

The University of Connecticut *College of Liberal Arts and Sciences*

Department of Physics News

Professor Takaaki Kajita Katzenstein Distinguished Lecturer Monday, March 26, 2018

The University of Connecticut's Department of Physics is proud to announce that on March 26, 2018 Professor Takaaki Kajita of the Institute for Cosmic Ray Research at the University of Tokyo will be presenting the 2018 Distinguished Katzenstein Lecture. In 2015 Professor Kajita shared the Nobel Prize in Physics with Professor Arthur McDonald for providing the first direct evidence that the masses of neutrinos were non-zero, something that physicists had been trying to ascertain for more than half a century.

Professor Takaaki Kajita received his doctorate in 1986 at the [University of Tokyo](#). Since 1988 he has been at the Institute for Cosmic Radiation Research at the University of Tokyo, where he became an assistant professor in 1992 and professor in 1999.

He became director of the Center for Cosmic Neutrinos at the [Institute for Cosmic Ray Research](#) in 1999. As of 2015, he is at the [Institute for the Physics and Mathematics of the Universe](#) in Tokyo and Director of the Institute for Cosmic Ray Research.

In 1998, Professor Kajita's team at the [Super-Kamiokande](#) neutrino facility in Japan found that when [cosmic rays](#) hit the Earth's atmosphere, the resulting neutrinos switched between two flavors before they reached the detector buried under Mt. Kamioka. This discovery helped prove the existence of [neutrino oscillations](#) and show that neutrinos have mass. In 2015, Professor Kajita shared the [Nobel Prize in Physics](#) with Canadian physicist Professor [Arthur McDonald](#), whose [Sudbury Neutrino Observatory](#) discovered similar results. The work of Professors Kajita and McDonald solved the longstanding [solar neutrino problem](#), which was a major discrepancy between the predicted and measured solar neutrino fluxes, and indicated that the [standard model of elementary particle physics](#), which required neutrinos to be massless, had weaknesses. In a news conference

at the University of Tokyo, shortly after the Nobel announcement, Professor Kajita said, "I want to thank the neutrinos, of course. And since neutrinos are created by cosmic rays, I want to thank them, too". Professor Kajita is currently the [principal investigator](#) of another Institute for Cosmic Ray Research project located at the [Kamioka Observatory](#), the [KAGRA](#) gravity wave detector.



Professor Kajita has received numerous awards including: The [Asahi Prize](#) 1987; The [Bruno Rossi Prize](#) 1989; The [Asahi Prize](#) 1998; The [Nishina Memorial Prize](#) 1999; The [Panofsky Prize](#) 2002; The [Yoji Totsuka Award](#) 2010; The [Japan Academy Prize](#) 2012; The [Julius Wess Award](#) 2013; The [Nobel Prize in Physics](#) 2015; The [Fundamental Physics Prize](#) 2016.

Leon N. Cooper, 2016 Katzenstein Distinguished Lecture

The Katzenstein Distinguished Lectures series continued in Fall 2016 for its 19th year, with an October 28, 2016 lecture by Professor Leon N. Cooper of Brown University, entitled “On the Interpretation of the Quantum Theory: Can Free Will And Locality Exist Together In The Quantum Theory?” Professor Cooper shared the 1972 Nobel Prize in Physics with Professors J. Bardeen and J. R. Schrieffer. The Nobel Prize was awarded for the first microscopic theory of superconductivity, now known as the BCS Theory. Superconductivity as evidenced by the disappearance of electrical resistivity was first observed in Mercury by Kamerlingh Onnes in 1911. Immediately, many theorists including Albert Einstein, set out to explain this newly observed phenomena. However it was not until 1933 that the essential property of magnetic flux exclusion was observed by Meissner and Ochsenfeld. No successful microscopic theory was developed until the 1957 Physical Review Paper that developed the BCS theory. A crucial element for the theory was published in a short letter to the Physical Review in 1956 by Leon Cooper, entitled ‘Bound Electron Pairs, in a degenerate Fermi Gas’. These pairs are now commonly referred to as ‘Cooper Pairs’.

The 2016 lecture took place in Physics Building Lecture Room P-36, and an excellent attendance included physics undergraduates, graduate students, faculty from Physics and other departments, and a number of UConn Physics alumni. Prior to the lecture, Professor Cooper met informally with Physics students in the Physics Library, and then met people at a reception that preceded the lecture. Following the lecture, Professor Cooper joined with Henry Katzenstein’s son David, a Professor at Stanford Medical School, along with faculty, staff, alumni and guests for a gala dinner at the University of Connecticut’s Foundation Building.

The Katzenstein Lectures are made possible by an endowment established by the late Dr. Henry S. Katzenstein and his wife Dr. Constance A. Katzenstein. Cornell Professor David Lee (1996 Nobel Laureate in Physics and 1956 M. S. alumnus of UConn) gave the first lecture of the current series of annual lectures by Nobel Laureates, in 1997. Henry Katzenstein received the very first Ph.D. in physics from our Department in 1954 after only three years as a graduate student here.

The 2017 Edward Pollack Memorial Lecture

The annual Edward Pollack Memorial Distinguished Lecture will be presented in 2017 with invited speaker Professor Matthias Weidemueller of the University of Heidelberg.

