

# The Dilated Times

The newsletter of the Drew University Society of Physics Students

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Editor: Elizabeth Bannon

## Paradoxical Professor

Yes...that's right. Professor Jim Supplee is part of an elite group whose members include Euler, Laplace, Lagrange, Stokes, etc.: people who have something named after them. Although Supplee doesn't have his own theorem or equation, he does have his own paradox. Well...he has an apparent paradox. If you don't remember Special Relativity, go refresh your memory. Ready? Ok, good.

Imagine a bullet which, when at rest, is as dense as a lake (neutrally buoyant to be more eloquent). Now if the bullet were to travel at a relativistic velocity through the lake, an observer in the lake would see the bullet's length contract. The bullet's density would increase and therefore sink. But for someone in a reference

frame, for which the bullet is at rest, the lake would become denser and the bullet would float. This is Supplee's Paradox (it is also known as the Submarine Paradox).

Now how exactly did Professor Supplee get his own paradox? While in grad school, Supplee and some of his friends were casually discussing this scenario, but then dropped the subject. A decade or so later, while teaching a course in Special Relativity in the Governor's School at Drew, he remembered this apparent paradox and decided to pursue it further.

Supplee's resolution and methodology proved so controversial that his paper was peer reviewed for 14 months before it was accepted for publication by the *American Journal of Physics* in 1988.

According to Supplee, it is "illegal" to use special relativity in a gravitational field. To avoid this, the lake was accelerating upward with an acceleration  $g$ . An



observer in the lake would see the bullet crash into the lake bottom, as expected. An observer in the bullet's frame would also see the bullet crash into the lake bottom. This is because in the bullet's frame, the lake floor isn't just accelerating upward, it is also curving upwards in front of the bullet. The floor curves upward more quickly than the bullet floats, and the bullet

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## Science at a Crossroad

Sparked by the enthusiasm and commitment of our new president, Robert Weisbuch, the sciences have begun a planning process to lift the level of science at Drew, to better engage the entire Drew community in the sciences, and to ultimately lead the way to a plan for a new facility. Although I feel I may have written these words here more than once before, there is a new feeling of enthusiasm and interest coming from the top that has re-energized this more comprehensive process. The president expounds on the essential place of the sciences in a liberal arts college, and invariably speaks of the arts AND sciences in his speeches and conversation. To back up his words, a six member eminent visiting science committee was invited to Drew last fall for an overview of our operations. Their report to the president

targeted our obvious need for better facilities, and certainly more square feet, but also noted a number of programmatic areas where Drew could improve and excel. They noted the unique elements for doing science at Drew such as the RISE program, the Drew Summer Science Institute (DSSI), and the NJ Governor's School in the Sciences, and suggested ways to integrate these programs more effectively into our operation.

Building on this outside visit, the president appointed a nine member Drew science planning committee which has been meeting steadily since late fall and will present its report to the president in May. The committee has examined the sciences and their place at Drew and will forward a number of suggestions for improving the culture of doing science at Drew campus-wide in areas such as admissions, facilities, and public relations. Some

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## A generous contribution has made chair endowment more affordable!

Thanks to a generous donation by a physics alum, we are now able to offer a discount for chair endowment. A matching program has been established, so for \$100 you can endow a lab chair, forever allowing students to sit on your name! Even better, you can contribute the original \$200 and have two chairs named after you! We thank those that have donated thus far to this worthy cause.

Thanks to the following:  
Ashley Carter; Thomas Zielinski, '04; Len Feldman, '61; Bob Fenstermacher, '63; Barry Fenstermacher, '69; Brad Schoening, '85; Bill Pezzuti, '85; Laura McBride, '08; Steve Gausepohl, '92; A. Christianne Ridge, '96; Chris Kendziora, '88



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Name: \_\_\_\_\_ Year: \_\_\_\_\_

Address: \_\_\_\_\_

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To endow a laboratory chair, send this coupon and a tax-deductible check for \$100 for each chair made out to "Drew University Department of Physics" and mail to:

Dr. Bob Fenstermacher, Department of Physics, Drew University, Madison, NJ 07940

## Say Goodbye to the Girls...Well, most of them

### Unexpected Wonders

"I just want a degree...I don't care about getting to know people...I already have everything I want in life..." This was my mantra when I first came to Drew. I was, it felt like, decades behind where I should be in life. I had a wonderful job in Manhattan, making more money than any one person should. My employer had a tuition reimbursement program and my boyfriend was coming to Drew to study theology. Why not finally finish that degree that had been eluding me since I had graduated high school in 1996.

