The University of Connecticut

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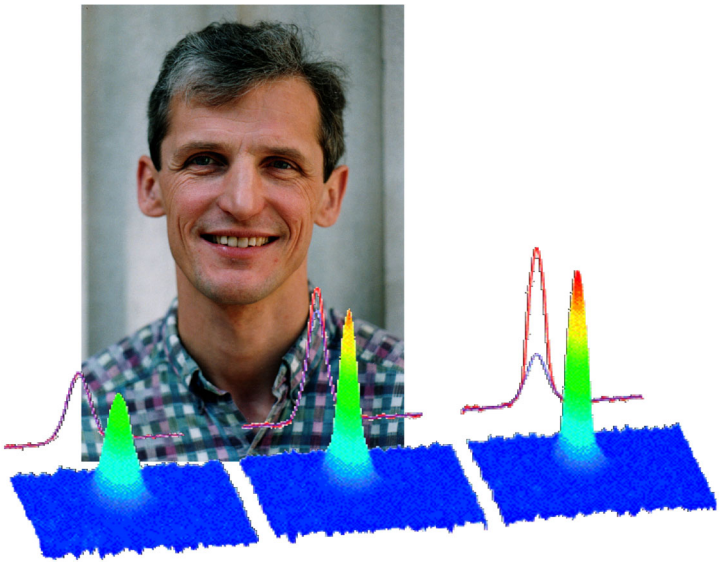


Wolfgang Ketterle, Katzenstein Distinguished Lecturer

Friday, September 15, 2006

Nobel laureate Wolfgang Ketterle, the John D. MacArthur Professor of Physics at the Massachusetts Institute of Technology, will be our guest to deliver the 2006 Katzenstein Distinguished Lecture on September 15, 2006. His talk is "New Forms of Matter Close to Absolute Zero Temperature." Professor Ketterle shared the 2001 Nobel Prize in physics, "for the achievement of Bose-Einstein condensation in dilute gases of alkali atoms, and for early fundamental studies of the properties of the condensates." The prize was shared with Eric Cornell, a former Katzenstein Lecturer, and Carl Wieman, both from the University of Colorado.

Professor Ketterle's research is in atomic physics and laser spectroscopy. He uses laser cooling and trapping of neutral atoms to explore new aspects of ultracold atomic matter, including but not limited to gaseous Bose-Einstein condensates. He was among the first researchers to observe a Bose-Einstein condensate in an ultracold dilute gas in 1995 and was the first to demonstrate the atom laser in 1997. Today, his research group uses large samples of ultracold atoms at nanoKelvin temperatures for research on topics such as sound, superfluidity, and properties of miscible and immiscible multicomponent condensates. These topics are interdisciplinary with condensed matter physics.

The field of atom optics has been invigorated by Professor Ketterle's development of the atom laser, which exploits the coherence properties of the Bose-Einstein condensate. Coherent beams of atoms extracted from the condensate are analogous to optical laser beams. Professor Ketterle's research group has used Bose-Einstein condensates as amplifiers for light and for atoms. This allows extremely precise measurements due to unprecedented control of the position and velocity of atoms provided by coherence of condensates.

In his lecture, Professor Ketterle will describe new forms of matter that appear at ultracold temperatures, well below one millionth of one degree Kelvin, where the wave nature of matter becomes explicit and visible. Starting with the Bose-Einstein condensate, now using similar techniques, his group creates other novel forms of "designer matter." The condensate is closely related to both superfluidity in liquid helium and superconductivity in metals. However, the experimentalist studying ultracold, dilute gases has fine control over system parameters that is unavailable to those studying liquid helium or a solid superconductor. Thus Professor Ketterle hopes to use dilute gases to gain further insight into these other physical systems, perhaps helping solve long-standing problems such as high-temperature superconductivity.

Wolfgang Ketterle received a diploma (equivalent to a master's degree) from the Technical University of Munich (1982), and a Ph.D. in Physics from the

University of Munich (1986). After postdoctoral work at the Max-Planck Institute for Quantum Optics in Garching, Germany, the University of Heidelberg and MIT, he joined the physics faculty at MIT (1993), where he is now the John D. MacArthur Professor of Physics. His awards include a David and Lucile Packard Fellowship (1996), the Rabi Prize of the American Physical Society (1997), the Gustav-Hertz Prize of the German Physical Society (1997), the Discover Magazine Award for Technological Innovation (1998), the Fritz London Prize in Low Temperature Physics (1999), the Dannie Heineman Prize of the Academy of Sciences, Goettingen, Germany (1999), the Benjamin Franklin Medal in Physics (2000), and the shared Nobel Prize in Physics (2001). Professor Ketterle is an eminent physicist, an excellent speaker, and a friend to the department; we are thrilled he is coming to visit.

