



Department of Physics



Tikhon Bykov  
Department of Physics,  
1 McMurry University, Box 38  
Abilene, TX 79697  
(325) 793-4875  
tbykov@mcm.edu

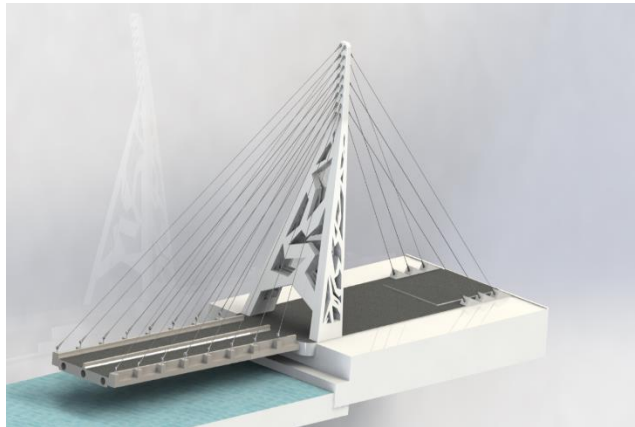
Friend

20-Jun-19

Dear Friend :

Now that the current academic year is over, we are glad to bring you the latest news from the McMurry Physics Department.

This year the department had a record high number of 7 graduating seniors. Six of them: Jacob Ferguson, Alexandria Mendoza, Tyler Sanchez, Jordan Speck, Juan Valadez and David Winski have graduated in May and the last one, Casey Walters, should be graduating in August.



Jacob Ferguson, working under the supervision of Dr. Renfro, presented his project to perform “Structural Analysis of Cable-stayed Bridge”. According to Jacob, for the past forty years, the cable stayed bridges have proven their dominance against other long spanning bridges. Due to the technical innovation, aesthetic appeals, and efficient application of materials, cabled-stayed bridges have provided new approach to maximize longevity and durability of bridges. The objective of Jacob’s senior research project was to perform a detailed study of the basic structural behavior, and present a structural analysis of a cable-stayed bridge. The picture of his proposed bridge is presented above. The reason for Jacob to choose this project was his interest in a career in Civil Engineering and/or Architecture-related field. He is currently working for Flintco, LLC Construction Company on renovation to Boeing 375 Hangar in San Antonio.

Jacob Ferguson, working under the supervision of Dr. Renfro, presented his project to perform “Structural Analysis of Cable-stayed Bridge”. According to Jacob, for the past forty years, the cable stayed bridges have proven their dominance against other long spanning bridges. Due to the technical innovation, aesthetic appeals, and efficient application of materials, cabled-stayed bridges have provided new approach to maximize longevity and durability of bridges. The objective of Jacob’s senior research project was to perform a detailed study of the basic structural behavior, and present a structural analysis of a cable-stayed bridge. The picture of his proposed bridge is presented above. The reason for Jacob to choose this project was his interest in a career in Civil Engineering and/or Architecture-related field. He is currently working for Flintco, LLC Construction Company on renovation to Boeing 375 Hangar in San Antonio.

Alexandria Mendoza, working under the supervision of Dr. Bykov, has defended her Honors Thesis “Droplets, Galaxies, and Collisions”. According to her, the study of astrophysical collisions was the main motivation behind this project. However, a hydrodynamic analogy was used. It has been shown that some aspects of collisions between highly various liquid droplets are very similar to collisions between astronomical objects. This project studied colliding liquid droplets of four different substances. Droplets of the different substances were sprayed in front of a high speed video camera.