Prof. Ed Pollack began as a faculty member in the Physics Department at UConn in the early 1960’s, immediately after finishing his Ph.D. in experimental AMO Physics at NYU under Prof. Benjamin Bederson. Previously Dr. Pollack had served in the U.S. Army and taught physics at both NYU and The City College of

New York (CCNY, his alma mater). He served as a mainstay on the faculty of the Physics Department here for over 40 years. These lectures are funded by an endowment established in his memory by members of the Pollack family and friends of the late Prof. Pollack. Approximately once a year we use the Pollack Lecture endowment to bring in a distinguished speaker on a topic related to experimental atomic, molecular and optical (AMO) physics, Ed's main research interest.

In 2014, the Pollack Lecturer was Prof. David Pritchard of MIT who spoke on his recent efforts in developing software for physics teaching based on physics education research; Pritchard is also a highly-recognized researcher in AMO physics, who mentored four Nobel Laureates in the field. Prof. Pollack also had strong interests in physics teaching, especially to undergraduates, as a popular teacher who taught most of the general education and physics-major courses in the Department during his long career here.

In 2016, Prof. Thomas Gallagher, Jesse W. Beams Professor of Professor of Physics at the University of Virginia was Pollack Lecturer, discussing some of his extensive research with Rydberg atoms (highly-excited H-like atoms). The Pollack lecture series continues to be an inspiration to our faculty and students, particularly in the AMO field. Other previous Edward Pollack Distinguished Lecturers were - 2015: Deborah Jin, Mac Arthur Fellow and Professor at the University of Colorado, JILA; 2011: Michael Drewsen, University of Aarhus, Denmark; 2010: Thomas Cravens, University of Kansas; 2008: Claude Cohen-Tannoudji, Nobel Laureate, College de France, Laboratoire Kastler-Brossel, Ecole Normale Supérieure; 2007: Ara Chutjian, Jet Propulsion Laboratory, California Institute of Technology; and 2006: Lewis Cocke, Kansas State University.

2016 Charles Reynolds Lecture

The Reynolds Lecture, held in honor of the late UConn Professor Charles Reynolds (a co-discoverer of the isotope effect), was given by Dr. Peter Littlewood in October, 2016. Peter was the director of Argonne National Laboratory as well as a Professor at the James Franck Institute, University of Chicago. The title of his lecture was "Bose Condensation of Polaritons: A Superfluid of Light."

Macroscopic phase coherence is one of the most remarkable manifestations of quantum mechanics, yet it seems to be the inevitable ground state of interacting many-body systems. In the last two decades, the familiar examples of superfluid Helium and conventional superconductors have been joined by exotic and high temperature superconductors, ultra-cold atomic gases, both bosonic and fermionic, and recently systems of excitons, magnons, and exciton-photon superpositions called polaritons.

Engineering of optical microcavities make use of the mixing of electronic excitations with photons to create a composite boson called a polariton that has a very light mass, and recent experiments provide good evidence for a high-temperature Bose condensate. Polariton systems also offer an opportunity to use optical pumping to study quantum dynamics of a many body system outside equilibrium, in a new kind of cold atom laboratory.

Dr. Littlewood completed his PhD under Professor Volker Heine at the University of Cambridge. Beginning in 1980, he worked at Bell Labs, finishing his time there as the head of the theoretical physics research.

In 1997, he became a professor at the Cavendish Laboratory in Cambridge and, in 2005, was promoted as the head of the Cavendish Laboratory, before being named the Associate Laboratory Director for Physical Sciences and Engineering at the Argonne National Laboratory in 2011. In 2014, he was named the Director of Argonne National Laboratory.

Physics Awards

Three faculty were selected as Fellows of the American Physical Society and this brings the total number of APS Fellows in the department to seventeen.

George Gibson has been elected fellow of American Physical Society (AMO).

Citation: For deepening our understanding of molecules in strong fields

George Rawitscher has been elected fellow of American Physical Society (DNP).

Citation: For pioneering contributions to the development of the continuum discretized coupled channels method for including the coupling to break-up channels in three-body models of deuteron elastic scattering, break-up and stripping and for his deep studies of the role of nonlocality in the nucleon-nucleus optical potential

Alan Wuosmaa has been elected fellow of American Physical Society (DNP).

Citation: For essential contributions to nuclear physics over a wide range of topics including the demonstration of the nonexistence of positron lines in collisions with very heavy nuclei at the Coulomb barrier, the nature of cluster structures in nuclei, studies of particle multiplicities in relativistic heavy-ion collisions, and the exploration of single-particle properties of light exotic nuclei.

In addition, **Gerald Dunne** received the CLAS Research Excellence Award for the Physical Sciences. **Elena Dormidontova** received the Directors Award for Faculty Excellence of the Polymer Program of the Institute of Materials Science (IMS). **Andrew Puckett** was chosen to be UConn's nominee for the 2017 Blavatnik National Awards in Physical Sciences and Engineering category. **Alan Wuosmaa** was elected Vice Chair of the New England section of the American Physical Society. APIRs **Diego Valente** and **Howard Winston** were recognized by President Herbst for being named as Scientific Teaching Fellows by Yale Center for Teaching and Learning for AY16-17.

The Undergraduate Program

The undergraduate program has been booming lately, growing at a fantastic rate. For the first time in the department's history we have had 200 physics majors registered and the required courses for the major are now regularly meeting with 40+ or even 50+ students. The first course that introduces quantum mechanics (Phys 2300, previously Phys 230) had 92 students enrolled, offered both semesters in 2016-17, though indeed several of those were engineers who are recognizing that they need some quantum mechanics to understand the latest advances in nano-technology. Overall, the number of majors has more than doubled in the past three years. This gives great excitement to the department, although it does put a strain on faculty in covering the teaching load and providing quality research experience for all the interested undergrads.

