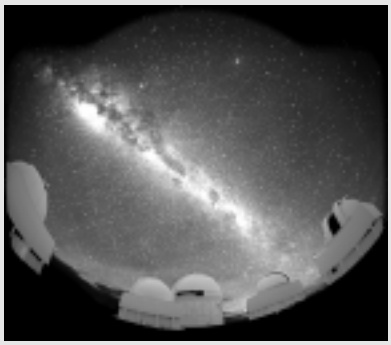

CTIO

OPERATIONS

SOAR Construction Progressing on Schedule

Steve Heathcote and Tom Sebring

The SOAR telescope project passed an important milestone at the end of April with completion of the primary mirror blank. At the same time, visible progress is being made on the construction of the observatory facility on Cerro Pachón. The SOAR (SOuthern Astrophysical Research) Telescope is a joint project involving Brazil, U. North Carolina at Chapel Hill (UNC), Michigan State U. (MSU), and NOAO. The goal is to construct and instrument a 4.2-m telescope offering the highest possible image quality over a tip/tilt corrected field of view about 7′ in diameter. For a brief description of the SOAR telescope and its instrumentation, see *NOAO Newsletter* No. 59; a detailed account may be found in a comprehensive series of papers presented at the Munich SPIE meeting (*http://www.noao.edu/soar*).

The SOAR primary mirror blank was fabricated from ULE low-expansion glass at Corning's Canton, New York, plant using the same production techniques and equipment employed to manufacture the blanks for Subaru and the two Gemini telescopes. It is 4.3 m in diameter, 104 mm thin, and weighs approximately 3200 Kg . The ULE material was purchased as long ago as 1990, but remained in storage for almost a decade while the SOAR consortium undertook the grueling process of raising construction funds for the telescope. The primary was fabricated from hexagonal segments sawn from the ULE boules, tiled together, and then fused at high temperature to form an essentially seamless disk. The layout of the segments within this mosaic was carefully

Within its steel shipping container, the new SOAR Telescope 4.3-meter mirror blank is ready to go to Raytheon in Danbury, Connecticut, for polishing and figuring. Representatives of the SOAR Partners were at Corning's Canton, New York, facility to celebrate completion of the blank. From left to right are: Bruce Carney (UNC); Eugene Capriotti (MSU); Paul Hunt (MSU); Steve Heathcote, the new SOAR Director; Charles Evans (UNC); Henry Cox (UNC alumnus); and Wayne Christiansen (UNC).

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chosen in order to balance any small differences in their coefficient of thermal expansion, thus minimizing thermal distortions of the finished mirror. The substrate was then plano-ground to the correct thickness, heated once more, and allowed to sag over a form to create a meniscus of the required radius of curvature. Then it was carefully annealed to relieve stresses. Finally, both faces of the meniscus were coarse-ground and acid etched to prepare for the subsequent polishing of the mirror. This fabrication process was completed at the end of April, when members of the SOAR project team and representatives from the US partner institutions gathered at Corning's facility to celebrate this important event. The finished primary blank has now been shipped to Raytheon's plant in Danbury, Connecticut, where the mirror will be fine-ground and polished. The blanks for the secondary and tertiary mirrors (both of which are monolithic structures made from the same batch of ULE as the primary) were delivered by Corning in December 1999.

Meanwhile, the observatory facility building on Cerro Pachón is beginning to take shape. The foundations for the dome and adjacent support building are two-thirds complete, and the pier that will support the telescope mount is nearing completion. The enclosure is now distinctly visible from Cerro Tololo. However, it is not necessary to travel to Chile to watch SOAR take shape. Thanks to SOARCam, one can now view the ongoing construction work by accessing ***http://www.physics.unc.edu/~evans/soarcam/soarcam.html***.

SOARCam is a closed-circuit TV camera, equipped with a long-focus zoom lens, mounted on the side of the Gemini South enclosure some 400 m from the SOAR site. SOARCam, assembled by Charles Evans, was made possible by a donation from UNC alumnus Dr. Henry Cox.

Contracts for all the major subsystems of the telescope and enclosure have now been let. The

Malcolm Smith and Steve Heathcote stand in front of the pier that will support the SOAR telescope. In mid-April 2000 the concrete work for the lower half is complete, with the forms in place to the full height of the pier. The Gemini South dome is seen in the background.

Active Optics System, which includes polishing of the mirrors and fabrication of their active support system, will be executed by Raytheon. The mount, which will be manufactured by RSI Universal Antennas of Richardson, Texas, has successfully passed critical design review and has entered the production phase. Funding has now been secured for three of the four first-generation instruments—the optical imager being built at CTIO under the supervision of Alistair Walker; the Goodman high-throughput optical spectrometer being built by UNC and Brazil under the direction of Chris Clemens; and the IFU-fed, Bench Mounted Optical Spectrometer to be built in Brazil by a group led by Jaques Lépine.

Funding is still being sought for the fourth instrument, a 2K×2K pixel near-IR imager to be built at Michigan State U. under the leadership of Ed Loh.