International Association for Relativistic Dynamics 2006 Conference

The International Association for Relativistic Dynamics (IARD) held its 5th biennial meeting here at Storrs on June 12-14, 2006. Researchers attended from around the world and in a variety of fields involving relativistic dynamics, general relativity, high energy scattering, quantum field theory, and conformal field theories. University of Connecticut physics department members who spoke were **Philip Mannheim**, **James O'Brien**, **Michael Lublinsky**, and Munir Islam's collaborator, Alexei Prokudin, also spoke.

At a banquet honoring **Kurt Haller**, Kurt's wife, Lottie, attended as our guest of honor. Words of appreciation of Kurt's work and life were given by **Ron Mallett** and Phil Mannheim (the conference local organizers) and by **Munir Islam** and Larry Horwitz.

The conference was generously supported by the University of Connecticut Research Foundation, the College of Liberal Arts and Sciences, the Department of Physics and the University of Connecticut Conference Services.

2006 Cross Border Workshop Held at the UConn Physics Department

From June 1-3, 2006, the Physics Department hosted the 8th Annual Cross Border Workshop on Laser Science. This workshop brings together researchers from Northeast United States and Eastern Canada and was organized this year by Prof. **George N. Gibson**. The location moves among the participating universities and has been at University of Rochester, University of Michigan, University of Toronto, and the National Research Council of Canada in Ottawa.

Topics vary from year to year depending on what's new and what are the research specialties at the host institution. This year, the focus was on ultrafast biophotonics, quantum imaging with ultrashort laser pulses, quantum information, and cold atom phenomena. Some 40 people attended, including graduate students, postdocs and professors from 10 different universities. A special guest was brought in from Arizona State University, Neal Woodbury, who is the director of the Center for Bio-Optical Nanotechnology. Dr. Woodbury talked about the primary events in photosynthesis, which have been elucidated with ultrafast laser spectroscopy. Other notable speakers were Joe Eberly, University of Rochester and Misha Lukin, Harvard University, in addition to several UConn faculty.

New CASE Members

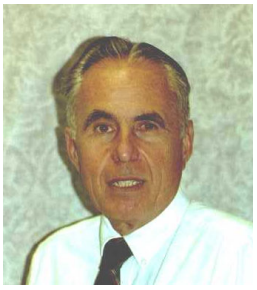
The Department would like to congratulate our newly-elected members of the Connecticut Academy of Science and Engineering. The new members were honored at the 31st Annual Meeting and Dinner held on May 24, 2006. Pictured are **Andrey Dobrynin**, **Gerald Dunne** and **Win Smith**. Also elected were **Phillip Gould** and **Juha Javanainen**.

First Edward Pollack Distinguished Lecture: Prof. C. Lewis Cocke

A distinguished lecture series in the field of atomic, molecular and optical physics has been established in memory of long-time UConn physics professor Ed Pollack. The first lecture was presented on Monday, April 17, 2006 by C. Lewis Cocke of Kansas State University on the topic: "Seeking Ways to Measure Atomic Dynamics in Real Time." Prof. Cocke was the 2006 recipient of the prestigious Davisson-Germer Prize of the American Physical Society. The citation read: "For a sustained record of novel experimental developments and new insights into interactions of ion and photon beams with atoms and molecules."

Prof. Cocke described his attempts to make "experimental movies" of the motion of atoms in an ion-atom collision as well as in atomic and electron rearrangements in a molecule during an ultrafast laser pulse. Cocke exploited a technique known as COLTRIMS to measure in coincidence the momentum vectors of product ions and atoms following an energetic collision. In an ion-atom collision, diffracted electrons ejected from the inner atomic shells in-effect take a picture of the quasimolecule formed during the collision, exploiting correlation of momentum vectors of the diffracted electrons and the final fragmentation process. Cocke and his colleagues at Kansas State, recognizing that close encounters in ion-atom collisions occur on a sub-picosecond ($<10^{-12}$ s) or even femtosecond (1 fsec $=10^{-15}$ s) time scale, are now using ultrafast (~ 10-100 fsec) laser pulses to study the double ionization and breakup of hydrogen and other small molecules. Photofragments (ions, atoms and electrons) are detected in a variation on the COLTRIMS technique and lab-frame data are transformed into a body-fixed molecular frame to reveal the dynamics of the molecular breakup. A pair of laser pulses with known delay (pump-probe) provides an external clock on the ultrafast time scale of the atomic dynamics. During his visit, Cocke consulted with a number of our faculty and visited our laboratories.

