 Å	0.43	59'

[1] FLAMINGOS Spectral Resolution given assuming 2-pixel slit. Not all slits cover full field; check instrument manual. FLAMINGOS was built by the late Richard Elston and his collaborators at the University of Florida. Dr. Steve Eikenberry is currently the PI of the instrument.

[2] IRMOS, built by Dr. John MacKenty and collaborators. Availability will depend on proposal demand and block scheduling constraints.

[3] As we go to press, the availability of the WIYN 3.5-m for science observations during 2011A is being evaluated due to the delay in the anticipated arrival of the One Degree Imager (ODI) for installation and commissioning. Full installation and commissioning is not expected to begin before the summer of 2011. However, some early testing for ODI may be done, resulting in 3-4 weeks loss of observing time. Please check the Web page *http://www.wiyn.org/ODI/about/ODIstatus.html* for updates prior to preparing your proposal for WIYN 3.5-m observing time. Please also feel free to contact *kpno@noao.edu* with questions.

[4] Observers should make sure they are using the most recent version of the Hydra manual (version 6), and view *www.wiyn.org/instrument/bench_upgrade.html* for help planning observations using the upgraded Bench Spectrograph (completed in spring of 2009).

[5] Integral Field Unit, 80"×80" field, 5" fibers, graduated spacing. Observers should make sure they view *www.wiyn.org/instrument/bench_upgrade.html* for help planning observations using the upgraded Bench Spectrograph (completed in spring of 2009).

[6] The Mosaic 1 camera is being upgraded with new e2v CCDs and MONSOON based controllers. The improved instrument is currently scheduled to be recommissioned at the Mayall 4-m during October of 2010. We expect to offer routine observing with the upgraded instrument in semester 2011A.

[7] OPTIC is no longer being offered at WIYN. For 2011A, MiniMo will be the only optical imager offered.

[8] WHIRC was built by Dr. Margaret Meixner (STScI) and collaborators. The availability of this instrument for science observations during 2011A is subject to the same uncertainty, at press time, affecting all WIYN 3.5-m science proposals. Please see footnote [3] above. Observers contemplating use with WTTM correction should consult with Dick Joyce or Lori Allen for details.

[9] While T2KB is the default CCD for CFIM, use of F3KB may be justified for some applications and may be specifically requested; scale 0.19"/pix, 9.7'×3.2' field. If T2KB is unavailable, CFIM may be offered with T2KA (scale 0.305"/pix, 10.4' field) or with F3KB to best match proposal requirements. *www.noao.edu/kpno/ccdchar/ccdchar.html*

[10] Following the successful upgrade and commisioning of Mosaic 1 (see footnote [6]) at the Mayall 4-m during semester 2010B, we intend to offer shared risk observing with the upgraded instrument at the WIYN 0.9-m during 2011A.

CTIO Instruments Available for 2011A

Spectroscopy	Detector	Resolution	Slit
CTIO BLANCO 4-m			
Hydra + Fiber Spectrograph	SITe 2K×4K CCD, 3300–11,000Å	700–18,000, 45,000	138 fibers, 2" aperture
R-C Spectrograph [1]	Loral 3K×1K CCD, 3100–11,000Å	300–5000	5.5'
SOAR 4.2-m			
OSIRIS IR Imaging Spectrograph [2]	HgCdTe 1K×1K, JHK windows	1200, 1200, 3000	3.2', 0.5', 1.2'
Goodman Spectrograph [1,3]	Fairchild 4K×4K CCD, 3100–8500Å	1400, 2800, 6000	5.0'

Imaging	Detector	Scale ("/pixel)	Field
CTIO BLANCO 4-m			
Mosaic II Imager	8K×8K CCD Mosaic	0.27	36'
NEWFIRM [4]	InSb (mosaic, 4-2K×2K, 1–2.3μm)	0.4	28.0'
ISPI IR Imager [5]	HgCdTe (2K×2K 1.0–2.4μm)	0.3	10.25'
SOAR 4.2-m			
SOAR Optical Imager (SOI)	E2V 4K×4K Mosaic	0.08	5.25'
OSIRIS IR Imaging Spectrograph	HgCdTe 1K×1K	0.33, 0.14	3.2', 1.3'
Spartan IR Imager [6]	HgCdTe (mosaic 4-2K×2K)	0.068, 0.041	5.2', 3.1'
Goodman Spectrograph [3]	Fairchild 4K×4K CCD	0.15	7.2' diameter
CTIO/SMARTS 1.3-m [7]			
ANDICAM Optical/IR Camera	Fairchild 2K×2K CCD	0.17	5.8'
	HgCdTe 1K×1K IR	0.11	2.0'
CTIO/SMARTS 1.0-m [8]			
Direct Imaging	Fairchild 4K×4K CCD	0.29	20'
CTIO/SMARTS 0.9-m [9]			
Direct Imaging	SITe 2K×2K CCD	0.4	13.6'

[1] The R-C Spectrograph will ONLY be scheduled in the case of extremely heavy spectroscopic demand that cannot be served by the SOAR+Goodman spectrograph. In general, the R-C Spectrograph should be out-performed by the Goodman Spectrograph on SOAR. A comparison guide is available. We will attempt to schedule highly ranked requests for R-C Spectrograph runs on the SOAR/Goodman. Proposals requesting R-C Spec should indicate why Goodman cannot fulfill their needs.

[2] The spectral resolutions and slit lengths for the OSIRIS imaging spectrograph correspond to its low-resolution, cross-dispersed, and high-resolution modes, respectively. In the cross-dispersed mode, one is able to obtain low-resolution spectra at JHK simultaneously.

[3] The Goodman Spectrograph is available in single-slit mode. Imaging mode is also available, but only with U, B, V, and R filters.

[4] Please see *www.noao.edu/ets/newfirm/* for more information. Permanently installed filters include J, H, and K_S. In addition to these three broadband filters, two narrowband filters, 2.12μm H_2 and 2.17μm Br-gamma, and five intermediate band filters for the J & H band (provided by P. van Dokkum, Yale U.) are installed currently. Changing filters is a time consuming procedure that removes NEWFIRM from service and poses some risk to filters and the instrument. If sufficient demand for filters other than those two narrowband and five intermediate band filters exists, a filter change will be considered. For more information, please refer to the NEWFIRM Web pages on "Filter Availability and Policy."

[5] ISPI should be out-performed by NEWFIRM. In exceptional cases, for example for programs already started with ISPI, and for which instrument characteristics should be identical for all observations, ISPI MAY be scheduled depending on block scheduling constraints. Proposals requesting ISPI should indicate if and why NEWFIRM or Spartan cannot fulfill their needs. If ISPI is requested, NEWFIRM should be indicated as second choice, in case no ISPI block is scheduled.

[6] Spartan is available in the low resolution mode. The high resolution mode is commissioned, but has seen very little use. Spartan should be preferred to OSIRIS for most imaging applications.

[7] Service observing only. Proposers who need the optical only will be considered for the 1.0-m unless they request otherwise. Note that data from both ANDICAM imagers is binned 2×2.

[8] Classical observing only. Observers may be asked to execute up to 1 hr per night of monitoring projects that have been transferred to this telescope from the 1.3-m. In this case, there will be a corresponding increase in the scheduled time. No specialty filters, no region of interest.

[9] Classical or service, alternating 7-night runs. If proposing for classical observing, requests for 7 nights are strongly preferred.

Gemini Instruments Available for 2011A*

GEMINI NORTH	Detector	Spectral Range	Scale ("/pixel)	Field
NIRI	1024×1024 Aladdin Array	1–5µm R~500–1600	0.022, 0.050, 0.116	22.5", 51", 119"
NIRI + Altair (AO- Natural or Laser)	1024×1024 Aladdin Array	1–2.5µm + L Band R~500–1600	0.022	22.5"
GMOS-N	3×2048×4608 CCDs	0.36–1.0µm R~670–4400	0.072	5.5' 5" IFU+
Michelle	320×240 Si:As IBC	8–26µm R~100–30,000	0.10 img, 0.20 spec	32"×24" 43" slit length
NIFS	2048×2048 HAWAII-2RG	1–2.5µm R~5000	0.04×0.10	3"×3"
NIFS + Altair (AO- Natural or Laser)	2048×2048 HAWAII-2RG	1–2.5µm R~5000	0.04×0.10	3"×3"
GNIRS	1024×1024 Aladdin Array	0.9–2.5µm R~1700, 5900, 18,000	0.05, 0.15	50", 100" slit (long) 5" – 7" slit (cross-d)

GEMINI SOUTH	Detector	Spectral Range	Scale ("/pixel)	Field
GMOS-S	3×2048×4608 CCDs	0.36–1.0µm R~670–4400	0.072	5.5' 5" IFU
T-ReCS	320×240 Si:As IBC	8–26µm R~100, 1000	0.09	28"×21"
NICI	1024×1024 (2 det.) Aladdin III InSb	0.9–5.5µm Narrowband Filters	0.018	18.4"×18.4"

EXCHANGE	Detector	Spectral Range	Scale ("/pixel)	Field
HIRES (Keck)	3×2048×4096 MIT-LL	0.35–1.0µm R~30,000–80,000	0.12	70" slit
MOIRCS (Subaru)	2×2048×2048 HAWAII-2	0.9–2.5µm R~500–3000	0.117	4'×7'
Suprime-Cam (Subaru)	10×2048×4096 CCDs	0.36–1.0µm	0.2	34'×27'
HDS (Subaru)	2×2048×4096 CCDs	0.3–1.0µm R<90,000	0.138	60" slit
FOCAS (Subaru)	2×2048×4096 CCDs	0.33–1.0µm R~250–7500	0.104	6' (circular)
COMICS (Subaru)	6×320×240 Si:As	8–25µm R~250, 2500, 8500	0.13	42"×32"
IRCS (Subaru)	1024×1024 InSb	1–5µm R~100–20,000	0.02, 0.05	21"×21", 54"×54"
IRCS+AO188 (Subaru)	1024×1024 InSb	1–5µm R~100–20,000	0.01, 0.02, 0.05	12"×12", 21"×21", 54"×54"

*Availability subject to change. Check the NOAO and Gemini Calls for Proposals and/or the Gemini Web pages for up-to-date information.

