

Wave of the New

Two new science research buildings went up in the South Campus of the college. The Physics department recently recruited four new faculty members. The department also elected a new chair. The Division of Science has a new dean, who happens to be a High Energy Physics experimentalist. CUNY has a new chancellor. A wave of the new has arrived!

The two new science research buildings are the CUNY Advanced Science Research Center (ASRC) and the Center for Discovery and Innovation (CDI) of the City College of New York. The buildings open for operation in the late fall of 2014 or early spring of 2015. Each of the two buildings will provide approximately 200,000 square feet of research space designed to facilitate collaborative and multidisciplinary research efforts. The CDI (the building to the right in the picture) will mainly accommodate researchers from the City College Science Division, while the ASRC (left building) will be a resource for all the CUNY colleges. The research to be pursued will be collaborative and interdisciplinary.



The two buildings will be connected at the base by a number of shared facilities, which include a vivarium, a receiving area, building support activities, and various shared core facilities, such as, imaging modalities, cryogenic equipment, and, materials characterization facilities. Each building has a unique identity on the interior with a common exterior campus expression.

The ASRC will house state-of-the-art science facilities. The research will focus on CUNY initiatives in five key

areas: Nanoscience, Photonics, Structural Biology, Neuroscience, and Environmental Sciences, arranged thematically on a floor by floor basis. CUNY Vice Chancellor for Research Gillian Small will be the Executive Director of ASRC, and there will be five directors leading the five above-mentioned flagship initiatives. Dr. Kevin H. Gardner, a leading biophysicist, will direct the Structural Biology Initiative. Dr. Charles J. Vörösmarty, a renowned expert in global water issues will lead the Environmental Cross Roads Initiative. Dr. Rein Ulijn is the founding director of the Nanoscience Initiative. The search is ongoing for the remaining two director positions. Dr. Jacob Trevino will serve as the ASRC Scientific Cleanroom Director. The mission of the ASRC is to be a catalyst for interdisciplinary scientific research and discovery and develop a university-wide integrated scientific research network.

Professor Alexios Polychronakos was elected chair of the Physics department and assumed responsibilities on July 1, 2013. His current research interest is on Quantum Field Theory, Gravitation and Integrable Models. The four new faculty members joining the department are Dr. Sebastian Franco (High Energy Physics Theory), Dr. Pouyan Ghaemi (Condensed Matter Theory), Dr. James Hedberg (Physics Education), and Dr. Vinod Menon (Photonics). Further details about their expertise and research interest appear in a following section of the Newsletter.

Dr. Tony Liss joined CCNY as the Martin and Michele Cohen Dean of Science on October 15, 2013. He is a renowned HEP experimentalist and a member of the ATLAS collaboration that was involved in hunting down the Higgs Boson at the Large Hadron Collider at CERN.

The CUNY Board of Trustees appointed Dr. James B. Milliken the Chancellor and Distinguished Professor of Law at the CUNY Law School effective June 1, 2014. Previously, he was the President of the University of Nebraska (2004 – 2014) and Senior Vice President of the University of North Carolina (1998 – 2004).

With new infrastructure, new resources and new leaders it is expected the science and technology enterprise in the college and the university will thrive and attain new heights.

Mini-CUSPEA Program Recruits Graduate Students from China

The mini-CUSPEA program was born out of the successful CUSPEA (China US Physics Examination and Application) Program created and run by Professor T. D. Lee (Columbia University) from 1979 to 1989. In 1979, higher education in China was still recovering from the Cultural Revolution. School transcripts and recommendation letters were difficult to evaluate, and standardized tests such as the Graduate Record Examination (GRE) and Test of English as a Foreign Language (TOEFL) were not available in China. So, the CUSPEA program was instituted as an alternative graduate school admission procedure. The CUSPEA exam was given in English and had a similar scope to that of Ph.D. written qualifying exams in major American universities. The questions were prepared by physics professors from participating North American universities -- starting with Columbia University, and eventually expanded to 97 universities. CCNY was one of the first universities participating, and we recruited Dr. Daxi Li as one of the first batch of students. In China, Professor Lee set up a nationwide committee of physicists to administer and grade the exams. The examinees are usually senior physics majors from top-ranking Chinese universities. Those who passed the exam were followed up by an interview by a small American delegation. The final admission was based on mutual agreement between the applicant and participating physics departments. A total of 915 Chinese students came to US universities over the ten years of the program. The three Chinese universities with the most students who passed the exam were University of Science and Technology of China (218), Peking University (206) and Fudan University (127). Each year, CCNY recruited one or two excellent students from China through the program.

In the early years in 1990s, after several years of suspension of the CUSPEA program, a new program called Mini-CUSPEA was developed. It is called "mini" because initially only the Fudan University from China, and three universities: Columbia University, New York University and the City College of New York from the US participated in the program. Every year, between 6-10 students are selected through the written exams and the interviews similar to the ones used in the CUSPEA, and they are admitted by the above three U.S. universities. Once admitted, the usual requirements for TOEFL and GRE for Chinese students are waived for the Mini-CUSPEA participants. Beginning in the Fall of 2006, the mini-CUSPEA program expanded to include Peking University students, and in 2009, the Columbia Applied Physics Department joined in the program.

In 2013, NYU opened a campus in Pudong, Shanghai, and they no longer participate in the mini-CUSPEA program. The mini-CUSPEA consortium now consists of Columbia Physics, Columbia Applied Physics, and CCNY Physics departments. This year, 10 students at Fudan and 17 at Peking took the exam on September 20, 2014. The consortium sent CCNY Professor Ron Koder to China for on site interviews with the successful candidates. Based on the interview and exam rankings, the consortium made offers to 8 students. We eagerly await the result of these offers.