The project remains on track towards first light in July 2002 and the beginning of routine scientific operations in mid-2003.

CTIO's Web Page: Your Resource for Proposals, Travel, and Observing at CTIO

Knut Olsen

If you plan to visit CTIO to observe, or are just thinking about submitting a proposal, CTIO's web page is the place to start (see accompanying table for URL addresses). Even if you've been to CTIO before, visit the site to get the latest updates on telescopes, instrumentation, and travel information.

Want to submit a proposal? As for time on all telescopes scheduled through NOAO, CTIO proposals are handled through NOAO's main web page. First, get the forms. Next, you can find details of the telescopes and instruments you wish to use by following the links on the CTIO main page. The Mosaic II and Hydra pages, in particular, have recent updates—Hydra's new camera is expected to be available next semester and the 16-channel readout mode with Mosaic II is undergoing testing. There is also a growing Mosaic II FAQ archive.

Once proposals have been reviewed by the TAC and scheduled at CTIO by Tom Ingerson, you'll find copies of the schedule at both the NOAO web site and the CTIO web site, which are both linked to CTIO's main page.

So you've been granted telescope time? Congratulations! CTIO's web page contains resources to help you plan your travel and your observing run. Under "Observer Resources" on CTIO's main page, click on "Preparing for an Observing Run." The "Travel Information" link points to much of the information that you will need when traveling to Chile. Also look closely at "Bruce Balick's Airport Survival Guide," which contains important tips on how to pass through the airport in Santiago with the least hassle.

Next, follow the "Observing Resources and Forms" link from CTIO's main page. *Be sure* to fill out the Visitor Support and CTIO Travel Information Questionnaires as these forms allow CTIO staff to prepare for your arrival.

Bringing a laptop? Be sure to read "CTIO Visitor Computer Guidelines." In La Serena and looking for a place to eat dinner? Check out the restaurant guide.

At the telescope, CTIO's web page will continue to be a valuable resource. You'll probably want to bring up the online instrument manuals, found by following the links under "Telescopes and Instruments" from the main page. If you're using an infrared instrument, Bob Blum's "Infrared Observing Page" is especially useful. To see the latest seeing measurement from the seeing monitor, follow the link under "Observing Resources."

Thanks to Max Boccas, you can now see the latest reflectivity measurement of the telescope's primary mirror, updated bi-weekly at the 4-m and monthly at the 1.5-m. Visit the optical engineering page, accessible from the "Telescopes at CTIO" link, for these values. Weather maps are useful, or maybe you want to know whether that tremor you just felt was real or the result of too much coffee—follow the link under "General Information" on the main page.

CTIO's web page is maintained by Tom Ingerson and Chris Smith.

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ITEM	ADDRESS
CTIO Web Page	*http://www.ctio.noao.edu*
NOAO Proposal Forms	*http://www.noao.edu/noaoprop/noaoprop.html*
CTIO Telescopes & Instruments	*http://www.ctionoao.edu and follow the links*
CTIO Telescopes Optical Engineering	*http://www.ctio.noao.edu/telescopes/opteng/optics.html*
CTIO Mosaic II FAQ Archive	*http://www.ctio.noao.edu/mosaic/faqs/*
NOAO Observing Schedule	*http://www.noao.edu/ctio/forms/tel_sched/*
CTIO Observing Schedule	*http://www.ctio.noao.edu/schedule/*
CTIO Observing Resources & Forms	*http://www.ctio.noao.edu/obsaid/obsaid.html*
CTIO Observer Resources, Preparing for an Observing Run	*http://www.ctio.noao.edu/misc/observer_info.html*
CTIO Infrared Observing Page	*http://www.ctio.noao.edu/instruments/ir_instruments/observe/ir_obs.html*
CTIO Seeing Resources	*http://www.ctio.noao.edu/htbin/wwwseeing*
CTIO Travel Information	*http://www.ctio.noao.edu/diroff/obser_trav.htm*
CTIO Airport Survival Guide	*http://www.ctio.noao.edu/misc/airport_charges.html*
CTIO Visitor Support Form & CTIO Travel Form	*http://www.ctio.noao.edu/forms/visitor_support.html* *http://www.ctio.noao.edu/forms/itinerary.html*
CTIO Visitor Computer Guidelines	*http://www.ctio.noao.edu/sys/usys.html*
CTIO Weather & Related Information	*http://www.ctio.noao.edu/site/environment.html*
CTIO Restaurant Guide	*http://www.ctio.noao.edu/misc/rest.html*

Undergraduates Enjoy A Busy Summer at CTIO

Donald W. Hoard

CTIO was home for a group of eager students during the Chilean summer (January through March) 2000. While their northern counterparts toiled through another dreary winter of class work, our four NSF-funded Research Experiences for Undergraduates (REU) students got a taste of astronomy research. The 2000 CTIO REU students (and their projects) were:

- Melanie Blackburn (West Virginia): "Dwarf Novae in Globular Clusters" (Advisor: Eric Rubenstein)
- John Bright (Mesa State College): "Globular Clusters in the Sculptor Group" (Advisor: Knut Olsen)
- Ben Johnson (UCLA): "Orbital Period of the Low Mass X-ray Binary X0614+091" (Advisor: Stefanie Wachter)
- Tanya Tavenner (Washington): "Optical Counterparts of X-ray Sources in the SMC" (Advisor: Donald Hoard)

All four CTIO REU students will attend meetings of the American Astronomical Society (two students in June 2000 and two in January 2001) to present poster papers based on their REU projects.

