In April and May, the Blanco 4-meter telescope was closed down for one of its longest and most ambitious shutdowns to date. The primary goal was to fix a long standing issue in which the radial supports would fail, at the rate of about one a year, resulting in small, but uncontrolled and unpredictable movements of the primary mirror in its cell. In addition, this shutdown was part of an ongoing effort to prepare the Blanco for the arrival of the Dark Energy Camera (DECam), optimizing it for survey use and to obtain the highest quality images.

All 24 radial support mounting brackets were replaced with those of a new, stronger design and were re-sited over fresh, undamaged glass. Very close attention was paid to mechanical alignment and tuning. All 96 bearings were replaced. We also produced and installed a set of radial definition units incorporating load cells to constrain any residual movements of the primary on its cell.

It is no exaggeration to suggest that this system has the complexity of a Swiss watch and more, and this shutdown was the culmination of many months of study and preparation. It seems to have paid off because the amplitudes of movements of the primary mirror have been reduced from around 2 millimeters to less than 0.25 millimeters. Importantly, these remaining movements appear to be at least partially predictable, allowing for compensation via the active alignment controls of DECam.

Initial optical tests showed the presence of previously unseen quadrafoil distortion, which we traced to the new radial definition units. This was disappointing and forced us to back them off so that they act as soft stops against any future primary mirror movements, but this was not before they had performed a valuable task of demonstrating that the counterweight system is very precisely balanced with residual errors of around 30 kilograms out of 15,000 kilograms.

It was planned to re-aluminize the primary mirror during this shutdown, but problems with the chamber made the acquisition of a coating of suitable quality unreliable, and it was decided to defer this step until next year. We do not consider this to be a critical problem as our program of wet-washing and CO₂ cleaning of the primary mirror appears to have produced a near-constant reflectivity after the first year’s inevitable decline following a fresh re-aluminization.

Overall, we believe this shutdown has been very successful and a significant step towards our goal of achieving the telescope’s full potential as an observing instrument, and we are grateful for our observers’ forbearance as we pursue it.
SAM: The Push to First Light

Brooke Gregory & The SAM Team

Since the early days, prior to the first conceptual design of the SOAR Adaptive Module (SAM), the project schedule has suffered a number of extensions to the expected pace of development. Since September 2007, however, we have been on track for a first light mid 2009; since December 2008, it has been on the calendar of SOAR. That deadline is now upon us.

The initial integration of the SOAR system in the laboratory (with satisfactory tests of closed loop performance and flexure) was declared to be complete in December 2008. At that point, the instrument was completely dismantled and sent back to the shop for anodizing and painting, as well as to make a number of modifications developed on the basis of experience with the instrument during integration and testing.

SAM re-emerged in April and final integration began. The last few weeks have been devoted to generating punch lists, which have grown faster than they shrank.

• In recent months a noise developed in the deformable mirror which necessitated urgent consultation with the mirror manufacturer, CILAS, as to the cause. This behavior has been observed as well at the Very Large Telescope and requires a modest tightening of the internal mounting screws.
• The week of July 20, the optical high-resolution camera (which will be used for instrument verification on the telescope) was incorporated in its final configuration for the first time, and optical tests indicated that a 60 percent Strehl was achieved. This involved another first: the non-common path errors were measured and quickly compensated for with small offsets in the wavefront sensor software.
• July 29, the environmental shutter (to protect the optics from dust and nesting birds) operated successfully for the first time.

In the end, the tendency of the list to shrink gained the upper hand, and we moved ahead with the final preparations for first light. SAM was moved out of the lab (it fit through the door after all), was placed in a big wooden shipping container, left its birthplace, and made its way up the mountain to its new home. It was lifted up to the Optical Nasmyth platform, fitted to the Instrument Support Box (especially modified in June to accommodate SAM), and cabled into the SOAR telescope.

Note added in press: SAM sees first light on 6 August 2009. Read Currents for updates on SAM.

Spartan Infrared Camera Commissioning Update

Jayadev Rajagopal, Steve Heathcote, Sean Points (CTIO/SOAR) & Ed Loh (Michigan State University)

We last reported on the commissioning of the Spartan Infrared Camera on SOAR in the March 2009 issue of the NOAO/NSO Newsletter. Spartan’s focal plane has four “Hawaii-II” 2048 × 2048 pixel HgCdTe detectors, with two plate scales offering angular resolution up to 43 milliarcseconds per pixel and a field of view up to 5 × 5 arcminutes. Commissioning has been progressing on schedule. In May, we replaced one of the engineering-grade detectors with a science-grade detector and added a set of narrowband filters. We tested Spartan in this configuration through June. During July 20–24, we opened up the instrument once more to add in the last of the four detectors and complete the complement of filters for the near future. We now have, in addition to broadband Y, J, H, and K, line and continuum filters covering Br-gamma, Fe II, H2, CO, He I and C IV. The instrument is now ready for further characterization, this time in its complete configuration. Although things are bound to get a little hectic with the arrival of the SOAR Adaptive Module, in August and the scheduled aluminizing run for the primary mirror, we are optimistic about having Spartan available for the community, at least on a shared-risk basis, by the 2010A semester.

