Fulfilling one of its central operational goals in a big way, the Southern Astrophysical Research (SOAR) telescope on Cerro Pachón in Chile made the first observations of the glowing remains of the most distant explosion ever seen in the Universe. The international telescope then provided the first accurate measurement of the incredible distance of this explosion, which earned SOAR a feature role in worldwide media coverage of the discovery.

A network of observers, led by Daniel Reichart and his team from the University of North Carolina at Chapel Hill (UNC), used the Ohio State InfraRed Imager/Spectrometer (OSIRIS), instrument on the SOAR telescope to detect the afterglow of the gamma-ray burst, just three hours after NASA’s SWIFT spacecraft discovered the burst using its gamma-ray and X-ray output.

This powerful burst, detected on September 4, marks the death of a massive star and the birth of a black hole. The event comes from an era soon after stars and galaxies first formed, about 500 million to one billion years after the Big Bang. Named GRB 050904, the object has a redshift of 6.29, which translates to an age of about 13 billion years. (The Universe is thought to be 13.7 billion years old, and the previous most distant gamma-ray burst had a redshift of 4.5). The GRB 050904 burst was very long in duration lasting over 200 seconds, while most bursts last only about 10 seconds.

The observer, Reichart, is director of the Panchromatic Robotic Optical Monitoring and Polarimetry Telescopes (PROMPT), a new array of six small automated telescopes at nearby Cerro Tololo Inter-American Observatory. Funded partly by the National Science Foundation, PROMPT is optimized to observe gamma-ray bursts in six different colors, and is just entering science operations. PROMPT was not able to see the new burst, confirming the idea that the object was either deeply enshrouded in dust or that most of its light was shifted to the longer infrared wavelengths due its very high redshift.

"This is when we got really excited, because this is exactly the sort of signature that you are hoping to see if you are looking for very distant objects," Reichart said.

Subsequent observations with SOAR and PROMPT ruled out the dust interpretation. Measurements of the redshift of the object with SOAR using photometric techniques suggested a value of six plus or minus 0.5, very close to the later value determined with spectroscopic techniques.

The SOAR data were first analyzed by UNC undergraduate Josh Haislip, who will be first author on the pending research publication. UNC graduate student Melissa Nysewander played a key supporting role, as did undergrads Chelsea MacLeod and Justin Kirschbrown.

"SOAR is a new telescope that is still in the advanced commissioning phase. The instrument that we used, OSIRIS, was just put on the telescope and made available for science observations a few weeks before this event," Reichart said. "In fact, I had asked Josh to do some extra research on the instrument to be prepared just in case, since my more senior students were away at a gamma-ray burst workshop! He and the other students on the team did an excellent job, and are now well-prepared to work on future bursts with SOAR and PROMPT.”

OSIRIS is a multi-purpose infrared imager and spectrometer built by the Ohio State University. It is deployed at the 4.1-meter SOAR telescope as a facility infrared instrument. For the gamma-ray burst observations, OSIRIS was used in imaging mode, where its relatively wide field of view is helpful in looking for nearby stars of known brightness to help calibrate the brightness of the new afterglow.

The observations at SOAR were made by Eduardo Cypriano and Elysandra Figueredo of Brazil, working from the telescope’s remote observing room about a two hour-drive away in La Serena, Chile.

continued
SOAR and PROMPT Team Up continued

They were connected by videoconference to the SOAR telescope operators on Cerro Pachón and to the collaborators at UNC.

“One of the design requirements for SOAR is that it should be able to respond quickly to gamma-ray bursts, and then use the expertise of remote observers and the excellent clear skies of the telescope site in Chile to find their optical afterglows,” explained SOAR Project Director Steve Heathcote. “The discovery of the extreme distance of this gamma-ray burst is a gratifying confirmation of the possibilities opened up by this mode of operation.”


Dedicated in April 2004, SOAR is funded by NOAO (through the National Science Foundation), the Ministry of Science of Brazil, Michigan State University and UNC.

Tucson Hosts Productive Week of Outreach Meetings

Douglas Isbell

For five days in September, Tucson was the worldwide center of astronomy outreach, as the city hosted three interrelated meetings carried out with great success.

After touring Kitt Peak during the previous afternoon, the public information officers from the seven international partners in the Gemini Observatory met in the NOAO main conference room on September 12. Among the new Gemini outreach initiatives discussed were kiosk versions of the popular Gemini Virtual Tour CD-ROM, emerging efforts in podcasting, public imaging contests modeled on successful Canadian efforts, and greater use of remote video tours of Gemini in school classrooms.

The next day, approximately 20 members of the international “STARTEC” group of astronomical observatories with public outreach functions also met at NOAO, sharing experiences and lessons-learned from a variety of public programs and visitor center operations. It was also reported that a working group of the International Astronomical Union is laying the groundwork to declare 2009 as the “World Year of Astronomy,” similar to the current “World Year of Physics 2005.”

Then, from Wednesday through Friday, the Astronomical Society of the Pacific (ASP) held its 2005 annual meeting at the Doubletree Hotel. For the first time, the meeting focused primarily on the emerging profession of astronomy education and public outreach. More than 370 people attended the ASP meeting, which received extremely positive reviews from numerous attendees and participants; it is likely that future ASP annual meetings will carry this outreach theme onward.

