The Dilated Times

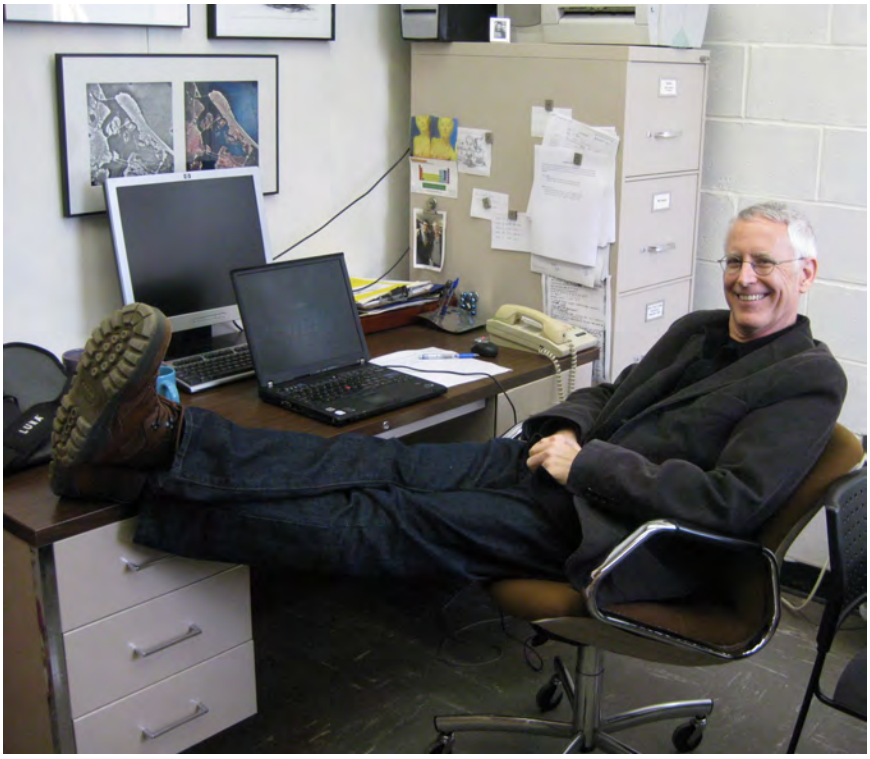
The Newsletter of the Drew University Society of Physics Students

Fall 2011 Volume 22 Number 1 **Editor: Ashish Shah**

Drew Physics Welcomes New Chair

By Melissa Hoffman '13

As the school year brought in new students, classes, and all the associated tasks, the physics department brought in a new chair – Dr. James Supplee. Dr. Supplee has been teaching at Drew since 1988 and this is his first time in the role of department chair. And being the new chair is indeed a big responsibility. As Dr. Supplee noted, "Everyone takes a turn, but frankly, I prefer teaching." The new position of chair carries extra obligations for the already busy professor. There's extra work, extra meetings, and lots of paperwork. Dr. Supplee has seen three other chairs at Drew – Dr. Bob Fenstermacher, Dr. Dave McGee, and Dr. Pat Boeshaar , though Dr. Fenstermacher has by far held the position of chair the longest - – over 36 years. "No one can be like Bob," Supplee explained, "it was like living in a fantasy land where we could all focus on teaching and research." Dr. McGee became chair upon Dr. F.'s retirement, and Dr. Supplee assumed the position of chair after Dr. McGee's departure last summer.



Just as the chair changes, the department as a whole changes, and Supplee believes that the changes in the department are going to be where the "new people" want to see change; the "new people" here are Dr. Robert Murawski, Dr. Minjoon Kouh, and the new professor that the department will hire for the fall of 2012. To get an idea of how 'new' everyone is, Supplee explained, "come September 2012, the cumulative combined experience [at Drew] of the three new people won't have a quarter of Bob's experience at Drew, but [that means] a lot can change – everyone's new!" And indeed, the new faculty member will complete the department's fresh new face. Dr. Murawski, Dr. Kouh, and the new person will have many opportunities for new teaching ideas and research, and Dr. Supplee anticipates that their actions will truly shape the department in years to come. And indeed, Dr. Supplee has already seen initiative for change. "[It was] wonderful that when Dave left, Dr. Murawski got his laser lab up and running so students could get lab experience." Dr. McGee was a full time experimentalist, and Drew is presently searching for another experimentalist.

