



Department of Physics



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Dear Friend :

We hope you had a very happy holiday season and a good start of the New Year. As usual, at this time of the year, we want to provide you with the latest news from the McMurry Physics Department.

Our seniors continued working on their research projects.

Alistair Adams, under the supervision of Dr. Bykov, has finished working on his project of “Backyard Conversion of Waste Biomass to Ethanol” and presented his work to an audience of physics students and science faculty in the late October. Since Alistair is an active-duty member of US Air Force and he was deployed and then transferred from Abilene, this was the first time when we used the achievements of modern technology as well as the multimedia capabilities of our recently renovated physics lecture room (S105) to allow Alistair do his presentation long-distance through the internet. Both the audience and the presenter were able to see each other, Alistair’s presentation was transmitted live and then he was able to answer live questions from the audience. Even though Alistair’s original proposal called for producing ethanol, his deployment and move from Abilene did not allow for a complete realization of the project, and yet he was able to finish building and testing a gasifier to produce a syngas from biomass. You can see a short video of Alistair’s gasifier being tested on Youtube at <http://www.youtube.com/watch?v=3OdWjAxm2hk&noredirect=1>. The finished gasifier is now kept in the physics department with the hope that another student or the McMurry SPS chapter will add an extension to allow purifying the syngas produced and its conversion to ethanol fuel. Alistair still needs to finish two more upper division physics courses before he can graduate, but we are hoping that this is not going to take him long.

Sheharyar Khan, under the supervision of Dr. Renfro, has finished his project “Design of an Air Supported Structure“. The objective of this project was to design an air supported structure (practice bubble) to cover the footprint of McMurry football stadium for the use of all McMurry athletics so that McMurry sport teams may practice with protection from inclement weather. The design of the practice bubble is similar to that of professional teams and in other universities nationwide. Sheharyar also performed some load analysis on the structure to further understand the physics and engineering behind the construction of practice bubbles. Furthermore, a cost analysis was also performed to determine the cost of building and maintaining a bubble here at McMurry. The design and load analysis were performed using software commonly used by professional engineers, SolidWorks. Sheharyar presented his project to a large audience of McMurry students and faculty in early December. He has finished all requirements for his degree and graduated in December. Sheharyar plans to spend the spring semester at UT-Arlington and take additional engineering courses. He then wants to apply for fall admission to a mechanical or civil engineering graduate program in the same school.

Jeremiah Land, under the supervision of Dr. Bykov, has finished his project “Coaxial UAV Helicopter”. The objective of the project was to develop a small, lightweight, coaxial helicopter UAV capable of stable flight from the proposed design. An iterative design process led to a change in construction materials and orientation of components in order to achieve a more stable design. Flight was achieved during testing of the final design iteration. Even so, the flight was not stable enough to be able to put video camera on board. The helicopter is now on display in the Physics Department among other former student projects. Jeremiah presented his project to the public in January and graduated with a major in Physics and a minor in Computer Science. Right after graduation he accepted an offer to take an IT-related job in New Mexico, where he will be moving soon. Jeremiah is also thinking about applying to engineering graduate program in the course of the next two years.

Under the supervision of Dr. Bykov, Jared Land, the winner of 2011-2012 Bloomer’s student research stipend, has started building a table-top sized rail gun which uses a strong magnetic field to drive a projectile. Jared has made significant progress in assembling most of the gun parts during the fall semester. He will continue working on the project throughout the spring. If time allows, the effects of various rail geometries/bore profiles will also be studied.

Under the supervision of Dr. Keith, Daniel Zipprian has constructed most of his micro-hydroelectric power generator. He still needs to optimize his design and test the generator's performance during the spring semester.

This year the department had the largest since 2004 incoming freshmen class. We started the fall semester with 18 students enrolled in our University Physics course, and even though not all of them were physics majors and some were lost to other majors, we were still able to move into the spring with a record high of 8 students. It seems that these 8 students will form a solid team which will become the core of our student population for the next few years.

Also this fall, Dr. Renfro offered a Digital Electronics course which has now become a required course for the electrical pre-engineering concentration in the physics major. It has become our ongoing effort to include group or individual projects into most of our upper division courses. In particular, the group of students who were taking the Digital Electronics course built a Christmas light display as their final project. This display is capable of changing light intensity and colors in correlation with any input music file.

There are a couple of other upper division class projects to mention. A group of students, including Jared Land, Jeremiah Land and Sheharyar Khan, who were taking Electricity and Magnetism II last spring, have finished the project of developing a numeric solution to solve the Laplace equation for electrostatic potential in two dimensions. They were able to obtain a numerical solution for the boundary problem of a two-dimensional finite size plane capacitor as well as a numerical model for one of the electrostatic potential distributions we often use as an experiment in our freshman physics lab. The other computational project was completed by Daniel Zipprian as a final for the Thermodynamics II class he was taking this fall. He created a simple Monte-Carlo simulation of the one-dimensional Ising model ferromagnetic crystal and studied its thermodynamic properties based on that simulation.

