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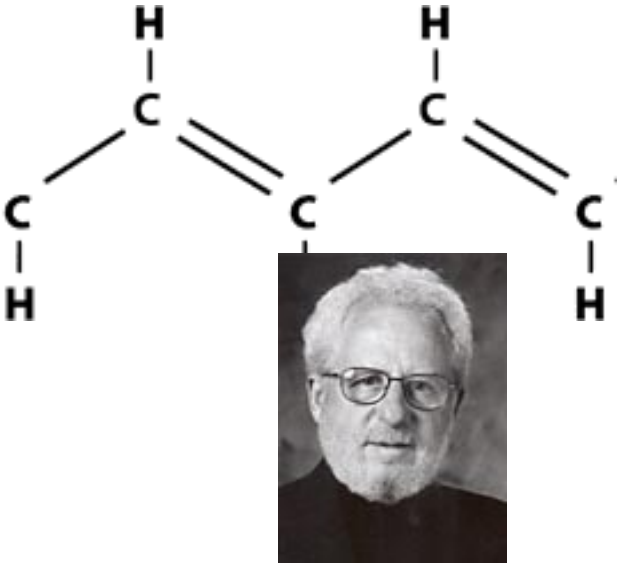


Plastics Made Conductive

Alan Heeger, Katzenstein Distinguished Lecturer

Friday, November 2, 2001

Professor Alan Heeger of the University of California, Santa Barbara, will present the 2001 Katzenstein Distinguished Lecture on Friday, November 2, 2001. Professor Heeger, along with Alan MacDiarmid and Hideki Shirakawa, received the 2000 Nobel Prize in Chemistry for the discovery and development of conductive polymers. Plastics can be made to conduct electricity. More than that, they can be made superconductive. One golden thread of twentieth century physics has been the understanding and development of new materials and new mechanisms of high electrical conduction. Heeger's work is a segment blended seamlessly into the master thread.

Alan J. Heeger was born in 1936 in Sioux City, Iowa and received his B.S. with high distinction from the University of Nebraska. In 1961 he received a Ph.D. in Physics from the University of California at Berkeley. He was a Professor from 1967-1982 at the University of Pennsylvania and served as Director of the Laboratory for Research in the Structure of Matter (Univ. of Pennsylvania). From 1974-1982, he served as Acting Vice Provost for Research. In 1982, he became Professor of Physics at the University of California, Santa Barbara. From 1987-1999, he was Director of the Institute for Polymers and Organic Solids. In 1990, he founded the UNIAX Corporation and served as its President until 1994. Since then, he has continued as Chief Scientist. He has been an Alfred P. Sloan Foundation Fellow as well as a John Simon Guggenheim Foundation Fellow. In 1973, he was the Morris Loeb Visiting Lecturer in Physics at Harvard. He received the Oliver E. Buckley Prize for Condensed Matter Physics (1983), an Honorary Degree from Université d'Etat a Mons, Belgium (1992), the Balzan Prize for "Science of New Materials" (1995) and the Nobel Prize in Chemistry (2000).

Prof. Heeger holds a large number of patents in the area of functional polymeric materials. We are used to thinking that plastics do not conduct electricity. In the late 1970s Heeger, MacDiarmid and Shirakawa discovered that, with specific modifications, C-C bond changes allow charge carriers to move from molecule to molecule, causing the polymer to conduct. For example, they found such behavior in a thin film of polyacetylene, exposed to iodine vapor. They have helped build their groundbreaking discoveries into a field of great fundamental and technological importance. Conducting polymers, and devices based upon them, offer opportunities for low-cost processing routes for a number of widely used applications.

Vortices in Superconductors: An Unusual State of Matter

Vortices (small circulating supercurrents), which thread a type of superconductor when placed in a magnetic field or while it is carrying a current, present both a technological and a scientific challenge. Moving vortices create resistance to current flow. Zero resistance occurs only when the material has enough flaws to pin the vortex lattice. Fundamental studies focused on the arrangement of vortices and their transformation with temperature and field have led to the term "vortex matter" to describe this rich topic of study. This year we were fortunate to enjoy two outstanding lectures on the dynamics and statics of the vortex states in superconductors.

On March 2, 2001, **Professor X. S. (Sean) Ling**, presented a physics colloquium describing some new breakthrough experiments in the study of vortex matter by the technique of inelastic neutron scattering. These studies were carried out at the National Institute for Standards and Technology (NIST) neutron reactor and were a collaboration between Dr. J. Lynn and Prof. Ling's group at Brown.

Dr. Ling is presently an Assistant Professor of Physics at Brown University; his Ph.D. is from UConn (1992); Professor **Joseph Budnick** served as his major advisor. He received his M.S. in 1987 at the Institute of Metal Research, Chinese Academy of Sciences, and his B.S. at Wuhan University.

