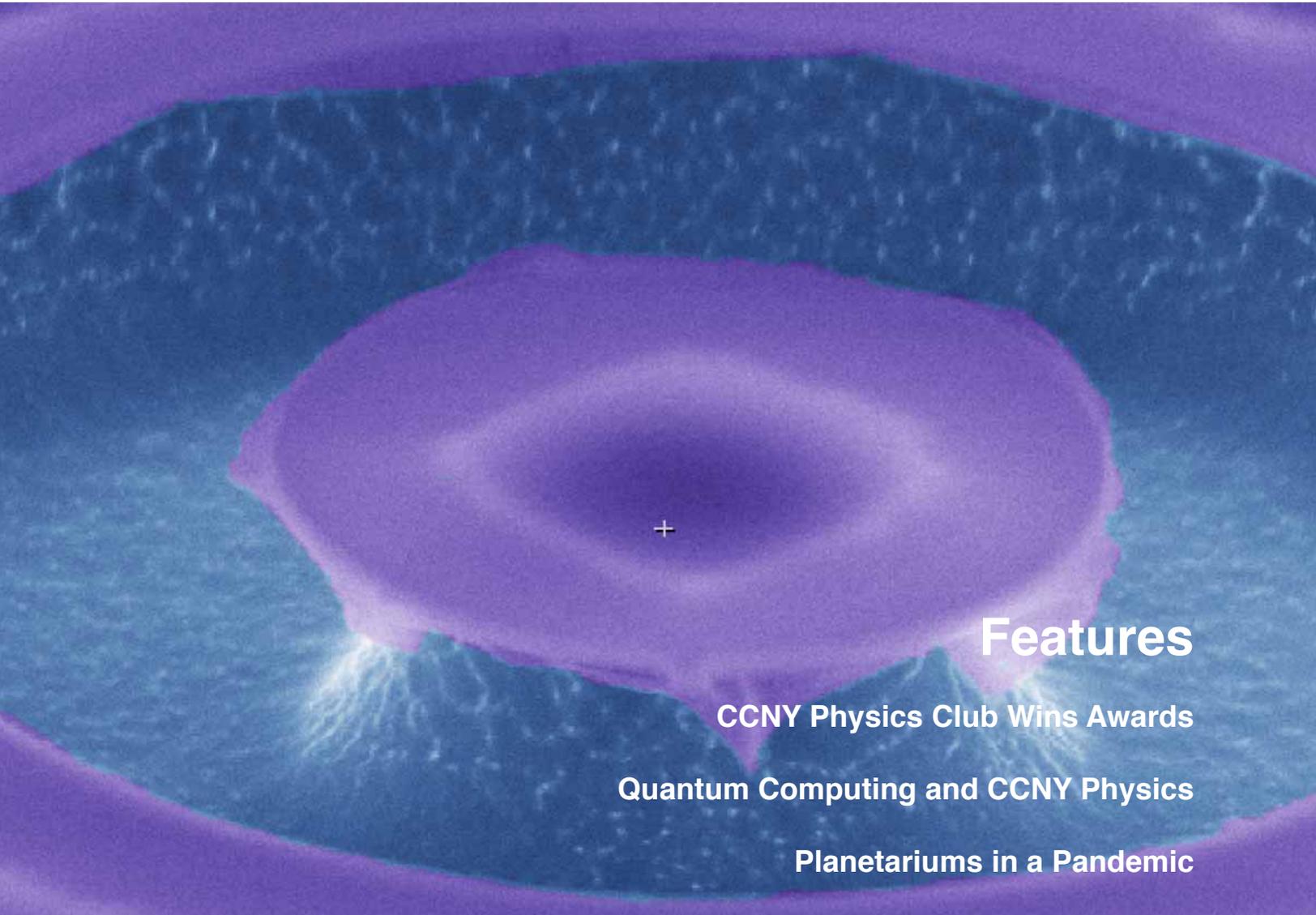


CCNY PHYSICS

The CCNY Physics Department Newsletter

Volume 12 Fall 2019 - Spring 2021

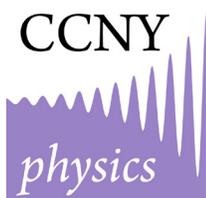


Features

CCNY Physics Club Wins Awards

Quantum Computing and CCNY Physics

Planetariums in a Pandemic



The City College
of New York



Welcome to the 2019-2021 CCNY Physics Department Newsletter.

It has been quite a year, but our department has remained strong and devoted to both our students and our research programs. We've had a newsletter for a number of years, but this year we decided to spruce it up a bit and give all these hardworking faculty, staff, and students a nice record of the past year's accomplishments.

Going forward, we will be releasing the newsletter in the fall of each year. So, enjoy this issue, and look forward to another in a few months.

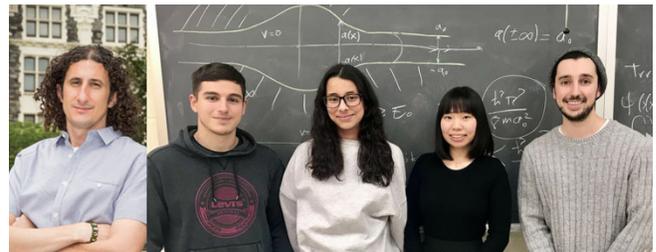
PHYSICS CLUB REMAINS VIBRANT, WINS AWARDS

The CCNY Physics Club bustles with activity whether students are meeting face-to-face on campus, or associating virtually abiding COVID-19 guidelines, and garners awards for their exemplary education and outreach activities. First, the awards!

