

The Year of Physics

...But doesn't physics happen all the time?

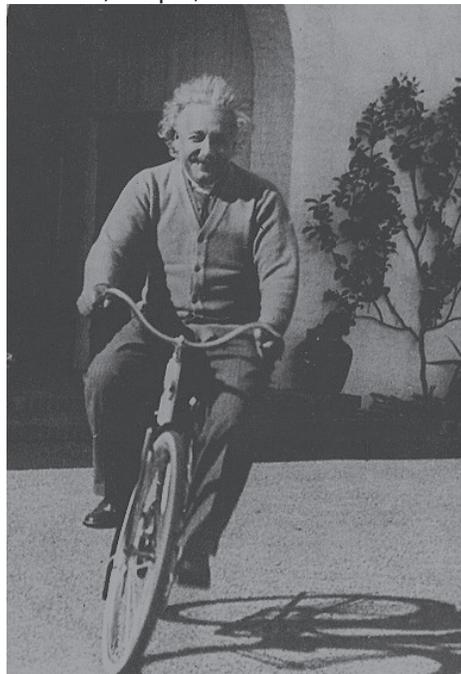
..... by Linda Watson

Happy New Year! UP welcomes you back to another exciting semester of physics. With 2005 marking the hundredth anniversary of Albert Einstein's marathon year of pivotal papers, we want to make sure everyone takes note of his accomplishments at the start of the Year of Physics. Along with UP, the European Physical Society, the International Union of Pure and Applied Physics and even the United Nations back this year of celebration.

Einstein wrote five papers in 1905: "On a Heuristic Viewpoint Concerning the Production and Transformation of Light" (the photoelectric effect) in March, "A New Determination of Molecular Dimensions" (his doctoral dissertation at the University of Zurich) in April, "On the Motion of Small

pressed to reach the scope of Einstein's studies and influences (by age 26 at least), I thought that simply publishing five papers in one year was rather astonishing. So, I checked up on some of the physics faculty here at UF to see what the normal publishing rate is. It seems as though the average is about two papers per year, but I did find one with his name on six papers in a single year. Most impressive!

Einstein received the 1921 Nobel Prize in Physics for his photoelectric effect paper, but even the presentation speech of this award noted the well-known "theory in question" of relativity and also remarked on the influence of Einstein's Brownian motion paper.



Particles Suspended in Liquids at Rest Required by the Molecular-Kinetic Theory of Heat" (Brownian Motion) in May, "On the Electrodynamics of Moving Bodies" (special relativity) in June, and "Does the Inertia of a Body Depend on its Energy Content? ($E=mc^2$)" in September. Phew, well, the titles seem amazing enough to me. While we'll all be more than hard-

To get you into the Einstein mood, I will share a few quotes from him. While I cannot give full credence to these being direct quotations, there seems to be general agreement.

To anyone who felt a little drained after finals last semester: "One had to cram all this stuff into one's mind for the examinations, whether one liked it or not. This coercion had such a deterring effect on me that, after I had passed the final examination, I found the consideration of any scientific problems distasteful to me for an entire year."

Or perhaps, "Imagination is more important than knowledge."

For some advice and inspiration for your semester:

"Everything should be made as simple as possible, but not simpler."

And, "The significant problems we face cannot be solved at the same level of thinking we were at when we created them."

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who we are

UP is a monthly undergraduate physics newsletter sponsored by the University of Florida's chapter of the Society of Physics Students, for students, by students. We seek to strengthen the undergraduate physics community at the University of Florida by providing a forum for undergraduates to share their views and experiences with each other and acting as a source of information for opportunities and events in physics.

December ROFU Presentations - Theory!

.....by Amruta Deshpande

Continuing the mission of opening students' eyes to current physics research, on Monday, December 6th, SPS hosted another session of ROFU presentations. Speakers this time were theorists Drs. Peter Hirschfeld, Richard Woodard, and Alan Dorsey. For the readers who are clueless right now, ROFU stands for Research Opportunities For Undergrads. ROFU presentations are talks given almost on a monthly basis by faculty at UF who are either searching for undergraduate research assistants or simply want to let students have a taste of the scintillating research that gets them up in the mornings. Such were the enthusiasts who shared a few words on Monday.

