Physics Annual Newsletter

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Department of Physics News

Serge Haroche, Katzenstein Distinguished Lecturer

Friday, October 30, 2015

We are excited to announce that Nobel Laureate Prof. Serge Haroche, of the College de France and Ecole Normale Superieure (ENS), Paris, France will present this year's Katzenstein Lecture. The topic of his lecture will be "Exploring the Quantum to Classical Boundary". Prof. Haroche shared the 2012 Nobel Prize with David J. Wineland (2014 Katzenstein lecturer) in the field of experimental atomic and molecular physics with the citation "for ground-breaking experimental methods that enable measuring and manipulation of individual quantum systems". A detailed autobiography and further information can be found at <http://www.nobelprize.org/nobel_prizes/physics/laureates/2012/haroche-facts.html>.

Prof. Haroche came up through the French educational system as a student in the 1960's at ENS. He worked in the Laboratory of Radiofrequency Spectroscopy of ENS, later renamed the Kastler-Brossel Laboratory, whose first director, Alfred Kastler, received the Nobel Prize for the invention of atomic optical pumping. In addition to Kastler's influence, Haroche did his Ph.D. thesis under the supervision of Claude Cohen-Tannoudji (Pollack Memorial lecturer in 2008), in which he explored atom-photon interactions using radiofrequency fields and the "dressed-atom" formalism. No lasers were used then, but Haroche soon became familiar with lasers as a post-doc at Stanford with the co-inventor of the laser, Arthur Schawlow. This is when he began what turned out to be a decades-long fascination with Rydberg atoms and their properties. He returned to Paris to continue research at ENS and accepted a teaching position at the University of Paris VI. With the help of colleagues who were microwave experts, he began to study microwave transitions between pairs of highly-excited Rydberg states which led to his Nobel-Prize winning research in cavity quantum electrodynamics (cavity QED). His growing reputation soon led to offers from both Harvard and Yale to come to America. He chose Yale for a few years beginning in the 1980's, spending one term at Yale and one term in Paris each year, and teaching at both places. For several years he was able to keep creative research projects going at Yale and in Paris and also demonstrated his skills as an articulate and effective physics teacher. Eventually he found the cross-Atlantic commuting to be too stressful on himself and his family and returned full time to Paris, where he has been a professor at the College de France since 2001.

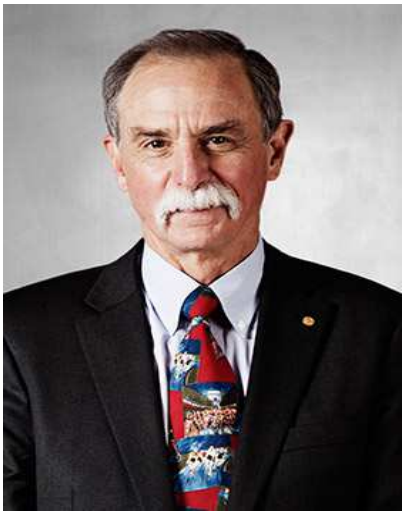
Haroche's lecture is likely to focus on his Nobel-related research in cavity quantum electrodynamics. This involves the construction of a "photon box" consisting of a superconducting microwave cavity whose radiation field is prepared by injecting a beam of highly-excited Rydberg atoms that can emit and absorb resonant photons into the cavity. This system permits the actual realization of some of the idealized thought experiments as proposed by some of the founders of quantum mechanics in the 1920's but only carried out in recent years. The abstract of Haroche's Nobel lecture mentions the realization of "the non-destructive counting of photons, the recording of field quantum jumps, the preparation and reconstruction of "Schroedinger cat"states of radiation (where a quantum system can be in a superposition of two states at the same time) and the study of their decoherence. This provides a striking illustration of measurements of the transition from the quantum to the classical world." It is not unlikely that the lecture will include some research performed since the Nobel award and some personal human interest stories about some of his scientific colleagues. We expect October 30 to be a grand occasion in the Department and hope you will attend.

David Wineland, 2014 Katzenstein Lecturer

The seventeen-year tradition of Katzenstein Distinguished Lectures continued in 2014, with a fascinating talk by Dr. David J. Wineland: "Superposition, Entanglement, and Raising Schrödinger's Cat". Dr. Wineland, from the National Institute of Standards and Technology (NIST) in Boulder, Colorado, shared the 2102 Nobel Prize in Physics with Professor Serge Haroche of the Collège de France and Ecole Normale Supérieure in Paris "for ground-breaking experimental methods that enable measuring and manipulation of individual quantum systems". The October 24 talk drew a large crowd and was well received. Attendees included not only members of the University of Connecticut community, but local high school students and UConn Physics alumni. Dr. Wineland met with students and faculty during his visit and attended a lovely banquet dinner in the Wilbur Cross Reading Room following the lecture.

In his talk, Dr. Wineland focused on his group's fundamental research with atomic ions which are laser cooled to very low temperatures and tightly confined using rapidly varying electric fields. Using precisely-controlled laser light, Dr. Wineland and his colleagues have been able to coherently manipulate both the internal energy states and motional degrees of freedom of these trapped ions, allowing the production of exotic quantum states and their nondestructive measurement. This work has revealed fascinating and counterintuitive aspects of quantum mechanics, such as quantum superpositions, whereby a particle can be in two distinct energy states at once. This is analogous to Schrödinger's Cat, which is neither dead nor alive, but in a superposition of these two states, until a measurement of its state is performed.

Dr. Wineland also discussed practical applications of these quantum systems to future technologies such as quantum computing and atomic clocks. A quantum computer, which would store and manipulate information in superposition states, has the potential to vastly outperform classical computers in certain tasks.