Keck Instruments Available for 2011A

	Detector	Resolution	Spectral Range	Scale ("/pixel)	Field
Keck-I					
HIRESb/r (optical echelle)	3x MM-LL 2K×4K	R~30k–80k	0.35–1.0μm	0.19	70" slit
LRIS (img/lslit/mslit)	Tek 2K×4K, 2×E2V 2K×4K	R~300–5000	0.31–1.0μm	0.22	6'×8'
Keck-II					
ESI (optical echelle)	MIT-LL 2048×4096	R~1000–6000	0.39–1.1μm	0.15	2'×8'
ESIi (optical echelle, IFU)	MIT-LL 2048×4096	R~1000–6000	0.39–1.1μm	0.15	2'×8'
NIRSPEC (near-IR echelle)	1024×1024 InSb	R~2000, 25,000	1–5μm	0.18 (slitcam)	46"
NIRSPAO (NIRSPEC w/AO)	1024×1024 InSb	R~2000, 25,000	1–5μm	0.18 (slitcam)	46"
NIRC2 (near-IR AO img)	1024×1024 InSb	R~5000	1–5μm	0.01–0.04	10"–40"
OSIRIS (near-IR AO img/spec)	2048×2048 HAWAII2	R~3900	0.9–2.5μm	0.02–0.1	0.32"–6.4"
DEIMOS (img/lslit/mslit)	8192×8192 mosaic	R~1200–10,000	0.41–1.1μm	0.12	16.7'×5'
Interferometer					
IF (See *http://msc.caltech.edu/software/KISupport/*)					

MMT Instruments Available for 2011A

	Detector	Resolution	Spectral Range	Scale ("/pixel)	Field
BCHAN (spec, blue-channel)	Loral 3072×1024	R~800–11,000	0.32–0.8μm	0.3	150" slit
RCHAN (spec, red-channel)	Loral 1200×800	R~300–4000	0.5–1.0μm	0.3	150" slit
MIRAC3-BLINC (mid-IR img, PI inst)	128×128 Si:As BIB		2–25μm	0.14, 0.28	18.2", 36"
Hectospec (300-fiber MOS, PI)	2 2048×4608	R~1000–2000	0.38–1.1μm	R~1K	60'
Hectochelle (240-fiber MOS, PI)	2 2048×4608	R~34,000	0.38–1.1μm	R~32K	60'
SPOL (img/spec polarimeter, PI)	Loral 1200×800	R~300–2000	0.38–0.9μm	0.2	20"
ARIES (near-IR imager, PI)	1024×1024 HgCdTe		1.1–2.5μm	0.04, 0.02	20", 40"
SWIRC (wide n-IR imager, PI)	2048×2048 HAWAII-2		1.0–1.6μm	0.15	5'
CLIO (thermal-IR AI camera, PI)	320×256 InSb		H,K,L,M	0.05	16"×13"
MAESTRO (optical echelle, PI)	4096×4096	R~28,000	0.32–1.0μm	0.15	
PISCES (wide n-IR imager, PI)	1024×1024 HgCdTe		1–2.5μm	0.18	3.1'

Magellan Instruments Available for 2011A

	Detector	Resolution	Spectral Range	Scale ("/pixel)	Field
Magellan I (Baade)					
PANIC (IR imager)	1024×1024		1–2.5μm	0.125	2'
IMACS (img/lslit/mslit)	8192×8192	R~2100–28,000	0.34–1.1μm	0.11, 0.2	15.5', 27.2'
FIRE (IR echellette)	2K×2K	R~6000	0.8–2.5μm	0.18	7" slit
Magellan II (Clay)					
MIKE (echelle)	2K×4K	R~22,000	0.32–1.0μm	0.12–0.13	5" slit
MIKE Fibers (echelle)	2K×4K	R~16,000	0.32–1.0μm	0.12–0.13	20'–23', 256 fibers
MagE (echellete)	1K×2K E2V	R~4100	0.31–1.0μm	0.3	10" slit
LDSS3 (grism spec)	4K×4K	R~200–1900	0.4–0.9μm	0.19	8.3'
MMIRS (IR img/spec)	2K×2K	R~1300–2400	1.0–2.5μm	0.2	6.9'
Megacam (mosaic imager)	36 (9×4) 2048×4608		0.32–1.0μm	0.08	24'

Hale Instruments Available for 2011A

	Detector	Resolution	Spectral Range	Scale ("/pixel)	Field
Double Spectrograph/Polarimeter	1024×1024 red, 2048×4096 blue	R~1000–10,000	0.3–1.0μm	0.4–0.6	128" long, 8"×15" multi
TripleSpec	1024×2048	R~2500–2700	1.0–2.4μm	0.37	30" slit

CHARA Instruments Available for 2011

The CHARA Array consists of six 1-m aperture telescopes with baselines from 30 to 330 meters.

Beam Combiner	Resolution	Spectral Range	Beams
Classic, Climb	Broad Band	H or K	2 or 3
Vega	1700	45 nm in V or R	2

Community-Access Time Available in 2011 with CHARA

Steve Ridgway

NOAO and Georgia State University are announcing a second opportunity for observations with the Center for High Angular Resolution Astronomy (CHARA) optical interferometer array at Mt. Wilson Observatory. About 50 hours will be available during calendar year 2011. Observations will be carried out by CHARA staff.

Requests should be submitted using the standard NOAO proposal form by selecting "CHARA" in the telescope list and entering "nights requested" as a decimal assuming 10 hours/night (e.g., 1.6 nights = 16 hours). Proposals must be submitted by the standard 2011A deadline of 30 September 2010. Note that this one-time call covers all of calendar year 2011, as opposed to the six-month period of February–July 2011 for other resources in the 2011A proposal cycle. For more information, see *www.noao.edu/gateway/chara/*.

TripleSpec at the Hale Telescope

Ken Hinkle & Ron Probst

One outcome of Renewing Small Telescopes for Astronomical Research (ReStar) is that NOAO is purchasing for the community about 10 nights per semester on two instruments on the Hale 200-in telescope. Proposals can be submitted through the NOAO Telescope Time Allocation Committee to observe with the Double Spectrograph and TripleSpec on the Hale. The authors visited Mt. Palomar in early August 2010 during a TripleSpec run.

TripleSpec is a medium-resolution, near-infrared spectrograph. Three copies were made of this instrument. One is at the Astronomy Research Consortium 3.5-m telescope, one at the Hale telescope, and the third is intended for Keck. While the instruments were made to common plans, there are small differences between the three copies. At Hale, the wavelength coverage is limited to ~1–2.5 μm and only one slit is available. This slit is 2.7 pixels wide, 1 arcsec on the sky, giving a spectral resolution of ~2800. The width is a good match to typical, delivered image quality at Palomar. The slit length is 30 arcsecs. A slit-viewing guider and acquisition camera use a fixed K-band filter.

continued

Kevin Rykoski (Palomar Observatory; left) and Guy Stringfellow (CASA, University of Colorado; right) observing with TripleSpec. The spectrograph GUI is to the left, the guider/acquisition GUI is to the right. (Image credit: Ken Hinkle/NOAO/AURA/NSF.)

TripleSpec at the Hale Telescope continued

Conditions were not perfect during our visit, and our observing experience was limited. However, we suggest that both guiding as well as obtaining useful signal-to-noise in the spectrum becomes difficult around K ~ 15. Limiting magnitudes are of course highly condition dependent. To make rough comparisons with other instruments, the Florida Multi-Object Imaging Near-Infrared Grism Observational Spectrometer (FLAMINGOS) on the KPNO Mayall 4-m telescope has a single slit R ~ 1300 mode covering the K and H bands. The 10-sigma limiting magnitude is K ~ 13.4. The K-band 5-sigma limiting magnitude for the Gemini Near-Infrared Spectrograph in the R = 1700 J-H-K cross-dispersed mode was 18.5 on the Gemini South 8-m telescope.

TripleSpec has a graphical user interface (GUI) for observers. GUIs operate both the spectrograph and the acquisition and guiding systems. Features are provided for manual and automated guiding using the K-band images of the slit plane.

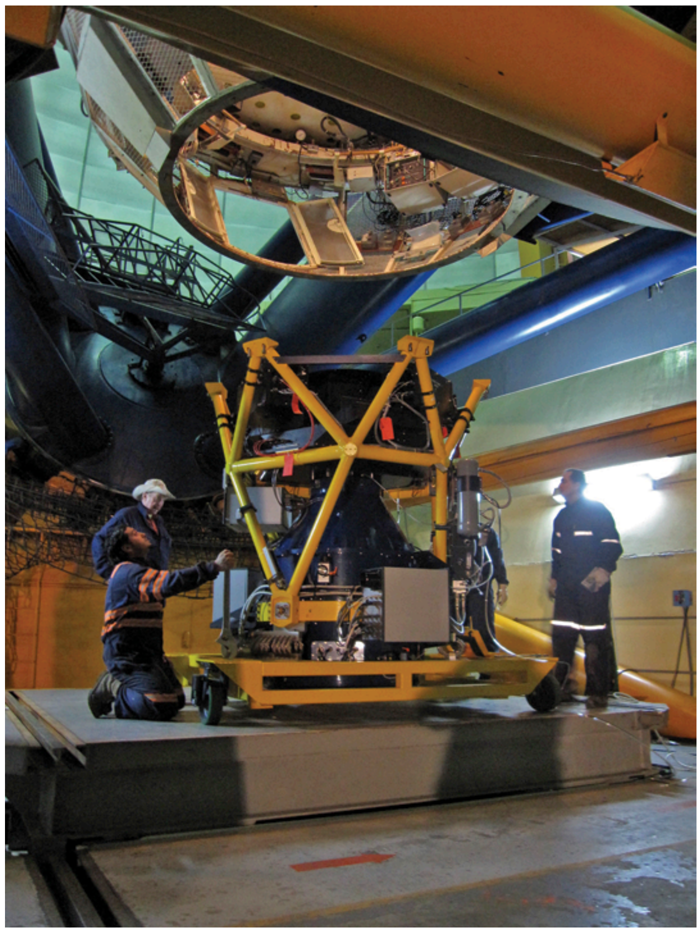
The Hale observer may be the only astronomer staying on the mountain. The 48-in and 60-in are automated telescopes. Nonetheless, Palomar offers high-quality visitor support for dining and lodging, telescope operation, and start-up assistance. Summer weather is typically good at Mt. Palomar. This is opposite to the weather at observatories in the desert Southwest. This is and should be an extra incentive for observers interested in observing objects in, for instance, the Northern Milky Way or the bulge. Additional information on TripleSpec at the Hale telescope can be found at *www.astro.caltech.edu/palomar/200inch/TSpec/TSpec_spec.html*.

NEWFIRM Moves to the Blanco Telescope

Roberto De Propris & Ron Probst

After two years of successful scientific operations on the Mayall 4-m telescope at Kitt Peak, the NEWFIRM wide-field infrared imager was moved to the Blanco 4-m telescope for three semesters. While NEWFIRM was designed to be shared in this manner, there were still hardware, software, and operational differences between sites

NEWFIRM arrives by truck at the Blanco 4-m telescope. (Image credit: Ron Probst/NOAO/AURA/NSF.)