Solid state theorist, Dr. Peter Hirschfeld began with his presentation on High T_c Superconductivity. T_c is the critical temperature below which substances become superconductors. In the past, this number hovered around 23 K. Today, High T_c refers to temperatures of about 100 K. Images of these materials, taken by a scanning tunneling microscope (which is a fantastic device on its own), reveal some defects in the material that appear without any particular order. Dr. Hirschfeld is interested in studying these defects and seeing what information can be gained by understanding ripple effects created by them. He is also interested in exploring the nature of disorder in the materials/systems

with which he works. Is the observed disorder intrinsic, or is it driven by natural disorder? Students interested in working with Dr. Hirschfeld would numerically solve equations of superconductivity and also help investigate how one can understand experiments conducted with Scanning Tunneling Microscopes.

"Listen to us when we tell you about Lagrangians," warned Dr. Woodard as he took the torch from Dr. Hirschfeld. In astrophysics theory, Lagrangians are a fundamental tool for decoding mysteries of the cosmos. On the chalk board, Dr. Woodard presented a series of formulas, equations, and symbols that looked like an alien language in which commas were a type of operation. Except it wasn't an alien language, and theorists today can recite these formulas like I was supposed to be able to recite my multiplication tables in fourth grade. Past all this strangeness and unfamiliarity is one big advantage: the knowledge that you are investigating the field that made most of us physicists. And while most of what he displayed looked foreign, Dr. Woodard assured that on large scales, the universe is simple. It is composed of only four things that consist of energy and matter. He advises interested students to study hard and go to good schools. This is a tough field, but incredibly rewarding.

For the home stretch, Dr. Alan Dorsey, who is "department chair by day and

physicist when [he] thinks of waking in the morning", presented his research in solid state theory. His primary work is in a field referred to with more than one name including soft matter physics and correlated electron physics. He works with electron gases and examines their particle interactions. Different force interactions dominate on different length scales. He is working to determine the nature of the gas at length scales when both interactions are competing to dominate. He presented experiments conducted with ferrofluids, fluids with magnetic properties. When a dot of ferrofluid is placed in a thin sheet of nonmagnetic fluid and a magnetic field is applied, the entire system rearranges in an anisotropy as the ferrofluid flows in reaction to the magnetic field. Theoretical calculations for these systems include developing correlations.

Before the talks officially ended, Dr. Dorsey encouraged students to look into doing research with professors here at UF and to look into the summer REU programs. Afterward, wide-eyed students recalled the upcoming exams the following week, and the room cleared faster than it had filled. A few still remained in discussion with the professors to find out more about their research. As for the rest, exams or no exams - pizza, drinks, and entertaining physics research lectures made for time well spent.

Professor Spotlight

Peter Hirschfeld

by Rahawa Haile

This month, UP interviewed Dr. Peter Hirschfeld. He taught Quantum Mechanics 1 last semester and will be teaching Quantum Mechanics 2 this semester.

UP: Operating system of choice?

H: I'm not a Linux person, but at least I'm embarrassed because of this.

UP: Why physics?

H: Family was into physics, and interest was gained through them.

UP: What did you do after undergrad?

H: I didn't follow what one would call a standard career path. I taught at Benedictine High School in New Jersey and proudly purchased their first batch of Apple 2E's. I was unsure as to whether I wanted to go to grad school, but decided upon it



since I'd no desire to teach the same things over and over again. Though I didn't get in at first, I improved my GRE score and was accepted afterwards.

UP: Why quantum?

H: I was bored with 2 years of Mechanics and E&M, and I almost became a history major but was given the advice, "Hang in there until quantum if you're bored, and you'll never regret it." This proved to be true.