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NOTES FROM THE OUTSIDE

By Paul-Michael Huseman '07

A path to high school teaching…

The doors to the elevator open, and Dr. Fenstermacher and I enter. It is the Spring of my Senior year, and this is perhaps the first time I'm taking the elevator in the Hall of Sciences. ("There's an elevator?", I thought to myself.) As we ride between floors to RISE, Dr. F asks me why I've decided to only apply to one grad school. I give a half-baked answer that is unsatisfactory even to myself. The truth is this: I did not know why I was applying to graduate school at all.

When I started at Drew, I wanted to be a high school teacher, maybe teach physics, but probably teach music. I majored in physics because of a bet I made with Prof. Supplee: "Get an A on the first exam, and you are declaring."

By the middle of October after my graduation from Drew, I had successfully dropped out of graduate school. At this point, I knew I wanted to teach high school, and I didn't want to go through three or more years of problem sets before I could become a teacher. After a brief stint working in media planning, I become an NYC Teaching Fellow. As a fellow, I got a free Masters in Education while teaching full-time (unionized and everything).

I currently teach at a small public high school that uses performance-based assessment instead of standardized testing. This means that my priority is helping my students become proficient in the skills of science by giving them authentic scientific experience, similar to the Advanced Lab courses at Drew. For example, I am currently teaching a course called the Physics of Sound. This course is centered on guitars that the students build. They use their understanding of frequency, wavelength, and the mathematical relationship that governs the chromatic notes in the Western scale to determine the location of each fret. They then test the accuracy of their guitars by measuring the frequencies using an online tuner. After this project, the lab teams design their own experiments for their guitars. Some groups might test the relationship between frequency and tension, others might look at how string material affects frequency. In each case, the students will find their own sources to develop their hypotheses, create their own procedure, and analyze their results. The report that documents their lab is then presented to a panel of teachers, where the students must defend their results and methodology.

My favorite part of each week is Friday, but not for the usual reasons. On Friday afternoons, I run our Google-sponsored robotics club, where my three teams of students build robots to compete in the regional competition held in the Javits Center (Grown-ups: That's where they hold the car show. Kids: That's where they hold Comic Con). Software engineers from Google come over and teach the teams how to write code using a variant of C, and I work with the teams on their robots. Together, the engineers and I help the students understand how their code and mechanical design work in lockstep to execute their game strategy. Sometimes we are highly focused, other times we just go robot bowling. Either way, these afternoon hours are tremendously fun and rewarding.

I wanted to write this directly to the current Drew students, and if you've made it this far, congratulations: You have more patience than I ever did. I just want you young whippersnappers to know that, whatever path you take, you will find something rewarding. You will be great at whatever you choose to pursue, because the greatness of the Drew physics department is contagious.

Paul-Michael Huseman teaches in New York City and welcomes questions about high school teaching, and the NYC Teaching Fellow Program. He can be contacted at: phuseman@gmail.com

There and Back Again: A Drewid's Tale:

Engineering at Columbia University

By Dr. Robert Murawski

On the crisp autumn morning of November 18th, eight brave Drew students embarked on a journey that would change their lives. This fellowship of Drewids was headed to Columbia University in New York on a quest for information about the dual degree engineering program. The trip started at Madison station at 10:30 am where the group caught the NJ Transit train to New York 's Penn station. They arrived around 11:25 and then feverishly scrambled to find the #1 subway train. Time was of the essence since the meeting at Columbia was to take place at noon. The first obstacle was the subway turnstile. Now, turnstiles are not particularly difficult in general but here is a trip advisory: you cannot get 8 people through a turnstile on one metro card. Having safely passed through, the group immediately boarded the subway. They took the train in a direct route to 116th street and Columbia University. Here is a second trip advisory: the #1 train is a local so if possible catch the #2 or #3 and transfer over at 96th for the #1. The group found themselves on the hallowed grounds of Columbia. The mammoth Low Memorial Library seemed to be the focal point of the campus. It is a huge marble structure with giant marble columns, and is a New York City landmark and a National Historic Landmark. Standing on the steps of the library one cannot help but feel smarter.

