The Washburn Observer

DEPARTMENT OF Astronomy
UNIVERSITY OF WISCONSIN-MADISON

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SALT Commissioning Produces Unique Proposals, Experiences

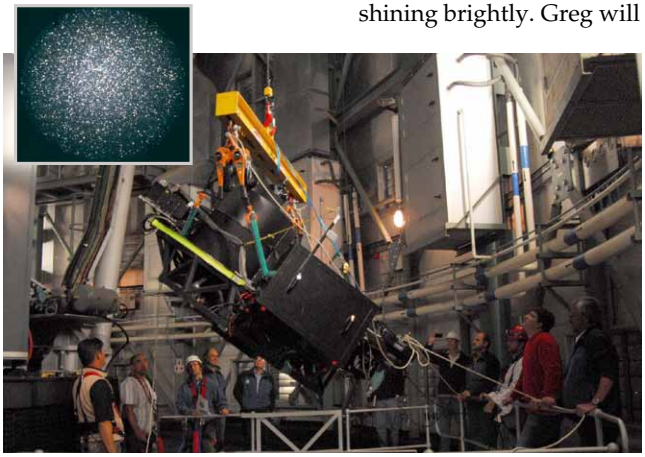
Inside This Issue

The Proposals

UW astronomy people are really excited about using the South African Large Telescope (SALT)—so much so that they've asked for more observation time in the coming semester than the 135 hours that are available for UW-Madison.

Fifteen proposals were accepted to use the UW time. Astronomy graduate students are especially excited about the telescope's new capabilities.

Third-year graduate student Greg Mosby is enthusiastic about using the new Robert Stobie Spectrograph (RSS) to better understand how massive galaxies are influenced by the supermassive black holes lurking at their centers. This fall, he is undertaking a pilot study focused on three powerful quasars, powered by black holes, that are actively feeding on gas and shining brightly. Greg will take advantage of RSS's impressive sensitivity to probe the faint outskirts of the quasar host galaxies that are less affected by the glare from the quasars. He aims to test a popular theory that mergers between galaxies trigger both black hole activity and bursts of star formation. "It's exciting to start my National Science Foundation Fellowship work on a telescope that's so important to our department," says Greg.



All hands were on deck and all eyes on the RSS as it was being lifted up onto the telescope. Inset photo: "Second light" image of Omega Centauri

Fourth year graduate student Corey Wood's proposal takes advantage of a novel mode of RSS called a Fabry-Perot. It will enable him to map the structure and velocity of highly ionized oxygen gas surrounding five quasars. This gas is believed to have been violently expelled from the quasar host galaxy by an abrupt increase in star formation and black hole activity triggered by a merger between two galaxies. "SALT's Fabry-Perot capability enables us to observe a spectral line at each position of the extended ionized gas cloud across a wide field of view," says Corey.

John Chisholm, a second-year graduate student, proposes to use RSS to observe an extremely unusual galaxy culled from a survey of several hundred thousand distant galaxies. The galaxy is remarkable because of the strong and broad lines of highly ionized oxygen and neon in its spectrum, indicating very energetic processes in the galaxy. "SALT's superior collecting area and advanced spectrograph enable an extremely deep, high quality spectrum of this faint galaxy to be taken in a short amount of time," says John.

A list of accepted SALT proposal titles and descriptions will be posted at www.astro.wisc.edu. (Click on Our Science, Research Observatories, South African Large Telescope.)

"It was cowboy astronomy. We'd come up with simple solutions and hope they'd work."

— Eric Hooper

The Experiences

Astronomy Department scientists Eric Hooper, Ken Nordsieck and Marsha Wolf have returned from South Africa, where they were placing the new Robert Stobie Spectrograph back on the

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Letter from the Chair

Bob Mathieu, Astronomy Department chair

A second newsletter is always an auspicious moment. While the first usually gets the most notice and celebration, it is the second that suggests the possibility of a long future.

In this issue, we take a moment to introduce you to the Department of Astronomy Board of Visitors. It was John Wiley who advised us early in the last decade to form such a Board. To be honest, our initial reaction was a bit quizzical…or, as my daughter would say, clueless. Fortunately, John had the wisdom to ask David Beckwith if he would be willing to form the Board and help guide our first steps together. Dave, then Russ Christesen and Don Procknow, and now Jere Fluno have nurtured the Board into an integral and invaluable part of our department community.

