



Spring 2022 Newsletter

Greetings Alumni, Friends,
Students, Faculty and Staff!

Let's celebrate another memorable and successful year! A successful year indeed: Our lives have largely returned to normal; we held the first in-person end-of-year departmental party since the pandemic began; ten of our majors walked across the stage and received their bachelor's degrees.

We sent our farewells to faculty members Bill Rice, Hannah Jang-Condell and David Thayer who resigned or retired for various reasons. We wish them well and thank for their services while at UW. We miss them all.

I am happy to announce that Dr. Max Moe has accepted a faculty position in the Department. Max has a PhD in Astronomy from Harvard and has been an Einstein Fellow and Astronomer postdoctoral research associate at the University of Arizona the past several years. His specialty is stars and stellar physics. He will be our newest Assistant Professor. Let's

congratulate and thank the search committee led by Chip Kobulnicky for a job well done.

I'd like to also announce several new major donations or anticipated major donations. One is from Patrick & Nora Ivers. Their generous new donation has allowed the Department to establish the Rebka, Hafele, Einstein Distinguished Lecture Series, a platform where we will invite nationally renowned physicists/astronomers to visit UW and give lectures. We also received three major donations from Windy Ridge Foundation, Craig Sutter and Wayne Needy last year. We appreciate the generous support from them and numerous others who have donated to our cause.

Alex Higley is a recipient of one of this year's A&S Outstanding Graduate Awards. Several of our students have received departmental awards for their outstanding performance and service. Please check out the Newsletter below to see the names of these deserving

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students. A number of our faculty received research grants and awards, as usual. To mention a few: Danny was selected as WYO Gold Teacher of the Year, and Chip won the UW Foundation Stewardship award.

Let's also congratulate Jifa Tian for receiving an A&S Extraordinary Merit in Research award and Aysenur Bicer for P&A Outstanding Teaching award!

There is a lot to look forward to. In August, we will be welcoming 8 new graduate students and about 35 freshmen. And, throughout next year, we will be preparing to move to the new College of Engineering and Physical Sciences.

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.

Have a great summer and I wish you a wonderful year ahead!

Jinke Tang

Department Head



Faculty & Student Awards

Undergraduate Awards

A&S Outstanding Graduates:

2022: Alex Higley

Graduating Senior Award:

Alex Higley

Mike Lindman

Julia Perlman

Hayden Scholz

Cinnamon Awards:

Silba Dowell

Aidan Ferguson

A&S Board of Visitors

Outstanding Service Award:

Jaclyn Zalcman

Society of Physics Students 2022:

Student Officers:

President - Silba Dowell

Vice President - Brock Parker

Secretary - Michael James Lindman

Treasurer - Corinne Komlodi

Advisor - Jesse Feddersen

Graduate Awards

Outstanding Graduate TA's:

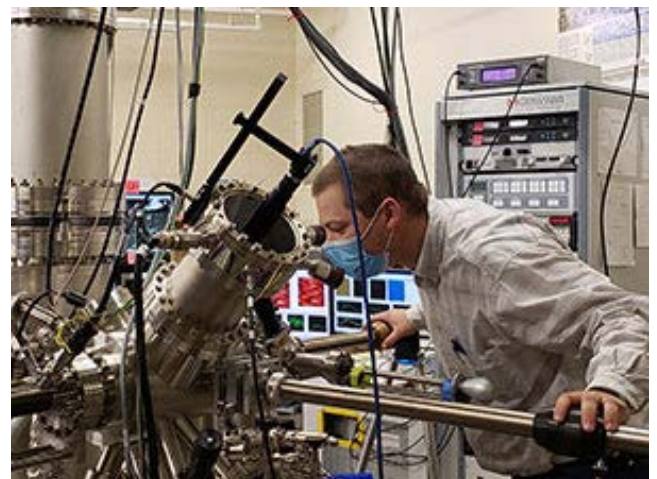
**Nikhil Patten, Amy Cavanaugh
and Andrei Zadorozhnyi**

