



WIYN OBSERVATORY

WISCONSIN INDIANA YALE & NOAO

Newsletter

October 2008

Director's News

A New (Excellent) Adventure!

It is with a lot of excitement and pride that I write my first column as WIYN Director. I feel very fortunate to join this Observatory and to have the opportunity to work with a great group of dedicated and talented people. I am also looking forward to accepting the ceremonial shovel... while acknowledging that I have big ("good and comfortable") shoes to fill! George Jacoby has masterfully led this organization and the progress made has been magnificent. WIYN is a state-of-the-art facility—one of the very best 4 meter-class telescopes in the world. George has played a huge role in the development of the observatory while also working incessantly to ensure its future. Kudos George, and Thank You!

As illustrated in this Newsletter, WIYN is progressing well on several fronts. The Bench Spectrograph Upgrade is close to completion, WHIRC is essentially ready to go, ODI is becoming more and more of a reality (go see the pictures on page 6!), and great science projects are conducted every night at the telescope. This is an enviable position for the facility. My work will be to make sure that this success continues while always looking ahead and clearing a path for the future (with the shovel, of course).

But no doubt about it, my own schedule is going to be quite packed in the coming months. My first item is to learn more about WIYN, KPNO, the current projects, and to become more familiar with the work performed by, well just about everybody! The upcoming Board meeting will offer an excellent occasion also for me to become more acquainted with the WIYN partnership. Planning for the renewal of the Consortium Agreement and operations during the ODI era will also be prominent topics. Despite this busy schedule, I encourage each of you to feel free to stop by at anytime for a chat (in English or French). I'll be listening!

I embark on this new adventure at WIYN with enthusiasm and great hopes. I am convinced that spectacular times are ahead. It will be fun, Pirates & Dudes!!!

~Pierre Martin

Science News

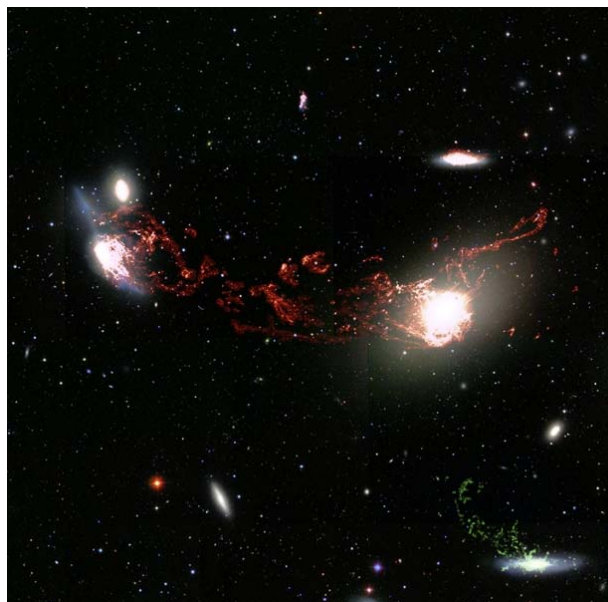


Image shows M86 (right) and NGC 4438 (left) connected by strands of ionized gas. Credit: T. Tal and J. Kenney.

A deep new image of part of the Virgo cluster has revealed monumental tendrils of ionized hydrogen gas 400,000 light-years long connecting the elliptical galaxy M86 (right) and the disturbed spiral galaxy NGC 4438 (left). Taken with the wide-field Mosaic imager on the Mayall 4-meter telescope at Kitt Peak National Observatory using a filter that reveals the light from H- α emission, the image and related spectroscopic measurements of the filament provide striking evidence of a previously unsuspected high-speed collision between the two galaxies.

The red filaments in the image show H- α emission with low velocities (similar to the velocities of the two colliding galaxies M86 and NGC 4438). The green filaments seen near the edge-on spiral galaxy in the lower right (NGC 4388) show H-alpha emission with much higher velocities, suggesting the galaxy in the lower right is not related to M86.

Spectroscopy of selected regions along the filament between M86 and NGC 4438, obtained with the Sparsepak Integral Field Unit instrument on the WIYN 3.5-meter telescope, shows a fairly smooth velocity gradient between the galaxies, supporting the collision scenario. There are no obvious stars in the filaments.

