The Washburn Observer

DEPARTMENT OF Astronomy
UNIVERSITY OF WISCONSIN–MADISON

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Inside This Issue

MaNGA Puts Department on Leading Edge of Integral Field Unit Science

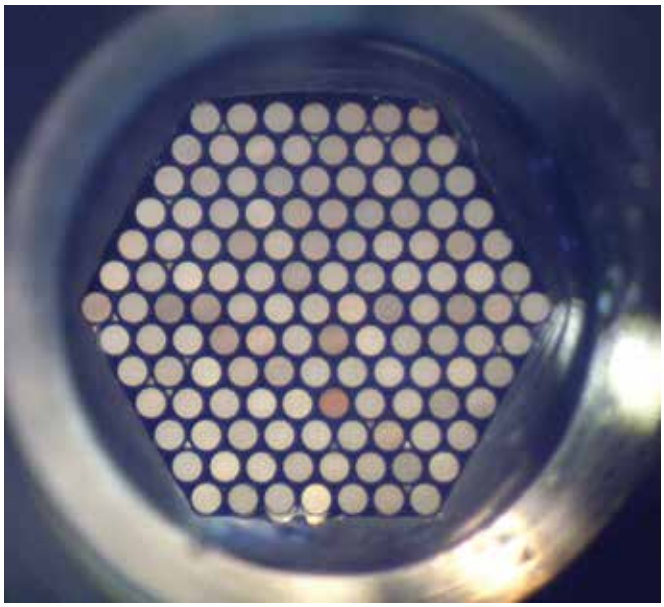
It may seem odd that a scientific project's acronym is the same as a Japanese comic book. But once you know that the project leader lives in Japan and is a punster, it all makes sense.

Mapping Nearby Galaxies at APO (MaNGA) is an ambitious new project that aims to uncover the internal structure and formation history of 10,000 galaxies and characterize the diversity of their evolutionary histories. It is part of the Sloan Digital Sky Survey IV (SDSS-IV), a multi-institutional project that will operate the Sloan Foundation's 2.5-meter telescope at Apache Point Observatory (New Mexico) from July 2014 to July 2020.

The UW is in the process of finalizing the Astronomy Department's buy-in to SDSS-IV, which will provide the university with access to data from three surveys—APOGEE-2, MaNGA and eBOSS—aimed at furthering our understanding of stars, Galactic structure, galaxy evolution and cosmology. "Membership in SDSS-IV is a really big deal for the department," says Professor Christy Tremonti. "It represents a significant investment of resources in a very exciting new direction."

"Great science has been done here at the UW with IFU observations of 10 to 50 galaxies. Having a sample of 10,000 galaxies will be a game changer."

—Christy Tremonti



An example of one of the MaNGA prototype Integral Field Units fabricated at Washburn Laboratories. This tiny bundle of 127 optical fibers (less than 2 mm in diameter) will provide spatially resolved spectra of galaxies billions of light years away.

Department scientists have been involved in SDSS-IV since its inception. Tremonti and new Associate Scientist David Wake helped to craft the original proposal for the survey. Professor Matt Bershady was subsequently asked to serve as SDDS-IV Project Scientist, a position that gives him responsibility for the overall scientific integrity of the project. He is also overseeing the design and testing of a critical piece of hardware for MaNGA, the fiber Integral Field Units (IFUs)—small bundles of optical fibers that will enable the survey to obtain spatially resolved spectra of galaxies.

The original Sloan survey (SDSS-I: 2000-2005) transformed astronomy by providing multi-color optical imaging of a quarter of the sky and spectra of more than a million objects, ushering in a new era of large, searchable astronomical databases, and a more statistical approach to science. As a young graduate student, Tremonti was one of the first to utilize the statistical power of SDSS for galaxy evolution studies. However, she was always aware of a major limitation of the survey: SDSS-I placed a single optical fiber on the center of each galaxy and typically

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Letter from the Chair

Jay Gallagher, Astronomy Department Chair

As I write this, it is almost two weeks past the vernal equinox. The Sun now is well on its way northward, bringing the spring season to the northern hemisphere of the Earth. Yet winter lingers on in Wisconsin with some snow, sub-freezing nights, and thin layers of thawed ground that are just sufficient to allow snowdrops and crocuses to flower. It is hard to believe that a year ago we already were into a semi-summer, having experienced temperatures in the mid–80s F range. Changeable weather, of course, is a hallmark of the Wisconsin climate and serves as a reminder of the complex nature of our terrestrial climate.