**William Scougale: Wyoming
NASA Space Grant Consortium
Graduate Research Fellowship**

**Scougale: One of 65 Graduate
Students Nationwide Selected to
DOE's SCGSR Program**

**David King: Wyoming NASA
EPSCoR Graduate Research
Fellowship**

**Ashley Piccone: NASA FINESST
graduate fellowship award**





Faculty/Staff Awards

Dr. Jifa Tian received the A&S Extraordinary Merit in Research award

Megan Candelaria, Shawna McBride, & Michele Turner were awarded \$4,000 from the A&S INREACH Activities Fund for the Women in STEM Conference proposal. Women in STEM Day was May 17, 2022

Dr. Chip Kobulnicky helped the department receive another round of both WGE and URDM awards

Aysenur Bicer won the P&A Outstanding Teaching Award

Aysenur also won the UW 2021 recipient of the WyDEC (Wyoming Distance Education Consortium) Innovative Teacher of the Year Award

UW's Myers Receives \$240,000 DOE Grant to Fund Research

Dr. Chip Kobulnicky wins UW Foundation Stewardship Award

Dr. Danny Dale has been selected as WYO Gold Teacher of the Year by the student group associated with the UW Alumni Association

Dr. Jinke Tang is a Co-PI on a 2-year \$500K DOE award with Maohong Fan (PI) for generation of rare earth metals from rare earth oxides using microwave plasma. Other Co-PIs include scientists from Ames Lab and Colorado School of Mines

Dr. Chip Kobulnicky received a \$281,543 three-year NSF grant "Collaborative Research: Mass-Loss Rates for OB Stars Driving IR Bowshocks"

Jesse Feddersen selected for the 2022 Promoting Intellectual Engagement in the First Year (PIE) Award!

Jesse Grosinger (Office Associate, Senior and Max Gilbraith (Planetarium Coordinator) received the A&S Extraordinary Staff Merit Award

From the Wyoming NASA Spacegrant Office

High-Altitude Ballooning update with Phil Bergmaier: Last fall, we completed the final year of the LIFT Project, our undergraduate high-altitude ballooning and outreach experience. Our two 2021 LIFT teams finished developing their balloon projects, which focused on measuring ozone and sampling microbes in the stratosphere. From September through early December, they led lessons and activities with students from Shoshoni High School and Laramie High School, culminating in successful balloon launches at each school.

Student-Research update: For the 2021-2022 school year, Wyoming NASA Space Grant is supporting eleven graduate students and ten undergraduate students with our research fellowships. Projects range from everything from looking at how past human exploration can inform our future to designing heat exchanger architectures for aerospace applications. Each week we feature a different student researcher on our blog (wyomingspacegrant.org/blog). Check it out to learn more!

K-12 Outreach update: The Science Kitchen is back in (in-person) action, visiting schools in Laramie and hosting groups on campus. From building and launching straw rockets to building penny batteries to discussing states of matter with liquid nitrogen, we have brought in over 1,000 K-12 students this academic year. Each month we summarize a k-12 outreach on our blog (wyomingspacegrant.org/blog). Check it out to learn more!



On Tuesday October 5th, The Physics & Astronomy Department hosted a 50th Anniversary Celebration of the Hafele-Keating Experiment with family and friends of Dr. Joseph Hafele and Dr. Glen Rebka, featuring speaker Dr. Pierce



In July 2021, local middle schoolers and high schoolers attended the annual Astro Camp and Teton STEM camp, hosted by Dr. Dale and Dr. Koblunicky

Updates from the Harry C. Vaughan Planetarium

The Harry C. Vaughan Planetarium flourished in serving the Mountain West community this past year. With an outreach distance of 300 miles, we were able to visit and donate telescopes to the Wind River Reservation high schoolers, rural Colorado, and Western Nebraska.

We had 3,200 in person visitors in 2021, 1,700 of which were K-12 students. Our traffic increased markedly as the year went on and we on track to nearly double last year's attendance for 2022.

