The Dilated Times

The newsletter of the Drew University Society of Physics Students

Spring 1998 Volume 8 Number 2 Editors: Zenia Helbig and Jeannine Dempsey

New Physics Course Fulfills Gen. Ed.

This coming fall, the physics department will be offering a new course geared towards non-science majors. The course, entitled "How Things Work", will be taught by Dr. Fenstermacher of the Physics Department, and will fulfill Drew's science general education requirement (Division I). As interest continues, the course will continue to be offered each fall, with Dr. Namiotka alternating with Dr. Fenstermacher as instructor.

"How Things Work" is modeled after a course first offered at the University of Virginia a few years ago. It was designed by UVA's Prof. Louis Bloomfield, who subsequently wrote a textbook to accompany his course. The course became immensely popular among the humanities majors at UVA in a short time, and it is now estimated that up to half of the incoming freshmen at the university use "How Things Work" to fulfill their science requirement.

Oftentimes, nothing is more terrifying to a history or French major than that fateful Division I science and math requirement. Unfortunately, the Drew science departments have not been of much comfort to such students, limiting introductory science courses to Environmental Biology, Introduction to Chemistry, Calculus, and Astronomy. Omitting names, it is enough to say that enough science majors have lost sleep over Calculus to ever recommend such a course to a left-brained friend. And even some physics majors have had a hard time keeping up with Pat Boeshaar in Astronomy. . .

Needless to say, the time has come for another gen. ed. science course (or, as Drew science majors so lovingly refer to them, a new "baby science" course). Although "How Things Work" may not prove to be much easier than the other introductory science courses which Drew offers, it may perhaps prove a bit more interesting. It is intended as a practical introduction to the physics of everyday life, focusing on the operation of objects in our daily environment. Potential objects of study include the roller coaster, musical instruments, automobiles, television, lasers, and nuclear reactors. The course will stress concepts over mathematics, alleviating much heartache among those in the humanities. More importantly, the course will enable students to "play at scientist" and to do as much "experimentation" as possible outside of class to illustrate the concepts they learn.

A poll was recently conducted in Dr. Boeshaar's Astronomy class which consists mostly of students in fields other than science. Surprisingly few of them cared how a light bulb, electric motor, or air conditioner worked. They wanted to understand the "big stuff", nuclear reactors and nuclear weapons in particular. Unfortunately, it is impossible to obtain a comprehensive understanding of the "big stuff" without some sort of working knowledge of the "little (and usually mundane) stuff". Hopefully, however, this new physics course will be able to provide students with enough understanding and enthusiasm to ignite their interest in the rest of nature's workings. Maybe someday, after having exhausted the topic of nuclear reactors, some student may be bored enough to wonder just how a wireless speaker works. Who knows?

The 1997 Nobel Prize In Physics

On March 9, Prof. Raychel Namiotka, the newest member of the Drew Physics Department faculty gave a talk on the 1997 Nobel Prize in Physics. The recipients of the prize--Steven Chu of Stanford University, Claude Cohen-Tannoudji of College de France and Ecole Normale Superieure, and William D. Phillips of the National Institute of Standards and Technology in Maryland--were recognized for their achievements in physics by the Nobel Foundation in Stockholm. Their work consisted of the development of methods to cool and trap neutral atoms with laser light.

The idea of trapping and cooling atoms had existed since the 1970's. Neutral atoms are more difficult to cool and trap than ions because neutral atoms do not feel the effects of electromagnetic fields, as strongly as ions. In 1985 Chu, then working at Bell Laboratories in NJ, succeeded in slowing atoms using six laser beams and cooling them in what became known as "optical molasses". However, the atoms would leak out of the molasses in about a second.