Flash forward 3 years...how life has changed. That boyfriend has become a husband. The computer science degree that I came to Drew expecting to earn has fallen by the wayside, replaced by the exciting Land of Physics. My fancy NYC job ended two years ago, after a thrilling ultimatum from the management to "choose between a career and an education". And a group of people who were merely professors and fellow students have become friends, even coming to celebrate my wedding.

I never expected to feel so welcome. Instead, I expected people to frown a little at me for being in my mid-20's and degree-less. I thought that the students in my classes would find me more than a little strange for choosing to spend my free time in a classroom, when I really had no need of it other than to mend my pride.

I was never so wrong. Instead, I found that people were interested in what I had to say. My at times asinine jokes were met with giggles instead of the silence that I'd grown used to. (except from Evan Kimberly...tough crowd there!) My professors have never been anything but encouraging, never making me feel as if I may be too old to start a career in physics (a fear that plagues me, truth be known). From Dr. F.'s intro physics class, where on the first exam of the semester I earned the stellar grade of a 42 out of 100, to Dr. Carter struggling this semester to help Megan and me understand the murky world of quantum mechanics, this experience has enriched my life in ways I could never have imagined. I found a family that enjoyed me as I am. Perhaps it's that physics people are all a little weird. We choose to study one of the most intellectually challenging topics possible, even reveling in the difficulty at times.

As I move to graduate, I am looking forward to fantastic changes in my life. My husband and I have decided that we want to spend some time living overseas, so we are moving to Bangalore, India for the next two years. I will be working in a lab in the field of synthetic biology, which is an extension of my REU program last summer. In my final weeks at Drew, I am at home, giving away most of my possessions and packing up the remaining few...finding homes for my animals and preparing for the next big adventure that has become my life.

Elizabeth Bannon, '06

### Truth in Physics

*Supplee on Taylor Series Expansions:*  
"This DOES work. We didn't spend the last 2 1/2 years teaching you the wrong thing as some kind of sick joke."

### Are You Old Enough To Take This Class???

"It's like a regular physics class with a three drink minimum."  
*Tyler, on our Optics class*

**Dave Newby: Should we sabotage their experiment and lie to them?**

**Dr. McGee: No! This isn't med school.**

# Say Goodbye to the Girls...Well, most of them

## Hey, Jackie...The Land of Beef is Calling

Now, while I would never suggest that a physics student not participate in an REU, I do offer a warning: be careful where that REU leads you! Avid readers of The Dilated Times may recall that an East Coast loving vegetarian headed out to Kansas, the furthest west she had ever been in her life, to learn about the field of physics education research. A year later, that same vegetarian has some shocking news: I am returning to the state of the "EAT BEEF" license plates, tornados, and glorified gift shops disguised as Wizard of Oz museums. (I swear, about 20% of trucks have "EAT BEEF" on their front license plate... I'll have to get to work on an "EAT SOY" plate for my Lumina). Jokes aside, I had a wonderful time in the physics department at Kansas State University, and am thrilled to have the chance to work with nationally recognized researchers Dr. N. Sanjay Rebello and Dr. Dean Zollman. I plan to pursue my PhD in physics, with a thesis in physics education research.