We've hired five new student presenters, and our two graduating presenters went on to be K-12 teachers immediately following graduation. Our student presenter team has added to a catalog of nearly fifty unique programs, giving visitors variety and timely information weekly.

Upgrades continue as we steadily increase our computer capacity and software capabilities in the planetarium and STAR Observatory. In July 2021, the free Windy Ridge AstroCamp took in twenty three up and coming middle school students for a full week of on-campus science experiences including building rockets, landers, telescopes, and environmental science experiments, leaving a lasting impression that will hopefully send them on to college to become scientists and engineers!

On campus, we hosted nearly a dozen different classes, from arts, sciences, and engineering. We also provided lab and learning space for astronomy and physics students.

For more information and the public show schedule, visit:

<https://www.uwyo.edu/physics/planetarium/>

or email planetarium@uwyo.edu

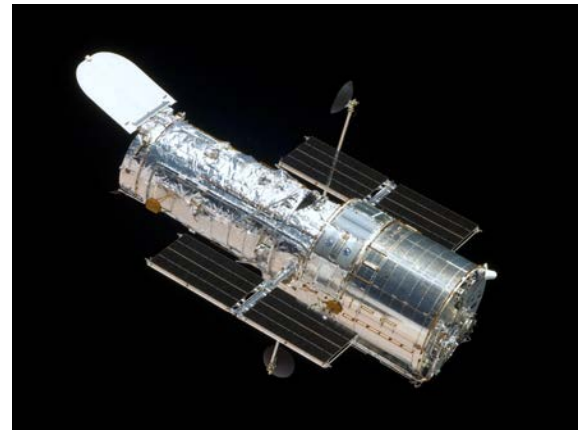
The planetarium showcased some amazing aurora photography taken from just north of Laramie by Wyoming NASA Space Grant Consortium staff member Phil Bergmaier (Photo © Phil Bergmaier Photography)



James Webb & Hubble Telescopes News

Dr. Kobulnicky received Hubble Space Telescope time in the coming cycle, which includes observing time and funding

Title: Obtaining the UV Reddening Curve of Extreme-Rv Highly Polarizing Dust Irradiated by Zeta Ophiuchi



Dr. Daniel Dale received time on the new James Webb Space Telescope on seven Cycle 1 projects, three of which will bring grant funding to UW!

Title: Dissecting the Prototypical Starbursts NGC 253 and M 82 and Their Cool Galactic Winds

Title: A JWST-HST-VLT/MUSE-ALMA Treasury of Star Formation in Nearby Galaxies

Title: Structure formation and baryonic cycling in the edge-on galaxy NGC89

From Forbes Magazine: Wyoming Remains Home To One Of The World's Largest Northernmost Optical Telescopes

Winter in Wyoming is hardly a trifle and can be as unpredictable as the wind. But astronomically, this part of the intermountain West has three things going for it --- mostly clear dark skies, with low humidity and an accessible high mountain near a major university.

As an unsung workhorse for optical astronomy, two thirds of the nights here are clear. So, the University of Wyoming at Laramie continues to operate a 1970s-era 2.3-meter telescope that remains one of the northernmost optical observatories in the Northern Hemisphere.

Thus, a week before the winter solstice, I found myself in the back seat of a four-wheel University of Wyoming Ford F-150 pickup truck with an astronomer and two engineers heading up a narrow mountain dirt road that would take us to the Wyoming Infrared Observatory (WIRO).

In winter at the summit, temperatures can drop to 40 below zero Fahrenheit and wind speeds can exceed 100 mph. Snow typically covers the road from December until May, which can limit travel to Sno-cats and all-terrain vehicles. But on this particular afternoon, there was a surprising lack of snow.

Located some 25 miles southwest of Laramie atop Mount Jelm, a pre-existing road, electricity and phone lines were already there for the taking when WIRO was completed in 1977. The site had previously been used by the U.S. Forest Service as a fire lookout station.

Just outside the dome, there's a fully functioning residence, with three bedrooms, a fully functioning bathroom and kitchen, living area, control room and maintenance room.