AWARDS

The Physics Club has recently garnered two major national awards. The Club, a chapter of the Society of Physics Students (SPS) received an Outstanding Chapter Award from the SPS National Office for 2020. The designation, given to fewer than 15 percent of all SPS chapters at colleges and universities in the United States and internationally, recognizes the CCNY chapter's successful "Physics Month" activities between October and November 2019 as well as its robust outreach activities. The CCNY Chapter has won this Outstanding Chapter Award for three consecutive years. The Chapter has been led by student officers Lisa Chan, Michael Gaziani and Veeshan Narinesingh with Professor Sebastian Franco as the faculty advisor.

The chapter is the winner of the Blake Lilly Prize from the American Institute of Physics (AIP). The award recognizes SPS chapters and individuals who make a genuine effort to positively influence the attitudes of school children and the general public about physics. The CCNY Chapter



The 2020 Physics Club Executives: Prof. Franco (Advisor), Michael Gaziani, Jireh Garcia, Lisa Chan, Matthew Kubikowski

is lauded for its vigorous STEM outreach program for underprivileged elementary and middle school students. The Chapter runs this outreach program in partnership with inner city schools and community groups, such as, Hamilton Grange Middle School, PS 325 Elementary School, America Scores, the New York Math Academy, the Bridge Golf Foundation and the Eagle Academy of Harlem. More than 600 public school students have participated in the STEM program since its inception in 2015.

"Your chapter's outreach efforts and dedication to physics education have visibly made a difference in your community and the SPS National Office is proud to present you with this prestigious award,"

Brad R. Conrad, director, Society of Physics Students & Sigma Pi Sigma at AIP, congratulated the CCNY group, which first won the award in 2018. Now, to activities.

ACTIVITIES

The fall 2019 Physics Week activities started with a “Welcome to Physics Day” event on October 22. Former president of the club Lisa Chan and Professor Polychronakos welcomed new members to the Physics Club community. On October 24, department chair Professor Menon met with members to receive feedback about their needs and experiences as physics majors. On October 25, a Virtual Open Labs and Theory Groups day was held to expose students to the available research opportunities. Later that day, Club members conducted live demonstrations to introduce students from Hamilton Grange Middle School to the wonders of physics. A star-gazing event on November 11 provided the students an opportunity to observe the transit of Mercury. On November 19, an Industry Discussion panel featuring CCNY alumna Abigail Murphy was held where she discussed her path to and experiences in working in industry and answered questions from students. The last event of the semester was a planetarium screening on November 21, with Professor Hedberg giving students a tour of space in CCNY planetarium.

The spring 2020 semester included a series of lunches with colloquium and seminar speakers: Dr. Zala Lenarcic, Dr. Johannes Flick, Dr. Denis Golez, Dr. Martin Claassen, Dr. Victor Albert, Dr. Xiaoqian Michele Chen, and Dr. Eric Isaacs over a three-week period starting on February 18. On February 27, another talk featuring guest speaker and physics alumna Deanna Lombardo was arranged to make students familiar with the work and environment of an industrial physicist. On March 2, a Quantum Computing talk featuring Dr. Seth Cottrell introduced the students to this emerging field with transformational potential. COVID-19 caused the cancellation of in-person events, but club members responded by organizing the first Physics Club Virtual Game Night on



April 10, held over Discord. A virtual Research Honors presentation session was arranged in place of the annual in-person presentations, and students who participated in research honors presented their research results over Zoom. To celebrate the end of the school year, another virtual game night was held on May 29, 2020. The Physics Club encouraged students to sign up for the Conference for Undergraduate Women in Physics (CUWiP) and nine students attended the conference at Yale University, January 17-19, 2020.

Fall 2020 marked the first fully online semester for Physics Club. Club member Dakota DeBold created the official Physics Club Discord server to keep club members in contact. The fall semester started off with another meeting with Professor Menon on September 25 allowing students to voice their concerns and opinions on the state of the department. The month of October featured two research talks. The first entitled “Contact tracing for COVID-19 using Network Physics” by Professor Hernán Makse on October 6; and the second by Dr. Mirko Amico on an introduction to quantum computing on October 13. The week of October 20 marked Physics Week again for the club, and began with a Welcome event featuring talks from club president Aidan Subrahimovic and Professor Parameswaran Nair on studying physics at CCNY. On October 21, Professor W. J. Rodgers from the University of Iowa presented an interesting talk on the history of science as viewed through a civil rights lens. October 23 featured talks by CUNY graduate students on various topics ranging from astrophysics to condensed matter physics. A game night was held again that same evening. A full day of research talks on December 4 that featured physics professors from all over CUNY was geared to generate interest within the student body in doing research.

Spring 2021 semester has already begun as a busy semester for the physics club. In collaboration with the Institute of Electric and Electronic Engineers (IEEE) the physics club has organized Python workshops every Thursday in March to teach members basic coding skills necessary for careers in STEM. An additional industry talk featuring Abigail Murphy was held on March 12 where she spoke with students about her industrial experience, followed by another game night. On March 23, a luncheon research talk on cosmic strings was hosted by the club featuring cosmologist Dr. Ken D. Olum. More events and talks are to follow.

