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# Physics

Volume 1, Issue 2, December, 2007

## Letter From the Chair

Dear Friends of the Department:

Please help us celebrate! 2008 will mark the 100th anniversary of the establishment of the Physics Department at OSU! Look for special activities and departmental initiatives on our website next year.

The past year has been a very active year, with many new and exciting developments. First of all, we have hired another new faculty member. Dedra Demaree started her work as Assistant Professor of Physics in September. We attracted Dedra to continue our work on improving lower division courses, efforts that started with Ken Krane, Ellen Momsen, and Pat Canan.

Teaching is an important aspect of the life in our Department. Two major new initiatives began in the past year. The nationally recognized Paradigms in Physics program, under the direction of Corinne Manogue, has attracted new NSF funding to help disseminate the material and help other Physics Departments start similar programs. Ken Krane has started a new Honors course in introductory physics. The Department had always desired to have an honors version of the introductory physics course, but our very low faculty numbers in the past few years made it impossible to offer such a course.

This year we have started a process of regular meetings of faculty members working on different aspects of the curriculum. The lower division, upper division, and graduate level workgroups each meet every three weeks in order to discuss the next steps we will take for improving the educational experience of our students. We follow the very successful model of the Paradigms group, and expect that the increased collaboration between faculty members will soon have very tangible results.

The Professional Masters program has graduated four students in the past year. Lisa Eccles (already featured in the previous newsletter), Jonathan Shanks, Vincent Cerimele, and Josh Mellon. They all have jobs, and have found their experience in this program very rewarding. There are three other programs like this on campus, and one important aspect of the program is the common set of business courses. Such contacts across programs are appreciated by all students. The Computational

Physics program is establishing itself and is steadily increasing its number of graduates with another three degrees awarded this year.

On the research front our recently hired faculty members are working extremely hard on establishing and enlarging their research programs. These faculty members and several "old-timers" are very active in ONAMI, the Oregon Nanoscience and Microtechnologies Institute, Oregon's first Signature Research Center. As a result of these and other activities we are now seeing a healthy increase in external funding.

Janet Tate has received the Milton Harris Award in Basic Research. The purpose of the Harris award is to recognize exceptional achievement in basic research by honoring an outstanding faculty member in the College of Science at Oregon State University. This is a well deserved recognition for her work and her leadership in the collaboration with other scientists in Chemistry and Electrical Engineering.

Challenges for the Department in the coming year are found on both the financial and personnel front. Even though we have hired new and energetic faculty members, we are still a small department, and we hope to start additional hiring processes next year. The challenge is to find funds for the set up of a research laboratory. Also, the number of undergraduate students has slightly decreased. As part of our plans to improve the introductory physics courses we will solicit input from high school teachers with the goal of establishing new educational collaborations, and we hope that a side effect of these contacts will be an increase in the visibility of our program. Finally, we need to keep attracting good graduate students, and therefore we are improving our web site, the main vehicle for advertisement in this modern age. Please visit <http://www.physics.oregonstate.edu> and let us know your suggestions for improvements!

We are also very much interested in your opinions about and suggestions for our newsletter. Please write [Physics.chair@science.oregonstate.edu](mailto:Physics.chair@science.oregonstate.edu) to give us feedback!

Henri Jansen

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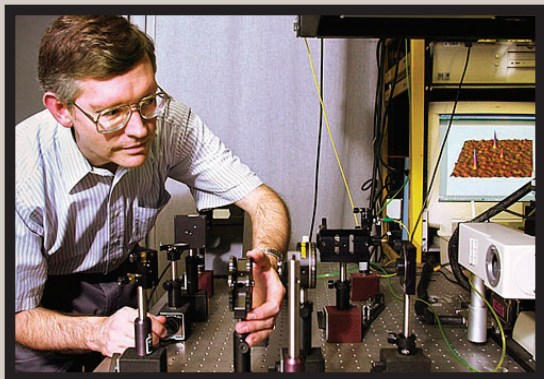
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Terahertz Spectroscopy Lab

# Physics

## Yunker Lecture



In Fall 2006, the Physics Department held its annual Yunker Lecture. This year's speaker was **Prof. W. E. Moerner** from Stanford University. "W.E.",

as he's known to colleagues like our own Prof. Oksana Ostroverkhova who did a postdoctoral stint in his laboratory in 2001-2003, is a founder of single-molecule spectroscopy and one of the world's forefront researchers. W.E. gave an entertaining talk that took his audience from the basics of how to observe and track an individual molecule all the way to the current research frontier on how to use single molecules for probing processes in biological cells. He kept everyone from the non-scientists to the undergraduates to the faculty fascinated!

The Yunker Lecture series was made possible by a generous gift from the family of Ed Yunker, Chair of Physics from 1949-1966, and continued donations to this legacy support this wonderful series.

## Carbon Nanotubes and Bio-molecules

*New faculty member Dr. Ethan Minot writes about his new research lab in Weniger Hall*

I joined the department in January 2007. Getting here has been an exciting journey. I left my home in New Zealand 8 years ago to pursue a PhD in the United States. My research took me from California to New York, and then to The Netherlands. Finally arriving in Oregon feels like coming home - I missed the Pacific Ocean, coastal mountains and sheep farms!