Our department has broad interests in understanding the astrophysical equivalents of climates. This stems from our long-term fascination with "gastrophysics," the study of physical processes associated with the evolution of cosmic gases. The behavior of gas in astronomical objects in some ways resembles what we experience in our atmosphere, but cosmic gas also has the ability to behave in unique and unexpected ways.

This combination of circumstances can be seen in the astronomers' choice of terms to describe features in astrophysical gases. For example, the interstellar medium contains "clouds," not of condensed water, but consisting of cold gas (think –400 degrees F and below) and dust bound together by their own gravity. These are prime targets for a study by Snezana Stanimirovic and the subject of Min-Young Lee's soon-to-be-completed Wisconsin PhD thesis. In another example, extragalactic researchers such as Christy Tremonti and her group explore properties of "galactic winds." These are far from gentle zephyrs, but rather are torrents of low density gas, driven by supernova explosions and racing outwards from galaxies at speeds in the 600 miles per second range, 20 times the speed of an interplanetary spacecraft. Although they are less dense than the best terrestrial vacuums, galactic winds can remove vast amounts of gas from galaxies, and as this raw material for star formation disappears, a galaxy's production of stars will cease.

Beyond these features that connect in some very general way to our terrestrial experience, processes exist that are specific to gas between stars and galaxies. In much of this material, electrons are stripped from their atoms so that the gas conducts electricity and can interact with magnetic fields that in turn direct streams of high energy particles, the cosmic rays. This combination opens a new realm of possibilities that is the province of theoretical research led by Sebastian Heinz, Alex Lazarian, and Ellen Zweibel, while observers such as myself and Eric Wilcots try to understand what actually happens in real astronomical systems.

Do we understand astronomical climates? Can we predict the conditions under which gas clumps into clouds and forms stars, blows away from a galaxy in a wind, or winds itself up in magnetic fields? No, not yet. But this continues to be a field that combines challenges associated with complex physical processes along with tantalizing possibilities for understanding how the universe that we inhabit came into being. It's a research area where Wisconsin will continue to push out the forefronts of knowledge. Along the way, we will learn about the cosmos and enhance our understanding of how dilute gas behaves within the solar system and on Earth, the places where the cosmic climate can touch our lives.

Jay Gallagher
Astronomy Department chair

Contributions

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 Professor Bob Mathieu, mathieu@astro.wisc.edu, 608-890-3767 or UW Foundation Director of Development Chris Glueck, chris.glueck@supportuw.org, 608-265-9952.

Thank you for your support!

Please Keep in Touch

We'd like to hear from you. Please send any news that 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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Britt Lundgren Does Absorbing Work

Britt Lundgren snowshoeing in Colorado

For three generations, Britt Lundgren's family has been in the camera business in her hometown of Rockford, Illinois. By using digital photography from Sloan Digital Sky Survey and Hubble Space Telescope cameras in her astronomy work, she feels that she is carrying on the family tradition.

Britt is a National Science Foundation (NSF) Astronomy & Astrophysics Postdoctoral Fellow and an expert on quasar absorption lines. Prior to coming to the UW last fall, she was a postdoc at Yale University. She graduated in physics from the University of Chicago and earned her PhD in astronomy from the University of Illinois at Urbana-Champaign.

In her research, Britt uses quasar absorption lines to study how galaxies evolve in terms of their gas content. Since 2000, she has used large samples of quasars from the Sloan Digital Sky Survey (SDSS). She creates automated algorithms to mine the 200,000 quasar spectra now available. "It would be hard to record all of the absorption lines manually within a lifetime," she says. Supercomputers facilitate the extraction of catalogs, which are used to make 3D maps of metal-enriched gas and to understand how the gas evolves.

Britt relates the gaseous signatures extracted from the SDSS to galaxies that might be expected to produce them. "It's tricky to see the galaxies that are home to these absorbers at high redshifts. They're faint and difficult to detect," says Britt. "Using deep galaxy surveys that overlap with the quasars, we can sometimes see galaxies that produce metal absorption lines, study their properties, and see how they're correlated."

