Physics

UNIVERSITY OF OREGON

UNIVERSITY OF OREGON DEPARTMENT OF PHYSICS SPRING 2009

UO Alum Wei Chen Honored

University of Oregon physics alum Dr. Wei Chen was named the 2008 Outstanding Master's Universities and College Professor of the Year by CASE and The Carnegie Foundation for the Advancement of Teaching. Wei Chen graduated from the UO physics department with a 1988 dissertation in high energy physics. His advisor was Rudolph Hwa. Following several years at a number of institutions he joined the faculty at the University of Central Oklahoma. In 2006 he became Assistant Dean of the College of Mathematics and Science.

Wei Chen with his students

Professor Chen's research has reoriented toward biophysics with particular interest in laser-tissue interaction, laser photothermal treatment of cancer, and monitoring of cancer treatment using different imaging techniques. He led in organizing conferences on Biophotonics in many countries and is a member of the Editorial Board of Journal of Biomedical Photonics.

Chen engages students in inquiry-based learning through experiments and simulations in his classes. His interdisciplinary approach to learning extends to his research on cancer treatment where students working in his lab use laser immunotherapy, a novel treatment method, that incorporates fields including, laser physics, engineering designs, and biology

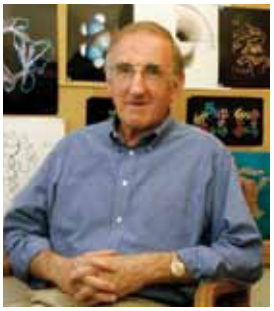
To sign up for future electronic copies of the newletter, please link to:
http://physics.uoregon.edu/newsletter

Physics Professors Eric Torrence and Hailin Wang Honored with Faculty Excellence Awards

A dozen of the brightest faculty members at the University of Oregon were honored in December for contributions in their fields of research and in their classrooms. The Fund for Faculty Excellence awards recognize faculty members performing at elite levels. Eric Torrence and Hailin Wang of the Physics faculty are among the recipients. The awards program was established by university donor Lorry I. Lokey in 2006 to reward top faculty members with research support and salary supplements. "The Fund for Faculty Excellence is an important program that enables the university to retain some of the brightest, eager minds in academics today," said Senior Vice President and Provost James Bean. The research support and salary supplements continue for five years and are renewable. The Fall 2008 physics newsletter featured an article on Professor Wang's research, and Professor Torrence is later featured in this issue.

Matthews Elected to the Council of the National Academy of Sciences

Professor Brian Matthews has been elected to the governing Council of the U.S. National Academy of Sciences (NAS). Created in 1863 by President Lincoln, the NAS brings together committees of experts in all areas of scientific and technical endeavor. They address critical national issues and advise the federal government and the public. Election to the Academy is regarded as one of the highest honors for U.S. scientists. Matthews was elected in 1987 and has served in different capacities including Chairman of the Section of Biochemistry.



Brian Matthews

Torrence Probes Femtophysics at the Large Hadron Collider

Professor Eric Torrence has established a global reputation for key contributions to important and highly visible international particle physics measurements. Since joining the Oregon physics faculty and the high energy physics group of Brau, Frey and Strom, in 2001 he led the tau physics discovery program of the BaBar Collaboration at the SLAC B Factory, and leads in preparation for the physics program of the ATLAS experiment at the Large Hadron Collider. Torrence is also an excellent and popular classroom instructor. He was promoted to Associate Professor of Physics in 2006.

After receiving his Ph.D. in 1997 from the Massachusetts Institute of Technology, Torrence worked on a broad range of significant topics in particle physics. He is an expert in tau lepton physics, stemming from his thesis research, which also included work on the electroweak mixing angle with the first linear collider, the SLC at SLAC. His leading role today in the tau physics efforts of the ATLAS experiment places him at the center of physics in the coming decade. Prof. Torrence's critical and visible role ensures access for UO students in this new frontier of science. This past year, two of his graduate students graduated and moved on to particle physics research at other institutions. He also is a leading expert on experimental issues for the International Linear Collider, the planned next step in the global exploration of energy frontier particle physics.