*Ethan Minot (on right) discussing a carbon nanotube model with student Caleb Joiner*

The major theme of my research over the last 8 years has been the electronic properties of carbon nanotubes. Figure 1 shows a schematic of a carbon nanotube. Made entirely from carbon, the walls of these tubes are a single atom thick. Typical diameters are 1-2 nanometers and typical lengths are 0.1 millimeters. In the early 1990s, techniques to grow nanotubes coincided with a theoretical interest in their

one-dimensional electronic structure. This was followed by a gold-rush of new experiments which I was fortunate enough to join. Carbon nanotube physics has matured in the last 15 years, however, the excitement and feeling of new possibilities has not diminished.

At OSU, with the help of many people, we have a new lab up and running to study carbon nanotube devices and new applications. A table-top growth system for carbon nanotubes was put together by undergraduate student, Caleb Joiner. Caleb's first batch of tubes came out of the oven in July. An atomic force microscope (AFM) was installed just in time to image these first nanotubes (see figure1).

The AFM is a very important tool for our research. It is the most flexible way to image and modify surfaces at the nanometer length scale. The height of a surface is measured by gently feeling the sample with an atomically sharp tip. We can see where the carbon nanotubes grow and measure

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# Physics

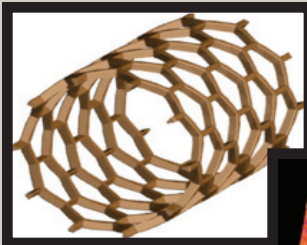
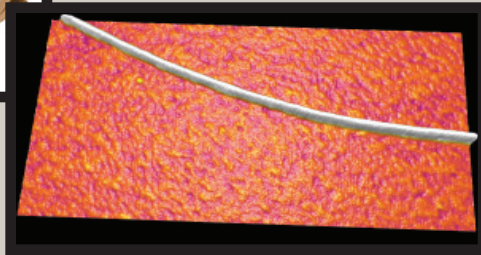


Figure 1 (left) The atomic lattice of a carbon nanotube showing the hexagonal bonding structure and hollow core. (right) An atomic force microscope image showing a nanotube on silicon oxide. The 400x800 nm image area is smaller than a single pixel in the best optical microscope.

(continued from page 2)

the diameter of each tube. More advanced experiments are also possible. Pushing nanotubes with the AFM tip moves them around like wet spaghetti. Electronic features, like tunnel barriers, can be created at kinks in the nanotube. The AFM tip can also be electrified so that charge on the tip affects the charge in the nanotube, allowing us to probe electronic structure.



The other indispensable technique in our lab is electron transport measurements. For these measurements, electrical contact must be made to individual nanotubes. Graduate student Matthew Leyden has created patterns of metal electrodes that contact the nanotubes. The micrometer-scale fabrication of electrodes is carried out in John Wager's lab in Electrical Engineering. These

electrically contacted CNTs become our nanoscale playground for investigating fundamental electronic behavior and testing new applications.

In the last five years, researchers have begun adapting carbon nanotube transistors to work as biological charge sensors. The electrical current running through the nanotube is disrupted by the electric field of a biological molecule. Acting as a charge sensor, the nanotube changes resistance in the presence of the molecule. Biological charge sensing is possible because nanotubes (and other electronic nanomaterials) have cross sections of similar size to biological molecules. Work in our lab currently focuses on understanding the operation of this new class of biosensor by quantifying the interactions between electrolyte solutions, charged molecules and carbon nanotube devices. We hope that with new understanding, and novel device designs, carbon nanotube biosensors will have important applications in medicine and for studying molecular biology at the single molecule level.

## Graduate Research and Teaching Awards:

This year the department established two new awards to recognize the enormously valuable contributions of our graduate students. Each award carries a purse of \$400. The *Graduate Research Award* recognizes excellence in research and this year's award went to **Sasha Govyadinov** for his outstanding research on sub-diffraction light manipulation. Sasha performed his work under the supervision of Prof. Viktor Podolskiy, and they published the results in *Physical Review Letters*, *Physical Review B* and *J. Modern Optics*. Sasha heads to the University of Pennsylvania to take up a postdoctoral position in the Department of Bioengineering. The *Graduate Teaching Assistant Award* rewards outstanding contributions to the department's teaching mission. This year there were two awardees: **Vince Rossi** and **Matt Neel**. Both are excellent and dedicated teachers. Vince is working with our Texas A&M collaborators on the Paradigms in Physics program to help them with curriculum reform. Matt is working on his dissertation in optics this year. The awards were handed out at the annual Spring Picnic.



Vince and Sasha pose with their commemorative plaques.

## Weniger Classroom Renovation:

In Summer 2008, the University will renovate the shared classrooms in Weniger Hall, including the three large lecture halls. Our alumni will be happy to hear this! A team of Physics faculty members is working on classroom redesign. We hope to couple this remodel with the development of new teaching space dedicated to Physics where we can implement innovative pedagogy in the large introductory courses. We will be seeking private funding for this initiative.

# Physics

## New Faces:

**Dedra Demaree:** Prof. Dedra Demaree joined the department in September 2007. Dedra's primary research focus is the use of writing in physics courses. She looks forward to applying her broader research interests to her primary work at OSU, which will be the investigation and incorporation of methods to improve education in our large enrollment service courses. She received a Ph. D. in Physics from the Ohio State University in 2006 and just completed a visiting professorship at the College of the Holy Cross in Worcester, Massachusetts.