The group found its way to the mathematics building for the first half of the trip, an information session about the combined plan program. Four speakers addressed a room of about 40 students and faculty members. The information was mostly about things the group already knew. The Columbia Combined Plan Program is the oldest of its kind in the United States and is designed for students who want a traditional liberal arts education and an engineering degree. The students spend three years at Drew earning their liberal arts degree and then transfer over to Columbia at the end of their junior year. Once accepted into Columbia, the students concentrate their studies on a particular engineering discipline for the next two years. The requirements for acceptance into the program are a minimum GPA of 3.3 overall and in their science courses, and three strong letters of recommendation from Drew faculty members (one from a science professor, one from a math professor, and one from the Drew liaison). If the student meets these requirements and has taken the appropriate pre-engineering courses, the transfer is guaranteed. Another thing the group learned was that housing is guaranteed for their first year in *The Carlton Arms* which overlooks Central Park. After a question and answer session, the group was taken on a small walking tour of the campus. The tour was led by two students who are currently in the Combined Plan Program. The group got a chance to see a mechanical engineering laboratory complete with bicycles, gears, pumps, and what appeared to be a giant turbine engine for studying turbo machinery. The entrance way to the lab had a very nice showcase of antique machines. The highlight of the tour was classroom 309 in Havemeyer Hall. This lecture hall is a real show stopper featuring 330 seats, a 40 ft long oak demonstration table, and a 40 ft domed ceiling. One gets a real sense of space and awe standing in this room. The room has been featured in several movies including the Spider-Man series and Ghostbusters. The building itself is a National Historic Chemical Landmark.

During this part of the tour, the group was allowed to ask the tour guides any questions they wished. The group learned that Columbia engineering students spend about 6 hours a day studying. Also, the transition from the affiliated school to Columbia is at first a bit of a shock. One of the tour guides, who did his liberal arts physics education at Albion College in Michigan, noted that he was a top student at his former school but an average student at Columbia. After the tour was over, the group headed back to the #1 train and downtown to Penn station. There the group had a lovely meal of Taco Bell and KFC and recapitulated all of the day's information. The NJ Transit train left the station at 3:25 pm and the group was safely returned to Madison by 4:30 pm. Overall, the fellowship successfully completed their mission, had some tacos, and made some lifelong friendships.

A Conversation With Dr. Petra Sauer

By Melissa Hoffman '13

Dr. Sauer is a Visiting Assistant Professor for 2011-12, and is teaching Phys 1, 2 and associated laboratories. In an interview with her, we learned the following:

What's your background? What schools did you attend for your degrees?
I received my B.S. in biological sciences from Fordham University, and my M.S. and Ph.D. in physics from Stevens Institute of Technology. After getting my Ph.D. I did a post-doc at Texas A&M for three years. I then taught at Bard High School Early College in lower Manhattan. BHSEC is a public high school that is partnered with Bard College. Students attend school for the traditional 4 years (9th-12th) and, if successful, receive both a high school diploma and an associates degree from Bard. The school is based on the idea that many high school students are intellectually capable of taking college classes but need the extra guidance offered in high school. I taught in both the high school and college programs.

What kind of research did you do as a Ph.D. student? What kind of research are you interested in?
My Ph.D. thesis looked at the possibility of building photonic crystals from self-assembling DNA junctions. While this was a theoretical/computational study, I also worked with Nadrian Seeman's (the father of DNA junction technology) DNA nanotechnology group in the chemistry department at NYU where many molecular devices based on these DNA junctions are currently being realized.
My postdoctoral research was also theoretical/computational. I modeled the response of small molecules to laser pulses. The molecules I studied were important in a variety of applications including anthrax detection and molecular electronics.

You teach Phys 1; what kind of students do you get (we're guessing lots of pre-med students?) and how do you like teaching the subject?
I love teaching Physics 1. I was pre-med as an undergraduate; having gone through this intensive program, I really understand what these students are going through. I find it an interesting challenge to make Physics 1 a meaningful and useful course for students who have no intention of continuing in physics and who are primarily taking the course to fulfill a requirement and pass the MCAT.

What do you like better, teaching or research?
While I really enjoyed the challenge of doing research, at the end of the day teaching is what really makes me happy.

Do you see yourself pursuing a tenure track position and what are your long-term goals?
No - when my son is older I plan to return to high school teaching. I love the challenge that teaching this age group presents.