The coherent manipulations pioneered by Dr. Wineland's group also form the basis of an optical atomic clock based on a single trapped ion. Such a clock is so precise that it gains or loses time by less than a billionth of a second per year!

Dr. Wineland did his undergraduate studies at the University of California, Berkeley, his graduate work at Harvard, and postdoctoral research at the University of Washington. He then joined NIST, where he is currently a NIST Fellow and Group Leader of the Ion Storage Group. In addition to the Nobel Prize, Dr. Wineland as received many other honors and awards, including the National Medal of Science, the Benjamin Franklin Medal in Physics, the Davisson-Germer Prize, the Arthur L. Schawlow Prize, the William F. Meggers Awards and the Herbert Walther Award. He is a member of the National Academy of Science.

Dr. Wineland was originally scheduled to visit UConn in the Fall of 2013, but an untimely shutdown of the Federal Government, for whom Dr. Wineland works, derailed those plans. We truly appreciate Dr. Wineland's willingness to reschedule his lecture. It was worth the wait.

Sigma Pi Sigma Events and Undergraduate Awards

The Tom and Barry Show

The Sigma Pi Sigma Honor Society induction ceremony and banquet took place May 1. The featured guest and speaker was **Dr. Joseph Lykken** (sounds like "finger lickin' good", according to Dr. Lykken) from Fermi National Accelerator Laboratory (FNAL). His talk, entitled "Neutrinos are Everywhere", was a runaway smash hit which kept the audience enthralled and provoked many interesting questions (especially from the students!). Sophomore physics major and president of the Physics Club, **Jack Lichtman**, pulled off the coup of inviting, hosting, and introducing Dr. Lykken, who is the Chief Science Officer and Deputy Director of FNAL (not to mention world famous high energy particle theorist).

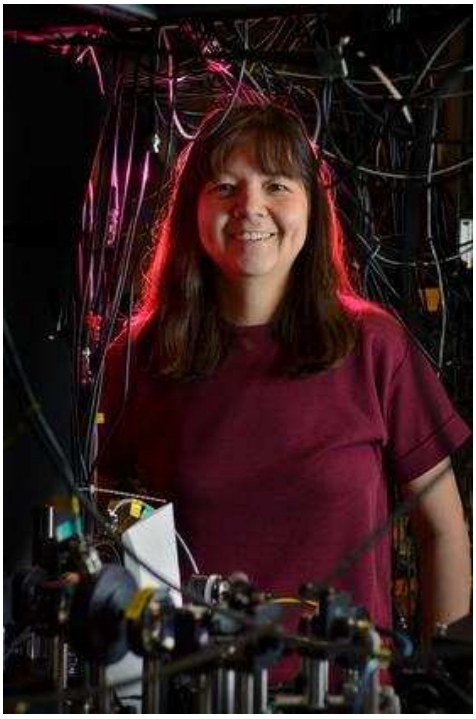
The event, of course, was organized to honor this year's inductees into the UConn Department of Physics chapter of the national Sigma Pi Sigma Honor society. The academically outstanding group consists of **Zachary Cohen, Alexander Debrizzi, Liana Hotte, Otto Holda, Lawrence Ng, Anthony Pensiero and Cameron Vickers**. Zachary is a double major in math (but will study physics in grad school!) who is doing research on general relativity. Alex recently initiated research with Doctor Schweitzer beginning an investigation into the calculation of a particle property called the D-term in the ground-state hydrogen atom, research that he plans to continue in the upcoming fall. Alex consequently intends to pursue a career as a professor following graduate school during which he hopes to study particle physics or cosmology. Liana, working with Dr. Jones, has been helping to build an electron detector for experiments at JLab, and has written this up for her Honors Thesis (she has also gotten help and encouragement from her cousin and UConn grad student **Brendan Pratt**). Otto is an engineering physics major interested in energy and the environment (save the world Otto!). Lawrence has been working with Professor Kharchenko, who he considers a great mentor, and plans to go on to grad school in physics. Anthony has worked with Dr. Wells in his lab, and was first inspired to study physics after watching a Richard Feynman lecture on the BBC. Wells has inspired him to continue work on materials, and finally, Anthony wanted it known that he is a huge NY Rangers fan (the Rangers are still in it after a miraculous come-from-behind victory over the Capitals as of this writing). Cameron has been working in the lab of Professor Stwalley, and will continue working in Stwalley's lab this summer. Cameron's mother attended the ceremony, and is a professor of Shakespeare here at UConn (Did you know he wrote 37 plays?). Cameron aspires to become a physics professor and do his own research.

After the colloquium, family members, friends, and faculty attended the SPS banquet, which was held for the fourth consecutive year in the Morosko Student Lounge of the Pharmacy Building (things we learned for next year: bring your own tables and don't order the steak). Our usual (professional but unpaid) Emcee, Professor Emeritus **David Markowitz,** was a no-show this year due to a prior commitment. He was definitely missed, although stand-in, Professor Tom Blum assisted by out-going Associate Department Head Barry Wells, was not too bad. SPS advisors Blum and Wells again managed (two years in a row!) their important task **to not lose the Chapter Book** (no one knows how it mysteriously disappeared a few years ago, then mysteriously reappeared.

The banquet was enjoyed by many faculty members this year, which was very nice to see. We encourage all faculty, students, staff, family, and friends (the whole world, really) to come next year (even **Kovner** showed up this year, but he forgot to bring **Daniel**!).

