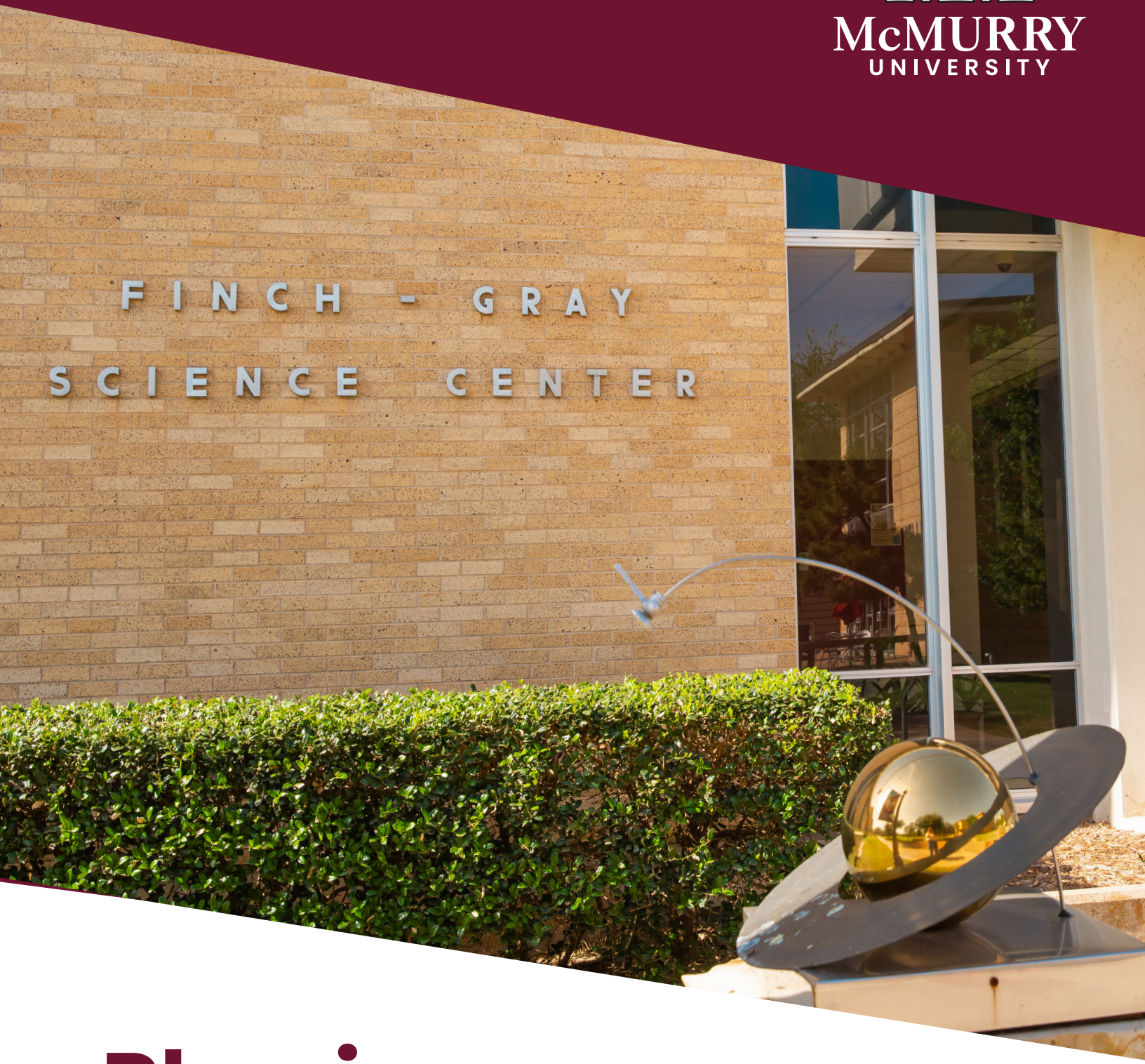
McMURRY UNIVERSITY



Physics Newsletter

2021 - 2022

Greetings from the McMurry Physics Department! As is usual at this time of the year, we are bringing you the latest news from our programs and want to tell you about the successes of our students and faculty.