What's been your favorite/least favorite part of working at Drew and in the physics department?
That's an easy question - the opportunity to work with the students here at Drew is my favorite part of the job.

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SPS Pizza Lunch Talks: Fall 2011

By Melissa Hoffman '13

Drew's Society of Physics Students Chapter (SPS) meets every week over a stack of delicious pizza's to view a movie, or hear a physics-related presentation. This semester, we had a variety of films and presentations, though, as usual, the buffalo chicken pizza was always the first pizza to disappear. To start off the semester, DSSI students presented their research from the summer; among them were Ashish Shah, Mark Boos, and myself working with Dr. Murawski, and Danielle Holz, Adam Fanslau, Mary Lamont, and Karina Russ working with Dr. Kouh. After a series of DSSI presentations, SPS moved on to a series of films and movies. Most of the films viewed at SPS are Nova films ranging from "Finding Life Beyond Earth" a film that questions the possibility of life in our solar system and beyond, to "The Next Big Thing" which addressed super-smart cars, eerily human robots, and other up-and-coming technology, to Brian Greene's series "Fabric of the Cosmos" which is a film-adaptation of his new book. SPS also watched the "Measurement of the neutrino velocity with the OPERA detector in the CNGS beam," the official presentation from CERN after the controversial discovery of super speedy neutrinos.

In addition to regular pizza lunches, SPS made a collective attempt to enrich the physics department here at Drew. Under the guidance of our advisor, Dr. Murawski, and the pens of the SPS officers, our chapter applied for the Sigma Pi Sigma Undergraduate Research Award, asking for funding to purchase a radio antenna through NASA's Radio Jove program, which would allow SPS to study Jupiter, the Sun, the galactic center, and other radio sources in the universe. Awards will be made in early January.

SPS's last big event was the Physics Taco Party, Friday, December 9th – the end of the semester holidays & tacos extravaganza, which includes a Santa grab-bag of gadgets and gizmos, quirky science-carols such as "Frosty the Photon", and of course, a seemingly never-ending supply of tacos.

Engineering Expedition to Columbia University

Courtesy of Dr. Robert Murawski

Drew students on steps of Low Memorial Library in front of the iconic bronze statue, Alma Mater.

Drew Group experiencing 309 Havemeyer

Daniel and Nicole in 309 Havemeyer

Howard Hughes Medical Institute (HHMI)

by Dr. Minjoon Kouh

Howard Hughes Medical Institute (HHMI) is a nonprofit medical research organization that plays an important role in promoting biomedical research and science education. In 2008, Drew received one of its prestigious institution-wide grants for enhancing science education and research programs. It has allowed Drew to implement innovative science curricula (such as the Great Challenges in Science courses), hire a new faculty member in biophysics, expand research opportunities for students, and launch pre-college outreach programs.

A number of summer research activities in the physics department have been funded by the HHMI grant. In Dr. Kouh's lab, Mary Lamont '14 used the accelerometers embedded in the Wii remote controllers to analyze a system of coupled oscillators, and Karina Russ '14 worked with computer vision algorithms with the goal of developing motion-tracking software to analyze the videos of neural growth from Dr. Knowles' lab in the biology department.

The HHMI grant also supports a high school bridge program, where a few selected incoming students live on the Drew campus in July and work with science faculty members and upper class students on research projects, getting acquainted with the campus and Drew's science programs. Among them were Mark Boos who worked with Dr. Murawski on an acoustic version of a laser spectroscopy technique know as Ramsey fringes, Danielle Holz who analyzed circular motion with the Wiimote accelerometers, and Adam Fanslau who worked with both Dr. Kouh and Dr. Knowles in analyzing the videos of neural growth.

In addition, the HHMI grant has funded a high school outreach program through which 14 juniors and seniors from neighboring high schools were invited to work with Drew science faculty members. For the physics department, Billy Kennedy (Madison HS) helped to test several introductory physics labs, Matt Hauserman (Madison HS) built a prototype of an inexpensive interactive whiteboard with a Wiimote, and Jordan Matelsky (Roxbury HS) contributed toward the neuron video analysis project with his superb programming skills. Some of the comments on the anonymous exit survey were:

"I loved this experience! It has really helped me understand properly what it means to be a scientist. I really appreciate being given the opportunity!"