A paper describing the Virgo results is scheduled to appear in the November 2008 ApJ Letters, written by T. Tal and J. Kenney along with H. Crawl, J. Feldmeier, and G. Jacoby (who initially discovered the mysterious filaments around M86).~

PERSONNEL NEWS

The WIYN group in Tucson recently held a dinner in honor of George Jacoby. George stepped down as WIYN Director after serving for eight years. Many of the WIYN staff attended, including such notables as Deputy Director Pat Knezek, and our new WIYN Director, Pierre Martin. It was an enjoyable evening of good food and wine, good company, and a communal glass of flaming Sambuca.

Pat presented a poster to George depicting "George Jacoby's Excellent Adventure" (opposite page) which was signed by the staff. She displayed a portrait of George, painted by our own Dan Blanco, which will hang in the WIYN area as a permanent tribute. Pat gave a brief speech on behalf of all the staff to thank George for being such a great leader. Other WIYNers have opted to share their thoughts about George in writing—so read on.



"Pirates" left to right: Dick Joyce, Mark Wagner, Craig Gullixson, Dave Monet, Phil Massey, Rick Pogge, Jim Janesick, George Jacoby, Gary DeCosta, Rick Binzel, Ron Gilliland, Steve Howell & Bob Hahnisch.

Pirates

Shown above is a motley crew of young rogue astronomers. One of them is the most famous of all pirate directors, George Jacoby, better known as "Ustahavea Beard." I remember the early days of CCD photometry when astronomers roamed the halls complaining about their lousy precision (perhaps 0.1 magnitudes) and how would they ever do any better? Two young lads heard the groans and stepped up to the challenge.

After convincing the powers that be that it would not be a total waste of time to allow the lads to use a few nights at the #1 0.9-meter telescope and the RCA1 CCD, the game was on. History was re-written those fateful nights (probably dark, rainy, and windy too) when photometric precision reached a new low... that is, 0.01 magnitudes.

George has always been a mate of the crazy idea and even crazier person. His support and friendship never waver. I will miss him as WIYN director, but am happy he will remain at NOAO and look forward to continued work with him. Remember, "The Skies the Limit!"

~ Steve Howell

Management and Science

Back in the 1980s, George, Steve Ridgway, and I carried out a program of measuring stellar angular diameters by lunar occultations in the near-infrared at the 4-meter telescope. This was a very successful scientific program which led to the measurement of more than 20 stellar angular diameters. The occultations themselves took less than a second, so the observations were scheduled as one-hour interruptions of regular observing. The three of us would get up, sometimes in the middle of the night, drive up to Kitt Peak, set up the equipment, make the observation, then drive back down.

After one such event, we were driving back through Three Points, where a heavy thunderstorm had occurred an hour earlier (although it was clear on Kitt Peak). The road was literally carpeted with untold thousands of small frogs which had come out after the rain, and there was no way to avoid them. Shortly afterwards, George went into management.

~ Dick Joyce

In our 15 years of professional interaction I have always enjoyed working with you and valued your broad wisdom. Actually, your first influence on me dates back to graduate school where I was inspired by a PASP publication "A Critical Review of Selected Techniques for Measuring Extragalactic Distances" by G. Jacoby et al. I was really impressed by the depth of that paper and it seemed a unique coincidence that we would meet soon after that. Since that time, it has been a pleasure working with you at WIYN through the construction, commissioning, and operations phases of the observatory, and the launching of the ODI instrument. It was also fulfilling to have the opportunity to work with you as a scientific collaborator on Sakurai's object! You have been a great mentor and friend and I look forward to continued interaction with you in future endeavors.

~ Dave Sawyer

I worked with George on the Mosaic Imager project at NOAO in the 1990s and now at WIYN on the One Degree Imager. I want to thank him for the support he has given me on these projects. He has provided a comfortable, enjoyable working environment and has always been fair with me. Good luck to you in your future endeavors George.

~ Gary Muller

I've known George almost from his arrival at NOAO, an unspeakably long time ago! He has always been generous with his time, unpretentious, and straightforward in manner and judgment. I have always enjoyed his sense of humor whether on the hiking trail, with a group of friends, or at work. We have all benefited from his guidance of the WIYN observatory these past years, a job requiring patience and diplomacy. All the best for the future George, and hopefully you will get time for more science.