UP: Will there be a significant difference in the workload required for Quantum 2 versus Quantum 1?

H: It should be about the same. The same amount of time will be needed

as before, but we'll deal with the more sophisticated aspects of quantum mechanics.

Additionally, Dr. Hirschfeld intends to cover quantum computing this term and is set on learning as much about it as possible. His message to his quantum students is that Perturbation Theory and Scattering Theory are more profound and interesting than they initially sound. Also, students enrolled in Quantum 2 should note that the class requires a term paper of roughly 10 pages and is not for the faint of heart.

Finally, Dr. Hirschfeld is also interested in undergrads who've had quantum, know about programming, and who seek to work on a research project. For more information on the project, email Dr. Hirschfeld at pjh@phys.ufl.edu or visit his website at <http://www.phys.ufl.edu/~pjh/>

Fourth Annual Steinway Piano Festival
1/6-1/11

Internationally acclaimed pianist and conductor Philippe Entremont is among the distinguished musicians who will teach masterclasses and lecture. Current UF students and alumni, well-known pianists, and young artists from around the world participate in five days of intensive piano study and performances. The masterclasses will be taught by Entremont, Nelson Delle-Vigne Fabbri Boaz Sharon, and Jean-Michel Damase. Public welcome to attend. For details, go to: <http://www.arts.ufl.edu/news.asp#item0>

Curtis Phillips Center for the Performing Arts

Located next to the Harn Museum of Art and Florida Museum of Natural History on Hull Road. Variety of performances. Student and rush rickets (if available) are only \$10! Refer to the events calendar on the website to see what else is coming up. Below are a couple sample events in January:

1/13 – 7:30 PM

Opera Verdi Europa performs Bizet's Carmen. French with English supertitles.

1/23 – 7:30 PM

Aquila Theater Company performs Shakespeare's Twelfth Night

Box office phone: 352-392-ARTS (2787)
<http://www.performingarts.ufl.edu>

Dine with the Dean

There is such a thing as a free lunch! Each month a group of students is invited to lunch with Dr. Gene Zdziarski, the Dean of Students. The purpose of the program is to provide students with an opportunity to meet with the Dean and talk about student issues and concerns over an informal lunch. To have your name added to the invitation list, send your name and UFID# to dine@dso.ufl.edu <http://www.dso.ufl.edu/dine>

National Science Foundation Research Experiences for Undergraduates

Research opportunities for undergraduates funded by the NSF. Research areas and deadlines vary by site. Typical applications require form, personal statement, letters of reference, and transcript.
<http://www.nsf.gov/home/crssprgm/reu>
Note: The UF department is hosting a 10-week REU program for summer 2005. Deadline is 2/15. <http://www.phys.ufl.edu/REU>

University Scholars Program

Opportunity for students to do research with professors at the University of Florida. Scholars will publish their work in the

Journal of Undergraduate Research and present at the USP Symposium. Requires student to find a faculty member to work with and submit summary of proposed research project along with letter of support from faculty mentor.
<http://www.scholars.ufl.edu>
Award: \$2500 stipend, possible additional grant for research support i.e. travel to conferences to present research
Deadline: TBA

CLAS Scholarship

A general scholarship for students in the College of Liberal Arts and Sciences. Requires application form and 500-600 word essay (no resumé or references).
<http://web.clas.ufl.edu/scholarships/clas.html>
Award: \$1000

Deadline: 2/1 – 5:00 PM

University Women's Club Scholarship

Scholarship to honor wives of past presidents of UF and distinguished campus leaders. Applicants must have junior or senior status, minimum 3.6 GPA, and participate in campus/community activities. Requires application form, personal statement, two letters of reference, community service letter, official transcript. Note: women and men both eligible. <http://www.dso.ufl.edu/scholarships/uwc>
Award: \$1500
Deadline: TBA