Working with the Board and our alumni more broadly is one of the most enjoyable facets of my professional life. The diversity of fascinating and delightful people is a rich pleasure. The shared dedication to the vitality and success of the department is an inspiration. And the unexpected adventures are a blast! How else would we have seen a Shuttle launch from the VIP area? (Dave Radzanowski, the current NASA chief of staff, is a department alumnus.)

The ways that our alumni and Board members give of themselves for the department are wonderfully varied. Some contribute their time and wisdom to guiding the department, including designing the new website! Others bring their telescopes to Universe in the Park events. Some contribute to our historical archives. And so often I receive notes from the UW Foundation about financial gifts from alumni, many of whom I did not know before, and some of whom were here before I came to Wisconsin. Each gift is special to us, and together they make a world of difference. We are deeply grateful to all those who help us teach our students, nurture our young researchers, and advance Wisconsin discoveries.

(I am not making this up–just as I finished that sentence, one of our finishing graduate students emailed me asking for Jere Fluno's address so she could write to him about her job outcome.)

As I begin my final year as chair, I want to also express my personal thanks. Our alumni allow me the pleasure of being able to say "yes:" To the undergraduate last fall who asked if he could go to the American Astronomical Society to present his research at Green Bank. To the graduate students who had an idea of their own that they wanted to try out with "grad queue" observing time on WIYN and asked if we could support their travel. To Matt Bershady and Jay Gallagher, who asked to purchase narrow-band filters for their research using the infrared camera on WIYN. To Eric Hooper, who asked if he could travel to Bombay to build a collaboration with our SALT partner. And finally, to the long-forgotten but wise student who asked if the students could buy pizza each week to attract the senior graduate students to Journal Club!

Bob Mathieu
Astronomy Department chair

The *Washburn Observer* is the alumni newsletter of the Department of Astronomy at the University of Wisconsin-Madison.

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Please Keep in Touch

We'd like to hear from you. Please send any news we can include in future newsletters or any changes in your contact information to: **sanford@astro.wisc.edu** or UW-Madison Department of Astronomy, 475 N. Charter St., Madison, WI 53706, Attn: Barb Sanford.

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If you wish to make a tax-deductible gift to the Department of Astronomy fund, which allows the department to support special opportunities for students, staff and faculty, you may contribute online at www.astro.wisc.edu (click on Friends & Alumni, Make a Gift) or send a check, payable to the UW Foundation, to: UW Foundation, US Bank Lockbox 78807, Milwaukee, WI 53278-0807. Questions may be directed to Department of Astronomy Chair Bob Mathieu, mathieu@astro.wisc.edu, (608) 262-8689 or UW Foundation Director of Development Chris Glueck, chris.glueck@supportuw.org, (608) 265-9952.

Kelley Hess Balances Science and Sports

Kelley Hess (center) gives her all for the UW Cycling Club team.

Astronomy Department graduate student Kelley Hess is perhaps most famous in the department for winning the Mad City Marathon in 2006. Last year, she placed seventh in her age group in the Ironman triathlon.

"Cycling and running are what I do so that I can come back to astronomy each day feeling refreshed and excited to discover something new," says Hess. "It's important to me to have mental and physical balance."

Hess was a runner and soccer player before she started biking during her second year of graduate school. She rides for the UW Cycling Club team during the collegiate school year and also for Team Kenda presented by Geargrinder. At the highest level, the UW team qualified for Nationals, which were hosted in Madison this year.

Hess's academic work is also impressive. She graduated this summer and moved to Cape Town, South Africa, where she is doing a postdoc at the University of Cape Town. Her research is in galaxy evolution. She is a member of the ALFALFA Consortium and worked on the Arecibo Legacy Fast ALFA Survey, which she used to study the evolution in the gas content of galaxies as a function of the environment in which they live.

"Astronomers think that galaxies spend most of their lifetime in the group environment and that that is where they undergo most of their evolution," she says. "But these groups are hard structures to identify. This is the first dedicated study from the perspective of their gas content to also examine the surrounding large scale environment."

"Cycling and running are what I do so that I can come back to astronomy each day feeling refreshed and excited to discover something new."

— Kelley Hess

For the past three years, Hess has received the Wisconsin Space Grant Fellowship. UW-Madison also awarded her a Vilas travel grant for domestic and international travel. She's done public lectures at Space Place and guest lectures for the introductory astronomy classes.