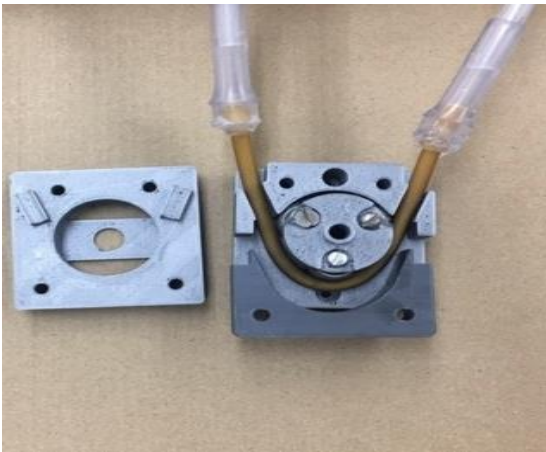
Alexandria Mendoza, working under the supervision of Dr. Bykov, has defended her Honors Thesis “Droplets, Galaxies, and Collisions”. According to her, the study of astrophysical collisions was the main motivation behind this project. However, a hydrodynamic analogy was used. It has been shown that some aspects of collisions between highly various liquid droplets are very similar to collisions between astronomical objects. This project studied colliding liquid droplets of four different substances. Droplets of the different substances were sprayed in front of a high speed video camera.

These collisions were recorded and broken down by frames in attempts to see the collisions happening. Depending on the substance, each collision was compared to known astronomical occurrences, such as two galaxies colliding or a neutron star merges. The picture above is one of the many pictures recorded by

Alexandria. In this picture two corn oil droplets are colliding mimicking the collision between two neutron stars. We are grateful to the Science and Math Advisory Board for supporting this work by awarding Alexandria with the Bloomer's Student Research Stipend. Alexandria is our first female graduate since 2011. She was also recognized as one of the two Outstanding Physics Graduates this year. In the fall she will start working on her Physics PhD at Baylor University, Waco TX.



Tyler Sanchez, working under the supervision of Dr. Renfro, completed his senior research project on designing and building a "3D Prosthetic Hand". According to Tyler, this project was inspired by the research performed at John Hopkins University and their groundbreaking prosthetic limbs that are changing the future. The objective was to be able to produce a simple yet effective 3D prosthetic hand that can mimic the hand movement of an actual human. In order to fulfill this objective, a variety of different materials were used to produce a functional hand that was durable enough to withstand the amount of stress that was being put on it. A code was written for Arduino that was able to convert the analog input coming from flexor sensors measuring the change in resistance and able to convert those values to digital outputs capable of positioning servo motors at certain angles. After the prototype was tested and had a successful correlation between the human movement and robotic movement, the magnitude of force, the prosthetic was able to output, was also measured. After graduation, Tyler is looking at several job opportunities in Austin area. All these jobs are related to CAD engineering drafting and 3D design.



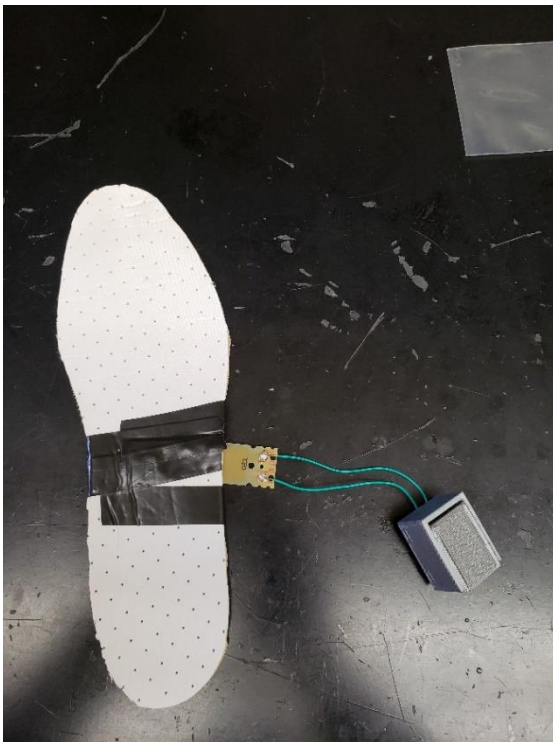
Jordan Speck, who was also working under Dr. Renfro's supervision, presented his senior research project "Peristaltic pump". According to Jordan, a peristaltic pump is a machine that uses a pressure system to draw a specific amount of liquid, or substance, through a tube. There are different types of peristaltic pumps used in medicine, testing and research, agriculture, and even the food industry. Hospitals use a type of pump called medical infusion pump, and it infuses medicine, nutrients and fluids into patients. Using a similar design, an electronically controlled titration machine (presented on the left) was built. This engineered titration system was able to pump a consistent and precise amount of a liquid at high/low speeds, and with more/less motor rotations. After graduation, Jordan will be looking for an engineering-related position in industry.

