



UW Physics & Astronomy Newsletter

Spring 2020

Greetings Alumni, Friends, Students, Faculty and Staff!

We are quickly approaching the end of spring semester. Like all other schools, classes at UW have moved online amid the COVID-19 saga. The dedicated faculty and staff are doing their best to assist our students with the transition. We sincerely hope everyone makes a smooth transition, stays healthy, and continues to have fun with physics/astronomy.

If you have not noticed, we have a number of new faces in Physics & Astronomy. Please look inside this newsletter for the newest members of our family. We are thrilled to have all of them join us here to make our department the best place for students to learn, grow and thrive.

The department is doing very well. For the second year in a row, we welcomed the largest class of freshman and transfer students in the recent history of the department. We also welcomed eight graduate students to our program (see below for their names and pictures). We are very happy that a number of our students were given prestigious awards for their academic and research achievements last year.

Former graduate student, Jessie Runnoe, is now an assistant professor at Vanderbilt University, and former graduate student Andy Yost is now an assistant professor at Oklahoma State University. Congratulations to them!

Oh, the University of Wyoming chapter of the Society of Physics Students (SPS) has again earned the designation of a SPS Notable Chapter!

Physics & Astronomy faculty continues to build strong records of excellent grantsmanship. Many of our faculty members have received new federal grants. Faculty members were also awarded various internal grants from the A&S College, UW Academic Affairs, and other sources. These grants make it possible that students gain real world research experiences and invaluable trainings.

Please let us know about your career path (physics@uwyo.edu). We post these updates on our alumni page <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.

Be safe and be well. I wish you a great semester and great year ahead.

A handwritten signature in black ink, appearing to read "Jinke Tang".

Jinke Tang

NEW PHYSICS & ASTRONOMY GRADUATE STUDENTS

This year the Physics & Astronomy department welcomed eight new graduate students!



Jefferson Carter
Physics Graduate Student



Evan Cook
Astronomy Graduate Student



Bijay DC
Physics Graduate Student



Nathan Magno
Physics Graduate Student



Christoffer Masi
Physics Graduate Student



Lucas Napolitano
Astronomy Graduate Student



William Scougale
Physics Graduate Student



Uche Ubeh
Physics Graduate Student

TEDxUWYO

Four University of Wyoming professors and their innovative ideas will be showcased Saturday, April 20, in TEDxUWYO. Scheduled from 1-4 p.m. in the UW College of Arts and Sciences auditorium, the independently organized event, licensed by TED, will feature local voices and TED Talks videos under the theme of “Horizon.” The event is open to the public, but attendance will be limited to the first 100 people. Launched in 2009, TEDx is a program of locally organized events that bring the community together to share a TED-like experience. Some of the best talks from TEDx events have gone on to be featured on TED.com and garnered millions of views from audiences across the globe. “We are very excited to bring the very first TEDx event to the University of Wyoming and bring awareness to the great ideas cultivated here,” say UW students Mark Menghini and Jake Aadland, the event’s organizers. Speakers at TEDxUWYO include Mike Brotherton, a professor in the Department of Physics and Astronomy, with a presentation titled “The Synergies of Science and Science Fiction.” For more information about TEDxUWYO, visit www.ted.com/tedx/events/32939.

NATIVE AMERICAN SUMMER INSTITUTE



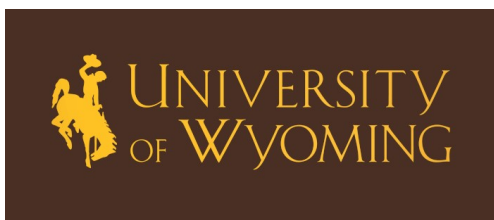
Faculty and students in P&A participate in UW's Native American Summer Institute every year. Photo shows a physics demonstration during the Native American Summer Institute where Prof. TeYu Chien and graduate student Henry Wladkowski demonstrate the static electricity generated by a Van de Graaff generator to high school students from Wind River Indian Reservation.