Prof. Ling presented an introduction to the physics of vortices and described the factors affecting vortex structure and pinning. Vortices are known to form their own lattice independent of the material's structure. He then described a beautiful set of experiments which clearly demonstrated the first direct structural evidence that the vortex lattice can literally melt or freeze just like ice or water. In his talk, he described the observation of classical features of a phase transition. Both supercooling of the liquid vortex phase and superheating of the solid phase were observed in these experiments. This work has been referred to "as a milestone contribution to this field" in the Physical Review Focus early this year.

George Crabtree Presents 2001 Charles A. Reynolds Distinguished Lecture

Dr. George Crabtree of the Argonne National Laboratory presented the Charles A. Reynolds Distinguished Lecture in Physics on April 4, 2001. His title was "Phase Transitions in Vortex Matter."

Dr. Crabtree is a distinguished condensed matter physicist whose work has been well recognized internationally, as evidenced by his large number of invitations to frontier science meetings. Dr. George Crabtree holds the rank of Senior Physicist at Argonne National Laboratory and supervises a major program focused on studies of granular, superconducting and magnetic materials. Ten students have received their Ph.D.s under his tutelage. In 1982, he received the University of Chicago Award for Distinguished Performance at Argonne National Lab. He has also received awards from the Department of Energy for Outstanding Scientific Accomplishments in Solid State Physics in the years 1982, 1985, 1995 and 1997. Dr. Crabtree is a Fellow of the American Physical Society and Recipient of an R & D 100 Award in 1996 for a "Magnetic Flux Imaging System." He serves as Editor of Physica C, an outstanding journal devoted to publications of research in the field of superconductivity. He received his B.S. in Science Engineering (with Distinction) from Northwestern University, M.S. from the University of Washington at Seattle and Ph.D. in Physics from the University of Illinois – Chicago Circle. Dr. Crabtree has a distinguished record of scientific accomplishments.

At the March 2001 Meeting of the American Physical Society in Seattle, he and Professor J. Clarke co-chaired a so-called "Woodstock" evening meeting at which the latest results were presented on Studies of Superconductivity in MgB_2, a newly discovered superconductor with a transition temperature of 39K. This session attracted about 1000 participants and lasted until the early morning hours.

In the Reynolds Lecture, Dr. Crabtree presented a general phase diagram for the vortex state which forms in High T_c (type II) superconductors at moderate magnetic fields for temperatures up to T_c. The vortex array forms a rich variety of condensed phases, including lattices, liquids and glass, depending on temperature and field. The complexity of these condensed phases and the transitions among them correspond to those of ordinary matter, thus giving rise to the name "vortex matter." His talk included a beautiful discussion of dynamic correlations in driven vortex phases. In these experiments an inhomogeneous current distribution is created in a disk by injecting current at the center and removing it at the circumference. In an axial applied magnetic field, the Lorentz force drives the vortex array around the disk. Various rotational regimes, including plastic, hydrodynamic, and elastic, are clearly seen along with transitions among them.

"I think of science the way I think of democracy. It is filled with flaws until you look at any competing system. We are flexible and tolerant and in the ideal, which we never measure up to, we are perfectly honest. That's because we go by the evidence as far as we can gather, analyze and understand it." -David Markowitz, Emeritus Professor at UConn, Editor of *Physics News* and *APS New England Section* newsletter editor (taken from the Fall 2000 edition)

Phonon Physics Award to be Named for Paul Klemens

In 1986, at The International Conference on Phonon Scattering in Condensed Matter in Urbana, Illinois, Professor Paul Klemens received an award for excellent work in the field over many years. Now he will be honored by the committee organizing the series of conferences by having the award, this year and in the future, named the Klemens Award for outstanding contributions to phonon physics.

A communication from committee member and previous awardee Lawrence Challis states "We feel this is a recognition of your own particularly outstanding contribution." At the Tenth International Conference to be held at Dartmouth College later this year, Paul will present the award to this year's winner, Professor **Alexa Kaplyanskii** of the A. F. Ioffe Physical Technical Institute in St. Petersburg, Russia. We are pleased the award honors Paul Klemens and send our best to Professor Kaplyanskii and those who will receive it at future meetings.

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. In our third year, we had five outstanding lectures in the general field of nanoscale science:

1. **Micah Dembo**, Boston University, "Traction Force Microscopy and the Mechanics of Fibroblast Migration"
2. **Paul Chaikin**, Princeton University, "Trillions of Quantum Dots, Fingerprints, Nanolithography with Diblock Copolymers, and the Formation of Striped Patterns"
3. **Richard Ernst**, ETH-Zentrum, Zurich, Switzerland, "The Future Role of NMR Spectroscopy in the Chemical/ Physical Sciences"
4. **Peter Zoller**, University of Innsbruck, Austria, "The Age of Quantum Information"
5. **Scott Kuo**, Johns Hopkins Univ. "Nano-Jitterbug: A New Approach to Cell Mechanics during Active Motility"

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. A comparably exciting lecture program for next year is being planned.

Festschrift for Professor Kurt Haller

Kurt Haller, Professor of Physics, was recently honored with a Festschrift by the journal Foundations of Physics, on the occasion of his 70th birthday. Only twenty six physicists have been honored this way, including such distinguished names as Paul Dirac, Louis de Broglie, Erwin Schroedinger, Ilya Prigogine, David Bohm, John Bell, Eugene Wigner, John Wheeler, Nikolai Bogolubov and Henry Margenau.