But these days the telescope can be operated robotically from anywhere in the world. In fact, one of the most prolific team members is currently doing her remote observing from mainland China. Only when there's a serious software or hardware problem with pointing the telescope itself will anyone need to actually go out to the telescope in the wee hours.

The dome can be opened robotically; the telescope can be pointed robotically, and an all-sky camera monitors cloud conditions. There are cameras inside and outside the building and a microphone inside the dome to listen and control all the necessary operations.

So, is Wyoming a sweet spot for optical astronomy?

Being higher in the atmosphere means your incoming light from the heavens is scattered/absorbed less, so you can see fainter objects compared to observing from sea level, Daniel Dale, an astronomer at the University of Wyoming at Laramie, told me. At more than 9600 feet in altitude, Jelm Mountain is easily home to one of the highest telescopes in the world, he says.

WIRO continues to be one of only two large telescopes wholly-owned and operated by a single university, with the small operating budget of only \$50,000 a year.

“Our niche is the fact that we control 100 percent of WIRO's telescope time,” WIRO Observatory director Mike Brotherton told me. “If you have access to a large telescope like Keck or Gemini, it's hard to get

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very much observing time, a night here or a night there.”

But if you want to characterize the orbits of exoplanets, or binary stars, or light curves in distant galaxies, you can't do that in five nights over the course of a year, says Brotherton. So, we're able to get hundreds of nights for a single project over several years, he says.

Over the last five years, I have been using spectroscopy to monitor active galaxies and quasars to see how gas in the vicinity of supermassive black holes responds to changes in the disk feeding the black hole, says Brotherton. Tracking gas as it is being accelerated around the black hole enables Brotherton to get a measurement of the size scale of the central black hole's region.

By measuring the gas' velocities and the radius of its motion in orbit around such supermassive black holes, Brotherton and colleagues can make good estimates of the central black hole's mass.

Another WIRO observing program has been following up on the treasure trove of newly discovered exoplanets.

Could the mountain support a larger aperture optical telescope?

“If we had \$80 million, we would tear WIRO down and build a 6-meter telescope,” said Brotherton, who notes that Jelm Mountain is both higher and darker than the Kitt Peak National Observatory in Arizona.

“The weather is probably comparable in terms of clear nights,” said Brotherton. “But air moving over the mountains does cause turbulence.”