"I had a passion for astronomy in junior high and high school but didn't think people could do it as a career and make a living at it," says Hess. "I started out in chemistry and took a basic introduction to astronomy class. Jim Bell, the principal investigator on the camera for the Mars Rover, was in my class, and I got to meet Bill Nye, the Science Guy." Hess learned about the research side of astronomy and discovered that people could actually make a living at it. She participated in the Research Experiences for Undergraduates (REU) program. As a senior in 2004, she spent the summer at the Very Large Array radio observatory in Socorro, New Mexico. "It was one of the best summers of my life, and I decided to go into astronomy," she says.

"SALT" continued on from page 1

Southern African Large Telescope (SALT) and commissioning the instrument this past (northern) spring. Here they share some of their experiences.

Ken Nordsieck spent more than three months at the SALT site, preparing the instrument to be put on the telescope. "Lifting the instrument on April 9 was a spectacular milestone," he says. Within two days, they had a second light image of the biggest globular cluster in the Milky Way. "Within a week, a rare stellar explosion of T Pyxidis occurred, its first outburst since 1967. It was an ideal 'commissioning lamp.' This convinced me that I have the right religion," says Ken. He got very little sleep working on the telescope and then the instrument. On a regular basis, he stayed up all night and then worked with the day crews. "But it was all worth it," he says. "It's fun to get complex, unique modes working."

On his first trip, Eric Hooper was supposed to commission the multi-object spectroscopy mode (MOS) of RSS but never got to do it because, just after lifting the instrument, he was enlisted to test and calibrate other instrument modes. When he returned to South Africa in August, he worked on the multi-object mode, helping to bring it from a barely functional state to nearly ready for full-scale operation. "It was cowboy astronomy. We'd come up with simple solutions and hope they'd work," says Eric. "It was nonstop, with no breaks. I worked my tail off but had a blast because of the people I worked with. It was fun being at the site."

Marsha Wolf's primary involvement was commissioning the Fabry-Perot mode of the RSS. She worked with Ted Williams of Rutgers University, the project scientist for this capability, in preparation for building a similar mode into a new near infrared instrument for SALT being built at UW. They worked through a lot of bugs and saw a lot of progress. "It was challenging to get the different software and computer systems to work together. Commissioning is hard work, but very rewarding when everything finally works," says Marsha. "It was pretty cool to see the different parts of a galaxy light up as we stepped through the wavelengths."

Universe in the Park Brings Astronomy to Public

It's not unusual to see groups of up to 100 campers and park visitors gathered around a telescope gazing at the night sky in Wisconsin state parks on late spring, summer and early fall evenings.

These budding astronomers are participants in Universe in the Park (UitP), a popular outreach program offered by the Astronomy Department. "Based on the simple idea that the best environment in which to introduce the general public to astronomy is outside under dark skies, pairs of UW graduate and undergraduate astronomy majors travel to state parks all around Wisconsin every year during the camping season to bring astronomy to the public," says program director Eric Wilcots, astronomy professor and associate dean of the College of Letters and Science. "UitP is an outstanding example of the Wisconsin Idea at work."

UitP began in 1996 through a proposal to the NASA IDEAS program. The principal investigator on the proposal and originator of the UiTP program was Karen Bjorkman, who was then an associate scientist at UW's Space Astronomy Laboratory working with the Wisconsin Ultraviolet Photo-Polarimeter Experiment (WUPPE) project, and is now a distinguished university professor of astronomy and dean of the College of Natural Sciences and Mathematics at the University of Toledo (Ohio).

"Universe in the Park is an outstanding example of the Wisconsin Idea at work."

— Eric Wilcots

Fifteen years later, the program, funded by the National Science Foundation and sponsored by the Astronomy Department and the Wisconsin Department of Natural Resources, is still incredibly successful. "In each of the last few years, at least 50 sessions, spread across most of the state parks in Wisconsin, have been held for groups of up to approximately 100 people," says astronomy graduate student and UitP presenter Paul Sell.

Just after sunset, one student gives a 30-minute presentation—a broad overview of one or two astronomy topics—with lots of wonderful images. Presenters will sometimes discuss recent astronomical news such as the discovery of new solar systems, the demotion of Pluto, and the latest results from the Hubble Space Telescope. The talks are for audiences of all ages so that anyone from ages 5 to 99 can understand and enjoy them.