The Festschrift, which filled three volumes of the journal, was edited by Kurt's UConn colleagues Philip Mannheim, Gerald Dunne and Munir Islam, together with Larry Horwitz from Tel Aviv University. While Kurt claimed "This was a great surprise," Munir Islam notes that "We ended up with 28 articles, which speaks to the fact that so many people in our field respect Kurt, know his work, and were prepared to contribute."

All science at root is based on asking questions of Nature, says Kurt. Noting that theoretical physicists "don't have labs," he says, "we ask those questions in a different way. Nature is built on mathematical laws to an awesome degree of precision and our job is to discover what fruitful correspondence exists between Nature and mathematics." Kurt points to the historical example of the Scotsman James Clerk Maxwell, who in the 1860s formulated a theory of electromagnetism and predicted, among other things, the existence of radio waves. It wasn't until some 20 years later that a student, Heinrich Rudolf Hertz, given a problem to prove Maxwell wrong, conducted an experiment that confirmed Maxwell's electromagnetic theory and demonstrated that these waves, which travel at the speed of light, exist and carry energy through space. "Maxwell didn't have an inkling" about today's radios and televisions. "He couldn't foresee all the consequences of his theory until others made the crucial contributions" that enabled basic research to get transferred into applications that have changed our lives. "One needs to use all the mathematics available to see what a theory says, to see what the equations tell us about Nature," Kurt adds. "The most important outgrowths are those outcomes that are totally unforeseen and unforeseeable."

Note: for a fuller account, please see the UConn Advance story by David Bauman (4/30/01), online at http://vm.uconn.edu/~advance/01043015.htm.

Time Travel with Ron Mallett

photo by Cloe Poisson/The Hartford Courant

Open the Hartford courant of Monday, July 23, 2001. The lead article is "Bush, Putin Agree to Cut Arsenals." Below it and filling about half of page 1 is "Time Travel with Light," a profile of UConn's Professor Mallett and a description of his theory combining general relativity with light and atomic properties. There is no picture of Bush or Putin, but there is of Ron – thinking for the camera – reproduced here.

Relativity shows that the energy of a pure light beam can gravitationally affect matter. Inside a circulating beam of light in a ring laser, a spinning neutral particle is dragged around the ring by the gravitational field. The gravitational frame dragging precession rate is inversely proportional to the velocity of light in the medium. Extending the theory to two counter-circulating light beams, a new and exact solution of Einstein's gravitational field equations is found for a nonrotating circular energy source. By the proper adjustment of beam intensity and slow light velocity, closed loops in time can be formed: the past and the future can be made one.

Ron Mallett was motivated as a youngster to seek to affect the past through future action. Ron's father died when he was only ten, and his active imagination together with his love of science fiction stayed in his mind as he approached the mathematics of general relativity. His present work attempts to learn whether the ambitions of science fiction, specifically traveling through time, will meet the test of science fact.

Despite the seriousness of his purpose, Ron has an engagingly playful nature. One indication of that was his reenactment of Galilean dialogues about ten years ago arguing over old and new (in Galileo's time) worldviews. **Valerie Heckman**, **David Markowitz** and Ron Mallett played the roles in full costume before an amused department audience. We have pictures of that fine event to remind us how much fun it is to argue ideas and to realize what our prejudices are (or might have been centuries ago).

Yukap Hahn Retires

On June 15, the department held a retirement luncheon for Professor Hahn. Current and former colleagues, post-docs and students of Yukap participated in a heartfelt tribute to him. Highlights follow.

Yukap arrived from NYU in summer 1965. His work was mainly on theories of complex atomic processes. The mathematics of many coupled integral and differential equations was the challenge that kept him involved for the several decades. Yet he based the mathematics on his keen sense of the subtle and often new physics going on.

Students expressed awe at his prowess as a teacher. He has been the foremost expert in the department at doing the "Jackson problems" that are the Classical Electromagnetism equivalent of marine training. But he did some of them virtually in his head, that is with intuition, and wrote down answers to be given reasons. Awesome.

Yukap Hahn, pictured with Linda Kruse, retired Administrative Assistant for the department.

Yukap worked hard on his research, sometimes during hours when almost everyone in town was asleep. He got ideas during the night and felt he had to follow them up immediately. Some dreams are fantasy but his seemed to be based on physics. Again awesome.

Yukap and Cora Hahn are relocating to Richmond, Virginia, where one of their three sons is a physician. His decision to retire came upon him as he was finishing up the end-of-the-semester tasks; their health has not been perfect for quite awhile and they know they will receive the best care if it becomes needed. Yukap is going to devote more time to his watercolor painting, Cora plans to take advantage of the more metropolitan activities afforded by the big city and they both plan to spend much more time with their granddaughters.