Britt draws on the expertise of Professors Christy Tremonti, Jay Gallagher, and Dawn Erb (a frequent visitor from UW–Milwaukee). "There's growing evidence that many of the absorbers are produced by gas ejected by strong winds from star-forming galaxies. If we can link the absorbers to galaxies with enough concentrated star formation activity to launch large-scale winds, then we can also use the location of the absorbers to constrain the distance to which the winds extend and their effect on the galaxy's environment," she explains.

"The department values education and outreach. With three NSF Fellows—Ben Brown, Brian Morsony and myself—UW, along with MIT, has more than any other school. That says something about the culture of the department."

—Britt Lundgren

She is also helping Professors Ellen Zweibel and Eric Wilcots and graduate student Anna Williams find targets for their research, which uses absorption lines to help measure the magnetic fields in galaxies.

"I always liked the challenge of science," says Britt. "Astronomy was the only thing I wanted to study. I dreamed of being an astronaut at a very young age but was too farsighted!" As a teenager, she would drive up to Kettle Moraine State Forest in Wisconsin and set up her telescope. "Wisconsin was darker than Rockford and a fun place to go," she says.

As part of the NSF Fellowship, the only federally-funded postdoctoral fellowship that requires education and public outreach in addition to research, Britt is working with an educator from Yerkes Observatory to develop educational materials for SDSS—fun activities for middle school students and up and a new website for teachers and students. She is also helping UW Space Place with its new Speakeasy Science programs and mentoring an Eagle School student on an astronomy project using data from the Hubble Space Telescope.

"The department values education and outreach," says Britt. "With three NSF Fellows—Ben Brown, Brian Morsony and myself—UW, along with MIT, has more than any other school. That says something about the culture of the department."

When not busy doing her research and outreach work, Britt runs (she ran track and cross country in college), does some rock climbing, and snowshoes on Lake Mendota.

Her publications include "Large-Scale Star Formation-Driven Outflows at $1<z<2$ in the 3D-HST Survey" about targeting the galaxy hosts of absorption lines using Hubble, submitted to the *Astrophysical Journal*. She would like to teach and continue her research after her postdoc.

New Video Projector Adds "Wow Factor" to Sterling Hall Planetarium

Thanks to a gift from the new Astronomy Board of Visitors chair Dan Koellen and his wife Diane, the Sterling Hall planetarium has a new "wow factor"—a state-of-the-art video projector and surround sound system.

The system enables planetarium show presenters to add both slides and videos to their presentations and elaborate further on their discussion topics. For example, a teacher can now show images and videos to more clearly explain the motions of the Sun, stars, and constellations in the sky that students just saw with the star projector.

"Because students learn in different ways, we want to present various concepts from multiple perspectives," says graduate student Paul Sell. "This combination of teaching tools is powerful because it links perspectives and helps students develop their spatial reasoning skills. It's important to encourage students to discover astronomy—not just telling them how something is, but rather, letting them put it together in their minds and think like a scientist."

While the new system was Sell's idea, a team of department members made it a reality. NSF Postdoctoral Fellows Ben Brown and Brian Morsony helped with planning and presentation; shop staff Rick Williams assisted with purchasing and scheduling the installation; and shop staff Rick Van Der Geest helped with the installation and added an audio receiver and speakers that he found in the Pine Bluff Observatory basement.

Department members experience the new video projector and surround sound system in the Sterling Hall planetarium. The projector is on the left at the base of the dome.

Sell is teaching other grad students and professors how to use the planetarium. Since the new system was installed in mid-January, several teaching assistants have already used the planetarium with great success. "The potential future benefit of this system is enormous," says Sell. "I hope it will inspire professors and grad students to use the planetarium more often to benefit their students and the public."

Coming to a Park Near You This Summer: Universe in the Park

Hear about the latest astronomical news from UW Astronomy graduate students, observe astronomical objects through a telescope, and learn about what you are viewing at a Universe in the Park program this summer! The popular outreach program is held at Wisconsin state parks throughout the summer and fall. It is co-sponsored by the UW Astronomy Department and the Wisconsin Department of Natural Resources, and funded by the National Science Foundation. View the complete schedule at: www.astro.wisc.edu (click on The Public, Universe in the Park).

500th paper!