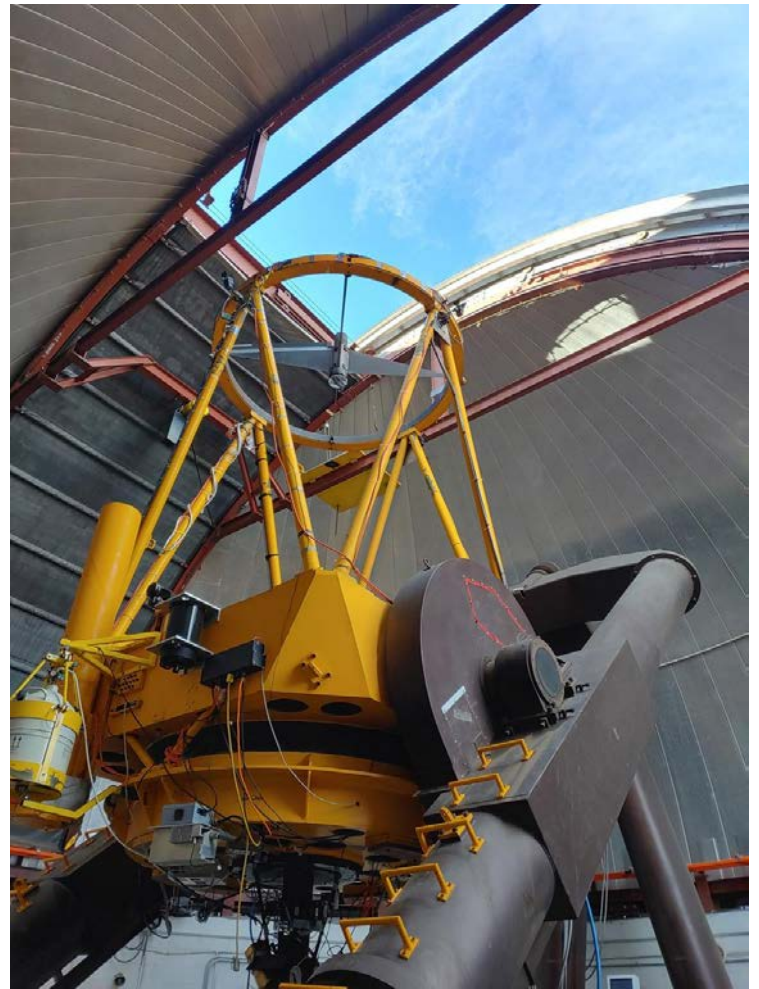
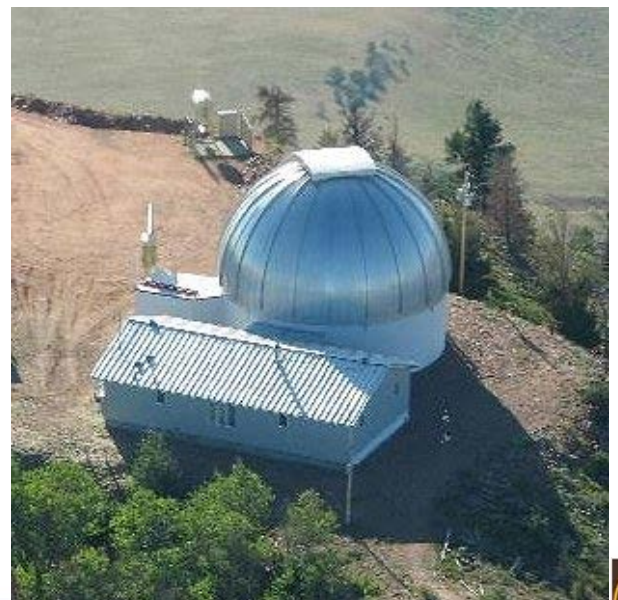


PHOTO: BRUCE DORMINEY

On October 22nd, the annual WIRO Open House took place, welcoming nearly one hundred public visitors to tour and observe at the observatory



UW's Myers Receives \$240,000 DOE Grant to Fund Research

A University of Wyoming faculty member has received a \$240,000 U.S. Department of Energy (DOE) grant that will be used to determine how to schedule observations of spectra of more than 30 million galaxies to be able to study dark energy.

“A major unsolved scientific mystery is the relatively recent onset of an accelerated expansion of our cosmos,” says Adam Myers, an associate professor in the UW Department of Physics and Astronomy. “Characterizing and understanding this strange, unexpected acceleration, which is often called ‘dark energy,’ remain one of the most important goals in high energy physics.”

The U.S. DOE recently announced \$93 million in funding for 71 research projects that will spur new discoveries in high energy physics. The projects -- housed at 50 colleges and universities across 29 states -- explore the basics of energy science that underlie technological advancements in medicine, computing, energy technologies, manufacturing, national security and more.

Projects selected by the DOE cover a wide range of topics at the frontiers of particle physics, including Higgs boson, neutrinos, dark matter, dark energy, quantum theory and the search for new physics.

Myers' grant runs 34 months, starting July 1 and ending April 30, 2024. The grant provides 48 total months of salary for Ph.D. students. Funds will be divided between two UW Ph.D. students, Myers says.

To conduct his research, Myers will use the recently completed Dark Energy Spectroscopic Instrument (DESI), housed on the Nicholas U. Mayall Telescope at Kitt Peak National Observatory near Tucson, Ariz.

DESI uses computer-controlled positioners to precisely place optical fibers at almost 5,000 locations in the focal plane of a 4-meter telescope, which provides simultaneous spectra of thousands of distant galaxies. In May 2021, DESI began a survey that will obtain spectra of more than 30 million galaxies to be able to study dark energy.