(Contributed by Sebastian Franco)

QUANTUM COMPUTING AND CCNY PHYSICS

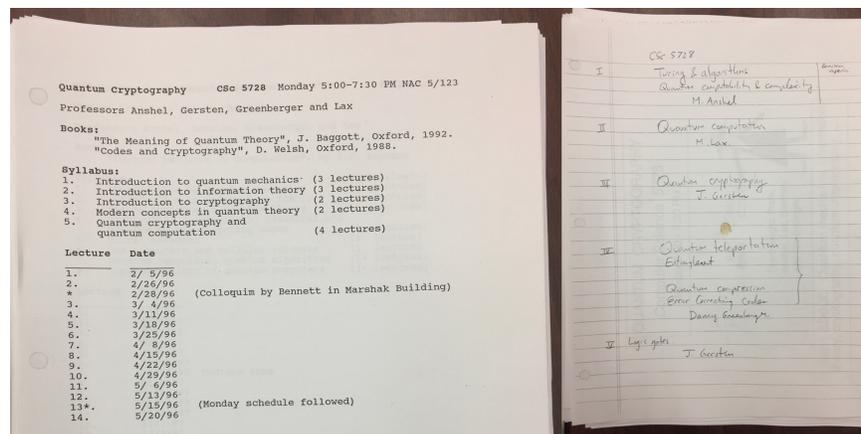
CCNY physics has had a long tradition of pioneering work in the area of quantum science and materials. And so, it must be no surprise that we offered probably one of the first undergraduate level courses in “Quantum Information /computing” in Spring 1996! This was just two years after the introduction of the famous Shor’s algorithm which partially jumpstarted the second quantum revolution. The course was taught by the “quantum optics” stalwarts of the department, Distinguished Professor Melvin Lax, Distinguished Professor Danny Greenberger, Professor Joel Gersten and Professor Michael Anshel (Computer Science Department). This course was co-listed with computer science and had over 60 students registered. Fig. 1 shows the syllabus of the course along with the specific instructor for these courses (courtesy, Professor Joel Gersten).

Fast forward to 2020 and we are in the middle of the second “quantum revolution” where quantum computing and related technologies have become national priority and several large corporations such as Google, Amazon, Microsoft and IBM are all invested heavily in the development of quantum technologies. The Physics department at CCNY continues in its tradition both on the research front and in teaching aspects of this emerging field. We currently offer one of the very few quantum computing courses at the undergraduate level now in its second year taught by [Dr. Seth Cottrell](#).

Over the past couple of years, several CCNY physics faculty have won large grants in the area of quantum information ranging from programs to develop a quantum

simulator using Bose Einstein condensates in solid state systems, quantum materials, quantum sensors, single photon emitters, and developing algorithms for emulating condensed matter phenomena using state of the art quantum computers. Funding for these programs have come from the National Science Foundation, Department of Energy, Department of Defense, and Industry. Current faculty working in these areas and recipients of the grants include: (theory) [Professor Pouyan Ghaemi](#) who works on developing quantum algorithms, and [Professor Sriram Ganeshan](#) who works on quantum hydrodynamics; and (Experiments): [Professor Lia Krusin](#) who works on quantum materials, [Professor Carlos Meriles](#) who works on quantum metrology, [Professor Alexander Khanikaev](#) who works on topological photonics, [Professor Maria Tamargo](#) who does growth of quantum materials and [Professor Vinod Menon](#) working on quantum photonics. All the experimental groups are located at the Center for Discovery and Innovation on the south end of the campus. These faculty members have come together informally to form the [Harlem Center for Quantum Materials](#) with the aim of carrying out world class collaborative research in this emerging field while carrying out the equally important role of educating the next generation of “quantum” workforce all the way from middle school to post-doctoral researchers.

(Contributed by, Vinod Menon. For more information, please feel free to contact him at: vmemon@ccny.cuny.edu)



*The Syllabus from an early course on quantum information and computing.
Courtesy of J. Gersten*

CUMMINS LECTURES 2019 & 2020



The fifth Hermann Z. Cummins Lecture was presented on April 24, 2019 by Dr. Jorg Wrachtrup, Professor and Director of the 3rd Institute of Physics and the Center for Applied Quantum Science, University of Stuttgart, Germany. Professor Wrachtrup is a recipient of the Leibniz Prize of the German Science Foundation (2012), the Bruker Prize (2013) and the Max Planck Research Award (2014). He is member of the Berlin Brandenburg Academy of Science and has continuously been listed as “Highly Cited Researcher” since 2014.

In his lecture entitled, “Nanoscale Quantum Sensing” Professor Wrachtrup discussed precision measurements in the nanometer scale where the accuracy of measurements is limited by quantum mechanics. He focused on the use of spin quantum sensors comprising a single electron spin plus a nuclear spin quantum register for measurements of a variety of quantities including electric and magnetic fields, temperature, and force. Nuclear spins are used to enhance the measurement accuracy of the electron spin *e.g.* via quantum error correction, as ancillary quantum bits for memory or quantum Fourier transformation. He went on to present a variety of applications ranging from quantum simulations to imaging of magnetic nanostructures.