519 peer-reviewed papers have now used GLIMPSE data since the first data delivery in 2004. The total for the next highest Spitzer Space Telescope Legacy project is 317.

209,942,030 sources!

The GLIMPSE project has now catalogued over 209 million sources in a narrow strip of the Galactic plane, with the number of sources climbing fast now that we're recovering the inner Galaxy with Deep GLIMPSE.

360 degrees!

As of January, *GLIMPSE 360* observations provide a continuous, gap-free mid-infrared coverage of the entire Galactic plane.

GLIMPSE mania!

A large 180-foot panorama display; hand-out posters with the whole Galactic plane; a movie of the Galactic plane; a rollout of more data for the citizen science project, Milky Way Project (milkywayproject.org); and a two-day topical science meeting on the outer Galaxy will highlight the June AAS meeting in Indianapolis.

0 injuries!

The GLIMPSE project/team has now gone nine years without a work-related injury.

GLIMPSE (Galatic Legacy Infrared Mid-Plane Survey Extraordinaire) is a Spitzer Legacy Project that surveyed the entire 360 degrees of the Milky Way galactic plane.

Briana Indahl Instrumental to RSS-NIR Team

It's a long way—almost 6,000 miles—from undergrad Briana Indahl's home in West Salem, Wisconsin, to the Cerro Tololo Inter-American Observatory (CTIO) in La Serena, Chile.

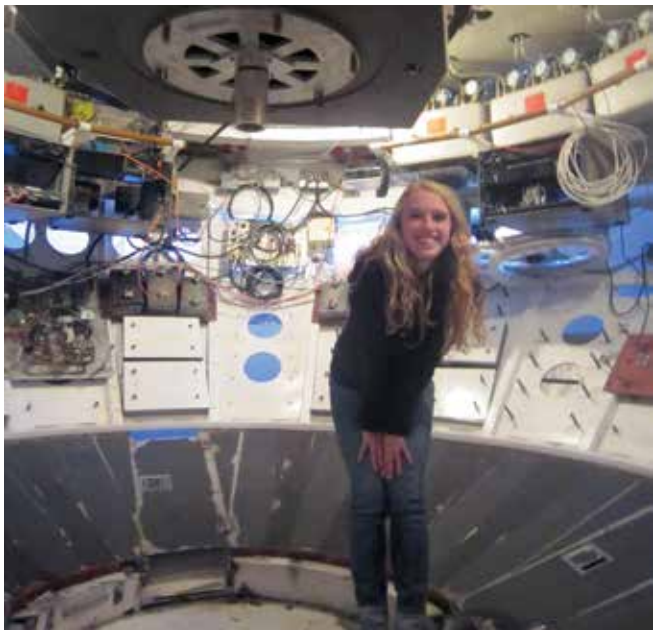
Briana spent the spring semester at the observatory as a Research Experiences for Undergraduates (REU) student. She and Gemini Observatory Science Fellow Peter Pessev did the first comprehensive search for carbon-rich asymptotic giant branch (AGB) stars in Milky Way globular clusters. Though it is not expected to find AGBs in these clusters, there have been seven serendipitous discoveries of these types of stars. They are known to exist in mass transfer binary systems with a carbon white dwarf companion and as products of stellar mergers. "Our results will aid in the modeling and understanding of globular clusters and galaxy formation," says Briana. They will present their research at the American Astronomical Society (AAS) meeting next January.

"It was pretty incredible being at CTIO," says Briana. "There were astronomers there from all over the world. It was a unique experience that showed me that I can work at a professional observatory."

All the REU students were granted observing time on the Small and Medium Aperture Research Telescope System (SMARTS) 0.9-meter telescope for two nights. "Observing at the top of the mountain was beautiful," says Briana. She also toured the Very Large Telescope Array (VLT), which is made up of four 8.2-meter telescopes, at the European Southern Observatory's Paranal Observatory. "These telescopes are always mentioned in introductory astronomy textbooks. It was an amazing experience to get to see them in person," she adds.

Briana describes herself as an outdoorsy person. When she's not doing science, she enjoys road biking, hiking, climbing, camping and skiing. After the REU program, she went backpacking with a fellow student in Patagonia in southern Chile and hiked to the top of Machu Picchu in Cuzco, Peru.