PHYSICS ANNUAL NEWSLETTER

This year our undergrads were honored with many academic awards, Research Experience for Undergraduates (REU) appointments at other institutions, and Summer Undergraduate Research Fund (SURF) Awards from UConn. The latter two allow students to work on research this summer with faculty at UConn and other institutions.

The Katzenstein Award, given for the best paper by a graduating senior, went to **Filip Bergabo** for his paper entitled “An Experimental Exploration of Spacetime Geometry” which he produced as part of an REU at Howard University last summer. *The Mark Miller Award*, endowed by the former UConn Physics Alumnus, allows an undergraduate to stay at UConn over the summer to work on research with a faculty member. This year’s award went to **Jonah Cerbin** who will work with Professor Sochnikov to study, using the new SQUID microscope in Sochnikov’s lab, the superconducting properties of SrTiO_3 . The American Physical Society provided the department with a \$1000 one-time award for undergraduate research in recognition of former UConn student (BS and MS 2015) and current MIT graduate student Michael Cantara, who was a *LeRoy Apker Award* finalist last year. The award went to **Sam Cutler**, a sophomore, who will work with Professor Whitaker on star formation shutdown mechanisms in galaxies. Finally, **Hope Whitlock** has been named a University Scholar, UConn’s highest academic honor.

A new honor this year for Excellent Service to the Undergraduate Physics Community from a graduating Physics Major went to Physics Club president **Jack Lichtman**. Jack has contributed mightily to the undergraduate culture in the department.

Walter Nadeau, a physics major who will join us in the fall from the Waterbury campus received the Physics Department Award for his work in Physics 1402 Honors.

The number of REU and SURF awards won this year by UConn Physics majors is an all-time high: **Bryan Dunn** (UConn), **Amelia Henkel** (UT Rio Grand Valley), **Daniel Kovner** (UConn), **Charles Maher** (Indiana), **Alexander Mercaldi** (Utah), **Andrew Sanchez** (Michigan State), **Sadhana Suresh** (Washington), and **Hope Whitlock** (UConn). Good luck with your research this summer, and we hope it propels you into a lifelong career in physics!

Undergrads going on to graduate school in Physics include **Filip Bergabo** (CUNY), **Vincent Flynn** (Dartmouth), and **Teddy Sauyet** (Stony Brook).

Sigma Pi Sigma Honor Society

This spring the UConn chapter of the Sigma Pi Sigma Honor Society inducted 12 new members: Emerson Dang, Matthew Ennis, Jacob Hastings, Charles Maher, Alexander Mercaldi, Christopher Oldham, Patrick Pearce, Jillian Rastinejad, Fernando Rodriguez, Andrew Sanchez, Christopher Stewart, and Sadhana Suresh. We were fortunate to have a large group of returning Sigma members who were inducted last year to serve as hosts this time around. Professors Wells and Blum emceed the evening and departmental advisor Micki Bellamy organized the event logistics. Our special guest and speaker for the event was Professor Jenny Hoffman from Harvard who gave a talk on “Imaging the Surface States of a Strongly Correlated Topological Insulator” which described her work with the scanning tunneling microscope; a microscope that can see and manipulate

individual atoms. The talk was masterful at taking a very complex topic (topological insulators – a candidate for quantum computers) and making it approachable for our students ... and faculty for that matter.

The winners of several awards and honors were announced during the event: Filip Bergabo who received the *Katzenstein Prize* for the top research paper by a graduating senior, Jack Lichtman who received a new award for *Excellence in Service to the Physics Community*, Hope Whitelock was named a *University Scholar*, four separate students received UConn summer research fellowships (Bryan Dunn, Amelia Henkel, Daniel Kovner, and Hope Whilelock), and five students won a position in a summer Research Experience for Undergraduate (REU) program at other universities (Amelia Henkel, Charles Maher, Alexander Mercaldi, Andrew Sanchez, and Sadhana Suresh). Overall, the lecture and banquet formed a memorable end to the semester, with a record turnout of families and departmental staff joining to celebrate our students' accomplishments.

Annual Mount Monadnock Hike October 2016



We have done it again! We do it every year: hike up Mt. Monadnock in New Hampshire to enjoy the beautiful fall colors, and warm up with a BBQ in Mt. Monadnock state park on the way back.

Our elders started the tradition many years ago, and we are keeping it alive. It's a great hike: short but sweet. Just over 2 miles from the parking lot to the summit with about 1700 vertical feet elevation to negotiate. A vintage New Hampshire trail: steep and rocky. Not boring. And if you feel like it, you can treat yourself to a little bit of off trail scrambling towards the top.

The summit is a huge open granite monolith with astounding 360 degree views. On a clear day you see from Boston to the East and to Mt. Washington to the North. And all around you is the sea of red and yellow fall colors if you choose your time right.

And we chose it right this time. It was a great hike: the weather, the views, the burgers... The only disappointment: there was practically no wind at the summit, where 30-40 mph gusts are the norm. So there you have it. We are doing it again this year: come join us! We had a record physics, friends, and family crowd last year- let's keep it that way.