On the 23d of September the Physics Department hosted two invited speakers from Texas Tech University. Dr. Mahdi Sanati, Assistant Professor of Physics and graduate school recruiter for the TTU Department of Physics, talked about the main directions of physics research at TTU. He also explained the application procedures and requirements to enter the graduate program in physics at Texas Tech. Dr. Walt Oler, Associate Dean of TTU College of Engineering and Associate Professor of Mechanical Engineering, talked about various graduate study opportunities in TTU engineering programs. Both Dr. Sanati and Dr. Oler were impressed with the quality of the McMurry Physics/Pre-Engineering program and commented that McMurry physics graduates should have no problems entering graduate programs at Texas Tech.

As has now become tradition, the Science Alumni Reception was held in the physics spaces on the first floor of the Science Building during the homecoming weekend. This year's homecoming speaker was Dr. Rick Nason, McMurry class of 1983. Dr. Nason graduated from McMurry College with a BS in chemistry and math and a minor in physics. He was also named an outstanding physics senior in 1983 and his name is engraved on the plaque among other outstanding physics students outside of the Physics Department offices. Dr. Nason holds a MS degree in physics from the University of Pittsburgh, as well as an MBA and PhD from the Richard Ivey School of Business at the University of Western Ontario, Canada. Dr. Nason is the international consultant and a founding partner with RSD Solutions, Inc. He is also an Associate Professor of Finance at Dalhousie University in Halifax, Canada. We were very glad to welcome Dr. Nason back on the McMurry Campus. His talk on "Science Education as Competitive Advantage" caused a lot of interest among the students, faculty and alumni present at the reception. One of Dr. Nason's main arguments was that the science background as well as the liberal arts education he received from McMurry gave him, and continues to give him, a huge competitive advantage in what he does. He said "I believe that a liberal arts and science undergraduate education is the best start that you can have on almost any career - and especially in business and even more so in finance".

On October 28 the Physics Department was glad to welcome back our old friend and McMurry physics alumnus Dr. Glenn Light. Dr. Light is the director of the Department of Sensor Systems and Nondestructive Evaluation Technology in Mechanical and Materials Engineering Division of Southwest Research Institute in San Antonio, TX. He received his BS degree in physics from McMurry College in 1972 and was named an outstanding physics senior that year. He holds a MS degree in Atomic and Nuclear Physics from University of North Texas and a PhD in Atomic and Nuclear Physics from the University of North Texas as well. For several decades in Southwest Research Institute, Dr. Light developed sensors, systems, and new techniques for nondestructive evaluation (NDE) of materials and structures. He gave a talk entitled "The Physics and Engineering of Nondestructive Evaluation Technology". In this talk Dr. Light described various nondestructive testing techniques and pointed out how some subjects learned by our students in different physics courses can find practical applications in these testing methods.

This fall the McM chapter of the Society of Physics Students has started working on organizing the first Physics Olympics competition for local high school student teams. The event will take place on the 14<sup>th</sup> of April in the McMurry Physics Department. The official rules and requirements to enter the competition are published at [http://www.mcm.edu/academic/depts/physics/McM\\_Phys\\_Olympics\\_Rules\\_2012.pdf](http://www.mcm.edu/academic/depts/physics/McM_Phys_Olympics_Rules_2012.pdf). Registration deadline is set for the 24<sup>th</sup> of February. If you are teaching high school physics class or know somebody who does in close proximity to Abilene and may be able to travel with the team to McMurry on the 14<sup>th</sup> April, please make sure to check this link and let any potentially interested parties know about this opportunity.

Among other alumni news to mention is that McMurry physics alumnus David Upshaw, who graduated from Texas Tech University Department of Mechanical Engineering with a MS degree in May, has accepted the position of manufacturing engineer with Schlumberger Limited, one of the world's largest oilfield service companies. David also got married in August. Congratulations to David and his lovely wife April on behalf of the Physics Department. We wish them all the best at their new place of residence in Tulsa, Oklahoma.

These are just some of the news we had during the fall semester, but you can always keep track of our current events by visiting us on Facebook. Look for the McMurry SPS group page.

As usual, we would like to ask your help to tell prospective students interested in physics about our program and your experience at McMurry. Please feel free to give these prospective students our contact information and/or invite them to visit us on Facebook under "McMurry Society of Physics Students" or online at <http://www.mcm.edu/newsite/web/academics/ncs/physics/index.htm>. We should also point out that our new web site is under construction and we hope to have it up and running sometime this year.

We always like to see you back on McMurry Campus. Please do come to visit us and tell our students about your experiences after McMurry and what role your physics degree played in that. Even if you are coming here not with a special purpose of giving a talk but for some other occasion, please do let us know about your visit and we will be happy to chat with you and hopefully get some of our students to meet with you.

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 electronic instead of the 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). Also please remember to update your contact information when you move. We have lost contact with some of the alumni who moved without leaving forwarding addresses. If some of your friends are also McMurry physics alumni, please ask them whether or not they are getting this letter. If not, tell them to contact us and we will be happy to put them on our mailing list.



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