WIYN OBSERVATORY
WISCONSIN INDIANA YALE & NOAO

Newsletter

October 2009

Director's News

A Candle and a Wish

Where does the time go? One year ago almost to the day, I joined the WIYN Consortium and succeeded to the excellent George Jacoby as Director. With several ongoing projects and efforts to push for innovative ways of operating WIYN in anticipation of ODI, time has passed by very quickly! This has not always been easy, but with the help of the wonderful and dedicated staff, it has almost been a piece of cake. And on this cake, I blow out my first candle, make a wish … and look ahead for the next dessert.

There is MUCH to report on activities at WIYN since the publication of the last Newsletter. During the summer, we have had a very successful shutdown period with an impressive list of maintenance tasks accomplished, as well as new projects being completed or undertaken. WIYN is a complex observatory, and we must remain vigilant in optimizing the performance of the telescope and its enclosure. Congratulations to the team for this great work! As for projects, we can report that the Bench Spectrograph Upgrade is essentially done (see report on page 4). We also initiated two projects during the shutdown: 1) The replacement of the chilling system for the primary mirror support; 2) The installation of very accurate thermal sensors on the primary mirror glass and cell to better understand the thermal environment and focusing of the telescope.

Significant progress has been made on ODI as well (see page 3). Even with the schedule slipping, the instrument is moving toward integration and the coming months will see many milestones: evaluation of the optics, dewar tests, further developments of the software components, etc. In parallel, WIYN has been working hard to find a solution for providing a data reduction pipeline and an archiving system to ODI users, a critical element for the scientific success of the instrument. Experts have produced a science requirement document from which pipeline solutions can be developed. One of them is an ambitious proposal put together by WIYN and the University Information Technology Services (UITS) at Indiana University, and we expect this proposal to proceed toward a design review phase in a few months.

No doubt, work at WIYN will be plentiful in the coming months! I do expect that the question asked above will still be relevant for many additional candles. And that's a wish.

~Pierre Martin

Advanced Astronomy Camp at the WIYN 0.9-m

Don McCarthy

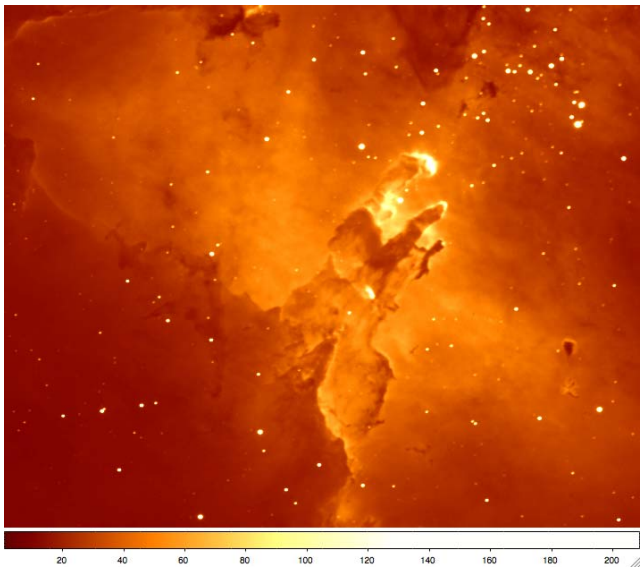

Figure 1: An H-alpha image of the star-forming region M16 (the Eagle Nebula) used as part of an Astronomy Camp team's study of the masses of young stellar objects. Credit: Eric Hooper, Kamala Ganesh, Catherine Miller, Brenna Robertson.

During four nights in late June, high school students from around the world assembled on Kitt Peak and used the WIYN 0.9-m telescope, among others, for advanced observing projects as part of the 20th Advanced Teen Astronomy Camp. In this annual week-long experience, Campers became real astronomers. They operated research-class telescopes and instrumentation, kept nighttime hours, interacted with leading scientists, investigated their own questions, interpreted their observations, presented results, and, most importantly, had fun.