~ Daryl Willmarth

PERSONNEL NEWS, *continued***Soccer**

I wish I played soccer, or had kids who played it, or was even vaguely interested in watching it, because apparently, that's what it's all about. Why soccer? One of the things I admire most about George is his uncanny ability to match the right person to the right job. Time and time again, I have watched him identify the best person to accomplish a task, or to provide desperately needed information so that we can move forward on a project. It is a skill I would very much like to develop. Unfortunately, to have this skill, you apparently need to be involved in soccer. George was forever coming into the office saying "I talked to Mike Lesser at our sons' soccer game last night, and Mike is interested in packaging the OTAs for us," or "I met a software architect at a game, and he's really interested in the software challenges for ODI." His involvement in soccer netted us several key people at WIYN, not to mention moving forward with ODI (oh, and an architect for the addition to George's house). I tried to adapt the technique for my own purposes by joining a local softball team. All that netted me was a split lip. Clearly, I still have work to do. In the meantime, I'm very grateful that George had faith in me, and recruited me to become a part of the WIYN team—even without the soccer connection!—because he and the team he put together at WIYN have worked well together. Maybe that's another thing they teach you in soccer?

~ *Patricia Knezek*

While we won't be working together in the same capacity, I look forward to seeing you for many more years on the soccer field. Let's try to reduce the blood, though.

~ *Hillary Mathis*

Shoes

I recall a conversation I once had with George about shoes—yes, shoes. Passing through the WIYN common area, I encountered George and Nanette Bird and paused to comment on Nanette's "cute shoes." George said he just could not understand why women love shoes – wearing them, talking about them, yada yada. The odd thing was that he proceeded to talk about his own shoes at some length, describing them as kind of old and not cute, but "good and comfortable." I couldn't help but smile.

As I thought about George's tenure as Director of WIYN, I realized that George is a lot like his shoes. He has this wonderful ability to make those who work with him feel that they have slipped into a pair of "good and comfortable" shoes. I have always felt supported and valued by George, and he always made me feel comfortable (there's that word again!) sharing my ideas and opinions. As extensive as his scientific knowledge may be, I feel that this is truly his greatest attribute. And those shoes are going to be very difficult to fill.

~ *Sheryl Falgout*

Party On, Dude!

Poster presented to George Jacoby at his farewell dinner, the subject is a spoof of the 1989 movie "Bill and Ted's Excellent Adventure." Jacoby quoted from the movie in his final column as Director in the July 2008 edition of the WIYN Newsletter. The movie plot involves time travel in a telephone booth, and a few familiar faces can be seen inside this one. Names of WIYN/ODI staff are listed in the credits, including the "directed by" credit. ODI is shown finished and installed on the WIYN 3.5-meter—thus, the time travel theme. Jacoby is holding the shovel used for the WIYN Observatory Groundbreaking in 1992.

Credit: P. Marenfeld, S. Falgout, & G. Muller.

Coffee

I want to thank George for his appreciation of **GOOD** coffee. His willingness to keep the observatory stocked with it is one of the fuels that keep us running at our best. It gives me something to look forward to when facing the start of another long night in January. Thank you, George!

~ *Doug Williams*

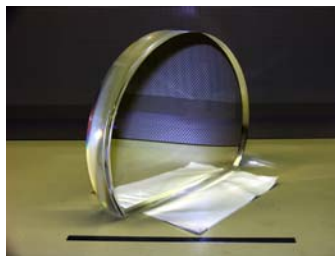
BENCH SPECTROGRAPH UPGRADE

Patricia Knezek

The final lens (L3, pictured right) for the collimator arrived on October 2, 2008!!! Although our plans for final assembly were delayed due to the late delivery of the final optical element for the collimator, a lot has been accomplished, and the Bench Spectrograph Upgrade project is now in its final phase. We plan to implement the final steps during October 28–November 19, which is all imaging programs on the telescope. In the next newsletter, we will provide a comprehensive report on the changes, many of which should be transparent to the user. We continue to update the BSU Status Report web page as possible, targeting observers who want to plan their observations. See www.wiyn.org/instrument/bench_upgrade.html.

Two items which are of note for users:

1. The new CCD system, STA1, has been in regular use since March on the Bench. The web page provides information about the detector, which has lower read



L3, the final (and largest) optical element for the new Bench collimator. A ruler is included for scale. Credit: G. Poczulp

noise than T2KA (3.2 e⁻ in high gain, versus ~6 e⁻ for T2KA), and better quantum efficiency. Although the dark current is low, there are some “hot pixels” (for which dark current is much larger than their immediate neighbors). These can be corrected during the processing stage. We will be developing master dark frames based on large number of frames that can be scaled to reduced the affect of the hot pixels on the science data, but recommend at the moment that observers take a set of darks themselves.