Sigma Pi Sigma

from left, Corey Merow, Ron Pepino, Mark Koudstaal, Chris Sanborn, Ilona Westram

One graduate student, **Ilona Westram**, and four of our undergraduates, **Cory Merow**, **Ron Pepino**, **Chris Sanborn** and **Mark Koudstaal**, were inducted into Sigma Pi Sigma this spring. At the Special Colloquium before the banquet, the Katzenstein Prize for the best essay by a graduating senior was presented to **Ben Taylor**. Ben's paper was on Ross filter chopping, a previously unexplored method for increasing signal to noise in various types of x-ray apparatus and was written on research he performed under the supervision of **Professor Doug Pease**. The colloquium was presented by **Professor William Happer**, of Princeton University. Professor Happer, a Fellow of the APS and a member of the National Academy of Sciences, spoke on the path "From Curiosity-Driven Research on Spins to Medical Imaging of Human Lungs." He discussed the improbable history of medical imaging of human lungs with laser polarized He-3 and Xe-129, ending with a look at some of the unsolved associated physics.

Lester R. Brown Delivers Commencement Address

Lester R. Brown, Founder and Chairman of the Board of Worldwatch Institute, was the Graduate Commencement speaker on May 20. He was recommended for the honor by **George Rawitscher** and hosted by the Physics Department. The University presented him with an honorary doctoral degree. His speech addressed two topics of global environmental importance. First, the melting of the continental ice in Greenland would raise ocean levels about thirty feet. Second, mismanagement of forests and watersheds in China has led to enormous dustbowls, with dust particles traveling in the upper atmosphere eventually being detected in continental United States. China now welcomes Lester Brown's advice and is paying close attention to preservation and renewal of its forests. During a brunch meeting with some twenty environmentally concerned UConn faculty led by Dean **Ross MacKinnon**, Mr. Brown displayed vast knowledge and a wonderful ability to weave together disparate global concerns, such as hunger, overpopulation, water scarcity, agriculture and the environment. Regarding compartmentalization of academic research, he said that such focused investigation helps global environmentalists like him. Still, those present expressed the desire to remove the compartment walls in order to foster more exchange between specialists. Lively discussion prevailed throughout.

Undergraduate Researcher Robert Roser Returns

On February 2, 2000, the department was treated to a remarkable colloquium, presented by Wilson Fellow Dr. Robert M. Roser of the Fermi National Accelerator Laboratory. A co-author of a Physical Review Letter on the experimental discovery of the top quark, Rob is a 1984 graduate of our department. He is now a co-leader of the Collider Detector Facility (CDF) upgrade and installation group and the infrastructure group and Associate Department Head of Operations for the CDF detector. The first group numbers about 70 physicists, engineers and technicians while the second group includes about 24 engineers and technical staff.

At the University of Connecticut, Rob worked with Professor Quentin Kessel's Van de Graaff accelerator while earning honors, including a Magna Cum Laude degree and induction into Phi Beta Kappa. Quentin recalls Rob's endearing sense of humor and extraordinary ability to coordinate many different tasks. Rob designed and machined components, graphed data and shared authorship of a Physical Review Letter in atomic collisions. After earning a Master's degree from the University of Rochester as a Rush Rhees Fellow, he took a job as a systems analyst at The Travelers Insurance Company, but returned to Rochester in 1989 for his Ph.D. in nuclear collisions. Rob has continued his career at Fermi Lab., first as a Postdoctoral Research Associate with the University of Illinois and currently as a prestigious Wilson Fellow.

Guess which of our featured professors received a mention in *Rolling Stone* magazine's "Hot List" (RS 876, August 30, 2001)?

New Grants in the Department

Professors **Edward Pollack**, **Quentin Kessel** and **Winthrop Smith** have won NASA recognition with an EPSCOR grant. Their new funding totals approximately $230,000 a year for three years to investigate reactions with highly charged ions. The studies will shed light on both uv and x-rays observed in cometary bow shock waves and provide cross sections required for modeling various astrophysical phenomena. These investigations will be carried out in conjunction with scientists at Connecticut College and the NASA Jet Propulsion Laboratory (JPL) in Pasadena. Earlier efforts in this area have been supported by the NASA sponsored Connecticut Space Grant Consortium, and this new funding will expand the existing collaboration with JPL. Equipment will be developed and tested in our department's Van de Graaff accelerator laboratory and then taken to JPL for experiments using highly charged ions from JPL's electron-cyclotron resonance ion source.

Starting August 2000, Assistant Prof. **Richard Jones** was awarded a research grant by the National Science Foundation, entitled "Research Program in Intermediate Energy Physics" providing a total of $252,000 in research funds for a period of three years. Prof. Jones' research centers around experiments being carried out at the Thomas Jefferson National Accelerator Facility (Jefferson Lab) in Newport News, Virginia which make use of the intense monochromatic beams from the electron accelerator to study the properties of quarks bound inside physical particles. The principle of "quark confinement" tells us that in nature quarks are observed only in bound states, analogous to the fact that electrons in nature are observed mostly inside atoms. Unlike the case for atomic electrons, however, experiments have shown that quarks cannot be freed from their bondage by any finite amount of excitation energy, which raises an interesting question of what happens to the quark system when it is excited. Recent advances in computing have begun to enable theorists to numerically solve for the properties of these excited states, and some novel predictions have been made which are testable by experiments. Jones and his group are participants in the "Radphi" experiment and the "Hall D" collaboration at Jefferson Lab that are answering key questions in this field of study.