(Ngee-Pong Chang, Professor, Department of Physics, CCNY)

80th Birthday Symposium in honor of Daniel Greenberger and Myriam Sarachik

The department celebrated the 80th birthday of two of its distinguished members Daniel Greenberger and Myriam Sarachik by organizing a symposium entitled, "*Quantum Mechanics: Phases, Transitions and Entanglements*" on



Friday, March 22, 2013. Professors Greenberger and Sarachik are 1950 graduates of the Bronx High School of Science, a class that included two Physics Nobel Laureates Steven Weinberg and Sheldon Glashow.

Both Greenberger and Sarachik are Distinguished Professors of Physics of the City University of New York (CUNY) and garnered many awards for their contributions to Physics. Professor Greenberger's research focuses on fundamental problems in quantum theory, mostly using quantum optics and entangled states. Professor Sarachik is a condensed matter experimentalist who enjoys wide acclaim for her fundamental contributions to studies of quantum spin dynamics and spin coherence in condensed matter systems.

The symposium brought together a group of distinguished speakers from within CUNY and abroad and featured talks on quantum entanglement spin dynamics, spin coherence and other frontier topics in Quantum and Condensed Matter Physics. The speakers included Professor Eugene Chudnovsky from CUNY Lehman College, Professor Laura Greene from University of Illinois at Urbana-Champaign, Professor Michael Horne from Stonehill College, Professor Steven Kivelson from Stanford University, Professor Philip Phillips from University of Illinois at Urbana-Champaign, Professor Marlan Scully from Texas A&M University, Professor Samuel Werner from The University of Missouri, Professor Jonathan

Friedman from Amherst College, Professor Mark Hillery from CUNY Hunter College, Professor Yoseph Imry from the Weizmann Institute of Science, Professor Miguel Levy from Michigan Technological University, Professor Wolfgang Schleich from University of Ulm, Professor Javier Tejada from University of Barcelona, and Professor Anton Zeilinger from University of Vienna and the Austrian Academy of Sciences. The day-long symposium was followed by a dinner attended by the speakers, as well as the family, friends and colleagues of Professors Greenberger and Sarachik.

Physics Faculty Members Honored

Alfano Garners New Awards

Distinguished Professor **Robert Alfano** continues to garner new honors and awards for his lifelong contributions to the field of photonics and ultrafast laser spectroscopy. His recent achievements include the Arthur L. Schawlow Prize in Laser Science awarded by the American Physical Society (APS), CCNY President's Award for Excellence, and Lifetime Achievement Award from the Association of Italian American Educators, all received in 2013.



The APS established the Arthur L. Schawlow Prize in 1991 “to recognize outstanding contributions to basic research which uses lasers to advance our knowledge of the fundamental physical properties of materials and their interaction with light.” Professor Alfano was cited “*for pioneering contributions to the field of ultrafast laser science, including the discovery of supercontinuum generation and new laser materials, as well as the study of pulse propagation in strongly scattering media.*”

The CCNY President’s Award for Excellence is an annual award “granted to individual faculty members whose creativity and commitment to student learning improves the learning experiences that students have in multiple disciplines at City College.” Professor Alfano was selected to receive the Award in the inaugural year (2013) because of his “outstanding work,” communication from the President’s office mentioned.

The Association of Italian American Educators honored Professor Alfano for his lifetime achievement in education and scientific research. He was made a “knight of the third Millennium” of the International Confederation of Knights Crusaders (CCC). “The activity of the knights of the third millennium consists in the promotion of integration for the various cultures, in a

spirit of peace and of fraternity,” a brochure of CCC mentions.

Dr. Albano is a Distinguished Professor of Science and Engineering and the founding Director of the Institute for Ultrafast Spectroscopy and Lasers at CCNY. He has published over 700 papers and holds 113 patents. He is a fellow of the American Physical Society (APS), Optical Society of America (OSA) and Institute of Electrical and Electronics Engineers (IEEE).

Greenberger named Distinguished Professor

Dr. **Daniel M. Greenberger**, Mark W. Zemansky Chair of Physics, was recently named CUNY Distinguished Professor in recognition of his accomplishments as a



theoretical physicist, and in particular for his contribution to fundamental problems in quantum theory. Dr. Greenberger is a 1950 graduate of the Bronx High School of Science, a class that included two Physics Nobel Laureates Steven Weinberg and

Sheldon Glashow, and Myriam Sarachik, the APS Buckley Prize winner and former president of the APS, among other luminaries. He received his B.S. from MIT in 1954, and MS and Ph. D. from the Univ. of Illinois in 1956 and 1958, respectively. His early work was in high energy theory and neutron interferometry. In 1986, on a sabbatical at the Technical University of Vienna, he along with Mike Horne and Anton Zeilinger discovered the GHZ (Greenberger-Horne-Zeilinger) theorem, a much improved version of Bell's theorem in quantum mechanics. Since then his research has focused on fundamental problems in quantum theory, mostly using quantum optics and entangled states. The honors and awards he received include the Humboldt Prize from Germany, publication of a two-issue festschrift by the journal *Foundations of Physics* on his 65th birthday, being elected a fellow of the APS and a foreign member of the Austrian Academy of Sciences, as well as being hired a consultant by the Nobel Prize Committee in physics. With Professor Zeilinger, he founded the APS topical group on Quantum Information, which now has over 1200 members. He organized a number of meetings on quantum mechanics, and serves on the editorial boards of a number of journals.

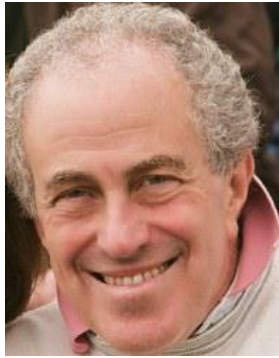
Physics Department recently organized a symposium to celebrate the 80th Birthdays of Dr. Greenberger and Dr. Myriam Sarachik, another Distinguished Professor of the

department, and a past President of the American Physical Society.