2016-2017 Graduate Updates and News

Our recent Ph.D. graduates from the Physics Department have begun promising careers. **Leland Aldridge** has accepted a postdoctoral fellowship at Yale University. **Amir Ali Farokhniaee** has begun a postdoctoral fellowship in, Biomedical Engineering at Case Western Reserve University. **Fu Chang Sun** is a postdoctoral Fellow at the University of Connecticut. **Hongyu Hu** has begun a career as Optical Engineer at Lightel Corp. in Seattle, WA. **Samuel Markson** is pursuing a career in software development in Boston, MA. **Brandan Pratt** has accepted a research scientist position at Formlabs in Boston, MA. **Christopher Sanborn, Alexander Barnes, Neda Paziresh**, and, **Robert Dabrowski** are planning to graduate in Summer, 2017.

Erin Curry won entrance into the National Scattering School, in summer 2016 that hosts promising graduate students in physics and materials science to participate in X-ray and neutron scattering techniques at Oak Ridge and Argonne National labs. **Xiang Zhang** received a summer research internship at Tyco Corp. in New Jersey. **Kemal Tezgin** gave an invited talk on "Chiral-odd GPDs in Bag Model," at 3D Nucleon Tomography Workshop, Modeling and Extracting Methodology, at Thomas Jefferson National Accelerator Facility, in March, 2017. **Y. Tian**, gave a poster talk on "Study of the statistics of small-scale heterogeneity" in the Fall Annual Meeting, EOS Trans. American Geophysical Union in December, 2016. **Susini deSilva**, gave a poster talk on "Modeling of inner core boundary topography with PKIP and PKP-Cdiff" at the Fall Annual Meeting, EOS Trans. American Geophysical Union in December, 2016. **Benjamin Commeau, Zhiwei Zhang and Y. Tian** gave talks at the March APS meeting, **Chris Sanborn** gave a talk on "Predicting the blockage of high frequency regional phases for CTBT monitoring" at EOS Trans. Fall Annual Meeting, American Geophysical Union, in December, 2016. **Dan Hoying** has been awarded a DOE Office of Science Graduate Student Research (SCGSR) award to work with scientists at Brookhaven National Lab and Blum for 1 year starting in July.

Hari Sharma published a paper in ACS Nano (impact factor 13.3) "Lipid Nanodisc-Templated Self-Assembly of Gold Nanoparticles into Strings and Rings. **Niraj Ghimire** gave a talk on "Finding frustrations and topological phases in a quasi-1D zig-zag chain of dipoles" in DAMOP 2017. **Belter Ordaz** gave a talk on "Optomechanical Description of Dynamical Casimir Effect" in DAMOP 2016 and on "New regime for dynamical Casimir effect in optomechanics" in DAMOP 2017. **David Riser, Brandon Clary, and Kemal Tezgin** received scholarships to attend the 2017 TMD Summer School in June in Philadelphia, PA, **Frank Cao** received a scholarship to attend 2017 HUGS Summer School in June in Newport News, VA.

Edward E. Eyle: 1955-2016

Prof. Edward E. Eyle, a valued member of the UConn Physics Department for 21 years, passed away at his home in Coventry, Connecticut on September 19, 2016, at the much-too-young age of 61. He had battled colon cancer for several years, but motivated by his dedication to physics, continued working in the Department to within days of his death. He is survived by his loving wife Karen Greer, his parents Mary and Gene Eyle, his sister Marian Harmount and her husband Scott, as well as sisters-in-law Joyce, Janice, and Elizabeth Greer and Christine Collymore, and many nieces, nephews, and cousins.



Ed was born in Akron, Ohio on March 8, 1955. He received his BS in Physics from MIT in 1977, and his PhD in Physics from Harvard in 1982, where he worked with Frank Pipkin on precision laser spectroscopy and excited-state lifetime measurements of molecular hydrogen. After a brief postdoctoral appointment at Harvard, Ed joined the Physics Department at Yale as an assistant professor. He then spent several years in the Physics Department at the University of Delaware, before coming to the University of Connecticut as a Professor of Physics in 1995.

Ed's research spanned a wide range of topics in experimental atomic, molecular and optical physics, resulting in over 90 publications. Early in his career, he focused on precision laser spectroscopy of atoms, mainly helium, and molecules like hydrogen (H_2) and nitric oxide (NO). He was a pioneer in developing techniques for the production of precise pulses of ultraviolet light and using these laser systems to access excited states, including highly-excited Rydberg states, of the species under study. Highlights included precise measurements of the dissociation and ionization energies of molecular hydrogen, and, in collaboration with colleagues at NIST and Australia National University, a determination of the helium ground-state Lamb shift via precise two-photon spectroscopy. After relocating to the University of Connecticut, Ed expanded his interests by collaborating with Phil Gould and Bill Stwalley on ultracold Rydberg gases and ultracold molecules. The Rydberg work included ionization dynamics, molecular resonances, forbidden transitions, superradiance, and the first demonstration of the excitation blockade. The molecular work encompassed photoassociative molecular formation of various alkali dimers, resonantly-enhanced multiphoton ionization (REMPI) detection, spectroscopy of unusual states, and resonant coupling between excited states. He also pursued experiments on the bichromatic force, a potential means of rapidly decelerating a molecular beam.

Ed had a real knack for technical details, especially in the areas of lasers, electronics, and computers. He developed a large number of microcontroller-based circuits which were used in a variety of experiments.

