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College of Liberal Arts and Sciences

2152 Hillside Road
Storrs, CT 06269-3046

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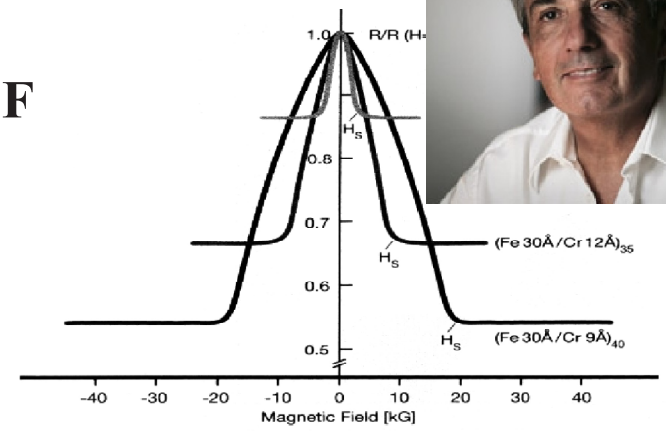


Albert Fert, Katzenstein Distinguished Lecturer

Friday, October 24, 2008

This year's Katzenstein Distinguished Lecture will be given by Prof. Albert Fert of Université Paris-Sud, France. He shared the 2007 Nobel Prize in Physics with Prof. Peter Grünberg of the Institut für Festkörperforschung in Jülich, Germany "for the discovery of giant magnetoresistance" (GMR), the effect that fueled a dramatic increase in the capacity of computer hard drives and has led to the rapid development of a new field of research and applications known as spintronics.

Although magnetoresistance has been known for over a century, the discovery of the GMR phenomenon in 1988, independently by Professor Fert's and Professor Grünberg's groups, was highly unexpected. Prior to that, it was believed that magnetoresistance, which is the change in electrical resistance due to an external magnetic field, could reach at most a few percent in ferromagnets. The GMR discovered in multilayer materials, consisting of ferromagnetic layers separated by a very thin non-magnetic metallic layer, surpasses 100 percent. The physics behind the GMRis based on the difference in scattering rate of the electrons traveling through a ferromagnetic conductor, depending on the relative orientation of their spin to the magnetization direction of the conductor — with those oriented parallel scattering less often than those oriented antiparallel. A consequence of GMR has been to revolutionize the magnetic recording industry: the very high sensitivity of GMR-based recording heads has led to a reduction in the bit size, and hence an enormous increase in the storage capacity and reading speed of magnetic hard-disk drives. It took less than ten years from the discovery to the implementation of GMR technology in hard-disks of computers, making this phenomenon one of the most quickly utilized in commercial technology. iPods, laptops and rapid search engines are among the modern icons made possible by GMR. This discovery gives impetus to both basic research and applied physics, shifting the focus from the transport of charge (electrical current) to the transport of spin (spin current). In this new field of spintronics, the electrons' spin is used to transport and to store information. This new technology may not only enable computers to become faster and more energy efficient, but it might also provide new functionalities, for example quantum information processing. Currently, the field of spintronics encompasses new effects such as: tunnelling magnetoresistance, colossal magnetoresistance, spin injection, spin torque, spin currents, spins utilized for quantum computation, and the evolution of a new class of materials, like magnetic semiconductors, some of which will be discussed in this year's Katzenstein Distinguished Lecture.

Prof. Fert graduated in physics and mathematics from the Ecole Normale Supérieure (Paris, France) in 1962 and received his doctoral degree in Phys-

ics at the Université Paris-Sud (France) in 1970. He is currently Professor of Physics at Université Paris-Sud and Scientific Director at Unité Mixte de Physique CNRS-Thales (Orsay, France). In addition to the Nobel Prize in Physics, Prof. Fert has been the recipient of numerous awards and prizes, including the International Prize for New Materials awarded by the American Physical Society (1994), the Magnetism Award awarded by the International Union for Pure and Applied Physics (1994), the Hewlett-Packard Europhysics Prize awarded by the European Physical Society (1997). In 2007, he received the Japan Prize given by the Science and Technology Foundation of Japan for "the discovery of Giant Magneto-Resistance (GMR) and its contribution to the development of innovative spin-electronics devices." Also in 2007, he was co-recipient of the Wolf Prize in Physics. Prof. Fert has been a member of the French Academy of Science since 2004.

Reynolds Lecture to Honor 100th Anniversary of Liquefaction of Helium

David M. Lee, Cornell University, co-recipient of the Nobel Prize in Physics in 1996 for his work on helium 3, will present the Charles Reynolds Distinguished Lecture on Friday, September 26, 2008. His talk is "One Hundred Years of Superfluidity." Professor Lee received his undergraduate degree from Harvard and his M.S. from the University of Connecticut in 1955, followed by his Ph.D. at Yale. While at UConn, Professor Lee worked in the laboratory of Charles Reynolds for whom this lecture series has been named. Professor Reynolds was the co-discoverer of the isotope effect in superconductors which pointed to the electron-phonon interaction as a major factor in the mechanism for superconductivity. Professor Lee was also a fellow student of Henry Katzenstein who received our first doctoral degree in physics. At that time, Charles Reynolds was a professor in our department.