"I had a really great time this summer. I couldn't think of a better way to spend my summer."

"I had heard great things about Drew's science department, but this program far surpassed my expectations."

We appreciate HHMI's support that has allowed Drew to expand and strengthen its science program in a variety of new ways.

Sauer…continued from Page 4

You married a physicist, do you think that's a popular thing to do, physicists marrying other physicists?
Dr. Murawski and I met in graduate school and did our post-docs at the same place. I don't know if this is a popular thing to do or not but it has worked out well for us.

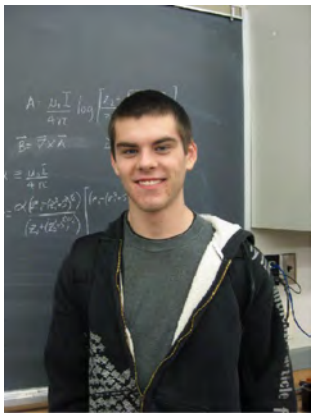
Do you think your son Nicky will grow up to discover the Grand Unified Theory, or at least become a scientist of some sort?
I hope Nicky will grow up to find his own bliss and have the strength and courage to follow it wherever it leads him.

HHMI Experiences — Summer 2011

Mark Boss '15

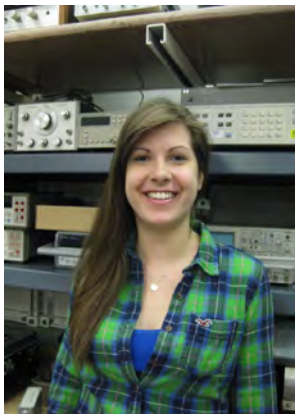
Over the summer I spent my days working with Dr. Murawski on finding the resonance curve of a tuning fork. The process involved taking many measurements and plotting the data using Graphical Analysis. Some of the data came out well, some less so. The sensitivity of the equipment I used was astonishing. I learned that in order to get good results in a lab you must take precautions before starting the experiment. Overall, the program has helped me prepare for my freshman year by gaining experience using some of the department's lab equipment. In addition, it has made me more comfortable with the professors in the physics department.

Adam Fauslau '15



I spent four weeks in the HHMI research program, working with Dr. Knowles for the first two weeks and Dr. Kouh for the second two. With Dr. Knowles and his DSSI group, I learned the basics of neuroscience research. I helped conduct the daily activities of research like plating, and feeding and observing cells. I even got a chance to dissect a fetal rat brain! I then went to Dr. Kouh's group and worked with Karina Russ. I helped her write a computer program used to track the growth of neurons. I really liked being able to work on two very different aspects of an experiment. These two perspectives helped shape my academic plans at Drew. Both working with Dr. Kouh and taking his seminar showed me the interdisciplinary connection between physics, computer science, and neuroscience, and caused me to peruse a new interest. The HHMI research program gave me a valuable experience and helped me refine my academic and career interests.

Danielle Holz '15



The HHMI Bridge Program was a pleasurable and enlightening experience. I worked with Professor Kouh and Mary Lamont on the use of Wiimotes for use in lab experiments. I studied the centripetal acceleration of the Wiimote on a bike wheel. The research on the Wiimote gave me a new outlook on how much physics actually is used in the Wii game system. When I started physics lab in the fall I was already familiar with the programs used like DataStudio and Graphical Analysis from the summer. During the four weeks of the program I was able to build relationships with upperclassmen and with the other freshmen participating in this program. Staying in Hoyt gave me a feel for dorm life which was a new experience to me. We recently had Science Day when Mary and I presented a poster on the Wiimote. At Science Day, I felt included into the Drew science community and I was excited that I was able to contribute.

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HHMI...continued from Page 7

Evan Wiley

I had the opportunity to work under the tutelage of Dr. Kouh this past summer. Our work was centered on developing a computer model of how infants might learn to focus both of their eyes on the same point. The computer model was based on neural networks so that it might be as realistic as possible. It was an interesting challenge to try to make a model that could successfully complete the task it was given while at the same time staying within the limits of what actual neurons are capable of. The model was tested using a simple robot as we felt that a mechanical representation of how well the model worked was more compelling than computer generated data alone. What I most enjoyed about this experience was that I was given a great deal of freedom in my work and that I was able to experiment with many different ideas.