Zemansky Chair for Lubell

Physics faculty recently voted **Professor Michael S. Lubell** to Mark W. Zemansky Chair of Physics. The chair is named after Mark W. Zemansky, Professor of Physics at the City College of New York, and the 1956 recipient of the Oersted Medal awarded by the American Association of Physics Teachers in recognition of notable contributions to the teaching of physics.

Dr. Lubell earned his B.A. (1963) from Columbia University, and his M.S. (1965) and Ph.D. (1969) from Yale University. He served on the faculty of Yale from 1971 to 1980 before joining the Physics Department at CCNY in 1980. From 1970 to 1971 he was a U.S. Atomic Energy Commission Postdoctoral Fellow. He has also held fellowships from the National Science Foundation (1964-66) and the Alfred P. Sloan



Foundation (1979-83). He has held concurrent positions as a Visiting Scientist at Brookhaven National Laboratory (1986-87), a Visiting Lecturer at the University of Texas-Austin and the Santa Barbara Institute of Theoretical Physics (1990) and a DAAD Scientist at Universität Bielefeld (1993). Dr. Lubell is a Fellow of the American Physical Society (APS) and the American Association for the Advancement of Science and a member of the New York Academy of Sciences and Sigma Xi. He is the Director of Public Affairs of APS, and served as the CCNY Physics Department Chair (1999-2005).

Dr. Lubell has published over 100 articles and 85 conference abstracts in scientific journals and books covering subjects in the fields of high-energy physics, nuclear physics, atomic, molecular and optical (AMO) physics, and science policy. He has been a newspaper columnist and presently writes a bimonthly opinion piece, "Inside the Beltway," for APS News, which has a circulation of 50,000.

Soon after assuming the chaired position, Professor Lubell organized the Zemansky Lecture, "Adventures in Urban Informatics: Lights, Phones, Sewers, Taxis," given by Dr. Steven E. Koonin on April 9, 2014. Dr. Koonin is the Director of Center for Urban Science and Progress at New York University, New York. Prior to assuming this position Dr. Koonin served as the second Under Secretary for Science at the U.S. Department of Energy (May 2009 through November 2011), professor of theoretical physics and provost at California Institute of Technology.

Makse, Nair, Polychronakos and Shattuck Elected APS Fellows

Four members of the CCNY Physics Faculty, Hernan Makse, V. Parameswaran Nair, Alexios Polychronakos, and Mark Shattuck were recently elected fellows of the American Physical Society (APS). Since the "total number of APS Fellows who may be elected in a given year is limited to one-half of one percent of the total APS membership" the selection process is "quite competitive."

Hernan Makse was recommended for the APS fellowship by the Topical Group on Statistical and Non linear Physics, "*For his contributions to a broad range of topics in non-equilibrium systems ranging from urban dynamics and complex networks to statistical mechanics of jammed matter, in particular, the elucidation of the random close packing state of granular matter.*" Professor Makse's research interest is in the theoretical understanding of complexity, and is related to "emergent properties", i.e., "properties not contained in the simple laws of physics, although they are a consequence of them."



V. Parameswaran Nair is a Distinguished Professor of Physics at CCNY. His areas of research are Theoretical and Mathematical Physics as well as High Energy and Elementary Particle Physics. He was nominated for the fellowship by the Division of Particles and Fields, "*For his contributions to theoretical high energy physics, including: the symmetries of gluon amplitudes, gauge theories in three space-time dimensions (especially involving Chern-Simons theories and anyons), non-commutative quantum mechanics, and the Quantum Hall effect in higher dimensions.*"



Alexios Polychronakos is the current Chair of the Department of Physics. His nomination for fellowship was recommended by the Division of Particles and Fields, and his citation read, "*For important contributions to the field of statistical mechanics and integrable systems, including the Polychronakos model and the exchange operator formalism, fractional statistics, matrix model description of quantum Hall systems as well as other areas such as noncommutative geometry.*" Professor Polychronakos' current research interest is on Quantum Field Theory, Gravitation and Integrable Models.



Professor Mark Shattuck's research interests are in experimental fluid mechanics, transport processes, complex fluids; granular media: mesoscopic physics on a laboratory scale; and biologically-inspired micro-robotics. His fellowship nomination "*For significant contributions to the understanding of the statistical*



properties of granular materials, and their analogy to molecular systems" was recommended by the Topical Group on Statistical and Nonlinear Physics.

With the election of these four fellows, the total number of APS Fellows in the department is now 13.

Fred Smith Retires

Professor Frederick Smith retired at the end of the summer of 2013, after serving 43 years in the Physics Department. Having done his undergraduate work at Lehigh University and obtaining his Ph. D from Brown University he did postdoctoral research at Rutgers University. He came to City College just at the start of 'open admissions' and played an important role in the development of the Physics Department since then. He was active in research, teaching and administration.



Professor Smith built a solid-state research laboratory. His early studies were devoted to superconductivity and dilute magnetic alloys. Later he explored the growth of silicon carbide and amorphous carbon films on silicon substrates. His laboratory also did extensive research on chemical vapor deposition of diamond films. He trained some excellent graduate students who were well-equipped to enter the fields of emerging technology. One of these students, Dr. Bernard Meyerson, became the chief technologist for IBM, where he headed a laboratory with thousands of scientists and engineers. Prof. Smith was honored to receive a von Humboldt fellowship to do research at the Max Planck Institute. Over the years had received substantial research grant support from the Department of Energy, the Air Force Office of Scientific Research, and the City University of New York.

Professor Smith always had a great love for teaching and mentoring students. His repertoire of courses ranged from introductory physics for physical scientists and engineers, to intermediate and advanced laboratory courses for

physics majors, and to advanced undergraduate courses in solid state physics, current topics in physics, and modern physics. He was instrumental in forming the physics majors' club and in leading them on field trips to places of interest to scientists. He modernized the teaching laboratories.