Deborah Jin, MacArthur Awardee, Presents The 2015 Pollack Distinguished Lecture

The annual Edward Pollack Memorial Distinguished Lecture was presented on Friday, April 10, 2015 by Deborah Jin, who is a NIST Fellow and a researcher at the JILA Institute of the University of Colorado, Boulder. The Pollack lectures are funded by an endowment established by members of the Pollack family and friends of the late Prof. Edward Pollack. They bring to campus a distinguished speaker on a topic related to experimental atomic, molecular and optical (AMO) physics, which were Prof. Pollack's main research interests, or to his long career as a devoted and successful undergraduate physics teacher. Pollack began as a faculty member at UConn in the early 1960's, after finishing his Ph.D. in AMO physics under Prof. Benjamin Bederson of NYU. Prior to that Ed had served in the U.S. Army and taught at both NYU and the City College of New York (CCNY, his alma mater). Ed was a mainstay of our Department for over 40 years and at one time or another taught most of the undergraduate courses while maintaining an active and successful experimental research program in atomic collisions.



Professor Jin received a MacArthur Foundation "genius grant" in 2003, the APS I.I. Rabi Prize in AMO Physics in 2005, the Benjamin Franklin medal in physics in 2008, the L'Oreal-UNESCO Award for Women in Science in 2013 and the Institute of Physics Isaac Newton Medal in 2014. She is a Fellow of the American Physical Society and a member of the National Academy of Sciences. She did her undergraduate work at Princeton and her graduate work at the University of Chicago, moving to JILA/Colorado on an NRC Postdoc immediately after that. There she participated in early demonstrations of Bose-Einstein Condensation (BEC), in which a cloud of atoms become so cold that it collapses into a single quantum state. Her recent research has applied laser cooling and trapping techniques to study supercooled atomic fermions (with half-integer spin) to force them into the state of the lowest possible temperature, a degenerate Fermi gas.

Jin's lecture topic involved some of her newest research on "Ultracold Polar Molecules". Ed Pollack's widow, Rita, was in attendance. Deborah Jin described how to produce an ultracold gas of polar molecules, how to make a laser-produced optical lattice trap for the polar molecule KRb, where the atoms and molecules interact at long range by well-defined electric dipole-dipole interactions that can be controlled by an external electric field. Weakly bound KRb molecules can be formed from a mixture of K-40 and Rb-87 atoms by using a "Fano-Feshbach resonance". Lasers are then used to coherently transfer these large, weakly-bound molecules into their lowest (ground) ro-vibrational quantum state. Jin reported that her research group at JILA has been studying ultracold chemical reactions of KRb molecules at temperatures as low as 200 nanoKelvin, where quantum mechanical effects dominate the collisions. She also described many-body effects involving these molecules confined in a 3-D optical lattice trap.

Prior to and after the lecture, Professor Jin spent time informally with our graduate students, especially the women students with whom she met separately. The respect and attentiveness she showed here to our students appears to reflect the style she applies in leading her very productive research group in Colorado. Her lecture was an excellent example of how to communicate clearly a complex subject to a broad physics audience.

Charles Reynolds Lecturer, October 2014

Our Charles Reynolds Lecturer in October 2014 was Professor Sankar Das Sarma who is the Richard E. Prange Chair in Physics, a Distinguished University Professor, a Fellow of the Joint Quantum Institute, and the Director of the Condensed Matter Theory Center at the University of Maryland, College Park.

Das Sarma has co-authored more than 600 articles in the Physical Review Journal series of the American Physical Society, including more than 140 publications in Physical Review Letters, and with more than 44,000 citations to his publications. He is one of the most highly cited researchers in physics.

He and his collaborators have worked on many different topics of condensed matter physics including transport properties of semiconductors. In collaboration with Chetan Nayak and Michael Freedman of Microsoft Research, Das Sarma introduced the nu=5/2 topological qubit in 2005, which has led to experiments in building a fault-tolerant quantum computer based on two-dimensional semiconductor structures. In 2010 Das Sarma and his collaborators introduced the idea of generic topological quantum computation using localized Majorana fermion in ordinary semiconductor materials. Das Sarma's work on graphene has led to the theoretical understanding of graphene carrier transport properties at low densities where the inhomogeneous electron-hole puddles dominate the graphene landscape. In 2011 Das Sarma and collaborators introduced a new class of lattice tight-binding flat-band systems with nontrivial Chern numbers which belongs to the universality class of continuum quantum Hall and fractional quantum Hall systems without any external magnetic fields. Such flat-band tight-binding systems with non-trivial Chern numbers have substantially enhanced the types of possible physical systems for the realization of topological matter. His lecture was a brief introduction to some of the above topics including a discussion about the search for Majaorana fermions in condensed matter.

From UConn to Cambridge, The Value of Exchange Programs

Joris de Vries was an exchange student in the Physics Department at UConn in Fall 2011. Joris is from the Netherlands, and in that year his fellow countryman Prof. Gerard t'Hooft gave the Katzenstein lecture. Professor Mannheim immediately realized the opportunity, asking Joris to greet the Katzenstein speaker in his native language, and creating in this way a pleasant surprise for the 1999 Nobel Prize winner. After the lecture Prof. t'Hooft went on with studies of quantum gravity, one of the current, big open problems in physics, and wrote the popular book "Time in Powers of Ten." But what did Joris do? Joris found the course "Introduction to Nuclei & Particles" and an independent study on CP-violation, which he took at UConn with Prof. Peter Schweitzer, so inspired, it stimulated in him a deep and continuing interest in particle physics. After returning home and completing his undergraduate education at the University of Utrecht in the Netherlands, Joris was admitted to the master's program at Cambridge University in the UK. Following a successful "probationary year" he was admitted to the Ph.D. program.