This memorial lecture will be an annual event. Prof. Pollack, a mainstay of our department since the 1960s, died of cancer on February 11, 2005. Ed taught a wide variety of physics courses at UConn and made impressive contributions to scholarship in experimental atomic and molecular physics. He was an outstanding teacher and took great pride in the accomplishments of his advisees. Born in 1931, in New York City, Ed received his B.S. degree in 1952 from the City College of New York (CCNY), a school long known for producing first-rate physics graduates. After completing his M.S., he served in the U.S. Army in 1954, undertaking research at Fort Detrick in Maryland. Subsequently, he taught physics at New York University and CCNY, earning a doctorate from NYU in 1963. Ed immediately received an appointment to teach physics at UConn during the administration of President Homer Babbidge, and made the university his professional home for over four decades.



Recently Ed secured NASA funding for research in charge-transfer atomic collisions in a research partnership with the Jet Propulsion Laboratory at the California Institute of Technology and a research team at Connecticut College. Profs. **Quentin Kessel** and Win Smith are carrying on this project with postdocs and students.

The Edward Pollack Endowment for Physics, initiated by Ed's family, provides funding for the lecture series. We were very happy that Ed's wife, Rita, joined us for this momentous event – by all accounts a tremendous success – and are looking forward to future distinguished lectures. We feel very fortunate to be able to honor Ed in this way.

DOE Outstanding Junior Investigator Award

Professor **Thomas Blum** recently won national recognition as a promising young scientist, winning an "Outstanding Junior Investigator" grant from the U.S. Department of Energy. The award recognizes Tom's significant contributions to high energy physics, and in particular his leadership in the field of lattice gauge theory. The DOE Outstanding Junior Investigator program began in 1978 and awards are presented to a select group of young high energy physicists. Tom received one of just seven awards nationwide, chosen by peer review, from among 65 proposals submitted to the Office of High Energy Physics. Congratulations, Tom!

World Year of Physics 2005: Einstein Celebration

In the Fall of 2005, the Physics Department celebrated the centennial anniversary of Einstein's miracle year 1905 with outreach programs and an Einstein centennial colloquium series.

Gayanath Fernando and **Elizabeth Juarros** organized several events for middle and elementary school students in Connecticut. At one such event (at Mansfield Middle School), nearly 400 students in grades seven and eight from three local middle schools (Ashford, Mansfield, and Willington) responded very enthusiastically to the time travel documentary presented by Ronald Mallett. Later, Elizabeth Juarros held the students' attention with her explanation of concepts related to light and sound (pictured above), while **Anne Wrigley** and **Kalum Palandage** illustrated with demos. An article written by Gayanath Fernando about Einstein's "Miracle Year" was distributed to the students. Letters of appreciation were received by the principal organizers from Principal Jeff Cryan, Mansfield Middle School, and Ms. Susan Irvine, the enrichment teacher at Southeast Elementary School (along with kind words from the Dorothy Goodwin Elementary School), thanking them for the World Year of Physics presentations.

The Einstein Centennial Colloquium Series, which ran from September 2 through December 2, featured 11 researchers from around the country. The lectures covered the entire range of physics (condensed matter, quantum optics, relativity, and cosmology) rooted in Einstein's seminal contributions including his ethical considerations. Speakers included: Randy Hulet (Rice University), Ron Mallett (UConn), Patricia Rife (University of Maryland), Frank Wilczek-Nobel laureate (MIT), Dan Kleppner (MIT), Michael Stroscio (University of Illinois Chicago), Francis Everitt (Stanford University), Alan Guth (MIT), Marlan Scully (University of Texas Austin), Georgi Dvali (New York University), and John Donoghue (UMass).

The UConn physics department world year of physics committee included Thomas Blum, **Samuel Emery**, Gayanath Fernando, Elizabeth Juarros, Ronald Mallett (Chair), **Cynthia Peterson**, **Chandra Roychoudhuri, Robert Schor,** and Winthrop Smith. Thanks to all of you from all of us who enjoyed the Einstein Celebration.

The Norman Hascoe Lectures on the Frontiers of Science

The Department of Physics has continued to play a leading role in a new lecture series funded by Mr. Norman Hascoe of Greenwich, Connecticut, aimed at exciting undergraduates with scientific interests in frontier areas of science. Each lecture is open to the public and is followed by a reception and an informal panel discussion. We are now in our eighth year and enjoyed several wonderful lectures this past year:

1. Lois Pollack, Cornell University, "Microfabrication and X-ray Scattering: New Tools for Studying Protein and RNA Folding"
2. Marilyn Gunner, City College, "The Role of Buried Charged Groups in Proteins"
3. Matthew Begley, University of Virginia, "Chemo-Mechanical Interactions Between Adsorbed Molecules and Thin Elastic Films: Implications for Micro-Device Development"
4. Markus Arndt, Universitat Wien, "Quantum Physics and Reality"
5. Alain Aspect, Institut d'Optique, "From Einstein Intuition to Quantum Bits: The Amazing Properties of Entangled Photons"
6. Jelena Vuckovic, Stanford University, "Nanophotonic Devices and Circuits for Classical and Quantum Information Processing"

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. Numerous disciplines are making advances in nanoscale science. We hope to continue to expand our lecture program and include even more areas of science in the coming year.