**Liz Gire:** Dr. Liz Gire joined the Paradigms group in September 2007 and will work with Prof. Corinne Manogue and colleagues as a Research Associate. She recently received a Ph. D. in Physics from the University of California, San Diego.

**Incoming grads:** We welcome the incoming graduate students, and look forward to seeing them become our future physics researchers, teachers, and business people. There are 3 women and 6 men, and we're delighted that the incoming graduate class is closer to gender parity than ever! The cohort is mostly from the Northwest and California, and we're glad to have among us the only physics student from the Oregon/Baden-Württemberg exchange program this year.

## Degrees Awarded:

From Fall 2006 to Fall 2007, the Physics department awarded 12 B.S. or B.A. degrees in Physics and Computational Physics; 8 M.S. degrees in Physics and Applied Physics, including 4 Professional Science Masters (PSM); and 2 Ph.D. degrees in Physics.

**Naman Amer**, Ph. D. (Physics)

**Sasha Govyadinov**, Ph. D. (Physics) to a post-doc at U. Penn Bioengineering

**Vincent Cermile**, M.S. (Applied Physics; PSM) to ViaSat, Carlsbad, CA

**Len Cerny**, M.S. (Physics) to graduate school in Science & Math Education, Oregon State U

**Elizabeth (Lisa) Eccles**, M. S. (Applied Physics; PSM) to Wafertek, Camas, WA

**Dona Hertel**, M.S. (Physics) to Chemeketa Community College, Salem, OR

**Joshua Mellon**, M.S. (Applied Physics; PSM) to ViewPlus Technologies, Corvallis, OR

**Nathan Nebergall**, M.S. (Physics) to Pacific University, Forest Grove, OR

**Jon Shanks**, M.S. (Applied Physics; PSM) to Microsystems Engineering, Inc., Lake Oswego, OR

**Joel Wetzel**, M.S. (Physics)

**Connor English**, B.S. (Physics)

**Kenneth Taylor**, B.S. (Physics) to graduate school in Physics at Montana State U

**Mark Mazurier**, B.S. (Physics) to an internship at Audix, Inc.

**Gabriel Mitchell**, B.A. (Computational Physics) to graduate school at Georgia Tech

**Erik Sather**, B.S. (Physics); B.S. (Computational Physics)

**Zachary Haines**, B.S. (Physics)

**Doug Jacobsen**, B.S. (Computational Physics) to graduate school at Florida State U, School of Computational Science

**Kimberly Johnson**, B.S. (Physics honors)

**Joseph Kinney**, B.S. (Physics) to graduate school in Physics at U. Minnesota

**Nicholas Kuhta**, B.S. (Physics) to graduate school in Physics at Oregon State U

**Nicholas Meredith**, B.S. (Physics honors)

**Joshua Russell**, B.S. (Physics) to graduate school in Physics at Oregon State U

# Physics

**Physics Without Borders:** Physics at OSU extends way beyond the confines of Weniger Hall! Physics shares common ground with every other science, so it's not surprising that we have built collaborative research and teaching projects with faculty in other departments and at other universities. And the internet makes collaboration with distant colleagues much easier.

The Oregon Nanoscience and Microtechnologies Institute (ONAMI) is a collaboration of researchers from Oregon's universities and the Pacific Northwest National Laboratory in Richland, WA. ONAMI was established in 2003 to foster innovation in nanotechnology and counts 9 OSU physics faculty among its members. This year ONAMI researchers in the Nanometrology and Nanoelectronics thrust area received \$4.6M to conduct research in a new project funded by the Office of Naval Research. OSU Physics faculty member David McIntyre is on the leadership team for this project with John Carruthers from PSU and Heiner Linke from UO. Physics faculty members Yun-Shik Lee, David McIntyre, Ethan Minot, Oksana Ostroverkhova, Viktor Podolskiy, Janet Tate, and Guenter Schneider received funding for projects to study new nanostructures and nanoscale measurement techniques. <http://www.onami.us>

Collaboration also means Weniger Hall has a continuous flow of students from other departments, which makes the hallway conversation varied and interesting. The transparent electronics project is a long-standing collaboration between the groups of Janet Tate in Physics, Doug Keszler in Chemistry, and John Wager in the School of Electrical Engineering and Computer Science. More Chemistry connections come from David McIntyre and Oksana Ostroverkhova's collaboration with Alex Shvarev, and Oksana further works with organic chemists from Kentucky and Kent State. Ethan Minot's work on carbon nanotubes as biological sensors resulted in a collaboration with Elisar Barbar in Biophysics, and Yun-Shik Lee's terahertz spectroscopy program also has a component conducted biochemistry & chemistry faculty (Shing Ho, now at Colorado State University and Wei Kong of OSU). Outside collaborations are well represented by Viktor Podolskiy, who has active programs involving researchers at 7 universities. His work on negative index materials with the Princeton group was recently featured in Nature Materials (and the Corvallis Gazette Times!). Corinne Manogue's research in Physics Education involves the collaborative efforts of Barbara Edwards and Tevian Dray in Mathematics, and Emily van Zee in Science and Math Education. Currently, some of the curricular materials from the Paradigms in Physics program are being tested beyond OSU: Physics has loaned TA Vince Rossi to help Jairo Sinova and Peter McIntyre at Texas A & M.