The other student sets up a moderate aperture (8-10 inches) telescope to observe some easily-accessible astronomical objects such as the moon, planets, globular clusters, multiple star systems and nearby galaxies following the talk. If the sky is clear, participants are given the opportunity to view whatever astronomical objects are available through the telescope. The students give detailed explanations of the objects being observed and encourage questions throughout the sessions. They also point out some interesting, easy-to-find constellations, satellite fly-overs and flares.

"This two-pronged approach of a presentation followed by observing not only shows participants amazing objects in the sky but also guarantees that they leave with so much more," says Sell. "After all, what better way to bring astronomy to the general public through an observing session than to go directly to campers who are already outdoors?" he asks.

"The UitP program is a natural way for astronomy to reach the public," adds graduate student Blakesley Burkhart. "The dark skies of Wisconsin's natural reserves and parks really show the 'wow' factor of astronomy while educating people at the same time. I love doing the program and traveling around the state."

UitP gained international recognition at the 2010 Communicating Astronomy with the Public conference in Cape Town, South Africa, where it was showcased as a model for park public astronomy outreach.

To find a Universe in the Park program at a state park near you, view the schedule at www.astro.wisc.edu. (Click on The Public, Universe in the Park.) The site also includes links to other astronomy topics and information about the current night sky.

photo by Ralf Kotulla

Grad student Paul Sell points out constellations to Perrot State Park visitors, who are enjoying the clear night and an impressive telescopic view of the Great Globular Cluster in Hercules.

Department Welcomes First Grainger Fellow

Alyson Brooks

This fall, the Department of Astronomy welcomes Dr. Alyson Brooks as its first Grainger Post-Doctoral Fellow. Alyson is a theoretical astrophysicist whose interests include galaxy formation and evolution, galactic structure, galactic chemical evolution, stellar abundances, and cosmological N-Body+SPH simulations of galaxies. Her theoretical work will enhance the standing of the department as an international center of research in galaxy evolution.

"As an observationally oriented theorist, I'm looking forward to working with observers in this strong observational astronomy department," says Alyson.

The Grainger Post-Doctoral Fellowship, the Department of Astronomy's first prize fellowship, is generously funded by The Grainger Foundation.

"I'm excited about winning this fellowship," she adds. "I love the freedom it gives me to do the type of work that I like."

In her free time, Alyson enjoys biking, reading and watching movies. She was the Sherman Fairchild Prize Fellow in Theoretical Astrophysics at the California Institute of Technology, and received her PhD and MS in astronomy from the University of Washington.

News Notes

Congratulations, Graduates!

Undergraduates: Rogerio Cardoso (pursuing graduate degree in astronomy at West Virginia University); **Thomas Finzell** (pursuing graduate degree in astronomy at Michigan State University); **Victoria Hartwick** (working with Professors Stanimirovic and Wilcots and applying to graduate schools); **Noah Hurst** (pursuing graduate degree at Department of Physics, University of California-San Diego); **Jacob Miller** (pursuing PhD in Physical Sciences, including physics, chemistry and geology, at University of Colorado at Boulder); **Daniel Reese** (doing one-year internship at Harvard Smithsonian Center for Astrophysics); and **Justin Schield**.

Graduate Students: Samuel Friedman; **Kelley Hess** (doing postdoc at University of Cape Town, South Africa); **Alex Hill** (doing postdoc in radio astronomy at Commonwealth Scientific & Industrial Research Organization (CSIRO) in Epping, Australia); **Ryan Keenan** (on Fulbright Fellowship at Cerro Tololo Inter-American Observatory (CTIO) in La Serena, Chile; in spring 2012 will do postdoc at Academia Sinica Institute for Astronomy and Astrophysics, Taipei, Taiwan); and **Jennifer Stone** (doing postdoc at Department of Physics, Nagoya University, Japan).

Awards

Victoria Hartwick and **Jake Miller** received the Raymond L. Doherty Award, given in recognition of a graduating senior's exceptional performance in astronomical research and in the classroom as an Astronomy-Physics major. Department Chair Bob Mathieu presented the awards at the Physics Banquet & Awards Ceremony held at the Fluno Center April 29.

Graduate student **Chris Bard** has been awarded a NASA/Goddard Space Flight Center Graduate Student Researchers Program fellowship for 2011.

Welcome, Grad Students

The Astronomy Department welcomes the incoming 2011/2012 class of graduate students.