As an administrator Professor Smith served as Chair of the Department. He was responsible for reversing a downward trend in the number of physics majors and the department now sees a year-to-year substantial growth in the number of majors. He would always take the time to talk to the students and carefully advise them. He even instituted the "Zemansky undergraduate physics prize", which recognizes beginning physics students for their excellent performance. He oversaw the machine shop and kept it operating smoothly despite the fact that the number of its personnel diminished substantially.

In addition to his more than eighty publications he co-authored a book entitled, "The Physics and Chemistry of Materials". This book was meant to educate physics students as well as chemists, and material scientists. Unlike most existing books, considerable attention was devoted to real materials, with their imperfections, impurities and other unique characteristics. It also focused on the science and technology relevant to current applications. The book, published in 2001, has sold over 3,700 copies.

Professor Smith has decided that he would like to devote his future to other interests, including family, friends and community. We wish him the best of luck in these endeavors, but speaking for the students, faculty and staff; we will truly miss him at City College.

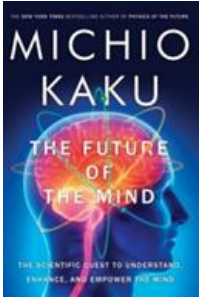
(Joel Gersten, Professor of Physics, CCNY)

Faculty activities and Achievements

Distinguished Professor Joe Birman's group has a new visitor and several former members of the group have made important transitions in their careers. *Dr. Miguel Fiolhais* joined Professor Birman's group in February 2014 for a one-year stay, which has already been extended to 2 years. Dr. Fiolhais is a member of the ATLAS team of the LHC and participated in the discovery of the Higgs boson. His work covers both "top quark" and Superconductivity theory. In 9 months since his arrival Dr. Fiolhais and Professor Birman have co-authored 3 papers in refereed journals.

Two former Ph. D. students of Birman Group, Dr. Oleksiy Roslyak and Dr. Yasemin Gurcan assumed tenure track faculty positions this fall at Fordham University, and Borough of Manhattan Community College of CUNY, respectively.

Doubleday published Professor *Michio Kaku's* latest book, *The Future of the Mind: The Scientific Quest to Understand, Enhance, and Empower the Mind* on



inspiration.”

February 25, 2014. The book explores recent technological advances that shed light on how brain works and makes provocative conjectures on mental illness, artificial intelligence and alien consciousness. It has received rave reviews from leading newspapers and journals. Scientific American called it, “Epic in its scope and heroic in its

New Faculty Members

The department recently added the following four new faculty members.

Sebastian Franco joined the department in the Fall of 2014. He obtained his Ph.D. from the Massachusetts Institute for Technology in 2005. After that, he held postdoctoral positions at some of the world-leading centers for theoretical high energy physics: Princeton University (2005-2008), the Kavli Institute for Theoretical Physics at the University of California Santa Barbara (2008-2011), and the Theory Group of SLAC at Stanford University (2011-2014, although this position was only held during 2012). From 2011 to 2014, Dr. Franco was a Lecturer



(equivalent to Assistant Professor with tenure) at the Institute for Particle Physics Phenomenology (IPPP) of Durham University in the UK, where he was promoted to Senior Lecturer in 2014. The IPPP is a leading international center for research in particle physics phenomenology - the bridge between theory and experiment in the study of the tiny building blocks of all matter in the universe and of the fundamental forces that operate between them.

Dr. Franco's research interests are in theoretical high energy physics. More concretely, he works on String Theory and Quantum Field Theory. His work spans a broad range of topics, ranging from formal aspects of String Theory to new scenarios for physics beyond the Standard Model. He has made seminal contributions in various areas, most notably: String Phenomenology (he introduced Intersecting Braneworlds, which have become one of the most successful and thoroughly studied scenarios connecting String Theory to particle physics), the AdS/CFT correspondence (he discovered the first infinite families of explicit AdS/CFT pairs, drastically

changing the status quo of the correspondence), the connection between geometry and quantum field theory in String Theory and particle physics model building (mainly in the context of supersymmetric extensions of the Standard Model).

His work has been recognized with several distinctions, including: an Advanced Fellowship from the UK Science and Technology Facilities Council, a first position in the Ramon y Cajal Programme of the Spanish Ministry of Education and Science, a recognition as a Distinguished Visitor of Prof. Steven Weinberg's (Nobel Prize in Physics 1979) Theory Group at University of Texas at Austin, the MIT Buechner Teaching Prize (the highest distinction for teaching at the Physics Department of MIT) and the MIT Lockett Award for the Excellence in Theoretical Physics.

His current work aims at finding a new, purely geometric, formulation of quantum field theory. Recent progress on this front has been the result of new studies in scattering amplitudes.

Pouyan Ghaemi joined CCNY in January 2014. He obtained his undergraduate degree in Physics from Sharif University of Technology in Tehran, Iran in 2003. He then received the Presidential Fellowship from MIT and moved to Boston to study for Ph.D degree which he received in 2008. His Ph. D thesis under the supervision of T. Senthil focused on strongly correlated electron systems, including high temperature superconductors and heavy fermion metals. During his Ph. D he also started working on problems on the boundary of high energy physics and condensed matter physics, in particular, on superconducting phase of Graphene with Frank Wilczek.



He then moved to Berkeley as a post-doctoral researcher jointly at UC Berkeley and Lawrence Berkeley National lab, and continued working on graphene and started his research on newly discovered pnictide superconductors and topological insulators (TIs). In 2011 he received a post-doctoral fellowship from Institute for Condensed Matter Theory at University of Illinois at Urbana-Champaign where he continued his research on TIs and graphene and started working on systems with multiple types of quantum orders, such as, dichalcogenides.

Ghaemi's current research is mainly on topological insulators, graphene, and coexistence and competition of different long-range orders in strongly correlated systems. He is particularly interested in strongly correlated TIs,

phases with broken symmetry in doped TIs, electronic band structure and transport properties of nano-structured topological insulators as well as effects of electron-electron and electron-phonon interactions on properties of TIs. In graphene his main interest is on the effect of mechanical lattice deformation on electronic band structures and novel correlated electronic phase which can be realized in graphene. Some of his well-recognized works are on thermoelectric transport in TI thin films, fractional TI phase in strained graphene, novel edge states as the signature of extended *s*-wave pairing in pnictide superconductors, topological phase transition in superconducting doped TIs and novel form of local quantum criticality in frustrated quantum magnets.