We have a long tradition of Physics Ph.D. projects being supervised by physicists in other departments, and our current crop of graduate students is no exception. Katie Hay studies fluid flow with Maria Dragila in Crop Science, Vince Rossi works on optical biomedical imaging with Steven Jaques of the Biomedical Engineering department OHSU, Jeff Hazboun works with Tevian Dray in Math on General Relativity, Matt Neel researches frequency doubling with Tom Plant of EECS, and Pete Sprunger studies nuclear reactions with Walt Loveland of Chemistry. You have only to look at our alumni news to see how many different professional fields our graduates now populate. Physics has something for everyone.

## **CPUG Degree Program Adds Video Presentations to its Collection of Curricular Materials**

*Prof. Rubin Landau writes about the latest from CPUG*

The Computational Physics for Undergraduates (CPUG) BS degree program began five years ago, and has been graduating a small, yet continuous, stream of students since then. Many of the students graduate with joint degrees in Mathematics, Computer Science, or Physics, and most go on to graduate school in a variety of specialties, at places including Princeton, Colorado, Washington State, and Minnesota.

With just five BS in CP degree programs in the entire country, there is little in the way of a standard CP curriculum, and much of the OSU effort has been directed at developing five new courses. These are taken by CP majors, other science and engineering undergraduates, and graduate students. Several new members of the department are now at work developing a graduate-level program in Computational Physics.

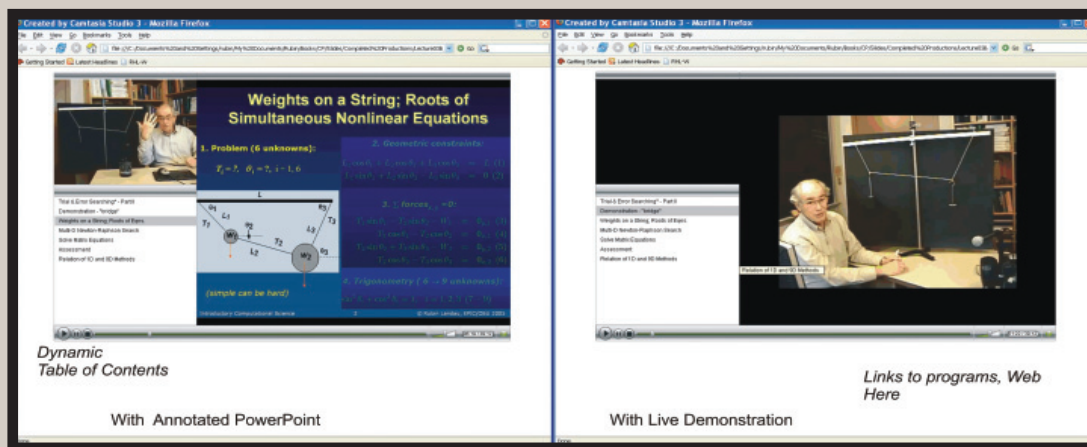
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# Physics

(continued from page 5) In order for the OSU program to be used as a model for other schools, my colleagues and I wrote up the contents of the new courses as four textbooks. These contain hundreds of adaptable simulations and visualizations in Java, C, Fortran, OpenDX, MPI, Maple, and Mathematica, and have been adopted by many schools. One of the texts, *A First Course in Scientific Computing: Symbolic, Graphic, and Numerical Modeling Using Maple, Java, Mathematica, and Fortran90*, R.H. Landau (Princeton University Press, 2005) was chosen by the American Library Association as one of the “best of the best” new academic books in 2005 (one of only seven in computing), and was given a DOE/Krell Institute award in 2006 for excellence in computational science education. Part of its novelty is that while the printed version uses Maple and Java as its computer languages, the CD that accompanies the text has alternative print-ready versions using Mathematica and Fortran 90, and interactive Mathematica notebook and Maple worksheet versions.

As an extension to our NSF-supported development work with courses and texts, in 2006 we began production of video-based modules supported in part by a Cyber Infrastructure grant and the OSU College of Science and Research Office. We are using these modules for the Introductory Computational Science course during Fall 2007 (they can be viewed at <http://www.physics.oregonstate.edu/~rubin/COURSES/VideoLecs>).

The photograph below shows two screen dumps from a module on search methods for the solutions of simultaneous nonlinear equations. On the left, I’m discussing the physics and algorithms needed, and on the right I’m showing an experimental demonstration of a statics problem that is simple, yet has no analytic solution. The module is viewed on a flash-enabled Web browser, and contains:



- A video and sound frame in which a professor has an “office hour” discussing class materials as if talking directly to a student.
- A large slide frame synchronized with the discussion in which items are animated when spoken about, and in which all screen activities, such as simulations, visualizations or Mathematica sessions are captured.
- Links to applets, course materials, codes, *etc.*, which can be customized by individual instructors.
- A dynamic table of contents frame that highlights the titles of the discussion topics as they change, and which allows the learner to jump to any portion of the discussion at any time.
- Controls that allow the discussion to be stopped, advanced, or reversed.