Currently, Joris is working on his Ph.D. project in Cambridge's MicroBooNE Group under Prof. Mark Thomson. BooNE (Booster Neutrino Experiment), an international experiment located at Fermi Lab near Chicago where a large 170 ton Liquid Argon detector will be used to measure low energy neutrinos. The Cambridge group plays a major role in the experiment. Joris' role is developing computational techniques for the reconstruction of neutrino-induced events that will be applied to the MicroBooNE data to reveal new properties of neutrino interactions. "It's very fun to do a Ph.D. at Cambridge", Joris says. We are pleased to see our students engaged at this frontier. We wish Joris lots of success, and look forward to hearing from him in the future. It is also a pleasure to note the value of our international student exchange program.

Annual Hike to Mount Monadnock, October 12, 2014

In keeping with previous years tradition, last October, at the height of the fall color season, the Physics Department ascented on Mount Monadnock in New Hampshire. This is a tradition started by Physics elders several decades ago, which we are religiously keeping alive. It turns out, Mount Monadnock is claimed to be the second most frequently climbed mountain in the Universe after Mount Fuji (although Wikipedia casts some doubt on this statistic). Either way, the 5 mile hike with 1700ft elevation gain is well worth the climb. The view from the vast bare granite summit of the mountain is amazing. On a bright day (which it was) you can see Boston way to the East and the White Mountains 100 miles to the North. And all the space in between is covered by a sea of beautiful red and yellow of maple, oak and beach. We had an excellent turnout, probably boosted by the promise of an after-the-hike barbeque. The faculty provided fois gras and champagne, some hamburgers and beer, while the students brought other really delicious food! We all enjoyed the outing, and for sure will do it again. So next fall – same place, same time!

Editor News

Niloy Dutta has been elected to Editor-in Chief of IEEE Photonics Journals for a 3-year term with possible extension for another 3 years by mutual consent.
Vernon Cormier has been appointed editor of the Elsevier journal "Physics of the Earth and Planetary Interiors" for two year renewable term and was also invited to give a presentation at the Fall Annual Meeting of the American Geophysical Union in the special session Structure, Dynamics, and Evolution of Earth's Core.
Alex Kovner is the new editor for the Physics Annual Newsletter. Thank you Alex for your support this year and hopefully more to come!

Career News UConn Physics Graduate Alumni 2015

The success of our graduate students continues as the years go by. **Nicholas Lewkow (**Ph.D. `14; advisor: Kharchenko) has taken a new position as a Data Scientist at McGraw-Hill Education in Boston. Nick's thesis, "Scattering of Particles and Radiation in Astrophysical Environments," has recently been selected for publication by Springer in their Best Theses Series. **Lahiru Narangammana** (Ph.D. `14; advisor: Wells) is now a researcher at the Sri Lanka Institute of Nanotechnology (SLINTEC). **Gokce Basar** (Ph.D. '11; advisor: Dunne) has moved from Stony Brook to a new postdoctoral research associateship at the University of Maryland. **J. C. Sanders** (Ph.D. '11; advisor: Javanainen) is now Chair of the Division of Science & Physical Education at The University of Science and Arts of Oklahoma. **Adolfo Huet** (Ph.D. '10; advisor: Dunne) accepted a faculty position at the Centro de Física Aplicada y Tecnología Avanzada, UNAM, Queretaro, Mexico. **Rico Pires** (MS '09; advisor: Eyler) has finished his Ph.D. at the University of Heidelberg, and is now working as a Management Consultant at McKinsey in Frankfurt, Germany. **Yuefeng Nie** (Ph.D. `10; advisor: Wells) has taken a new position as an Assistant Professor at Nanjing University. **James O'Brien** (Ph.D. '10; advisor: Mannheim) has been promoted to Associate Professor and awarded tenure at Wentworth Institute of Technology, Boston (MA). James has also been elected vice president of the International Association of Relativistic Dynamics, and helped organize the November 2014 meeting of the New England Section of the American Physical Society held at Wentworth. **Andrew Carmichael** (Ph.D. '08; advisor: Javanainen) is now a Lecturer at California Polytechnic State University, San Luis Obispo, CA. **Hashini Mohottala** (Ph.D. '07; advisor: Wells) was awarded tenure and promoted to Associate Professor at the University of Hartford. **Dajun Wang** (Ph.D. '07; advisor: Stwalley) is an Assistant Professor of Physics at Chinese University of Hong Kong. **James McDonald** (Ph.D. '01; advisor: Gai) is now Chair of the Physics Department at the University of Hartford.

Force Concept Inventory

The department has taken up new initiatives to measure learning gains in introductory physics classes. Starting in Fall 2013 and continuing to date, introductory physics classes taught by Jason Hancock and Diego Valente used the Force Concept Inventory, a peer-reviewed pre-test/post-test model to determine the effectiveness of the instructional efforts. The results of these diagnostic tests set a baseline for the existing teaching practices against which other new approaches can be compared and provide valuable feedback on the effectiveness of our learning strategies. In April, Jason was invited by the Dean of CLAS to represent the physics department and present the results of these studies at an internal conference "New Ideas in Science Education" alongside other faculty and teaching staff from other UConn science departments.

Physics Career Preparation

Professor Doug Hamilton's PHYS 1010 class was used this spring by Professor Barker as part of his EDCI course; "Fundamentals of Teaching & Learning". The course is part of the "Graduate Certificate in College Instruction" program. The students visit his PHYS 1010 lecture and they have follow-up meetings about teaching philosophy, best practices in teaching large enrollment courses, and the rewards and challenges of the endeavor. One of our own physics graduate students, Belter Ordaz, is part of Professor Barker's program. It is a good example of how we mentor our graduate students in terms of career preparation.

Springer: "Scattering of Particles and Radiation in Astrophysical Environments"

Nicholas Lewkow (Ph.D. '14; advisor: Kharchenko) had his thesis, "Scattering of Particles and Radiation in Astrophysical Environments," selected for publication by Springer in their *Springer Theses* series, described as the "best of the best": Internationally top-ranked research institutes select their best thesis annually for publication in this series. Nominated and endorsed by two recognized specialists, each thesis is chosen for its scientific excellence and impact on research. Congratulations Nick!