2. The 3300 l/mm VPH grating is now housed in its permanent cell and has a mount that allows for very precise positioning (necessary due to the refractive properties of the grating). The grating is now available for science programs in shared-risk mode. It is expected to out-perform the echelle by about a factor of two in the wavelength range (~425-575 nm). The resolution is $\lambda/\Delta\lambda = 4000-25000$ for 200-500 μm fibers.

WIYN SHUTDOWN REPORT

Charles Corson

An unusual effort was made this past August to be proactive in maintenance for the primary active support system. The system, in full-time service since late 1993, has previously only received necessary maintenance, a tribute to the robustness of the overall design. The effort approached the system comprehensively to give attention to all aspects of electronics and mechanics, and also to documentation and training for key support personnel. An independent test stand was developed, on which every function of an individual actuator could be tested and characterized, provided by Kitt Peak Engineering.

The main goals of the maintenance were as follows:

- Verify all high-level functions of the active controller cards
- Establish a common state for the controller card transducer circuits, and calibrate to a known configuration.
- Using the control and mechanical functions of an actuator, verify the force read back function against a calibrated force standard within a range of +/-150 lb force (lbf).
- Test and verify the mechanical operation of the active controllers
- Inspect and replace wearable or worn parts where appropriate.
- Document all procedures and provide baseline documentation for actuator and system performance.

Of the 66 actuators, 27 were tested and verified during the two-week shutdown. Of the 27 tested, one actuator was found to have a failed harmonic drive, and one was found to have an unacceptable level of force hysteresis. The failed harmonic drive has been replaced and tests prove a distinct improvement in the system average force error of the system, now well within +/-0.05lbs. All actuator cards and spares were tested, five were found to be inoperable; repairs have been executed and we now have a full and known set.

As only 27 of the 66 actuators were tested, there will be no attempt to make any system corrections to the force tables used to float the glass. The units tested do establish a 5% drift in the loadcell performance from the manufacturers stated force response, something that is not unexpected for loadcells that have been in service for ~15yrs. Tests have established that any actuator in the system is capable of applying forces to +/-0.15lbf over +/- 150lbf, or 0.1%. This forms an important baseline for evaluating future performance. Plans are being made to finish the remaining actuators in FY09/10.

Many of the hydraulic leaks of the system were due to a machining error where the actuator cylinders mate with hydraulic fittings. These hydraulic ports were machined to remove the error. Components of the hydraulics were exchanged if there were signs of damage or wear.

WHIRC Update

Dick Joyce (NOAO), Heidi Schweiker (WIYN), & Margaret Meixner (STScI, PI)

Commissioning of the WIYN High-Resolution Infrared Camera (WHIRC) is nearing completion. Although the July 2008 observing block was essentially wiped out by poor weather, the four-night STScI block in September had sufficiently clear conditions to permit the observations which should confirm the remaining commissioning requirements, as well as to carry out some science observations on behalf of the WHIRC team.

As of September, the remaining commissioning issues are the excess read noise associated with the instrument rotator and demonstrating the required flatfielding precision through all of the filters. Replacement of the Monsoon IR Acquisition Board appears to have largely eliminated the excess noise; WHIRC now routinely achieves a read noise ~ 35 e- in Fowler 1 mode and ~ 20 e- in Fowler 4 mode. The latter should allow one to achieve background-limited operation in a 600s integration through all of the narrowband filters. As this article is

being written, preliminary analysis of observations of a standard star cluster indicates that flatfielded images can achieve rms accuracies of 2 percent or better. This performance should improve once procedures are developed for compensating for the effects of the pupil ghost. Comparison of flatfields obtained over the April – September 2008 time frame shows them to be stable at the 1 – 2% level.

The WHIRC documentation has been received from the Instrument Development Group at JHU, and the User's Manual has been tested and refined during several observing runs by visiting astronomers from the WIYN partner institutions.

We plan to work on integrating WHIRC with WTTM active correction during the 2008B semester. Documentation on WHIRC, including a link to the current version of the User Manual, can be found at www.noao.edu/kpno/manuals/whirc/WHIRC.htm.

THE "CREATURE"



Giant Arizona Desert, or Black-Headed Centipede (Scolopendra h. arizonensis). Credit: J. Glaspey

It was a dark and stormy night, and the SPECKLE observers were huddled in the control room. Krissy, the WIYN Observing Assistant, said, hey look at that! We looked, and there it was—the creature with a thousand legs. As we panicked and hopped up onto chairs and counters, our hero Daryl Willmarth, showing no concern for his own safety, scooped the creature up in a dust pan and carried it outside to return another day.