Connecticut Medal of Science

Governor Jodi Rell presented the prestigious Connecticut Medal of Science to **William C. Stwalley**, Head of the Department of Physics, at a ceremony in Hartford on September 28, 2005. The Connecticut Academy of Science and Engineering and the Connecticut Department of Higher Education organize the nomination process. The Connecticut Medal of Science, modeled after the National Medal of Science, was created by the state legislature and is Connecticut's highest award for scientists and engineers. The award is presented every other year to recognize extraordinary achievements in scientific fields crucial to Connecticut's economic competitiveness. Professor Stwalley will be permanently featured at the new Connecticut Center for Science and Exploration.

Bill at the award ceremony with Valerie Lewis, Commissioner of Higher Education, and Governor Jodi Rell.

"I'm pleased to be recognized for my work by the State of Connecticut and the prestigious institutions that present this award," said Stwalley. "Not only does it reflect well on me, my students, and my departmental colleagues, but also on the University as a whole. There is a great deal of extraordinary work taking place at UConn, and our department is an important contributor to science and high technology."

Peter Nicholls, university provost and executive vice president for academic affairs, says, "Bill Stwalley is an immense talent and an exceptionally valuable asset to the University. His work and the work of his students and colleagues in the physics department have helped make it a leader in the field. Its standing will only continue to grow under his leadership and through their remarkable research. This honor was truly well deserved."

We couldn't agree more. Congratulations, Bill!

2006 Physics Olympiad: The Adventure Begins!

Have you ever wondered how many rice krispies can fit in a balloon? Or, indeed, how would they get in there? Or what you would have to do to make sure your water balloon hits the moving target when you're throwing your projectile from your office window on the first floor? Well, we have! It turns out a balloon can hold over two pounds of rice krispies if you grind them up. And as for your balloon attack- you are better off sacrificing one of your balloons as a test. How do we know this? The 2006 UConn Physics Olympiad!

On May 25th 2006, the first-ever UConn Physics Olympiad took place at the Storrs campus. Seventeen teams from Connecticut high schools participated in five tasks to determine the winner of the competition. The tasks were hands-on and physics-related, covering several themes in physics, from the very basic to the first-year college level: electricity and magnetism, center of mass and torque, density, kinematics and mass distribution. With over 80 students attending from 10 different high schools in the state, the first Physics Olympiad received rave reviews from teachers and students alike.

The Olympiad was modeled on the Yale Physics Olympics, in at attempt to foster interest in physics and create connections with schools and students in our area. At a time when

everything points to a crisis in science education at the high school level, we wanted to offer up our resources to local high schools and show that physics can be fun and exciting.

With this purpose in mind, a group of faculty, staff, graduate and undergraduate students formed the organizing committee. Funding was received from the Society of Physics Students in the form of the Marsh White Award; the College of Liberal Arts and Sciences; the Office for Early College Experience; a private donation from Mrs. Carini in memory of Dr. Carini; materials from Mansfield Supply; the members of the Organizing Committee and the Department of Physics.

After months of planning, much energy and enthusiasm, the Olympiad took place on May 25th. The result? A success without question. Raisa Roginsky, winner of the Teacher of the Year Award, from Guilford High School, wrote "thanks very much for the event! Good timing, great organization!" Kim Lowell, Physics Teacher from Newtown High School, said "My students and I had a great time. We look forward to coming again next year!!" Students from Bloomfield High School rated the Olympiad with "a 10. It was excellent in every way." They also wrote "The Olympics were tons of fun. UConn should absolutely continue this in years to come." Mr. Fontaine, from Tolland High School, wrote "Our students could not stop talking about the Olympiad and were appreciative of the gifts and the support from your entire entourage. It was a great time for all of us and I already know of some underclassmen that are looking forward to their chance to take part in next year's Olympiad."