As my time at Drew winds down, I realize how much the physics department has changed in my four short years here. Professors have come and gone, and I am very happy I had a chance to work with Dr. Morgus on my independent study this

semester before I leave. Freshmen year Nate and I thought we would be the only physics majors, and then were joined by Christina, Ali, Liz, and Megan. Nate sure got a unique experience as a physics major being the only male in our seminar class! Due to our wonderfully small class sizes, especially in upper level courses like Thermo, Quantum, and A-Lab 2, I feel as though I have had nearly one-on-one attention from all of the faculty. I am very grateful for the time Dr. Carter, Dr. Supplee, and Dr. McGee have spent with me throughout my time at Drew. Dr. Fenstermacher has had to put up with my nervous breakdowns (although the rest of the faculty certainly weren't immune to them), but has always done so with the fatherly attention and assistance I needed.

A few lessons the Drew Physics Department has taught me: 1. If you are working on an optical setup that is about 5 inches big with Dr. McGee, who happens to have a cold, you will have a cold soon as well. 2. If you work in the observatory, you will find a dilemma in your weather-wishes: if it's cloudy, you don't have to work; but if you don't work, your paycheck will be quite depressing! 3. Physics majors can eat a lot of tacos!

Jackie Haynicz, '06

## Confused Freshman Becomes Happy Senior

"You're majoring in what?!" I heard this line from all of my family, friends, and high school teachers once I declared my physics major. All of my life I had been interested in music, theatre, and literature, so this decision clearly came as a surprise to everyone at home, especially my family of artists, history buffs, and literature geeks. To be completely honest, I have always had an interest in science. It was actually one of my best subjects, and I loved my science classes all throughout school – I just hated the idea of becoming a scientist.

I have never known exactly what I wanted to do with my life. At times, there seemed to be too many options to choose a career, and at other times I was so disheartened by the thought of having to make a decision that I didn't want to do anything at all. I entered college planning on majoring in English, but by the end of my freshman year at Drew, I was frustrated and confused: I had taken an English class that I hated but also a physics freshman seminar and an astronomy class that I loved. (And I still didn't know what I wanted to do with my life.) Following the trend of the only classes I enjoyed that year, I decided to register for physics for the following fall.

Physics was much more fun than I ever could have imagined, and although my professor (soon to be advisor) kept telling me that I should become a physics major, I still couldn't reconcile that huge step with the fact that I didn't want to be a scientist. Finally I realized that my major didn't have to be something I wanted to make into a career, nor did it have to be something

at which I was particularly good – it just had to be something I enjoyed. Several people, including my mother (an advisor to many English majors at Lehigh), told me that no matter what major I declared, I would inevitably gain skills that would help me in whatever profession I finally chose.

Honestly I still don't know what I want to do with my life, but I have an exciting opportunity coming up after graduation. For the next few years, I will be teaching English in Japan. Although it may seem like a jump between fields, I was happy to walk into my interview this spring at the Japanese Consulate confident that my major had prepared me very well for the job: above all, I have learned patience, but also persistence, rational and critical thinking, and creativity in problem solving. Thanks to many of my professors in the department, I also now know the value of patient teachers who are able to explain concepts clearly and approach problems in several different ways, and I hope to be able to bring all of these qualities to anything I do in life.

I am grateful for the turn of events that brought me to the physics department and for all of the professors there who helped me through one of the hardest majors at Drew. There were several times when I questioned choosing physics, but I believe I have come out on the other side of the tunnel wiser, stronger, and much better-prepared for whatever career path lies ahead of me. Thank you from the bottom of my heart to the Drew physics department – I could not have imagined a better four years.

Ali Steele, '06

"Total internal reflection. I can't get out! Heeelllllppp meee! Like in that movie, The Fly..."  
Dr. Supplee

"That's very Candiotti of you. Which is a good way to be if you're dividing. Not so good if you're dancing. If this gets in the Dilated Times, the whole class fails!"  
Anonymous

**"The hare population has a positive correlation with the hare populations, cause, you know, they're rabbits."**  
Dr. Candiotti

## Science at a Crossroad

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exciting science initiatives will be offered to build upon and improve current Drew programs, and also to generate new programs that will better connect with and capitalize on our location here in NJ, and mesh with current interests of prospective students. The report will make the case again for new and improved facilities, and with these initiatives demonstrate the enormous creative potential for science expansion at Drew, once the necessary space is available.