Mallett: Keynote Speaker

Professor Ron Mallett gave the keynote dinner talk at the annual meeting of the National Society of Black Physicists in Baltimore, Maryland on February 26, 2015. The tile of his topic was "A (Very) Brief History of General Relativity" in celebration of the hundredth anniversary of Einstein's general theory of relativity.

Kavli Foundation Article from Alum

Yuefeng Nie (Ph.D. '10; advisor: Wells), was the lead author on a recent Physical Review Letters article, ``Interplay of Spin-Orbit Interactions, Dimensionality, and Octahedral Rotations in Semi-metallic SrIrO3'', Phys. Rev. Lett. 114, 016401 (January 2015), which was also featured in an article by the Kavli Foundation, ``New 'knobs' can dial in control of materials'': This work shows that `the strong spin-orbit interactions caused strontium iridate to teeter on the brink of being either a metal or a semiconductor – a "semimetal", suggesting that the spin-orbit interaction could be a new way of controlling the electronic properties of complex materials.' Yuefeng Nie has also recently accepted a faculty position in the National Laboratory of Solid State Microstructures and College of Engineering and Applied Sciences, Nanjing University, Nanjing, China. Professor Barry Wells will visit Yuefeng this summer in Nanjing.

UConn Daily Digest Features

Professor Jason Hancock's story about PRL "Kondo interactions from band reconstruction in YbInCu4" was featured in UConn Today, phys.org, with press releases from both UConn and Brookhaven and a scientific highlight from Argonne. Story was chosen for the DOE>>Office of Science>>University Research web page.

Professor Jason Hancock was also the lead researcher to solve low-temperature magnetic mystery, http://today.uconn.edu/blog/2015/03/physicists-solve-low-temperature-magnetic-mystery/?utm_source=FacStaffDailyDigest. The paper was published on March 27 in the journal *Physical Review Letters.*

Professor Ron Mallett had a featured article by CLAS Director of Communications Christine Buckley on his time travel research in the UConn Faculty/Staff Daily Diget on March 12th! The link to the article can be seen at: http://today.uconn.edu/blog/2015/03/theories-of-time-travel/

Rawitscher's Mini-course on Numerical Spectral Methods

Professor George Rawitscher presented a mini-course on Numerical Spectral Methods in Sao Paulo, Brazil this past Spring. The course consisted of 12 lectures, and was held under the auspices of the International Center for Theoretical Physics, which is a research institute affiliated with the State University of Sao Paulo.

The main purpose of the mini-course was to inform the scientific community, which included mainly physicists but also chemists and biologists, of spectral computing algorithms. Spectral methods were introduced in the 1970s, but their power is not yet fully appreciated. The main difference from previous methods, such as finite difference and finite elements, is that the value of a function at all the mesh-points are taken into account simultaneously; while the finite difference methods include only 3-5 points at one time.

Fiber Amplifiers and Fiber Lasers

Niloy Dutta has published a book on Fiber Amplifiers and Fiber Lasers.

This invaluable book provides a comprehensive treatment of design and applications of rare earth doped fiber amplifiers and fiber lasers.
Optical fiber amplifier is an important component for optical communication systems. It has applications as pre-amplifiers, post amplifiers, and as repeater amplifiers in evolving optical networks.

Optical fiber amplifiers and fiber lasers are also important for high power industrial applications and sensors.

The applications of fiber amplifiers were first studied in the late 1980's, since then the diversity and scope of such applications have been steadily growing.

Fiber Amplifiers and Fiber Lasers is self-contained and unified in presentation. It can be used as an advanced text by graduate students and by practicing engineers. It is also suitable for non-experts who wish to have an overview of fiber amplifiers and fiber lasers. The treatments in the book are detailed enough to capture the interest of the curious reader and complete enough to provide the necessary background to explore the subject further.

Nuclear Physics Group Reaches Milestone in High-Throughput Computing

The year 2014 represented a major milestone in experimental nuclear physics in the USA, with the completion of a major upgrade of the high-energy electron beam at the Thomas Jefferson National Accelerator Facility (Jefferson Lab) in Newport News, Virginia to 12 GeV, and the commissioning of the GlueX experiment. UConn faculty member Richard Jones and students have played key roles in the design and construction of the polarized photon source for the GlueX experiment, and in developing the software and computing infrastructure needed to analyze the large volume of data that the experiment will generate, more than 3 PB (pronounced "peta bytes") per year. The scientific goal of GlueX is to look for new particles of strongly interacting matter whose existence is predicted based upon the Standard Model of particle physics, but which have not yet been clearly observed in experiments. Their (non)existence would provide important clues to the particular way that quarks are cloaked by the gluonic field inside the atomic nucleus, so that they are never seen in isolation.

Searching through the plethora of particles produced in the GlueX experiment for the signatures of rare exotic particles is a demanding computational task that requires largescale computational resources and an effective strategy for high-throughput computing. Grid technology is one such strategy that has emerged in the last 10 years for scientific computing across a spectrum of disciplines (see http://www.opensciencegrid.org/catching-up-with-gluex/). In 2007 the UConn group received a multiyear grant to develop grid computing capability for the GlueX experiment, culminating in the first demonstration of high-throughput processing of GlueX simulations on the OSG in December, 2012. In March 2014, the GlueX collaboration conducted a full-scale data challenge exercise in which OSG resources ran head-to-head with the resources in the Jefferson Lab computer center. More than 60% of the data was successfully processed on the OSG, and demonstrated that GlueX has effectively doubled its computing throughput by tapping into the massive resources of the national research grid.