APACHE POINT OBSERVATORY

The 2018 UW acquisition of a 1/16 share in the Apache Point Observatory 3.5-meter telescope—operated by a consortium of eight major universities—is reaping big rewards for department faculty and students. Pictured below, Prof. Danny Dale, four graduate students, and an undergraduate student used APO’s imaging camera in January of 2019 to probe the extent of stellar radiation in the outer reaches of several nearby galaxies. Their goal is to combine these data with ancillary data at UV and IR wavelengths to help us to understand how galaxy disks form. Prof. Mike Brotherton and a team of students are using APO’s infrared spectrograph to measure the properties of ionized gas in the inner few light years of active galaxies that contain supermassive black holes weighing several million to several billion solar masses. These data they will measure the masses and life cycles of black holes as they devour stars and gas, making these objects visible even in the most distant universe. Prof. Chip Kobulnicky and students are using APO’s double imaging spectrograph to measure the temperatures of high-velocity massive stars ejected from their birthplaces. Their research has led to a revision of the canonical rate at which stars lose matter by a factor of three, implying that, when these stars explode as supernovae, they create more black holes (and gravitational waves!) than previously thought. APO access is enabling new observational experience and new kinds of thesis projects for the department’s undergraduate and PhD students.



UNDERGRADUATE ASTRONOMY PROGRAM



The University of Wyoming has been named one of the Top 25 Most Affordable Bachelor's in Astronomy for 2020 by Great Value Colleges. University of Wyoming, which placed 12th, was selected not only for the program's affordability but also for the institution's overall outstanding reputation, its faculty's excellence, and the unerring commitment to providing students a high-quality education and in doing so, giving them all the tools that they need to achieve their future career goals. Read the article here:

<https://www.greatvaluecolleges.net/affordable/astronomy-bachelors/>

SINGLE-CELL CARBON NANOTUBES RESEARCH



From left, William Rice, a UW assistant professor of physics and astronomy; Joshua Walker, a UW Ph.D. student in physics from Cheyenne; and Valerie Kuehl, a Ph.D. student in chemistry from Beulah, Colo., characterize the alignment of single-cell carbon nanotubes in Rice's spectroscopy lab. The three headed a study that shows, for the first time, the ability to globally align single-wall carbon nanotubes along a common axis. This discovery can be valuable in many areas of technology, such as electronics, optics, composite materials, nanotechnology and other applications of materials science. A paper on the research, of which Walker was lead author, appeared in the Oct. 9 print edition of NanoLetters.

PHYSCON



UW undergraduate students with Nobel Laureate John Mather.

In the fall, Rudi Michalak took six undergraduate students (Silba Dowell, Cierra Rainey, Naomi Jones, Brock Parker, Kris Steelmon, and Anh Nguyen) to the PhysCon conference of the Society of Physics Students in Providence, Rhode Island. The students networked with national American Physical Society officers, students from our and other zones, and attended talks by three Nobel Laureates (among other notable speakers). UW had a well-received graduate school table, and Hannah Jang-Condell also functioned as Zone Councilor during the meeting.



Photo of Physics undergraduate students after the final PhysCon banquet.

COVID-19 RESPONSE

The Physics & Astronomy department's faculty, staff, and students have been working hard to respond to the COVID-19 pandemic and adapt to online instruction for courses and labs.

Danny Dale, Professor/Associate Dean of Arts & Sciences:

Dr. Dale essentially "flipped" his Physics 2 course. In addition to requiring the standard problem sets and text readings, he is having students watch specific Khan Academy videos as well as his own lecture videos that he posts on the course website. During his regular class meeting times, he's offering optional Zoom-based discussion sessions where they review concepts, discuss homework, and do practice problems. The combination of Zoom and his iPad has come in very handy, since he can display his screen while writing to a virtual notepad. These Zoom sessions are optional, since it has been recommended we avoid mandatory synchronous course meetings, because some students don't have access to fast internet/Wi-Fi.

Jessica Sutter, Astronomy Graduate Student:

Jessica has been working with the Roadshow and a new graduate student outreach group to create some educational activity videos. She has created two videos so far, and says she is having a lot of fun with it. To view the videos, click the links below. Thanks, Jessica!

<https://youtu.be/V38Jf9f-lQo>

<https://youtu.be/UDp4bOIz42A>



“WORLD ABOVE THE TETONS”

Astronomy professor Mike Brotherton is the next speaker in the Wyoming Stargazing “World Above the Tetons” speaker series, where he will talk via Zoom about his work with super-massive black holes, quasars and active galactic nebula, as well as his science fiction.