The science planning committee expects that its work this year will be a first step in a multipart process for science planning. Work will continue to identify those recommendations for immediate implementation, and to more closely evaluate costs and space requirements for others. If a building is in the future, a year-long planning process must



begin soon.

Meanwhile, as we speak, improvements to our programs are in progress. Funded by federal dollars, planning is almost complete for this summer's major renovation of the third chemistry lab, a biology lab for biochemistry and molecular biology, and the second floor hallways. Physics will convert its demonstration room into a second laser laboratory for Professor Laurie Morgus to begin her research work at Drew this fall. For physics, this is a domino process which will result in a significant reconfiguration of our central storage area to achieve more efficient use of that space for storage and demo setup. Once again, it will be a busy summer with construction and chaos, but for a good cause – more opportunities for both student and faculty member research!

Dr. Bob Fenstermacher

## Supplee's Paradox

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crashes right into the floor. With the use of the Lorentz transformation, Supplee then showed that the bullet impacts the same point on the floor in both frames.

So what happened next? Well, for the next 15 years, nothing. This 'edgy' paper caused no stir, not even a 'what were you thinking, Supplee?' phone call. That is until 2003 when George E. A. Matsas of the Instituto de Física Teórica in Brazil tackled this 'submarine paradox' in the context of general relativity. (Matsas article was published in *The Physical Review* after only 2 months of peer review). This spurned a great deal of interest, and Supplee was even interviewed by the Wall Street Journal. Although Matsas' paper was responsible for the attention, his name was not attached to the Wikipedia article on the paradox. Matsas did not feel slighted, in fact, he firmly believes that it is Supplee's Paradox. So feel free to ask for Supplee's autograph, particularly on exam day.

Paul-Michael Huseman '07

## Win a Physics Department T-Shirt!

Last semester, we had NO takers! So we'll try one last time, before we retire the "Win a Physics Department T-Shirt!" contest. PROVE that you have what it takes! Solve the problem correctly, and you'll be entered to win a physics t-shirt!!! Winner and answer will be published in the fall. This semester's problem is from Serway, our intro physics text book. Good luck!



A motorist drives north for 35.0 min at 85.0 km/h and then stops for 15.0 min. He then continues north, traveling at 130 km in 2.00 h. (a) What is his total displacement? (b) What is his average velocity?

*Rules: One winner will be picked at random from correct submissions. Students, whether past, present or future, are encouraged to submit solutions. Send answers to Dilated Times T-Shirt Contest, c/o Dr. Robert Fenstermacher, Drew University, Madison, NJ 07940.*

## SPS 2006 Election Results!!!

President – Paul-Michael Huseman  
Vice President — Dave Newby  
Activities Coordinator – Tyler Drake  
Newsletter Editor – Ethan Marsh

## This Chick Can Follow Instruction!

"Put your pencils down. Don't write this down, and don't tell anyone that I told you."

*I can't tell you the rest, I had to put my pencil down and now I don't remember what he said. (Toni York)*

## Who Said Physicists Don't Party

"Wow, Andromeda is heading towards us? Do they tell you to duck? That's gonna be a party! 1999 was nothing compared to this!"

*On Mak's revelation that Andromeda and the Milky Way are heading towards each other.*

## The Start of a Great Summer: REU Plans

### Ethan & Dave: Friends Forever

This summer, fellow Drew physics major Dave Newby and I will be spending 10 weeks at Lehigh University participating in a summer research program. Our participation in the program is funded through Drew, which has been conducting research in cooperation with Lehigh and other schools in the field of photorefractive non-linear optics for several years. Although I do not know all the details of what I will be working on, one of my tasks will likely be to construct a prism coupling device, much like the one Evan Smith and I have been building in Dr. McGee's lab this semester.

Although the details of how a prism coupler works are somewhat complicated magical sounding (it involves something called the evanescent wave), basically it

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## Did I hear you correctly?