2008 is the 100th anniversary of the liquefaction of helium by K. Onnes in Leiden, Holland. This achievement led to the discovery of superconductivity in 1911, also by K. Onnes. The 1996 Nobel Prize was jointly awarded to David Lee and Robert C. Richardson of Cornell, and Douglas D. Osheroff, now at Stanford University, for their work at Cornell in the early 1970s. They had to chill their ^{3}He sample to a temperature of only 2 mK before it transformed into a superfluid, a special liquid state of matter which flows without viscosity. The superfluidity of ^{4}He is understood as a condensation of weakly interacting bosons. ^{3}He is a fermion fluid and forms pairs of atoms analogous to the Cooper pairs of electrons in superconductivity. The phase transition in ^{3}He was discovered almost four decades later and a thousand times lower in temperature than the transition in ^{4}He. Another notable distinction is the constituents; the fermion pairs are magnetic and possess an internal structure which makes ^{3}He more complex and possessed of more phases than the other isotope. Professor Lee is very knowledgeable in all aspects of liquid helium and its historic 100 years of research since the discovery. Professor Lee is a strong supporter of our department and a former Katzenstein Distinguished Lecturer. We are delighted to have this spirited and dedicated physicist help us celebrate this special year.

CARBON IN THE 21ST CENTURY
Joint Meeting of the APS/AAPT New England Sections

One hundred eighty-nine registrants and seventy-three students attended the Fall 2007 Joint Meeting of the NES-APS/AAPT, Oct. 19-20, 2007, at the University of Connecticut in Storrs. The number includes three physicists from far-away South Korea who traveled exclusively to participate in this meeting; they were attracted by the popular topic "Carbon in the 21st Century." The techni-

cal program showcased invited speakers who addressed different branches of physics with the common theme of modern day carbon, including nanotubes, fullerenes and graphene.

Listing of Plenary Speakers: Tony Heinz, Columbia University, Optical Spectroscopy and Dynamics in Carbon Nanotubes; Antonio Castro Neto, Boston University, Drawing Conclusions from Graphene Carbon in the 21st Century; Walter de Heer, Georgia Institute of Technology, Nanopatterned Epitaxial Graphene: A New Paradigm for Nanoelectronics; Philip Kim, Columbia University, Relativistic Quantum Physics at Your Pencil Tips: Dirac Fermion in Graphitic Carbon; Lisa Pfefferle, Yale University, Exploration of Nanotube Structure Selectivity Using Bimetallic Catalysts. The Keynote Banquet Speaker was Sir Harold W. Kroto, Florida State University, who shared the 1996 Nobel Prize for chemistry with Richard Smalley and Robert Curl of Rice University for their discovery of the carbon-60 molecule, named Buckminsterfullerene.

In addition to the plenary talks, both the APS and AAPT sections provided opportunities for participation with contributed oral talks and poster sessions, and the AAPT component also included several workshops on Saturday afternoon. The AAPT contributors include Christine Broadbridge, SCSU; Eugenia Etkina, Rutgers; William Gerace, UMass; **George Gibson**, UConn; Laurence Gould, University of Hartford; Russell Harkay, Keene State College; **David Perry**, UConn; and Fred Myers, Glastonbury Public Schools.

"The Nature of Light
What is a Photon?"

has just been published by CRC Press. It contains up-to-date theory, practice and philosophical implications of optics. The book was edited by **Chandrasekhar Roychoudhuri**, University of Connecticut, A. F. Kracklauer, Weimar, Germany, and Katherine Creath, Tucson, AZ.

Spike Lee's production company, Forty Acres & A Mule Filmworks, has acquired the film rights to Professor **Ronald Mallett's** book, "Time Traveler – a Scientist's Personal Mission to Make Time Travel a Reality." Read more at http://advance.uconn.edu/2008/080623/08062303.htm.

The Norman Hascoe Lectures on the Frontiers of Science

The Department of Physics just enjoyed our tenth year of a lecture series funded by the late Mr. Norman Hascoe of Greenwich, Connecticut. The series, aimed at exciting undergraduates with scientific interests in frontier areas of science, is open to the public and is followed by a reception and an informal panel discussion. We were very pleased with our lectures this past year:

- Harold Kroto, Florida State University, "Science, Society, and Sustainability"
- Ignacio Cirac, Max-Planck Institut für Quantenoptik, Garching, Germany, "A Quantum Information Perspective of Many-Body Physics"
- Kenji Ohmori, Institute for Molecular Science, National Institutes of Natural Sciences and The Graduate University for Advanced Studies (SOKENDAI), Japan, "Visualizing and Controlling Picometric Quantum Ripples in Molecules"
- Robert W. Tkach, Bell Laboratories, Alcatel-Lucent, "Technologies for a Renaissance in Optical Communications"
- Flavio Maran, University of Padua, Italy, "Gold Nanoparticles, Peptides, and Electron Transfer"
- Mark Raizen, University of Texas at Austin, "Comprehensive Control of Atomic and Molecular Motion"

Nanoscale science involves application of the concepts and techniques of physics to systems at a higher level of complexity (e.g. the supramolecular and macromolecular) and is the focus of major federal research funding initiatives. Advances in nanoscale science are being made in many disciplines.