Read the full article here:

https://www.jhnewsandguide.com/scene/events/uw-astronomer-to-talk-of-science-fiction/article_82e54e25-1949-5cf9-abaa-ef4c3085d508.html

PHYSICS & ASTRONOMY DEPARTMENT FACULTY AWARDS

Congratulations to Chip for receiving a Women in Graduate Education Graduate Assistantships (WGE) award! Chip also got the Under Represented Domestic Minority (URDM) award!

Congratulations to Danny for securing a \$500K pledge from the Windy Ridge Foundation, plus a \$250K UW match! The \$750K award will be used to support an astronomy themed STEM camp for middle school students and to support graduate students under a named faculty fellowship.

Congratulations to Jifa Tian! His A&S Faculty Interdisciplinary Seed Grant Proposal, Exploring Topological Superconductivity in 2M WS2 for Topological Quantum Computation, has been selected for funding at the full requested amount of \$25,000.

Chip's Graduate Recruitment Initiative Proposal was awarded at the full requested amount of \$10,000. Congrats!

Congrats to Adam for a new three-year NSF grant to promote computer science education in Wyoming! Adam is a Co-PI on this \$1M grant.

Adam has been chosen by the Arts and Sciences faculty to serve on the Central Committee as the Physical Sciences Division representative. The term for this committee is three years, starting September 2019.

Shawna McBride received an award from A&S INREACH Activities Fund.

Hannah has been chosen by the Arts and Sciences faculty to serve on the A&S Reappointment, Tenure and Promotion Committee as the Physical Sciences Division representative. The term for this committee is three years, starting September 2019.

Congrats to Hannah for a \$20K 2019 Wyoming NASA Space Grant Faculty Research Initiation Grant!

Chip Kobulnicky has been awarded the 2019 Promoting Intellectual Engagement in the First Year (PIE) award.

Mike Brotherton got a Science Initiative seed grant (\$45,000).

Mike Brotherton received an open textbook (openstax) award.

TeYu Chien received a Science Initiative seed grant (\$90,000 – for two years).

Rudi was elected Chair-Elect of UW faculty Senate. He will serve as Chair in Year 20-21.

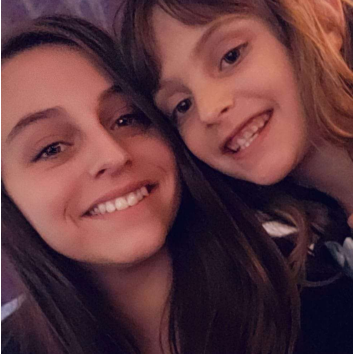
TeYu (Lead PI), Jifa, Bill, Yuri and Jinke were awarded with a \$750K two-year DOE EPSCoR grant to study magnetic skyrmions in 2-dimensional materials.

Mike Pierce has been invited to join the science team for a major new instrument (GNAO) being developed for the Gemini North telescope. The Gemini telescopes (North and South) are the largest publicly accessible telescopes available to US astronomers. Congratulations, Mike!

We would like to hear from you!
If you would like to share your news in the next newsletter, please email us at: physics@uwyo.edu.

NEW FACULTY & STAFF

CASIE PHILLIPS



My name is Casie Phillips and I am from Lander, Wyoming. I moved to Laramie, Wyoming a year ago in July to pursue my Bachelor's Degree in Accounting. I have been with the University of Wyoming for a little over a year now. I started with the Residence Life & Dining Services Department as their Accounts Payable. Before moving to the Physics, Astronomy, and Chemistry department, I was their HR/Payroll Liaison. Lastly, I have a beautiful five year old daughter who is in kindergarten at the UW Lab School. I look forward to working with all of you!

UMESH SILWAL



Last fall, we welcomed Dr. Umesh Silwal to the department. Umesh is our new Lab Coordinator. He also teaches physics classes and will be involved in various outreach activities. He obtained his Ph.D. degree in Engineering/Applied Physics from Mississippi State University (MSU) in 2018. His research was focused on the structure study of exotic nuclei using the β -decay γ -ray spectroscopy techniques. Before he moved to Laramie, he has worked at MSU as a visiting assistant professor for two semesters. Besides teaching and laboratory work, he likes to spend time on physical fitness, sports, and travel.