Physics Outreach Events

The Physics Department was involved in a number of Community Service and Outreach programs this year, including STEM-Fest, CT Invention Convention, and CT State Science Fair!

STEM-Fest

Dave Perry and Heather Osborne were co-organizers for this day-long (high-school day, that is) outreach event in which 130 high- school students from eleven high schools competed in a series of short challenges in math, science and critical thinking. Dave and Heather represented the Physics team, Alan Parry from Mathematics, Kenneth Noll of Molecular and Cell Biology, and Kelly Burke from the Institute of Materials Science joined together to create the events. They had a tremendous amount of support and assistance from graduate students, staff and faculty in the physics department. A special thanks to Subway and Big Y for their generous donations, which contributed to the success of the event.

Connecticut Invention Convention

This year Dave Perry participated in the Allgrove/Seymor Elementary School Invention Convention as a mentor. The students ranged from second grade to fourth grade, they presented their innovative inventions to panels of mentors from academia, industry and business professionals. The mentors provided comments on the inventor's presentation, device functionality, and device practicably. The inventions spanned a wide spectrum including: organic cough suppressant in the form of a lolly-pop, a rotating multi-level system for organizing shoes to increase efficiency of one's closet, resigned brief case that can function as a complete office. The inventors with highest ranking were recommended to attend the State Invention Convection held at UConn.

UConn Physics Department Awards Promising Young Scientists at the 67th CT State Science & Engineering Fair of 2015

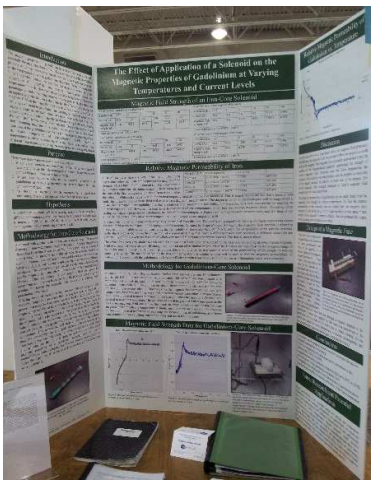
Mansfield, CT - Awards for the 2015 Connecticut State Science & Engineering Fair were released Wednesday, March 11th, 2015. A team from the UConn Physics Department (Professor Menka Jain and Dr. Dave Perry) convened at Quinnipiac University at Hamden, CT to judge the projects from all high school levels in the categories of physical and life sciences. The team distributed the UConn Physics Department Award and Early College Experience awards. School affiliation, age, and demographic information of the participants were anonymous until after the fair. Each participant was awarded a $100 gift certificate as a cash prize.

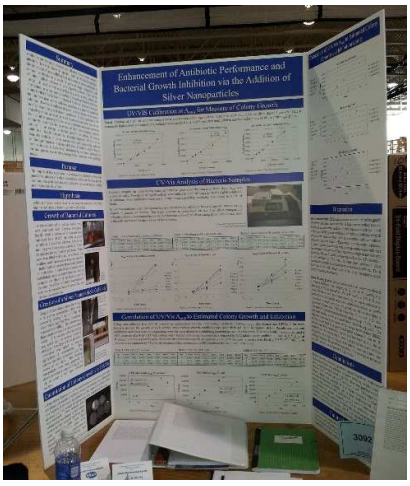
11th grader **Max Marcussen** from Greenwich High School in Greenwich, CT was awarded the **UConn Physics Department Award** by the UConn Physics Department for his project entitled "*The effect of application of a solenoid on the magnetic properties of gadolinium at varying temperatures and current levels.*", which showed how the magnetic strength and permeability of the solenoid built using gadolinium varied with temperature as compared to that of an iron solenoid and magnetic switch was built.

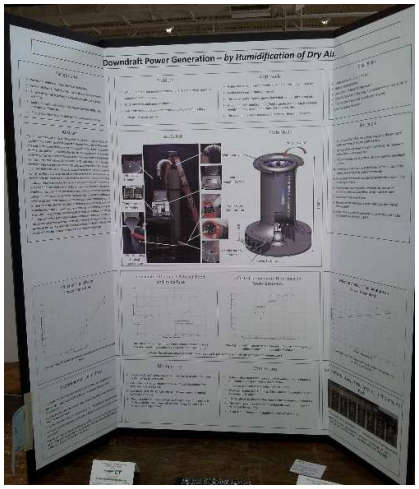
10th grader **Ankita Roychoudhury** from Daniel Hand High School in Madison, CT was awarded the **UConn Early College Experience Program in Physical Sciences** by the UConn Physics Department for her project entitled " *Power generation via downdraft of humidified dry air* ", in which the effectiveness of a tall downdraft tube to generate power by utilizing hot air of various air densities and humidity values was examined.

11th grader **Andrew Lim** of Greenwich High School in Greenwich, CT was awarded the **UConn Early College Experience Program in Life Sciences** by the UConn Physics Department for his project entitled " *Enhancement of antibiotic effects on various species of bacterium via infusion of silver nanoparticles*", where a systematic evaluation was performed with the purpose to enhance the inhibition of bacterial growth via infusion of a silver nanoparticle colloid into bacteria growth alongside conventional antibiotics.

More information on the CT State Science Fair can be found at:
http://www.ctsciencefair.org/







Award-winning posters *at the 67th CT State Science & Engineering Fair at Quinnipiac University March 10-14th, 2015. The UConn Physics Department selected these posters from over 450 entries in categories ranging from middle school to high school in physical and life sciences.*

Professor Cynthia Peterson was awared "28 Years of Dedicated Service as Science Fair Judge" at the CT Science Fair!