Raising the assembled instrument for on-telescope installation and first light. (Image credit: Ron Probst/NOAO/AURA/NSF.)

continued

NEWFIRM Moves to the Blanco Telescope continued

that required careful planning, as well as the challenges of transportation and of knowledge transfer to support staff. Knowledgeable and enthusiastic participation by staff at both sites resulted in a successful move.

An error with the export license and some delays in shipping en route meant that the delivery date for science slipped by several weeks. Some scheduled CTIO NEWFIRM programs were either delayed into 2011A or rescheduled for the Infrared Side Port Imager if the science allowed.

NEWFIRM reached CTIO in good condition at the end of March. There followed five weeks of reassembly and checkout, culminating in a successful cooldown and cold off-telescope operations test. CTIO mountain staff worked closely with visiting NEWFIRM team members from Tucson to acquire familiarity with the instrument hardware and its complex software system. Our model for CTIO operations emphasized the transfer of normal operational support while avoiding extensive training for very unusual situations. Significant additions to the Blanco infrastructure were also carried out, including installation of a cryocooler system for on- and off-telescope operation of NEWFIRM and a large cleanroom, which also will be used for DECam operations.

After a break determined by the scientific scheduling of the Blanco 4-m telescope, 13 nights were used for commissioning on the telescope. This effort combined engineering, performance characterization, and short science verification projects with further staff training. Despite bad weather, this was successful, as demonstrated by the image on the front cover of this *Newsletter*. NEWFIRM is performing well on the Blanco as an integrated system for doing science. NEWFIRM went through its first two observing time blocks with no more than minor problems and is being used by a growing community in the Southern Hemisphere. The experience of moving and sharing this major instrument between sites has been described technically in an SPIE paper and has been something of a "dry run" for the installation of DECam on the Blanco telescope in 2011.

Changing the NEWFIRM filters. (Image credit: Nicole van der Bliek/NOAO/AURA/NSF.)

The Upgraded WIYN Bench Spectrograph

Patricia Knezek, Matthew Bershady (University of Wisconsin) & Daryl Willmarth

The upgraded Bench Spectrograph on the WIYN 3.5-m telescope has been commissioned. For those who are unfamiliar with the WIYN Bench, it is fed by either of the general-use, multi-fiber instruments at the WIYN 3.5-m telescope on Kitt Peak: the Hydra multi-object positioner and the SparsePak integral field unit (IFU). The WIYN Bench is very versatile and can be configured to accommodate low-order, echelle, and volume phase holographic (VPH) gratings. The overarching goal of the upgrade was to increase the average spectrograph throughput by ~60% while minimizing resolution loss (<20%). In order to accomplish this, the project has had three major thrusts: (1) a new CCD was provided with a nearly constant 30% increase in throughput over 320–1000 nm; (2) two VPH gratings were delivered; and (3) a new all-refractive collimator that properly matches the output fiber irradiance (EE90) and optimizes pupil placement was installed, as were new baffles correctly sized for the incoming beam for all three fiber cables.

We have successfully demonstrated that the upgraded Bench has met the project goals over a wavelength range of 330–950 nm. For example, with the 600@10° l/mm surface-ruled grating there is no evidence of instrumental resolution loss, while the on-sky throughput in the central SparsePak fiber increased by at least 50–70%. With the newly commissioned 3300 l/mm VPH grating and SparsePak, the peak total system efficiency at the blaze angle of 58° is 19%. This throughput is comparable to what is being achieved with other spectrographs on 4-m-class telescopes (e.g., peak efficiencies of 10–18% for the RC spectrograph on the CTIO Blanco 4-m telescope and 20–30% for the Goodman spectrograph on SOAR). Thus, the WIYN 3.5-m telescope is once again a competitive optical spectroscopic telescope for its aperture. We refer readers to two SPIE papers, Bershady et al. 2008, "WIYN bench upgrade: a revitalized spectrograph" and Knezek et al. 2010, "The upgraded WIYN Bench Spectrograph," for details about the actual installation and commissioning efforts and the subsequent findings about the post-upgrade system performance. Both papers, as well as more information and help for planning observations, can be found at *www.wiyn.org/instrument/BSU/bench_upgrade.html.*

KPNO 4-m and 2.1-m Control Room Improvements

Bob Marshall & Lori Allen

Renovations and upgrades for the control rooms at the 4-m and 2.1-m telescopes were begun during the summer of 2010. The goals are to create a better environment for observing by renovating the facilities (room, appliances, and computers) and reducing the clutter. While most work will be completed during the summer shutdowns for each telescope, the computer and video upgrades will be completed during the 2010B semester.

New flooring will be installed in both control rooms during the summer shutdowns. The floor is a conductive vinyl tile in order to control static discharge.

At the 4-m a sink was installed in the small area behind the white board. An instant hot water heater is connected to the sink. Other "kitchen" area improvements at the 4-m include new appliances, a microwave shelf, and containers for the condiments. The appliances are a larger refrigerator, microwave, coffee maker, coffee grinder (beans not supplied), and wide-slot toaster.

New multi-function printers are installed at both control rooms. The printers support duplex printing, copying, and scanning. They can scan directly to USB flash memory. At the 4-m, the printer will be moved from the food area to the edge of the counter next to the sofa.

New computers will be installed in both control rooms. Based on the successful experience at WIYN (figure below), we have chosen Apple Mac Mini computers with two 24-inch, flat-screen, LCD monitors (each with 1920 × 1200 resolution); a sound bar; and a camera with a microphone. The new systems will replace "tan" and "nutmeg" at the 4-m and "sapphire" and "teal" at the 2.1-m. The Mac Minis will use "rsh" and VNC to control the instruments and will provide updated browsers, Skype, connections for USB devices, a DVD writer, and NFS mounts to the data file systems. The Mac Minis will be phased in during the beginning of the 2010B semester and, until they are fully checked out, will coexist with the older systems.

Mac Mini setup at WIYN, which is similar to that planned for the 4-m and 2.1-m control rooms. (Image credit: Bob Marshall/NOAO/AURA/NSF.)

We are looking at the video displays and planning to replace some of the old video monitors with LCD monitors. We are testing video converters and video servers and will implement the changes during the 2010B semester.

Other changes include upgrading the fast Ethernet switches to gigabit Ethernet switches at both telescopes and providing two desk lamps for each control room. To reduce clutter, we removed unneeded cables, rerouted cables, and mounted Ethernet switches and power strips to the wall. Also, the 4-m control room is getting a sofa, stereo, replacement blackout shades, and a new coat of paint.

Reminder to Mosaic and NEWFIRM Principal Investigators

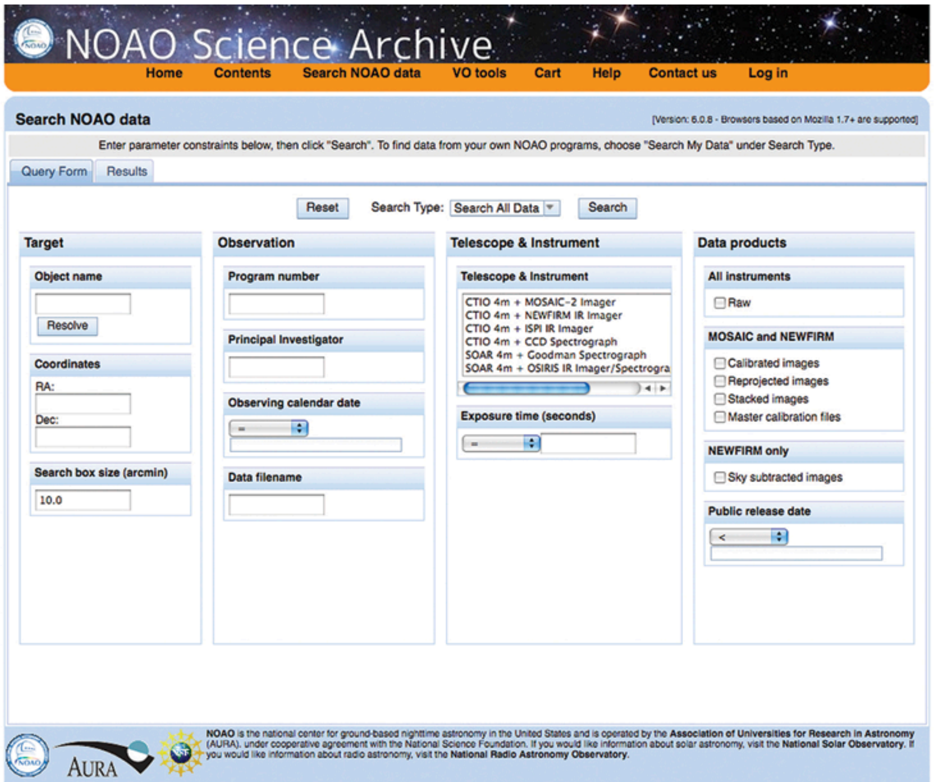
Frank Valdes

Mosaic and NEWFIRM observations taken with the KPNO and CTIO 4-m telescopes are routinely pipeline-calibrated and entered into the NOAO Science Archive, generally within two weeks of the end of an observing run. Mosaic data are available from semester 2008A to the present and are limited to unbinned exposures taken using NOAO filters. Routine processing of CTIO NEWFIRM observations will commence with semester 2010B, and data from past KPNO NEWFIRM observations will be processed and archived over the next six months. Automatic emails will be sent to principal investigators upon completion of processing for both upcoming and past runs. Refer to the following article for news about accessing your Mosaic and NEWFIRM data. For more information, see *nvo.noao.edu/noaonvo/help.shtml* or write to *vohelp@noao.edu*.

Access Your Data with the New NOAO Science Archive Interface

Mark Dickinson

The NOAO Science Archive contains raw data taken with more than 20 different telescope-plus-instrument combinations, which includes data from CTIO and KPNO telescopes and NOAO data from the WIYN, SOAR, and SMARTS partnerships. In addition, data from the NEWFIRM wide-field infrared imager and the two Mosaic imagers on the KPNO and CTIO 4-m telescopes are processed through pipelines, and those reduced data products also are stored in the Archive. Principal investigators may register for a user name with the National Virtual Observatory (NVO) to then retrieve their proprietary data from the Archive. All raw and reduced data also become available to any user, without registration, after the data's proprietary period expires.



With such rich and varied data holdings in the Archive, it could be challenging to find the data you want. The Archive "portal" provides a number of ways to do so, including graphical VO tools to search for data by location on the sky or by time. Until recently, direct searches of Archive holdings were formulated using an advanced query builder. In principle, this allowed users to construct complex searches involving any of the dozens of metadata parameters stored in the Archive database. In practice, however, the old query builder could be cumbersome and its interface unintuitive.