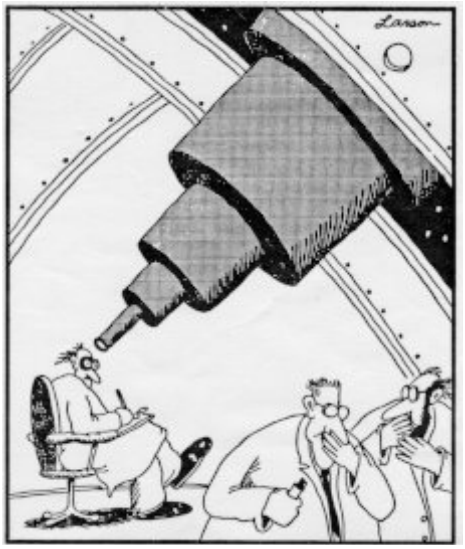
In 1988 Phillips added to Chu's optical molasses by using magnetic fields which affected the internal energy levels of the atoms, causing them to be trapped. Phillips also discovered that the temperature of such a magneto-optical trap could reach a much lower limit than previously expected--as low as 40 microkelvins. Cohen-Tannoudji explained how such deep cooling could take place, theorizing that the cooling occurred because atoms can assume a "dark state" in which they do not react to light. He also showed that the temperature of the atoms could be further dropped.

The cooling and trapping techniques developed by the above-mentioned scientists have been perfected in recent years, leading to the creation of the Bose-Einstein condensate, among other things. The ability to cool atoms using the techniques developed by the three scientists may also lead to several other applications, among them better spectroscopic measurements. This technique may also be used to perfect atomic clocks.

Prof. Namiotka presented a truly enlightening talk, demonstrating her understanding of the research conducted. It is quite a feat for a professor to be able to explain the most current research being conducted in a field to a roomful of undergraduates (most of whom had never heard the terms "atom trapping" and "atom cooling" prior to that afternoon) and to have them leave the lecture having understood most of what occurred in that research.

NEWLY-DECLARED PHYSICS MAJORS:

TRICIA MISSALL	(CLA 01)
CHRIS PERRY	(CLA 00)
NIMEL THEODORE	(CLA 00)
JAMES DAVIDSON	(CLA 00)



Invitation:
Come visit James Davidson in the observatory on Friday nights between 8 and 11.

Becca Gets Published

Just eight months after my summer research at Stevens Institute of Technology with Dr. Supplee ended, the results are being printed in the Journal of Undergraduate Research in Physics (JURP). The research performed was an investigation of the interaction between an atom, and a train of laser pulses. We used the classical case of the Lorenz model atom, and compared our results against results which took quantum mechanical effects into account. We found surprising agreement between the results, even for large pulse areas where it would seem the classical case would not provide satisfactory results.

At the end of April, the article "Effects of a Train of Short Laser Pulses on a Lorentz Model Atom" will be printed in JURP explaining the research and results. This wraps up the presenting portion of my summer research, which I also spoke about in the fall. The entire experience, from last June until now, has been a thoroughly worthwhile experience from which I take many new skills and knowledge.

-Rebecca Fraser

How hot is it in Hell?

(A true story written by an anonymous physicist)

A thermodynamics professor had written a take home exam for his physics students. It had one question: Is Hell exothermic (gives off heat) or endothermic (absorbs heat)? Support your answer with a proof. Most of the students wrote proofs of their beliefs using Boyle's Law (gas cools off when it expands and heats up when it is compressed) or some variant. One student, however, wrote the following:

First, we need to know how the mass of Hell is changing in time. So, we need to know the rate that souls are moving into Hell and the rate at which they are leaving. I think that we can safely assume that, once a soul gets to Hell, it will not leave. Therefore, no souls are leaving. As for how many souls are entering Hell, let's look at the different religions that exist in the world today. Some of these religions state that if you are not a member of their religion, you will go to Hell. Since there are more than one of these religions, we can project that all people and all souls go to Hell. With birth and death rates as they are, we can expect the number of souls in Hell to increase exponentially. Now we look at the rate of change of the volume of Hell, because Boyle's Law states that, in order for the temperature and pressure in Hell to stay the same, the volume of Hell must expand as souls are added. This leaves two possibilities.