These teenagers traveled from 13 states, three Arizona cities, and Spain. Overall, 21 of the 24 students were from out of state. Special efforts were made to recruit Tohono O'odham students, and we were pleased to have one such student in the Advanced Camp. Twelve adult counselors served as research advisors, mentors, and role models. Many of these staff members were former Campers, and included graduate students, postdocs and faculty members from Mt. Holyoke, University of Hawaii, University of Arizona, University of Texas-El Paso, University of Colorado-Boulder, Space Telescope

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Astronomy Camp at WIYN 0.9-m

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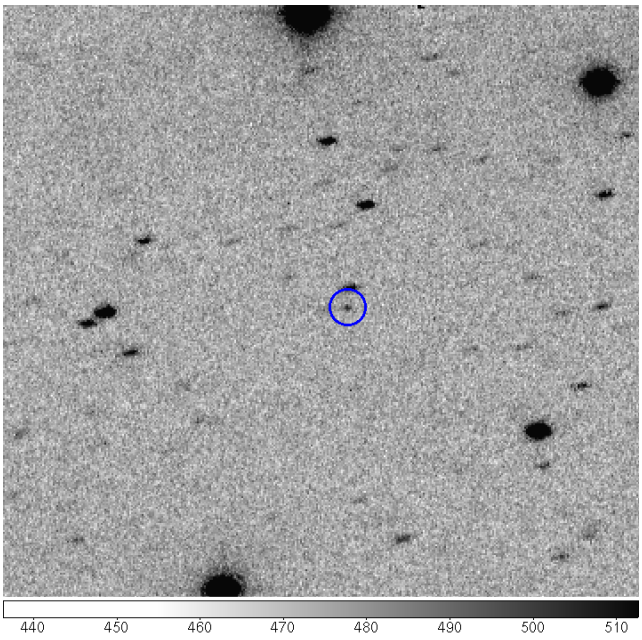


Figure 2: An R-band CCD image of asteroid 2059 (Baboquivari) obtained at the Advanced Camp with the WIYN 0.9-meter telescope and processed by Dr. Eric Hooper. This object is very faint (V=22.2) and required stacking images of a moving object so background stars appear streaked.

Science Institute, and the Laser Interferometer Gravitational-wave Observatory. Dr. Eric Hooper of the University of Wisconsin-Madison was the primary Camp leader at the 0.9-m facility.

Astronomy Camp emphasizes a hands-on learning approach, and activities are driven by student involvement and interest. Throughout the week, our students were immersed in realistic research experiences. The process began online before Camp by posing research questions and exchanging ideas. During the Camp, students formed teams and wrote telescope proposals for review by an internal Time Allocation Committee, which generated a four-night telescope schedule. Throughout this experience, astronomy served as a teaching tool to demonstrate science, engineering, math, and technology in action. Each day the students also contributed to the Observatory by undertaking outdoor service projects.

The Campers carried out many different types of observations, some of which are illustrated here. At the WIYN 0.9-m telescope, they obtained multi-band CCD images of the asteroid 2059 (Baboquivari) and measured its VRI-band colors for the first time. Images were also obtained for projects involving pattern speed of spiral galaxies, chemical evolution of nebulae, quasar photometry, and activity in Comet Garradd (C/2008 Q3). The 2.3-m Bok telescope was used for associated visible spectroscopy. Campers will continue to work on these projects as they pursue both local and national science fair competitions. One student, Mr. Harry Gaebler, recently won the Astronomical League's National Young Astronomer Award for his work on the pattern speeds of spiral galaxies.

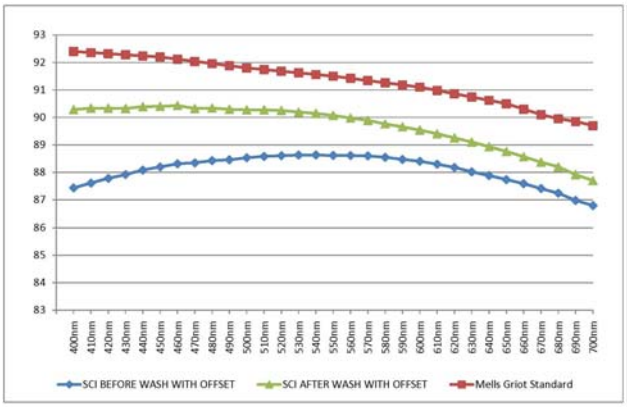
We are grateful to Ms. Hillary Mathis (WIYN) and to all the personnel from Kitt Peak, both on the mountain and downtown, who worked very hard to make a positive impact of the lives of a new generation of astronomers and leaders. Dr. Ron Probst graciously exchanged his scheduled 0.9-m observing time so our nights could be contiguous. Student scholarships and general support were provided from adults who have attended Astronomy Camp, NOAO education, as well as NASA through Space Grant funds. The Camps are sponsored by The University of Arizona Alumni Association. More information can be found at *astronomycamp.org*.