Juan (Junior) Valadez, working with Dr. Bykov, completed his senior research project on "Portable Wind Powered Cell Phone Charger". This project was about designing a small size Vertical Axis Wind Turbine (VAWT) and Horizontal Axis Wind Turbine (HAWT) and using these turbines to charge several cell phones. The goal was to test both designs to see which one has the higher efficiency and lower cost to charge a smart phone. The intent was to design and implement both wind turbine systems at a low cost that it would be feasible for home owners' use. Both turbines were made of the same material. It was found that HAWT is much more efficient in producing electrical power than the VAWT. Even though it is feasible to



charge a cell phone with the designed HAWT, it may require several days for the phone to be completely charged. The final HAWT design is presented in the picture on the left. After graduation, Juan intends to work with “Cajun Industries” LLC, a Civil Engineering and Construction Company, where he did his internship last summer.

David Winski has defended his Honors Thesis which was completed under the supervision of Dr. Bykov. This work was entitled “Collecting Kinetic Energy from Everyday Movement”. According to David, the goal of his project was to investigate the idea of using kinetic energy from everyday human activities and converting it to electricity in order to power a small electric device. In order to achieve this goal a group of people were studied that followed roughly the same schedule and did similar activities. The group consisted of males and females of varying height and weight in order to see if these variables affect the energy collection. The devices used to collect the data, varied from each other by the method they use to convert kinetic energy into electric energy. These devices utilized the methods of piezoelectricity and acceleration. It was found that the power output from the acceleration sensor from all of the subjects is too small to power small devices such as cellphones. The power output from the piezoelectric device was sufficient to charge a cellphone but it was not enough to power a larger device such as a laptop. There was strong positive correlation between subjects’ activity level and power output. David’s design for the piezoelectric sensor inserted into cushioned insole of the subject’s shoe is presented in the picture on the left. In addition to the formal defense, David presented his project at the McMurry Academic Conference in April. We are grateful to the Science and Math Advisory Board for supporting David’s work with the Bloomer’s Student Research Stipend. David was recognized as our second Outstanding Physics Graduate this year. He will start working on his Physics PhD at the University of Maine this coming fall.



Casey Walters, working with Dr. Keith and Dr. Renfro, has finished building and testing his “Vacuum Cannon”. According to Casey, a vacuum cannon is a device that uses a pressure differential to accelerate a projectile (ping pong ball) to high speeds. The ball is placed at the end of the tube while the air pump is vacuuming out the air. Both ends are wrapped with a thin, airtight material. When a valve opens on one side, the pressurized air flows through the opening inside of the pvc pipe and pushes the ball out of the other end going at a

very high speed. The cannon presented in the picture below is still in need of some repairs. Casey is taking classes during the summer and putting the finishing touches on his project. He is now working full-time with



the Texas Department of Transportation engineering office in Abilene and will continue there after his graduation in August.

A majority of the design projects described here might not be possible to complete without an additional 3D printer that was purchased by the Physics Department in the fall. We are grateful to the Ward-Bottom Science Fund for making this possible.

In addition to having so many graduates, we have an even larger group of juniors who will be working on their projects next year. There were twelve proposals for these projects presented to the public in May.

Jerett Bell, working with Dr. Bykov, wants to design and build a “Diver Propulsion Vehicle” (DPV), more specifically, a DPV in the scooter or tow-behind category. A semi-professional DPV cost upwards of \$1,000 and typically lacks the performance desired by the consumer. The main goal of the project is to find the most cost effective way to build a DPV that will create a maximum thrust output higher than that of current semi-professional DPV’s on the market. Easily accessible electronics and hardware will be combined with a simple design to remain comparably inexpensive to

produce while creating a powerful thrust output. Jerett has already built a small DPV prototype, in order to study the mechanics and operations of this type of vehicle.