“This is a remarkable achievement that will produce, by far, the largest sample of extragalactic spectra ever assembled,” says Myers, who has been working on targeting software for the DESI survey for more than five years. “For context, DESI is so technologically advanced that UW's principal telescope, the Wyoming Infrared Observatory, would require tens of thousands of years to conduct the DESI survey.”

Myers says little is known about the underlying, theoretical properties of dark energy, but researchers continue to analyze the expansion of our universe to try to glean new observational insights into the nature of cosmic acceleration.

To study how different parts of the cosmos are moving relative to each other, researchers need to make huge maps of vast volumes of our universe, Myers says. Such maps are assembled by obtaining spectra of extensive numbers of objects -- known as extragalactic sources -- in the sky

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that are beyond the edge of the galaxy. acceleration, yielding new insights into the properties of dark energy,” he says.

These extragalactic sources include different types of galaxies, such as Luminous Red Galaxies, Emission Line Galaxies and quasars, which Myers describes as “the luminous hearts of very distant galaxies that are powered by matter falling into extremely massive black holes.”

“With enough measurements of the movement of extragalactic objects at different times throughout the history of our universe, researchers hope to better constrain any subtle changes in cosmic acceleration, yielding new insights into the properties of dark energy,” he says.

During the DESI survey, Myers and his research group will collaborate with the DESI operations team, which determines how to schedule DESI observations and monitor the overall progress of the survey.

Specifically, Myers will be responsible for overseeing which objects in the sky DESI has targeted and will target.

For example, the most distant quasars are particularly useful for mapping the universe, as they can be used to trace gas in front of each of the quasars to create a detailed, 3D cosmological map. These quasars are, therefore, scheduled to receive additional observations as the DESI survey progresses. Myers’ team will be responsible for maintaining the code that determines which quasars are sufficiently distant to receive additional attention.

Additionally, DESI has the capability of

overriding its regular schedule to observe particularly interesting objects of interest to the high energy physics community, such as the electromagnetic counterparts to gravitational waves. Myers will be responsible for adding such new “objects of interest” to the DESI observational ledger, and ensuring such new targets do not interfere with the overall, dark energy-related science goals of the DESI survey.

“Particle physics plays a role in many major innovations of the 21st century and, to keep our competitive edge, America must invest in the scientists and engineers that are advancing basic physical science today to create the breakthroughs of tomorrow,” says Secretary of Energy Jennifer Granholm. “The Department of Energy is proud to be the nation’s leading funder of physical sciences, leading to life-changing medicines, technologies and solutions that create a better future.”

Serving as a cornerstone of America’s science efforts, DOE’s High Energy Physics program plays a major role in nurturing top scientific talent, and building and sustaining the nation’s scientific workforce. For example, the pharmaceutical industry uses X-ray beams -- created by DOE’s particle accelerators -- to develop more effective drugs to fight disease, and DOE’s particle accelerators helped create the heat shrink-wrap used by households and businesses across the world to keep food and produce fresh.

The High Energy Physics program’s principal goal is to provide a deeper understanding of how our universe works at its most fundamental level.

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Particle accelerators and other tools developed in pursuing this goal often meet other needs of society.

The Office of High Energy Physics within the DOE Office of Science manages the projects.

Jesse Feddersen selected for the 2022 Promoting Intellectual Engagement in the First Year (PIE) Award!

Selected Student Comments: Jesse was the professor for my General Astronomy class, and was a huge influence in my success this semester, across all classes. I'm an Astrophysics major, so I was looking forward to my Astronomy course already, but Jesse made it far more interactive and complete than I had imagined. He cared about each of his students and their individual success, he gave us tons of opportunity for extra credit, as well as encouraging us to have a passion for learning. He was also very good at making sure that the class was personalized for the students. At the end of the semester he had a survey for all of the students inquiring of which labs they enjoyed and which they thought were less fundamental in their understanding of the course material. Overall Jesse was definitely my favorite professor, and I look forward to working with him in the future as I continue with my degree.