CONRAD VOGEL



I grew up in Lincoln, NE and studied Mechanical Engineering at the University of Nebraska. I have loved Laramie since my first visit in 1995, when I spent the Christmas holiday with my girlfriend and her family (now known as my wife and in-laws). In 2010 I was delighted to have the chance to move to Laramie for a job in the A&S research support department. In 2015 I accepted a job at the Large Binocular Telescope Observatory in Tucson, but Laramie remained near to my heart. After a few years at LBTO, and a short stint at the Richard F. Caris Mirror Lab, I was thrilled to return to my favorite place ever and once again be a part of UW, this time as a WIRO engineer. When I'm not at work, I like tinkering in my shop at home with machine tools, motorcycles, bicycles and cars.

MAX GILBRAITH



I grew up in Golden, Colorado and attended the University of Colorado Boulder. There I graduated with a Bachelor's degree in Astrophysical and Planetary Science with a minor in Atmospheric and Oceanic Science in 2015. I began working with Fiske Planetarium on the CU campus in the spring of 2014, contributing to thousands of public shows, arts projects, concerts, plays, and other special events. During this time, I also participated in field work with CIRES and INSTAAR conducting climate, glacial, and snow research. I've also collaborated to help write, animate, and film a feature length planetarium film about climate change. When not in the planetarium I love to ski, play music (of which I have two recorded albums with a space-themed jam band), and hike. I'm excited to join the UW team and serve the students and community of beautiful Laramie, Wyoming.

STUDENT AWARDS & ACCOMPLISHMENTS

Congratulations to Ryan Parziale and William Scougale for receiving A&S outstanding graduates awards for 2019! Bryant Beau Jerome and Aylin Marie McGough-Peker received A&S outstanding graduate awards for 2020.

1st-year grad Cristilyn Gardner received news of her NSF graduate fellowship award in April of 2019.

Two of Bill Rice's undergraduate research students, Abby Firme and Ethan Taylor, were recognized in a group of twelve students for best undergraduate research presentations at the APS April meeting in Denver. Congratulations!

Grad student Amy Cavanaugh received a NASA Space Grant Graduate Research Fellowship. This award comes with a matching grant from Ivers Graduate Research Matching Funds.

Undergrad Alex Higley has been accepted into the Wyoming Research Scholars Program.

David King received an outstanding presentation award at APS's 4 Corners Meeting in Arizona.

Rabindra Dulal and Will Chick both received Arts & Sciences Dean's Graduate Scholar awards.

SPS National Council has awarded the University of Wyoming SPS Chapter as a 2019 Notable Chapter. All chapter award winners will be recognized on the Outstanding Chapter Award page in the coming weeks. Congrats to Hannah, Nick Trimble, Alexander Schultz, Michael Lindman and Julia Perlman.

Former graduate student Jessie Runnoe is now an assistant professor at Vanderbilt University.

Former graduate student Andy Yost is now an assistant professor at Oklahoma State University.

LIFT PROJECT

In 2019, the Wyoming NASA Space Grant began a new chapter of its high-altitude balloon program called the LIFT Project, an effort funded by a grant from the National Science Foundation. Through LIFT, teams of UW undergraduates majoring in science, engineering, and education help design and build authentic K-12 STEM-related projects and curriculum for high-altitude ballooning. The teams are partnered with K-12 teachers in Wyoming, giving them the opportunity to test out their projects in a real classroom setting. During this past year, two LIFT teams developed STEM projects focused on cosmic radiation and the speed of sound.

The cosmic radiation team designed several Arduino payloads capable of measuring cosmic radiation (Gamma rays and Beta particles) using a small Geiger radiation sensor. They collaborated with high school students from Newcastle High School in Newcastle to explore the science behind cosmic radiation and develop protective shielding to fit around the radiation sensors. In early November 2019, they successfully launched a high-altitude balloon that lifted their payloads to an altitude of over 101,500 feet. Following the launch, students analyzed the data to determine the effectiveness of their radiation shields. The speed of sound team also used an Arduino setup to develop a payload that directly measures the speed of sound with an ultrasonic distance sensor. They partnered with middle school students from the UW Lab School in Laramie. Throughout the project, these students learned about sound waves and the atmospheric conditions that affect the speed of sound. They then successfully flew the Arduino payload to over 88,000 feet on a high-altitude balloon launched from Prexy's Pasture at the University of Wyoming. The data collected by the payload was used to further explore how the speed of sound changes with altitude.