Farewell & Welcome—Staff Changes at CTIO

Chris Smith, Brooke Gregory & Nicole van der Bliek

On 1 October 2009, Andrea Kunder and John Subasavage will start at CTIO as postdoctoral fellows. John will be the first CTIO/SMARTS Postdoctoral Fellow, specifically supporting the small telescopes on Cerro Tololo on behalf of both CTIO and the Small and Moderate Aperture Research Telescope System (SMARTS) consortium. Andrea will be a CTIO Postdoctoral Fellow, and she will participate in more general CTIO support.

John Subasavage obtained his PhD from Georgia State University in 2007, where he was involved with the Cerro Tololo Inter-American Observatory Parallax Investigation (CTIOPI) project since his arrival in 2000. John’s research is focused on nearby stars and, in particular, white dwarfs, for which he makes ample use of the SMARTS telescopes. For example, medium resolution spectroscopy obtained at the 1.5-meter telescope was used to identify previously unknown, nearby white dwarfs. Subsequently, accurate V-, R-,
and I-band photometry of these newly identified white dwarfs, obtained at the 0.9-meter, was used in combination with the 2-Micron All-Sky Survey J-, H-, and K-band photometry and model atmospheres to determine "photometric" distances of these newly identified white dwarfs. In 2007, John became the 0.9-meter coordinator for the SMARTS consortium, and at CTIO, he will spend 50 percent of his time supporting the SMARTS telescopes and being the CTIO liaison to the SMARTS consortium.

Andrea Kunder recently obtained her PhD from the Dartmouth College Physics & Astronomy Department. Her thesis is an investigation of the formation of the Milky Way and the structure of the Galactic Bulge using RR Lyrae stars, which are Population II standard candles. Andrea spent two summers at the Lawrence Livermore National Lab working with massive compact halo object (MACHO) data, in which she compiled a catalog of 3700 RR Lyrae stars. During her astronomy career, she has especially enjoyed working with astrophysicists at institutes in Germany, Hungary, and, most recently, India. We are looking forward to their contributions, both in support of activities on the mountains and in enriching the scientific and general staff environment in La Serena!

On July 8, Edgardo Cosgrove quietly retired from the staff of CTIO & SMARTS Telescope Operations after 35 years of service to the observatory. He helped generations of astronomers use photographic plates, photoelectric photometers and teletypes, filters, prisms and gratings, image intensifiers, videoconferences, CCDs, and exotic infrared detectors. When SMARTS was created he was key, with Arturo Gomez, in making it a success. Edgardo was trained as a teacher of chemistry, and as such he was an enthusiastic educator of new observers at Tololo and of new colleagues in TELOPS. He set an example, which will be missed, in providing helpful documentation of instruments, telescopes, and procedures. His colleagues on the summits and in the offices of the observatory wish him the best in his retirement years.

Students Wanted for 2010 CTIO REU Program

The Cerro Tololo Inter-American Observatory (CTIO) offers six undergraduate research assistantships in La Serena, Chile, during the northern winter semester through the NSF-funded Research Experiences for Undergraduates (REU) program. The CTIO REU program provides an exceptional opportunity for undergraduates considering a career in science to engage in substantive research activities with scientists working at the forefront of contemporary astrophysics.

Student participants will work in close collaboration with members of the CTIO scientific and technical staff on specific research projects, such as galaxy clusters, gravitational lensing, supernovae, planetary nebulae, stellar populations, star formation, variable stars, and interstellar medium. The CTIO REU program emphasizes observational techniques and provides opportunities for direct observational experience using the state-of-the-art CTIO telescopes and instrumentation.

Participants must be enrolled as full-time undergraduate students during the REU program and must be citizens or permanent residents of the United States.

The program will run for 10 weeks, from approximately 11 January to 22 March 2010. A one-week observing run on Cerro Tololo, a three-day field trip within Chile, and attendance at the 2011 American Astronomical Society conference in Seattle, WA, are included in the program. In addition, a modest stipend and subsidized housing are provided.

Complete applications, including applicant information, official transcripts, and two or three letters of recommendation should be submitted no later than 9 October 2009.

For more information (and an application), please check www.ctio.noao.edu/REU/reu.html. Women and candidates from underrepresented minorities particularly are encouraged to apply.