Hye Seung Lee, BS astronomy/space science, MS astronomy, Chungnam National University, Daejeon, Republic of Korea. Interests: cosmic ray acceleration, magnetic reconnection. Worked with Professors Lazarian and Desiati last year and went to Germany with Lazarian to work with well-known cosmic ray expert Professor Rienhard Schlickeiser on cosmic ray acceleration by turbulence.

Claire Murray, BS physics/astronomy, Carleton College, Northfield, MN. Interests: extragalactic astronomy, especially stellar astrophysics and radio astronomy, with specific focus on gaseous nebulae studies. Other interests: cluster dynamics, magnetic field interactions, interstellar medium.

Benjamin Tofflemire, BS astronomy/physics, with minor in mathematics, University of Washington. Interests: physics of stellar atmospheres, flares and magnetic activity. As participant in Astrophysics REU program last summer, did research testing a new statistical analysis technique on three-dimensional magnetohydrodynamic (MHD) simulations in the search for relationships between density distributions, turbulence and magnetic field strength under Professor Lazarian.

Heinz, Stanimirovic Awarded Tenure

The Department of Astronomy is pleased to announce the promotion of **Sebastian Heinz** and **Snezana Stanimirovic** to associate professors with tenure.

Heinz's research focuses on the astrophysics of black holes and their influence on the formation of structure in the universe. His passion for teaching goes beyond the classroom. He organized several semester-long PLATO lecture series to communicate science to

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From left, Snezana Stanimirovic and Sebastian Heinz

lifelong learners.

"The tenure process was a lot of work but very rewarding," says Heinz. "It gave me a real sense of all the things I accomplished during my time here at the UW. I really appreciate the support from the department, and especially my mentoring committee, throughout the entire process."

Stanimirovic researches neutral gas in the Milky Way and its immediate neighbors, focusing on the conversion of atomic gas into molecular clouds and later stars. She and her students use the premier radio telescopes, including the Arecibo Observatory, the Expanded Very Large Array, and the Australian SKA Pathfinder. Her research and educational work were recognized by the Research Corporation for Science Advancement with the Cottrell Scholar Award in 2009.

"The tenure process went smoothly thanks to my department mentoring committee and the UW-Madison WISELI (Women in Science & Engineering Leadership Institute) support through many workshops and their women faculty mentoring program," says Stanimirovic.

Alumni News

David Koch, a graduate of the AMEP (Applied Mathematics, Engineering and Physics) program, is the deputy principal investigator for the Kepler Mission at the NASA Ames Research Center in Moffett Field, CA.

Soeren Meibom is an astronomer at the Harvard-Smithsonian Center for Astrophysics in Cambridge, MA, where he works with NASA's Kepler Mission.

Stephan Jansen Retires

Stephan Jansen

Now that systems programmer Stephan Jansen has retired after 23 years at the Astronomy Department, his cell phone alerting him to data storage problems won't ring at 3 a.m. anymore, but his three cats will still awaken him at 4 a.m.

Stephan's job was to maintain the department's computer hardware and software. "Playing with new hardware and interacting with people were the best parts of my job," he says. "The worst part, of course, was the middle-of-the-night phone calls."

He explains that the department originally had one really big machine (his word for "computer") and a medium-size machine that ran a VMS operating system. The department then bought desktop machines running Digital Unix, SGIs running IRIX, and finally switched to Linux. Now, the department has 200 to 250 computers, a number of which are in clusters of 50 and 100 in service rooms in Sterling and Chamberlin.

Making everything work together was Stephan's biggest challenge. "At one time I had all the operating systems at the same time, and it was painful to get them to work together," he recalls. The key to his success was his infinite patience and not getting irritated. "No question or request for help was too big or too small for Stephan," says Professor Ellen Zweibel. "Stephan was always there to head off disaster by telling us what we needed to do to upgrade our computing equipment," adds emeritus Professor Ed Churchwell.

What to do with all the data, which is growing by leaps and bounds, is the biggest challenge he sees in the future. Disk space is becoming cheap, but it's hard to back up and maintain and keep the hardware running, he explains.

"No question or request for help was too big or too small for Stephan."

— Ellen Zweibel

With his characteristic humility and wry sense of humor, he claims that his greatest accomplishment was managing to stay at the department until he retired.