Dr. Vahid Sadoghdar, Director of the Max Planck Institute for the Science of Light, Erlangen, Germany delivered the sixth Hermann Z. Cummins Lecture, “Efficiency in the Interaction of Light and Matter: from Nano-quantum optics to Nano-bio-photonics” on November 18, 2020. Dr. Sadoghdar is one of the world’s leading experts in nano-optics, and holds the Chair in Nano-optics, Plasmonics and Biophotonics in the Department of Physics at the University of Erlangen-Nürnberg, Germany.

In his virtual presentation, Professor Sadoghdar reported on his group’s recent studies, where they reached unity efficiency in the coupling of single photons to single molecules. He described how this high coupling efficiency helps to realize polaritonic states involving a controlled number of molecules and photons. He further discussed how the mechanisms that play a central role in quantum optics help image and track single biological nanoparticles such as viruses and small proteins with high spatial and temporal resolutions.

The lecture sponsored by the Cummins Memorial Fund and the City College Fund memorializes Hermann Z. Cummins (1933-2010), a Distinguished Professor of Physics at the City College of New York. Professor Cummins’ numerous awards and honors for his pioneering experimental research in statistics of radiation-matter interactions, as well as elastic, quasi-elastic and inelastic light scattering include election as a Member of the US National Academy of Sciences (1996) and a Fellow of the American Academy of Arts & Sciences (2001).

PLANETARIUMS IN A PANDEMIC

THE LAST SHOW

The planetarium had its last in person show just over a year ago, when we welcomed students from P.S. 721X in the Bronx for a live bilingual space show featuring physics major Jireh Garcia offering a live Spanish translation of the narration. Just before that we had started other motions towards offering interdisciplinary art & science events for the campus community. And so, shutting the doors last March was particularly painful given the excitement that was brewing. 2020 was supposed to be the year we finally reopen with regular scheduled programs for the greater City College of New York community. Yet, we knew we were not the only planetarium that would have to go completely virtual for at least a year. Here's what we did to maintain our momentum.

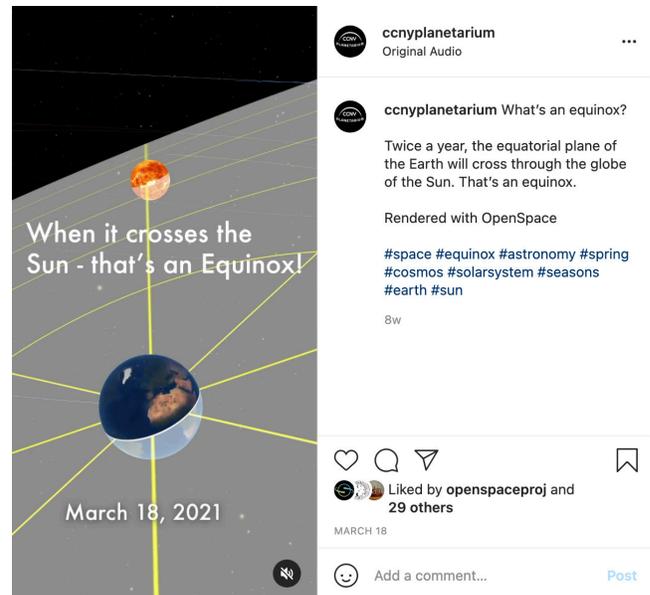
NEW FORMAT

Over the last year, we've had to reinvent ourselves for the smaller screens. This has been a fun challenge though. Hoping to keep our momentum up during the 'virtual year' that was, we've produced dozens of short science visualization vignettes for distributions on several internet platforms. These videos range from grand scenic tours of alien worlds to short explainers of basic astronomy concepts.

All are based on astrophysical data and attempt to portray the universe as physically true as possible, while of course trying to be as exciting and visually interesting as possible.

OTHER PROJECTS

We've released a celestial map featuring new drawings of all 88 IAU constellations. The images are now includ-



ed as part of the universe simulator software OpenSpace, a NASA funded and open source astrovisualization tool used by planetariums around the world.

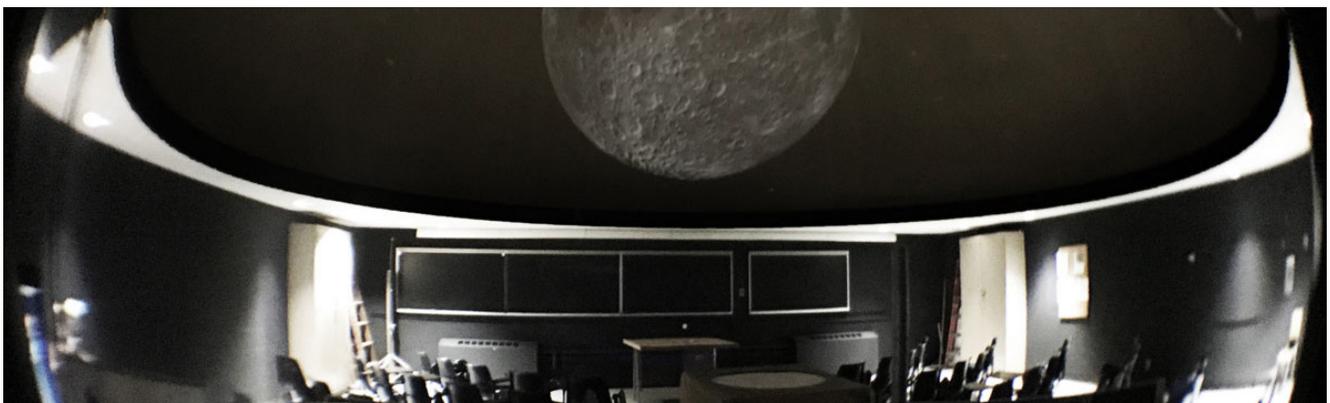
Just recently, Planetarium Director James Hedberg shared his work with ancient star maps with the California Academy of Science's Morrison Planetarium. For example, Ptolemy's 2000 year old tables of star positions and stellar magnitudes were transformed into data sets that could be visualized in the dome, letting a participant see the sky as Ptolemy and other famous historical astronomers recorded it. View the exchange [here on YouTube](#).