James Hedberg came to City College in the Fall of 2013. He received his Ph.D. in Physics from McGill University in Montreal, Canada in 2011. Prior to that, he earned an MS in Physics from Portland State University, after having completed a BA at St. John's College, Santa Fe, NM, in 2000.

During his doctoral work, he designed and developed new instrumentation for condensed matter research.



Specifically, the scanning probe microscope he and the team constructed was designed to operate in 100 mK environments and 16 Tesla magnetic fields. With this instrument, he developed

new methods to image real space charge flow through exotic quantum systems, such as graphene in the quantum Hall regime. After a post-doctoral position doing similar research, also at McGill, he became a Course Lecturer in Physics there. During this year, he chose to hang up the lab coat, for the time being, and commit fully to teaching physics.

While teaching the introductory courses at CCNY, Dr. Hedberg will also engage himself with other projects, mostly related to physics education. These include the development of new lecture demonstrations, updating undergraduate physics labs, and developing online teaching tools to complement the classroom instruction. Dr. Hedberg is also deeply interested in the history of science, especially the developments of instrumentation in relation to the evolution of the fundamental principles. He recently prepared an interactive display for the department featuring a brief look back at the history of voltage measuring devices. He plans on producing more displays in the future using the catalogue of devices found in the archives of the City College Physics Department. Other interests include repairing classic cars, searching for really hot peppers, and playing baroque counterpoint. He's also a

big fan of softball, so if you need a brick wall at short stop, send him a note.

Vinod Menon joined the department as Professor in Fall 2014. He was a Professor of Physics at Queens College of



CUNY where he joined in 2004 as part of the Photonics Initiative. Prior to joining CUNY he was at Princeton University where he joined as the Lucent Bell Labs Post-Doctoral Fellow in Photonics in 2001. He received his MSc in Physics from the University of Hyderabad, India in 1995 and his Ph.D. in Physics from the University of Massachusetts in 2001.

Dr. Menon specializes in photonics and experimental condensed matter physics. Most recently his group has been working on metamaterials geared toward quantum optics applications and on microcavities that trap light to realize half-light half-matter quasiparticles. Some of the recent results from his group include the discovery of topological transitions in metamaterials and its use for controlling spontaneous emission (*Science* 2012), demonstration of organic-inorganic hybrid excitons and their emergent properties in microcavities (*Phys. Rev. Lett.* 2014), development of technique for visualizing exciton diffusion in disordered molecular solids (*Nature Communication* 2014), and the demonstration of half-light half-matter quasiparticles in atomically thin materials (*Nature Photonics* 2014 – In Press).

His group currently consists of 5 graduate students, and 1 post-doctoral researcher and he soon hopes to have few undergraduate students as well. Alumni from Dr. Menon's group have gone on to win prestigious post-doctoral fellowships and tenure track faculty positions. More details about his group can be found at www.lanmp.org

Robert Suhoke Promoted

Robert "Bob" Suhoke has been promoted to Chief College Laboratory Technician effective August 27, 2014. Bob joined the Physics Department on September 8, 1997 as a Senior College Laboratory Technician. Bob helps run the department's Advanced Physics lab courses and the demonstrations in the introductory courses.

Undergraduate Students Receive Awards

Physics Department gives out several awards and scholarships to undergraduate students. Listed below are recent recipients of those awards. Avila Bryant received the Sidney Millman Scholarship Award that is given to a junior physics major demonstrating high potential. The Sonkin Medal was awarded to Richard Wells Crandall for demonstrating the best performance in the Physics

laboratory course(s) and/or in experimental research. Tai Danae Bradley received the Ward Medal that is awarded to the graduating physics major with the highest GPA in physics and math courses. Richard Wells Crandall is the recipient of the Bernard Hamermesh Scholarship, which is awarded to the outstanding graduating Physics major, who has demonstrated some of the skills, knowledge, technique and imagination necessary for a successful Experimental Physicist and who shows promise of being an active contributor to the research efforts in some branch of Experimental Physics. Harry Soodak Memorial Award given to a deserving physics major student entering the junior year went to Aycock-Rizzo Halley. Haiming Deng, Zabir Hossain and Alan Stern graduated with research honors.

The Zemansky Introductory Physics Prize is awarded to students who demonstrate outstanding scholarship in Introductory Physics 20700 or/and Physics 20800 courses. Thirty two students received the award in the 2013-14 academic year.

Giovanni Milione Wins Emil Wolf Competition

Giovanni Milione, a Physics PhD student at the CUNY Graduate Center, is a winner of the Optical Society of America's (OSA) Emil Wolf Outstanding Student Paper Competition for 2014. The Emil Wolf Outstanding Student Paper Competition "recognizes the innovation, research and presentation excellence of graduate students attending the OSA Annual Meeting, Frontiers in Optics (FiO)." The award given by the Optical Society of America entitles the recipient to a \$300 stipend and free year of OSA student membership. Giovanni's paper "Radial and azimuthal polarized vector Bessel beams" was presented at the FiO conference held in Tucson, Arizona, 18 – 22 October, 2014. Giovanni is pursuing his Ph. D. thesis research on the interaction of optical vortex beams (light bearing high orbital angular momentum) with matter under the supervision of Distinguished Professor Robert Alfano at the Institute for Ultrafast Spectroscopy and Lasers (IUSL), Department of Physics at CCNY.



Recent PhD's

Muhamed Amin completed the requirements for his Ph. D. in February 2014. Professor Marilyn Gunner supervised his Ph. D. thesis, "Computational Insights on the Oxygen Evolving Complex of the Photosystem II."