Briana received a Hilldale Undergraduate Research Fellowship, a Fay Ajzenberg-Selove Award from the Physics and Astronomy Departments, and a Wisconsin Space Grant Consortium Undergraduate Research Award this spring. She plans to graduate next May with a degree in physics and astrophysics and go on to pursue a PhD in astronomy. "I really like the idea of working at an observatory like CTIO someday, or possibly doing astronomical instrumentation work," she says. She's applied to a weeklong instrumentation workshop for grad students and advanced undergrads being held in Toronto this summer.



Briana Indahl under the primary mirror in the CTIO's Blanco 4-m Telescope

For the past year, Briana has worked with Dr. Marsha Wolf in her instrumentation lab characterizing the detector system for the Robert Stobie Spectrograph-Near Infrared Arm (RSS-NIR) being built by the UW for the Southern African Large Telescope (SALT). She continued on this project upon her arrival back to Madison from CTIO and presented her research at the Undergraduate Symposium in April.

"Briana has become a valuable member of the project team," says Wolf. "After beginning to analyze detector characterization data, she took it upon herself to learn the Python programming language and wrote code that greatly improved the efficiency of the analysis. She was also instrumental in testing custom detector electronics that were developed by the Inter-University Centre for Astronomy and Astrophysics (IUCAA, India), one of our SALT partner institutions, in its -40 degree C operating environment."

Briana's publications include a Gamma Ray Burst Coordinates Network (GCN) circular 14202 and "Performance Characterization of the near infrared detector system for RSS-NIR on SALT," Proc. SPIE 8453, High Energy, Optical, and Infrared Detectors for Astronomy V, 845327 (September 25, 2012).

She is a member of the Physics Club and a co-founder and officer of the newly formed Astronomy Club. She volunteered for the Wonders of Physics program and worked on various other club projects.

Working as a summer camp counselor after her freshman and sophomore years, Briana taught astronomy classes and organized and led a weekly star party at the Tomahawk Scout Reservation, a boy scout camp outside of Rice Lake, Wisconsin.

When she started out at the UW, Briana only knew that she wanted to study something in the sciences. After taking Astronomy 103 in her second semester, she decided to try physics and started leaning toward astronomy research in her junior year. "My advisor, Professor Stanimirovic, encouraged me to pursue my research goals, and the department helped me get my position in the instrumentation lab," says Briana.

"I love Madison," she says. "I go to all the Badger football games and even went to the Rose Bowl in my sophomore year."

Elena D'Onghia Models Dynamics of Milky Way

A computer simulation of the Galactic disk, performed by Elena D'Onghia

"A successful life is a teenage dream that comes true when you grow up."
—Alfred de Vigny

While watching a TV documentary on comets, Assistant Professor Elena D'Onghia decided to become an astronomer when she was 13 years old. "It took years for my dream to come true," she says.

Six years earlier, her father had brought home a used encyclopedia, and the chapter on astronomy sparked Elena's interest. She went on to study the humanities, including Latin, classical literature, and philosophy, before switching to physics. "I disproved the widely held belief that someone with a humanistic background does not become a scientist," she says. Her gymnastic training, which taught her discipline and the need to work hard and never give up, has also served her well in her scientific pursuits.

Born in the town of Vercelli in the Piedmont region of Italy, Elena studied physics and received her PhD at the University of Milan. She was a postdoc at the Munich Observatory in Germany, a Marie Curie Fellow at the Institute for Theoretical Physics in Switzerland, and a Keck Fellow at the Harvard-Smithsonian Center for Astrophysics in Cambridge, Massachusetts, before coming to the UW last fall.

Recently awarded a prestigious 2013 Alfred P. Sloan Foundation Research Fellowship, Elena will explore how the Milky Way disk formed and evolved. The old stars in our Galaxy date from its earliest history, and their spatial distributions reflect the physical processes that governed the formation of our Milky Way. Ongoing experiments such as the UW-led GLIMPSE survey are mapping the spatial and velocity distributions of the Galaxy's old stars over a larger volume than has previously been possible.

From these data, scientists are able to assemble a picture of the environment in which the stars in the old, thick disk and spheroid components of the Galaxy formed and how they were incorporated into the Galaxy. All of these phenomena cannot be created in a physical lab. Instead, astrophysicists have to create virtual laboratories on computers in order to simulate the astronomical phenomena in large-scale computational experiments.

