



Department of Physics



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

Friend

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Dear Friend :

Yet another academic year is over and, as usual at this time of the year, we would like to bring you the latest news from McMurry Physics.

The department had one graduate this spring, Heath Koop. Under the supervision of Drs. Keith and Renfro, Heath completed the project to build an induction smelting furnace to be used in melting and casting metal parts. He has accounted many challenges in this work and it took him much longer than it was originally planned to complete this project. Even though the final product was not able to melt an iron nail, it was possible to heat that nail to several hundred degrees Celsius using a very low input voltage. Heath presented his final results to the public at the end of May. Just before graduation Heath received a job offer to work as IT specialist for an oil company in the Big Spring area. He will be moving there right after graduation. He may consider going into graduate program in Mechanical Engineering in future.

This year's juniors have started working on their research proposals for projects to be completed in the course of the next academic year.

Ricky Garcia will study how to improve baseball batting tee to make fundamental batting practice easier and more productive for baseball players. The two issues with the batting tee he wants to address are 1) the extra work that hitters must perform to change the pitch location while using the tee, and 2) the tendency for the tee to fall over after contact with the bat. To resolve these issues Ricky wants to develop a system that allows the tee to move on an x-y table and has its weight distributed so that the bat would not knock it over. Ricky will be working on this project and supervision of Drs. Bykov and Renfro.

Because of Ricky's interest in baseball another project he was working on this year in collaboration with junior student Jeffers Rader was to study baseball in flight. This project was part of the Classical Mechanics II course Ricky and Jeffers were taking with Dr. Bykov. Since baseballs can develop very high speeds close to a hundred miles per hour, the effects of air resistance play a substantial part in forming the shape of the baseball trajectory. There are several factors to account for including the drag force, the wind, the Magnus force (on rotating baseball) as well as the effects of air pressure and density at various elevations. Ricky and Jeffers developed a code using RK4 numerical method to solve equations of motion for the baseball in flight. They then used our new high speed video camera to perform video analysis of the motion of the real baseball and compared experimental data to numerical results. We are grateful to Mr. Larry Conlee whose generous donation made it possible to purchase the high speed video camera used in this project.

We would also like to congratulate Ricky Garcia on being accepted to the summer undergraduate research program in Texas A&M University in College Station. During this summer he will be working on a project in the area of Engineering Technology and Industrial Distribution. This field deals with product improvement, manufacturing, and automation as well as the data processing, quality assurance, and supply chain management

aspects necessary to distribute technological products. We are looking forward to hear from Ricky in the fall about his experience during the summer.

Another senior research proposal this year was introduced by a physics junior Jacob Howdeshell. His project entitled “Conversion of combustion engine generator from gasoline to syngas“ will continue the work started by Alistair Adams several years ago. The intended outcome of the project is to run a combustion engine off of syngas produced from waste biomass, and to accomplish this using low cost readily accessible parts. If successful the energy output of the syngas will be compared to that of both regular gas and old gas using a load line. The syngas generator built by Alistair Adams will be used for the syngas production in this project. Jacob will be working under the supervision of Dr. Keith.

Three students (Taylor Freehauf, Kent Grimes and Ricky Garcia) in the Advanced Lab course under the supervision of Dr. Bykov participated in the project to improve Michelson interferometer experiment to measure the index of refraction of glass. The old Michelson interferometer required manual rotation of a transparent glass piece causing the change in the number of fringes moving across the screen. It was extremely difficult to achieve slow and smooth rotation and to count these fringes. The objective of the project was to create a system which automates the rotation of that glass piece. It was achieved through the use of a computer-controlled stepper motor which drives the rotation of the glass piece and increases the precision of the experiment. The resulting system was able to create a slow, constant change in fringes on the screen which were easier to count. The 3D printer was also used to print the parts for this project. You can see short videos of the new setup for this experiment at the McMurry SPS Facebook page.

Electronics students (Jacob Howdeshell and Marco Flores) under the supervision of Dr. Keith have received a practical task which was commissioned by one of the SNCS faculty members to convert a standard tabletop lamp (usually sitting on a coffee table in the middle of the living room far away from any electric outlets) to a cordless LED light source that could be recharged during the time when this lamp is not in use. The task was successfully accomplished with a 12-volt DC LED bulb and a rechargeable battery pack customized to connect directly to the lamp without the need to modify the lamp. A prototype 3-way 12-volt LED light bulb was also constructed. You can see the videos of students working on the project at the McMurry SPS Facebook page.

Students in the Engineering Drafting course taught by Dr. Renfro this spring gained a lot of experience working with the 3D printer. Many of them had a chance to complete a project of their choice, while others used what they learned about 3D printing to make parts for the other projects performed in Electronics and Advanced Lab courses. Students in this class were also commissioned to print plastic coins with the McMurry War Hawk image for the SMAB golf tournament in April. Once again you can see some of the student accomplishments from that course on our Facebook page.