The newest release (v1.5) of the NOAO End-to-End Data Management System (E2E) reorganizes the portal pages and introduces a new, simpler, form-based query interface that should be immediately familiar to users of other astronomical archives such as those for Gemini, European Southern Observatory (ESO), or Hubble Space Telescope (HST). You can enter constraints based on the telescope-plus-instrument combination, observing date, target coordinates (or by common astronomical object names via a name resolver), and other basic parameters. A set of checkboxes let you select the sorts of data products that you wish to retrieve, including raw data and various stages of processing for the Mosaic and NEWFIRM pipeline-reduced products. Click on "Search" and the results are delivered as a table. For non-proprietary data, you can click a link to download a file directly, or you can add files to a "cart" and then stage them for retrieval via ftp. If you wish to retrieve your own proprietary observations, selecting "Search my data" will take you to the login page, then back to the search form, where searches now (by default) will show you only the data from your own NOAO programs.

These changes are just a first step toward making the NOAO Science Archive easier to use. In future versions, the NOAO Science Data Management group plans to streamline the presentation of search results and the process of retrieving the desired data. We also hope to expand the range of queriable observing parameters. For example, you may notice now that certain properties, which you might expect to be searchable, are missing from the form, such as the filter used for an imaging observation. This is due to the complex and historically-layered nature of the Archive's data holdings, which come from many different instruments and telescopes, each of which has its own data-taking system and produces FITS headers, which are by no means fully standardized. Therefore, taking "filter" as an example, this information may appear in different FITS keywords for different instruments, and there is no standard filter nomenclature used in all headers from all instruments, making searches by filter quite difficult. But there is hope to remediate at least some of the Archive metadata in order to expand its searchability, starting with instruments like Mosaic and NEWFIRM, which are subject to standardized pipeline processing.

In the meanwhile, please visit the new Archive Web pages at *www.archive.noao.edu*, give them a try, and see what interesting data you can find. If you have a recent or upcoming observing run at an NOAO telescope, we encourage you to leave your DVDs or external hard drives at home and retrieve your data from the Archive where they are stored safely. And in particular, if you are using NEWFIRM or Mosaic, get your pipeline-reduced data and let us know how well they suit your scientific needs. Your feedback is always welcome at *vohelp@noao.edu*.

Changes Improve Observer Support at KPNO

Nanette Bird

To improve support for visiting astronomers and staff observing and working on the mountain and to reduce costs, the operations and staffing model for the support office was revised during the past two years. The changes provide observers with a more streamlined process of preparing for their observing runs. There are improved procedures (an increase in the use of Web-based systems and a decrease in the flow of paper), new staff, and redistributed work loads. The restructuring also allows better support for the KPNO Director's Office. This article describes how visiting astronomers to KPNO, WIYN, or NSO telescopes currently should work with the KPNO Support Office to make arrangements for their observing runs.

For most observers, the process begins with a friendly reminder to the program's principal investigator that an Observing Run Preparation form (ORP, *www.noao.edu/kpno/forms/orp-form/noao-orp.html*) needs to be completed six weeks prior to the first night of observations. These reminders are sent by recently-hired office assistant Cheryl Marks. The ORP form provides the KPNO and Facilities staff with the observer's housing, shuttle, US government driver's license, and instrument needs. While we still request that observers complete the Motor Vehicle Operator's Identification Card in order to drive NOAO vehicles, including those based on the mountain, we no longer provide a hard copy of the license. The ORP forms are processed by Bellina Cancio who is an administrative assistant based on the mountain.

Bellina, working with others at KPNO, processes the ORPs to make sure that proper housing and telescope/instrumentation preparations are made for the observing run. This form will be updated in the coming year to provide additional information that will help the support office staff in their efforts to assist the observer more efficiently.

Upon arrival at the NOAO headquarters in Tucson, it should be a priority for the observers to check in with Karen Ray in the Central Facilities Office to confirm that they have a current government driver's license and a reservation on a shuttle going to Kitt Peak. Once they arrive on Kitt Peak, observers should check in with Bellina in the administration building to pick up their room and telescope keys. Any questions the observers might have regarding accommodations and facilities on the mountain should be directed to Bellina. She is also the person observers should contact with questions regarding their bill or the online payment system the support office has in place.

Travel and on-site expenses of graduate students at US institutions who are observing at KPNO as part of a PhD thesis program are paid by NOAO. Reimbursement will require submitting original hotel and shuttle receipts and proof of airline travel dates and costs, such as a copy of the ticket, to Cheryl Marks for processing.

Once an observing run has been completed, observers are strongly encouraged to complete an Observing Run Evaluation form (ORE, *www.noao.edu/cgi-bin/ore/oreform.pl*). Please note that there is an option to send confidential comments directly to Interim KPNO Director Abi Saha. If observers do not complete the ORE form, they are likely to get a friendly reminder from Cheryl Marks to do so.

We hope these improvements will streamline an observer's path before, during, and after his or her observing run, while also serving to inform KPNO about the success of that observing run. Working toward a more efficient system that also will benefit the Kitt Peak Support Office and the Kitt Peak Director's Office is a continuing goal.

Sky Brightness Measurements at KPNO

Recent spectrophotometer measurements of the Kitt Peak sky brightness compared to similar measurements taken both 10 and 20 years ago show that the sky brightness at zenith has remained relatively constant over the past 20 years, while the sky towards Tucson has darkened by ~0.1 magnitude over the last 10 years. The new measurements are presented and analyzed by Neugent and Massey in their upcoming PASP article (*arxiv.org/abs/1007.4597*).

Thanks to Buell Jannuzi

Todd Boroson

Buell T. Jannuzi stepped down as Director of Kitt Peak National Observatory on 9 June 2010. Buell had been the Kitt Peak director (including acting director) since fall 2005. During these years, he led the observatory through a very volatile period. At the start, NOAO's program was evolving to invest more resources in participation in the large projects that emerged from the 2000 Decadal Survey, at the cost of the existing NOAO facilities of Kitt Peak and Cerro Tololo. However, following the NSF Senior Review report in 2006 and ensuing discussions with the NSF, this trend was reversed, and efforts were made to renew the existing facility infrastructure and modernize the suite of capabilities. As the Kitt Peak director, Buell not only managed the operation of the mountain facilities and the support staff through this difficult time, but he also took a substantial role in helping to guide the strategic direction of NOAO, working closely with three NOAO directors, Jeremy Mould, Todd Boroson, and David Silva.

Buell made a number of notable contributions as the Kitt Peak director. First and foremost, he developed a close and positive relationship with the leaders of the Tohono O'odham Nation, on whose land Kitt Peak National Observatory sits. He made a serious effort to learn about their culture and their history in order to interact with them effectively and find mutually beneficial projects to support. During his tenure as director, NEWFIRM was commissioned on the Mayall telescope. While others handled the technical aspects of commissioning and operation, Buell facilitated all the aspects of integrating such a major new instrument into the mountaintop and telescope infrastructure. Buell led the organization and planning for the celebration of the 50th anniversary of the US National Observatory, which culminated in March of this year with two very exciting science symposia and a day of scientific reflection and festivities. He developed and managed the call for large science programs for the Mayall telescope, which is currently in process. And, he participated effectively in the city, county, and state discussions concerning outdoor lighting ordinances in order to guarantee a long and healthy future for Kitt Peak as an astronomical site.

We are privileged to have had Buell's commitment of time and effort, as well as his good ideas, to improving Kitt Peak and NOAO. Buell remains on the NOAO scientific staff, and he plans to devote more time to his research, while continuing to contribute to the NOAO program.

Abi Saha Appointed KPNO Interim Director

Bob Blum

NOAO is pleased to announce that Abi Saha agreed to become the Associate Director of NOAO for Kitt Peak National Observatory (KPNO) on an interim basis beginning in June 2010. The appointment is for up to one year. This is a dynamic time for Kitt Peak. New instruments are being deployed (Mosaic 1 upgrade, Kitt Peak Ohio State Multi-Object Spectrograph—an optical MOS), and the Large Science Proposal (LSP) process will play out in 2011. The former Kitt Peak director, Buell Jannuzi, placed these projects on a firm and clear course, and NOAO is confident that Abi will keep them on course until they are deployed or a permanent director is hired.

Abi comes to KPNO with a wealth of experience in telescope operations including having played key roles in the WIYN operations during his career as WIYN Telescope Scientist, WIYN Science Advisory Committee member, and WIYN Board member. He has served as the NOAO Large Synoptic Survey Telescope (LSST) Project Scientist and leader of the NOAO LSST Science Working Group developing operations simulations and science programs (Abi chairs the LSST science collaboration on stellar populations). Abi is one of the most widely recognized scientists at NOAO having made many outstanding contributions in observations of resolved stellar populations in Local Group galaxies, variable stars, and the distance scale using NOAO facilities and the Hubble Space Telescope, among others.

While the search for a permanent director is underway, we look forward to a year with Abi at the helm of Kitt Peak. He is sure to leave a positive imprint there even in a short time.

Kitt Peak Director Search Underway

A search committee has been formed and charged with recommending to NOAO Director David Silva and to AURA the next NOAO Associate Director for the Kitt Peak National Observatory (KPNO). The future of KPNO is exciting, with new instruments headed to the Mayall and WIYN telescopes in the near term and the possibility of a Large Survey Project being carried out on the Mayall telescope in the coming decade. Over the long term, KPNO would benefit from the leadership of a director with a vision for how KPNO fits into the US System of observing facilities.

As described in the position announcement at *www.noao.edu/cas/hr/jobs/jobs.php*, applications for the Directorship are due 1 October 2010. Following an interview process, the search committee is expected to forward their recommendation to the AURA Observatory Council in early February. We encourage all interested parties to consider this opportunity to make a difference in the future of ground-based optical/infrared astronomy. Interested parties are invited to contact NOAO Director David Silva (*dsilva@noao.edu*) for further information.

NOAO 50th Anniversary Celebration Presentations Now Available Online

(Reprinted from May Issue of Currents)

In March of this year we celebrated, with a series of scientific meetings and public evening talks, the 50th anniversary of the National Astronomy Observatory (now NOAO and NSO). As described in the February issue of Currents, the dedication in 1960 of Kitt Peak National Observatory marked the beginning of merit-based access to world-class facilities for all astronomical researchers. The subsequent creation of the Cerro Tololo Inter-American Observatory added access to the southern skies through the National Observatory. Open access to facilities based only on merit, then a relatively new paradigm for observing facilities, has played an important role in the rich achievements of the US astronomical community over the past 50 years.

Many of the presentations made at these events are now available online. *From First Light to Newborn Stars* focused on the physics of star formation in galaxies, from early times to the present and in both distant and nearby galaxies, including the Milky Way. *The Eventful Universe* explored the time domain in astrophysical phenomena, including solar system, Galactic, and extragalactic objects, with a common theme of understanding the best observational strategies for detecting, characterizing, and following up transient events.