UConn Hosts 21st ICAP

Approximately 600 physicists from around the world met in Storrs starting July 27th through August 1st, at a conference that included five Nobel Prize winners: Steven Chu, Lawrence Berkeley National Laboratory; Eric Cornell, University of Colorado-Boulder/JILA/NIST; Roy Glauber, Harvard University; William Phillips, University of Maryland/NIST, and a public talk by Wolfgang Ketterle, the John D. MacArthur Professor of Physics at MIT. The conference consisted of 47 invited talks by leaders in the field and 3 poster sessions.

Prof. Roy Glauber from Harvard (2005 Nobel Laureate) delivering the after dinner presentation on the concept of the "iCap."

The 21st annual International Conference on Atomic Physics - "ICAP 2008" - was hosted by the Department of Physics at the University of Connecticut. In the area of ultracold physics, applications are the development of new technology for quantum computing and a better fundamental understanding of the properties of materials. Colder atoms would lead to more precise measurements in atomic clocks and to more accurate GPS systems. ICAP covered the latest developments in atomic physics, including a better understanding of quantum properties from the atomic and molecular level to the nanoscale.

The biennial conference was last held in 2006 in Austria and in Brazil before that. The next ICAP will be held in Australia. The co-chairmen are Professors **Robin Côté**, **Phillip Gould** and **Winthrop Smith**. Visit the conference website at http://www.phys.uconn.edu/icap2008.

Phi Beta Kappa – Epsilon of Connecticut

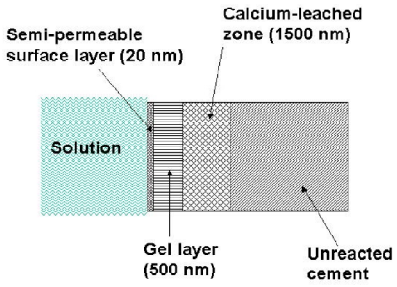
Congratulations to **Kristen Basiaga** and **Erind Brahimi** who were initiated to Phi Beta Kappa this past year.

Understanding Concrete Formation at the Nanoscale

About 12.5 billion tons of concrete are used every year throughout the world in infrastructure constructions, maintenance and repair. Various additives are placed into cement, the binder for concrete, which improve its macroscopic (large-scale) properties. Despite its common use, there is little understanding of the formation of the material on the nanoscale and steps to optimize its behavior. **Jeffrey Schweitzer**, University of Connecticut, and researchers at the Ruhr University in Germany have used a sophisticated piece of imaging equipment to study the hydration process in cement formation at a resolution of 2-3 nanometers. This process occurs when water is added to the material to make the paste-like cement.

By viewing nanoscopic properties of cement during its formation, the researchers determined how additives modify hydration. This fact, apparent over time on the nanoscale, allows matching mixtures of cement to desired applications. Understanding the mechanisms of the chemical reaction of hydration leads to control of solid and liquid components of the cement and their mixture.

Both short-term and long-term properties of concrete are becoming reliably predictable because of new knowledge at the nanoscale. There are many benefits to industry and society. Optimizing mixture composition and process parameters will obtain a better final product. Construction time for highways could be reduced, thereby alleviating congestion. Optimum utilization of cement could result also in less carbon dioxide and other pollutants released into the atmosphere.



Reaction zones in hydrating tricalcium silicate (one of the main components in the cement portion of concrete) during the induction period.

2008 Physics Olympiad

On May 22nd, 2008, the third Annual UConn Physics Olympiad took place at the Storrs campus. Seventeen teams from Connecticut high schools competed in five tasks to determine a winner. The tasks were hands-on and Physics-related from the very basic to the first-year college level: density, free fall kinematics, torques in equilibrium, forces and dynamics. With over 80 students attending from eight high schools, the Physics Olympiad received rave reviews from teachers and students for the third year in a row.

The mission of the UConn Physics Olympiad is to support physics teachers and students of Connecticut by complementing their physics curriculum and connecting high school science programs with the resources available at UConn. Within the framework of a collegiate game, we provide these students the opportunity to see physics in new ways succeeding in inquiry-based tasks, in an atmosphere of fun and creativity.

Team Williams Blues (The Williams School, New London) trying to make the slowest balloon rocket for "Up, Up & Away."

After months of planning, of much energy and enthusiasm, the Olympiad got students building towers made of pasta and playdough which hold the load at the top, creating the slowest rocket out of balloons and drinking straws, measuring frequency ratios without a timer, water-balloon bombing a moving target and estimating volume and density for a mystery egg using only skittles and water. It couldn't have been a greater success. Mr. Fontaine, Physics Teacher and Department Head at Tolland High School, sent us a comment that says it all: "On behalf of all my students and myself, I wanted to pass along a great big thank you and congratulations on another successful Olympiad." Mr. Fontaine has attended all three Olympiads with his students. "The students were very happy to have experienced a good deal of success but even more telling was hearing them talk to one another about how much fun they had. Discussions on the bus ride home were dominated by descriptions of what was done and what improvements could be made. As a bonus, they seem to have made some new friends."

Want more info on the Olympiad? Check out www.phys.uconn.edu/olympiad/. Interested in assisting us in sponsoring this incredibly effective outreach effort? Please contact Carol Guerra (carol@phys.uconn.edu).