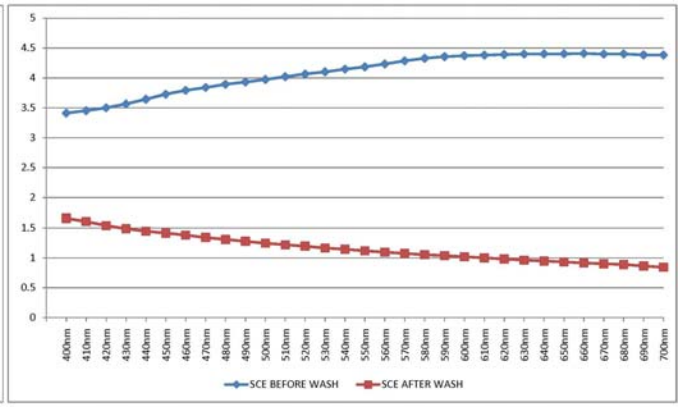
WIYN 0.9-meter Telescope Report

Hillary Mathis

The main task during summer shutdown was to wash the primary mirror. In the graph below right, improvement in scattered light after the washing is shown. The graph below left shows reflectivity before and after washing. Credit: L. Reddell.

A new mirror cover was made during shutdown, which will help to keep it clean.





One Degree Imager Filters, Revised Schedule, and Other News

Daniel Harbeck

ODI is currently transitioning from the design phase to production and assembly. All drawings of the instrument body and dewar assembly have been released, and all large parts have been fabricated in the NOAO machine shop. Corrector optics have all been delivered to Tucson, and are now either in the process of anti-reflection coating or advanced characterization.

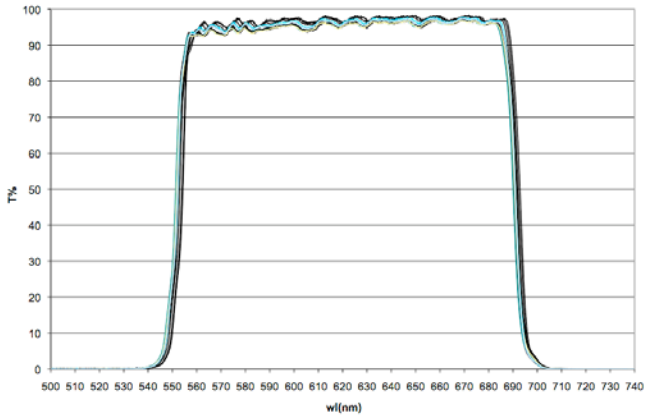


Figure 1: Transmission curves of the ODI r' band filter. The different throughput curves in the plot correspond to varying locations on the filter.

The first two of the ODI optical filters, SDSS r' and i' band, have been delivered by the vendor, Barr Associates. The last of the three filters ordered (SDSS g'-band) is currently in transit to Tucson. All the filters meet or greatly exceed specifications, and excel with great throughput and spatial homogeneity (see the example in figure 1). The g'-band filter has a small red leak redward of 10800Å, which we concluded is negligible when the sensitivity of the CCD detectors is folded in. Barr was able to improve the spatial homogeneity of the g'-band filter, compared to early prototypes. The filters will remain in their sealed shipping containers for the rest of the year; and we will eventually mount them permanently into the aluminum frames of the filter change mechanism. The ODI exposure time calculator (see the ODI Website at *http://www.wiyn.org/ODI/*) uses the as-built filter curves for the g', r', and i'-band filters.

Figure 2: Ken Don and Bill Ditsler mount the test dewar window into the entrance window module.

We are now assembling the ODI dewar to test its vacuum and thermal system. The detectors of ODI have to be cooled to -100ºC, and this necessitates an evacuated environment. Since the detectors themselves will dissipate more than 120 watts, a sophisticated control system is required to hold the detector's temperature constant within ±1ºC. We will thoroughly test the dewar control systems until the end of this year to ensure that the they will eventually find a stable and safe environment.

Unfortunately, it will be a while before we can mount the detectors into the ODI dewar: delays in the fabrication process of the detector carrier ceramics led to an overall schedule slip. The fully populated focal plane will not be available before May 2010. Considering the time needed to fully integrate and test the focal plane into the dewar, we had to reschedule installation of ODI from February 2010 to October 2010. Scientific commissioning will continue into mid 2011. Shared risk science operations of simplified modes (i.e., static and coherently corrected imaging) could start early in the 2011A semester.