Participants from the two science meetings came together for a joint session, *50th Anniversary Symposium, Celebrating the Past, Looking to the Future*, that looked back at the contributions of NOAO and NSO to several important areas of astrophysical research as well as forward to the discoveries that will be enabled by the future activities of NOAO and NSO. Talks by Alan Dressler, Charles Lada, Heather Morrison, Douglas Rabin, Vera Rubin, and Nick Suntzeff covered topics such as dark matter and dark energy, the solar corona, star and galaxy formation, and the history of the Universe.

Presentations from these events are now available online in either PDF or PowerPoint format at *www.noao.edu/kp50/* under the program links for each symposium.

At the same site, we have archived video presentations of the public evening lecture by Alan Dressler ("The Living History of the Universe") as well as those from a second public evening "Why Kitt Peak? The History of Iolkam Du'ag and the Birth of Kitt Peak National Observatory" that featured presentations by Dr. Aden B. Meinel and Bernard Siquieros. The first Director of Kitt Peak National Observatory, Meinel spoke about the history of the selection of Kitt Peak as the location for the National Observatory. Siquieros, the Education Curator of the Tohono O'odham Nation's Cultural Center and Museum, shared a Tohono O'odham perspective on the meaning and history of Iolkam Du'ag, or Kitt Peak, Baboquivari, and the other mountains of the Tohono O'odham Nation. Please enjoy these presentations and join with us in celebrating our 50th anniversary!

The Clemson-NOAO Operations Partnership (2006–2009)

Jeremy King (for the Clemson University astrophysics group)

Five years ago, with the encouragement of the NSF and AURA, NOAO requested proposals from the community to partner with the National Observatory in the operations of the facilities provided by Kitt Peak National Observatory. The goal was to form "win-win" partnerships that would support the continued operations of an important component of the US system of ground-based observing facilities for the benefit of the entire community while also providing a possible partner with some new science and educational opportunities that might not otherwise have been available to the partner. This call for proposals came during a particularly challenging period in the funding of KPNO and before the NSF's Senior Review had released their recommendations for the future of the facilities operated by NOAO. As a result of this call for proposals and the subsequent successful proposal by Clemson University, NOAO entered into a limited, three-year partnership with Clemson for the operations of the Mayall 4-m Telescope. While NOAO is not currently entering any new agreements of this sort, we would like to summarize in this article how the opportunity, while it was available, benefited the broader community and Clemson University.

By all measures, the now completed Clemson-NOAO operations partnership was a success. The funding provided by Clemson allowed KPNO to maintain and improve its operations of the Mayall during the time period of the agreement while allowing the Clemson astrophysics group to explore opportunities and challenges associated with dedicated telescope access on a limited-term basis with an eye towards possible future long-term participation in a telescope consortium.

Although the current austere fiscal environment makes such a future for Clemson University uncertain at this time, the benefits of the "test drive" provided by the Clemson-NOAO partnership, from a Clemson University perspective, were myriad. Even though several partnership opportunities were explored, the KPNO 4-m telescope opportunity offered numerous attractive features: (1) a suite of established and maintained facilities/instrumentation in both hemispheres (limited time-trading between KPNO and CTIO was possible) well-matched to the scientific needs of the Clemson faculty and students; (2) a reasonable amount of time (neither too small nor too large) to ensure productive science; (3) paying operational costs and avoiding capital costs; (4) the existence of an experienced professional NOAO staff tending to operational tasks; and (5) being able to contribute to the financial support of the workhorse KPNO 4-m facility, which remains an important asset in the US optical/near-infrared (IR) arsenal.

A variety of graduate student-led scientific programs were pursued during the partnership period. As part of her ongoing dissertation research, PhD student Ginger Bryngelson has doubled the number of late-time observations of Type Ia supernovae in the near-IR. Ginger and her advisor, Mark Leising, have also mentored an undergraduate through the Partnerships in Astronomy & Astrophysics Research and Education (PAARE) summer program in a project using data from the Mayall 4-m partnership time. (PAARE is a joint program involving South Carolina State University (SCSU), NOAO, and Clemson with funding from NSF to provide mentoring to minority undergraduate and graduate students.) PhD graduate Eric Bubar (now at University of Rochester) exclusively utilized Mayall 4-m echelle data in his dissertation work on spectroscopy of candidate members of the putative Wolf 630 stellar moving group; his results identifying a chemically, temporally, and kinematically uniform group of nearby disk stars have been published in the *Astronomical Journal* (volume 140, p 293; 2010). Eric also was able to bring an SCSU undergraduate in the PAARE program with him to observe at the Mayall 4-m telescope (Figures 1 and 2). Most of Clemson's graduate student observers also carried out ancillary observing programs in addition to those dedicated to acquiring dissertation data. Some of Eric's high-resolution spectroscopy of candidate post-T Tauri stars is providing the material for a senior undergraduate thesis under the direction of Jeremy King at Clemson.

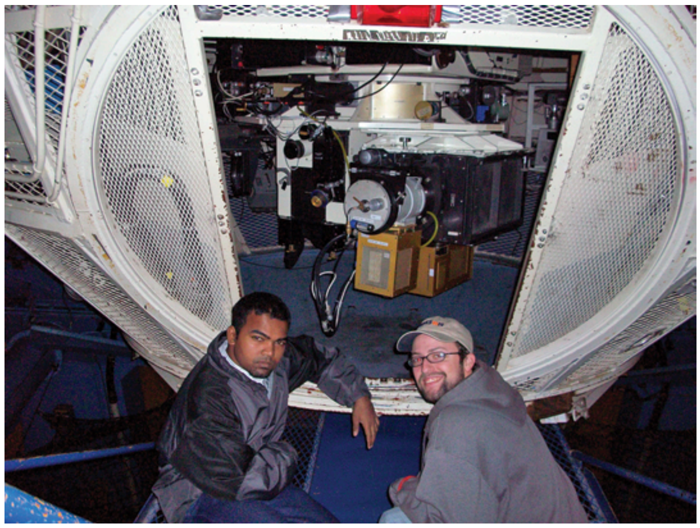


Figure 1: Jared Lalmansingh (left), an undergraduate student in the NSF-funded South Carolina State-Clemson-NOAO PAARE program and Clemson PhD graduate Eric Bubar (right) in front of the echelle Cass cage of the KPNO Mayall 4-m telescope. (Image credit: Don Walter, SCSU.)

Figure 2: Jared Lalmansingh (foreground) and Eric Bubar in the Mayall 4-m telescope control room. (Image credit: Don Walter, SCSU).

continued

Clemson-NOAO Operations Partnership continued

KPNO access under the agreement provided all the data for the recently defended dissertation of PhD student Brian Donehew (Figure 3). He and advisor Sean Brittain have a paper submitted to the *Astronomical Journal* titled "Measuring the Accretion Rate of Herbig Ae/Be Stars" and a second paper in preparation exploring the difference between the accretion process of HAe and HBe stars. Brian's work has shown that the correlation between the luminosity of Br-gamma and the accretion luminosity holds for Herbig Ae stars, but not for Herbig Be stars. Sean brought nine Clemson undergraduate students to observe at Kitt Peak, awarding observing opportunities via competitive mock proposals submitted as part of a junior-level astrophysics class.

Figure 3: Clemson PhD student Brian Donehew fills a dewar at the KPNO 2.1-m telescope. (Image credit: Ginger Bryngelson, Clemson University.)

PhD student Adria Updike and her advisor, Dieter Hartmann, have utilized NEWFIRM and FLAMINGOS imaging from the KPNO 4-m and 2.1-m telescopes to investigate the near-IR properties of GRB afterglows and host galaxies. KPNO 4-m data was utilized in the published determination (A&A 491, L29; 2008) of the photometric redshift of GRB 080514B—the first GRB with an optical afterglow and detected emission >30 MeV. Adria's 4-m and 2.1-m observations also are utilized in nine GCN circulars. Ancillary observing programs provided data for Adria's yeoman service in advising five Clemson undergraduates in creative inquiry projects ranging from star cluster color-magnitude diagrams to novae in M31. Adria brought four of these students and four undergraduates in the Research Experiences for Undergraduates program at the Southeastern Association for Research in Astronomy (SARA) observing with her at KPNO during time secured as part of the cooperative agreement.

Benefits of the cooperative agreement extended beyond the provision of data for graduate student theses and faculty research programs. Roughly a dozen undergraduate students were able to observe at Kitt Peak (Figure 4); two-thirds of these undergraduates were female. Telescope access made possible under the agreement was noted positively in Clemson funding proposals—including the successful Sagan fellowship proposal of PhD student Matt Troutman. Applicants to the Clemson graduate program frequently noted the cooperative agreement as one of their reasons

Figure 4: Three of our Clemson astronomy undergraduates (left to right), Nicole Jackson, Crystal Fordyce, and Laura Laughlin, at the KPNO summit. (Image credit: Sean Brittain, Clemson University.)

for their interest in applying to Clemson. The stream of telescope time strengthened a culture of ground-based observational astrophysics at Clemson complementing the University's long-standing interest and expertise in space-based, high energy observations and theory. Additionally, the telescope access made available under the agreement allowed Clemson students and faculty to initiate, complement, or strengthen collaborations with colleagues at Max Planck Institute for Extraterrestrial Physics, the Thüringer Landessternwarte Observatory (Tautenburg, Germany), University of Illinois Urbana Champagne, Indiana University, University of Arizona, and NOAO.

The highlights above reflect Clemson's productive partnership with a first-class partner in NOAO. For smaller departments/groups like ourselves (five full-time research-active astronomers, 10–15 graduate students) that might consider entering into similar cooperative agreements in the future, our experience suggests several items to be carefully considered in order to ensure a positive outcome: (1) the track record of productivity of the facility, its personnel, and instrumentation; (2) the desired level of activity-passivity in becoming a partner; (3) the necessity of funding to support travel, analysis, and publication after the more difficult task of identifying funding for the operating/capital costs; (4) more telescope time does not necessarily mean more scientific productivity; and (5) how one's participation can add value, beyond financing, to the facility.

While the partnership program that we participated in has now come to an end (i.e., NOAO is not currently entering into such agreements), it succeeded in meeting the needs of both partners and the broader community. The Clemson astrophysics group warmly thanks former KPNO and NOAO directors Buell Jannuzi and Jeremy Mould and NOAO staff members Di Harmer and Dave Bell for their patient, dedicated efforts in nurturing and productively guiding the Clemson-KPNO partnership; the NOAO Tucson and KPNO mountain support staff for their professional service; and the Curry Foundation for their generous financial support of the partnership.

