Department of Physics

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Friend

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Dear Friend :

All of us in the McMurry Physics Department hope that you had a great holiday season and a good start to the New Year. As usual, at the beginning of the spring semester, we want to tell you about the notable events of the fall.

Throughout the fall semester our senior, Heath Koop, has been working on his research project to design and build an induction smelting furnace to be used for melting and casting metal parts. In this project Heath is constructing a furnace with an insulation canister and electronic controls. He has spent an extensive amount of time designing and building the electronic part of this project. Currently the design stage is complete and Heath needs to put all the parts together to be able to test his furnace and present it to the public before he graduates at the end of the spring semester. Heath is working under supervision of Dr. Keith and Dr. Renfro.

Our junior students: Richard Garcia, Jacob Howdeshell, and Jeffers Rader will be working on their senior research proposals this spring. We will bring you more details about these at the end of the spring semester.

This fall four students: Taylor Freehauf, Marco Flores, Kent Grimes and Richard Garcia were working with Dr. Renfro (as part of the Automated Experiments course) on the project to build an automated X-Y Table that can be used for several experimental applications in senior projects as well as in Advanced Physics Lab. An X-Y Table is a table that can move two gantries in two different perpendicular directions simultaneously. This allows the programmer to place a device at a particular known location. A majority of Computer Numerical Control, CNC, devices use this technique to operate. In this project, students were assigned to write a program in LabView to calibrate the sensor carriage location using the two relays on the device, then perform a scan movement of a predetermined sized field. Pictures of the device can be seen below.

Two students: Jacob Howdeshell and Heath Koop attempted a numerical project as part of the Thermodynamics II course they took with Dr. Bykov. The project was to study a phase transition between paramagnetic and ferromagnetic states in a two-dimensional Ising crystal. The Mote-Carlo simulation with Metropolis algorithm was used. The main focus of the project this year was to look at how the size of the system affects critical temperature and critical behavior of thermodynamic properties of the system.

We had a large and academically strong freshman class this year. The fall semester started with sixteen students in University Physics course, twelve of whom were physics majors. Ten students made it to University Physics II in the spring; nine of them are physics majors. Even though some of these students are planning to transfer into engineering schools in future, we still hope to retain a large number of them. Three of these students are members of the University's Honors Program. Some of them have joined the Society of Physics Students (SPS) starting in their first semester.

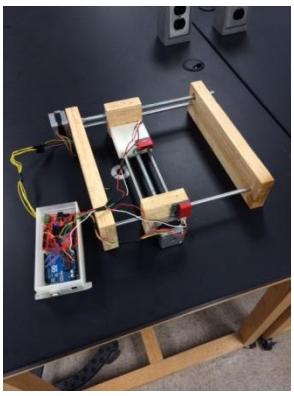

Figure 1. Over all view of X-Y Table.

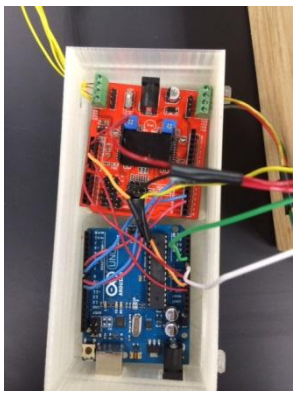

Figure 2. Arduino stepper motor control card and data acquisition card. Electronics box was printed on the department's new 3D printer.

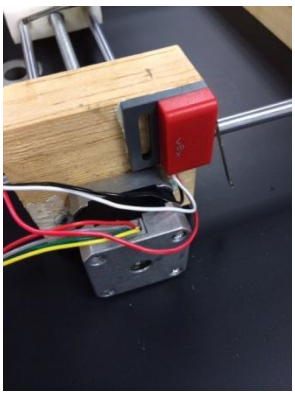

Figure 3. Stepper motor control with contact relay switch to keep gantry from impacting the wall.

Figure 4. Block and screw system that is attached to the stepper motor that moves sensor platform.

Our SPS chapter has decided to return to the old trebuchet project. Many of you were involved with building the physics trebuchet in the 2006-2007 academic year. You may recall that the wooden trebuchet was built to fit the back door of the physics machine shop and was very heavy and difficult to move. With the shop equipment updates in recent years, the "old trebuchet" was disassembled, since it was taking too much space and was impossible to move. However, we have received multiple requests from many people, who would recall the old days when the trebuchet was taken out to the campus quad for shooting during preview days, to bring the trebuchet back. We are grateful to Dr. Alicia Wyatt, who has graciously donated her old trailer to be used as the base for the "new trebuchet". We are also grateful to the University Maintenance Department for providing space for storing of the "new trebuchet" after it is finished. The "new trebuchet" will reuse some of the parts from the "old trebuchet", but many new parts are going to be made in metal instead of wood. With the plasma cutter and welder being now available in our shop, we can make the metal parts on site without outsourcing them to other manufactures. We will continue working on the trebuchet this spring with the hope of building an easy-to-move and convenient to operate version. We devote this effort to those of our former students and faculty who conceived the idea and built the first trebuchet in the early and mid-2000s.

Several physics students were able to visit with the Science and Math Advisory Board members during the fall SMAB meeting and talk about their future career plans. We are grateful to SMAB for providing this opportunity for students.

We have continued our alumni talk series "What did I do with my physics degree?" in October. This time we were joined by Mr. Tom Helm, McMurry Physics class of 1973. Mr. Helm spent forty years working as an engineer in the semiconductor industry. In his talk "The hot life of McM physics major in the furnaces" he shared his experience working for different semiconductor companies. He also discussed deposition and growths of semiconductor films, explaining why one would chose CVD (deposition) vs. diffusion (growth) to create a film. Other areas he touched on were metal deposition, plasma deposition, wet cleans and etches and planarization. We wish to thank Mr. Helm for his talk and hope to see him again in the near future.

