



Physics



UNIVERSITY
OF OREGON

UNIVERSITY OF OREGON DEPARTMENT OF PHYSICS

FALL 2008

2008 University of Oregon Physics Graduate Class



Prospective and Current Oregon Graduate Students at 2008 Recruiting Weekend

The Oregon physics department has welcomed twenty new graduate students in the fall. They have come from every corner of the U.S. (see below) as well as Germany, India, New Zealand, and China, and our department will be enriched by their diversity of experience.



Parthasarathy Creates Unique Research Program at UO

Biological systems must obey the laws of physics. Assistant Professor Raghu Parthasarathy knows this well. Among his research interests is the interplay between physics and biology that determines the properties of biomaterials. His pioneering work in this area has already earned him great distinction in his short career, having been awarded an Alfred P. Sloan Research Fellowship in 2007 and a National Science Foundation Career Award in 2008.

Among Parthasarathy's interests is the creation of composite materials composed of biomembranes and inorganic microparticles that can self-organize into structurally complex forms, including crystals with useful optical properties. Other interests include illuminating the causes of the striking robustness displayed by the tuberculosis pathogen, which the Parthasarathy group examines by constructing experimental models that mimic bacterial membrane architecture while

enabling quantitative physical characterizations.

He has also been developing innovative curriculum to bring these new frontiers to the classroom, and involves undergraduates prominently in his research and publications.



Raghu Parthasarathy

The Department of Physics is fortunate to have Parthasarathy as a colleague.

Dave Soper Recognized by Major Physics Prize

Professor Davison Soper, most recent past chair of the physics department, is a 2009 recipient of the American Physical Society's J. J. Sakurai Prize for Theoretical Particle Physics. He will share the prize with John Collins (Penn State) and Keith Ellis (Fermilab) when presented formally in May during the American Physical Society's annual meeting in Denver. Soper was cited for his "work in perturbative quantum chromodynamics, including applications to problems pivotal to the interpretation of high-energy particle collisions."



Davison Soper



Oregon faculty, staff, and students work with the ATLAS collaboration at the Large Hadron Collider. Read about this in future newsletters

You Can Support UO Physics

Have you wondered how to support UO physics students? It's easy, through the University of Oregon Office of Development. To learn more, go to the physics web page, <http://physics.uoregon.edu>, and click on the "Give Now" link.

Professor Wang Spins for the Future

The new field of spintronics holds potential for advances that could move the electronics industry beyond its half-century reliance on electron charges. UO physics professor Hailin Wang is contributing fundamental advances to this promising new field. "To make major improvements, we now need to go beyond charges to spin, which has been very important in physics but not used very often in applications," Wang said. With doctoral student Shannon O'Leary, Wang recently used ultrafast laser techniques to study the effect of excitons (an electron weakly bound to a hole) on the spin of electrons in a CdTe quantum well—semiconductor material formed from cadmium and tellurium, sandwiched in a crystalline compound between two other semiconductor barrier layers. Their experimental result "shows that we can manipulate the spin when we inject excitons at appropriate times in the precession cycle of the spin," O'Leary said. "The result gives scientists a new tool for manipulating spins, and it may prove to be a handy method because it simply requires shining a pulse of light of the appropriate energy at the right time."



Hailin Wang

Wang has been a member of the physics faculty since 1995, coming to Eugene after earning his Ph.D. at the University of Michigan. His undergraduate degree is from one of the leading universities in China, the University of Science and Technology. He is a fellow of both the American Physical Society and the Optical Society of America. Wang is the current director of the Oregon Center for Optics (<http://oco.uoregon.edu>). He led our efforts to expand optics education beyond the typical curriculum to include an optics internship master's program and a summer Optics Camp for middle- and high-school students.

Professor Wang's research may lead the way toward a new electronics of the future.

"Intellectual growth should commence at birth and cease only at death."

—Albert Einstein

QuarkNet: Teaching Teachers about Research

BY RAY FREY

When high school students ask their physics teacher questions such as “What is research like?” or “What exactly is dark matter?” or “What happens in particle accelerators?”—now they can get their answers. Every summer since 2002, ten high school science teachers from around Oregon gather for about a week at the UO for QuarkNet, a program designed to give teachers firsthand exposure to scientific inquiry as practiced by researchers in high-energy physics. Teachers take part in research activities and share ideas on how to inject inquiry-driven projects into their classes. In addition, they are brought up to date on current paradigms and recent advances in elementary particle physics and other areas of fundamental physics research. QuarkNet (<http://quarknet.fnal.gov>) is a national



Oregon QuarkNet teachers

program that was inspired in part by the U.S. involvement in the Large Hadron Collider project at Conseil Européen pour la Recherche Nucléaire, and by the perception that there is a disconnect between the exciting research of the collider and the public's lack of knowledge of it. Teachers are in a great position to bridge this disconnect.