We've been using the time away from the dome to develop our collection of assets for use in space shows. When the doors open again, we'll be ready with a lot of exciting new visuals and more to share.

In the meantime, stay up to date with us here:

ccnyplanetarium.org.

(Contributed by James Hedberg)

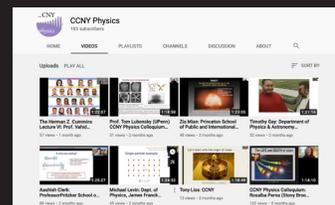


CCNY APS-IDEA TEAM FORMED

The APS-IDEA (American Physical Society Inclusion, Diversity, and Equity Alliance) Network was launched in October 2019, with the mission to “empower and support physics departments, laboratories, and other organizations to identify and enact strategies for improving equity, diversity, and inclusion.” The APS-IDEA will do so by “establishing a community of transformation.” Since this mission statement resonates so well with the CCNY Diversity & Inclusion Mission, an interdisciplinary CCNY team consisting of members from the Physics Department, the Chemistry Department, and the CCNY NSF CREST Center for Interface Design and Engineered Assembly of Low-dimensional Systems (IDEALS) submitted an application to join the network. The application was favorably reviewed by the APS-IDEA Application Review Committee and the CCNY team became one of the inaugural teams of the network on June 30, 2020. The feedback provided by the Review Committee stated, “The reviewers felt this was a strong application from a team with a good track record. The interdisciplinary team is a plus as is the experience in recruiting URM researchers in the CREST center. Welcome to APS-IDEA!” The CCNY APS-IDEA Team includes members from the faculty, staff, research associates, as well as graduate and undergraduate students.

APS-IDEA held three online workshops in 2020 (first two had identical contents to optimize team involvement) and one in 2021 to give Network members opportunity to know one another and learn about concepts for improving equity, diversity, and inclusion, such as shared leadership. CCNY Team met twice last year and so far once in the spring 2021 semester. To find out more about APS-IDEA activities please visit: APS Inclusion, Diversity, and Equity Alliance. For information on CCNY APS-IDEA Team and how you can participate, please contact Sebastian Franco (sfranco@ccny.cuny.edu), Maria Tamargo (mtamargo@ccny.cuny.edu), Natascha Krishnanand (nataschavkg@gmail.com), or Swapan Gayen (sgayen@ccny.cuny.edu).

ON THE BRIGHTSIDE



While the changes we faced in 2020 were largely unwelcome, having to quickly become a more digital department did provide the catalyst for a few improvements. We now have a YouTube channel to host all our colloquiums and events of the past year. Hopefully we'll be able to maintain this tradition even after we return to our normal colloquium room.

You can catch up on all the events from the last year on our channel:

youtube.com/c/CCNYPhysics

CCNY PHYSICS BS DEGREES GRANTED BY YEAR



BY THE NUMBERS

It's always nice to look back over 20 years and see that some things do in fact get better. This graph shows our BS graduates every year since 2001.

We'll take it as a sign that we're doing something right!

FACULTY ACHIEVEMENTS AND HONORS

TRIPLE CROWN FOR MYRIAM SARACHIK



Distinguished Professor Myriam Sarachik keeps on garnering new awards and honors for her contributions to science and human rights. She has recently received three major awards.

First, she received the 2020 APS Medal for Exceptional Achievement in Research for her “fundamental contributions to the physics of electronic transport in solids and molecular magnetism.” American Physical Society President (2020) and chair of the selection committee, Philip Bucksbaum, commented, “Myriam Sarachik has been one of the world’s leading experimental condensed matter physicists for over a half-century. Her outstanding contributions helped to shape our modern view of many collective effects in solids, including the Kondo effect, heavy fermion physics, disordered 2-D systems, and strongly-correlated electron systems.” Bucksbaum also commended Sarachik for promoting the core values of APS, and for “her efforts to defend human rights and the principles of diversity and inclusion in physics.” The Medal for Exceptional Achievement in Research is

the highest honor that APS confers to recognize researchers from all fields of physics. Previous recipients were Edward Witten (2016), Daniel Kleppner (2017), Eugene Parker (2018), and Bertrand Halperin (2019)

Next, she was awarded the 2020 IOP (Institute of Physics, UK) President’s Medal “For her fundamental contributions to condensed matter physics, lifetime service to the physics community and efforts to defend the human rights of scientists and the principles of diversity and inclusion in physics.”