Black Metal

Professor Chunlei Guo, Ph.D. UConn 1999, recently made a startling discovery during his studies of the interaction of ultrashort laser pulses with metal surfaces. Although metals are generally thought of as shiny and reflective, Dr. Guo has learned how to turn them black and now calls the transformed surface "black metal."

Metals are one of the most commonly used materials in everyday life, from the construction of aircraft to tiny sensors and detectors. An intrinsic property of nearly all metals is high reflectivity for electromagnetic waves. As a consequence, a fighter plane is prone to detection by radar and a metallic thermal sensor/detector will suffer low light collection efficiency. Dr. Guo has introduced a novel technique that turns highly reflective metals highly absorptive, creating the so-called "black metal." This discovery has attracted intense public interest and has been covered by hundreds of news media worldwide.

The following is from a University of Rochester press release:

"The key to creating black metal is an ultra-brief, ultra-intense beam of light called a femtosecond laser pulse. The laser burst lasts only a few quadrillionths of a second. To get a grasp of that kind of speed—a femtosecond is to a second what a second is to about 32 million years.

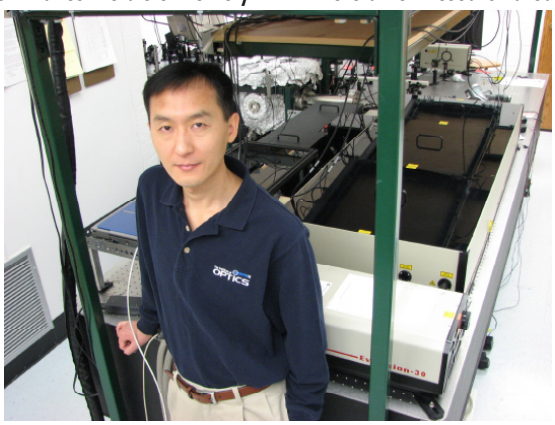
"During its brief burst, Guo's laser unleashes as much power as the entire grid of North America onto a spot the size of a needle point. That intense blast forces the surface of the metal to form nanostructures—pits, globules, and strands that both dramatically increase the area of the surface and capture radiation. Some larger structures also form in subsequent blasts.

"Guo's research team has tested the absorption capabilities for the black metal and confirmed that it can absorb virtually all the light that falls on it, making it pitch black.

"Other similar attempts have turned silicon black, but those use a gas to produce chemically etched microstructures. Regular silicon already absorbs most of the visible

light that falls on it, so the etching technique only offers about a 30 percent improvement, whereas regular metals absorb only a few percent of visible light before Guo hits them with the laser."

The huge increase in light absorption makes metals extremely useful whenever radiation gathering is needed. Some examples include: increased sensitivity of thermal sensors and detectors; efficient collection of solar energy; and improved stealth technology. In the past, non-metallic materials or black paints have been used to absorb electromagnetic waves used for detection. However, directly transforming a metal's surface to render it black will make the surface highly resistant to high temperature and wear; the metal black surface is greatly roughened by laser pulses, which can improve the efficiency for catalysts that are important for various applications including fuel cell technology.



More information on his research including a partial list of news articles can be found at http://www.optics.rochester.edu/workgroups/guo/News.htm.

With his Ph.D. from UConn physics in 1999, Dr. Guo took a postdoctoral position at Los Alamos National Laboratory from 1999 to 2001 where a new research area studies ultrafast dynamics in solids under high-intensity laser irradiation. Dr. Guo's many contributions in this area earned him The Postdoctoral Publication Prize in Experimental Sciences at Los Alamos National Laboratory. This prize is given to one or two individuals every two years for performing the most significant work in experimental sciences in all disciplines at Los Alamos.

After his postdoctoral training, Dr. Guo joined the faculty at The Institute of Optics at University of Rochester in 2001. It is the oldest optics school in the US and one of the leading optical research and educational centers in the world. There he heads a research group studying fundamental interactions of ultrashort pulsed laser with matter in different phases, including solids, gases, and plasmas.

Sigma Pi Sigma Inductees and Events

The following graduate students have been inducted into Sigma Pi Sigma for 2007-2008: **Leland Aldridge**, **Jason Byrd**, **Yi Li**, **Michael Mastroianni**, **Peter Poulos**, **Matthew Recore**, **Aaron Swindell**, **Steven Vanderveer**, **James Wells**, **William Zimmerman** and **Kishan Yerubandi**. Undergraduate students inducted include **Erind Brahimi**, **Jared Harrelson**, **Emmaris Soto**, **Mitchell Underwood**, **Gabriel Schneck** and **Lou Bachenheimer**. **Poorani Shanthakumar**, who received her Ph.D. in early spring was also inducted.

For the first time, our Chapter has the distinction of being named an outstanding chapter for 2006-2007. This award was due primarily to the hard work of **Christine Ploen** (who was inducted last year), and other officers of the Physics Club. The Club activity is at an unprecedented level, and because of the enthusiasm generated by the current officers, seems well positioned to maintain, or even surpass that level, in the coming year.

Claude Cohen-Tannoudji to Present Edward Pollack Distinguished Lecture

The third annual Edward Pollack Distinguished Lecture will be presented on Friday, October 3, 2008 by Professor Claude Cohen-Tannoudji. In 1997, Dr. Cohen-Tannoudji shared the Nobel Prize in Physics with Bill Phillips and Steven Chu for their work on laser cooling and trapping of atoms, which led to the development of new types of atomic clocks and the observation of new forms of quantum gases such as Bose-Einstein condensates and the lowest temperatures ever achieved. He is member of the French Académy des Sciences and a foreign Associate of the U.S. National Academy of Sciences. Cohen-Tannoudji and his wife Jacqueline are personal friends of Edward and Rita Pollack.