Support is provided under this grant for one graduate student, as well as for undergraduate assistants. Nutmeg Scholar and UConn undergraduate physics major **Brent Evans** has participated in these projects during summers 2000 and 2001. One of the major projects undertaken by the group has been the construction of a Beowulf cluster of unix workstations to serve the needs for high-performance computing in the Physics Department. Funded initially in 2000 with a combination of UConn Research Foundation funds and external grants, the cluster has now grown to 36 processors and a total of over 1 TB (tera-byte) of disk. An additional $15,000 from Jones' NSF grant was invested in this system, which is designed to continuously evolve as technology progresses. In addition to the nuclear physics applications, this cluster is now being used for theoretical condensed matter and atomic/molecule/optics calculations. Collaboration has sprung up in 2001 between Physics and groups in Materials Science, Chemical Engineering, and Computer Science in the area of advanced computing, and promises to yield benefits for basic research and applications across the sciences and engineering. Projects such as this provide opportunities to students at all levels to make important contributions to scientific research and at the same time to build experience for future careers in a broad array of areas.

An Experiment in 100s Level Labs

Lab periods in the Physics Department have traditionally begun with a lesson of 15-20 minutes by the graduate student-teaching assistant (TA), followed by a hands-on session in which students follow instructions to perform the required exercises. The intellectual challenge comes in answering questions at the end.

An outcome of recent physics education research is the inception of novel teaching methods for the labs. In spring 2001, we ran a pilot study of the Heller Method in algebra-based Physics 121. The method divides the three-hour period into an hour of discussion and two of hands-on investigation.

Problem-solving is at the heart of the method. Expert techniques are formalized into a five-step sequence applied by students. For the method to work, students must read the lab material in advance and design experiments to solve the problem at hand. TAs respond to students' questions with leading questions. Thus students are more involved in their own education process than formerly was the case.

While this experiment into innovative pedagogy had growing pains, it improved students' conceptual understanding and earned warm approval by the TAs. The project will be extended to other elementary laboratories.

Several factors allowed the introduction of the Heller Method. A full complement of computerized labs and computer-controlled experiments, enabled by funds from the Schwenk Endowment and from UConn, facilitate the process, and the TA training was supported by a grant from the Teaching and Learning Institute. Our new Director of the Undergraduate Laboratories, Gloria Ramos, played a key role in the design and implementation of this pilot study.

Excellence in High School Physics Teaching Award

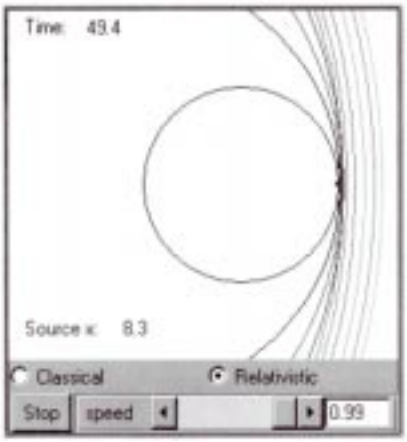
The winner of the 2001 "Excellence in High School Physics Teaching" Award is **Jon Wallace** of the *Another School Program* based in Meriden, CT. Jon is the first UConn graduate to win the award. He graduated in 1979 with a B. S. in geology from UConn, then earned an M. S. in environmental education and a Certificate of Advanced Study in science from Wesleyan University. The following is Jon's description of his teaching life.

"The *Another School Program* (ASP) is a program for 'at-risk' youths from 16 to 21. We provide an off-site environment which helps many achieve their goals of a high school diploma. It is a public school and the students end up with a 'true' high school diploma. I am the current president of CAPT (Connecticut Association of Physics Teachers). I've taught at the ASP for twenty years. I'm interested in radio astronomy and will be giving a talk about my 'amateur' radio work from my backyard to the people at Greenbank, WV (NRAO). I also raise large arthropods ('bugs') that I bring to schools and other events. I also teach the Project ASTRO teacher/astronomer training sessions during the summer to help teachers and astronomers pair to bring students a richer astronomy experience. Thanks again for the award - it was a great honor!!!"

We say thanks to Jon Wallace for being such a gracious and deserving recipient of the 2001 award.