Stephan received a bachelor of science degree in computer science and math from UW-Madison. His hobbies are biking and reading science fiction and fantasy, so naturally his retirement plans are "to ride a lot of bike and read a lot of books."

"I've always been interested in astronomy," says Stephan. "I don't know how to do the science, but I do know how to make the programs work. I picked up just enough information to make me dangerous."

Jack Honor Finds the Perfect Fit

We all try to make sense of the world in our own way. Undergrad Jack Honor is doing it by majoring in astronomy and physics.

This summer, Jack, now a junior, participated in the department's Research Experience for Undergraduates (REU) program, working on radiative transfer models with astronomy senior scientist Barb Whitney. Radiative transfer is the flow of energy as light through material. Jack used Barb's code (several decades in the making and still getting better!) to create models of young stellar objects in order to better understand how stars form.

Jack Honor

As observing techniques become more sensitive and more complex morphologies are discovered, modeling software needs to be able to handle the newly discovered processes and shapes. Jack tested the code to make sure it modeled these new morphologies correctly. He also modeled real-world protostellar objects to help characterize their physical traits. The newest version of the code will soon be published and open for use by the astrophysical community.

Always interested in math and computers, Jack didn't think he was going to be a scientist. As a freshman, he realized that he wanted to never stop learning about the world, and an education based on physics seemed like a perfect fit. His future plans include graduate school, but he's keeping his doors open. When he's not doing science, Jack bikes, golfs and hangs out with friends. With an older sister who graduated from UW, he became a Badger fan early on.

Jack's research was recently featured on astrobites, a website that introduces undergraduates to research by explaining selected astro-ph articles, at http://astrobites.com/2011/08/21/undergrad-research-1/.

Board of Visitors Helps Department Shoot for the Stars

Following the lead of other UW departments, the Department of Astronomy launched its own Board of Visitors in the fall of 2002. Its members are a diverse group of people who share a love of both astronomy and the University of Wisconsin-Madison.

The Board advises and assists the Department and its chair in fulfilling the Department's mission and vision. It also serves as a bridge between astronomy amateurs and professionals; the University of Wisconsin-Madison administration, students and alumni; the State of Wisconsin; and the wider community.

The Board of Visitors is made up of business and science agency executives, marketing professionals, journalists, academics and amateur astronomers living not only in the Midwest but also on both coasts. Current members of the Board include: Pat Bautz, David Beckwith, Russell Christesen, Kenneth Ciriacks, Jere Fluno (chair), Richard Greiner, Dan Koellen (vice chair), Peter Livingston, Donald Procknow, Robert Terrell and John Wiley. For more information, visit the Board of Visitors section of our website at www.astro.wisc.edu. (Click on Friends & Alumni, Board of Visitors.)

The Board assists the Department in a number of ways. It acts as a sounding Board and an advocate for the Department's vision, long-range plan and programs. It assists in establishing contacts and relationships between the Department and pertinent organizations and individuals in the University community. It helps identify and leverage synergies between astronomy projects and potential commercial applications. It assists the faculty, in conjunction with UW Foundation development efforts, to secure funding for new and forward-looking programs included in the Department's plan. And it advises on opportunities to enhance the impact and image of the Department.

"The Board of Visitors plays an important role in the success of astronomy at UW-Madison," says Department Chair Bob Mathieu. "They also have become an integral part of the Department community."

The Department's relationship with the Board of Visitors has already reaped benefits in its short history. The Board was very active in the review of the Department's strategic plan for research and kicked off a matching challenge to fund the proposed initiatives. It was instrumental in establishing the Grainger postdoctoral fellowship, and in the creation of this newsletter.

The Board also relishes adventures—intellectual and otherwise—including, in recent years, a visit to the Kennedy Space Flight Center and launch of the shuttle Atlantis, trips to the WIYN Observatory in Tucson and the SALT Observatory in South Africa, and a weekend of theater, art and astronomy in Spring Green, WI celebrating the 400th anniversary of Galileo's first use of the telescope to gaze into the heavens.

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Jeff Miller, University Communications

Autumn leaves cover the ground in front of the newly renovated Washburn Observatory.

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State Fair visitors viewed sunspots and distant landmarks through telescopes set up by UW Space Place and the UW-Madison Astronomy Department as part of UW-Madison Day at the Wisconsin State Fair on August 10. Staff also distributed educational booklets, posters and bookmarks as part of the event.