Once we have finished creating these video modules for the CP classes, we will combine them with texts, programs, and applets to produce digital text books. These eBooks are a developing concept. They can be Web viewed, pod cast, archived, or published as part of the National Science Digital Library. They will be created by converting our LaTeX books into a higher-level markup language such as MathML, and will provide multiple modes for accessing the materials, and thus alternatives for those with a disability in one mode. (If you haven’t already guessed, some of these ideas benefited from discussions with John Gardner, our “science accessibility” pioneer.) This work is progressing with the assistance of Sally Haerer (at OSU), Manuel Paez (in Colombia), and Cristian Bordeianu (in Romania).

# Physics

## Physics reaches out to Middle Schools:

On August 8, 2007, the Physics Department hosted a Science and Math Investigative Learning Experiences (SMILE) workshop entitled "The Physics of Sound" for approximately twenty middle school teachers from Oregon. David Bannon introduced concepts, performed demonstrations and provided hands-on activities for the participants. Jim Ketter set up the demonstrations. In March, 2008 a follow-up workshop will be held in which the teachers will learn how to design and build inexpensive musical instruments.



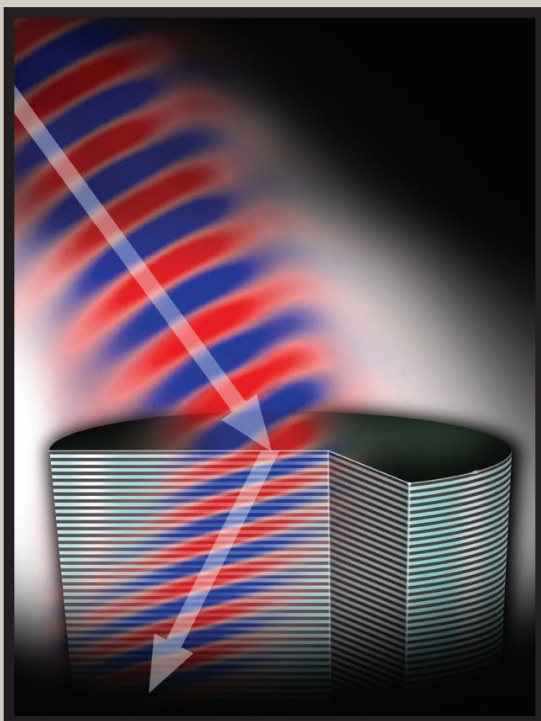
Physics regularly participates in outreach activities of this type: This summer, grad students Vince Rossi and KC Walsh taught classes in OSU's precollege program "Outside the Box", a 2-week long program for talented and gifted middle-school students. Vince taught "The World Seen Simply Through Energy" and "Explorations in Astronomy", and KC taught a class entitled "Quantum Theory". <http://oregonstate.edu/precollege/box/>

*Participants perform a resonance experiment using a tube partially immersed in water and a tuning fork and learn that when the frequency of the standing wave in the air in the tube equals the frequency of the tuning fork, they resonate and produce a louder tone.*

## Optical Metamaterials:

Recent advances in the computational power of clusters and workstations and progress in fabrication technologies have instigated explosive development of metamaterials - artificially structured composites designed to bring to life phenomena that would be impossible in conventional systems. Optical metamaterials form one of the research directions in Viktor Podolskiy's group. Over the past three years, in collaboration with the groups of E. Narimanov (Purdue U), Viktor and his students have developed a unique

approach to build a material capable of negative refraction of light. Light behavior of this kind allows, in principle, the development of "invisibility shields" and focusing to sizes smaller than light's wavelength. Their design was recently realized in an experiment done in C. Gmachl's group (Princeton U), illustrated in the figure at the left. The metamaterial itself is composed from 80-nm-thick layers of highly doped InGaAs and AlGaAs. The 8-micron-thick structure is the first bulk negative index sample operating at infrared frequencies. This experiment, published in Nature Materials, is another step towards realization of complete control over optical pulses in nanometer-scale regions, currently being developed in the Podolskiy group.



*Simulation of light bending the "wrong way" in a negative index material (image courtesy of Keith Drake)*

# Physics

## Other Department News:

### Faculty:

There were several **faculty awards** this year. *Janet Tate* won the 2007 College of Science Milton Harris Award in Basic Research for her work on wide band gap semiconductors and transparent electronics. A symposium will be held later this year to celebrate the award. *Rubin Landau* received a 2006 Undergraduate Computational Engineering and Sciences Award from the Krell Institute. The award was one of just three made in the nation (see article on CPUG). *Yun-Shik Lee* received a prestigious Humboldt fellowship to spend his sabbatical leave in Marburg, Germany, after a short trip to Korea.