Continued on back page

Alumnus Profile—Kevin Pitts

Kevin Pitts earned his Ph.D. in physics from the University of Oregon in 1994. Kevin's thesis research focused on Bhabha scattering in the SLD experiment, the elastic scattering of the electron and positron. Through this process he measured the electron coupling to the Z boson. He also played a central role in the construction of the SLD luminosity monitor at Oregon, and in its installation and operation at the Stanford Linear Accelerator Center.



Kevin Pitts

After a term as a postdoctoral research associate at the Fermi National Accelerator Laboratory, Kevin joined the Department of Physics at the University of Illinois in 1999. He was awarded a U.S. Department of Energy Outstanding Junior Investigator Award in 2002, and a National Science Foundation Career Award in 2004. As a postdoc and faculty member on the Collider Detector at Fermilab experiment, Kevin has played a major role in the construction of the central drift chamber and the trigger system. He has been active in heavy-flavor physics and searches for new particles and interactions. He has been a member of the Fermilab Users Executive Committee for the last two years, serving as chair for the past year. Kevin is also active in science outreach and diversity issues, leading the Saturday Physics Honors Program at the University of Illinois and participating annually in the Worldwide Youth in Science and Engineering program.

Q: Why did Albert Einstein cross the street?

A: To get away from Niels Bohr. But when he got to the other side Bohr was there also.

Recent Oregon Physics Graduates

Ph.D. Adam Halverson, Guoqiang Cui, Joshua Turner, Jeffrey Kolb, Qi Li, Brian Long, Erin Craig, Keisuke Hasegawa, JinWoo Lee, Laura Riikimäki, Tao Li, Shannon O'Leary, Rahmat Rahmat, Charles Rohde, Jan Strube.

B.S. Sequoia Kia Marie Alba, Stephen James Alexander Battazzo, Mark Timothy Cater, Andrew Benjamin Chastain, Michael Alan Creech, Jordan Wesley Crist^d, Jeffrey Clinton Garman, Barrett Robert Hafner, Elliott Evert Hinds^{dp}, Nicholas Lee

Hoskins, Ian Sierra Gabriel Kelly-Morgan, Jeffrey Forrest Lamb, Jodi Elizabeth Manela, Christopher William Mann^{dc}, John Charles Mc Neil^{dp}, Elizabeth Halley Olhsson^{dp}, Halsey Edan Ostergaard, William Robert Prime, Benjamin K. Roberts, Stephen Joseph Saltekoff, Benjamin Kyle Scholl^d, Yonatan Michael Schultz, Jared Nathan Sherr, Zane Garrett Taylor, Gregory Thomas Tietjen^d, Asher Lyons Tubman, Aaron Michael Webster, Kim Baluyot Yabut.

d: departmental honors; **c:** cum laude;

s: summa cum laude; **p:** phi beta kappa



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QuarkNet *Continued from page 3*

In the last few years, Oregon QuarkNet has focused on providing teachers with cosmic ray detectors for their schools. Students learn that cosmic rays are the products of natural particle accelerators, for which there remain fundamental unanswered questions. The detectors, similar in principle to many of those used in high-energy physics research, allow students to try to understand, by direct measurement, the nature of this exotic, otherwise invisible phenomenon. Our goal is to provide all participating schools with such a detector system, allowing students to compare their data sets, to combine these data to look for ultra high-energy cosmic ray events, and, well, to let students investigate the answers to their own questions!

To sign up for future electronic copies of the newsletter, please link to: <http://physics.uoregon.edu/newsletter>

Message from the Department Head

Friends and alumni of UO physics:

Welcome to the very first edition of our renewed departmental newsletter! This is an important part of an ongoing effort to build community. We sincerely hope it helps all of us stay connected in the future.



Having assumed the department headship one year ago with the usual dose of trepidation, I have been delighted to find the position to be very energizing. We continue to have a strong faculty that is involved in all of the big physics issues: physics beyond the standard model, controlling quantum information, understanding how complexity emerges in diverse systems. In this issue and others, we will highlight a few of these faculty members, particularly those in the early part of their career. We are also very proud of the many outreach activities that we lead, and these will be highlighted in upcoming issues as well.

I hope you enjoy reading about what we're up to. If your appetite has been adequately whetted, you can find much more information at our website. And we encourage you to reconnect with a visit to our department any time. Faculty members delight in seeing what we have wrought, and current students sincerely benefit from hearing and relating to your life stories!

Steve

Science is the belief in the ignorance of experts. – Richard Feynman