As usual in the fall, we were very glad to see some of our recent graduates; including Austin Wegner and Daniel Zipprian, as well as the older generation of physics alumni, represented by Mr. Tom Helm and Mr. Robert Seago, during the Science Homecoming Reception.

Yet another physics alumnus, Mr. Larry Conlee, visited McMurry campus in October. It has been a long time since he was last here. Many things have changed in the department, but Larry was still able to recognize some of the old equipment he worked with when he was a student here under Dr. Bottom's

tenure. According to Mr. Conlee, it was Dr. Bottom's guidance that led him to a long and successful career at Motorola and at Research In Motion, the company that introduced the Blackberry phone. Mr. Conlee most recently served as a Special Advisor of Research In Motion Limited until his retirement in March, 2013. Previously, he served as the Chief Operating Officer, Product Development and Manufacturing of Research In Motion Ltd. During his visit Mr. Conlee met with faculty and students and talked about his extensive experience working in the telecommunication industry. We are grateful to Mr. Conlee for finding time in his busy schedule to visit the department and we hope to see him again in the future. We are also grateful for his generous gift that will enable us to purchase a high speed video-camera for motion analysis as well as a camera for one of our telescopes.

We hope to see even more of you as speakers in the "What did I do with my physics degree?" series as well as our visitors during homecoming in future years. If you happen to be in Abilene for any reason, please do come to see us and our students and learn about the latest news in the Physics Department.

It is with deep sadness we have learned about the passing of one of our most devoted alumni, Dr. Jerald D. Lee on August 16th 2013. Dr. Lee graduated from McMurry University with BS in Physics in 1961. He was among the very first group of students who received the physics degree after Dr. Bottom created the physics program in 1958. Dr. Lee received his PhD in physics from Ohio University and was working for DuPont Engineering Physics Group before his retirement. After retirement Dr. Lee remained in close contact with our Physics Department. In particular, he was very interested in establishing a senior research capstone experience and provided us with interesting ideas for senior research projects. We will keep Dr. Lee's memory alive by using his ideas in future student research.

Figure 5. McMurry Society of Physics Students (SPS) visit to the Texas A&M Cyclotron Institute.

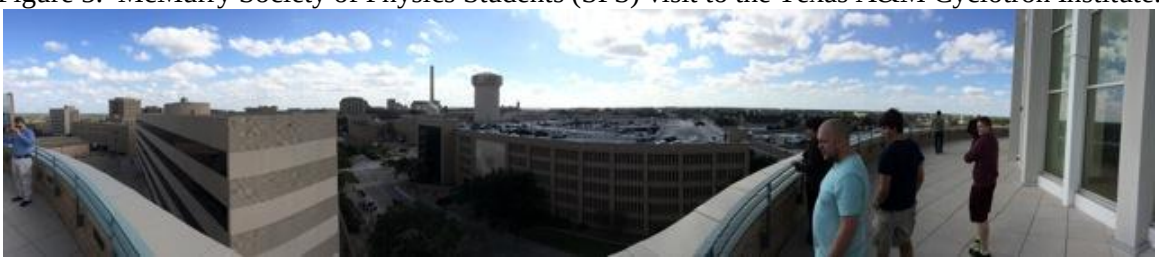

Figure 6. McMurry SPS students overlooking the Texas A&M campus from the top of the one of the physics buildings.

In November all physics faculty and a group of physics students including Heath Koop, Taylor Freehauf, Kent Grimes and Nicholas Conklin traveled to Texas A&M University in College Station, to take a tour of the Physics Department there. In addition to visiting the new Texas A&M physics building and observing various interesting building features including the giant Foucault pendulum taking the height of several stores in the building lobby, we were also able to visit the A&M Cyclotron Institute, tour the astronomy instrumentation lab, the magnet lab and tour the teaching observatory. We are grateful to Dr. Jim Sterling who made this visit possible by helping organizing the tours and letting McMurry physics faculty and students to stay in his house in College Station.

At the end of the fall semester, the department received a donation of a new research quality Celestron telescope. Dr. Keith is looking forward to using the telescope to conduct observations with his Astronomy students. We are grateful to Dr. Johnny Bliznak for his generous donation. You can see the new telescope in the picture below.

Figure 7. Celestron telescope

Figure 8. Two-sided plastic disc to commemorate the purchase of the 3D printer.

Also during this fall the department purchased a Makerbot Replicator 2, 3D printer, to be used for future student projects as well as in the "Engineering Drafting" course being offered by Dr. Renfro in the spring. The first item printed on the printer was a commemorative coin. Heath Koop was already able to use the printer to print plastic parts for his project and an electronics box was printed for the X-Y Table and can be seen in Figure 2. We are looking forward to seeing a wide range of applications that this printer can serve and to provide valuable learning experience especially for our pre-engineering students. This purchase would not be possible without support from the Ward-Bottom Physics Fund and we wish to thank Mr. Roger Ward for his continuous support of McMurry Physics Program.

In October we welcomed a new McMurry president, Dr. Sandra Harper on our campus. Some of our older alums and friends may remember Dr. Harper as a professor of communications and the Dean of the College of Arts and Sciences in the late 1980s and early 1990s. After gaining extensive administrative experience at other institutions of higher education, Dr. Harper returned to McMurry to be become the first full-time female president in McMurry history. We are looking forward to strengthening our academic programs under Dr. Harper's new leadership.

These were just some of the many events we had during the last semester. You can always keep track of our current news by visiting us on Facebook (look for McMurry Society of Physics Students) or online at our web site is located at https://sites.google.com/site/mcmurryphysicsdepartment/home.

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.

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