



# Community Requirements for the Dark Energy Camera

*Alistair Walker, Chris Smith & Tim Abbott*

**A** progress report for the Dark Energy Camera (DECam) was given in the June 2007 issue of the *NOAO/NSO Newsletter*. In summary, DECam is a very large format CCD imager and optical corrector for the prime focus of the Blanco 4-meter telescope, and is expected to replace the present Mosaic-2 imager in late 2010. It is being built by a consortium of more than 110 scientists from 14 universities and institutions in five countries (Brazil, Chile, Spain, UK, and the US), in exchange for 30 percent of Blanco telescope observing time over five years to carry out the Dark Energy Survey (DES).

DECam will be a Cerro Tololo Inter-American Observatory facility instrument, available to all users. The dual purpose of DECam requires careful design and planning so that the instrument and its data systems satisfy the needs of both the DES consortium and the general user community. Many specifications derived from the DES science requirements will fully satisfy community users, but this will not always be the case. For example, the DES will use SDSS  $g,r,i,z$  filters (possibly splitting  $z$  into  $Z$  and  $Y$ ), whereas the community will doubtless wish to use other filters with DECam. In the June 2007 article about DECam community filters, Chris Miller described historical filter use with the two NOAO Mosaic imagers, laid out some of the options for DECam, and called for input from the astronomical community on the subject.

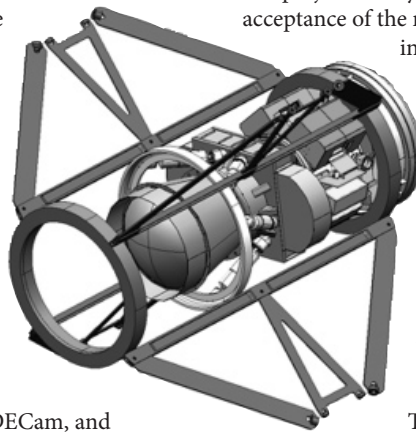
A second example is the data system. Both DES and community data will use the NOAO Data Transport System to move the data across high-bandwidth lines from Cerro Tololo to the National Center for Supercomputer Applications at the University of Illinois. There, the DES data will be processed by a DES pipeline and then subjected to the specialized analyses needed to produce the DES science. Community data will be processed by a similar pipeline—a project deliverable—that will be imbedded in the NOAO end-to-end (E2E) system, which will finally deposit the data into the NOAO Science Archive.

We have put together a document, called “Community Needs for the Dark Energy Camera & Data Management System” (see [www.ctio.noao.edu](http://www.ctio.noao.edu), under headlines). This document first outlines DECam and its data management system, and then goes on to describe the specific uses and features that will be needed to provide full functionality to the NOAO user community. This document, together with the DES Scientific and Functional Requirements document that covers the DES-specific requirements, establishes the guiding principles for building DECam and its data systems.

The project is only a few months away from the stage where formal acceptance of the requirements documents will be necessary. Following that, any changes will be more difficult to make, and will be under the strict purview of a change-control board.

A community-needs working group will be set up to provide recommendations both during the present process of defining the specifications, and in the future when the question of possible changes might arise. It is very important that the community needs are fully considered now and incorporated into the instrument design where appropriate.

The NOAO Users Committee will meet in Tucson in early October: an important part of their meeting will be devoted to evaluating the Community Needs document and recommending additions and revisions. You are strongly encouraged to read the “Community Needs for the Dark Energy Camera & Data Management System” document, and to provide feedback either to the authors of this article ([awalker@noao.edu](mailto:awalker@noao.edu), [csmith@noao.edu](mailto:csmith@noao.edu), and [tabbott@noao.edu](mailto:tabbott@noao.edu)), or directly to the Users Committee (see [www.noao.edu/dir/usercom/](http://www.noao.edu/dir/usercom/)).



# SOAR Completes Second Semester of Science Operations

*Sean Points & Steve Heathcote*

The second semester of regular science operations at the Southern Astrophysical Research telescope (SOAR) has drawn to a successful close. Eleven NOAO programs totaling 27 nights of observing were carried out on the 4.1-meter telescope during semester 2007A.

Since the start of regular science operations in October 2006 through June 2007, SOAR has been used for science 39 percent of the time, with 41 percent spent on engineering and maintenance, 18 percent lost to weather, and only 2 percent lost to failures. Of the time allocated to NOAO, 71 percent was used for science, with 25 percent lost to weather and 4 percent lost to failures. To date, six refereed papers based on data obtained at SOAR have been published, although none were by NOAO users.