The Hitchhiker's Guide to the Galaxy

by Katherine Keller

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This is the hilarious tale of the adventures of Arthur Dent, previously a perfectly normal Englishman. However, when the Earth is destroyed to make way for a galactic highway, he finds himself stuck in outer space without a home, or planet, to return to. Rescued by Ford Prefect, an alien from the planet Betelgeuse who has been stuck on Earth for the past fifteen years, Arthur gets a crash course on survival in the universe that brings new meaning to the term "survival of the fittest." In fact, Ford Prefect turns out to be a traveling researcher for that intergalactic bestseller *The Hitchhiker's Guide to the Galaxy* and is therefore able to provide Arthur with all sorts of important advice, like why one should always carry a towel. The renegade president of the galaxy Zaphod Beeblebrox, the president's Earthling girlfriend Trillion, and the eternally depressed robot Marvin soon join them. Together these five find that in our messed up universe anything can happen, especially when you're traveling with an Improbability Drive.

The Hitchhiker's Guide to the Galaxy holds the answers to many important questions like: Where do ballpoint pens really come from? What is the answer to the ultimate question of life, the universe, and everything? And just how smart are dolphins?

This book is full of witty, sarcastic humor that will leave you rolling on the floor with laughter and wanting more. And you will be in luck because *The Hitchhiker's Guide to the Galaxy* is an incorrectly named trilogy of five books. I, myself, am already starting on the third.

Events & Opportunities

Department Christmas Party

.....by Amruta Deshpande

We've all seen the New Physics Building Lobby chock full of tables and chairs and wondered what was all the ado. Friday, December 17th, the tables and chairs were back, this time adorned with holly leaves and festive hues. The ado was the annual department Christmas party. As every year, the lobby rocked with Christmas tunes heard softly over busy chatter. Students, staff and faculty, along with families, shared drinks and jokes over a meal to rave about. The afternoon culminated in an awards presentation in which members of the faculty and staff as well as outstanding students and researchers were acknowledged for their efforts. Awards, music and good grub make a good time for anyone.



Long lines were evidence of mouth-watering food at each annual department Christmas party. Onlookers waited patiently and judiciously for a chance to stockpile the most scrumptious dish. The staff had collected a savory assortment of hors d'oeuvres, cheeses, meats, and tangy pickled snacks. Desserts varied from custards and cookies to rich German chocolate cake and baklava. Many flavors were contributed by students and faculty. Having put taste buds and bellies at rest, everyone settled in to listen to the awards presentation.

Awards went out to faculty, staff, graduate students and researchers. The only award for faculty, "teacher of the year", was presented this year to SPS and undergraduate advisor, Yoonseok Lee. He was followed by one outstanding staff member, Janet Germany, and many graduate students and researchers. The latter were awarded for various roles like being outstanding teacher assistants

and researchers as well as being well-rounded, significant contributors in their environments. Each received a monetary reward along with a plaque in recognition.



Towards the end came the announcement that silenced the mob. It was the announcement of Ray Thomas's retirement after thirty-five years with this department. Department chair and MC, Alan Dorsey, was followed by Bob DeSerio and friends and well-wishers of Ray Thomas in speaking of his valuable contribution to the department. His meticulous nature kept the labs and much more running like a newly oiled bike, all before anyone had ever heard of using computers. Imagine getting all those engineers and gen-ed students registered for classes through any means other than online registration. Stories of obstacles overcome in the past were told, and all spoke of the difficulties endured in the process of his replacement. Ray Thomas also expressed his sentiments and shared his work experiences and with future plans.



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Positions are available on our staff for 2004-2005. For more information email upnews@phys.ufl.edu

Submissions

We welcome your news! Please send submissions to upnews@phys.ufl.edu by the third Monday of each month

After an emotional pause, music reappeared in the background and the chatter kicked back in. Attention returned to whatever items still remained on food trays. A few more finger foods were snatched, and then the trays began to disappear. The festive hues evaporated, the music system was dismantled and the old tables and chairs were folded up and put away. The lobby transformed back to its shiny floors and interactive displays, ready to attract the wanderer who carries a smidgen of curiosity.



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