Evan Wiley is a student at Johns Hopkins University. He was working with Dr. Minjoon Kouh during the summer 2011.

Supplee becomes chair…continued from Page 1

"I think students should use wrenches and screwdrivers!" Dr. Supplee expressed his enthusiasm for students working hands-on in a laboratory any chance they can, and he wants to see that opportunity expanded when the new professor arrives.

When I asked Dr. Supplee about new programs and directions, he had four main points that were again molded around the idea of the newer faculty members shaping the department. "Minjoon has only been here 2 and a quarter years; neuro-physics hasn't completely unfolded yet." In addition to Dr. Kouh's science-fusion, other directions and programs include Dr. Murawski's laser lab which started up this summer, a reinvigoration of the 3-2 Engineering program, which has existed at Drew for quite some time, but has been getting more attention lately, and of course, whatever the new professor brings to the department. "I'm not steering," Supplee says, explaining that he takes care of the details allowing the other professors to execute their goals. Of course, being the chair meant that Dr. Supplee had to postpone his own plans so that he can pay full attention to the detail-filled work that a chair must tend to.

I asked Dr. Supplee where he saw the department in the next few years… "I have no clue. Everyone is new. School-wide evolution could affect [the department] along with new faculty… It seems that Drew is changing faster than it used to, so we have to respond quickly." Dr. Supplee pointed out that there are 90 students enrolled in Intro Lab, and that the University has never seen such high numbers in the intro physics lab before.

It was recently revealed that Dr. Supplee has a special connection to this year's Nobel Prize in Physics. The 2011 winner, Adam Reiss, attended the New Jersey Governor's School in the Sciences in 1987. At Gov School, which is housed at Drew University, Reiss took a class on special relativity with Dr. Supplee. Reiss commented on this in the media, so of course I had to ask how cool it was for Dr. Supplee to be credited with planting the seed of curiosity in the most recent Nobel Prize winner. He remarked that as a professor, you are aware that you're saying things that affect students and their motivations but professors often never find out they had such an impact. "It's super cool, especially because we found out about it."

We're excited to see the department grow and change along with Dr. Supplee as our chair, and we wish him the best of luck.

Naphthalene crystal in presence of Argon Ion laser, courtesy of Ashish Shah

Summer

Research

PIX

Whirlpool galaxy from the observatory, courtesy of Melissa Hoffman

GOT PRE-OWNED LAB EQUIPMENT/INSTRUMENTATION??

The department asks that alums remember us and our continuing need for laboratory instrumentation and equipment. If you have a particular item that is no longer useful to you and could find a new home at Drew, we would be very happy to hear from you at any time. While not limited to these, some current needs include:

If you have equipment you would like to donate, please contact:
Dr. Robert K. Murawski
Drew University
Department of Physics
Madison, NJ 07940
E-mail: rmurawsk@drew.edu

General Lab Instrumentation
- Digital scopes
- Function/pulse generators
- Meters

Gas handling – regulators
Microscopes
Optomechanics (e.g. Newport, Thorlabs, etc)
Power Supplies
- High voltage power supplies – 5 to 10 kV (e.g. Bertan)
- Low voltage, general-purpose

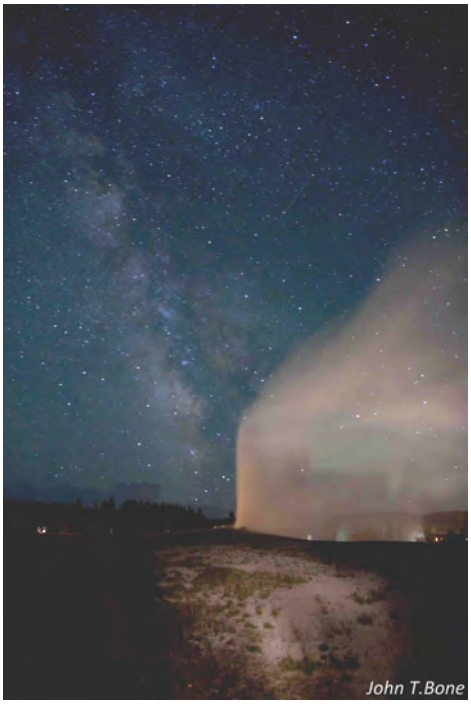
Vacuum pumps – general purpose roughing pumps and diaphragm/oil free pumps (for use with small vacuum ovens)

More specific research equipment:

Electronics – Stanford Research SR280 NIM bin, SR250 Integrator, SR645/535 digital delay
Fiber optic equipment – fiber cleaver, fiber optic switches
LASERS – NdYAG, Argon Ion, Diode-pumped solid state, fiber-coupled, HeNe
Microscope hot stage

Send The Physics Department Your Business Card!