As we started this academic year, things were returning back to normal. Even though we still faced many pandemic challenges, we were able to return to face-to-face classes and have our classrooms filled to regular capacity. The virtual option was still in place for those students who were not able to attend classes in person.

Tikhon V. Bykov, Ph.D.,

The Virgil E. Bottom Endowed Professor of Physics

Professor and Chairman, Department of Physics

Division Chair, Division of Science and Mathematics

Activity Coordinator, Title V Project Building STEM Success

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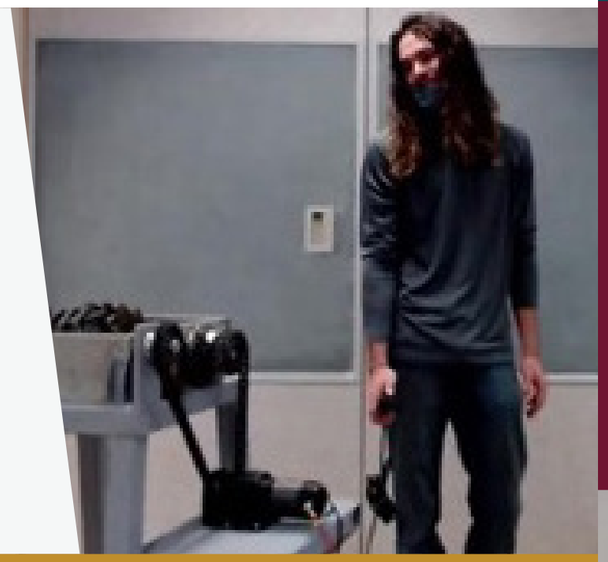
Seniors Student Showcase

Austin Bridwell

HOMETOWN: ABILENE, TX

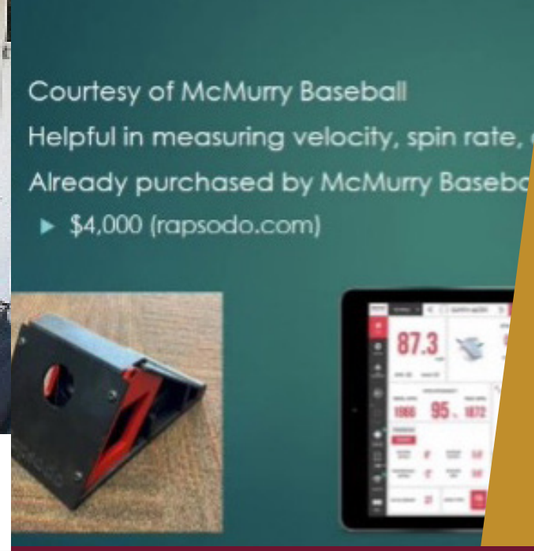
Austin Bridwell, working with Dr. Wayne Keith, completed his project “Plastic Grinder” where he developed and fabricated a device capable of grinding plastics efficiently into strips that could be reused. Austin was recognized as one of the outstanding physics seniors and was a recipient of the “Piper-Bottom Award for Excellence in Physics.” He graduated in December 2021 and started a new job in March as a mechanical engineer with Rentech Inc. in Abilene, Texas. We are grateful to the McMurry University Science and Math Advisory Board (SMAB) for supporting Bridwell’s project with the Charles and Lisa Bloomer Student Research Stipend.



Eduardo Contreras

HOMETOWN: FORT WORTH, TX

Eduardo Contreras, working with Dr. Keith, completed his project “Engine Diagnostics and Repair” where he was to rebuild and diagnose the fuel injected, 1.6 liter four-cylinder combustion engine out of a broken down 1994 Honda Civic Ex, studying the inner workings and purpose of each component that drives and supports the combustion process. Contreras graduated in May and now works as an engineering technician with the Texas Aerospace Services in Abilene, Texas.