Finally, she was scheduled to receive the Barnard Medal of Distinction, the highest honor that Barnard College confers at last year’s Barnard Commencement, which was cancelled due to the pandemic. She will receive the Medal at the 2021 virtual Barnard Commencement. The letter from the president of the college informing Professor Sarachik about the award mentions, “We have many reasons to honor you, not to mention the fact that you are a Barnard alumna! Over the years you have made fundamental contributions to physics, served as leader in advancing human rights, and inspired so many of your students and colleagues, showing immense grit and determination as you overcame unspeakable challenges along the way.” Past recipients of the Medal include Barack Obama, Hillary Clinton, Leymah Gbowee, Samantha Power, Chimamanda Ngozi Adichie, Zainab Salbi, and Patti Smith.

MENON ELECTED OSA FELLOW



Professor Vinod Menon has been elected a fellow of the Optical Society of America (OSA) “for important contributions to strong light-matter interactions in low-dimensional materials and hyperbolic metamaterials.” The class of 2020 OSA fellows includes 94 OSA members honored for their significant contributions to the advancement of optics and photonics through education, research, engineering, business leadership and service. Menon’s research focuses on the exploration of light-matter interaction at the nanoscale to explore emergent material properties (classical and quantum) that arise when matter is subjected to artificially engineered electromagnetic environments. As an IEEE Photonics Society Distinguished Lecturer since 2018, Menon is also involved in giving talks at Society chapter meetings, chapter-related events or technically co-sponsored conferences. Professor Menon is the current chair of the CCNY Physics Department

GANESHAN GARNERS NSF CAREER AWARD

Assistant Professor Sriram Ganeshan has received a highly-competitive and prestigious NSF Career Award for his research project, “CAREER: Quantum Hydrodynamics: From Electron Fluids to Chiral Active Matter.” The five-year \$514K award will support Ganeshan’s research on developing “quantum modifications” to the classical hydrodynamics that captures the unique properties of the macroscopic quantum state. The goal is to develop a general semi-classical theory of certain quantum fluids. Ganeshan is hopeful that in the long term the research may uncover hitherto untapped mesoscale phenomena that can be used towards developing a new generation of quantum devices. The project has following three education and outreach components as well: (a) Development of a special topics course on fluid dynamics applied to condensed matter systems aimed at graduate students and senior undergraduates; (b) Research opportunities for undergraduates and high school students, and (c) Interactive demonstrations based lectures for high school students on basic fluid dynamics principles that underpin the research effort. The last component seeks to address the resource scarcity for setting up demonstrations in many of the schools under the ambit of the College-Now program run at the City College of New York

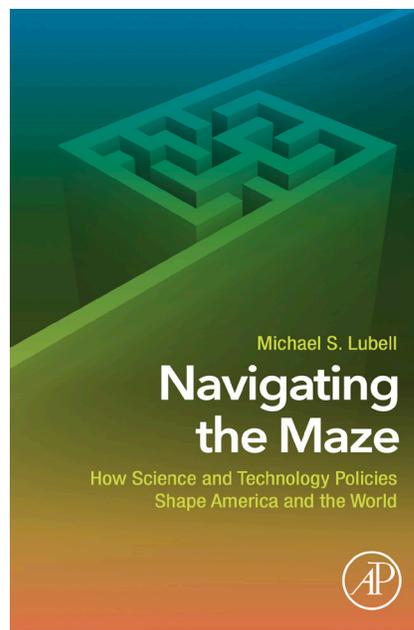


NAVIGATING THE MAZE

Michael Lubell, the Mark W. Zemansky Professor of Physics at the City College of New York, offers a historical roadmap, illuminating how America became the global leader in science and technological innovation, and provides prescriptions for shaping effective future policy and science advocacy domestically and on the world stage in his new book *Navigating the Maze: How Science and Technology Policies Shape America and the World* (Elsevier Academic Press, 2019, ISBN: 9780128147108). The 333-page book presents historical narratives to highlight past and recent policy decisions that affected scientific and technological development domestically and globally.

Salient features of the book include: (a) compelling narratives about Climate Change, the Internet, the Human Genome, the BRAIN Initiative, the Manhattan Project, the Science Stimulus, the origin of the National Institutes of Health and the National Science Foundation, and more; (b) insights into the future of S&T through a 225-year American policy retrospective, highlighting impacts on health and medicine, STEM education, economic growth, energy, defense, innovation, and industrial competitiveness; and (c) revealing the role of science and technology on the global stage, from diplomatic engagement to military intervention and from scientific collaboration to technological competition.

“People rarely think about the policies that provide access to things like the Internet and MRIs. They pay even less attention to the decisions that paved the way for creating the technologies those things rely on—things like smart phones, computers and superconducting magnets,” said Lubell. “Policymaking can either promote or inhibit scientific research, and it can either enable or deter the development of the technologies that flow from scientific discovery. S&T policymaking is an immensely powerful tool that has shaped the world of today and will unquestionably shape the world of tomorrow. Understanding how it works and how to use it effectively is more important than ever, as technology plays an increasing role in our daily lives.”