Chandi Chandler, working with Dr. Bykov and Dr. Keith, presented the proposal for her Honors Project which she entitled “To Boldly Find What Has Not Been Found Before”. According to Chandi, the purpose of this project is to instruct and educate the general public on how to search for asteroids. The average citizen has had a lack of access to the data and technology necessary to participate in the scientific research and discovery of small astronomical bodies. By creating a lesson plan with basic astronomical topics and the instruction and use of the astrometry software “Astrometrica”, a small group of subjects will be able to search for asteroids using actual data from Pan-STARRS (Panoramic Survey Telescope and Rapid Response System) and report discoveries directly to the Minor Planet Center for cataloguing.

Eduardo Contreras, who will be working under the supervision of Dr. Keith, will study “Engine Diagnostics and Repair” for an internal combustion engine. For this project, a 1994 Honda Civic Ex with a 1.6 Liter 4 cylinder engine will be used. The engine is having trouble starting, but when started if it starts, it has a loud knocking noise in the bottom end, and is not drivable. The goal for this project is to diagnose the issue with the vehicle and hopefully repair the engine. In the process, details of the combustion engine functions will be studied.

Aaron Herring, working under the supervision of Dr. Renfro, will be testing different roofing materials for use as passive dew water collectors. In his experiment, Aaron will test roofing materials for production of water condensation and cost effectiveness. This will be achieved by placing each sample of roofing material in a steam box and recording how much steam condenses on the material. This information can be used in developing roof designs for passive dew condensers.

Colton Hunt, working with Dr. Renfro, in his project “Printing Conductors”, will try to make a conductive filament that can be used for 3D printing. There will be different conductive materials mixed with standard PLA pellets and melted down in a mill that will be built by hand. The mill will take the PLA pellets and the conductive material and melt them down into a 3D printable filament. The goal is to find which material provides the best conductive filament. The filaments’ resistivity will be tested to see which filament is the most conductive.

Gabriella Martell, working with Dr. Renfro, will study and design a table top prototype of a “Smart Road System”. According to Gabriella, this smart road system will incorporate solar panels and sensors that will

facilitate the task of driving, and will interact with different obstacles that often interfere with driving abilities, therefore making roads safer for everyone involved.

Carlos Martinez Hamdan, working with Dr. Bykov, will study the physics of a tennis racquet. His project is entitled “Determining the best spots for a tennis racquet and measuring frequency nodes of the racquet”. The main objective is to determine how different spots on a tennis racquet would respond when hit by a tennis ball. For tennis players, the path to success relies on the racquet, it is not just the way the player hits the ball, but what would be the best spot for the ball to make contact with the racquet. Data collection and analysis procedures for various sports on a tennis racquet will be developed as part of this project.

Jacob Metcalf, working under Dr. Renfro’s direction, wants to design a “One Stop USB Hub”. According to Jacob, the modern world of avid smartphone users, needs an inexpensive and fast charging device that works on any platform and supports the fast charging capabilities of modern smartphones. This device would also need to be easy to assemble and can be installed in any building, workplace, or campus with ultimate charging capabilities that most devices cannot offer. Thus, the goal of the project is to design and build that hub for the use of the everyday person of today’s society.

Mason Mireles, working with Dr. Bykov, wants to build an “Affordable and Efficient Fishing Bait Cannon”. Mason stated, that the objective of his project is to design and test a bait cannon to aid any fisherman at any skill level. This piece of equipment will ensure a reliable cast that will travel distances beyond the ones provided by human capability. The goal is to be able to design a bait cannon that uses compressed air to shoot the bait and can be easily stored, easily transported, and cost effective. The intent is to select the best design, which can then be tested by shooting different sized bait with different amounts of pressure.

Jose Mireles, also working with Dr. Bykov, wants to create a “Training machine that increases soccer player’s passing accuracy”. According to Jose, these days the majority of sports use technology in the benefit of making fair judgements. Soccer uses technology throughout the games by using Video Assistant Referee, but rarely uses technology for training purposes. The objective of his senior research project is to incorporate technology for training purposes in the sport of soccer. He will design and build a training machine that would require a player to pass a soccer ball to a randomly lighted panel. The device will then use photo sensors to gather player’s passing accuracy. This machine will be a scaled-down and affordable version of similar machines used by professional soccer teams that typically cost millions of dollars.