Derek Hostas

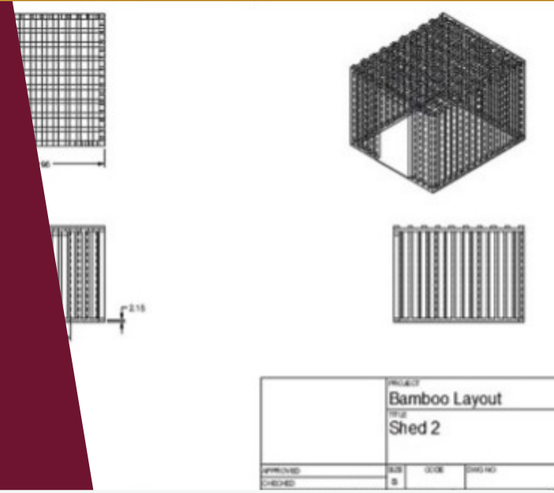
HOMETOWN: IOWA PARK, TX

Derek Hostas, working with Dr. Keith, completed the project “Does Spider Tack Truly Make a Difference?” The objective behind this project was to determine if using spider tack, a sticky adhesive used in weight training, gives a baseball pitcher a clear advantage. Hostas graduated in May with a double major in physics and mathematics. He was recognized as an outstanding physics senior and a recipient of the “Piper-Bottom Award for Excellence in Physics.” He will intern with the Texas Department of Transportation (TxDOT) in Lubbock this summer and will attend a master’s level graduate program in civil engineering at Texas Tech University in the fall.

Megan Martinez

HOMETOWN: EL PASO, TX

Megan Martinez, working with Dr. Keith, completed the project “Architecture of Bamboo.” The objective was to demonstrate how one can apply bamboo in the architectural world. The project explored the concept of building a shed out of bamboo to represent how the structure of bamboo works. She presented this design along with a table-top model of the shed during her senior research project presentation. After graduating in December, Martinez now works as an engineering technician for medical equipment in the Children’s Hospital in El Paso, Texas.



Jessy Villagomez

HOMETOWN: ROBY, TX

Jessy Villagomez, working with Dr. Keith, completed the project “Bluetooth Two-Way Communication Device.” The objective for this project was to create a two-way communication device using Bluetooth and integrate with a 3D-printed helmet. The idea behind it was to recreate a walkie-talkie. Villagomez graduated in May and is pursuing a career in engineering.

Other Student Research Projects

Two junior students presented proposals for their senior research projects and will continue their work during the upcoming academic year. We are grateful to the Science and Math Advisory Board for awarding these students' projects the 2022-2023 Charles and Lisa Bloomer Student Research Stipends.

Kaylee Berdoll

HOMETOWN: UTLEY, TX

Kaylee Berdoll, working with Dr. Tim Renfro, completed her honors project proposal on "Regulating crow populations in pecan orchards with experimentally determined effective audio files projected from a drone." Her objective is to determine an efficient way of managing a crow population in a pecan orchard by creating a mobile device that will effectively deter crows with sounds from a speaker mounted on the device.

Taryn Fambrough

HOMETOWN: ALEDO, TX

Taryn Fambrough, working with Dr. Keith, proposed "Building a Dobsonian Telescope." She is planning to build an 8-inch diameter Dobsonian telescope that has a concave main mirror and a secondary mirror that will show the image when looking through the eyepiece. With an 8-inch primary mirror, many things can be seen ranging from the moon to bright galaxies.

Coursework Projects

Austin Bridwell & Kenneth Stokes

As part of the "Thermodynamics II" course offered by Dr. Bykov in the Fall 2021, Austin Bridwell and Kenneth Stokes worked on the project to perform a "Numerical study of liquid films in the external field of a wetting substrate using Density Functional Theory (DFT) for 2D lattice gas with short-range interactions." In this work, the method of density functional theory was used to study the density profiles of nonuniform liquid and vapor on a wetting substrate in the case of complete wetting. Disjoining pressure for those films was then found. It has been shown that the disjoining pressure decays with increasing thickness. Bridwell presented this project to the McMurry chapter of the Society of Physics Students and to the Texas Section of American Physical Society Spring 2022 meeting at Abilene Christian University.
For completing this project, Bridwell was recognized with the Certificate of STEM Research and awarded the STEM Research medallion. Dr. Bykov is grateful to the Virgil E. Bottom Endowed Professorship Fund for supporting parts of this project.