"To astronomers, the calm beauty of the night sky in the southern hemisphere is the world's greatest wonder. The disk of our Galaxy is clearly visible, but understanding it requires both imagination and physical intuition."
—Elena D'Onghia

The art of modeling the dynamics of the Milky Way through supercomputer simulations of unprecedented resolution is the focus of Elena's research. "This is just a taste of the events to come in the new era of information-rich astronomy, where the entire Galactic disk is imaged to an unprecedented depth," she says. "It is the interplay between stars orbiting in the disk and the underlying dark matter halo that allows us to use observations to draw conclusions about the properties and dynamics of the Galactic disk through comparisons with simulations."

Elena's first results on disk dynamics, published in the *Astrophysical Journal* (April 1, 2013), argue that the spiral structure generated in the Milky Way's stellar disk is surprisingly long-lived. "This has important consequences for many aspects of disk evolution, including the currently popular claim that stars such as our Sun can migrate in radius from their birthplaces due to the action of time-variable spiral arms," she says. "These findings are novel and need new simulation techniques to be developed. This is an area where there is plenty of room for basic breakthroughs."

Our Galaxy is now being explored in a panchromatic way, leading toward a more complete understanding of its constituents. "My research will include new calculations of the formation of spiral arms by giant molecular clouds and by the impact into the disk of satellite galaxies, all in anticipation of an exciting decade of observations," she says.

A number of personnel and resources will be invested in these high-resolution numerical simulations and the interfacing of these results to key experiments, especially Sloan Digital Sky Survey IV, an ambitious mission that will create a map of our Galactic disk and nearby galaxies.

"To astronomers, the calm beauty of the night sky in the southern hemisphere is the world's greatest wonder. The disk of our Galaxy is clearly visible, but understanding it requires both imagination and physical intuition," says Elena. "I will help to extend our view of the Milky Way as a site of interesting events and begin to look ahead to a truly fascinating period in the history of astronomy."

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

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News Notes

Awards

Assistant Professor **Elena D'Onghia** was awarded a 2013 Alfred P. Sloan Research Fellowship (one of 126 scientists nationwide) for her research on the dynamics of galaxies.

Graduate student **Isak Wold** received the 2012–13 Stebbins Award for his research on distant galaxies.

Graduate student **Andrew Schechtman-Rook** received the 2012 Whitford Award for his thesis study of galaxy disks. He and graduate student **Natalie Gosnell** received Chambliss Awards for their exemplary research reported at the January American Astronomical Society meeting in Long Beach, California.

Graduate student **Greg Mosby** was named to the Bouchet Honor Society.

Alumni News

Aaron Geller (PhD 2010), currently the Lindheimer Fellow at Northwestern University, has received an NSF Astronomy and Astrophysics Postdoctoral Fellowship.

Laura Chomiuk (PhD 2010) has moved her Jansky Postdoctoral Fellowship to Michigan State University, where she will join the Physics and Astronomy faculty later this year.

Congratulations, Graduates!

Graduate student **Paul Sell** received a L&S campus-wide Teaching Assistant Award for Exceptional Service. He will do a postdoc at Texas Tech University (Lubbock) and will work with Associate Professor Tom Maccarone on X-ray binaries in high-energy accretion physics.

Graduate student **Min-Young Lee** will do a postdoc at CEA-Saclay, France and will work with Dr. Suzanne Madden on the properties of the interstellar medium in local galaxies in the collaborative project SYMPATICO (Synthetic MultiPhase Analysis of the Ism of Cosmic Objects).

Department News

The Department of Astronomy is pleased to announce that **Professor Ellen Zweibel** has been appointed Department Chair beginning this fall. Many thanks to current chair Jay Gallagher for his service this past year.

Alex Lazarian was named as a Fellow of the American Physical Society.

The department will welcome **Aleks Diamond-Stanek** as its second Grainger Postdoctoral Fellow this fall.

Carlos Vera-Ciro joined the department as a postdoc this semester. He completed his PhD at the University of Groeningen (Netherlands).

Dr. Marsha Wolf is now a full Scientist and is serving as Interim Director of the Washburn Astronomical Laboratories.

