



December 2017

## News from the High Plains



Spring 2017 Graduates



Apache Point Observatory

COLLEGE OF ARTS & SCIENCES  
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Greetings Alumni & Friends!

After serving as the Department Head for nine years, Danny Dale has stepped down. The department owes our past success to Danny's leadership, dedication and diligent work. We thank Danny for his tremendous contribution to the department and his passion for the wellbeing of our students. Without much of a break, Danny will serve as an Associate Dean for A&S College starting in January 2018.

We welcome Ed Synakowski to the department. Ed is UW's new VP for Research and Economic Development. He is an expert in plasma physics and was an Associate Director of Science for Fusion Energy Sciences at DOE prior to his arrival in Laramie. We also welcomed Connor O'Malley last year. Connor was trained at Rutgers University and brought his enthusiasm for teaching to the department.

Although the budget reduction over the past two years has impacted the department, we are back to an upward trajectory. The department is doing very well. We are in the process of hiring an experimental condensed matter physicist. This person is expected to start in the fall of 2018. I will keep you updated with the progress.

P&A faculty continues to build a strong record of excellent grantsmanship. Several of our faculty members have received major federal funding since the summer. See below for a complete list of the grants received by the faculty. These includes three major NSF grants, two major NASA grants and one from Indiana University. Faculty members were also awarded various internal grants from the A&S College, UW Academic Affairs, and School of Energy Resources. These grant will allow us to support more students to gain research experience.

Our astronomy faculty and students now have access to Apache Point Observatory (APO) located in the Sacramento Mountains in Sunspot, New Mexico via a new buy-in agreement with APO (see photo).

We had several retirements last year. Professor Paul Johnson retired from the university in the fall of 2016 after 35 years of service at UW. As a former Head, Paul steered the department through some of our most difficult years. Jerry Bucher retired as a WIRO engineer, and Ed Koncel retired after many years of teaching introductory physics. Nicole Wade left the department in fall 2016 and she is now working at a local school. Beth Leonard left us for an on-campus position at WYGISC in the fall 2017. We thank their contributions to the department and will miss them dearly. We are in the process of hiring Beth's replacement and hopefully Jerry's replacement soon.

Please let us know about your career path (physics@uwyo.edu). We post these updates on our alumni page [physics.uwyo.edu/Alumni/alumni.html](http://physics.uwyo.edu/Alumni/alumni.html). Also, please send us your email if you are interested in receiving an electronic copy of these newsletters.

Best regards,

Jinke Tang  
Department Head

## Department News:

Graduate students, Aaron Wang and Jessica Sutter, were awarded Dean's Graduate Scholars. Congratulations!

Congratulations to Jessica Sutter, Josh Heiner and Sam Pasco for receiving Wyoming NASA Space Grant Graduate Research Fellowships!

Joshua Walker was awarded a Wyoming NASA Space Grant – NASA Center Summer Interns to study at NASA Goddard Space Flight Center. Way to go!

Congratulations to Joann Hilman, Gabriel Miller and Danielle Schurhammer for receiving Wyoming NASA Space Grant Undergraduate Research Fellowships!

Undergraduate student Ericka Chorniak was selected to serve on the A&S Curriculum Committee, and undergraduate student Logan Jensen was selected as an A&S ambassador. Congratulations!

Logan Jensen was invited by the WY Governor for his State of State speech. Governor Mead highlighted Logan and his individual accomplishments when he delivered his State of the State speech to the 64th Wyoming Legislature and discussed the Science Initiative. Photo below.

Professor Rudi Michalak took 8 undergrads to SPS Quadrennial Congress in San Francisco. Students gave 5 presentations at the conference. They also visited SLAC and Google headquarters. Photo below shows undergrad student Caitlin Kennedy at her poster.

Three cheers for Hannah Jang-Condell who received an A&S Extraordinary Merit in Research award in March 2017!

In November, Hannah hosted a successful Habitable Worlds 2017: A System Science Workshop in Laramie. Nature has published an article summarizing the workshop that has attracted researchers at the forefront of the study of planetary habitability.

Danny Dale has recently visited WY high schools in Cheyenne for recruiting and outreach. He has also been asked by President Laurie Nichols to join her to visit Sheridan, Powell and Greybull. He, President Nichols and Trustee Michelle Sullivan hosted the first legislative dinner with five area legislators in attendance.

Congratulations to Lynn Wheat for a well-deserved A&S Staff Extraordinary Merit Award!



## Major Grants Received by Faculty Last Year:

Chip Kobulnicky received a NSF grant on prediction of a red Nova outburst. He shares the new \$520K NSF award with a colleague from Calvin College.

Bill Rice is the Lead PI on a \$750K NASA grant for advanced optical measurements of ice adhesion on icephobic aircraft surfaces.