We had several outstanding freshman students in the University Physics course this spring. Many of them will continue on to the sophomore year. We would especially like to mention Kirk Hodel and Sam Boyce who were

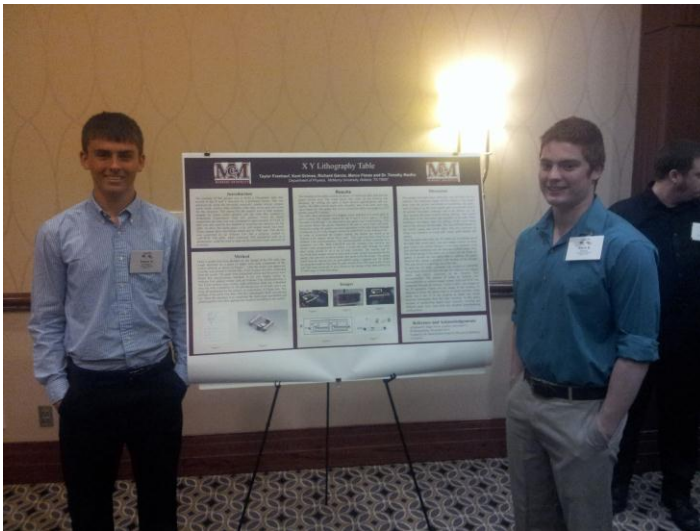


named outstanding physics freshmen of the year. They both have been actively involved with the Society of Physics Students starting from their first year. The major SPS project this semester was the rebuilding of the Physics Trebuchet which has been associated with the department over the last ten years. As you may recall, the “old trebuchet” was rather heavy and difficult to transport and store which finally made us to disassemble it during the machine shop remodeling a couple of years ago. We are now ready to announce the rebirth of the trebuchet which was finished just before the final exams this spring. The new trebuchet has inherited some of the old parts, such as the throwing arm, the bar and the main beams, but at the same time many parts were now made in metal and welded

to the base trailer which was generously donated by Dr. Wyatt. The new trebuchet will now be much more mobile and can be transported to large distances. It will be parked in the University Storage Facility, so we do not have to worry about finding the space in the department. Unfortunately, it was finished too late to be able to test it and participate in the West Texas trebuchet competition in Midland this spring, but we are looking forward to testing it during the fall semester and hopefully being able to go to Midland next spring.

In late February together with the West Texas Science Center, the Physics Department hosted a public lecture devoted to the 75th anniversary of McDonald Observatory. McDonald Observatory astronomer Dr. Matthew Shetrone spoke on "New Frontiers in Globular Cluster Research," discussing how stars formed in our galaxy and in distant galaxies. In his lecture Shetrone discussed how all stars form in clusters and how globulars are dense clusters that have survived from the beginnings of the Milky Way. According to him, if we want to understand the early days and formation of the Milky Way or any other galaxy, then studies of globular clusters are a good way to accomplish this. At the Hobby-Eberly Telescope at McDonald Observatory, two experiments have been conducted to understand how much of the Milky Way's halo may have been formed from globular clusters and how we can use globular clusters to study galaxy formation in distant galaxies. The lecture had a good public turn out and the speaker received some interesting questions from the audience.

In March all physics faculty and a group of physics students, including Taylor Freehauf, Kent Grimes, and Kris



Valdez, participated in the Texas Section of the American Physical Society (APS), American Association of Physics Teachers (AAPT) and Society of Physics Students (SPS) joint meeting at Abilene Christian University. While for Kris this was the first professional meeting he attended, Taylor and Kent were able to present a poster they made based on the project they have completed in collaboration with Ricky Garcia and Marco Flores last semester under supervision of Dr. Renfro. The objective of this project was to create an XY Lithography table that is capable of scanning the surface of an object. This was achieved with the help of stepper motors, a stepper motor drive card to drive the motors, motion relay switches, slide rods and a wooden frame. With the table built, it can be used to produce a light intensity mapping of

the surface of an object placed under the table. The poster received significant attention from the audience.

Also during that conference Dr. Renfro gave a talk about the success of student projects and how project-based teaching has been incorporated into the McMurry physics curriculum.

Dr. Bykov and Dr. Keith hosted two sessions during that conference.

Some of the notable talks during the meeting were devoted to alternative sources of energy and, in particular, Thorium Molten Salt reactors. Kirk Sorensen and Robert Hargraves presented very impressive talks about why Thorium is so important as an energy source.

In late March, Dr. Keith, Dr. Wyatt, Dr. Martin (of the Math Department) and physics freshman Kirk Hodel attended a highly prestigious Energy Thought Summit in Austin TX. During that meeting they were able to interact with many energy policy professionals and other thinkers such as Apple Co-founder Steve Wozniak and John Scott, Chief of Energy Conversion Branch at NASA. Kirk was the only undergraduate student from any school in attendance, and all members of the McMurry contingent felt that it was a very interesting and worthwhile conference.

The last but not the least news this spring is that Dr. Renfro has received tenure and has been promoted to the rank of Associate Professor. Dr. Bykov has been promoted to the rank of Professor.

Since our freshman enrolment is not clear yet, as always, we are asking you to help us identifying more prospective students. We do need and appreciate your help in that, so If you know of a prospective student who

might be interested in pursuing a degree in physics or pre-engineering, please give that person our contact information and/or direct him/her to our website for more information.

As you know, we always like to welcome our alumni back and would like to see more of you coming here, giving talks and meeting with students. We have not had a chance to host anybody this spring, so if you happen to pass through Abilene, please do let us know about your visit. One of the best occasions to visit is during Homecoming. This year it will take place on October 9th-12th. As usual, you will receive a special invitation to the Science Homecoming Reception in the fall, but you may want to place it on your calendars even now.

These were just some of the very many news we had during this spring. You can always keep track of our current events by visiting us on Facebook. Look for the McMurry Society of Physics Students group page.

If you have been recently added to our database and 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. Also if you know of other people who might be interested in receiving this letter please send us their contact information. Some of the people who were on our mailing list before have moved without providing us with new addresses. If you are in contact with McMurry Physics alumni and not sure if they are receiving this letter, please let them know about its existence and ask them to contact us at their convenience.



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