Professor Cohen-Tannoudji did his Ph.D. at the Ecole Normale Supériore in Paris in atomic physics, studying the very small "light shift" or AC Stark shift induced by light intensity on atomic energy levels, under the supervision of Nobelist Alfred Kastler and Jean Brossel. This work eventually led to the Nobel Prize. After his Ph.D., he taught at the University of Paris from 1964 to 1973, which led to his classic text "Quantum Mechanics" with Bernard Diu and Frank Laloë. He was appointed as one of only 52 professors (in all subjects) at the Collège de France in 1973, with the demanding rule that different lecture topics are required each year. Lectures are open to all. Professor Cohen-Tannoudji, recently retired from his position as Chair of Atomic and Molecular Physics at the Collège de France, is also a researcher of the CNRS Laboratoire Kastler Brossel associated with l'Université Pierre et Marie Curie in Paris. A final title for his talk in Storrs is not yet available but it is a safe bet he will mention some aspect of ma-

nipulating and “dressing” atoms with laser photons, possibly including a “trampoline” for cold atoms and atomic matter-wave Bloch oscillations in an optical lattice – an analog to electron waves in a solid crystal lattice.

This memorial lecture is an annual event in honor of the late Prof. Edward Pollack, a member of our department since the 1960s. Ed taught most of the courses in the Department at one time or another to generations of students; he was an outstanding teacher. He and his students also made impressive research contributions in the area of experimental atomic and molecular collisions. Born in 1931 in New York City, Ed received his B.S. and M.S. from the City College of New York (CCNY) in 1952. Following a stint in the U.S. Army, he taught at both New York University and CCNY, earning his doctorate under Benjamin Bederson at NYU in 1963. He was then immediately offered an appointment in physics at UConn where he served for over 40 years until his untimely death in February, 2005. The Edward Pollack Endowment for Physics, initiated by Ed’s family and friends, provides funding for this annual memorial lecture series in AMO physics.

Arrivals/Departures

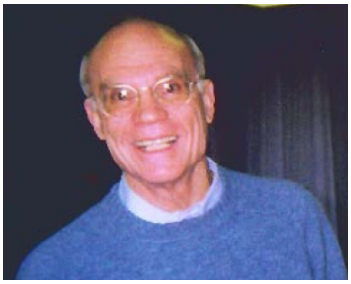
Dr. **Menka Jain** is joining the Condensed Matter Physics group as an Assistant Professor this fall. She was hired by the Institute of Materials Science in a search for an expert in materials physics and she has chosen the Physics Department as her academic home. The search for her position was international in scope and received nearly 100 applications.

Menka received her B.S. and M.S. degrees in physics from Shri Sahu ji Maharaj University in Kanpur, India, and her Ph.D. in chemical physics at the University of Puerto Rico in San Juan. While a student at San Juan she held two separate National Science Foundation Graduate Fellowships. At the completion of her graduate work, Menka initially was a Postdoctoral Scholar at the University of Puerto Rico and then moved on to the Los Alamos National Laboratory in New Mexico where she was awarded the prestigious Director's Postdoctoral Fellowship. At Los Alamos, she has studied and synthesized thin films and nanostructures of materials that are promising for next-generation electronic applications. Among the materials she has investigated are ferroelectric oxides, materials that are both ferroelectric and ferromagnetic (called multi-ferroics), and carbon nanotubes. She is an expert in the synthesis of thin films and nanostructures using MOCVD (metal-organic chemical vapor deposition), a technique of great interest to industry and to many researchers at UConn. Menka's research expertise bridges the interests of the condensed matter physics and materials science communities at Storrs and we expect that she will promote important collaborations between researchers in different academic departments.

Phil Best joined the UConn Physics Department in 1971 and retired after the spring term in 2008. He has been an imaginative experimentalist, an innovative teacher, a devoted member of the department, and a valued friend to many of us.

Like “David Copperfield,” we can begin with his birth, in Perth in Australia, where the benign climate afforded young Phil a fit life in the outdoors. He continues to favor sports on land and in water, perhaps not in the air tethered to a bungee cord, as are some of his countrymen (and women). There is still time. He earned his degrees at University of Western Australia, B. Sc. with First Class Honors and Ph.D.

Phil’s research is in electron, x-ray and infrared spectroscopies, the interaction of radiation with matter and associated topics. Prior to UConn, he was in the Physics Department and Laboratory of Atomic and Solid State Physics at Cornell, and then at the United Aircraft Research Laboratory (now United Technologies). Among his many publications in condensed matter physics are book chapters “Secondary Electron Emission” in “Encyclopedia of Physics” from 1980 (Addison-Wesley, pub.) to 2005 (Wiley-VCH, pub.). His external support was provided by the National Science Foundation and the US Army Research Office.