Mike Pierce received an award from Indiana University for \$175K plus in-kind contributions of equipment that will be used to develop a precision radial velocity spectrograph for WIRO.

Hannah Jang-Condell, Chip and Mike have already been given award notice of their forthcoming \$750K NASA grant to use the new spectrograph entitled Igniting a New Era of Planet Discovery with FHiRE: A Precision Spectrograph at the WIRO Telescope.

Jinke Tang, TeYu Chien and Yuri Dahnovsky received a \$600K NSF grant to study a unique spin structure, Skyrmions, that may have applications for next generation data storage.

TeYu is also the PI on another joint NSF grant for concurrent design of quasi-random nanostructured material systems. He shares the \$700K grant with a colleague at Northwestern University and another at Iowa State.

Danny received a \$43K grant from the NSF to study design issues for the Next Generation Very Large Array telescope.

## UW internal grants received by faculty last year:

Danny and Bill have each been awarded an A&S Seed Grant.

Danny also received an A&S In-Reach grant.

Chip was awarded an Academic Affairs graduate recruiting grant.

TeYu, Bill, Yuri and Jinke have each received an Academic Affairs Energy Graduate Assistantship.

Yuri received a Science Initiative Research Assistantship.

Bill was also awarded a Wyoming NASA EPSCoR Faculty Research Grant.

## Selected external grants received by faculty in 2016:

Danny Dale received a 3-year renewal of NSF REU summer program grant in 2016.

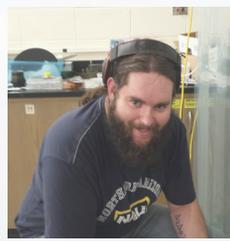
Adam Myers received a \$130K grant from DOE to study quality assurance and data reduction for the Beijing-Arizona Sky Survey

Adam also received a NASA grant (\$165K) entitled Unveiling hidden black holes in the cosmic web: Dark matter halos of WISE quasars from Planck CMB lensing.

Bill received an award from the School of Energy Resources (\$285K). His project centers on new crystalline forms of carbon to solve challenges like short-range, high-capacity metallic carbon wires, facile synthesis of graphene-derivatives, and nano-diamonds from coal.

Jinke received a \$312K award from the School of Energy Resources. The project focuses on the magnetic properties of rare earth elements and includes a feasibility study of recovering REEs from coal.

TeYu was also awarded significant funding from the School of Energy Resources to study graphene production from coal.



(pictured from left to right - top)  
 Amy Cavanaugh  
 Emily Jensen  
 Dinesh Baral  
 Jacob McLane



(pictured from left to right-bottom)  
 Riley Jordan  
 Narendra Shrestha  
 Brad Lyke  
 David King  
 Josh Walker (not pictured)

This year we welcomed 9 new grad students and 1 post doc.