Mario and the Physlets

Mario Belloni, who earned his Ph.D. in our Department in 1997, has attracted widespread attention for his work with **Wolfgang Christian** on computer-based teaching tools in which "Physlets" – computer simulations of a variety of scenarios – are used to demonstrate and confirm basic physical principles. A book, *Physlets: Teaching Physics with Interactive Curricular Materials* (Prentice Hall), co-authored by Wolfgang Christian and Mario Belloni, is widely used and was featured in an article in the February 16, 2001 issue of The Chronicle of Higher Education. The scenarios that are featured on Physlets – currently available for introductory physics courses – include footballs, baseballs and rockets moving under the influence of gravity, simple harmonic oscillators, and light reflecting and refracting at a variety of surfaces. Physlets can graphically persuade confused and doubting students that it really is possible for objects to be accelerating at the very instant at which their velocity is zero, that satellites can accelerate towards the earth without ever getting any closer to it, and that, when a light beam enters a slab of glass, the fact that its speed in that medium is less than in air accounts for the fact that it is refracted. Physlets are being used in our department by Professor **George Gibson** as part of his *Physics of Music* course. The animated time-dependent character of Physlets makes them especially well suited to illustrate concepts in wave motion. The "sound-out" command also provides a way to play complex waveforms through the computer speakers. Additional information on Physlets and their application to physics pedagogy can be found on their web site, http://webphysics.davidson.edu.



The Doppler Physlet, displayed with a web browser, shows the wave fronts emitted by a moving object. The student can change the slider to set the velocity and an optional radio button to enable relativistic effects.

Mario Belloni's thesis research was conducted under the guidance of Prof. **Kurt Haller**, a particle theorist in our Department, and dealt with the construction of gauge-invariant operators and states in non-Abelian gauge theories such as Quantum Chromodynamics. The work resulted in three publications in which Mario was a co-author – two in Physics Letters B and one in Physical Review D. Mario also participated in the Department's teaching program as a Teaching Assistant, and twice was the recipient of the Marshall Walker Outstanding Teaching Assistant Award. After completing his Ph. D. degree at UConn, Mario held a temporary position as Assistant Professor of Physics at Eckert College in Florida. For the last two years he has been in a tenure-track position as Assistant Professor of Physics at Davidson College in North Carolina.

As of January 2001, Mario and his wife Nancy are the proud parents of a daughter, Emmy. We are all delighted at Mario's well-deserved success.

New Faces

At the beginning of the new fall semester, Dr. **Andrei Dobrynin** will join the faculty of the Department of Physics and the Institute of Materials Science. Andrei comes to UConn from the University of North Carolina, where he has been a senior researcher since 1995. He received his Ph.D. in theoretical physics from the famous Moscow Institute of Physics and Technology in 1991, and has since held research appointments at Eastman Kodak/University of Rochester, and the Ecole Supérieure de Physique et Chimie Industrielles, in Paris, France. His research interests lie mainly in the theory and computer simulation of polymers and other complex fluids. He has recently

worked on the theory of microphase separation in block copolymer systems, phase transitions in polyelectrolyte and polyampholyte solutions, and the dynamics and thermodynamics of semidilute polyelectrolyte solutions. His work relates to understanding of the stability and interactions of biomolecules such as RNA and DNA.

Andrei's expertise in the theory and modeling of soft condensed matter will be a highly welcome addition to both the polymer program of the Institute of Materials Science and to the condensed matter group in the Physics Department.

Ken Bernier joined the Department of Physics during the past year as the Administrative Specialist at the Photonics Lab, working closely with Chandra Roychoudhuri handling the myriad details involved in Chandra's research grant management. Ken formerly operated his own business installing hard- and software for PCs, applications training, and web page design. Ken is also an accomplished musician, composer and artist.

Shahid Farooqi, Research Associate, and **Yanpeng Zhang**, Postdoctoral Fellow, recently accepted positions to do research in the laboratories of **Edward Eyler** and **Phillip Gould**. Shahid designs, conducts and analyzes experiments involving ultracold Rydberg states and plasmas. He hails from Pakistan where he was a faculty member at the Jinnah University at the Islamabad Campus. Yanpeng designs, conducts and analyzes experiments involving high resolution laser spectroscopy, molecular physics and ultracold physics. He collaborates on research with Professor **William Stwalley** as well as Professors Eyler and Gould. Yanpeng was a Professor at the Department of Electronic Science and Technology at Xi'an Jiaotong University in the People's Republic of China. We are very excited about the addition of Shahid and Yanpeng to the ultracold portion of our AMO program and look forward to seeing the results of their work.

NRC Fellowships Awarded to Four Recent UConn Grads

Four of our graduate students have been awarded prestigious National Research Council Fellowships in the past two years. **Tzveta Apostolova** arrived at UConn soon after receiving her Diploma in Physics from Sofia University in Bulgaria. There were almost no students here from that country at that time. **Stephen Gensemer** acquired his B.A. from Bates College in Lewiston, Maine. **John Nibarger** received his B.S. in Physics from the University of California, Santa Cruz before joining us. **Daniel Potrepka** received a B.A. from UConn and a M.S. at Louisiana State Univ. He did more graduate work at Rutgers Univ. before returning to UConn for his Ph.D. in April, 1998.