Frances Narvaez, working under the supervision of Dr. Renfro, will study an “ABS Cellulose Plastic Alloy”. According to Frances, even though plastic formulation has become revolutionary in the manufacturing industry, it has been recognized that plastic wastes pose a significant ecological problem. Currently, plastic materials being used for 3D printing are ABS and PLA filament. In this project ABS pellets will be used with specific additives to create a stronger, more durable plastic alloy for 3D printing. It has also been proven that cellulose fibers found in the cell walls of plants and bacterial cells can be broken down into individual composite strands called “fibrils” and used to produce strong, steel-like fibers. One of the tasks in this project is to find an additive to mix in with those fibers and use it to coat the ABS filament in order to create a much stronger printing material; and in the future, potentially replace ABS with plastic waste to decrease misuse.

Finally, Desmond Turner, who will be working with Dr. Bykov, will study how to “Use Neodymium Magnets in Football Helmets to Help Reduce Chances of a Concussion”. Concussions are unfortunately a common injury in the sport of football and approximately 60 percent of football concussions caused by head-on-head collisions. The goal of this project is to reduce the risks of concussions by placing strong neodymium magnets inside the football helmets. The idea is to use these magnets to reduce the force taken in head-to-head collisions by having the magnets repel when in close contact. The magnets will not be able to stop the collision completely but they should reduce the force during the collision. The neodymium magnets will be placed in the front, back, and both sides of the football helmet. The force during collisions will be measured at different speeds for the helmets with and without magnets inside them. The force results will be compared. We are grateful to the Science and Math Advisory Board for awarding one of the 2019-2020 Bloomer’s Student Research Stipends to Desmond to support his work on this project.

There are several other student projects that were performed as parts of regular courses that are worthy of mentioning.

In the “Automated Experiments” course offered by Dr. Renfro in the fall, one of the projects completed by Joseph Watson, Muhanad Hawsawi and Gabriela Martell was “Two Dimensional Radio Wave Imaging”. This project’s intent was to use a robot in order to map electromagnetic wave transmission in the radio spectrum. The 855 MHz radio band was used to locate the direction of cell phone towers. The robot included a helical antenna, Software Defined Radio, and an Arduino Uno paired with two stepper motors for two dimensional motion control. In the future, this work could be extended to other signals including WIFI routers, or newer cell phone frequencies. Joseph Watson presented the findings of this project at the McMurry Academic Conference in April.

As in the past, engineering projects were introduced in the Engineering Statics and Engineering Dynamics courses. In Engineering Statics, students designed a “spaghetti bridge” as a final project for the course. Part of the task was to calculate the load that the model bridge can withstand and to test the bridge with a toy car. In Engineering Dynamics, students designed and built a mechanical analog counting device that used small spheres and an electric motor. The device had to count to 100 before resetting.

As last year, because of a very large group of sophomores and juniors, the department offered two sections of the Advanced Physics Lab with Dr. Renfro and Dr. Bykov teaching these sections. Several final laboratory projects were completed. In Dr. Renfro’s section the two projects were “Design of mini rockets” and “Software design to measure the speed of sound”. In Dr. Bykov’s section the projects were: “Study of tracks for alpha and beta particles in a cloud chamber”, and “X-ray florescence for metals exposed to gamma radiation”.

One numerical project was completed in the “Electricity and Magnetism II” course offered by Dr. Bykov in the spring. This year the project was to use Finite Differences Method for solving of the Laplace Equation for electrostatic problems with cylindrical symmetry and, in particular, to study the electric potential for a “Needle on the base electrode”, similar to what might occur in electron microscope.

The freshman class this year was not so large, but we will have several strong students who will continue into the sophomore year. Still, with the large number of juniors and seniors, for the first time, we will be offering two sections of Classical Mechanics course in the fall. Thirteen students have already signed up, some other students still need to finish their registration for their fall classes. Even though the summer is just starting, the University Physics course is already half full for the fall, and we hope that even more freshman students will sign up when official freshman registration will start in June and July. If you know of any prospective students who might be interested in a physics or engineering degree, please direct those students’ attention towards the McMurry Physics Program.