*Dr Supplee: "Which is bigger, E or B?"*

*Elizabeth: "Yeeeeeeees."*



# Notes From the Outside

## Physics at Brothers College in the 1940's



When I first came to Drew in 1945 World War II was in full swing, and many temporary arrangements were in place on the campus to aid the war effort. The Navy V-12 program was much in evidence and we under-age young men who joined in that year were not in the main stream of activities. There was a stream of studies for engineering (!) which I joined most enthusiastically – for just one year!

Then clearly engineering faded and physics became my passion – the best decision I ever made in those days. Because of the war effort all our professors were either older or had some disability for military service. What luck for physics and math.

I cannot imagine better persons than Prof. Marshall Harrington, Prof. Bernard Greenspan and Prof. Isaac Batin. They were inspirational not only in their knowledge but in their teaching and encouragement. They have been my role models throughout my scientific career.

My start in physics was a sensation for me – the equations and math worked. I could actually solve problems (which were many and challenging) and the lab experiments WORKED! I only later realized the enormous planning and insights that made that happen.

Sure, we had antique equipment by today's standards, but it was state-of-the-art then, as I later came to appreciate. Electron tubes, sliding-arm rheostats, little moving-coil electrical meters, beam-balances with little weights (shades of chemistry) and meter-sticks and calipers. But how exciting to discover that the neat equations of Newton actually worked when ball-bearings were sent down tracks and timed. I have NEVER forgotten the thrill of those early labs and the care our instructors (often our seniors) had in guiding us.

Well, on moving to "Major" status the classrooms and classes were in those days unique. Majors were SCARCE and often the advanced classes in physics had only 2 or 3 students, and we met in Prof. Harrington's office in Brothers Hall. More like a British University tutorial – there was no hiding place in those classes. And we used the BEST texts available – I still have my optics text ("Jenkins and White") marked "Brothers College 1948"! We of necessity were nearly always directly involved in question-and-answer situations.

What super preparation this was for graduate school at Johns Hopkins, where nearly all the examinations were oral examinations, one-on-one with professors. I've used this method

with two generations of graduate students in India, with great success.

And the advanced labs were heaven. We were (all 2 or 3 of us) given a lot of freedom to set up our equipment as we saw fit. And the excitement of actually measuring  $e/m$  for electrons using Helmholtz coils, and measuring the electronic charge by Milliken oil-drops was unforgettable. Our introduction to optics and spectroscopy was fundamental as Prof. Harrington had at

Princeton been involved in much work of that sort. In those days I never imagined that optics would eventually become my "thing".

Nuclear physics was a great mystery to us – remember the positron had just recently been "discovered" – and when the fission bomb was revealed there was of course an enormous stir in the physics department. We excitedly simulated the explosion by arranging about 100 mousetraps (set) on a lab table – CAREFULLY setting

two corks on each – covering the array with a large cardboard box – and dropping ONE cork through a hole in the top of the box. The resulting "explosion" was very satisfying to our adolescent selves, but I'm afraid not very revealing of nuclear properties! The chemistry department always wondered where all their small corks had vanished.

Our freedom! We had access to the library of course, but also to the labs and the small workshop – without instruction and at any time of day or night. The night watchmen became very familiar with our late presence. The faculty trusted us – what a gift to our self-esteem and sense of responsibility.

Gosh, as I've "plowed the fields of memory" for these notes I've been rewarded by turning up recollections ever more precious to me as I realize the great start that "Physics at Drew" was for my life, and how indelible were the patterns that were shown to me there. I am sure, from reading your publications, that these traditions are alive and well today. Your equipment may be a lot more modern, you may use computers instead of my trusty log-log-decitrig sliderule – but if the adventure of physics is still alive for you then you are headed for a life of great expectations.

And I'm SURE you will always appreciate the start you had at Drew.

An exercise for the student: If you want a glimpse into Physics in the 1940's, try to find the book "Modern Physics" by R.B. Lindsay. It will open your eyes to the "excitement yet to come" by reading what was known in those days.