Eric Torrence

The Department of Energy and the National Science Foundation support Professor Torrence's research. Professor Eric Torrence was honored this year by an Oregon Faculty Excellence Award. (See article on front cover.)

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.

A Report on Stockholm Nobel Ceremonies

BY JIM REMINGTON

Roger Tsien generously acknowledged our lengthy collaboration on the atomic structure of the molecule known as Green Fluorescent Protein with an expense-paid trip to celebrate Nobel Week. GFP has become indispensable to biologists as a marker for protein localization and a signal for gene expression. In order to rationally modify the protein the atomic structure had to be known and this was determined by my research group in 1995. With Roger's group, we were then able to produce useful variations, such as yellow version YFP. We collaborated for many years to develop GFPs that report changes in the cellular environment.

Jim Remington

The week was an unforgettable whirlwind of press conferences, receptions, private dinner parties and the Nobel Ceremonies. The lectures were particularly fascinating, including the political commentary, such as physicist Toshihide Maskawa's denunciation of Japan for its role in causing WWII. The dinner with the royal family and their 1,370 guests was an astonishing affair, featuring gourmet food and wines, speeches, dancing, and plays. An estimated 1 million Swedes watched on television. I was more than happy being a co-celebrant.

GK/12 Education Program

The University of Oregon's 5-year, $3 million NSF Graduate Teaching Fellows in K-12 Education (GK-12) Science Outreach project is in full swing in rural schools in Eastern Oregon. Funded in March, under the direction of Dr. Dean Livelybrooks (Physics) and Dr. David Johnson (Chemistry), the program places 12 physics and chemistry doctoral students as "scientists-in-residence" into elementary schools in Hermiston, Pendleton, and the surrounding area. The GK-12 Fellows spend 2 weeks, three times annually, in their schools, co-teaching inquiry-based, hands-on, physical science with elementary teachers. The project aims to strengthen GK-12 Fellow's ability to communicate science, to sustainably improve science instruction in our partner schools, and to boost kids' excitement around science.

GK/12 Continued

So far, the GK-12 Fellows are getting rave reviews. Shawn Worstell, principal of Sunset Elementary in Hermiston, reports, "The best part of the program has been the [GK-12 Fellows] demonstrating that elementary teachers can teach physical science. . . Physics is not a common focus of instruction for elementary students. This program has shown each teacher in the building that physics is fun, and they can teach it even if they are not a physicist. The other major benefit is to see the joy of learning on the faces of the students. This is 'wow' science and the students love it."

Ben Lopez with students

Workshop on Quantum Control

Recently, there has been rapid progress towards the realization of novel quantum technologies---ranging from quantum computers and secure quantum-communication networks to quantum-limited precision metrology. This progress has been enabled by developments in such diverse fields as optics, ultracold-atom physics, nanomechanics, and nuclear magnetic resonance. Thus, the precision control of quantum systems, along with related issues such as quantum measurement, quantum information, and error correction, is currently a principal direction in the research on quantum systems.

This past August, led by Professor Dan Steck, the Oregon Center for Optics and the UO Physics Department hosted the fifth PrACQSys (The Principles and Applications of Control in Quantum Systems) Workshop. This workshop brings together a diverse range of researchers in physics, control theory, dynamical systems, stochastics, signal processing and information science to strengthen the community of quantum control. In prior years this workshop has been hosted by Caltech, Harvard, and U. Sydney; this year, over 50 international researchers attended. We had three days of stimulating talks and discussions on current topics in quantum control, ranging from, control in NMR systems, to quantum trajectories, to cavity quantum electrodynamics. The workshop participants also took a break and enjoyed wine tasting, and a tour at King Estate Winery, or a hike up Spencer's Butte in the beautiful Oregon Summer.