## 2017 Solar Eclipse

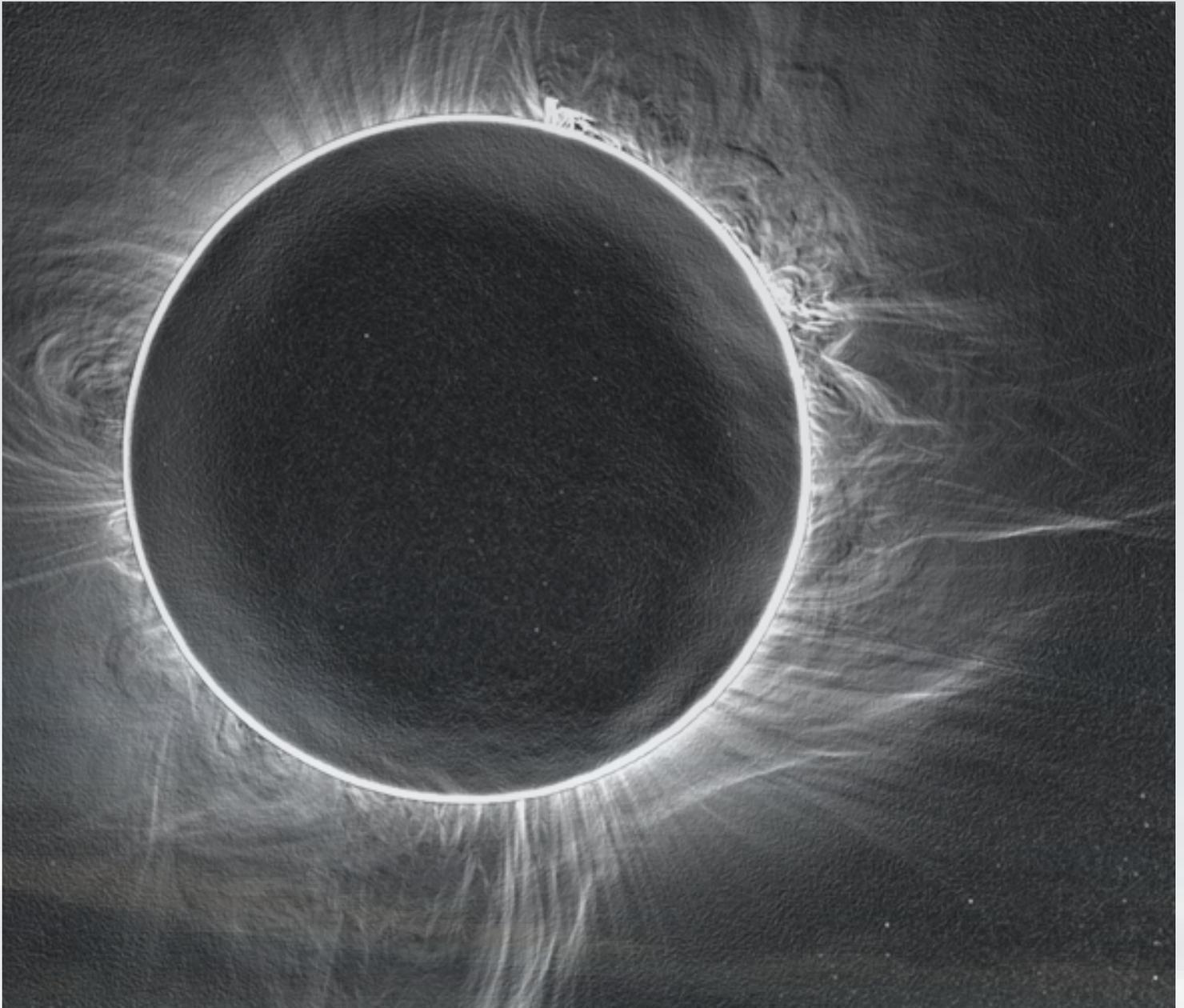
Last summer Wyoming residents had an opportunity to witness one of nature's greatest spectacles, a total eclipse of the sun. The August 21 event was the first total eclipse of the sun visible in the continental United States in 39 years making it one of the most anticipated astronomical events in decades. A total solar eclipse requires precise alignment of the Sun, Moon and Earth such that the moon fully covers the Sun and its shadow crosses the Earth tracing a narrow path of "totality." Anyone located along this narrow path saw the Sun's brilliant surface covered by the moon allowing the faint, filamentary corona to be seen for a brief 2 and 1/2 minutes. This year's eclipse was particularly rare because the path of totality crossed the entire US from Oregon, through Wyoming, to South Carolina allowing the event to be viewed by millions of people. The weather forecasts for Wyoming were particularly good and attracted people from all over the US and even the globe to come to the state for the event. In fact, the US Postal Service chose the UW Art Museum as the site for unveiling their commemorative stamp on June 20 in order to celebrate the eclipse. Over 400 people attended the event and were treated to lectures from dignitaries, NASA scientists, and Dr. Michael Pierce an astronomer in the Physics & Astronomy Department. There were also local amateur astronomers present with telescopes to allow the public to view the Sun.

As people from across the state and the world began making their travel plans to witness the big event, Pierce and UW students Logan Jensen, Gabriel Miller and Sarah Eftekhazadeh were busy training Wyoming High School teachers to assist in an ambitious research project known as the Citizen CATE project. CATE, an acronym for the Continental Area Telescope Experiment, was a project conceived and organized by Dr. Matthew Penn of the National Solar Observatory (Tucson, AZ) to train these citizen scientist teams to obtain high definition video from 70 locations along the path in order to construct a 90 minute, time-lapse record of the corona's complex structure and motions. With a temperature of over a million degrees, the corona is much hotter than the 6000 degree solar surface. While there is considerable evidence that the physical processes involved in heating the corona are related to wave-like transport of gas through the Sun's magnetic field the details are uncertain. The CATE project would enable solar scientists to record these waves for the first time. CATE was funded by NASA and the National Science Foundation and Pierce and his students were responsible for selecting and training the 9 teams to be deployed across the state of Wyoming. Thanks to additional corporate sponsorship, the CATE teams will keep the telescopes, high-end video cameras and the laptop computers used in the project for future projects. When eclipse day finally arrived the weather proved to be spectacularly clear and all the Wyoming teachers and their students obtained data. In fact, 67 of the 70 teams across the US did as well making CATE one of the most successful citizen science projects ever. The resulting time-lapse video has revealed waves and jets of hot gas never seen before and promises to keep solar scientists busy for years to come!