Dr. Richard P. Riesz, '49



# Einstein and Planck: Enduring Friends

The spring semester of every even year I get to teach a course listed as History 57: The History of Physics in the 20th Century. It's a course I thoroughly enjoy teaching for a variety of reasons, not the least of which is that I am reminded of the richness of the history of science, often by papers I ask the students to write. This semester one of the assignments was to write about the professional and personal relationship between Max Planck and Albert Einstein. In the process the students learned some fascinating facts about the two men. Here are a few examples.

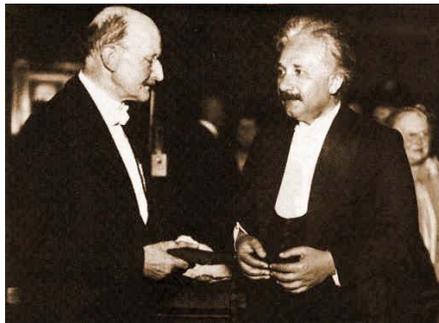
Planck's great contribution to physics was his discovery in 1900 that in order to explain the observed spectrum of black-body radiation, he had to assume that the interaction of electromagnetic radiation with the cavity walls occurred in discrete quanta of energy. This made Planck decidedly uncomfortable because he, as a member of the "old school" of physics, believed firmly in Maxwell's wave theory of radiation. In attempting to reconcile his radiation law with classical electrodynamics, Planck suggested that  $E = nh\nu$ , where  $n$  is an integer, simply referred to the total energy of the oscillators in the cavity walls.

Einstein felt no such inhibition. In the first of the five papers he produced during his "miracle year" of 1905, he respectfully acknowledged Planck's work but took an entirely different approach, boldly stating that light behaves "as if it consisted of mutually independent energy quanta," and

going on to give a beautifully simple explanation of the photoelectric effect. Einstein said, "I regard my paper on radiation and the energetic properties of light as very revolutionary."

For Planck, however, the quantum discontinuity did not merit serious consideration. In a letter of recommendation that he wrote on behalf of Einstein, he said "... in his hypotheses on light quanta, he may have gone overboard in his speculations."

Now consider this. Planck was co-editor of the *Annalen der Physik*, the jour-



nal to which Einstein submitted his 1905 papers. Einstein was then a 26-year old unknown, with no connection to a university and no significant published papers to his credit. Yet Planck agreed to the publication of four of the five papers the year they were written and one the following year. Two of the five were on the special theory of relativity, which Planck regarded as truly revolutionary and went on to draw attention to. Meanwhile, Einstein dismissed his relativity theory as merely "a careful reformulation of classical physics." How ironic it is that despite their

obvious mutual respect, the two men disagreed totally about the significance of their own and each other's work!

Planck and Einstein were quite different in background and personality. Planck, 20 years older than Einstein, was considered "rightist and elitist;" Einstein was "leftist and humanitarian." Planck had a strong attachment to his country; Einstein didn't belong to it, having given up his German citizenship when he was young. Yet they became close friends. Planck brought Einstein to Berlin in 1914, giving him a prestigious academic position and election to the illustrious Prussian Academy of Sciences. Their 19 years together in Germany were filled with good times. Their enjoyment included musical evenings, with Planck playing the piano and Einstein the violin.

Some historians characterize Planck as a "father figure" to Einstein. Whether or not that's true, it is certain that Einstein revered Planck. In a letter of condolence to Planck's widow following Planck's death in 1946, Einstein wrote,

"The hours I was permitted to spend at your house, and the many conversations which I conducted face to face with that wonderful man, will remain among my most beautiful recollections for the rest of my life."

Physics is a human endeavor. In our history course we are learning how very human the great contributors were.

Dr. Ashley Carter

## Ethan & Dave

*(Continued from page 4)*

is a device that uses prisms to 'couple' a laser beam into and out of waveguide. By examining the output beam, various properties of the waveguide, including thickness and the propagation constants of the observable modes, can be determined. If our experiences with our prism coupler are any indication, this summer promises to be fun, challenging, and extremely kludgy.