Figure 1. Three-color image of Thackeray's Globules in IC 2944 taken using the SOAR Optical Imager with B, V, and R filters corresponding to the blue, green, and red channels in the image. The mean FWHM of the PSF of the point sources is about 0.6 arcsec.

After the primary mirror lateral link support upgrade (see the March 2006 *Newsletter*), SOAR has routinely been achieving image quality consistent with the Cerro Pachón seeing monitors. More extensive work is underway to quantify the delivered image quality from SOAR. The best images taken so far have had a resolution of  $\sim 0.5$  arcsec in V with the SOAR Optical Imager (SOI),  $\sim 0.43$  arcsec in SDSS  $i'$  with SOI, and  $\sim 0.21$  arcsec in K with the Ohio State InfraRed Imager/Spectrometer (OSIRIS). Furthermore, the primary mirror now stays tuned for extended periods of time, greatly increasing observing efficiency. Further improvements in delivered image quality and efficacy are expected as we implement low-order wavefront sensing allowing closed-loop control of the primary mirror figure.

Semester 2007B, in which there are 11 NOAO programs scheduled for a total of 30 nights, is about to start. SOI and OSIRIS remains the instrument suite at SOAR in regular science use (see [www.soartlescope.org](http://www.soartlescope.org) for further information on these instruments). However, semester 2007B will also see extensive work on instrument commissioning, with three new instruments scheduled for delivery in 2007B and early 2008A.

The new detector package for the Goodman Spectrograph has been received at the University of North Carolina at Chapel Hill and is working in the lab. Both the collimator and the camera optics have been rebuilt, and software integration work is progressing. Once this has been completed, the camera will be shipped to Chile for integration with the spectrograph, allowing us to complete the commissioning of this instrument.

Given this timeframe, we do not expect commissioning to have advanced far enough for us to offer the Goodman Spectrograph as a general-user instrument in time for the 2008A NOAO Call for Proposals. However, if integration and commissioning progresses according to our plans, we will issue a special call for proposals to use this instrument during semester 2008A.

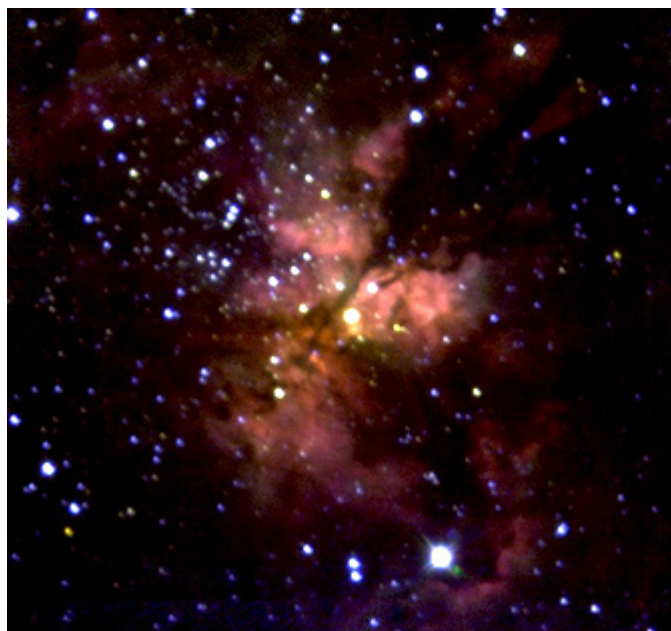


Figure 2. Three-color image of the massive stellar cluster associated with the IRAS 16177-5018 source taken using OSIRIS with [FeII], H $_2$ , and Br $\gamma$  filters corresponding to the blue, green, and red channels. The mean FWHM of the point sources in the image is about 0.7 arcsec.

Testing of the Spartan infrared (IR) camera at Michigan State University continues, but has revealed mechanical problems that remain to be resolved. Consequently, the date for delivery to Chile and the start of commissioning remains uncertain, but it is unlikely to be before November 2007.

The Phoenix high-resolution IR spectrometer was scheduled to move to SOAR in April 2007 after a successful stint at Gemini South as a visiting instrument. However, after the accident with GNIRS on Gemini South, an agreement has been reached between NOAO and Gemini to leave Phoenix at Gemini South for the remainder of 2007. Thus, it is anticipated that Phoenix will move to SOAR during the early part of semester 2008A, but the timeframe remains uncertain.