More information is available at the PrACQSys web site: http://atomoptics.uoregon.edu/~dsteck/pracqsys/index.html

Alumni Profile - Karen O'Neil

Karen O'Neil received her Ph.D. in 1997 with a thesis entitled "Faint Fuzzy Stuff: The Missing Baryons". She built on previous work involving the detection of extended galaxies that have such low contrast that they are effectively hidden by the noise of the night sky. She introduced state of the art optical instrumentation to more effectively probe this phenomenon. Outstanding results led to approximately fifteen publications involving various aspects of her sample. Thousands of this new kind of galaxy have now been discovered.

Ironically, following her Ph. D. training in optical astronomy, her career turned to various aspects of radio astronomy. She began as a Staff Scientist at the Arecibo Observatory in Puerto Rico, helping spearheaded the development of a novel new multi-beam instrument. This demonstrated competence propelled her to the National Radio Astronomy Observatory in 2002 as head of program development for Green Bank Operations. Her duties included bringing the new GBT 300-meter radio dish on line.

Karen O'Neil

Karen was recently promoted to Assistant Director for Green Bank Operations with specific focus on upgrading the GBT. The development of focal plane array cameras has been identified as the top priority for the GBT and offers the potential of increased GBT observing speed by factors of 10 to 1000.

From a modest beginning of grinding out the detection of faint fuzzy stuff, Karen O'Neil has experienced an accelerating scientific and management trajectory. In her spare time she is also a wife and a mother of two boys, having achieved a rewarding and balanced life.

Please post recent alumni news at:
http://physics.uoregon.edu/newsletter

The Lighter side of Physics

In-Class Quotes by UO Faculty

Recorded by Sasha Tavenner Kruger (PhD 2006)

"You very quickly start adding apples and oranges, and you don't want to do that. But you can find the product of apples and oranges; that's an apple-orange. No problem." ***– Professor John Toner***

"It's not too hard... if you have Mathematica."
– Professor Stephen Hsu

"You always have to check units. That's how I find half of my mistakes. The other half I never find."
– Professor Mike Raymer

UNIVERSITY OF OREGON
DEPARTMENT OF PHYSICS
1274 University of Oregon
Eugene OR 97403-1274

Nonprofit
Organization
U.S. Postage
PAID
Eugene OR
Permit No. 63

Department of Physics
Phone: (541) 346-4751
Fax: (541) 346-5861
kevan@uoregon.edu
Editor: Jim Brau
http://physics.uoregon.edu

David Sokoloff Elected AAPT President

David Sokoloff has begun his term as Vice President of the American Association of Physics Teachers, and will serve as Vice President, President-Elect, President, and Past President in successive years. Sokoloff's physics education research created active learning materials. He has presented workshops in developing countries, authored Real Time Physics and Interactive Lecture Demonstrations, and is editor/contributor to the Active Learning in Optics and Photonics Training Manual. A previous recipient of AAPT's Distinguished Service Citation, and Robert A. Millikan Award, he says "I look forward to working more closely with an organization that has given me so many opportunities to grow professionally."

David R. Sokoloff

Message from the Department Head

Aiming to continue our excellence for decades, we are updating the UO Physics Department strategic plan. Recent metrics are good: faculty awards and recognition, strong research funding and productivity, effective teaching and valued service, and well-prepared graduates, as featured in our newsletter's alumni profiles. Recruiting and supporting strong students is critical. We must draw from the broadest possible scope. Nationally, about 50% of high school physics students are female, yet less than 20% of our majors and graduate students, and just 1 of our 27 physics faculty, are women. 55% of college freshmen are women, but only about a third are white males. We must attract strong students from currently underrepresented groups to our Department. We are addressing this. The NSF-funded GK-12 program reaches K-8 students in rural schools, low socioeconomic demographics, and Hispanic populations. Our NSF-funded UCORE program reaches a diverse population of community college students. This May, the Committee on the Status of Women in Physics of the APS will visit the Department; they will offer valuable advice on attracting women to all levels of our Department. We welcome help and advice from our alumni as we pursue these difficult but stimulating challenges, and mold the future of our Department.

- Steve Kevan ***kevan@uoregon.edu***