1. If Hell is expanding at a slower rate than the rate at which souls are entering Hell, then the temperature and pressure in Hell will increase until all Hell breaks loose.
2. Of course, if Hell is expanding at a rate faster than the rate of increase of souls in Hell, then the temperature and pressure will drop until Hell freezes over.

So which is it? If we accept the postulate given to me by Prof. Omniscient during my freshman year, (that "it will be a cold day in Hell before you graduate with a degree in physics"), and take into account the fact that I still have not succeeded despite seven years as an undergraduate, then possibility #2 cannot be true, and so Hell is exothermic.

The student got the only A. Rumor has it, that A finally allowed him to graduate with his degree in physics...

Notes from the Outside

Greetings from Itta Bena, Mississippi. Yes, I actually live in a place called Itta Bena. It comes from the Choctaw language and means "Home in the Woods." It may sound like "The University in the Forest," but, believe me, it is a world away. Itta Bena is in the heart of the Delta, the poorest region in the country. This flat, desolate area is known for its cotton fields and catfish ponds, as well as for being the birthplace of the Blues. Living here for just a short time makes it easy to see why.

Because of a severe teacher shortage in the Delta, I was quickly able to land a job. I entered Greenwood High School armed only with my Drew diploma and without a hint of teaching experience. Even if I had been trained, though, nothing could have prepared me for what I would encounter.

My formidable task is to teach one class of fairly respectful but somewhat unprepared physics students and five classes of uninterested ninth-grade physical science students. I think that Mrs. Zumwalt, as I am now called, must be something of an enigma to them. My strong Yankee accent and use of strange words like "ohms" and "infrared" prompt such comments as, "Go back to Asia, or wherever it was you came from."

Where literacy is at a low, scientific thinking is as well, and higher order thinking skills are rare and undeveloped. When a ninth grader does not know how to use a ruler, it is impossible to move to those deeper levels. The students face such problems as drugs, poverty, teen pregnancy, and broken homes; so it is difficult for them to see beyond their situation to recognize the need for an education to break the cycle.

When asked how I feel about teaching and the entire experience, I have very mixed emotions. There are occasions when a light bulb goes on or a student asks a question that shows he is thinking, but these rewarding moments are few and far between. More often, it feels like a tug-of –war, with me pulling for education but seldom winning. Despite the difficulty, though, I trust that in some way I am repaying the quality education I received and helping to level the playing field for my students.

Sarah Zumwalt (CLA 97)

Upcoming SPS Events...

Saturday, April 18 …
(12 – 2 PM)
Spring Saturday
(Physics demo table)

Monday, April 20 …
(5:30 PM)
Physics Awards
Banquet

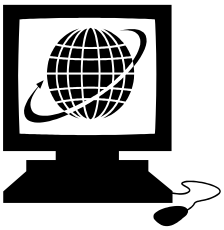
Friday, May 8 …
(3:30 PM)
SPS Spring Picnic
(Dr. F's House)

Summer Internship

This coming summer, junior physics major Bridget Sullivan will be interning at the University of Rhode Island as part of their 1998 Summer Undergraduate Research Fellowship in Oceanography program. This is a eleven week program which offers eight paid positions for science and engineering majors from around the country.

Bridget will be doing research under the guidance of Dr. Isaac Ginis from the department of Numerical Physical Oceanography, whose work consists mostly of modeling hurricanes. Together, Bridget and Dr. Ginis will be working on a coupled ocean atmosphere model. This specific model takes into account the way a hurricane changes the ocean temperature in its predictions of hurricane intensity. The research team will be running real time tests on their model as hurricanes occur throughout the summer.

Dr. Ginis happened to call Bridget while she was home over spring break and invited her to come visit the URI labs. She spent the day with him and had the opportunity to see a lot of the research that is being conducted there. Bridget also managed to secure herself a fellowship position that day. Needless to say, she is very excited and can't wait to begin her work this summer.



Check out the Physics Web Page at:
http://www.drew.edu/cla/depts/phys/phys.html

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inside...

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