The National Science Foundation also supported Phil and co-workers in instructional lab development for undergrads at UConn. Since 1998, Phil has been Associate Department Head

for Undergraduate Education. In that role he has been advisor to the Physics Club and particularly to Sigma Pi Sigma, the physics honor society UConn chapter. He helped develop the basic course "Physics of the Environment," which has become a popular way for non-science undergrads to satisfy distributional requirements for graduation. He received the David Blick Science Education Award from the NEAG School of Education in 2005.

Phil's wife, Laurie Best, has retired at the same time from UConn's Office of the Registrar. They plan to divide their time between Perth, land of their birth, and Connecticut, closer to where their children and grandchildren live. If they choose to, they can experience what some people desire: a number of years without winter.

Anthony Barresi left his budget specialist position in Physics to take on new duties at the UConn Health Center. He had served as funding facilitator for faculty in Physics and as a liaison to the Office of Sponsored Programs. We wish Anthony a productive future in his new position.

Cecile Stanzione left her business manager position in Physics to take on new duties in the Department of Dramatic Arts at UConn. She was an important member of the department for nearly 7 years, serving as the primary financial administrator and overseeing the staff in the main office. Her performance met all challenges in various key tasks, for which we are grateful. We wish her good luck.

Xtreme Departures

Ad Astra Rocket Company, founded by former NASA space shuttle astronaut (6 flights) and physicist, **Franklin R. Chang Diaz** (UConn B.S. 1973), was established in 2005 in Houston, Texas, to commercialize the technology of the VASIMR engine, a plasma propulsion system originally developed by NASA with potential to support an emerging in-space transportation market. The company has, through a privatization agreement with NASA, an exclusive license to the original VASIMR patents. However, in the last couple of years, Ad Astra has added major improvements to these patents in the form of new company-owned intellectual property. Plasmas are electrically charged fluids that can be heated to extreme temperatures by radio waves and controlled and guided by a strong magnetic field. The magnetic field insulates the hot gas from any nearby structure so temperatures well beyond the melting point of materials can be achieved and the resulting plasma can be harnessed to produce propulsion. The higher the temperature of the exhaust gases, the higher the velocity and fuel efficiency. Dr. Chang Diaz invented the VASIMR™ concept and has been working on the technology since 1979. Ad Astra's mission: To revolutionize space transportation and exploration, through the development and commercialization of the VASIMR™ engine and related technologies. The company also owns and operates a supporting research and development subsidiary in Guanacaste - Ad Astra Rocket Company, Costa Rica. Dr. Chang Diaz was born in San Jose, Costa Rica and in 1995 the government conferred on him the title of "Honorary Citizen" - the highest honor Costa Rica confers to a foreign citizen, making him the first such honoree who was actually born there.

Michael Abramczyk received a 2008 Goldwater Scholar Honorable Mention. Michael is a sophomore with a double major in physics and philosophy and studies lattice quantum chromodynamics (QCD) with Professor **Thomas Blum**.

Thoughts At My Retirement ... Phil Best

These memories form a part of continuity in my life.
1. Am I a physicist yet? Wanting to become a physicist from age about 14 years, at various times in my career I would ask that question: After my B.Sc. degree, the answer was "no." After my Ph.D., the same answer! Surprisingly, after 3 years of postdoc and 5 of experimental physicist in industry the answer was the same.

Now I digress, to my undergraduate years, advanced lab. In measuring the output current of a transformer

as a function of frequency, I observed the expected linear relationship at low frequencies, but at the highest frequencies the gain rolled off, below a linear relationship. I had no idea why that was the case, and from the response of my professors, they were similarly in the dark.

A couple of years ago, in the department office, a young colleague (George Gibson) for whom I have considerable respect, seemed downcast. I inquired "why", and was told of the same puzzling result that I had met some 50 years earlier. The answer I knew intuitively, instantly: The drop-off was due to the increasing inductive reactance of the primary, with frequency. I realized then that I was, indeed, a physicist. Had I bothered to check on the question since I had begun teaching, I suspect the answer would have become "yes" after I had taught the core courses a couple of times, thus internalizing the material, in the psychological sense.

2. Fire! As a boy I loved to look at the flames of the wood fire in the fireplace of our living room, and was curious about their nature. I had occasion to revisit that question, with some clear answers, as a consultant to Advanced Fuel Research, Inc., reported by: P. E. Best, P. L. Chien, R. M. Carangelo, P. R. Solomon, M. Danchak, and I. Ilovici, "Tomographic reconstruction of fourier transform-IR emission and transmission spectra in a sooting laminar diffusion flame; Species concentrations and temperatures" Combust. Flame 85, 309 (1991). ...continuity, and

3. Approaching our 49th anniversary with my lovely bride, Laurie, I am grateful for the continuity and the strength of that enduring relationship: it is more important than my devotion to physics.

Congratulations to Professor **Gayanath Fernando** on the publication of his book "Metallic Multilayers and their Applications" published by Elsevier this year. The text is a handbook of metal physics which will be a wonderful reference for experienced researchers and students.

In Memoriam

Norman Hascoe, the Founder and CEO of Hascoe Associates Inc., Greenwich, Connecticut, passed away last October at the age of 78. Norman was a generous supporter of many charitable activities, one of which was the Norman Hascoe Distinguished Lecture Series on the Frontiers of Science. These lectures have featured eminent scientists from around the world, including several Nobel Laureates (most recently, Sir Harold Kroto). Now beginning their eleventh year, these visits allow students at all levels as well as faculty in science and engineering not only to hear the lectures, but also to interact with the lecturers and participate in panel discussions after each lecture. Norman's degrees were in Engineering and he received an Honorary Doctor of Science degree from UConn. Norman's career involved the manufacture of advanced materials and other high technology components for the semiconductor industry, and thus an important theme of the Hascoe Lecture Series is the "nanoscale science" frontier epitomized by the current semiconductor industry.