Figure 3: ODI r'-band filter in its shipping container. It is 42cm x 42cm.

WIYN 3.5-meter Summer Shutdown Highlights

Charles Corson

Figure 1: Final acid wash of primary mirror.

- Primary and tertiary mirrors acid-washed and recoated
- Secondary actuators rebuilt
- Hydra maintenance performed and Hydra cradle tested in preparation for ODI
- New primary mirror chiller installed
- Routine dome maintenance

Figure 2: Primary being lowered onto the mirror cell.

Bench Update

Patricia Knezek

The WIYN Bench Spectrograph is now in the final clean-up, analysis, and documentation phase. All of the major activities are complete, the commissioning data has all been taken, and we have prioritized the data to work on. We have also trained all the instrument support staff and Observing Assistants in the use of the upgraded Bench.

We continue to work on updating the BSU Status Report Web page, which can be viewed at *www.wiyn.org/instrument/bench_upgrade.html*. An updated version of the Hydra manual (version 6) has now been released. Also, a GUI-based version of the program "setup.f" has been created. It is updated to reflect the new collimator and CCD, allows for a choice of binning, and also now includes SparsePak as an option. It is essentially an exposure time calculator, but has currently been verified only with the 600@10 grating. We encourage users to test out this GUI and provide feedback to John Glaspey (*jglaspey@noao.edu*) and Pat Knezek (*knezek@noao.edu*). The "Hydra" section of the WIYN Instrumentation Web page has a link to the upgraded Hydra manual, and it is also available in the Hydra ftp site. Similarly, the new setup GUI is linked from the "Hydra" section of the WIYN Instrumentation Web page, or you can go directly to it at:

www.noao.edu/cgi-bin/kpno/wiyn/hydrasetup.pl .

The new CCD:

The STA1 CCD now has a new power supply. Initial tests indicate that the noise performance with this new power supply is as good as, and probably better than, the original. Analysis is currently ongoing on data obtained with the new power supply during the summer shutdown, so watch the Web pages for final numbers. The plan is for this new power supply to be the default for the CCD, while the original power supply will serve as a backup.

The software for the MONSOON electronics that control the STA1 CCD was upgraded during the summer shutdown. There were also some modifications made to the MONSOON Observing Platform (MOP), which provides the observer interface with the electronics. All of these changes should be transparent to the observer.

LEDs were removed in the Detector Head Electronics (DHE) during the summer shutdown. This, and careful taping, should eliminate reported problems of enhanced background emission by some observers. While testing the "true darkness" of the Bench room, an interesting phenomenon was discovered. We were using a rare configuration of the Bench, and were seeing excess light on the detector with a pattern. This would show up every time the lights were turned on in the Bench room, but rapidly decayed away with time as the lights remained off. The source of this light was eventually traced to the orange "clean power" outlets – they fluoresce! We just happened to have one visible along the line of sight with this particular configuration, so the light was in focus. This has no doubt been the situation all along, but covers have now been placed over the clean power outlets, so that short-lived source of background light has been eliminated.

We do want to remind observers that the STA1 CCD exhibits a behavior such that the bias level decays with time when the CCD has just been powered on after having been powered off for long and short time intervals. It is advisable to run a series of bias frames immediately after powering the device on to help speed up the decay. Serious data-taking can resume after about 30 minutes.

The new collimator:

An initial analysis of data taken with the new all-refractive collimator indicates that the as-delivered focal length is 776 mm. (The nominal design was for 800 mm.) We need to confirm that measurement, and then will update the documentation and software accordingly.

ODI Meeting-in-a-Meeting at June AAS

Patricia Knezek

The partners of WIYN Observatory held a three session "meeting-in-a-meeting" on Tuesday, June 9 and Wednesday, June 10, 2009 at the AAS meeting in Pasadena to educate and engage the astronomical community in planning science with the WIYN One Degree Imager (ODI). This was seen as an important step in raising the awareness of ODI outside of the WIYN Consortium. A brief overview of the sessions and full presentations can be found at *www.wiyn.org/ODI/observe/ODIAASMIM.html.*

The next step will be a workshop on planning the Yale Survey. It will be held in New Haven on October 2 & 3, 2009. More details on the Survey and the workshop can be found at: *www.astro.yale.edu/odisurvey/.*

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The *WIYN Newsletter*, contacts list, and miscellaneous information about WIYN Observatory may be viewed on our Website at *www.noao.edu/wiyn/*. For ODI news, go to *www.wiyn.org/ODI/*.