Ed was a valuable member of the UConn Physics Department, as well as the physics community as a whole. He was a Fellow of the American Physical Society (APS), helped establish the APS Francis M. Pipkin Award and later chaired the Award Committee, and served on the Executive Committee of the APS Topical Group on Fundamental Constants and Precise Tests of Physical Laws, as well as the Editorial Board of Physical Review A. He spent productive sabbaticals at JILA (2007) and MIT (2015). At UConn, he chaired the Space Committee for many years, and was instrumental in planning and coordinating the relocation of several research labs to the Biology/Physics Building. The teaching labs, especially at the advanced undergraduate level, were a particular passion of Ed's. He devoted a great deal of time and energy to developing new labs for the optics, electronics, and advanced lab classes. In recognition, the labs for these courses are now named in his honor. Ed taught a variety of classes at both undergraduate and graduate levels, including electricity & magnetism, optics, lasers, atomic physics, electronics, and the advanced lab sequence. He was a dedicated and effective teacher who always had the best interests of his students in mind.

Although Ed worked extremely hard, he also knew how to enjoy himself. He was an avid outdoorsman who enjoyed back-country skiing, biking, back packing, and photography. A 100 mile bike ride or a 20 mile alpine hike were nothing out of the ordinary for Ed. He was always up for a challenge - the steeper the hill or mountain, the better.

Ed was a dedicated citizen of the Physics Department. He was devoted to pushing the frontiers of science and advancing the careers of his students and colleagues. He will be sorely missed and fondly remembered.

As a means of memorializing his passion for the advanced undergraduate teaching labs, Ed, together with his wife, Karen Greer, established the Edward E. Eyler Endowment Fund for Physics Advanced Labs. Their generosity will enable the procurement of equipment and supplies critical to enhancing laboratory facilities for all of the advanced lab courses. Others are encouraged to contribute to this fund (Account #31530) – see page 16 for details on donating.

Lottie and Kurt Haller Remembrance

The physics department records with sadness the passing of Lotte Haller on October 25, 2016. Lotte was the wife of longtime faculty member Kurt Haller, who built up the Department's particle theory group from scratch, leading to the hiring of Munir Islam, Philip Mannheim, Mark Swanson, Daniel Caldi, Gerald Dunne, Alex Kovner, Tom Blum, Fedor Bezrukov, and Luchang Jin, and the securing in 1978 of a now 40 year running Department of Energy grant to support particle theory research. Lotte was a good friend to the department over the years, and especially to Kurt's many students, often entertaining them in her home. After Kurt's death Lotte maintained an association with the Physics Department and regularly attended the annual Katzenstein dinners, with the Haller family establishing two funds at the University of Connecticut Foundation in honor of Kurt: The Kurt Haller Opportunity Fellowship and the Kurt Haller Endowment for Physics Research and Graduate Education. Lotte is survived by two sons, Paul and Geoffrey, and is buried next to Kurt in the cemetery on North Eagleville Road. Both Lotte and Kurt will be fondly remembered by the members of the Physics Department and especially by those whose lives they touched and enriched.

Physics Outreach Events

Faculty, staff, and students have continued the physics department's strong tradition of outreach through the '16-'17 academic year, remaining involved in endeavors such as the CT State Science Fair and the Science Olympics. Faculty continue to serve in numerous societies at the university, national, and international levels.

There have been a multitude of public talks showcasing expertise in the department. Gerald Dunne gave a public talk on Gravity Waves and Merging Black holes at U3A Adelaide, Australia; Ilya Sochnikov gave a talk on Nanoscience to students at Stamford High School; Phillip Mannheim spoke at the Westport Astronomical Society; and Ronald Mallett gave talks in Connecticut, New York, Massachusetts, Texas, Florida, and Austria. George Gibson gave a talk on How to Make the World's Smallest Camera, at EO Smith High School. Richard Luddy gave a talk to 200 high school freshman as part of the UConn Head Start Program, as well as a talk at

Northwest Catholic High School In summer 2016. Chandra Roychoudhuri hosted two high school students and their parents to do experiments to understand non-interaction of waves.



Ann Marie Carroll demonstrating the Leidenfrost Effect to high school students

Liquid nitrogen demonstrations were conducted by Ann Marie Carroll and Dave Perry for 5-12 year old children at the Mansfield Public Library in July of 2016, and students of Guilford High School in November of 2016. Hope Whitelock and Ann Marie Carroll gave a liquid nitrogen demonstration for 4H students in November of 2016. Also in November of 2016 Dave Perry and Ann Marie Carroll volunteered at the cardboard canoe race at UConn Avery Point as part of the Early College Experience Program. In December of 2016 Hope Whitelock and Undergraduate Tyler Metivier gave a waves/music demonstration to KUBE (Kids and UConn Bridging Education) for middle school students.

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Richard Luddy was pined in the face by UConn students as part of a fundraiser for Connecticut Children's Medical Center in December of 2016, and Cynthia Peterson gave a talk as part of a fundraising event for the Connecticut State Museum of Natural History in March of 2017.

During the summer of 2016, Cynthia Peterson supervised the KASET Space and Astronomy module along with graduate student Yasaman Homayouni for students in grades 4-10. The program consisted of planetarium visits as well as hands on sessions. Dave Perry ran a KASET module, "Explore Your Physical World."



Undergraduate students Hope Whitelock and Tyler Metivier show middle school students the difference between longitudinal and transverse waves using a slinky.



Cardboard Canoe Race, UConn – Avery Point, CT – Early College Experience

Howard Winston co-sponsored two performances of an actor who portrays Albert Einstein at the UConn Waterbury Campus' Osher Lifelong Learning Institute in the summer of 2016 and the spring of 2017.