The department saw an **influx of funding** this year. *Viktor Podolskiy* has a new grant from the National Science Foundation for his work on optical computing and nanoscale photonics in metamaterials. His work has been recently highlighted in Portland Business Journal, at msn Money.com, Laser Physics World, as well as in a number of local newspapers and on KEZI 9 news. *Corinne Manogue* and *David McIntyre* and 3 other faculty members from outside Physics have renewed funding to disseminate the Paradigms in Physics program. *Henri Jansen* is the PI on a new grant from the NSF with Emily van Zee in Science & Math Education and Ken Winograd in the College of Education. The project focuses on "Integrating Physics and Literacy Instruction in a Physics Course for Prospective Elementary and Middle School Teachers". Physics also won about \$90,000 this year from OSU's Research Equipment Reserve Fund to upgrade equipment. *David McIntyre* and *Janet Tate* will build a new UV-visible-near IR spectrometer to improve capabilities in the optical characterization of electronic materials. *Oksana Ostroverkhova* will purchase a high-sensitivity EMCCD camera (Electron Multiplying Charge Coupled Device) for single molecule spectroscopy. *Guenther Schneider* will purchase a high-performance computing system to perform solid state physics calculations: 9 compute nodes with dual quad core Intel Xeon 3GHz processors (72 processor cores total) connected with Gigabit ethernet. The total memory will be 144GB and total disk space will be 3.3TB. Projected performance would have put this computer in the TOP 500 super-computer list in 2003. (To get onto this year's list, you'd have to have spent close to \$1M!) The Technology Resource Fee competition also resulted in some upgrades to Physics instructional capabilities. *David McIntyre* is in the process of upgrading the Computer Interfacing lab with funds from the Technology Resource Fees. *Viktor Podolskiy* will acquire a class license of *COMSOL Multiphysics*, a state-of-the art commercial partial differential equation solver environment. This software will be used throughout computational physics and optics courses to better prepare students for real-world computer-intensive physics problem solving.

In **other faculty activities**, *Henri Jansen* just completed a 3-year term on the Faculty Senate, and *Janet Tate* is organizing a national conference on graduate education. "Graduate Education in Physics: Which Way Forward?" is sponsored by the National Science Foundation and will take place in the American Center for Physics in College Park, MD 31 Jan - 2 Feb, 2008. <http://www.aps.org/programs/education/conference.cfm>

### Graduate students:

*Mark Kendrick* received the Oregon Sports Lottery Scholarship Award, and *Katie Hay* received an award for an Outstanding Student Paper submitted to the Fall meeting of the American Geophysical Union in San Francisco. *Sunny Donato* received a Naval Research Enterprise Intern Program (NREIP) fellowship to perform summer research at the Naval Research Laboratory in Washington, D.C. *Justin Elser* has received a grant to attend Grid Computing Workshop organized by University of Texas at Brownsville.

### Undergraduate students:

The undergrads continue to bring their hard work and good humor to the department. Seniors *Alden Jurling*, *Nick Meredith* and *Gabriel Mitchell* received OSU URISC awards to conduct summer research at OSU, and senior *Sam Peterson* received an NREIP fellowship to perform summer research in ultrafast spectroscopy of explosives under the supervision of Dr. J. Monat at the Naval Research Laboratory in Washington, D.C. Scholarship winners were *Alexander Brummer* (Andy Aitkenhead Scholarship); *Colin Shear & Patrick Waters* (David B. Nicodemus Memorial Scholarship); *Jessica Armstrong, Cory Pollard & Kat Tadehara* (Excellence in Physics Scholarship); and *Scott Clark* (Paul Copson Memorial Scholarship). Scott also got an 800 on the Math GRE – well done! The Society of Physics Students has been active this year under the leadership of *Ramsi Hawkins* and *Rozi Nystrom* and faculty advisor Oksana Ostroverkhova. Cool activity of the year was an evening watching "The Core" on a giant 54" plasma TV screen donated by Hewlett Packard to Bill Hetherington's lab. SPS welcomes alumni at their meetings to discuss their careers; please let us know if you are in the area.



# Physics

**Alumni Update:** We're always pleased to hear news of your careers and activities. Drop an email to individual faculty members or update us via our alumni page at the departmental website. Please keep your address current with the OSU alumni office, so we can mail you a copy of the newsletter.