We're very proud of our alums and want to share your paths with current students. Let us know what you are up to and where you are working. Send us your business card for our display. Please send your card or cards to Dr. Robert Murawski, Department of Physics, Drew University, Madison, NJ 07940.



Yellow Stone

By Drew Bryar '12

Congratulations to our very own John Bone, class of 2012, for his honorable mention in a photo contest conducted by *Optics and Photonics News*. John Bone, never without his camera, is our department's resident photographer, and was made aware of this contest by Melissa Hoffman. He chose a picture of the Milky Way over Old Faithful in Yellowstone National Park taken this past summer. One of the judges put it best saying, "the photographer captured an image that made all of its viewers desire to be there with him." For those interested in photography, John has many more to share of the night-sky, advanced lab, many of our physics events, and general photographs of Drew University. They can be seen and/or purchased on his website, http://t-bone-photos.smugmug.com.

Science News

By John T-Bone '12

In Science News…

On September 23rd, 2011 scientists from the CERN and Gran Sasso Laboratories released results from a three year experiment that challenges the fundamental principle that the speed of light is the greatest velocity obtainable. Neutrinos, small low interaction particles, were observed to travel six thousand meters per second faster than the speed of light (three hundred million meters per second). As part of the OPERA experiment, neutrinos were sent from the CERN Laboratory on the French-Swiss border to the Gran Sasso Laboratory in Italy, approximately seven hundred kilometers away. This past October, the experiment was performed again at CERN and confirmed the previous findings. However the researchers remind us that no one experiment is sufficient to overturn fundamental principles of physics. Currently, plans are underway to try and recreate these results at Fermilab, outside of Chicago.

"Why did the neutrino cross the Swiss-Italian border?" and "How many CERN scientists does it take to break physics?" jokes are currently under development.

Earlier this fall, a supernova was visible in the Messier 101 galaxy. Twenty one million years ago, the star, PTF11KLY entered the final stages of its life in an explosive burst of electromagnetic energy, now visible here at earth. Supernovae are rare, but critical to understanding the origins of our own solar system. Sadly, the supernova was not visible at the Drew Observatory, with bad weather, light pollution and the "Drew Weather Control Department" to blame.

Disclaimer: The Drew Weather Control Department is (unfortunately) fictional. Though wouldn't it be nice if we could just call up the right office and ask for a clear sky?

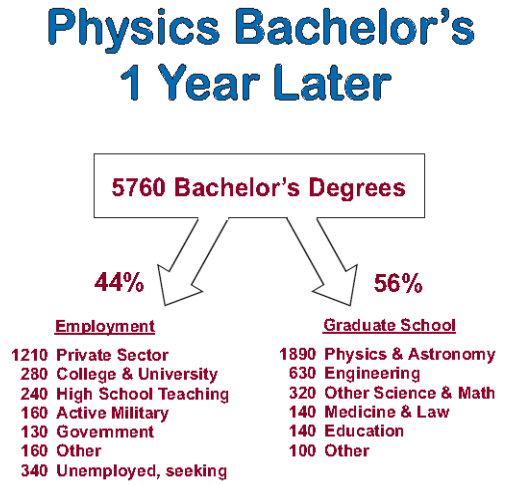
Career Corner...

Is Grad School for You?