The Connecticut Science and Engineering fair celebrated its 69th year running. Cynthia Peterson judged 14 finalist 7th and 8th grade projects, which included an interview portion. Dave Perry and Ann Marie Carroll evaluated approximately 150 posters in physics and life sciences for the UConn Special Awards category.

The Science Olympiad is a nationwide organization dedicated to promoting science education through conducting competitive science tournaments. The state portion of the competition takes place yearly in Storrs, CT. Jonathan Trump, Cynthia Peterson, and graduate student Yasaman Homayouni re-designed a spectroscopy event, which Yasaman and Cynthia supervised; Dave Perry supervised a wind power event; Ann Marie Carroll supervised an optics event; Hope Whitelock registered and distributed food to volunteers.

Faculty Scholarship

The physics department continues to produce excellent science, enhancing our national and international presence in all of the research areas. Our research awards have significantly increased since eighty percent of the physics faculty are funded. Grant awards were \$2,229,155 in FY 2016 and they are \$ 3,882.618 in FY 2017.

Elena Dormidontova was funded by Petroleum Research Fund as well as funded by NSF with Prof. M.-P.Nieh (Chemical and Biomolecular Engineering). **Alex Kovner** received a new NSF Award and received a 9 month Scientific Associateship at prestigious CERN (2018). **Janson Hancock** received the UConn Scholarship Facilitation Award and was awarded with Maxim Dzero (co-PI) a DOE, Basic Energy Science grant. **Susanne Yelin** was awarded the renewal of her NSF grant. **Kate Whitaker** was awarded a NASA grant, through the Space Telescope Science Institute and she is a Co-PI on the "DAWN Center for Excellence" a 10 year timeline in Denmark- starting September 2017. **Kyungseon Joo** received a renewal of his grant from DOE's Office of Nuclear Physics, as well as received funding from Jefferson Science Associates to organize two international conferences in 2017 to be held in Paris, France and Rome, Italy. In addition, Kyungseon received funding from IAEA and American Nuclear Society to organize a conference in Seoul, South Korea. **Cara Battersby** was awarded the Templeton proposal for the BiteScis initiative, bringing modern science research into the K-12 classroom. **Vasili Kharchenko** received a 3 year grant from the Chaikin-Wile Foundation. **Nora Berrah** received a new NSF grant and she was granted the renewal of her DoE, Basic Energy Sciences grant.

Two separate proposals by **Gerald Dunne** (Particle Physics) and **Robin Côté** (AMO physics) were granted to organize two Kavli Institute for Theoretical Physics (KITP) Programs. **Peter Schweitzer** and **Kyungseon Joo** received a 3-year NSF international grant to collaborate in Orsay, France. The focus of this grant is for (1) International REU and (2) Study Abroad Program for Graduate Students.

The faculty continue to be in leadership position in scientific journals. **Niloy Dutta** is the Editor-in-Chief of IEEE Photonics Journal. **Vernon Cormier** is the Editor of the Elsevier journal "Physics of the Earth and Planetary Interiors". **Juha Javanainen** is the Editor of Physics-Scripta and **Susanne Yelin** is the Editor for Advances in Atomic, Molecular, and Optical Physics Serial (Elsevier).

New Arrivals to the Physics Department

New Financial Assistant in Physics



Anna Huang accepted the vacant financial assistant position in the Physics administrative office in March. She was raised in New Britain, CT and went to New Britain High School before attending UConn in 2012. She was the first in her family to attend college and graduated from UConn in December 2016 with a major in Accounting and minor in Sociology. Anna has a huge appreciation for the beauty of nature and enjoys many outdoor activities including hiking and biking. She's also a big fan of the show *The Office* and loves puzzles, with two of her favorites being Sudoku and Jumble. She is very excited to join the Department of Physics and especially looks forward to learning new things and meeting new people!

New Program Assistant in Physics



Caroline Cichocki or "Carrie" accepted the program assistant for finance and administration position in the Physics administrative office this past winter. Her professional background includes office management and administration. She grew up in Stafford Springs, CT where she resides with her husband, Eric. Carrie enjoys hiking, camping, and is an avid runner. She has successfully completed two half marathons! She loves baking and entertaining family and friends. In addition, she has a passion for event planning and has been involved with organizing various community events including the Stafford Arts Commission's Summer Concert Series and the Taste of Manchester. Carrie graduated from Eastern Connecticut State University and while there worked as a student employee. From that experience, she developed an appreciation for higher education administration and is very excited about joining the Physics department!

New Laboratory Technician II



We are excited to announce the addition of **Sarah Trallero** to our teaching labs team as a Lab Tech II. Sarah received her honors bachelor degree in physics from McMaster University, Canada in 2007. She then graduated with a Master of Science in the field of ultrafast laser physics, under the supervision of Paul Corkum at the University of Ottawa, Canada. Her research focused on the interaction of intense laser fields with bandgap solids. Sarah held a position of physics instructor and undergraduate academic advisor at Kansas State University, KS from 2010 to 2017, where she specialized in teaching physics in a studio format. She also spearheaded the undergraduate recruitment program at K-State and subsequently saw significant growth in the undergraduate population. Sarah has been the recipient of many prestigious awards, including the National Sciences and Engineering Research Council of Canada Graduate Scholarship. Welcome, Sarah!