Faculty Recognition

Gold star recognition for a another successful year for faculty members of the Physics Department. The outpour of awards and accomplishments in both teaching and mentoring, as well as, research and funding have been outstanding; keep up the good work! Some of these noteable achievements are mentioned below. We would need to create a separate book of accomplishments from this year, so congratulations everyone on a job well done!

Both Professor **Alex Kovner** and Professor **Boris Sinkovic** proposals were selected via the 2015 Research Excellence Program (REP) awards. They each received $25,000! Provost Mun and Vice Provost Sally Reis recognized Professors **Richard Jones** and **Cynthia Peterson** for their participation in the UConn Mentor Connection.

Research funding has increased this past year with many faculty receiving either new grants or renewals which is a significant achievement in this tough economy. In particular, our Assistant Professors have been very successful. **Jason Hancock** received two grants! One from Pratt and Whitney entitled "Computational and Experimental Studies of Laser-Powder Interactions for Additive Manufacturing". This is a multi-PI effort with IMS and SoE faculty and staff and is being used to support 1st year Physics graduate student Erin Curry as an RA. The significance is that Physics and CLAS are contributing to activities at the Additive Manufacturing and Innovation Center on the depot campus. Jason has also be awarded a three year NFS grant with a project period that begins a month early! The topic is "Lattice dynamics of strong negative thermal expansion materials". **Andrew Puckett** received a prestigious new grant, DOE Office of Science Early Career Research Program, "Three-dimensional structure of the nucleon". Associate Professor **Elena Dormidontova** received an NSF grant "Curvature-Dependent Polymer Hydration in Biomaterials, 9/14/14-8/31/17.

Our publications record is both strong and high quality since our work is published in prominent journals such as Physical Review Letters and Nature Communications, as well as in books. Niloy Dutta published a 420 page book called *Fiber Amplifiers and Fiber Lasers*. Please reference page 10 of the Newsletter to review the content and details his work. Nora Berrah, M. Humphrey, P.V. Pancella published a book *Quantum Physics* in the Idiot's Guide series, Alpha Publishing, 2015.

Fulbright Scholar

Professor Kyungseon Joo has been selected as one of this year's Fulbright Scholars. Work will be done at CEA-Orsay in France during the next academic year. Congratulations and we wish you the best of luck!

Most Valued Reviewer 2014

Professor Fedor Bezrukov has also been named one of the most valued reviewers of 2014 by Professor He, Editor of Nuclear Physics B. Professor Gerald Dunne has been named one of the most valued reviewers of 2014 by Professor Ringwald, Editor of Physics Letters B. Professor Alan Wuosmaa received the Outstanding Referees for 2015 Award from ASP.

Associate Dept. Heads

This year Professor Thomas Blum has taken over the reins for Professor Barry Wells as Associate Department Head for Undergraduate Affairs. Barry will also be taking over as Undergraduate Coordinator of the Physics Club. Robin Cote and Gerald Dunne continue their Associate Department Head responsibilities for Administration and Graduate affairs, respectively.

Promotion and Tenure in 2014

Both Peter Schweitzer and Menka Jain were granted tenure and promoted to Associate Professor, and Tom Blum was promoted to Full Professor. Nora Berrah and Alan Wuosmaa were granted tenure on arrival at the Full Professor level. Congratulations to all! We appreciate your hard work and dedication.

New Arrivals

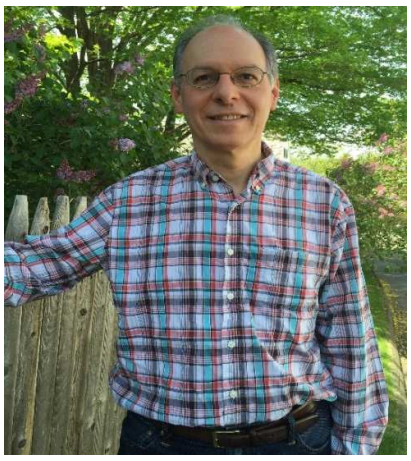
Jeanette Jamieson accepted the Program Assistant for finance and administration position in the Physics administrative office this past winter. She resides in Tolland with her husband, Todd, stepson, Evan, sons, Ryan and Peyton, and their golden retriever, Brody. She and her family enjoy the outdoors, and especially love being on the water and taking their annual trip to Lake George. As sports fans, they root for the Boston Celtics but have a house divided between Yankee and Red Sox fans! They enjoy attending games and playing sports together. Jeanette comes from a competitive family and still enjoys competition as an adult. She loves spending time with her three sisters and actively participates in marathons and 5ks. Jeanette graduated from Central Connecticut State University with a B.S. in Accounting and was inducted into the National Honor Society for Business Excellence. She brings to the department her work experience as an Asset and Loan Management Consultant at SS&C Technologies. Jeanette has been a positive addition to the office staff and we are delighted to welcome her into the department.

Howard Winston joined the Physics Department last fall as an Assistant Professor in Residence at the Waterbury regional campus. He's taught physics at Waterbury, as an Adjunct Professor, since 2007. Howard worked at the Schlumberger-Doll Research Center (SDR) in Ridgefield and then at the United Technologies Research Center (UTRC) for 25 years before retiring in 2014. He obtained his B.S. degree in Physics from Rensselaer Polytechnic Institute in 1978, and his M.S. and Ph.D. degrees in Physics from Brown University in 1980 and 1984, respectively.