Pictured above are, Lego group: Teams Warhawks 1 and Warhawks 2 from Bloomfield High School ; and Milford 1 and Milford 2 from Jonathan Law High School. Legos for Big Kids Task. On previous page, Balloon Group: Team Ohm My Voltage from Westbrook High School; team Titans from Mark T. Sheehan High School; and teams Tolland A and B from Tolland High School. Elliptical Target (aka Water Balloon Drop) Task. More photos are available on the website: http://www.physics.uconn.edu/olympics/

Schlumberger Fellowship

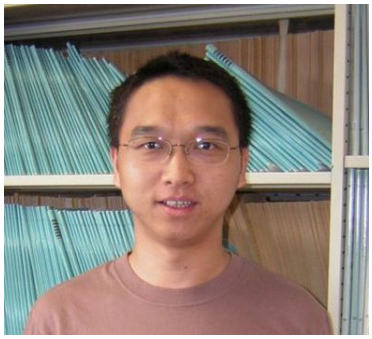
Min Yu, a second year graduate student working under the supervision of Professor Gayanath Fernando, has won a Schlumberger Women in Science and Engineering fellowship. The pool of applicants hail from over 20 countries and were all well qualified students with plans to pursue graduate studies in science and engineering world-wide. Min's research work with Professor Fernando is focused on theoretical studies of CdSe nanoparticles and carried out in collaboration with Professors Rampi Ramprasad and Fotios Papadimitrakopoulos in the Departments of Chemical Materials and Biomedical Engineering and Chemistry, respectively. Their publication was just accepted in the prestigious "Applied Physics Letters" and has been chosen as an important contribution to the frontier of nanoscience by editors of several American journals. Min plans to attend graduate school in Urbana and work with another colleague of Prof. Fernando.

Thomas Welsh, Physics B.S. '75, '80 J.D. is a regent elected to the American College of Commercial Finance Attorneys. He is an attorney with Brown & Welsh, P.C. and lives in Meriden, Connecticut.

Arrivals/Departures

Lorraine Smurra, our highly capable program assistant, retired at the end of the spring semester. We wish her the best in her future endeavors (e.g. spending more time with her grandchildren and the rest of her family, rooting for the Red Sox) although we are sorry that she is no longer part of our team. Lorraine has effectively managed the graduate, undergraduate and REU programs for the last seven years. She had excellent rapport with students, staff and faculty. While we could continue to enumerate her talents, let us just say that her wisdom and wit are sorely missed.

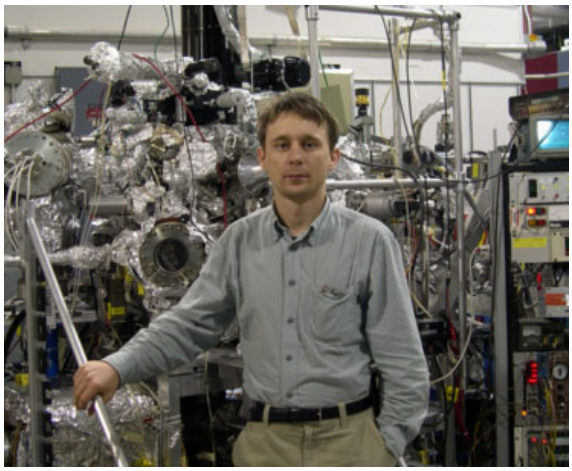
We were able to entice **Nicole Hryvniak** to take Lorraine's place on our team. Nicole, a New Jersey native, received her B.A. in Sociology from Rutgers University. She most recently worked in Admissions at Rutgers in New Brunswick. She is currently getting used to country life with her beagle, Baxter, and looking forward to the upcoming basketball season. We are impressed with her skills and are excited to have her join the staff in Physics.



Qinghai Wang joined the UConn Physics Department High Energy Theory Group as a Postdoctoral Fellow beginning in Fall 2005. Qinghai obtained his B.S. and M.S. at the University of Science and Technology of China and his Ph.D. in 2005 in Physics at Washington University in St. Louis, under the supervision of Professor Carl M. Bender. Qinghai is an expert in quantum field theory and mathematical methods in theoretical physics and will be working with Gerald Dunne. We welcome him to UConn!

Dr. **Lukasz Plucinski** joined Prof. Sinkovic's group during the 2005/2006 period. Lukas is a native of Poland with a Ph.D. degree from Hamburg University in Germany. His thesis research was on the electronic structure of semiconductor surfaces under the supervision of Prof. R. L. Johnson and was carried out at the Hamburg Synchrotron Radiation Laboratory (HASYLAB). In 2003 Lukasz came to the United States to work as a postdoctoral fellow in the group of Prof. K. E. Smith of Boston University where he continued work on semiconductors.

In Prof. Sinkovic's group at UConn, Lukasz embarked on studies of magnetic surfaces and interfaces. He worked mainly at the National Synchrotron Light Source (NSLS), a part of the Brookhaven National Laboratory (BNL) on Long Island, NY. At NSLS he employed a highly specialized technique of spin-resolved photoemission that is performed in very few laboratories worldwide. His research has elucidated the spin character of particular electronic states that are responsible for the spin-dependent tunneling in ferromagnet/insulator/ferromagnet junctions. Such junctions produce a large magnetoresistance that is currently being explored for use in magnetic RAM memory and is expected to be marketed in the foreseeable future.