Weikang Chen defended his Ph. D. thesis entitled, "Dynamics of nanoparticles in fluids and at interfaces," in

June 2014. Professor Joel Koplik was his mentor. Dr. Chen is working on software development at Flextrade Systems.

Islam Hoxha's Ph. D. thesis, "Planar Waveguide Structures for Post-EDFA Broadband Near-Infrared Optical Amplifiers," was conducted under the supervision of Professor Vladimir Petricevic. He completed his degree requirements in February 2014.

Jian Li completed his Ph. D. degree requirements in September 2013. Professor Jiufeng Tu supervised his thesis research entitled, "Infrared and Raman Spectroscopy Study of Layered Systems."

Andrew Mutter defended his thesis, "Design and optimization of a de novo protein charge separation dyad" in September 2014. He carried out his research under the supervision of Professor Ronald Koder. Dr. Mutter is currently pursuing his postdoctoral research in Lene Hau's lab at Harvard University.

Binlin Wu graduated in 2014. His thesis, "Time reversal optical tomography and decomposition methods for detection and localization of targets in turbid media" was carried out under the tutelage of Professor Swapan Kumar Gayen. Dr. Wu is pursuing his postdoctoral research at Weill Medical College of Cornell University.

Rui Zhang defended his thesis in August 2014. Professor Joel Koplik supervised his thesis, "Nanoscale interactions of particles and drops with heterogeneous surfaces." Dr. Zhang is now a postdoctoral research associate at the University of Chicago.

New Graduate Students

Graduate students in the Ph.D. program, who came to the department in 2014 Fall, are: *Brian Dressner, Amol Deshmukh, Rahul Deshmukh, Tal Galfsky, Jacob Henshaw, Jesse Kanter, Jiusi Lei, Deanna Lombardo, Arthur Parzygnat, Peter Schantz, Zheng Sun, Zhuo Yin, and Cody Youmans*. Students who entered the Master's program as of Fall 2014 are: *Michael Bonaro, Harry Charalambous, Evan Robert Christopher, Christopher R. Considine, Richard Crandall, Jonathan Ross Goodman, Zabir Hossein, Ahamed Zubair, Lika Lale Levi, Michael Mienko, Gabriel Reder, Salah Ezz Salah, Edward Joseph Shaer, Jenna Snyder, Alexander Vassilopoulos, Michael Winters, and Shanshan Wu*. The department extends warm welcome to these new graduate students.

In Memory

The Department of Physics mourns the loss of several members. We continue printing reminiscences of the accomplishments and contributions of some of them by friends and colleagues in this issue.

Joseph Aschner
(1922 – 2006)

Joseph Aschner played an important role in the department as a teacher, chair of the summer session starting in the early 1970's, and as an excellent Assistant Chairman for an extended period of time until his retirement. He was born in Vienna on a Monday, January 23rd, 1922. He fled from Vienna at age 16 in April 1938 (the year of the Anschluss). Following brief stays in Paris, France (May and June 1938) he lived in Bogota, Colombia for a year and immigrated to the United States in September 1939.

Joe Aschner received his early education in Vienna attending the elementary school at Auhofstrasse in the 13th district, and then from 1930 to 1938 at the "Hietzinger Gymnasium" on Fichtnergasse. In Colombia, he attended the "Colegio Rosario" in Bogota. After arriving in the USA, he went to the Central High School in Chicago for his senior year and then spent the following two years at the University of Chicago. The attack on Pearl Harbor triggered the entry of the US into Second World War, and Joe then enlisted in the US Army in July of the following year, where he served until 1946. Following his discharge, he enrolled once again at the University of Chicago, and ultimately earned his Ph. D. Degree from the University of Illinois in 1954 working on the diffusion of radioactive ions in crystals. He then accepted an offer from Bell Telephone Laboratories, where he worked in the semiconductor division in the group that was concerned with making the prototypes of the modern transistors. In 1962 he joined the faculty of the Physics Department of the City College of the University New York as an Assistant Professor, was promoted through the ranks to Associate and Full Professor and retired in 1991.

Joseph Aschner married twice. He met his first wife during his years at the University of Chicago (before enlisting in the army), and divorced her in 1955. His daughter Katherina, to whom he was very close, was the issue of this first marriage. He married Helga in 1962, the same year he arrived at CCNY. We remember well how Joe and Helga had a succession of cats that they treated like people and to which they were much attached. With his wife Helga, he enjoyed many years of retirement at their east side apartment, their house on Long Island, and traveling throughout the world. Joseph Aschner died on Tuesday, October 31st, 2006 at the age of 84.

(*Myriam P. Sarachik, Physics Department, CCNY*)

Seymour Lindenbaum
(1919 – 2009)

Seymour "Sam" Lindenbaum, a distinguished particle physicist who held joint appointment at the Physics Departments of Brookhaven National Lab (BNL) and the City College of New York (CCNY) died on August 17,

2009. He was born in New York on December 2, 1919. He received his Bachelor's degree in Physics from Princeton University in 1945 and his Master's and Ph.D. degrees in Physics from Columbia University in 1949 and 1951,



respectively. He served as a research associate at Nevis Cyclotron Laboratories from 1946 to 1951. He joined BNL as an associate physicist on June 4, 1951, rose through the ranks to become a senior physicist in 1963 and a co-group leader of the Particle Spectrometer Group in 1970. He retired from BNL after 45 years on June 16, 1996, but returned in 1998 as a guest

senior physicist to pursue his research as a member of the STAR collaboration. He became a member of the City CCNY Physics Faculty in 1970 and held the Mark W. Zemansky Chair in Physics, while retaining his joint appointment at BNL. He retired from CCNY in 1995.