2020 GREAT GRAD

Alexandros Gloor was among the graduating CCNY students chosen for 2020's Great Grads salute. CCNY Great Grads "not only excel in the classroom; they have personal stories that inspire us and illustrate the transformative power of higher education, as well." Alexandros pursued a BS in Physics and a BA in Philosophy.

ZEMANSKY INTRODUCTORY PHYSICS PRIZE

recognizes outstanding scholarship in Introductory Physics 20700 or Physics 20800 courses

Luis Arias, Zhou Chen, Tamas F. Caldwell-Gilbert, Hisham L.Hasan, Veeraj S.Jethalal, Abdullah M. Khan, Ghufuran Khan, Zeeshan Khan, Weiye Kuang, Zhi Heng Lui, Tasnim A. Raka, Anupriya Roul, Jennifer Shin, Kaitlyn Toy, Alan Tsigalnitisky, Long Yin Wan, Samuel I Wolnerman, Yaraslau Yajac, and Vincent M. Yang.

STUDENT AWARDS

The Physics Department gives out several awards and scholarships to undergraduate students every year. The following students won the awards for the 2019-2020 Academic Year.

SIDNEY MILLMAN SCHOLARSHIP

John Panagiotopoulos

presented to the junior Physics major demonstrating high potential

SONKIN MEDAL

Jia Hui Weng

for the best performance in the Physics laboratory course(s) and/or in experimental research.

WARD MEDAL

Jireh Garcia

presented to the graduating physics major with the highest GPA in physics and mathematics courses

BERNARD HAMERMESH SCHOLARSHIP

Alexandros Gloor

recognizes 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.

DR. JERRY A. GELBWACHS SCHOLARSHIP

Merna Youssef

awarded to the Physics major demonstrating academic excellence and high potential to benefit society

MARTIN A. TIERSTEN SCHOLARSHIP

Brian Kazi

the students with the highest performance in Mechanics (Physics 35100)

HARRY SOODAK SCHOLARSHIP

Ian Brinkley

given to the outstanding junior physics major who wants to pursue a career in Physics

MICHIO KAKU AWARD

Jireh Garcia
Merna Youssef

recognizes the outstanding graduating Physics major who has demonstrated some of the skills, knowledge, technique and imagination necessary for a successful Theoretical Physicist.

RESEARCH HONORS

Jireh Garcia
Merna Youssef
Maria Francesca Soddu
Jia Hui Weng
Hussain Bokhari

RECENT GRADUATES

Annual Commencement exercises are festive occasions in academic institutions that recognize and celebrate students' academic achievements culminating from years of dedicated work. The Class of 2020 was deprived of this much cherished festivity. These students had to settle for attending online classes for most of their senior year and received their degrees in virtual commencement events. However, their accomplishments are very real, and they had to work harder amidst unusual and uncertain circumstances. What follows is a list of students who earned their BS, MS and PhD degrees recently.

BS DEGREE RECIPIENTS

Summer 2019: Derna Rowe, Faidon Theofilakos, Jeff Varela

Fall 2019: Asmanda Espinosa, Mahindra H Lall

Spring 2020: Abdullah Amer, Panagiotis Anastasiou, Hussain Bokhari, Eric Brobyn, Lisa Chan, Kurt Dawiec, Jireh Garcia, Nkrumah Garner, Michael Gaziani, Alexandros Gloor, Yingie Huang, Sung Soo Jang, Michael Miranda, Menret Rezkalla, Jaylene Salas, Simon Savitt, Jia Hui Weng, and Merna Youssef.

MS DEGREE RECIPIENTS

Fall 2019: Briana Franklin, Carlos Ordaz, and Abdelali Sajja

Spring 2020: Edward Lieb, Gentian Muhaxheri, Fermin Nunez, Isaac Pulatov, James Scholtz, and Demoine Stewart

PHD DEGREE RECIPIENTS

The following individuals received their PhD degrees from the joint Graduate Center of CUNY and the City College of New York Doctoral Program.

Jiusi Lei, Particle Dynamics in Anti-de Sitter Space by EIH Method,
(Advisor: V. Parameswaran Nair), September 2020.

Rong Wu, Control of Molecular Energetics and Transport via Strong Light-Matter Interaction,
(Advisor: Vinod M. Menon), September 2020.

Xiuhong Cai, Proton Pumping Mechanism in Cytochrome c Oxidase,
(Advisor: Marilyn R. Gunner), June 2020.

Vasilios Deligiannakis, II-VI Type-II Quantum Dot Superlattices for Novel Applications, (Advisor: Maria C. Tarmago), February 2020.

Francesca Beatrice Arese Lucini, Stability and Application of the k-core Dynamical Model to Biological Networks,
(Advisor: Hernán A. Makse), September 2019.

Jie Gu, Exciton Polaritons in Two-dimensional Transition Metal Dichalcogenides
(Advisor: Vinod M. Menon), September 2019.

Azeem Ul Hasan, Physics and Mathematics of Graded Quivers
(Advisor: Sebastián F. Franco), September 2019.

Qiongge Li, Inference of Language Functional Network in Healthy, Cancerous and Bilingual Brains by fMRI and Network Modeling
(Advisor: Hernán A. Makse), September 2019.