Edward N. Frisius, of Potomac, MD, passed away last November at the age of 91. After receiving a B. S. in Civil Engineering at Caltech, Edward had a rich and varied career as a professional engineer. Highlights included prospecting for oil in the Sinai Peninsula; building WWII runways for the Army; improving oilfield productivity in California and Texas; founding Santa Fe Springs, CA; designing La Mirada, CA; designing the Los Angeles storm drain system; designing the Mexicali, Mexico, water systems; serving as Research Director of the Naval Electronics Labs; and serving as Chief of Economic Analysis and Forecasting for the US Postal Service. Edward and his wife of nearly 67 years, Remy, were frequent guests at Physics Dept. events. Edward and his family generously supported the Physics Dept. and an Edward Frisius Memorial Fellowship has recently been established in his memory. Edward is survived by his wife, Remy, his children, Ramona, Mauricette, and Edward, his sons-in-law, Lewis and William, his six grandchildren, and his five great-grandchildren. Ned was an enthusiastic supporter of our department and our activities.

UConn Physics Club Hosts SPS Spring Meeting

The Physics Club at the University of Connecticut hosted the New England (Zone 1) Spring meeting of the Society of Physics Students (SPS) on March 29, 2008. Under the guidance of Dr. Christine Broadbridge, Southern Connecticut State University, the Physics Club organized a professional conference for all SPS students in Zone 1.

Students had the opportunity to present their own research projects to their peers, either through the poster session or through a colloquium-type of talk at the meeting. The plenary lectures were given by UConn's own Dr. **Ronald Mallett**, and **Drew Chieda**.

But it wasn't all work - a session of Physics Jeopardy, the viewing of the classic geek movie 'Real Genius', and dinner with the colloquium speaker, Dr. Adam Johnston, were just some of the more playful parts of the program (http://www.phys.uconn.edu/spsmeeting/) that our students put together.

The Physics Club gets kudos for an exciting and productive meeting. They even sell T-shirts as part of their fundraising efforts (contact the club officers if you'd like to order one!). More information about the club can be found at http://www.phys.uconn.edu/physicsclub/.

The Value of Undergraduate Research

On April 18, 2008, Professor **Robert Roser** (UConn B.S., 1984), Fermi National Laboratory, presented the Physics Colloquium. Rob, one of the co-discovers of the top quark, is now one of two co-spokespersons for the laboratory's 2 large collider detectors. This position makes him the leader of over 700 scientists from 63 laboratories in 15 countries. Rob gave a wonderful talk on the Search for the Higgs Boson at the Tevatron.

Three of Rob's fellow students who mentored him in Professor **Quentin Kessel's** Van de Graaff Accelerator Laboratory in the early 1980s joined him for the afternoon. The group all began their research careers as undergraduates in the laboratory. They are: **Robert Rubino** (UConn B.S. 1981, M.S. 1985), now President and Chief Technical Officer for Stran Technologies in Naugatuck; **Paul Clapis** (UConn B.S. 1978, M.S. 1980, Ph.D. 1985), currently the Director for the intelliMATCH/intelliSUITE Platform for SunGard Corporation in Livingston, NJ; and **David Olson** (UConn B.S. 1979, M.S. 1980, Ph.D. from the U. of Illinois at Urbana-Champaign in 1988, and a M.D. from UConn in 1995). Dr. Clapis continues to live in Connecticut, but travels worldwide, working with both software developers and its users. Dr. Olson lives in Woodstock and is currently the Clinical Director of the Brain Imaging Center at McLean Hospital, Harvard Medical School Department of Psychiatry. In his research at the Center, he uses magnetic resonance imaging and spectroscopy to study the functional, structural and neurochemical pathology associated with bipolar disorder, schizophrenia, depression and substance abuse.

1981 and 2008. Bob Rubino, Paul Clapis, Rob Roser and Dave Olson (l to r). Quentin Kessel is in the background of both photos.

These four led a lively discussion on graduate student life and career paths with current graduate students before the colloquium. They attribute much of their current success to their UConn education, particularly crediting their early experiences in the laboratory.

ENDOWMENT NEWS

The department is very pleased with your endowment contributions which continue to enhance our mission. The endowment of Drs. Henry and Constance Katzenstein once again brought a Nobel Laureate to campus for the eleventh annual "Katzenstein Distinguished Lecture." This fund also provides a monetary prize for the best undergraduate physics paper of the year. This year's winner is **Karen Cydylo**. The work for her senior thesis, "Experimental and Theoretical Studies of Phase Matching for Third Harmonic Generation in Air" was performed under the guidance of Professor George Gibson, who commented that "...Karen got a true research experience - we hit a lot of (apparent) dead ends, but she had the patience and determination to carry on, and ended up with a great result." Members of the Undergraduate Affairs Committee who judged this year's entries commented on the clever balance of theory with experiment. Karen is a member of the Sigma Pi Sigma and Phi Beta Kappa honor societies and managed our Physics Club this past year. She hopes to work for a few years for a laser or optical company and then return to graduate school for her Ph.D.