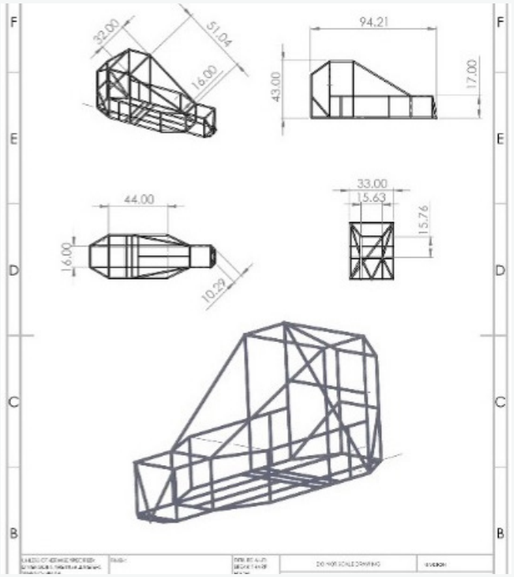
Isaiah Narvaez & Kaylee Berdoll

Another student project was completed by Isaiah Narvaez and Kaylee Berdoll as part of the Automated Experimental Measurements course they took with Dr. Renfro in Fall 2021. On May 6, Narvaez presented the project during the McMurry University Academic Conference. His talk was entitled "Automated Dog Feeder Dispenser" and described the design and the challenges that were faced while constructing an automatic dog feeder controlled by an Arduino-based timing mechanism.

SPS Chapter Honored

Our Society of Physics Students (SPS) chapter remained very active this year. Every year, the chapter plans a major project that will strengthen our local physics community and be a visible outreach effort of the university. Sometimes these projects may span multiple years, which was the case with a couple of the projects that were finished at the end of the last academic year. In Fall 2021, our SPS chapter president, Austin Bridwell, wrote a paper talking about our recently finished projects. This paper "From Leonardo to NASA and back again" was published in the Winter issue of the SPS Observer.

As McMurry Physics Department launches a new major in Engineering Physics, the SPS chapter was looking to start a project with substantial engineering content. Our interest was caught by the Baja SAE all-terrain sporting vehicle competition. It was decided that during the 2021-2022 and 2022-2023 academic years, we will design and construct a vehicle frame built to SAE standards. The chassis will be designed completely by the SPS members while still being within the set SAE competition requirements. To fund this project, our chapter was awarded an "SPS Chapter Research Award". We were able to purchase some materials for this project and go through the required machine shop training (thanks to Dr. Renfro and Mr. Upshaw) during the Spring 2022 semester. Now, we are



looking forward to completing the main part of the first phase of this project in Fall 2022. We are grateful to the SPS National Office for supporting this project through the SPS Chapter Research Award.

Title V Grant & Sciences Growth

Our program is evolving and improving as we go through the second year of the US Department of Education Title V project, "Building STEM Success." Our focus during this academic year was on developing curriculum and finalizing the structure for the new engineering physics major. This major will become available to new freshman students who will start at McMurry in Fall 2022. In the Spring 2022, Mr. David Upshaw piloted teaching new courses in the major. The courses had healthy enrollments and were well received by the current students. We are looking forward to the fall and welcoming our first group of engineering physics students.