New Faculty in Physics

Dr. Alexander "Sasha" Balatsky will be joining the physics department in the fall of 2017 as a full professor of Physics. Dr. Balatsky comes from Los Alamos National Laboratory and NORDITA in Sweden. He is a well-known theorist in condensed matter physics, in particular in the subfield of strongly correlated materials including high temperature superconductors.

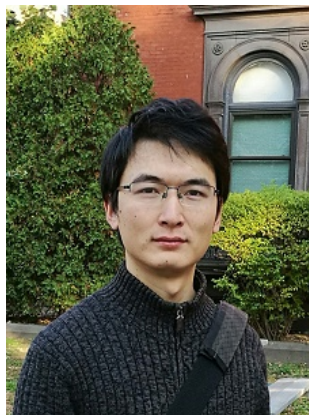


He has also made significant contributions to many materials physics enterprises such as graphene and two-dimensional systems, ferroelectricity, multi-ferroics and topological insulators. In addition, some of his other research interests transcend several interdisciplinary boundaries.

His many scientific honors include fellowships from the American Association for the Advancement of Science (AAAS), American Physical Society (APS) and Los Alamos National Laboratory (LANL). He brings an excellent research record with about 300 publications and approximately 10,000 corresponding citations. We are fortunate to have someone of his caliber join our department and wish him the very best during his career at UConn.

Dr. Luchang Jin will be joining the Department of Physics as an Assistant Professor, starting in Fall 2017.

Luchang did his undergraduate studies at Peking University, and his PhD at Columbia University with Professor



Norman Christ. He is currently a postdoctoral fellow at Brookhaven National Laboratory. His research specialty is theoretical particle physics, using the technique of lattice gauge theory to study the muon anomalous magnetic moment, as well as parton distribution functions in nuclear and particle physics. Luchang has won numerous awards for both physics and informatics, and has a keen interest in computational physics.

Dr. Daniel McCarron will be joining the Physics Department this fall as an Assistant Professor of Physics.

He is one of two recently-hired experimentalists in atomic, molecular and optical (AMO) physics, the other being Carlos Trallero. Daniel hails originally from England, having received both his undergraduate and graduate degrees from Durham University. His PhD work was done with Prof. Simon Cornish and involved the formation of ultracold RbCs molecules via the process of magnetoassociation. He is currently a postdoc in the group of Dave DeMille at Yale, where he is performing experiments on direct laser cooling of molecules, specifically SrF. The techniques of laser cooling have worked wonderfully for a number of atomic species, but until recently, their application to molecules has been fraught with difficulties. Daniel's efforts have not only allowed successful cooling to temperatures below one thousandth of a degree above absolute zero, but also confinement and compression of the molecules in a magneto-optical trap (MOT). At UConn, Daniel plans to expand the menu of laser-cooled molecules, and use more efficient techniques to produce larger and colder samples, ultimately realizing a Bose-Einstein condensate (BEC), where the particles occupy a macroscopic quantum state. Such systems will find applications in a number of exciting areas, including chemistry at ultralow temperatures, quantum information, simulations of condensed-matter systems, and tests of physics beyond the Standard Model.



Dr. Carlos Trallero will be joining the Physics Department in the fall of 2017 as an Associate Professor of Physics. He comes to us from Kansas State University, where he started as an Assistant Professor and became a world leader in ultrafast laser science, both in laser development (he has a record in the stability of a carrier envelop phase stable laser) and scientific achievements (generation of high order harmonics and their use in molecular spectroscopy).



Carlos received a Master's degree in nuclear physics from the Higher Institute for Nuclear Sciences and Technology, Havana, Cuba. He then came to the United States for graduate school at Stony Brook University, receiving a Ph.D. in ultrafast laser physics. He had a postdoctoral position in the Steacie Institute for Molecular Sciences, in Ottawa, Canada, before becoming a professor at KSU.

While Carlos' research overlaps most strongly with Drs. Nora Berrah and George Gibson in the physics department, Carlos sees opportunities for interdisciplinary research applying his ultrafast techniques to condensed matter physics and chemistry. Because Carlos has worked in a large laser center in Kansas, he would like to bring together and organize the ultrafast researchers at UConn from various departments and make UConn a focal point for ultrafast studies on the East Coast.

Physics runs in the family, as Carlos' father (Carlos Trallero) is also a physicist and very involved with the Latin American Physical Society. It is a goal of Carlos (junior) to recruit students from Cuba and across Latin America to increase the representation of Hispanics in physics. Carlos has been involved a number of outreach activities in Kansas and hopes to continue this at UConn.

Welcome Alexander, Luchang, Daniel, and Carlos!

New Assistant Professors in Residence in Physics

This past spring the Physics Department concluded a successful search for three new Assistant Professor in Residence positions to start this fall, two at the Storrs campus and one at Stamford. The new Storrs hires are **Dr. Deepak Sainju** and **Dr. Ernesto (Belter) Ordaz** while **Dr. Keith Wood** is headed to Stamford. Deepak is coming from Northwest Vista College in San Antonio where he is currently an Associate Professor. Deepak received his Ph.D. in Physics from the University of Toledo (OH) (thin films) and has 10 years of experience teaching intro physics at the college level. Joining him is his wife Menka Sainju and two children Swagat and Saurav. Belter is busy wrapping up his Ph.D. right now at UConn with advisor Professor Yelin (and also studying physics education). Joining him is his wife Sandra Camacho and daughter Sandra Ordaz. Keith is also finishing his Ph. D. (magnetospheric physics) and will graduate from the University of Auburn. Keith will

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be accompanied by his fiancée Megan Flannery. The new professors will focus on our introductory physics curriculum, including Physics 1201-2, 1401-2, and 1501-2. We also hope to enlist their expertise and enthusiasm to assist our switchover to studio-style teaching as we move into our new building and modern classrooms. Welcome Belter, Deepak and Keith!