Among the highlights was a standing room-only demonstration of the “astronomy in the pub” concept as implemented in Australia. Led by Helen Sim, the session moved from a semi-formal presentation in a conference meeting room over to the hotel bar for a taste of the real thing, on the topic of Mars research versus Earth science concerns. NOAO hopes to implement this idea locally, perhaps in La Serena.

Special thanks to Kathie Coil, Katy Garmany, Steve Pompea, Connie Walker, former NOAO staff member Elizabeth Alvarez del Castillo, and everyone else who helped make these meetings so very productive.
An Extreme Makeover at the Kitt Peak Visitor Center

Richard Fedele

The Kitt Peak Visitor Center underwent an extreme makeover worthy of a television special over the summer, completing a full interior face lift. Gone are the tile and carpet floors that covered the main exhibit area. In its place is a rolled linoleum floor in an attractive two-tone blue color. The reason for this change was not only aesthetic, but also one of durability, functionality and ease of maintenance.

The walls and doors were also painted a light blue to match the color scheme of the new floor, giving the Visitor Center a more uniform and welcoming look. With the installation of a new interior wall, ceiling tiles and a new lighting system completed in the previous year, this makeover paves the way for us to focus next on the exhibits, which will be made into one of the highlights for tourists visiting the mountain.

Not only will new astronomy exhibits be developed, but we will also be preparing exhibits on the natural history of the Kitt Peak “sky island” and an expanded exhibit on the Tohono O’odham Nation.

Visitor Center Membership Program

A growing slate of public programs and related outreach activities has spurred the Visitor Center to offer its first-ever membership program for the general public.

As it enters its fifth decade of operation, the Visitor Center has been the hub for more than two million people eager to experience the largest and most diverse collection of research telescopes assembled at any one place in the world. Two of the 25 active telescopes on Kitt Peak are dedicated solely to public viewing, via the world-renowned Kitt Peak Nightly Observing Program, with a third public telescope scheduled to open in early 2006.

The mission of the visitor center is to inspire a sense of wonder and awe about the Universe, through exhibits, tours and public programs. Our goal is to inform and educate the public daily about basic astronomy, current research themes, and the nature of the scientific process. We also explain how Kitt Peak, NOAO and the National Science Foundation have played major roles in U.S. astronomical research since Kitt Peak was founded in 1958.

Kitt Peak membership offers a variety of unique members-only benefits beyond the routine access to the observatory offered to the public 362 days per year. Membership includes star parties, new behind-the-scenes tours, a quarterly newsletter, and first notice of special events, along with discounts in the gift shop, the Nightly Observing program, classes and workshops. An additional benefit of membership is free general admission to more than 275 science centers participating in the Association of Science-Technology Centers Passport Program.

One of the main goals of this membership program is to spur community support for this unique facility. With this support we hope to ensure another four decades or more of creative and informative public outreach.

For more information, see www.noao.edu/outreach/kpvc or call (520) 318-8726.
Students Needed for the 2006 REU Program at Kitt Peak

Kenneth Mighell

Each summer, a group of talented college students comes to Tucson to participate in astronomy research at Kitt Peak National Observatory (KPNO) under the sponsorship of the National Science Foundation’s Research Experiences for Undergraduates (REU) Program. Like the parallel program at Cerro Tololo, the KPNO REU program provides an exceptional opportunity for undergraduates considering a career in science to engage in substantive research activities with scientists working in the forefront of contemporary astrophysics.

Each REU student is hired as a full-time research assistant to work with one or more staff members on specific aspects of major on-going research projects at NOAO. As part of their research activities, these undergraduates gain observational experience with KPNO telescopes, and develop expertise in astronomical data reduction and analysis. They also take part in a weekly lecture series, and a field trip to New Mexico to visit the National Solar Observatory at Sacramento Peak and the Very Large Array in Socorro.

At the end of the summer, the students share their results with the Tucson astronomical community through a series of oral presentations. In addition, as part of their internship experience, all six of our 2005 REU participants will be presenting posters on results from their astronomical research projects at the January 2006 American Astronomical Society meeting in Washington, DC.

We anticipate being able to support six REU positions during the summer of 2006. As required by the NSF, student participants must be citizens or permanent residents of the United States. The KPNO REU positions are full-time for 10 to 12 weeks between June and September, with a preferred starting date of early June. The salary is $470 per week and additional funds are provided to cover travel to and from Tucson at the beginning and end of the summer.

Further information about the KPNO REU 2006 program, including the online application form, is available at www.noao.edu/kpno/reu. Completed applications, including official transcripts and three letters of recommendation, must be submitted to NOAO no later than 25 January 2006.

Diffuse Light in the Virgo Cluster

A team led by Chris Mihos of Case Western Reserve University captured the deepest wide-field image ever of the nearby Virgo galaxy cluster, directly revealing for the first time a vast, complex web of “intracluster starlight”—nearly 1,000 times fainter than the dark night sky—filling the space between the galaxies within the cluster. The streamers, plumes and cocoons that make up this extremely faint starlight are made of stars ripped out of galaxies as they collide with one another inside the cluster. They act as a sort of “archaeological record” of the violent lives of cluster galaxies.

The Virgo image (the subject of a 19 September 2005 Case Western press release) was captured through Case’s newly refurbished 24-inch Burrell Schmidt telescope at Kitt Peak National Observatory. Over the course of 14 dark moonless nights, the researchers (including John Feldmeier of NOAO) took more than 70 images of the Virgo Cluster, and then used advanced image processing techniques to combine the individual images into a single image capable of showing the faint intracluster light.