"Data cables handle extreme temperatures in large telescope," a RSS-NIR article about electrical cables operating in the cold, by Wolf and Kevin Siegel, Communications Manager, HELUKABEL USA, was published in the February 2013 issue of *DesignWorld* at designworlddigital.com/designworld/201302#pg32.

Matt Bershady was appointed Project Scientist for the Sloan Digital Sky Survey-IV.

Caryl Boyer is the new Associate Managing Editor of *The Astronomical Journal*.

Board of Visitors

Attorney **Scott McBride** (BS Astronomy/Physics 1995) of McAndrews Held & Malloy Ltd (Chicago) has joined the Board of Visitors.

Dr. Richard ("Doc") Greiner has completed his term on the Board of Visitors, with deep thanks from the department.

Dan Koellen is the new Board of Visitors Chair. He replaces Jere Fluno, who has stepped down after his second term as Chair. Peter Livingston is the new Vice Chair, replacing Koellen.

MaNGA *continued from page 1*

sampled less than 20 percent of its total light, providing an incomplete picture of the galaxy's average properties, and no information on variations within the galaxy.

MaNGA's innovation is to deploy numerous IFUs, in place of individual fibers, and to provide spatially resolved spectroscopy. This will enable astronomers to make maps of an individual galaxy's gas and star motions, chemical abundances and stellar populations. UW scientists have been building and using IFUs on the WIYN telescope for well over a decade. However, with the WIYN IFUs, galaxies must be observed one at a time, making it challenging to build up large samples. "Great science has been done here at the UW with IFU observations of 10 to 50 galaxies. Having a sample of 10,000 galaxies will be a game changer," says Tremonti.

UW's heavy involvement with MaNGA was enabled by the newly fledged Washburn Astronomical Laboratories. Bershady, graduate student Arthur Eigenbrot, and staff members Mike Smith (mechanical engineer), Jeff Percival (senior research scientist), Kurt Jaehnig (instrument designer) and Scott Buckley (instrument maker) are designing and testing the IFUs and building an automated fiber-optic testing system. "The MaNGA project has provided Washburn Labs with an opportunity to show how it can enhance and add value to the department's observing interests," says Percival**. "**The team has done a great job, and it would not have been possible without the superb technical staff that Washburn Labs provides," Scientist/Interim Director Marsha Wolf adds.

Tremonti is particularly excited about the new opportunities that the Sloan survey will open for students. "Survey membership links us to a network of collaborators at top-tier US and international institutions. It's a wonderful collaborative environment, and I expect it will significantly broaden our grad students' experiences," she says.

The department would like to thank Board of Visitors member/past chair Jere Fluno for a gift that provided the seed money for the project.

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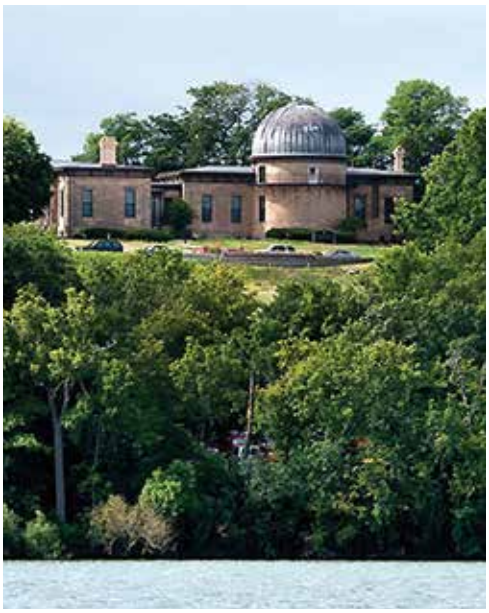

Pictured from Lake Mendota, Washburn Observatory sits atop Observatory Hill.

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Ten different exploration stations—from live zoo animals to plant pathology—were set up at Family Science Night at Space Place on Friday, March 15. At this station, a Madison College volunteer shows children how to make cheese. The event was a collaboration of the Urban League's South Madison Promise Zone, UW Institute for Biology Education's Adult Role Models in Science, and Space Place. Fusion Science Theater presented two performances of "The Way the Ball Bounces," and the Catholic Multicultural Center and Boys and Girls Club provided food. With more than 300 people attending, Family Science Night was a great success in fostering appreciation for science and building community.