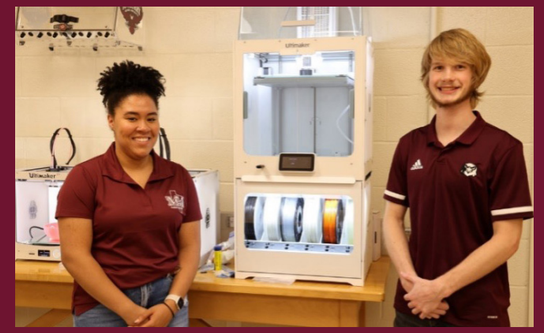
Another major undertaking that was supported by the Title V grant this year was the renovation of the upper-division physics laboratory spaces. Demolition of the old room S120, the former dark room, chemical storage room, and secured storage room was finished last summer. An interesting discovery was made when the wooden panels in room S120 were taken down.

We all knew about Dr. Bottom bringing World War II surplus military equipment to be used in the department in the late 1950s. However, we did not know that some of that equipment was still here and was kept behind these wooden panels for many years. We found a World War II antique radio station, a mine detector, and couple of other items. Most of the renovation project was finished in August 2021, and the space was officially dedicated at the end of the academic year.

The new seminar room next to the lab space previously occupied by the room S120, is now serving as a student lounge, and a classroom for small physics courses. The physics library moved here as well. The new lab features a 3D-printing station. Our Instron 34TM-50kN material testing machine will be used for several engineering physics courses, student research projects, and faculty research. Additional improvements were made to the physics department machine shop. A newly installed fume extractor will provide sufficient ventilation for welding and plasma cutting. A precision-machined, stainless-steel welding table has arrived and will be installed in the shop.

Another important component of the "Building STEM Success" project is to provide science students with ongoing support for an undergraduate course of study and career training that would support them entering graduate programs or STEM related employment after graduation. This function is now with the STEM Student Success Center (S3C). Through that center, each science student is assigned an academic success coach who will work with the student during their period of study. Thanks to these efforts, this coming summer our graduating senior Derek Hostas will participate in an internship with the Texas Department of Transportation, and Taryn Fambrough will participate with the summer REU physics program at the University of Oklahoma.

In August, we will pilot our first Summer Bridge Program (LiftOff) that will boost the mathematics proficiency of incoming freshman students. The program will allow students to receive six hours of college credit by taking a pre-calculus course taught by the S3C professional tutor, Ms. Tammy Werner, and Freshman Seminar course taught by Mr. David Upshaw. We have been developing engaging content for this summer program and are looking forward to welcoming the first student group.



SPS Notable Accomplishments

In the fall, the SPS National Office recognized McMurry University Chapter of the Society of Physics Students as an Outstanding Chapter for the 2020-2021 academic year. This is the third time in a row that the SPS National Office has recognized our students. We are honored to be recipients of these awards.

On April 8, our SPS chapter inducted the newest Sigma Pi Sigma member, Kaylee Berdoll. We have also used this induction ceremony as an opportunity to recognize our last year's graduate, Jonathan Samudio who is the recipient of the 2021 National Society of Physics Students Service Award. We are grateful to the SPS National Office for honoring Samudio with this award. We were glad to welcome him back on our campus and presented him with the award certificate during the Sigma Pi Sigma induction ceremony. He was also our invited speaker for the inductions.

Guest Speakers

Throughout the academic year, our SPS chapter hosted several invited speakers, including our newest faculty member and McMurry physic alumnus, Mr. David Upshaw, talking about "Contemporary Topics in the Scientific Arna." McMurry physics graduate Joseph Watson gave a talk entitled "Working with NASA's Balloon Borne Experiment for Cryogenic Large Aperture Intensity Mapping as a design intern." Dr. Jonathan Asaadi from the University of Texas at Arlington gave a presentation entitled "Pixelation: Bringing liquid noble element detectors into focus."

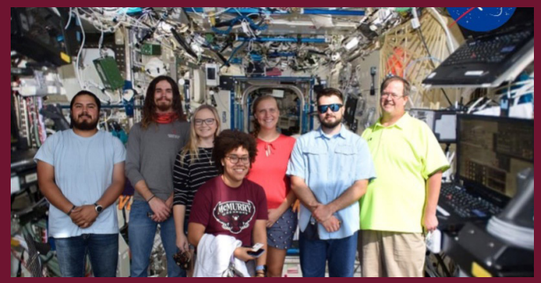
Upcoming Project

Another major undertaking that our SPS chapter is going to participate in over the next several years is "Sigma Pi Sigma's Great American Eclipse Event ". Sigma Pi Sigma will be livestreaming the eclipse from multiple locations within the eclipse's path of totality. McMurry happens to be very close, but not completely in the path of totality for these two eclipses. Under the leadership of Dr. Keith, our chapter is planning to set up one telescope with the broadcasting camera on our own campus connected to a telescope in a location in the path of these eclipses.