The Georgiana and Marshall Walker endowment rewards the student voted by the faculty as the best Teaching Assistant of the year. Congratulations to **Ting-Yu Huang**, this year's winner.

We have several maturing funds intended to support graduate students doing research. These include the Isaac S. and Lois W. Blonder Graduate Fellowship in Physics (Isaac S. Blonder was our first physics major, B.S., 1938); The Ruth and Paul Klemens Endowment (Paul is currently Emeritus Professor of Physics and was Department Head 1967-74); the Nagavarapu Graduate Award in Physics (Nagavarapu S. Mohan received his Ph.D. in 1975); and the Dwight Hills Damon Graduate Fellowship in Experimental Physics, are all continuing. Ike's endowment provided a fellowship for **Aaron Swindell** this past year and with Mohan's fund we made an offer to **James Wells**. We are pleased to announce a new fellowship account named for Edward Frisius. The account was initiated by his family, which includes Mauricette (Frisius) Stwalley, wife of William Stwalley, the Head of the Department of Physics. (Please see in memoriam article.) Income from the graduate student funds are also being used to attract the best physics graduates from across the country.

The Edward Pollack Endowment for Physics, initiated by Ed's family, supports an annual distinguished lecture in Atomic, Molecular, and Optical Physics. Last year we were pleased to host Dr. Ara Chutjian, of the Propulsion Laboratory at Caltech, who collaborated with Ed. Prof. Claude Cohen-Tannoudji, École Normale Supérieure in Paris, will present our next Edward Pollack Distinguished Lecture on October 3rd of this year.

We are grateful to all of you who contribute to these funds. Many of you respond to the general solicitations sent out by the University; we would be delighted if you used the fund numbers on the next page to direct such contributions to the Physics Department. We appreciate your assistance supporting and educating our students.

APS Awards to UConn Physicists

The American Physical Society (APS) instituted the Outstanding Referee Award program and recognized 534 referees (out of 42,000) for the Outstanding Referee designation in 2008, the inaugural year; 130 will be honored annually in the future. Four UConn faculty received this lifetime award: **Robin Côté**, **Juha Javanainen**, **William Stwalley** and **Susanne Yelin**. In addition, Robin Côté was also elected as an APS Fellow this year "For contributions to the study of ultracold systems, and the effect of long-range interactions in ultracold Rydberg gases, atom-ion mixtures, and the formation of ultracold molecules."

Making a Gift

There are many ways of making a gift including checks; marketable securities; planned or estate gifts; and through payroll deduction for University employees. Checks should be made payable to The University of Connecticut Foundation, with a cover note directing your gift. All gifts are eligible for tax deductions as The University of Connecticut Foundation, Inc., is recognized as a 501(c)(3) non-profit organization. Donors have the option of remaining anonymous if they wish.

STAY IN TOUCH

We've added a feature to our departmental web page that also assists our Alumni Office in updating their records. We would like to start an email distribution list for our Physics Alumni so that we can update you promptly when we have important news to share. Please help us by logging on to our site http://www.physics.uconn.edu and clicking onto the link for Alumni. That will take you to a page that requests your contact info, including your email address. There is also a place for any comments you would like to send us. We want to keep in touch and keep you posted. Thank you for your assistance.

I/we would like to support the Physics Department programs.
Please direct my gift of $_____ to:

- Edward Frisius Memorial Fellowship (22520-2014)
- Space-Time Twisting by Light Project (22398-2014)
- Time Domain Fund (22457-2014)
- Dwight Hills Damon Graduate Fellowship in Experimental Physics (31028-2014)
- Edward Pollack Endowment for Physics (30958-2014)
- Ruth and Paul Klemens Endowment (30951-2014)
- Kurt Haller Endowment for Physics Research and Graduate Education (30911-2014)
- Marshall and Georgiana Walker Graduate Award Fund (30876 -2014)
- Nagavarapu Graduate Award in Physics (30723-2014)
- Katzenstein Distinguished Lecture Series Endowment (30438-2014)
- Charles Swenberg Memorial Endowment (30641-2014)
- Isaac S. and Lois W. Blonder Graduate Fellowship Endowment (30743-2014)
- Physics Department Unrestricted Fund (20351-2014)
- Physics Olympiad (payable to "UConn" and mailed to Dept of Physics) (20352-2014)

Matching Gift

I work for a matching gift company. The form is enclosed.

My company is: _____

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Should you wish to support one of these efforts, please send your contribution directly to the University of Connecticut Foundation with the fund number of the program of interest to you written on your check.

University of Connecticut Foundation
2390 Alumni Drive, Unit 3206
Storrs, CT 06269-3206

Thank you for your support!

Any news about yourself that you are interested in sharing? We have enjoyed the unsolicited mail we receive as a result of our newsletters so now we're actively soliciting. Please send suggestions to: David Markowitz, Editor, at the Department address.

SAVE THE DATE
October 24, 2008

Invitations for the Katzenstein dinner are about to be mailed. If you are interested in attending but do not receive your invitation by the end of September, please contact Kim Giard at 860-486-4924, email: kim.giard@uconn.edu.