Fortunately for us, the famed wildlife photographer, John Glaspey, happened to be visiting and snapped the photo shown here. So WIYN observers beware, the creature walks among us!!~

WIYN Newsletter Staff

Patricia Knezek,
Science Editor
pknezek@wiyn.org

Sheryl M. Falgout,
Editor, Design & Layout
sfalgout@wiyn.org

WIYN 0.9-meter Telescope Report

Hillary Mathis

The WIYN 0.9-meter had a successful shutdown with many upgrades. We installed a new TCS computer to replace our aging one. New cables were installed from the telescope drive motors up to the telescope to help reduce the noise on the S2KB chip.

After months of testing the central overillumination on S2KB, a mask size was decided upon and installed over the dewar window. The installation and use has proven successful.

Safety issues were also addressed during shutdown, such as the lack of lighting on the stairs leading up to the telescope floor. And finally, the telescope hard limits were upgraded.

The WIYN 0.9-meter Consortium has brokered a relationship with the Kitt Peak Visitor Center. When there are nights unwanted by the members of the Consortium, telescope time will be turned over to the Visitor Center for their Early Evening Program, as well as their All Night Program. Assuming a successful trial period, the Visitor Center use of the telescope will be included in our next Consortium contract.~

The WIYN Newsletter, contacts list, and miscellaneous information about WIYN Observatory may be viewed on our Website at www.noao.edu/wiyn/.

ODI News: Hardware Checks & Dewar CDR

Daniel Harbeck

The team at the NOAO instrument shop has started to assemble ODI parts. Currently, the front lens holder, telescope interface ring, atmospheric dispersion compensator, and filter mechanism have progressed significantly, allowing a first fit check. Figure 1 shows ODI mounted on the WIYN rotator simulator cart. After this first check, there is still a lot of detail work remaining, but this first assembly was a very impressive demonstration of ODI's dimensions. Congratulations to the NOAO instrument shop team for reaching this milestone! In the meantime, we also received the outer shell for the ODI dewar and the base plate for the focal plane. Construction of the shutter made great progress as well. The large shutter was designed and is being fabricated by Klaus Reif and his team at the University of Bonn and the Hoher List Observatory.



Figure 1: Major components of ODI's instrument support package are assembled on the instrument rotator simulator cart (yellow). The blue-colored parts will hold a third of the filter exchange mechanism. Three swing arms are visible: One is positioned in the beam, one out of the beam, and the outermost is in a position where the filter could be exchanged.

The last remaining review of an ODI hardware system took place in September when the ODI dewar subsystem underwent an external critical design review. Bruce Bigelow, Tim Pickering, and Tom O'Brien served on the panel. After a day of design presentation—mostly carried out by Gary Muller, ODI mechanical engineer—and intense discussions, we received a very positive response from the panelists. Along with some very positive findings, we also received advice on improved handling of



Figure 2: Gary Muller and Roger Repp inspect the ODI dewar shell. The CCD flex-circuit interface plate will mount on the large rectangular opening. One of the four cryo-coolers will be mounted to the large round opening at the right.

Figure 3: The Silicon-Carbide focal plane base plate. The 64 square openings are the locations for the OTA detectors; the focus sensor CCDs will be placed in the rectangular openings. The surface of the focal plate is polished flat to 10µm and provides the reference plane for mounting the OTA detectors.

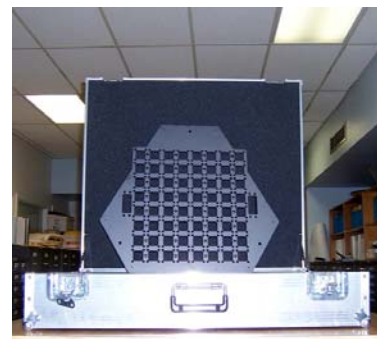


Figure 4: The Bonn Shutter for ODI during assembly. The two-blade design will allow linear exposures ranging from tens of milliseconds to hours with homogeneous illumination of the focal plane.

risk areas such as the timely delivery of the focal plane with packaged OTA detectors, and the heat removal from the CCD controller. The ODI team thanks the panelists, all of whom had previously served on earlier ODI reviews. We appreciate their willingness to share their expertise to enhance our project. A review of the ODI software will be held in November.~