NSSC and the 2011 Seattle AAS Meeting

Ken Hinkle & The NSSC Staff

The scheduling of the winter American Astronomical Society (AAS) meeting coincides with the Gemini proposal Phase II deadline. Most of the NSSC staff will be present at the Seattle AAS meeting. This is an opportunity for us to meet with users of NOAO facilities and, in particular, anyone granted Gemini time to help with Phase II preparation. Many Phase II problems can be quickly resolved in person. The AAS also gives us a chance to meet you, talk about observing with Gemini and other facilities in the NOAO ground-based, optical/infrared system, and talk about reducing your Gemini data. If you have detailed questions contact us in advance. Look for us at the NOAO booth on the exhibits floor.

NOAO Goldberg Fellowship—Who Will Be the Next Goldberg Fellow?

The search is on for the next Leo Goldberg Fellow!

NOAO is soliciting applications for the Leo Goldberg fellowship, a five-year post-doctoral fellowship that is aimed at supporting young astronomers of outstanding promise who have interests in observational astronomy, astronomical instrumentation, or theoretical astrophysics. These fellowships are intended to advance innovative and groundbreaking scientific research, to encourage long-term projects, and to engage talented individuals in the mission that NOAO undertakes on behalf of the astronomical community.

The fellowship may be carried out either at NOAO South in La Serena, Chile, NOAO North in Tucson, Arizona, or a combination thereof. A unique aspect of the fellowship is that the fifth year of the fellowship may be carried out at any US university or astronomical research institute willing to host the Fellow. Goldberg Fellows benefit from NOAO's firm commitment to mentoring its post-doctoral research staff. The fellowship provides a context for designing and executing challenging, long-term research programs and preparing for a career in astronomy.

Applications are due 8 November 2010. Details on the application process and evaluation criteria are described in the Goldberg Fellowship ad in the AAS Job Register. For further information on the fellowship and application process, please contact Joan Najita (*najita@noao.edu*), who heads the NOAO Office of Science.

Goldberg Fellowships have been awarded to Lucas Macri (Texas A&M University), Armin Rest (Harvard University and Space Telescope Science Institute), Gregory Rudnick (University of Kansas), Jennifer Lotz (Space Telescope Science Institute), and Simon Schuler (current Goldberg Fellow at NOAO).

In addition to pursuing their independent research programs, past Goldberg Fellows have had the opportunity to engage in NOAO-related activities such as planning for the Large Synoptic Survey Telescope (LSST), the commissioning of the NEWFIRM wide-field infrared imager, and the characterization of Gemini instrumentation. Goldberg Fellows have also served on NOAO Time Allocation Committees, supervised students in the Research Experiences for Undergraduates program, and worked with University of Arizona staff and graduate students. NOAO-related opportunities for future Goldberg Fellows include LSST development, the Dark Energy Camera and Dark Energy Survey at Cerro Tololo Inter-American Observatory (CTIO), the One Degree Imager at WIYN, and the Kitt Peak Ohio State Multi-Object Spectrograph (KOSMOS).

The Goldberg fellowship program, begun in 2002, is named in memory and honor of astronomer Leo Goldberg, who made distinguished contributions to our understanding of gaseous nebulae and to solar and stellar physics. As Chair of NASA's Astronomy Missions Board (1967–1970), he helped develop a strategic vision that led to a suite of ground-breaking missions that revolutionized solar physics and astrophysics during the ensuing decades.

As Director of Kitt Peak National Observatory (KPNO) from 1971 to 1977, Leo oversaw the commissioning and initial instrumentation of the Mayall and Blanco 4-m telescopes. He also recruited a large number of young astronomers and imbued them with a vision of a national observatory that develops and provides world-class facilities open to all astronomers based on the scientific merit of their proposed research. The astronomers and post-doctoral fellows drawn to KPNO and CTIO by Leo's vision included an incredibly large number of future observatory directors and department chairs whose commitment to superb scholarship and community service owes no small debt to Goldberg.

Throughout his life, Leo was committed to identifying outstanding young scientists, offering them support and opportunities to succeed, holding them to high standards, and encouraging in them the belief that support of broad community interests is both a noble goal and a necessity for progress.

Astronomy Week at the Sells Rec Center

Katy Garmany

Recently, the NOAO Education and Public Outreach (EPO) group was asked by Travis Francisco from the Sells Recreation (Rec) Center on the Tohono O'odham Nation if we could provide an astronomy week program during the week of June 14. As the Rec Center is one of the main activity centers in Sells, we were delighted to work with them. Led by Rob Sparks (NOAO) and Erin Doktor (University of Arizona) who developed the program, we offered four mornings full of activities, a community star party on Thursday evening, and a trip up

continued

Clockwise from top left: Seeing the sun through a solar filter; Patrick Nepsky demonstrates a Fresnel lens to a group of campers; Rob Sparks introduces our sun to the campers; Play-doh planets where everyone makes simple models of the relative size of the planets in our Solar System and Pluto is what is left under your fingernail; Water rockets on a hot day are always a hit; Pye Pye Zaw, introducing the Comet Art project to students, was one of their favorite councilors; Campers build their own Galileoscope; and campers use their Galileoscopes at the Thursday star party. (All images credit: Erin Doktor/NOAO/AURA/NSF.)

Astronomy Week at the Sells Rec Center continued

to Kitt Peak for a daytime tour on Friday. The camp was only possible with the help of the NOAO EPO student workers: Pye Pye Zaw, Patrick Nepsky, and Carmen Austin. And the EPO staff particularly appreciated the help they received from the Sells Rec Center staff.

Every morning the EPO team headed for Sells, where about 20 to 30 children, most between the ages of six and eight, showed up for the morning. There was a different theme each day: the Sun, planets, meteors and comets, and moon formed the week's emphasis. Some of the many activities included using a solar oven to cook apples, investigating ultraviolet beads, launching water rockets, making a dry-ice comet, making moon balls to model lunar phases, and looking at the daytime moon.

On Thursday evening, the star party was made possible with help, and telescopes, by NOAO Electronics Technician Kathy Zelaya, Research Experiences for Undergraduates student Kendra Kellog, and EPO students Emily Berkson and Justin Duffy. Visitors enjoyed seeing the first quarter moon, Saturn, and M13.

NOAO already has been asked if we can repeat a program like this in the fall.

Banners Flying from the NOAO Optics Tower

Pete Marenfeld

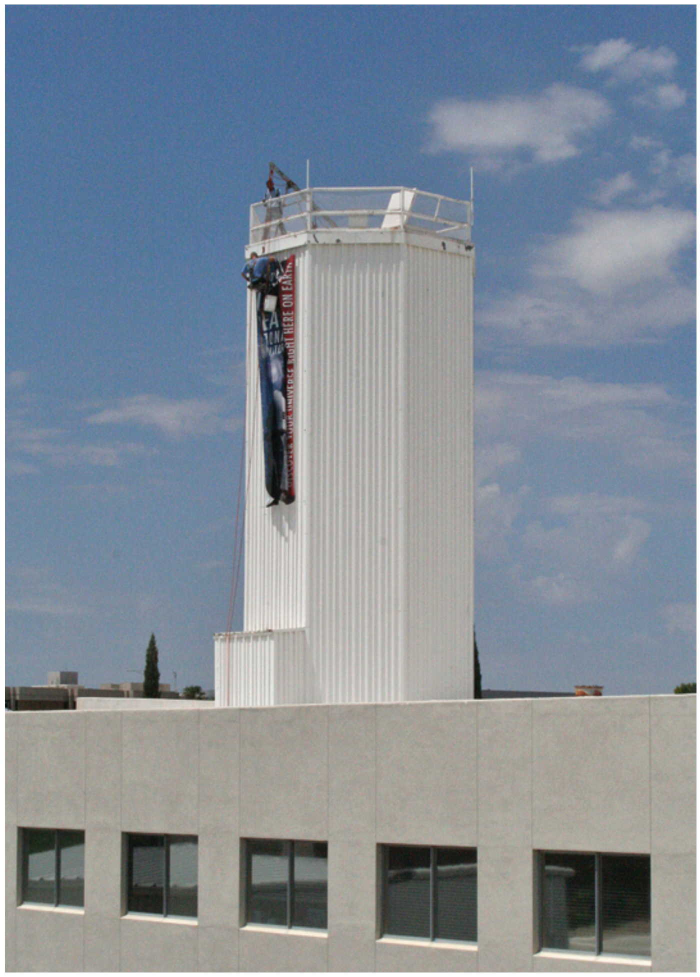
Banner viewed from the front entrance of NOAO North downtown facility. (Image credit: Pete Marenfeld/NOAO/AURA/NSF.)

Banner viewed from the south, visible from the University of Arizona mall. (Image credit: Pete Marenfeld/NOAO/AURA/NSF.)

continued

Banners on NOAO Optics Tower continued

KPVC banner, visible from the Hillenbrand softball stadium to the east of NOAO. (Image credit: Pete Marenfeld/NOAO/AURA/NSF.)



Installing the banners. (Image credit: Pete Marenfeld/NOAO/AURA/NSF.)

Look up as you approach the NOAO North building these days; three banners are now hanging from the optics tower at the downtown facilities. The banners are part of an ongoing effort to better brand NOAO locally and to increase visitation to our public programs on Kitt Peak. Anyone who works for NOAO has experienced the blank stare when they tell someone where they work. Or worse: "Oh, yes, NOAA. Don't you forecast hurricanes?" An explanation often elicits a comment, "Oh, you're part of the University of Arizona, aren't you?" These banners are an attempt to clear up some of this confusion.

The three banners showcase NOAO North with images of the Kitt Peak Mayall 4-m telescope, NOAO South with the CTIO Blanco 4-m telescope, and the Kitt Peak Visitor Center (KPVC). They are made from an outdoor mesh and are expected to hold up through any Tucson weather. This is being tested by the current monsoon season. NL

Advanced Astronomy Campers Converge for a Week of Research at KPNO

Don McCarthy (University of Arizona)

For the second consecutive year, Kitt Peak hosted the Advanced Astronomy Camp (Figure 1), and high school students from around the world assembled on the mountain for a week (June 14–22) of multi-wavelength studies of astronomical objects. This year's group included 25 students from 16 states and the countries of India, Singapore, and Costa Rica. These students were mentored by 13 staff members, consisting of faculty from several institutions—Eric Hooper (University of Wisconsin-Madison), John Moustakas (University of California San Diego), and Craig Kulesa (University of Arizona)—together with undergraduate and graduate students (several of whom were former Campers) from the University of Arizona, University of Texas at El Paso, Cal Poly Pomona, University of California-Davis, Arizona State University, and Case Western.

Figure 1: 2010 Advanced Astronomy Camp students at Kitt Peak summit.