His contributions to Physics over a long professional career are diverse and varied. He started his career at BNL developing first differential gas Cerenkov counters for the Cosmotron. He conducted experimental research at the Cosmotron and proposed the nucleon "isobar model" to explain the salient features of high-energy pion production. He designed the radiation protection shielding for the Cosmotron and proposed the basic parameters of the Alternating Gradient Synchrotron (AGS) shielding. In 1959 he formed and led a group that developed an on-line computing technique to handle high data rate accumulate by electronic detector arrays and the rapid automatic data processing of complex particle interactions. He and his group carried out the first on-line computer experiments at the AGS using sets of scintillation counter hodoscopes. They measured elastic scattering of particles produced by the AGS and investigated pion-nucleon forward dispersion relations, which proved the validity of a basic axiom of modern relativistic field theory. They also found that A_2 meson, a subatomic particle was not split, and helped confirm the validity of the quark model of elementary particles. The Lindenbaum-Ozaki group, which he formed with his long-term collaborator, Satoshi Ozaki, developed the Multi-particle Spectrometer (MPS) and its second generation MPS-II, and used those to discover direct evidence for glueballs, hypothetical particles that are a predicted but as yet unobserved essential feature of quantum chromodynamics. In the early 1980s Lindenbaum got involved in designing magnet and detector technology for the Relativistic Heavy Ion Collider (RHIC) Project. As a member of the STAR collaboration, he was involved in the theoretical study of

the fluctuations and correlations in relativistic heavy ion collisions to search for indications of “bubbles” of quark-gluon plasma that might be created prior to the formation of hadrons.

At CCNY Professor Lindenbaum taught a graduate course in High Energy Physics (HEP) and undergraduate lab courses, but most of all, he mentored experimental Ph.D. students at ongoing HEP experiments at BNL. “He was our window into the world of ‘Big Physics,’” remarked Dr. Victor Chung, Professor Emeritus and a colleague of Professor Lindenbaum at CCNY.

Martin Kramer
(1941 - 2011)

Martin Kramer came to CCNY from BNL in 1970 along with Seymour Lindenbaum and maintained his joint position at BNL. He was also a member of Sam Lindenbaum's experimental group at BNL. Robert Marshak, a distinguished theorist and President of CCNY at that time, was instrumental in attracting both of them to CCNY to build the HEP Experimental Program in the department. Martin Kramer was born in Ellenville, upstate New York, in 1941. He graduated from Ellenville High School as valedictorian, and attended Columbia University. He earned his Ph. D. from Columbia University under the supervision of Nobel Laureate Leon Lederman (a CCNY graduate), and did postdoctoral research at the University of Chicago.



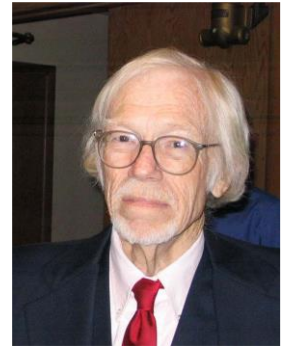
At BNL, Dr. Kramer was involved in the experiments carried out with the Multi-particle Spectrometer (MPS) and MPS-II, development of various detector systems for particle physics experiments, such as, the silicon multiplicity detector system, time projection chamber (TPC) detector system, development of very high event rate data acquisition system, and relativistic heavy ion collision experiments. He was a meticulous experimentalist who did not “jump to conclusions unless he cross checked everything” observed physicist Leslie Camilleri, his fellow graduate student who also was a student of Leon Lederman. At the City College, he taught Physics 205-206, a two semester general Physics course sequence for nursing students for many years. CCNY had a large nursing school at that time which required their students to master the principles of physics. “Marty was an amiable colleague and friend when he was not also at BNL participating in his experimental work,” remembers his CCNY colleague Victor Chung.

Martin Kramer and his wife Carol moved to Shoreham in 1971, where he became deeply involved in the Shoreham Civic Organization. He valued education and excellence and was active in bringing enrichment programs for gifted and talented students in Shoreham area schools. Following a stroke, he was in poor health for two years before passing away on November 28, 2011 at the age of 70. He is survived by his wife, a son (Scott Kramer), a daughter (Karen Thakral) and five grandchildren.

Leonard Oscar Roellig
(1927 – 2010)

Leonard Oscar Roellig, who served the Department of Physics and the City College of New York both as a faculty member and an administrator from 1976 – 1996, breathed his last on Friday, February 12, 2010. He was born in Detroit, Michigan on May 17, 1927. He graduated from Denby High School, served in the US Army from 1945 to 1946, enrolled at the University of Michigan to earn his A. B. in 1950, then served in the US Navy for two years and returned to the University of Michigan, where he received a M. S. in 1956, and Ph. D. degree in physics in 1959.

Len joined the faculty of Wayne State University in 1958 as an Assistant Professor and rose through the professorial ranks to full Professor of Physics by 1968. He served as Director of Science Research Program for Inner City High School Students (1967 - 1971), Secretary of the Faculty Senate (1970-1971), Dean of Academic Administration (1971-1972, and Associate Provost for Academic Programs and Planning (1972-1976). In 1976 he moved to the City University of New York (CUNY), where he assumed the position of Vice Chancellor for Academic Affairs. In 1983 he returned to doing physics full-time in the Department of Physics at City College where his tenure resided. He immediately became a valuable member of our department, deeply involved and highly productive in all aspects of academic activity – teaching, research and service.



Len's primary research focus was positron physics. Rumor has it that his colleagues worldwide referred to him as “Dr. Positron.” While at Wayne State, he founded the university's positron annihilation group. As a visiting faculty member, he founded a similar program at the University College, London. When he resumed his research as a full-time colleague in our department, he continued his life-long interest in positrons, mentoring graduate students, publishing papers and collaborating broadly with colleagues at Brookhaven as well as the Paul

Scherer Institute for Natural and Engineering Sciences in Switzerland.

Following his retirement in 1996 Len moved to Boulder, Colorado with his wife Pauline, to whom he was married for 57 years by the time of his death. He established a loose connection with the University of Colorado, where he joined many activities (including teaching, tutoring, and helping undergraduate students who were having difficulty with their physics courses), and enjoyed auditing a broad range of courses in a variety of disciplines.