Ethan Marsh, 07

## The Best Lab Partner in the World

A week after the end of this semester, I will be going to Wisconsin for a

week-long trip with Liz Bendler (Editor's Note: Uh, Dave? It's Bannon now.) and Dr. McGee. There we will be assisting chemists at the University of Wisconsin to set up and begin operating an apparatus for measuring the electro-optic coefficient of polymer films.

From May 30th to August 4th, I will be at Lehigh along with Ethan Marsh and Dr. McGee for an REU program dealing with nonlinear optics. It will be exciting to not only continue studying what I've already started in independent study, but to learn more about nonlinear optics and gain exposure to a number of other experiments in the field. I'll report back in

the Fall about how my long, physics-filled summer went.

Dave Newby '08

## Look Out! Paul is BACK!!!

This summer I am going to participate in the Drew Summer Science Institute (DSSI), continuing work on my independent study with Professor Supplee. This semester our work has focused on a simple harmonic oscillator being driven by two sinusoidal pulses. We are primarily interested in how the energy delivered to the oscillator changes as we vary several parameters, e.g. the duration of each

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# Busy Professors Make For Better Classes

## The Summer Plans of Morgus & McGee

### Dr. Morgus Establishes Her New Lab

As summer approaches, I am looking forward to the opportunity to once again do research full-time instead of splitting my time between teaching, research, and grant proposal writing. Unfortunately, as my first year at Drew comes to an end, there will be little time to unwind and reflect upon the experiences of the last year, for I will be headed to Knoxville, Tennessee right after I administer my final exam in order to attend the annual meeting of the Division of Atomic, Molecular, and Optical Physics (DAMOP). At the conference, I will be co-presenting three posters, two of which stem from the molecular physics research on NaK (sodium-potassium) that I did as a graduate student, whereas the third one deals with an atomic project involving Cs that my husband, my dissertation advisor, and I initiated last April and have been working on during weekends and holidays throughout this past academic year.

After returning from the conference, I will be commuting to Lehigh University for 10 weeks to do some research in the lab where I conducted my Ph.D. experiments. Tyler Drake will be working with me, my dissertation advisor, my husband (whose first name also happens to be Tyler, which should make things interesting), and the other members of the AMO (atomic, molecular, and optical physics) group through his participation in Lehigh's annual Research Experiences for Undergraduates (REU) program. I'm hopeful that Tyler enjoys his experience at

Lehigh as much as I did as an undergraduate. It's a great opportunity to get to meet physics majors from all around the country. In fact, I still keep in touch with a couple of people that I met through my REU experiences!

Back at Drew, the physics demonstration prep room (next to S-244) is scheduled to be totally revamped into a laboratory space. The large optical table, which is currently in the back of the electronics/advanced lab space, will be moved into the lab once the renovations are completed. Come September, the room will look completely different and be ready to set up some experiments.

In addition to the conference and making progress on some research projects, I also plan to spend some time writing up the results on the Cs experiment mentioned above so that we can submit them for publication. Lastly, I will spend a couple of weeks preparing my courses for the fall semester. In addition to the algebra based introductory physics class and introductory physics lab section that I taught this past year, I will also be teaching the modern physics course.

Amidst everything else, my husband and I do have plans for a little bit of fun. We'll be spending 10 days out west visiting my in-laws and doing some hiking. I'm also sure there will also be several trips to the Hershey, PA area to visit my niece who was born just this past November.

Dr. Laurie Morgus

### Dr. McGee Keeps Working in His Old Lab

We are looking forward to another busy summer in the Drew laser and photonics laboratory. This is the first of three summers funded by our National Science Foundation materials research grant to identify novel materials with potential for applications in telecommunications and integrated optical circuits. At one end of the research spectrum we will be looking at very basic material properties, such as refractive index variability under an applied voltage. Other techniques will involve measurements of optical absorption, second harmonic generation, and photodegradation resistance. At the other end of the spectrum, we want to explore new ways of making optical integrated circuits. Can they be printed, like the lines of ink from an ink-jet printer? Or, following another approach, can they be directly written using a scanning laser beam?