Last fall we had a very special event during the Homecoming weekend. We were proud to celebrate 60 years of Physics at McMurry. As many of you know, the Physics program was started in 1958 by Dr. Virgil Bottom, who led the program for 15 years and graduated an amazing group of physics students. It was Dr. Bottom’s unprecedented research expertise and teaching talent that allowed many of his graduates to take on outstanding careers in the quartz crystal industry. To honor Dr. Bottom and his students, we invited Mr. Kelley Scott ’63, Dr. Roger Ward ’67, and Dr. Larry Conlee ’71 to participate in the panel discussion devoted to the history of quartz crystals and Dr.

Bottom’s role in that story. Introductory remarks were offered by the former physics chair and the author of “Crystal Clear: The Struggle for Reliable Communications Technology in World War II”, Dr. Rick

Thompson. The panel was moderated by Betty Hukill. Various historic cell phone models were displayed by Dr. Conlee. Some historic quartz crystal artifacts provided by Mr. Scott and Dr. Ward were placed on display as well. Due to the generosity of Mr. Scott and Dr. Ward, these artifacts are now permanently displayed in the McMurry Science Building (see picture). Many of our students, alumni and friends were present during the panel. We are grateful to everybody who could participate. If you could not make it to the event, you can still watch the panel by going to <https://vimeo.com/299450771/cbf92fcc73>.

One of the focal points for this Homecoming was the announcement made by McMurry President Dr. Sandra Harper, about the completion of two fundraising campaigns. The endowments for the “Dr. Virgil Bottom Endowed Professorship in Physics”, and “Dr. A.C. Sharp Physics Endowed Scholarship” were completely funded this year.

Next year’s Homecoming will take place during the weekend of October 24<sup>th</sup>-26<sup>th</sup>. Please mark your calendars. You will be receiving a separate invitation for this year’s event in the early fall. We hope to see many of you during Homecoming.

We also hope that some of you will be able to participate in the “What did I do with my physics degree?” talk series. If you happen to be in Abilene for any reason, please do come to see us, talk to our students, and learn about the latest news in the Physics Department. We are very grateful to Mr. Taylor Freehauf ’16 for visiting with our students this spring and giving an excellent talk about his experience in graduate school and looking for a job afterwards. Taylor, who is currently an Associate Aeronautical Engineer at Lockheed Martin in Fort Worth, was able to provide his perspective on how what he learned at McMurry was useful for his career at graduate school and beyond. Many students felt inspired by his example and will hopefully focus more on their studies, realizing that what they are learning in their classes is something that they would actually be using through their entire career.

Several McMurry Physics students will participate in Internships and Research experiences this summer. We were able to establish a formal relationship with Skyline Power LLC Company to secure two summer internships spots for our students. Colton Hunt and Carlos Martinez Hamdan were chosen for these internships through a competitive interview process. Both students, who are interested in engineering careers, will be working on the construction site for the electrical substation of Mesquite Star Windfarm in Sweetwater TX. Jonathan Samudio will participate in an NSF sponsored Research Experience for Undergraduates (REU) project at Texas Christian University in Fort Worth, TX. His project will be in the field of Computational Astrophysics. He will be using computational techniques to determine the probability distribution for the number and properties of the Milky Way satellite dwarf galaxies (Large and Small Magellenic Clouds) and compare these numeric results to observational data collected by the Gaia satellite last year. For the second year, Mason Mireles will be working as an intern on an oil rig with Ensign Energy Company in Greeley, Colorado.

As we mentioned in our last newsletter, in August of 2018, Dr. Keith attempted to conduct asteroid research with seven students at the NURO 31-inch telescope in Lowell Observatory in Flagstaff, Arizona. During that week, students were also able to take several educational side trips, including the Historic downtown Lowell Observatory, and Meteor Crater. Weather and technical problems with the telescope focusing prevented them from collecting any usable science data, but everyone learned a lot from the experience. We are grateful to the Science and Math Advisory Board for funding a part of that trip.