Len and Pauline had three sons, all very accomplished. Tom is an astrophysicist doing research at NASA (Space Science and Astrobiology at Ames); Mark is an Executive Vice President and General Counsel at MassMutual Financial Group; and Paul is the founder and Chief Executive Officer of Bulletin Intelligence, a publication that provides “daily open-source intelligence briefings for corporate and government leaders.”

Len Roellig’s last few years were difficult due to various health problems and a stroke that left him severely incapacitated. He died on Friday, February 12, 2010.

(Myriam P. Sarachik, Physics Department, CCNY)

Chi Yuan (1937 - 2008)

Chi Yuan, Emeritus Professor of Physics at CCNY and Founding Director of the Academia Sinica Institute of Astronomy and Astrophysics (ASIAA) in Taipei died on July 24, 2008. He was born in Nanjing, China on March



27, 1937. He graduated from the National Taiwan University in 1959, and received his Masters of Science from the University of Florida in 1962, and his Doctor of Philosophy from the University of Michigan in 1966. He then worked as a research associate at MIT for three years with

Professor C.C. Lin, a world leader in fluid dynamics. He joined CCNY in 1969 as an Assistant Professor. He was a valued member of the department, contributing both to the teaching of the popular astronomy course and to establishing CCNY stature in astrophysics through his research in the formation of spiral arms of galaxies, including the birth and migration of stars. He became an Associate Professor in 1975 and was promoted to Full Professor in 1981. He took early retirement from CCNY in 1994 to return to Taiwan as Founding Director of the ASIAA. He served as Director of ASIAA from 1994 to 1996, formed the Computational Fluid Dynamics and

Magneto-hydrodynamics group, and led the theory group for the last ten years. He retired as Distinguished Research Fellow in 2007, and continued as Visiting Scholar with the ASIAA.

Chi Yuan’s work on the density-wave theory for spiral arm structures in galaxies, with C.C. Lin and Frank Shu remains his seminal contribution in Astrophysics. His early work elucidated the observational tests of density-wave theory, and the effects of magnetic fields in galactic shocks. In the 1980s, Chi Yuan worked on spiral density waves in Saturn’s rings. In the last two decades of his life, Chi Yuan focused on the problem of barred and spiral structures in the nuclei of galaxies, with their implications for fueling the central supermassive black holes. He trained and mentored a great number of students in astrophysics, both at CCNY and in Taiwan.

His colleagues and students portray him as a generous, thoughtful, trusted and compassionate friend. In the early years of influx of students from China, he took personal part in helping to gather used furniture for the new arrivals. When a visiting scholar fell ill, he helped arrange for emergency admission into a hospital. He played a similar role in Taiwan as well, as one of his friends there summed up, “we all know what nice really is by watching Chi.” He was also a scholar in Chinese history, well known for his calligraphy. His concern for others well-being, his good humor and his kindness will be missed by one and all. He enjoyed good food, and “was a gourmand and a gourmet” as one friend put it. Chi Yuan battled brain cancer during the last two years of his life. His wife Lucy, daughter Jessie and a granddaughter survive him.

Russel Hinchliffe (1949 – 2009)

Russ Hinchliffe served as foreman/administrator of the Science Division Machine Shop from September 1999 to



October 2009. He passed away on October 13, 2009 at the College. He carried on the tradition of maintaining a precision machine shop that serviced the research and teaching needs of the Biology, Chemistry, Earth and Atmospheric Sciences, and Physics Departments, as well as providing help to several Departments in the Grove

School of Engineering and the Structural Biology Center. In this way, he carried on the tradition of Joseph Altmann and Gerry Cannella, former Machine Shop foremen. Russ was a congenial and skilled machinist who was well-liked and respected by everyone who came into contact with him.

(Frederick W. Smith, Professor Emeritus of Physics)

Cummins, Wills and Zemansky Lectures

In addition to the weekly departmental colloquium and seminars organized by different interest groups, the department has several special lectures that are presented annually. These include Hermann Z. Cummins Lecture, the Lawrence Wills Lecture and the Mark W. Zemansky Lecture. All three recently brought eminent scientists to the campus delivering the lectures.

The inaugural Cummins Lecture was presented on April 18, 2013 by Professor Wolfgang Ketterle of MIT and 2001 Physics Nobel Laureate. The title of his talk was, "*Superfluid gases near absolute zero temperature.*" Professor Albert Libchaber of Rockefeller University, New York presented the second Cummins Lecture, "*From bacteria to artificial cells: the problem of self reproduction*" on April 10, 2014. . The Cummins lecture is sponsored by the Cummins Fund that grew out of initial contribution made by Professor Cummins, and subsequent fundraising by the department and the college.

The Lawrence Wills Lecture is supported by The City College Fund in memory of Professor Lawrence Wills who joined the CCNY Physics Department in 1933. Professor Ivan Schuller of UCSD delivered the recent Wills Lecture entitled, "*Why Physics? Beyond Atom Bombs and Big Bangs: Nanoscience,*" on October 23rd, 2013.

Mark W. Zemansky was a professor of Physics at the City College of New York, and the 1956 recipient of the Oersted Medal awarded by the American Association of Physics Teachers in recognition of notable contributions to the teaching of physics. The department has an endowed chair named after Professor Zemansky, and whoever holds that chair organizes the Zemansky Lecture. Recent Zemansky Lectures include, "*Quantum Games, Quantum Information, and the Foundations of Quantum Mechanics,*" given by Professor Anton Zeilinger; and "*Adventures in Urban Informatics: Lights, Phones, Sewers, Taxis,*" delivered by Dr. Steven E. Koonin.

The Physics Department is reaching out to its alumni and friends to help support CCNY's programs by contributing to the City College Fund. Please mark your contribution, "For Physics Department Use" and send to: City College Fund, Shepard Hall #166, CCNY, 160 Convent Avenue, New York, NY 10031.