## Undergraduates:

- \* **Zack Peterson** (B.S. 2006) is pursuing graduate study in economics at Oregon State University.
- \* **Joe Peterson** (B.S. 2006) is a graduate student in physics at New Mexico State University.
- \* **Joshua Stager** (B.S. 2006) completed his MS in Science Education at OSU in Summer 2007, and after student-teaching at Corvallis High School, is now the physics teacher at Philomath High School, where he also teaches Applications in Chemistry and freshman Integrated Science.
- \* **Nicholas Lane** (B.S. 2004) is developing a soon-to-be released next-generation social networking tool, working at a software engineering company in Portland while he lives in Eugene. Telecommuting is treating him well.
- \* **Briony Horgan** (BS 2005) is working on her Ph.D. in Astronomy at Cornell University in Ithaca, NY. She is currently studying how wind and water have affected the surface composition and geology on Mars.
- \* **Dara (Easley) Jones** (B.S. 2003, M.S. 2004), worked at Portland General Electric in Portland, OR as an analyst. She and **Tom Jones** (B.S. 2004) married in 2006. They are now both in the physics Ph.D. program at the University of New Mexico in Albuquerque.
- \* **Levi Kilcher** (B.S. 2003) is still in Corvallis in a Physical Oceanography PhD. He hopes to be finished in two years and looks forward to exploring beyond the world beyond Corvallis. For now, in his ever-fleeting spare time, he runs, rock climbs and coaches the OSU Women's Ultimate Disc team.
- \* **Jon Gillen** (B.S. 2003) conducts his Ph.D. research on Bose-Einstein condensates under the direction of Markus Greiner at Harvard University.
- \* **Bobby Henderson** (B.S. 2001) has been in the news recently as he and his Flying Spaghetti Monster take on the Kansas Board of Education.
- \* **Frank Oliver** (B.S. 2001) is a Research and Development Manager with Airtronics Inc. in Tucson AZ, where he uses small business research grants as part of a business diversification strategy. foliver@airtronicsinc.com
- \* **Ross Brody** (BS 2001) is finishing a Ph.D. on stochastic behavior of Brownian particles in potential wells at the University of Maine. He remains an avid cyclist, climber, cook & baker who kept a bread-making business during grad school.
- \* **Diedrich Schmidt** (B.S. 2000) received his Ph.D. in Physics from the University of Washington in 2005 and is a Research Fellow at the National Institute for Materials Science in Tsukuba, Japan. He will move to the University of Bochum in 2008 to study AFM, near-field IR vibrational microscopy and Raman spectroscopy of water.
- \* **Nate Bezayiff** (B.S. 1999) graduated from the University of California, Santa Cruz with a Ph.D. in Physics.
- \* **Kyle Schlueter** (B.S. PH & EP, 1998) is a partner in the LA office of Knobbe Martens Olson & Bear LLP, an intellectual property law firm. He received a J.D. degree from the UCLA School of Law in 2001.
- \* **Gayle (Tanner) Wittenberg** (B.S. 1995) received Princeton University's first Ph. D. in Neuroscience in 2003. After a 3-year research/teaching post-doctoral fellowship at Princeton, she joined Bristol-Meyers Squibb, where she uses her statistical & neuroscience expertise to understand why certain medicines work better for some people than others.
- \* **Andrew Wittenberg** (B.S. 1995) who received a Ph.D. in Atmospheric Sciences from Princeton University in 2002. He is a scientist with the Climate Dynamics and Prediction Group, GFDL/NOAA. He leads a team developing comprehensive models of the oceans, atmosphere, land & ice, which they couple to chemical, vegetation, and emissions models to assess what humans are doing to the planet. When he's not debugging models, his research focuses on tropical climate variability (such as El Niño).
- \* **Anu (Bhat) Kaul** (B.S. 1992) received her Ph.D. in Materials Science from U.C. Berkeley and is a scientist at JPL in Pasadena, working on carbon nanotubes & quantum computing. She's the mom of Ishani (5) and Arnav (2).

## Graduate Students:

\* **Derrick Hilger** (Ph.D. 2004) is an Assistant Professor of Physics at Duquesne University in Pittsburgh, PA.

Derrick has been diversifying the Duquesne physics curriculum. He is bringing the work he did with (continued on page 10)

# Physics

(continued from page 9) \* other graduate students at OSU under the GK-12 Fellowship program to Duquesne and other Pittsburgh area schools. Derrick is engaged to Jaime, an internal medicine resident at Mercy Hospital. They're planning a summer wedding in Hawaii.

\* **Ben Nielsen** (Mat. Sci. M.S. 2004) is an engineer at Precision Measurements & Instruments Corp, Corvallis.

\* **James Osborne** (M.S. 2004) is at Microsoft, Redmond, in the Message Platform and Services group, and sometimes represents Microsoft at OSU job fairs. James entered Microsoft through a program that specifically targeted non-CS/CSE grads.

\* **Eric Moret** (Ph.D. 1999) joined Intel Corporation in Nov. '99. After a year as a process engineer responsible for the equipment used to test the lead CPU products, he moved to R&D and now works in the Advanced Technology and Test Methods group, defining test manufacturing processes for the chips to be released a few years from now.

\* **Mark Shroyer** (Ph.D. 1999) is an Assistant Professor of Physics at Knox College in Galesburg, IL, after being a post-doc at Emory University in Atlanta. Teaching new courses, taking on advisees, and setting up research has been hard work, but he loves it. He has joined the hunt for research funding! Mark and MJ have a son (6) and a daughter (10). MJ is the math and science coordinator for a campus program that offers academic, social and financial support to low income/first generation students.

\* **Ernesta Meintjes** (Ph.D. 1998) is with the MRC/UCT Medical Imaging Research Unit at the University of Cape Town, South Africa. She was awarded a National Research Chair in Brain Imaging in December 2006. Her research is in brain and cardiac Magnetic Resonance Imaging. An ongoing aim of her work is to apply new techniques and technologies to study diseases that pose a major public health problems in developing countries. Outside of work, she enjoys the company of Riaan (still an avid cyclist) & their daughters Shanay (7) & Alyson (4).

\* **Goran Karapetrov** (Ph.D. 1996) is a physicist at the Material Science Division of Argonne National Lab near Chicago. He works on electronic properties of superconductors exploring the interplay of superconductivity, magnetism, and charge density waves in old and new materials using low temperature scanning tunneling spectroscopy.

\* **Jeanette Roberts** (Ph.D. 1995) is working in on Extreme Ultraviolet Lithography in Intel's Research group – with a front-row seat to the end of optical lithography scaling as we know it.

\* **Dennis Tom** (Ph.D. 1995) plays games for a living! He resides in Redmond, WA and is a Senior Development Program Manager at Microsoft Corporation in the Xbox division. He invents and develops new hardware accessories for the Xbox 360 and Zune. Outside of work, he and his wife are kept busy by their daughters, Nicole (4) and Elise (2).

\* **Scott Fuller** (Ph.D. 1994) is an Applications Engineer at FEI, Inc. in Hillsboro, OR, one of the premier nanotechnology companies in the world. Scott supports the account managers through sample work and customer demonstrations. Scott has 2 children aged 4 and 6 and lives in Portland. Despite suffering various injuries in the process, he tries to remain active through mountain biking, basketball, and running.