Some other departmental news from the past academic year are the following:

In November, a large group of Physics students and all faculty traveled to Texas Tech University in Lubbock, TX to tour their Physics and Engineering facilities and to learn more about graduate school opportunities for McMurry Physics graduates. During this visit the group was able to meet with several physics and engineering faculty. Dr. Sung-Won Lee, the Chair of the Physics Department at Tech, presented various research groups and described the state-of-the-art research that is being conducted in the department.



In the afternoon, the group visited, Maddox Engineering Research Center, the newest engineering facility on the Texas Tech Campus. We were able to learn about Hydrology research performed there. In particular, different chemical and physical methods used for water purification and environmental disasters cleanup efforts. The rest of the afternoon was spent visiting the Nano Tech Center and learning about engineering technologies used in the semiconductor industry. Students were also able to meet the chairs of the Department of Electrical Engineering and Mechanical Engineering and learn about various tracks for their engineering graduate degrees. According to physics junior student, Carlos

Martinez Hamdan “ ... Getting to talk with a lot of the staff helped me get a better track of what I want to do with my career or my life so I could say that this trip was really helpful for me”. We are grateful to the Science and Math Advisory Board for making this trip possible.



In November, Dr. Keith and two students: Jonathan Samudio and David Winski attended the Texas Section of APS/AAPT/SPS meeting at the University of Houston. They also took a tour of Rice University Campus. David attended the Atomic, Molecular, and Optical Physics session that gave him some ideas on what he might want to focus on when in graduate school. According to Jonathan, “The Houston APS conference proved to be very insightful. I was given the opportunity to learn about different fields that I could possibly pursue at the graduate level. That is the best part of the conferences in my opinion. Only being a second year I don’t get to have too much exposure to the potential fields of physics one could pursue in graduate studies, so the conferences are a fantastic opportunity to get familiar with them.” We are grateful to the Ward-Bottom Science Fund that made possible for the students and Dr. Keith to travel to Houston.

In January, Gabriella Martell and Frances Narvaez traveled to the national site of the Conference for Undergraduate Women in Physics (CUWiP) at Texas A&M University in Corpus Christi. Frances said “ I think the two biggest and most important things that I learned

there was that networking is just as important as having knowledge of what you are doing and REU’s are a big deal in getting research experience and exposure to what I’m going to be dealing with in the future. ... I learned about so many different job opportunities in the physics world, and that there is more to it than just physics. There is application of it in engineering and computer science in more ways than I originally thought



there was, and now I am thinking about doing more than what I had initially planned. I think attending CUWiP really helped me become more informed in the things that I need to have done before graduating and what I need to do to prepare myself for it.” We are grateful to the Ward-Bottom Science Fund that made it possible for Gabriella and Frances to travel to CUWiP.

As you may recall from last year’s newsletter, last spring when we went to the Texas APS/AAPT/SPS meeting in Tarleton State University, both students and faculty enjoyed the talk given by the NASA lead engineer for the Cassini Mission, Ms. Julie Webster. The NASA Cassini-Huygens program was a mission designed to study Saturn, and Saturn’s rings and moons. The Cassini spacecraft, the largest planetary spacecraft ever built by NASA, was launched on October 15, 1997. It mapped Saturn’s magnetosphere, discovered previously unknown moons, found that at least two moons might be habitable for life, and studied Saturn’s atmosphere and rings more closely and extensively than ever before. After 20 years of operation Cassini finished its mission on September 15, 2017, by controlled plunge into Saturn’s atmosphere. It was these events that served as an inspiration for our SPS students to start a project to commemorate the Cassini



Mission. Through this entire year, students were actively designing and working on building the statue that would depict Cassini taking on its last orbital turn around Saturn before plunging into the planet. Brass Saturn rings were cut and polished by a group of SPS students under guidance from Drs. Renfro and Keith. The aluminum Cassini cast was made by Arron Herring based on his previous 3D plastic prints. Arron is also responsible for a number of 3D printed Cassini memorabilia, including “Cassini Key Chain” and “Cassini Coffee Cup”. These souvenirs were presented to Ms. Julie Webster on March 28, 2019 when she arrived to participate in the Cassini