While at UTRC, Howard most recently worked in the areas of autonomous systems for planning and visual data interpretation and electrical diagnostics using constraint-based reasoning and embedded time domain reflectometers. Prior to that, he worked on fly-by-wire flight control systems and the use of Bragg grating sensors for structural health monitoring of composite materials. Other work at UTRC included exploratory applications of thermoacoustics for cooling and refrigeration and the simulation of novel forms of in-situ radiographic inspection. At SDR, he worked on symbolic machine learning algorithms based on cached data dependency and error propagation information. Howard has a long-standing interest in how Nature represents itself (something that happens whenever we, a part of the universe, do or study physics) and what, if any, constraints this capability imposes on physical law.

Howard's interest in education stems from his appointment at Brown as the graduate representative to the Educational Policy Committee. Working with the Dean of the College, this committee was responsible for reviewing and approving undergraduate plans of study under the Open Curriculum. Although his primary appointment is in the Physics department, Howard is also teaching calculus and engineering courses at Waterbury and is helping to build a program there to support engineering students through their freshman and sophomore years. To support this effort, he'll be co-teaching a hybrid course in digital logic design with Professor Keith Barker (CSE) next fall at Waterbury and plans to introduce one of the calculus-based introductory physics sequences to the campus in 2016.

Howard lives in Woodbury with his wife, Patrice, and their cat Charlie. Their daughter, Morgan, is a graduate student in Marine Biology at the University of Hawaii at Manoa. Howard and Patrice enjoy snowshoeing and taking walks through the Connecticut countryside.



ENDOWMENT NEWS

The Physics Department is grateful for your contributions to our many endowed and non-endowed funds, which enable us to significantly enhance our missions in a variety of ways and those of UConn. The primary use of the funds is to support deserving graduate students, but other uses include distinguished lectures, undergraduate and graduate awards, an undergraduate research fund, research-related funds, and a general Physics Dept. fund. A list is given below.

We will be hosting our 17th annual Katzenstein Distinguished Lecture on October 30, 2015 to be presented by Nobel Laureate, Serge Haroche. This lecture is supported by an endowment established by Drs. Henry and Constance Katzenstein, Henry being the first Ph.D. in UConn Physics! This endowment also provides annually a $250 prize and plaque for the best paper by an undergraduate Physics major. This year's winner is Dan Violette for "Monte Carlo Simulations of Atmospheric Loss by Stellar Winds from Exoplanets" (Vasili Kharchenko, adviser). The runner up is Kara Googins for "Recruitment and Retention of Undergraduates in STEM Majors" (Nora Berrah, adviser).

The Edward Pollack Endowment for Physics, initiated by Ed's family and many friends, supports an annual Distinguished Lecture in Atomic, Molecular and Optical Physics. See p. 5 for a discussion of the Pollack Distinguished Lecture on April 10 by Debbie Jin, JILA.

The next section of the newsletter will detail some of the summer appointments made using the various funds. Those students and the entire Department are grateful to each of you who contribute to these funds and to the support of our students, faculty, and research. Many of you respond to the general solicitations sent out by UConn; please use the fund numbers from the attached list to direct contributions to the Physics Department. Your assistance in helping us excel in our missions is greatly appreciated.

Summer 2015 Research Fellowship Awards

Through the generous support of our donors, a number of special Summer Research Fellowships have been awarded to some of our most outstanding and promising graduate students. **Bradley Clarke** was awarded the *Dwight Hills Damon Graduate Fellowship*; **Anees Ahmed** was awarded the *Kurt Haller Endowment Award*; the *Isaac S. Blonder and Lois W. Blonder Graduate Fellowship* was awarded to **Matthew Phelps**; the *Edward Frisius Memorial Fellowship* to **Daniel McNeel**; the *Anne and Win Smith Fellowship* to **AmirAli Farokhniaee**; and the *Ruth and Paul Klemens Fellowship* to **Asanka Amarasinghe**. Congratulations to these students, and many thanks to the endowment contributors who are providing vital support for our students in their physics research progress.

Making a Gift

There are many ways of making a gift including checks, marketable securities, planned or estate gifts and thorugh 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 as tax deductions as The University of Connecticut Foundation, Inc., is recognized as a 501(c)(3) non-profit organization. Donors have the option of remaing anonymous if they wish. If you are interested in establishing a new fund, please contact our Administrative Manager, Alessandra Introvigne.

UConn Foundation Department of Physics Funds Donation Page

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

Non-Endowed Funds
20351 Physics Department
20366 Physics Thermoluminescence Lab
21706 Norman Hascoe Lecture Series
22398 Space-time Twisting by Light Project
22457 Time Domain Fund
22520 Edward N. Frisius Memorial Fellowship
22662 Anne and Win Smith Fellowship Fund

Endowed Funds
30438 Katzenstein Endowment in Physics
30641 Charles E. Swenberg Memorial Scholarship Fund
30723 Nagavarapu Graduate Award in Physics
30743 Issac S. and Lois W. Blonder Graduate Fellowship in Physics
30876 Marshall and Georgianna Walker Graduate Award Fund
30911 Kurt Haller Endowment for Physics Research and Graduate Education
30951 Ruth and Paul Klemens Endowment
30958 Edward Pollack Endowment for Physics
31028 Dwight Hills Damon Graduate Fellowship in Experimental Physics
31224 Kurt Haller Academic Opportunity Fellowship Fund
31409 Mark E. Miller Undergraduate Research Fund

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!

Do you have any news about yourself that you are interested in sharing? We enjoy the unsolicited mail we receive as a result of our newsletters so now we're actively soliciting. We happily accept articles or tidbits for 'we hear that...' Please send suggestions to: Alex Kovner, Editor, at the Department address or to kovner@phys.uconn.edu.

SAVE THE DATE October 30, 2015
Invitations for the Katzenstein dinner will be sent early September. If you are interested in attending but do not receive your invitation by the beginning of October, please contact Jeanette Jamieson at 860-486-4924,
e-mail: jeanette.jamieson@uconn.edu