Deepak Sainju



Keith Wood



Belter Ordaz

New Post-Doctoral Fellows in Physics

Also hired within the last year are the new Post-Doctoral Fellows: **Dr. Nora Kling** is working with Dr. Nora Berrah; **Dr. Eric Fuchey** is working with Dr. Andrew Puckett; **Dr. Alexander Stankiewicz** is working with Dr. Vasili Kharchenko, **Dr. Christopher Sanborn** is working with Dr. Vernon Cormier, and **Dr. Nobuo Sato-Gonzalez** is working with both Dr. Kyungseon Joo and Dr. Peter Schweitzer.



Nora Kling



Alex Stankiewicz



Eric Fuchey



Nobuo Sato-Gonzalez

Endowment News

The Physics Department is very grateful for your contributions to our many endowed and non-endowed funds, which enable us to significantly enhance our educational and research missions in a variety of ways, as well as those of the University of Connecticut as a whole. A primary use of the funds is to support deserving graduate students, but other uses include distinguished lectures, undergraduate and graduate student awards, an

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undergraduate research fund, research-related funds, and a general Physics Department fund. A list of these funds is provided below where you can also find information on the various funds in the University of Connecticut Foundation, which support the Physics Department in numerous important ways. The entire department is grateful to those of you who contribute to these funds and thereby provide important assistance that significantly enhances our department's educational and research missions.

This last year has been a noteworthy year for the Physics Department Endowment. It was however an extremely sad one, with the passing away of our colleague for many years Professor Edward E. Eyler. During his years with us Ed was very committed to developing the laboratory program that we provide for our physics majors. To establish a permanent memorial and tribute to Ed, Ed and his wife Karen Greer have made a substantial donation to the Physics Department to set up an advanced teaching laboratory for physics majors in the Physics Building. The laboratory bears the plaque: "Edward E. Eyler Advanced Physics Teaching Laboratory", and will serve to memorialize Ed's commitment to teaching in perpetuity.

We will be hosting our 20th annual Katzenstein Distinguished Lecture Monday March 26, 2018 to be presented by Nobel Laureate Professor Takaaki Kajita, who in 2015 shared the Nobel Prize in Physics with Professor Arthur McDonald. This lecture is supported by an endowment established by Drs. Henry and Constance Katzenstein, Henry having been the very first student to be awarded a Ph.D. in Physics at UConn.

The Katzenstein endowment annually provides a \$250 prize and plaque of recognition for the best research paper by an undergraduate Physics major. This year the Katzenstein Prize was awarded to Filip Bergabo for his paper "An Experimental Exploration of Spacetime Geometry" based on the research he carried out while on an REU (Research Experience Program for Undergraduates) program at Howard University under the direction of Howard University faculty member Dr. Tristan Hubsch. Even though Filip is only an undergraduate, he delivered a talk at a meeting of the American Physical Society on the topic: "Studies of the energy-momentum tensor in extreme-instability systems". For this research Professor Peter Schweitzer served as his advisor. There were two other submissions for the undergraduate Katzenstein prize: Jack Lichtman submitted a paper "Universality of Cometary X-ray Emissions", and Theodore Sauyet submitted a paper "Size Effect on Magnetocaloric Properties of GdCrO₃".

The Edward Pollack Endowment for Physics, initiated by Ed's family and many friends, supports the annual Pollack Distinguished Lecture in Atomic, Molecular, and Optical Physics.

Another example of our funds is the Dwight Hills Damon Graduate Fellowship in Experimental Physics, funded by Dwight's family and many friends. It provides a summer research fellowship to one of our outstanding graduate students.

In the following pages you can find details about the various funds in the University of Connecticut Foundation, which support the Physics Department in numerous important ways. The entire department is grateful to those of you who contribute to these funds and thereby provide important assistance that significantly enhances our department's educational and research missions.

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
Edouard Paradis Award (in process)

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
- 31530 Edward E. Eyler Endowment for Physics Advanced Labs

Making a Gift:

There are many ways of making a gift to the UConn Foundation in support of the Physics Department, including checks, marketable securities, planned or estate gifts and through payroll deduction for UConn 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 remaining anonymous if they wish. If you are interested in the possibility of establishing a new fund, please contact our Department Head Prof. Nora Berrah, and/or our Administrative Manager, Alessandra Introvigne.

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UConn Foundation Department of Physics Funds Donation Page

I/We would like to support the Physics Department Programs. Please direct my gift of \$ _____ to the fund (s) listed below. Please include the amount of the donation (if designating to various funds), name and number of fund (s):

Matching Gift

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

My company is: _____

Should you choose to support one of these funds, you can send your contribution directly to the University of Connecticut Foundation. Please include the fund name and number on your check:

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

We greatly appreciate your support!

SAVE THE DATE: Monday March 26, 2018

Invitations for the Katzenstein lecture and dinner will be sent out by January 1, 2018. If you are interested in attending but do not receive your invitation by then, please contact:

Caroline Cichocki
Phone: 860-486-4924
Email: caroline.cichocki@uconn.edu