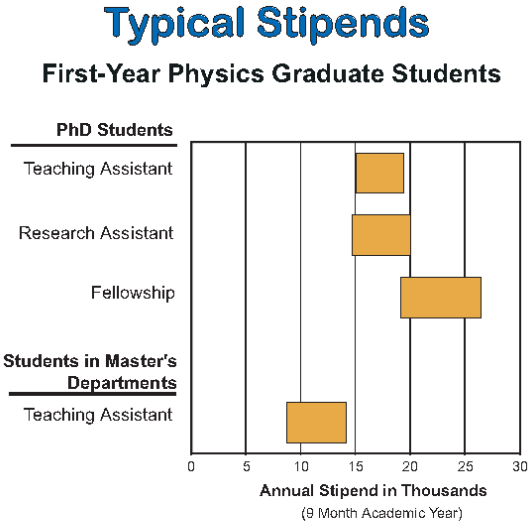
By Dr. Bob Fenstermacher

As physics majors move through their four years at Drew continually pondering the question of what physicists actually do, they observe seniors wrestling with the decision of whether to apply to graduate school. Physics majors are fortunate in that they can apply for graduate education in many different related fields as well as medical school and law school. At Drew most (~75%) physics majors choose to go to graduate school in physics, one of the fields of engineering, education (physics teaching), and occasionally to law or medical school. The remaining majors choose employment among the wide diversity of jobs available to well educated Drew students, armed with strong logical thinking skills, and quantitative skills probably superior to most others in the job market.

Statistics from the American Institute of Physics (AIP) show that 56% of physics majors across the country choose graduate school in fields similar to Drew students. Graduate school in physics is the likely path to a professional physics position in academia at a school like Drew or large research institution, or to a research position in a corporation or government laboratory. A doctoral degree is usually required for these positions, which today can typically take another 5-6 years of graduate work. A masters degree can take 2 years, but often is not the necessary "ticket" for a college or major research career. While you may be thinking that another 5 years in physics classes is insane, it's actually less. Most doctoral programs include about two more years of classes, with advanced courses in topics already familiar to you, e.g.,E&M and quantum mechanics, and probably a few you won't see at Drew. Following these classes, you begin mentored research work which becomes much like having a daily physics research job. This research work will ultimately lead you to a doctoral thesis, making you an expert in your chosen field of work. Remember a Ph.D. is a research degree designed to show that you can accomplish original work. You may or may not continue that specific work in your career going forward.



Source: AIP Statistical Research Center, Initial Employment Survey Classes of 2007 and 2008.



Typical stipends are the middle 50%, i.e., between the 25th and 75th percentiles.

Source: AIP Statistical Research Center, First-year Graduate Student Survey, 2009-10.

One thing you don't have to worry about is paying for your graduate work. Large research universities will cover all your tuition and fees, and pay you a stipend for living expenses. As a teaching assistant you may be expected to teach introductory physics labs; as a research assistant you would begin some research funded by external grants, e.g., from the National Science Foundation. There are also a few prestigious and competitive fellowships available which may require no employment. Possible stipends are shown here from AIP statistics, and Drew students have done at least this well in the past few years. Fellowships as high as $30+K are not impossible.

So consider your future plans carefully. Grad school is available and affordable, but a major commitment. What you are doing right now (courses, research, and internships) can prepare you well. Talk with physics faculty members about your many options.

Rare Venus Transit in June

By Dr. Bob Fenstermacher

Weather permitting on June 5, 2012, we will be witnesses to one of the rarest of astronomical phenomena, a transit of the sun by the planet Venus. A transit occurs when one of the inner planets, Mercury or Venus, passes directly across the face of the sun. Only seven such events have occurred since the discovery of the telescope in the early 1600's, with the last one being observed here at Drew in the early hours of June 8, 2004. Orbital geometry causes such events to occur in pairs either in December or June approximately 8 years apart, and then not for over a century. This is your last shot! Timing for this transit is near sunset rather than sunrise, and so presents a great opportunity for many more to view the event. Drew's Questars with full aperture solar filters will be in operation at the Drew Observatory on June 5, hoping to view and photograph the transit beginning a few minutes after 6 pm. The entire path of Venus across the sun takes over six hours and will continue long after the sun sets for us. So put this on your iPhone calendar for June 5. I hope we see you here.

Venus Transit at Drew Observatory, June 8, 2004

Come visit the Drew Observatory on clear Friday nights

Check out the NEW physics department website at:

http://www.drew.edu/physics

The Dilated Times

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Address Correction Requested

Inside...

Meet the new physics chair, Drew welcomes Dr. Sauer, HHMI and HHMI Summer Research, Engineering Field Trip, Pizza Lunch Events, Notes From the Outside, Science News, Is grad school for you?, Bone wins a prize!

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