Both before and on eclipse day all of the UW astronomers from our department participated in public events across the state. Drs. Michael Brotherton, Daniel Dale, Hannah Jang-Condell, Henry Kobulnicky and Adam Myers organized teams of UW students at Grand Teton National Park as well as at several of the state parks across the state. Thanks to the generous support from Google, the University of Wyoming and NASA, our astronomers were able to hand out informational flyers and special eclipse-safe glasses to over 90,000 people attending these events. Wyoming proved to be a popular eclipse destination.

Other notable groups visiting the state to record the eclipse included an IMAX film crew located at the joint UW and National Park Service research station on Jackson Lake, a video crew live streaming the event from Casper for NASA TV and groups from WGBH Boston/Nova and Time magazine streaming video via Facebook Live. The IMAX crew was assisted by UW student Jacob McLane and summer intern Lia Eggleston. When all the excitement was over UW astronomers had given numerous press interviews and school visits making the eclipse the largest public outreach activity ever allowing us to showcase the scientists and students from Department of Physics & Astronomy. The August 21, 2017 event promises to be an experience that we will remember for many years to come!



The Sun during eclipse from the Citizen CATE project. In this project we had 70 telescopes across the US acquiring video of the Sun to make a time-laps movie of the filaments in the solar corona. These are comprised of 1,000,000-deg K plasma confined and heated by waves within the Sun's magnetic field.

# ALUMNI NEWS

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Congratulations to **Dr. Matthew Greenhouse** for A&S Outstanding Alumnus for 2017! Dr. Greenhouse graduated from UW in 1989 with a Ph.D. in Physics, and his career accomplishments since then easily place him in the ranks of our best alumni. Though he has an excellent record in scholarship with over 100 publications to his name, Dr. Greenhouse has earned this nomination through his leadership efforts at NASA. Dr. Greenhouse has made his mark in the field of astrophysics by successfully leading multiple missions for NASA. He is particularly adept at leading the efforts to develop and integrate the sophisticated instrumentation that is used on NASA's space-based satellites, instruments such as infrared cameras and spectrometers that are used to study planets, comets, stars, and galaxies. He currently holds one of the senior-most positions for the JWST mission, the upcoming observatory that will be launched in October 2018 and ultimately will replace the Hubble Space Telescope. His work has been rewarded with more than 20 awards including the NASA Exceptional Achievement Medal and the Robert H. Goddard Award for Achievement in Science.

**Ivy McLeod** (B.S. 1997) is currently a flight controller at Stinger Ghaffarian Technologies in Houston. Ivy came back to the

department in October and shared her career path/experience with SPS and provided valuable suggestions for students looking for careers in industries and NASA. Thank you, Ivy!

**Tyler Ellis** (B.S. year) came back to the department in November from Louisiana State University, where he is currently a graduate student, and gave a talk entitled: Confirmed Flux Dips of Boyajian's Star from Earth. We enjoyed it!

## ALUMNI PROFILES

**Paul Miller** (B.S. year) teaches physics at West Virginia University. His interests include physics education, informal science education, and plasma physics. He specializes in the teaching of introductory physics for engineers and for elementary education majors, and he is part of the new WVUteach program. He is a former director of the National Youth Science Camp and is currently involved with the American Physical Society's Division of Plasma Physics education and outreach effort. Paul received his BS in physics at the University of Wyoming, where he also completed a BA in secondary science education. He received his MS in physics from the University of Michigan. Dr. Miller taught in high schools in Oregon, Maryland, and West Virginia before returning to physics to complete his PhD at WVU. He is married to Betsy Miller and has two fun kids, Griffin and Nora Wren.

**Thank you to our recent donors!** Dr. and Mrs. David Barnaby, Burnett Family Charitable Fund, Dr. Lowell Burnett, Dr. Robert Davis, Miss Cheryl K Dellai, Dr. Robert Ellefson, Dr. & Mrs. Terrence and Margaret Flower, Ms. Leslie W. Fung, Dr. Paul K. Henry, Mr. Lowell W. Hill, Mr. and Mrs. Gary & Betty Jo Horton, Mr. Michael E. Johnson, Dr. & Mrs. Klawiter, Jr., Dr. Roland Lamberson, Mr. and Mrs. David & Lois Larmouth, Captain William L. Roberts, Mr. Roy C. Sarver, Mr. Samuel R. Schrinar Jr., Dr. Terry A. Scott, Ms. Jean M. Meyer-Scott, Mr. Jerry D. Tastad, Dr. and Mrs. Ronald Wilson. We thank Mr. & Mrs Patrick and Nora Ivers for their recent major donation to the department.

If you would like to donate please visit [uwo.edu/foundation](http://uwo.edu/foundation).

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