In June of 2006 Lukas accepted another postdoctoral position at the Advanced Light Source (ALS, part of the Lawrence Berkeley National Laboratory in California) in

the group of Prof. C. S. Fadley. There he will do high-energy high-resolution photoemission experiments. Interestingly, part of this new work will be carried out in Germany, thus completing Lukas' professional experience in the States.

Guest Professors

During the months of October and November 2005, the Physics Department was fortunate to host Professor **Walter Gloeckle**, funded by the UConn Research Foundation through the Visiting Professor program.

Walter Gloeckle, a freshly retired professor at the University of Bochum, Germany, is an internationally known expert in the area of few-body systems. Together with researchers in Germany, Japan and Poland, he developed over years a reliable method for solving the quantum-mechanical equations for scattering of an incident projectile on a target composed of two bound particles that subsequentially break up or form new arrangements. This work was directed towards nuclear particles, and, combined with numerous experiments, will determine the nature of the nuclear forces.

One purpose for Professor Gloeckle's visit was to acquaint the atomic physics community with three-body methods commonly used in the nuclear domain. Those in vogue in atomic physics are considerably different from the nuclear counterpart, although both aim to solve the same underlying Schroedinger equation. Gloeckle presented four different talks in the Physics Department and one colloquium in the Mathematics Department. With Professor **George Rawitscher** he wrote a long paper adapting the nuclear methods to atomic physics.

Professor Gloeckle's visit injected new vigor into the "three-body" expertise of the Physics Department. This area is increasingly important for ultra-low temperature atomic physics, for which our department is well known. Applications include creation of a Bose-Einstein condensed state of atomic molecules out of a substrate of unbound atoms, which is heavily affected by three-body processes, and reactions between atoms and molecules in interplanetary space or in the earth's atmosphere, the latter related to global warming studies.

Our Physics Department is very fortunate to receive a Guest Professorship award from the University of Connecticut Research Foundation to bring Professor **Aharon Davidson**, of Ben Gurion University of the Negev in Beersheva Israel, to Storrs for the months of August and September 2006.

The author of over 80 articles, Dr. Davidson is currently a full professor at Ben Gurion, having joined its faculty in 1984, after holding a career development chair at the Weizmann Institute, an honor given only to Israel's most promising young physicists. He has been a visiting professor at the University of Melbourne in Australia, McGill University in Canada, and Syracuse University, and a Rothschild Fellow at the University of Maryland upon receiving his Ph.D. at the Technion in Israel in 1977. On three separate occasions he has received a Best Lecturer Award from his home institution.

Dr. Davidson is a theoretical elementary particle physicist known for grandunification of the fundamental strong, electromagnetic and weak forces, and on their possible unification with gravity through the introduction of extra spacetime dimensions in addition to the four familiar ones.

Dr. Davidson has visited us regularly but will provide added benefits as Guest Professor. He will present an extensive series of lectures to our faculty and graduate students on grandunification of the fundamental forces and higher-dimensional gravity, topics of his expertise that our students are not ordinarily exposed to. He will give a department research colloquium, and some less formal presentations to our graduate students and majors.

Jin-Tae Kim, former graduate student of Bill Stwalley, returned to Storrs in December 2005. Jin-Tae, Professor and Head of the Department of Photonic Engineering at Chosun University in Korea, will spend his sabbatic leave here at UConn.

Jin-Tae received his Ph.D. in Physics from the University of Iowa in 1995, completing the last two years of his thesis research on laser spectroscopy at UConn before joining **Ed Eyler**'s group as a postdoctoral fellow working on H_2 spectra. He returned to

Korea for a position in the Korea Atomic Energy Research Institute before accepting a faculty position at Chosun University.

Jin-Tae has been working with **Dajun Wang** and **Court Ashbaugh** on laser spectroscopy and ultracold molecule formation in KRb, as part of the NSF-supported ultracold molecule project co-directed by Bill Stwalley, Phil Gould and Ed Eyler.

Jin-Tae and his wife are enjoying their return to Connecticut and introducing their children to the U.S.

FROM RUSSIA WITH INTENSITY

Joe Budnick and **Doug Pease** are in the midst of a long series of experiments on doped alloys using an innovative Xray detector. It is cunningly based on elegant math, brilliant construction and international intrigue. Doug explained it to the editor, who hopes that no serious errors have crept into this meager summary. Details have been published in full.