Now in its 23rd year, Astronomy Camp immerses students in the process of astronomical research as a means of encouraging them to further their education in science, technology, engineering, and math-related studies and careers. This process models the typical flow of research from the inception of ideas to telescope proposals, reviews by an internal Telescope Allocation Committee, scheduling of observations, data analysis, and finally presentation of results. During daytime, Campers participate in interactive lectures, demonstrations, tours, hikes, data analysis, a trip to Mt. Graham International Observatory, and a service project on the mountain. In the words of Camper Maria Herrera (Costa Rica), "Camp is a perfect example of how learning can be completely joined with having fun! It generates knowledge-hunger, curiosity, and good friendships! It was simply awesome!"

This year's Campers began discussing potential projects in an online forum a few weeks before Camp. They converged on twelve projects, including transit of the extrasolar planet TrES-2b, metallicities of stars with and without planets, quasar spectra, spectro-photometric variations of Cyg X-1, molecular mapping at radio wavelengths of planetary and star forming nebulae as well as supernova remnants, BVRI lightcurve of the asteroid (2059) Baboquivari, bulge-to-disk ratios of spiral galaxies vs. Hubble type, etc. Some of the Campers will continue analyzing their data for upcoming science competitions such as the National Young Astronomer Award, won in 2009 by Camper Harry Gaebler, who returned for his third Advanced Camp.

For their research projects, the students' teams utilized a wide variety of facilities and sometimes more than one telescope-instrument combination. The WIYN 0.9-m telescope obtained wide-field CCD images often in narrowband filters, the Bok 2.3-m telescope provided spectroscopy, the 12-m telescope and Submillimeter Telescope (SMT) of Arizona Radio Observatory mapped regions in molecular bands of CO (230 GHz) and HCN/HCO+ (88–89 GHz), the 0.5-m Kitt Peak Visitor Center telescope enabled CCD imaging for lightcurve work and pretty pictures, and the 0.4-m Roll-off-Roof telescope was used for occasional eyepiece observations in between research stints.

One particularly exciting project involved rapid classification of new supernovae as shown in Figure 2. Led by John Moustakas with external assistance from Doug Leonard (San Diego State University), this project obtained spectroscopy of two supernovae that exploded during Camp; one aspect of this project was an aim by the Campers to publish the initial type of the supernovae quickly. The Campers experienced the excitement of modern research as well as the pressure to produce quick results. Although they submitted their results quickly enough, these spectra were unusual and were complicated by light from the underlying galaxy, both of which delayed the analysis, and another research group reported the results before us.

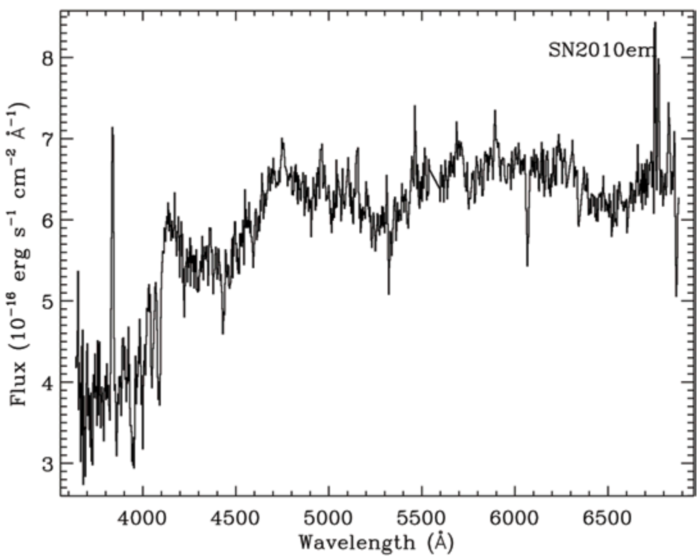


Figure 2: Supernova 2010em was discovered on June 18 by the Lick Observatory Supernova Search team in the faint, late-type disk galaxy UGC 12237. In an effort to classify the new supernova, a group of Astronomy Campers, led by John Moustakas and Kate Brutlag, used the B&C spectrograph at the Bok 2.3-m telescope and obtained the optical spectrum shown above. Unfortunately, contamination from the host Sc galaxy was too severe to obtain a secure classification.

continued

Advanced Astronomy Campers at KPNO continued

Another project involved the lightcurve of a near-Earth asteroid: (2059) Baboquivari. Since this object was ~2 magnitudes brighter this year than in 2009, we obtained higher signal-to-noise photometry with the WIYN 0.9-m telescope. Further analysis will characterize the object's colors and should result in the first taxonomic classification of this object. A movie of the asteroid's path is posted at *zeus.as.arizona.edu/~dmccarthy/ATC10/baboquivari.mpg*.

The 0.5-m Advanced Observing Program telescope at the Kitt Peak Visitor Center was used for both research and picture taking to demonstrate principles of image processing. Figure 3 shows a lightcurve of the transit of the hot-Jupiter planet TrES-2b obtained in the z-filter. It is remarkable—and would have been unthinkable only a few years ago—that teenagers using a modest-sized telescope with an (admittedly, high end) amateur CCD camera could detect a transiting planet with an amplitude of 0.02 mag. Figure 4 shows a wide-field image of the North American Nebula (NGC 7000; IC 5067-70) obtained through an H-alpha filter using the Takahasi 106-mm refractor. We are very grateful to operators Steve Peterson and Flynn Haase for being so willing to interact with the students and for their guidance in using the telescope optimally.

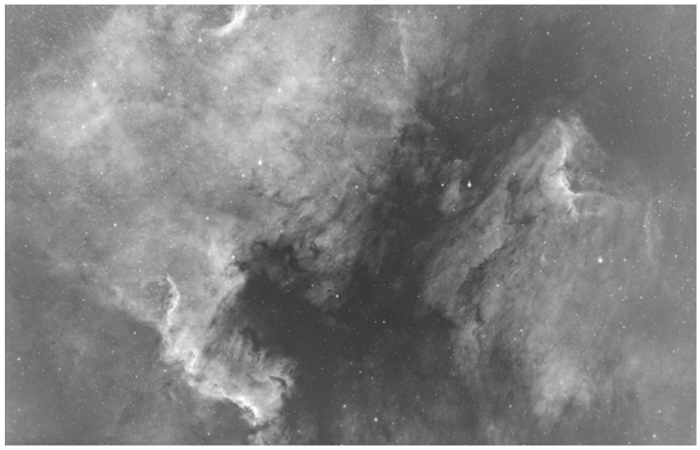


Figure 4: A wide-field image of the North American and Pelican nebulae (NGC 7000; IC5070) obtained in the emission of hydrogen-alpha. This image was obtained from the Takashi refractor mounted on the Kitt Peak Visitor Center 0.5-m telescope as part of the Advanced Observing Program of KPNO.

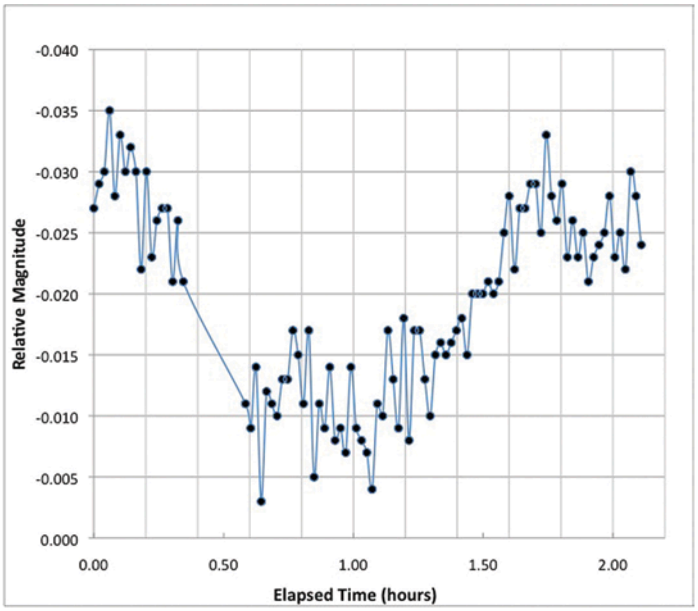


Figure 3: Lightcurve of the transiting, hot-Jupiter planet TrES-2b obtained at the Kitt Peak Visitor Center 0.5-m telescope in a z-band filter. The data gap from 0.3–0.6 hours was caused by repositioning of the telescope at meridian crossing.

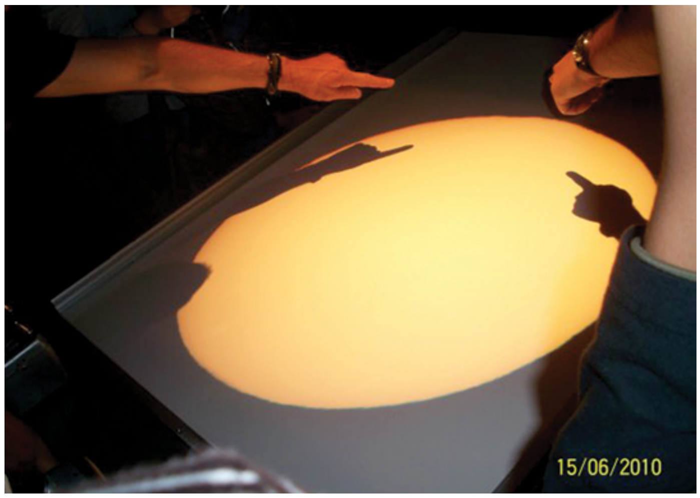


Figure 5: Sunset viewed via the main beam of the McMath-Pierce Solar Telescope. The dynamic effects of atmospheric refraction and dispersion, airplane transits, and coloration of sunspots provided lessons in basic physics and astronomy. (Image credit: Maria Herrera.)

An unusually fun and educational experience came each night while watching sunset through the main and auxiliary beams of the McMath-Pierce Solar Telescope. Each observation provided opportunities to discuss a variety of solar and atmospheric phenomena (Figure 5). Also, airplanes were visible as they transited across the Sun, sometimes showing their contrails either during transit or as they egressed the limb. A particularly unexpected phenomenon, first noticed by Camper Zoey Martin-Lockhart, was associated with the chromatic dispersion of the solar image; sunspots displayed the opposite orientation of color separation from the overall solar disk. Counselor Brandon Swift figured out an explanation, which we would be happy to share with anyone interested. Claude Plymate from the National Solar Observatory went out of his way to facilitate our use of the telescope and also provided several in-depth tours of the facility.

During the week, Astronomy Campers also interacted with scientists from other institutions, heard an inspirational talk by David Levy at the 2.3-m telescope, merged the science of star formation with organ music during a presentation by graduate student Matthew Whitehouse, splurged in the gift shop, took a daylong trip to Mt. Graham to experience the Large Binocular Telescope and SMT, and enjoyed the long-standing tradition of volleyball on the mountain after removing weeds and dirt from the court as part of a daily service project.