The US undergraduate students were joined by two Chilean masters students in the parallel Programa de Prácticas de Investigación en Astronomía (PIA):

- Axel Bonacic (Pontificia U. Católica de Chile, Santiago): "Peculiar Motion Solutions with a set of SN Ia Distances" (Advisor: Bob Schommer)
- Juan Seguel (U. de Concepción): "Search for Nearby Supernovae" (Advisors: Lou Strolger & Chris Smith)

Two Chilean electronics engineering students doing internships at CTIO also participated in the summer student program:

- Mario Caceres (U. Técnica de Federico Santa María, Valparaiso): "Image Processing and Animation for the Cloud Camera Feasibility Study" (Advisor: Roger Smith)
- Felipe Daruich (U. Católica, Valparaiso): "Study of Vibrations in the Blanco 4-m Telescope" (Advisor: Max Boccas)

The 2000 CTIO REU students on their way to the Humboldt Penguin Preserve at Los Chorros, Chile. From left to right in foreground: Ben Johnson (UCLA), Tanya Tavenner (Washington), John Bright (Mesa State College), and Melanie Blackburn (West Virginia).

In addition to their individual research projects, all of the astronomy students participated in observing runs on Cerro Tololo. These included working in pairs for two nights each of orientation on the Curtis Schmidt telescope with Donald Hoard, REU Site Director (to introduce them to observing techniques, instrumentation, and the CCD control system at CTIO), as well as additional observing runs with CTIO staff members. Other activities

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included weekly scientific seminars presented for the students by the CTIO staff, a "mini-course" on professional and career aspects of astronomy, and a tour of the Gemini South site on Cerro Pachón.

A highlight of the 2000 REU program was participating in the CTIO/ESO/LCO Scientific Meeting "Stars, Gas, and Dust in Galaxies: Exploring the Links," which was held in La Serena in mid-March (see accompanying article). In addition to their scientific activities, the students also made numerous weekend forays into the surrounding countryside, including trips to the Humboldt Penguin Preserve at Los Chorros, Fray Jorge National Park, and the Pisco Elqui region.

Exposure to the international astronomical community and the opportunity to work with scientists and students from other countries are key components of the CTIO REU experience. These young scientists will be part of the next generation of astronomers in an era of international telescope projects. The CTIO REU program offers valuable insight into the operation of a major astronomical observatory. Although not all US students are enrolled in degree programs flexible enough to accommodate an academic-term REU program, for those who are interested in a special opportunity to explore research in an observational and international environment, we offer a unique REU experience. Operating the program during the Chilean summer allows us to provide a rich scientific and educational program for both Chilean and US students.

We are now starting to plan for next year's REU program, which will run from January through March 2001. Look for announcements in future newsletters and check the CTIO REU Web page for the most up-to-date news and information about the program (*http://www.ctio.noao.edu/REU/reu.html*).

Astronomers Talk Stars, Gas, and Dust

Knut Olsen

More than 100 astronomers gathered in La Serena March 15–18 to attend the 2000 CTIO/ESO/LCO Workshop "Stars, Gas, and Dust in Galaxies: Exploring the Links." The program was designed to give a comprehensive overview of the physics of galaxies through three days of oral reviews and oral and poster contributions, and to promote lively interdisciplinary exchanges through a day of "town meeting"-style discussion on questions submitted in advance by the attendees. By all accounts the workshop was a success. Gerhard Hensler provided the introduction and did an admirable job of taking on an extra review on a day's notice. The program began with reviews and contributions on the interstellar medium, then moved to stellar populations and their interaction with the ISM, and ended with large-scale phenomena such as galaxy interactions and galactic winds and outflows.

While the bottom-up approach led naturally to a focus on the more easily studied nearby galaxies, reviews and contributions on the study of the integrated properties of galaxies brought distant galaxies under the program's umbrella. Dennis Zaritsky's closing remarks on mass budgets in galaxies discussed dark matter halos and placed the program in a cosmological context.

Friday night's late-night dinner and salsa party did not stifle the next day's open discussions. Four working group leaders—Pierre Cox, Sally Oey, Eva Grebel, and Fabienne Casoli—led the discussions with attendants' "burning questions," which spanned topics from individual stars to distant galaxies. A final panel was asked to make predictions on what the next 10 Gyr will look like; most of them demurred, preferring to speculate on what the next 10 years of astronomical research will bring.