Both Dr. Feddersen and his teaching style are exemplary of excellence in not just STEM education, but education as a general rule. His interactive classes kept students engaged, and he never ceased to remind us of his availability and flexibility as an instructor. It was made very clear to us that his primary purpose, aside from instruction, was to work with us, providing whatever resources/assistance necessary,

in order to understand the course material with the greatest of ease. Not only this, but he provided us with a plethora of opportunities, such as observation nights that indubitably stimulated passion for the subject. Dr. Feddersen is absolutely deserving of outstanding recognition for his, stellar, teaching style!

UW Physics & Astronomy Department Gathers with Atmospheric Sciences in September 2021 to Discuss Merger During University Reorganization



Dr. Chip Kobulnicky wins UW Foundation Stewardship Award

This award includes funding that will be directed to the department.

Excerpted from nomination letter:

Chip has been running summer science camps for Wyoming and regional youth since 2003. ... On many occasions, after camp parents asked “What did you do to my kid? He/She is a different person--- more outgoing, more confident, and bursting with happiness!” In addition, former UW Honors College Dean Donal Skinner determined through his analysis that “Astro Camp” was the #1 pre-college experience for recruiting future Honors students to UW. Ultimately, and much to our chagrin, Exxon Mobil removed their funding for such camps.

After a few years’ hiatus due to lack of funding, Chip worked with the UW Foundation and a generous (and nominally anonymous) donor to re- envision camp as a week-long experience for 24 high school students. As usual, Chip has done a fantastic job in creating and executing a stimulating and impactful experience for our youth. And he has put in considerable legwork in developing and maintaining an effective relationship with the donor. It is our hope that this camp will be permanently funded through an endowment. Chip is doing his usual very best in conveying to the donor the impact of their remarkable ongoing gift.

The Student RSO of the UWAA, WYO-Gold, Awarded Professor Danny Dale as their Teacher of the Year for Going Above and Beyond Lessons in the Classroom

By Heather Baker

Dale has an impressive history, including earning a doctorate in physics and mentoring over 100 degree-seeking students. Dale’s background in astrophysics led to WYO-Gold students Gareth Flowers and Zander Smith interviewing him for the RSO’s pilot podcast Cowboy’s Corner: Space Cowboys.

“I enjoyed making the podcast experience fun for Gareth and Zander. I liked seeing the podcast’s impact—how it helped them, the struggles they went through, and then seeing them come through on the other side with a polished product,” Dale says.

For over 20 years, Dale has fostered college students’ lives outside the classroom. He directs the Harry C. Vaughan Planetarium that educates and entertains many public and private groups each week . Dale also coaches the UW Women’s Hockey Team. In his thirteen years as a coach, Dale has been able to meet students from a variety of majors.

“I get to see another slice of the UW population. It’s fun to have nursing students, pre-vet students and others. What I especially like about the team that I coach is that they are so welcoming. They embrace everybody,” Dale says.

The women’s welcoming environment likely evolves from the warm atmosphere that Dale creates. Walking into Dale’s office, a Yoda figurine and a happy smile greets visitors.

Regardless of the discussion topic, Dale keeps the exchange interesting with his facts and with his sense of humor.