Tzveta Apostolova was one of the previous millenium's final physics Ph.D.s with our department, earning her Ph.D. under the guidance of Professor Yukap Hahn. Her dissertation, "Modeling of Laser-Induced Damage in Dielectrics with Sub-Picosecond Pulses" was presented in fall 1999. Now she is an NRC Fellow at the Air Force Phillips Research Laboratory in partnership with the University of New Mexico. As a post-doctoral fellow, she performed modeling of electron transport and laser breakdown in dielectrics and semiconductors with development of parallel algorithms for the physical models. The project described in her successful NRC application was "to study external control of carrier scattering in quantum-well photodetectors through the application of an incident laser pulse. These studies are vital to the performance of semiconductor optical detectors." The involved mathematics and computer codes make this a formidable problem.

Stephen Gensemer received his Ph.D. under the supervision of Professor Phil Gould in March, 2000. Steve specializes in the area of atom cooling and trapping. He conceived, developed and carried out a sequence of unique and insightful (and difficult) experiments to probe the time evolution of pairs of atoms formed as they approach each other at very large internuclear distances ($\sim 1000 a_0$). In particular, his recent work has clearly shown the importance of the "optically forbidden" 2_u state, which is partly allowed at very large distance because of retardation and hyperfine mixing with other states. Since the trap lasers of magneto-optical traps produce the 2_u state, which is metastable at normal internuclear distances, his work significantly deepens our understanding of such traps. Steve's NRC application proposed using optical shielding of fermionic potassium atoms (^{40}K) to change their interactions so that Cooper pairing in a degenerate Fermi gas can be more readily achieved. Steve has carried out related research with Professor Debbie Jin at the Joint Institute for Laboratory Astrophysics (JILA) at the University of Colorado, where a degenerate Fermi gas was first produced.

John Nibarger worked in the High-Intensity Laser Physics Laboratory upon his arrival at UConn, under the supervision of Dr. George Gibson. He received his Ph.D. in Physics in the Fall of 2000; his dissertation defense was on how the advent of ultrashort pulse laser systems has allowed the study of atoms and molecules in extreme environments. John's thesis project involved substantial experimental work where he showed his abilities to carry out complex experiments with a state-of-the-art laser system. John was also co-author on seven major publications, including two in Physical Review Letters, and first author on two of the seven. He also contributed to or gave over a dozen conference presentations during his time at UConn. John received the NRC

fellowship for studying ultrafast processes in magnetic materials and is now at NIST, Boulder, Colorado.

Dan Potrepka worked in the laboratory of Prof. Joseph Budnick, in close collaboration with Professors William Hines and Douglas Pease on studies of superconductivity in $YBa_2Cu_3O_{7-x}$ (YBCO). Bromine was known to restore superconductivity in deoxygenated YBCO but the occupation site of the bromine was not identified. In his thesis, Dan used a number of techniques including x-ray absorption spectroscopy and nuclear magnetic resonance to prove that the bromine produced a local phase decomposition of the YBCO structure, liberating oxygen which was absorbed by the surrounding region. The bromine formed nanoclusters of barium bromide and never entered the superconducting lattice. This work answered a long-standing question and directly shows the influence of halogens on high T_c oxides. Dan is in the second year of his associateship with Dr. Steven Tidrow at the Army Research Laboratory in Adelphi, Maryland, working on "Perovskite Materials for Phase Shifters in Electronic Scanning Antennas," a materials and electrical study of ferroelectric perovskite oxides. He synthesizes new materials derived from a perovskite oxide, follows the change in dielectric constant due to an applied electric field over a wide temperature range of paraelectric behavior, and studies the microwave properties of these materials.

The Physics Department's Endowments are Growing in Both Numbers and Amounts

The department is very pleased with the financial support we have received from so many of you (and, of course, pleased with the moral support we receive from all of you!). In particular, the endowment support permits us to recognize students on a level that would not otherwise be possible. Many of you have contributed to our first endowment, the ***Katzenstein*** fund and, in fact, the faculty and staff added $20,000 ($40,000, with the UConn 2000 matching funds) to this fund, bringing the total to over $100,000. Henry Katzenstein, our first Ph.D., and his wife, Connie, established this fund so that we might have a distinguished lecture series and a prize for the best undergraduate research paper each year. In addition to these primary goals, during this past year income from this fund has also provided recognition to the best graduate student teaching assistant, paid for the initiation banquet meals for the new Sigma Pi Sigma inductees, and helped to sponsor the lecture in honor of the late Professor Charles Reynolds. More recently the Katzensteins have added significantly to their endowment. The income from this fund permits activities which raise the morale of the department and the quality of our program.

In last year's newsletter we reported on the establishment of a fund in the memory of ***Charles Swenberg*** by his family in order to provide scholarship help to either undergraduate or graduate physics students in need. The family, together with one of Charles' collaborators, NYU Professor Martin Pope, have contributed generously to this fund. Now we are pleased to report two new endowments:

The Isaac S. and Lois W. Blonder Graduate Fellowship in Physics. As noted in our 1998 newsletter, "Ike" Blonder graduated with his B.S. in physics (High Honors) in 1938. He went on to found Blonder Tongue Laboratories and Blonder Broadcasting. As quoted in the 1998 Physics Newsletter, "My greatest pleasure at Connecticut ... was working under Dan Noble on his FM police radio as an NYA student. Not so pleasurable was my 25 cent an hour job as an NYA laborer, scraping the flyspecks off the windows in the bull barn." Dan Noble was a professor at UConn who went on to head Motorola's research laboratories. Ike is concerned about science education in the U.S. and how too few students go on for advanced degrees in science and engineering. The Blonder Graduate Fellowship will help us to improve that.