Conferences and Presentations

In 2021-2022, we participated in two academic conferences outside of McMurry. We are deeply grateful to the Ward-Bottom Science Fund for making these trips possible. On October 21 - 23, a group of physics students accompanied by Dr. Renfro, traveling to the University of Houston at Clear Lake to participate in the Texas Section of the American Physical Society fall meeting. While in Houston, the group toured the NASA Johnson Space Center.

On March 10 – 12, a group of students accompanied by all faculty participated in the Texas Section of the American Physical Society spring meeting at Abilene Christian University. At the meeting, our students made two presentations on the projects that were completed during the last academic year. Austin Bridwell made an oral presentation of the computational physics project that he and Kenneth Stokes completed with Dr. Bykov. Taryn Fambrough and Robert Samudio presented a poster based on the NASA MINDS project that was completed by our chapter last year. The poster was entitled "Electrostatic Charge Mitigation in Shadowed Regions of the Moon." The project studied various methods of charge dissipation for possible use on spacesuits during the Artemis mission.



Special Thanks to Alumnus Roger Ward

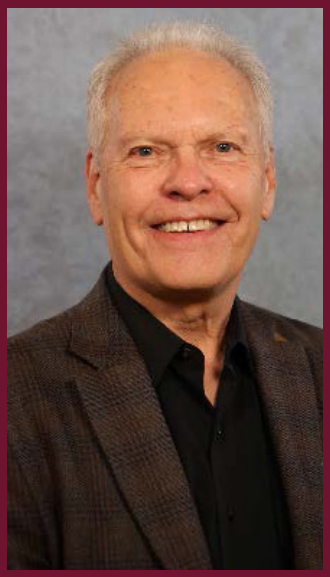
The physics department wants to use this newsletter as an additional opportunity to thank Dr. Roger Ward, former President and CEO for Quartzdyne, Inc. and McMurry University physics alumnus, for his continuous support of McMurry's science programs. Many of our achievements would not be possible without his generous support. Earlier this academic year, Dr. Ward donated an additional $1 million to the Ward-Bottom Science Fund. This gift will allow more students to become recipients of the Ward-Bottom Science Scholarships that are designed to support students from small Texas towns interested in pursuing degrees in physics, biology, or chemistry at McMurry. We are also looking forward to new opportunities including purchasing new equipment.

New Face in the Department

Mr. Ryan Pittman,
Science Laboratory Manager

In March, we welcomed the newest member of our team, Mr. Ryan Pittman, 2017 outstanding McMurry physics graduate. He completed his MA degree in physics at Baylor University and returned to McMurry to be the science laboratory manager. In his new role, Mr. Pittman will be serving the biology, chemistry and physics departments managing laboratory supplies, equipment, purchases and installations, lecture demonstrations, supervise student workers, and perform many other important tasks. We are looking forward to continue working with Pittman.

Keep track of our current events by visiting us on Facebook at the McMurry Society of Physics Students or online at ***https://sites.google.com/site/mcmurryphysicsdepartment/home.***



Retiring Faculty

After several decades of serving McMurry University science programs in many different capacities, Dr. Gary Wilson retired from his McMurry faculty position at the end of this academic year. He will continue serving as the project director for one of the Title V grants for one more year. As we celebrate Dr. Wilson's many years of service to McMurry University, we would like to thank him for his continuous support of the physics program, including his contributions to hiring the current physics faculty. He has offered many years of advice and encouragement to help build a stronger and better physics program.

McMURRY UNIVERSITY

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