We are thankful for the hard work, patience, and gracious support provided by Mike Hawes and his dedicated staff as well as Hillary Mathis, Bob Martino, Dave Murray, Casey Muse, Frederick Ramon, Clay Nuñez, Mike Merrill, Bellina Cancio, Debra McQuiston, Nanette Bird, Elizabeth Alvarez del Castillo, Betsy Green, Bill Wood, Dennis Means, Geno Bechetti, Ron Mastaler, Mike Soukup, and Tom Folkers. Astronomy Camp is sponsored by The University of Arizona Alumni Association and has a Web site at *astronomycamp.org*.

Telescope Fund for Kitt Peak Visitor Center

Rich Fedele

For over 46 years, the Kitt Peak Visitor Center (KPVC) has had a rich history providing outreach opportunities for the public. Its 3,400 square feet of space has functioned as part museum, part interpretive center, and part comfort station, along with transitory functions such as an auditorium, classroom, and media center. Over the years, more than two million people have come to learn about the science, history, and mission of KPNO, NSO, NOAO, AURA, and NSF.

For its operations, the KPVC uses earned income generated from gift shop sales, program fees, and donations. Our stargazing program fees account for 50% of the earned income needed to run the visitor center operation.

The visitor center, which receives from 45- to 50-thousand guests annually, is considered to be one of the major niche tourist attractions in Southern Arizona and a unique experience for even seasoned world travelers. The KPVC has received both national and international attention; last year alone the visitor center and its programs were mentioned or written about in *The Miami Herald*, *The Arizona Republic*, *The New York Times*, the *St. Petersburg Times*, *The Dallas Morning News*, *The Washington Post*, and the *Arizona Daily Star*. There were numerous other articles written in smaller publications throughout the US.

All of this attention was focused on our unique and popular Nightly Observing Programs that have been in operation since 1996. The workhorse of this program, our Meade 16-in telescope, has been in service providing images and nightly viewing opportunities for tens of thousands of guests. Rebuilt twice, this amateur telescope is worn out and needs to be replaced.

We have started down an ambitious path to raise the $126,000 needed for a replacement telescope and mount. The only way we can afford to purchase a new telescope is through donations.

With a new telescope, we can ensure our public observing programs remain vibrant. We have had adults return and share stories of visiting Kitt Peak as children and the impact it made—an indelible impression. They bring their families and share their enthusiasm for our programs. With your support, we can ensure that thousands more guests will be able to capture their moment of awe, bringing their stories to friends and families and inviting them to visit the world's largest working astronomical observatory. Most importantly, we can continue to inspire children, feeding their inquisitive nature to look up at the night sky and wonder.

Our mission at the Kitt Peak Visitor Center is to "inspire a sense of wonder and knowledge about the Universe, through exhibits, tours, and public programs." We do that well. Quality public outreach can spark the minds and imaginations of generations to come. One spark can ignite a firestorm of curiosity; we provide that spark for tens of thousands of people.

For more information or if you are interested in making a tax-deductible contribution to this important fund, please contact Rich Fedele at *rfedele@noao.edu* or call 520-318-8163.

Herman Ramon Retires after 40 Years with KPNO

John Dunlop & Mike Hawes

Herman Ramon recently retired after working 40 years in support of the Kitt Peak facility. Herman joined the Kitt Peak Facilities staff in July of 1960 and was actively involved in numerous projects on the mountaintop site. His carpentry and building skills were utilized extensively throughout his career on both large and small installation and improvement projects. Herman helped to fabricate numerous furniture and cabinet units around the mountain as well as the construction of the enclosure for the aluminizing chamber at the Mayall 4-m telescope.

Herman came to Kitt Peak after serving in the Army and proceeded to help build several large structures around Kitt Peak such as the Emergency Center and the main ramada in the picnic grounds. Herman also helped to build the console rooms that many astronomers have used over the years at the 2.1-m and 4-m telescopes. Very skilled at masonry work, many such efforts of his are evident around the grounds.

Throughout his long service to the National Observatory, Herman was a talented individual who continuously helped to improve the appearance of the facility and public areas. Herman also was very active in his District's activities for the Tohono O'odham Nation. His dedication to Kitt Peak will be missed and we wish him well in this new phase of his journey.

Cheryl Marks Joins Kitt Peak Support Office

Nanette Bird

The Kitt Peak Support Office welcomes Cheryl (Cheri) Marks as our new part-time Office Assistant. Cheri is teaming up with Nanette Bird and Bellina Cancio in supporting the KPNO, WIYN, and NSO observers before, during, and after their observing runs. While Cheri is getting acquainted with her new responsibilities, any questions regarding dorm availability, shuttles to Kitt Peak, and general observer support, should be directed to Bellina (*bcancio@noao.edu*) or Nanette (*nbird@noao.edu*). Welcome aboard Cheri!

New Scientific Staff Coming to CTIO

Robert C. Smith

At the end of this year, Dr. David James will join the NOAO scientific staff at CTIO in La Serena. David is currently an assistant professor at the University of Hawai'i at Hilo, and is director of the Hoku Ke`a Observatory on top of Mauna Kea. He is overseeing the final phases of the construction and instrumentation of the Hoku Ke`a telescope, a new 0.9-m telescope on Mauna Kea to replace the original 0.6-m one (which was the first astronomical telescope on the mountain). He has been a frequent observer at CTIO and KPNO, pursing an active research program in the fundamental properties of solar-type stars and nearby star-forming regions. Before going to Hawai´i, David spent four years at Vanderbilt University where, in addition to his lecturing duties and research, he served as the director of the Fisk/Vanderbilt outreach program, presenting over 600 portable planetarium shows to school-age children in the area.

Staff Changes at NOAO North and South

(15 February–31 August)

New Hires

Cerda, Diego	Instrument Maker 5, Instrument Shop (temp.)	NOAO South
Correa, Ana Maria	Accountant 5, Administrative Services (temp.)	NOAO South
Dubois, Ross	Public Program Specialist, Kitt Peak Visitor Center	NOAO North
Hernandez, Rodrigo	Assistant Observer, SMARTS (temp.)	NOAO South
Lee, Brittany	Weekend Supervisor, Kitt Peak Visitor Center	NOAO North
Marks, Cheryl	Office Assistant, Kitt Peak Support Office	NOAO North
Noriega, Vina	Gift Shop Cashier, Kitt Peak Visitor Center	NOAO North
Nunéz, Clay	Cook, Kitt Peak	NOAO North
Olsen, Margaret	Gift Shop Cashier, Kitt Peak Visitor Center	NOAO North
Ramon, Frederick	Cook, Kitt Peak	NOAO North
Seron, Jacqueline	Web Design (temp.)	NOAO South
Wiest, Heather	Shipping/Receiving Clerk, Central Facilities	NOAO North
Barringer, Daniel	KPNO REU summer student	NOAO North
Byler, Eleanor	KPNO REU summer student	NOAO North
Hawkins, Keith	KPNO REU summer student	NOAO North
Kislak, Michelle	KPNO REU summer student	NOAO North
Merritt, Allison	KPNO REU summer student	NOAO North
Morrison, Sean	KPNO REU summer student	NOAO North

Promotions

Aguirre, Ricardo	Admin. Specialist 3 (La Serena & Mountain Mgr. of Operations)	NOAO South
Aguirre, Samuel	Commissaryman 2 (Head of Kitchens on Tololo and Pachón)	NOAO South
Bird, Nanette	Administrative Assistant III	NOAO North

continued

Staff Changes at NOAO continued

Cancio, Bellina	Administrative Assistant I	NOAO North
Lewis, Anjie	Accounting Specialist	NOAO North
Matheson, Tom	Associate Astronomer	NOAO North
Najita, Joan	Head of Program, Office of Science	NOAO North
Olsen, Knut	Head of Program, System User Support	NOAO North
Saha, Abi	Interim Associate Director of NOAO for Kitt Peak National Observatory	NOAO North

New Positions

Price, Jane	Administrative Coordinator, NSSC	NOAO North

Retirements/Departures

Adams, Sally	Administrative Assistant (NSSC), retired	NOAO North
Bogglio, Hector	Administrative Specialist 6	NOAO South
Cuello, Herman	Gasfitter (temp.)	NOAO South
Glaspey, John	Visiting Astronomer, retired	NOAO North
Guerra, Erwin	Janitor (temp.)	NOAO South
Harrison, Craig	Research Associate Postdoc	NOAO South
Huanchicay, Eduardo	Lead Telescope Mechanic, retired	NOAO South
Jacoby, George	Astronomer, retired	NOAO North
Keitges, Ben	Public Program Specialist	NOAO North
Lazo, Javier	Administrative Specialist 7 (temp.)	NOAO South
Morse, Kristen	Accountant	NOAO North
Narbona, Jeanette	Administrative Specialist 7 (temp.)	NOAO South
Nielsen, Danielle	Research Assistant	NOAO South
Pasten, Victor	Instrument Maker 1, retired	NOAO South
Ramon, Herman	Craftsperson (KPNO), retired	NOAO North
Rivera, Mario	Designer Drafstman (temp.)	NOAO South
Rojas, Ramon	Janitor (temp.)	NOAO South
Varas, Ricardo	Driver (temp.)	NOAO South
Velasquez, Jose	Assistant Observer (SMARTS)	NOAO South

Deaths

Haid, Dennis	Part-time bus driver for Kitt Peak	NOAO North
Irvine, Jim	Senior Instrument Maker	NOAO North
Lawrence, Randy	Sub-awards & Contracts Officer	NOAO North
Petri, Arden	Retired, former NOAO Technical Associate	NOAO North

2010 AURA Awards

AURA Award – Service	Garmany, Katy	NOAO North
AURA Award – Service	Norman, Dara	NOAO North

2010 NOAO Awards

Excellence Award – Science	Walker, Alistair	NOAO South
Excellence Award – Service	Bird, Nanette	NOAO North
Excellence Award – Service	Clemons, Dawn	NOAO North
Excellence Award – Service	Gregory, Brooke	NOAO South
Excellence Award – Service	Phillips, Jim	NOAO North
Excellence Award – Service	Rivera, Rossano	NOAO South
Excellence Award – Team	*Blanco Mirror Support Upgrade Team*: Tim Abbott, Alfonso Cisternas, Fabián Collao, Brooke Gregory, Andés Montané, Juan Orrego, Victor Pastén, Victor Pinto, Victor Robledo, Roberto Tighe, Pedro Vergara	NOAO South
Excellence Award – Team	*Computer Infrastructure Services*: Dave Bell, Frank Bull, Mike Fleming, Iain Goodenow, Steve Grandi (Mgr.), Sue Hayes, Mike Peralta	NOAO North