The log spiral of revolution (LSR) detector has the shape presented in math methods texts. It is the natural shape of growth of the chambered nautilus. There is debate over how it benefits the nautilus but the benefit to the detector comes from its remarkable geometric properties.

The shape is a graph of an equation in which the radius (distance from the origin) varies exponentially with the polar angle. DesCartes showed four centuries ago that all straight line rays from the origin intersect the LSR at the same angle. Thus the origin is the focal point for rays traced back from a source and incident on the LSR at that angle. The first Xray application was by (a different) deBroglie one century ago.

Now we enter solid state physics and recognize that planes of atoms scatter preferentially at the Bragg angle for the crystal. We arrange the special angle of the LSR to agree with the Bragg angle. If it can be built, the result is a reflector with exceptional focusing ability.

A secret process was invented by two Russians whereby any smooth shape can be deposited with essentially single crystal, highly oriented pyrolytic graphite (HOPG), the brightest Xray reflector known. Doug has the desired unique shape machined out of plexiglas with a computer-assisted lathe and he sends it to these Russians. He receives back the highly focusing reflector, a monochrometer with a tremendous solid angle. Nothing else comes close.

Chromium doped vanadium oxide is a candidate Mott-Hubbard metal insulator system. At 0.3% Cr it is conducting. At 1% Cr it is insulating. In forty years of study no one has been able to look at the Cr environment before. Conventional XAFS fails because the Cr fluorescence is swamped by that of V, present in large numbers and just to the left of Cr in the periodic table. Other detectors fail for other reasons.

The punchline is that the LSR works beautifully. The Budnick/Pease research group has already discovered several features of the doped alloy system that either contradict a former idea in the field or go further than anyone has before in suggesting a mechanism for the metal-insulator transition. The group has used the same technique on doped ferroelectrics and published their results. There seems to be no end to the usefulness of this detector.

AAAS Fellow

William C. Stwalley was elected to the rank of AAAS Fellow by the American Association for the Advancement of Science. The council elects members whose "efforts on behalf of the advancement of science or its applications are scientifically or socially distinguished." Professor Stwalley was honored for his distinguished career in academic research and teaching and for numerous important contributions to the development of basic and applied atomic physics. The honor of being elected a Fellow of AAAS began in 1874 and is acknowledged with a certificate and a rosette, which were presented to Prof. Stwalley on February 18, 2006 in St. Louis during the AAAS Fellows Forum, part of the Association's Annual Meeting.

Time Travel Book Release

Ron Mallett has completed a personal memoir/popular science book entitled " Time Traveler: A Scientist's Personal Mission to Make Time Travel a Reality." The book will be released in November 2006 by the Avalon publishing group. For more information please log on to Ron's home page at http://www.physics.uconn.edu/~mallett/main/book.htm.

In Memorium

Connie Katzenstein (10/5/1927-4/25/2006)

We are sorry to report that on April 25, 2006 Constance Allenberg Katzenstein known to us as Connie passed away. She and her late husband Henry were great friends of the Physics Department. The Katzensteins gave generously through an endowment which has enriched the UConn Physics Department and will continue to do so. In particular it made possible the annual Katzenstein Distinguished Lecture as well as the Katzenstein Prize for Undergraduates. This coming September 15, 2006 Professor Wolfgang Ketterle of MIT will be the 11th Nobel Laureate in 11 years to deliver the Katzenstein Lecture. This lecture is the highlight of our academic year. We remember fondly the annual visits of Connie and Henry.

Connie was born October 5, 1927 in Memphis, TN and raised in Chicago. She attended the University of Chicago where in 1949 she met and married Henry. Connie and Henry moved to Storrs where Henry received his Ph.D. (the first in Physics) in 1954. She was the mother of David, Ruth, Amy and Robert and the grandmother of nine grandchildren. She thoroughly enjoyed her family and was extremely proud of all of them. After moving to California in 1962, Connie completed a Master's and then a Ph.D. in Clinical Psychology through the University of Chicago. She practiced psychotherapy until she retired in 1993. She accomplished all this while raising her children and participating in peace, justice and civil rights organizations.

Connie Katzenstein was a remarkable lady, a joy to be with, and we will miss her.

Teaching Award

Raisa Roginsky of Guilford High School was presented the University of Connecticut 2006 Award for Excellence in High School Physics Teaching. The Physics Department initiated this award to forge closer bonds to high school physics teachers, and to recognize that the university community values the efforts of our high school colleagues. While some physicists decide on physics as a career while at a university, most decide at the high school level. Therefore, if this country is to educate enough physicists to meet tomorrow's needs, most of them will have to come from high school physics courses. Mrs. Roginsky teaches "exciting, vibrant courses that challenge and inspire our students": this gets them in. In addition to excitement there must be quality instruction, which she also provides. Her students have won the Yale Physics Olympics two years in a row, and were first in both JETS (engineering competition) and Physics Bowl (twice). Currently, former students of hers are Ph.D. students in physics at Stanford, Georgia Tech, and MIT.