Memorial unveiling ceremony on the McMurry Campus. The Cassini statue is now permanently installed in front of the main entrance to the Science Building, and the names of the SPS students: Chandi Chandler, Aaron Herring, Alexandria Mendoza, and David Winski are commemorated on the statue’s plaque. You can watch the entire unveiling ceremony online at <https://youtu.be/BGy3NIpwk4c>. Our students’ achievement is also featured on the NASA web site at <https://solarsystem.nasa.gov/resources/2409/remembering-cassini-texas-style/> in the article “Remembering Cassini Texas Style”. Ms. Webster, who after the end of the Cassini mission is now the NASA Chief Engineer for the Juno mission to Jupiter, was also an invited speaker for a lecture that she gave to McMurry science students and during the “Women Leadership Luncheon” on the same day. We were glad to see our friends from the ACU SPS chapter present at the unveiling ceremony and the lecture.

Many McMurry SPS students visited a lecture given by the ACU physics professor, Dr. Rusty Towell in their “Cosmic Café” series in December. In April, both chapters had a joint ceremony for Sigma Pi Sigma, National Physics Honor Society inductions. Dr. Charles Ivey of the ACU Physics Department was an invited speaker for this event. Dr. Ivey provided very interesting remarks on the history of both chapters. He recalled the days when the McMurry Sigma Pi Sigma Chapter, created under the leadership of Dr. Bottom, was the first Sigma Pi Sigma Chapter in Abilene. This year we inducted 5 outstanding students: Chandi Chandler, Aaron Herring, Mason Mireles, Jonathan Samudio, and Joseph Watson to be the newest McMurry Sigma Pi Sigma members. Chandi will be serving as the incoming McMurry SPS president, Joseph will serve as the SPS vice-president, Aaron will become the new SPS treasurer and Mason will be our secretary. We are

grateful to the National SPS Office, ACU SPS and the Ward-Bottom Science Fund for providing financial support to the joint Sigma Pi Sigma Induction Ceremony.

Our SPS chapter had an exceptionally active year. In May, outgoing SPS president David Winski was recognized as the best 2018-2019 student-leader for an academic student organization on the McMurry campus. For the second year in a row, the McMurry Chapter of the Society of Physics Students was recognized as “McMurry Outstanding Student Academic Club” of the year. Congratulations to all of our students for the job well done!



During the Spring Commencement, 1971 McMurry Physics graduate and our long-time friend and supporter Mr. Larry Conlee was awarded the Honorary Degree of Doctor of Science from McMurry University. The degree recognizes Dr. Conlee’s many contributions into creation and development of the first cell phones in the early 1990s, first at Motorola and then as Chief Operating Officer, Product Development and Manufacturing for “Research In Motion” (BlackBerry). Our sincere congratulations to Dr. Larry Conlee for the well-deserved honor! In the picture Dr.

Conlee is standing next to 2019 McMurry Physics Graduates and McMurry Physics Faculty.

During the Spring Semester, Dr. Wayne Keith was on a well-deserved sabbatical. During that sabbatical, he was working on the second edition of the book “Earth’s Magnetosphere” by Dr. Walter Heikkila. Dr. Keith will be listed as coauthor for this second edition of the book that will include a new chapter on the inner magnetosphere, as well as the newest data from recent satellite missions and end of chapter problems for students. In June Dr. Keith traveled to Polenzo, Italy to participate in the International Plasma Physics of the Magnetosphere Conference. Attendance at that international meeting helped promote his forthcoming book and raised the academic profile of McMurry University. We are grateful to McMurry University, Dr. Heikkila and the Science and Math Advisory Board for supporting Dr. Keith’s attendance at this conference.

These are just some of the many events of the past academic year. You can always keep track of our current events by visiting us on Facebook (look for McMurry Society of Physics Students) or online at <https://sites.google.com/site/mcmurryphysicsdepartment/home>.

If you have been recently added to our database and/or never received this letter before and/or by some reason want to be removed from the list and/or prefer to update your contact information and/or prefer to receive an electronic instead of a paper copy of this letter, please do not hesitate to contact me at the address above or by email at [tbykov@mcm.edu](mailto:tbykov@mcm.edu).

Tikhon Bykov - Wayne Keith - Timothy Renfro, The McMurry Physics Department