\* **Bianca Hermann** (M.S. 1992) is Professor of Physics working on scanning probe microscopy at the Ludwig-Maximilians-University, Munich, and on superconductors, and molecular self-organization on surfaces and bio-sensors at the Walther-Meissner Low Temperature Institute. Her group has ten students busily compiling data for M.S. and Ph.D theses. Meanwhile, she and Peter are parents of Colja (8) and Jana (6).

\* **Dinghui Lu** (Ph.D. 1995) is a professor at Zhejiang University in Hangzhou, China. He teaches Quantum Field Theory, and researches the effects of the quark core on rapidly rotating neutron stars. He can hear the roars from the stadium hosting the Women's World Cup of Soccer from his home!

\* **Jeff Schnick** (Ph.D 1988) teaches physics at Saint Anselm College in Manchester, NH. Marie teaches in the city school system; Sara is finishing her MS in history at Northeastern; Natalie is a senior at Hartwick College.

\* **Manuel Páez** (Ph.D. 1983) retired in 2002 from the Physics Department of the Universidad de Antioquia, Medellín, Colombia after 33 years in that department. He is working with Rubin Landau on Computational Physics.

\* **Valentina Dimitrova** (Tate group Research Associate 1998-1999) left the startup company she was working for in Andover, MD, to become a Senior Process Engineer with Intel in Chandler, AZ.

# Physics

## Contributions to the Physics Department, 1 July 2006 to 1 October 2007:

We thank the many friends of the Physics Department for their donations that enhance the ability of the Department to provide physics experiences that are essential to the development of our students.

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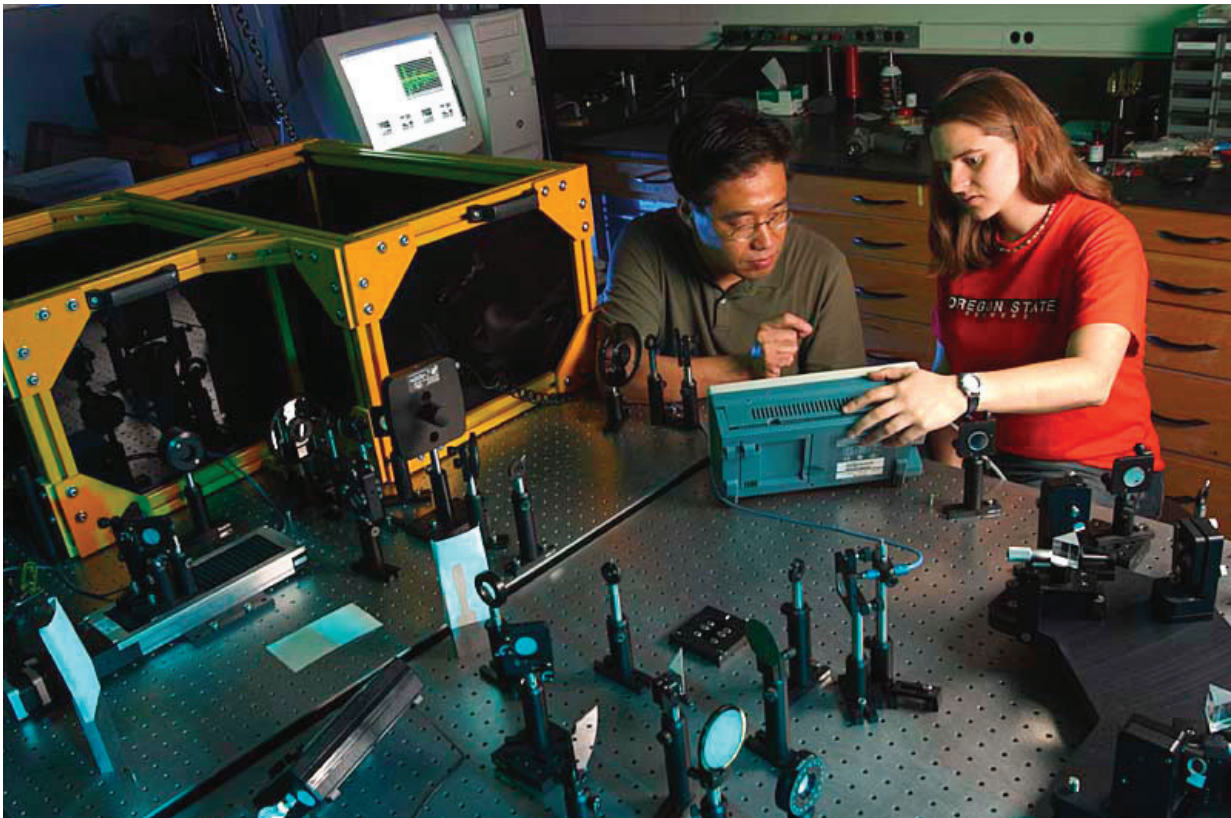
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Professor Yun-Shik Lee and graduate student Katie Hay discuss a measurement in the Terahertz Spectroscopy lab. Prof. Lee has developed single frequency sources, polarizers and other optical elements for the unexplored THz region of the electromagnetic spectrum. He applies this to the study of photonic crystals among many other things.