The KMS Nagavarapu Graduate Award in Physics. Most of us know Dr. Nagavarapu S. Mohan as "Mohan." He did an experimental thesis under the guidance of Professor Dwight Damon and also worked closely with Professor Paul Klemens. He graduated in 1975, and about a year ago, he contacted Paul about the possibility of helping us; the result is this graduate student award established by Mohan and his wife, Paritala S. Kamala. They currently live in San Jose, California, and he is employed by United Defense LP in Santa Clara. They are the proud parents of a son, Sriniketh S. Nagavarapu, at Stanford University. The department enjoyed a visit from Mohan in January of this year.

Those of us in higher education are acutely aware of the increasingly restricted public support for higher education on both the national and the state levels. It is almost as if many of our elected officials are pulling up the drawbridge after receiving their education, making it more difficult for today's students. The operating budget for the University of Connecticut, adjusted for inflation, is significantly less than it was ten years ago, with the result that tuition at UConn has had to more than double in that time. In spite of this, our department has managed to grow and expand into new areas. Our external funding is greater than ever and provides quality experiences for both undergraduate and graduate students as they participate in our research. Nevertheless, the funding we earn or receive from federal grants and/or the State is always earmarked for very specific purposes. This is one of the reasons that we are particularly appreciative

of the support we have received from many of you. As you can see, it makes a very real difference to the quality of the experience that we can provide for both our undergraduate and graduate students.

In one respect, we do have unusual support from the State of Connecticut. This is through UConn 2000, a State-based matching program, which now adds $1 for every $2 contributed to an endowment. As these matching funds are limited on an annual basis, it is important for major donors to work with the University of Connecticut Foundation to ensure that their contributions are matched by this program. Both Ike Blonder and Mohan have managed to leverage their contributions on our behalf: Ike, with a gift of appreciated stocks being matched by UConn 2000, and Mohan, with his gift first receiving a 100% match from his company, United Defense LP, and then the UConn 2000 match being applied to this total. Please contact either Ms. Regina M. Tracy, Director of Development for the College of Liberal Arts and Sciences, University of Connecticut, (860) 486-5661, or Quentin Kessel if you would like more information on giving. You may use the following form if you would like to add to one of our existing funds.

In May, 2001, The University announced Campaign UConn. With a goal of raising $300 million, Campaign UConn is the largest public university campaign in New England. We are pleased to announce that during the silent phase, over $150 million has already been raised, including the gifts from Drs. Henry and Connie Katzenstein, Nagavarapu Mohan and Isaac Blonder. This private support makes the difference between a great university and a good one and will be dedicated to faculty, student support and the development of academic programs. You may receive a solicitation from this program. Needless-to-say, we would be delighted if you respond to that solicitation *and direct your contribution to the Physics Department!* Using the fund numbers from the form below will ensure that your contribution goes into the correct fund.

I/we are interested in supporting the Physics Department programs. Please direct my gift of $_____ to:

- ❒ 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 Nagavarappu Graduate Award Endowment (30723-2014)
- ❒ Physics Department Unrestricted Fund (20555-2014)

Matching Gift

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

My company is: _____

_____

_____

_____

phone/fax _____

Please send your contribution directly to the

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

Thank you for your support!

SAVE THE DATE
November 2, 2001

Invitations for the Katzenstein dinner will go out in September to those of you with New England, NY, NJ and PA addresses. If you are interested in attending and live outside of this area, please contact Kim Giard @ 860-486-4924, email: kim.giard@uconn.edu for an invitation.

❖ ❖

Any news about yourself that you are interested in sharing? We have enjoyed the unsolicited mail we received as a result of our last newsletter.

❖ ❖

From:

Professor Quentin Kessel
University of Connecticut
Department of Physics
2152 Hillside Road
Storrs, CT 06269-3046

Please, if this newsletter had difficulty in finding you, take a moment to provide the department with the following information. If our newsletter effort is to be successful, it is imperative that we develop an accurate mailing list.

Name:

Preferred Address (if other than what we have used for this letter):

Phone number:

Yes, I will attend the November 2, 2001 Henry Katzenstein Distinguished Lecture.

❒ Please reserve _____ places at the banquet.

❒ Please send me a reminder for the March 2002 Reynolds Lecture.

❒ Please send me a reminder for the April 2002 Sigma Pi Sigma Lecture.

❒ Please include me on the alumni email list on the Physics web page.
My email address is _____.
I also have a web site address which is _____.

Please return this form to:

Professor Quentin Kessel, Ph. D. UConn '66
University of Connecticut
Department of Physics
2152 Hillside Road
Storrs, CT 06269-3046

Any news or suggestions for our next newsletter?

To: David Markowitz, Editor
at Department address

(Folding both ends of this sheet in will turn the response form into a mailer.)

253700
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