Einstein's Brane

Professor Philip Mannheim has authored the book "Brane-Localized Gravity", published by World Scientific Press, released in October 2005. Brane gravity (wherein our four-dimensional universe is taken to be a brane or membrane embedded in some higher-dimensional space) is one of the most active areas of current research in elementary particle theory. Professor Mannheim's book on the subject provides a detailed pedagogical introduction to the subject for students and workers in the field.

DOE Grant

Professors Doug Pease, Anatoly Frenkel (Yeshiva University) and Joseph Budnick have been funded by the Department of Energy to study metal-insulator transition materials. The proposal title is "Study of Phase Separation as Related to the Metal-Insulator Transition in Chromium Doped V_2O_3." The grant is for three years and began in January of 2005. Crucial to this proposal is the log-spiral-of-revolution x-ray detector developed by Doug and numerous collaborators.

ENDOWMENT NEWS

Your endowment contributions continue to add to our "quality of life" in important ways. The endowment of Drs. Henry and Constance Katzenstein once again brought a Nobel Laureate to campus for a tenth annual "Katzenstein Distinguished Lecture." Additionally, this fund provides a monetary prize for the best undergraduate physics paper of the year. This year the Katzenstein Prize for the best science essay by a graduating senior was won by Charles (Chad) E. Rogers III for his paper "Optical Frequency Control by Phase Modulating a Self-Injection-Locked Diode Laser" (more below). The Georgiana and Marshall Walker endowment rewards the student voted by the faculty as the best Teaching Assistant of the year. Congratulations to **Marek Krasnansky**, this year's winner.

Maturing endowments include those established by Isaac S. Blonder (our first physics major, B.S., 1938), Paul Klemens (Professor of Physics and Department Head 1967-74), and Nagavarapu S. Mohan (Ph.D., 1975). Ike's, the Isaac S. and Lois W. Blonder Graduate Fellowship in Physics, Paul's, the Ruth and Paul Klemens Endowment, and Mohan's, the KMS Nagavarapu Graduate Award in Physics, are all intended to support graduate students in doing research. The department's Graduate Affairs Committee has decided to use the income from these funds for summer fellowships for incoming graduate students. With this extra incentive, we expect to compete for the best physics graduates from across the country.

We are grateful to those 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. They make a world of difference to us, both to our morale and to our effectiveness in assisting our students.

Katzenstein Prize

Charles (Chad) E. Rogers III is the winner of the 2006 Katzenstein Prize. This award is given annually for the best physics essay by a graduating senior. Chad's prize-winning essay, "Optical Frequency Control by Phase Modulating a Self-Injection-Locked Diode Laser", described his Honors thesis work done under the supervision of Prof. Phil Gould. The goal of the project was to produce light with arbitrary frequency chirps by sending the output from a diode laser through an optical-fiber-based phase modulator. A time-varying voltage applied to the modulator produced a time-varying change in the phase of the light passing through it, thereby modifying the light's frequency in a controllable manner. Since the amount of phase change attainable with the modulator was limited, a trick had to be employed. Using a 40 meter fiber loop, a pulse of light was sent through the modulator multiple times, gaining the prescribed phase in each pass. After the desired number of round trips, the pulse was projected from the loop by an optical switch. The frequency chirp was measured by combining the pulse with a fixed-frequency laser and observing the resulting beat signal. A further trick, to offset losses in the loop, was to self-injection-lock the laser after every round-trip. The set-up allowed chirp rates up to 40 GHz per microsecond to be realized. This frequency-chirped light will be very useful in experiments aimed at controlling collisions between ultracold atoms. Chad will continue his research over the summer and pursue his graduate studies in Physics at UConn in the fall. Congratulations, Chad!

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 Pollack Endowment for Physics (30958-2014)
- Ruth and Paul Klemens Endowment (30951-2014)
- Endowment for Physics Research and Graduate Education (30911-2014)
- Marshall and Georgiana Walker Graduate Award Fund (30876 -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)
- KMS Nagavarapu Graduate Award Endowment (30723-2014)
- Space-Time Twisting by Light Project (22398-2014)
- Physics Department Unrestricted Fund (20351-2014)

Matching Gift

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

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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.

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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
September 15, 2006

Invitations for the Katzenstein dinner have just been mailed. If you are interested in attending but have not received your invitation, please contact Kim Giard at 860-486-4924, email: kim.giard@uconn.edu.