We'll start the summer by picking up on the Spring 2006 Independent Study projects of Elizabeth Bendler, David Newby, Ethan Marsh, and Evan Smith. We'll also be working closely with students and faculty at Lehigh University, Johns Hopkins, and University of Wisconsin. Drew physics majors Ethan Marsh and David Newby will spend ten weeks at Lehigh working with recent Drew grad Nate Woodward on building an experiment to write 2-micron wide optical waveguides into lithium niobate using a high power laser appropriately named "The Sabre". They will also construct laser experiments designed to generate second harmonic optical signals in novel organic polymers.

Leading the materials synthesis effort is Drew chemistry major Justin Mykietin. He will spend the summer at the Univer-

sity of Wisconsin Nanoscale Science and Engineering Center (NSEC). At NSEC, Justin will work with Dr. Padma Gopalan on the synthesis of fluorinated polymers, which have the potential to transmit light with exceptionally low absorption. At Johns Hopkins, Dr. Howard Katz will be working with materials science undergraduates Jennifer Bai and Vanessa Velasquez on the synthesis of dendritic electro-optic polymers, which have the potential to offer improved thermal stability over more conventional polymers such as methacrylates.

Perhaps the most exciting part of all this is the interaction among the various groups. In late May, Dave and Elizabeth will spend a week at the Wisconsin NSEC working with Dr. Gopalan's graduate students on setting up electro-optic characterization experiments similar to those built here at Drew. The setup will be used to screen materials for further development, which will then be sent to Drew for detailed analysis by Dave and Ethan periodically during the summer. In mid-summer Dave, Ethan, and Justin will visit Dr. Katz's team at Johns Hopkins to learn techniques of thin-film fabrication. This will be followed by a visit from Dr. Katz's team to Drew, where Dave and Ethan will characterize the electro-optic behavior of the JHU materials.

We are very excited about continuing these projects through the 2006-07 academic year and we are always looking for motivated physics and chemistry majors to join our team. If you're interested, stop by the lab and see what all the excitement is about.

Dr. Dave McGee

## Look Out! Paul is BACK!!!

*(Continued from page 6)*

pulse, the spacing between pulses, the driving frequency, etc.

For this summer, we will be studying the similarities and differences of this classical system versus a semi-classical model: a 2-level quantum atom being hit by two pulses of light. This research will require quantum theory in order to analyze the response of the atom. The model we will be using is semi-classical, however, because we will consider each pulse of light to be a wave, not as a series of photons. We will, as with the classical case, study how the energy delivered to the atom changes as we vary the analogous parameters.

The investigation of the similarities and differences between these two systems will become the basis for the honors thesis that I am planning on writing in the '06-07 academic year, for which Professor Supplee will be my advisor.

Paul-Michael Huseman, '07

### *Congratulations...*

*to the following new members of ΣΠΣ!!!*

Elizabeth Bendler, Tyler Drake, Paul-Michael Huseman, Rebecca Keith, Ethan Marsh, Dr. Laurie Morgus, Evan Smith, Toni York

## *Upcoming Events*

### **April 22: Spring Saturday**

Come see nifty demos!

### **April 26: End of Year Banquet**

Phood and Phun with Physics! Also, we'll be inducting new members into ΣΠΣ

### **May 8: Spring picnic**

We'll head back to Dr. F.'s house for more food! Good times, good times!

### **May 20: Graduation! Woo hoo!**

'Nuff said...

Don't forget to visit the physics department website at:

**<http://depts.drew.edu/phys/>**

# The Dilated Times

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*Address Correction Requested*

### **inside...**

Sinking (or rising??) bullets, the future of science at Drew University, Goodbyes from Ali, Jackie and Liz, and much, much more!!

### **Contributors...**

Elizabeth Bannon, Dr. Ashley Carter, Dr. Robert Fenstermacher, Jackie Haynicz, Paul-Michael Huseman, Ethan Marsh, Dr. Dave McGee, Dr. Laurie Morgus, Dave Newby, Dr. Richard P. Riesz, Ali Steele