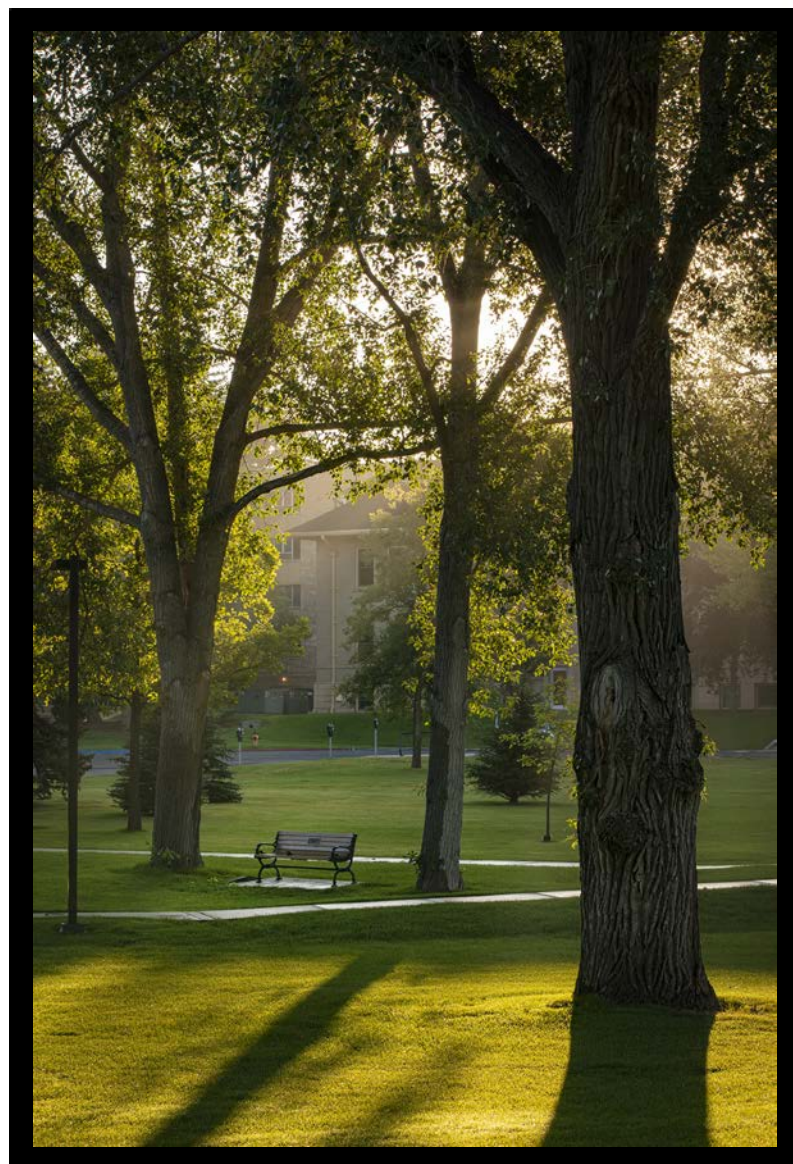
Dale’s far-reaching impact impressed WYO-Gold students. Flowers never had a class with Dale, but Dale inspired Flowers throughout the podcast production process. Flowers could not think of a better person to interview for piloting the Cowboy’s Corner series.

“Being a teacher is more than creating assignments. I know Dr. Dale has been super busy between his students, his research, his work with the new telescope, and as an associate dean. But he took the time to help Zander and I with the podcast. He has gone above and beyond—exemplifying what being a teacher means,” says Flowers.

Regardless of his long list of accomplishments, Dale remains humble. He enjoys science fantasy like Star Wars and theorizing over other scientist’s contributions to their respective field, namely Carl Sagan. Receiving recognition as WYO-Gold’s Teacher of the Year made an impact on Dale.

“We are humans, right? To hear good things about your work feels really good. It means a lot, and so I try to pay it forward. Receiving the award makes me want to double-down and ensure that I recognize

other people’s efforts because recognition makes a huge impact on our lives. I want our students and my colleagues to know that everything that we do is worth the effort.”



Articles and Awards Found at these links:

<http://www.uwyo.edu/uw/news/2021/10/uws-scougale-one-of-65-graduate-students-nationwide-selected-to-join-scgsr-program.html>

<https://www.forbes.com/sites/brucedorminey/2021/12/29/wyoming-remains-home-to-one-of-the-worlds-largest-northernmost-optical-telescopes/?sh=2e0daa40799d>

<https://www.uwyo.edu/uw/news/2021/06/uws-myers-receives-240,000-doe-grant-to-fund-research.html>

<https://wyclass.org/wydec/wydec-master-distance-educator-awards/>

<http://www.uwyo.edu/uw/news/2022/04/uw-selects-top-first-year-course-instructors.html>