Cody K.W. Youmans, Interplay of Magnetism, Superconductivity, and Topological Phases of Matter
(Advisor: Pouyan Ghaemi), September 2019.

IN MEMORIAM

MARVIN H. MITTLEMAN

1928-2019



The world of physics lost a treasured colleague, and CCNY lost a long-serving member of the physics department a little more than a year ago. Marvin Mittleman, who joined the CCNY faculty as an associate professor of physics in 1968 and was a mainstay of the physics department until his retirement in 1999, died on December 29, 2019. Marvin was born on March 13, 1928 to Sol and Jenny Mittleman. He received his BS in physics from the Polytechnic Institute of Brooklyn (Brooklyn Poly) in 1949, and his PhD from MIT in 1953. His PhD supervisor was Francis Low. He did his postdoctoral research at Columbia with T. D. Lee from 1952 to 1955. He then

moved to Berkeley, and took a position with the Lawrence Radiation Laboratory (now LBNL) as a research physicist, where he worked with Edward Teller and Ken Watson, among others. This lasted until 1966. He was also a lecturer in the physics department at UC Berkeley (Cal) during that time. He then spent 1966-68 full-time at Cal, as a research physicist at the Space Science Lab. He moved to CCNY in 1968.

He had worked with other luminaries to help build CCNY's reputation as an academic leader in science research and education, recruiting young physicists and promoting the accomplishments of the CUNY physics program during a stint as executive officer of the physics graduate program.

Dr. Mittleman, who had risen to the rank of full professor within two years of his arrival at CCNY, played a crucial role during both good financial times, as the department grew, and bad financial times, as the department strove to maintain morale. He served as a mentor to younger faculty members and post-doctoral associates, as well as graduate and undergraduate students. As a theoretical physicist, he provided insights and guidance that assisted his colleagues pursuing research in experimental atomic and molecular physics, quantum optics and condensed matter physics.

His book, *Introduction to the Theory of Laser-Atom Interactions* (Springer, Berlin), first published in 1982, was required reading for researchers in the rapidly developing field. As laser technology continued to progress, multi-photon and high-field photon-atom experiments, once thought impossible, became feasible. Recognizing the advances, Dr. Mittleman expanded his treatise, and in 1993 a second edition appeared, adding theoretical constructs for the newly accessible regimes.

At the time of his death, Marvin Mittleman had been professor emeritus for twenty years, and he had ceased making regular visits to campus. His physical presence had diminished, but his legacy of theoretical work and mentoring was not forgotten. He left an indelible mark on CCNY's physics program and the world of physics more generally.

(Contributed by Michael Lubell)

ALVIN KATZ

1949-2020



Alvin Katz, a research associate at the Department of Physics, died on the evening of July 8, 2020 while walking outdoors. Al was born on June 3, 1949 to Mortimer and Ruth Katz. He received his Bachelor of Science degree in Physics in 1980 from the City College of New York, and his PhD in Physics from the City University of New York in 1988. After a postdoctoral research stint at CCNY, he joined the Interdigital Communication Corporation (ICC), Port Washington, NY as a research scientist in 1991. He returned to CCNY as a research associate in 1994 and continued in that position to the end.

Al was a devoted research scientist. His research at CCNY involved the use of time-resolved laser spectroscopy to study ultrafast processes in semiconductors; development of optical spectroscopic techniques for detection and diagnosis of diseases; laser welding of biological tissues to heal wounds; investigating the role of bacteria in modifying clay structure and the formation of new minerals; and exploring the role microbes play in storage of organic carbon in soils. More recently, he was using cryo-electron tomography to investigate the structure of viruses and virus like particles. He has successfully collaborated with researchers in the departments of Physics, Earth and Atmospheric Sciences, as well as Biology and Medicine. At ICC he was involved in developing components and methods for optical communications and information processing applications.

Al was a wonderful colleague – knowledgeable and ready to help. He seldom missed any departmental colloquia, and would be there to help solve the glitches with audio-visual equipment that had a way of turning up before a talk. He served as a co-mentor to students of his collaborators from other departments, training them meticulously on optical, light-scattering, and numerical techniques. He was a cosmopolitan progressive in his views on political and social issues.

Al had several serious health issues in recent years but was quite stoic about those. He would be hospitalized, undergo treatments, but would get back to the department, conducting his research at the first available opportunity. He told his family that he would never retire so that he could keep his “mind sharp.” He is survived by his mother, wife Silvia Blumenfeld, son Josh, daughter Eve, and granddaughter Maya (Eve’s daughter). He will be missed by his family, friends and colleagues.

(Contributed by Swapan K. Gayen)

ROBERT M. LEA

1931-2020



Robert (Bob) M. Lea, Emeritus Professor passed away on Monday, June 1, 2020 at Kimball Farms Assisted Living Center. He was born on November 4, 1931 in Manhattan, NY to the late Isidore and Rachel Levy. He graduated from The Bronx High School of Science in 1949 and attended Union College in Schenectady, NY. After graduating from Union College in 1953, Bob attended Yale University where he obtained his PhD in Physics in 1957.

Bob Lea conducted research in experimental particle physics at Brookhaven National Laboratory in Long Island before settling into a long career as a Physics Professor at the City College of the City University of New York until his retirement in 1992. He served as the Chairman of the Physics Department and played a key role in transforming it from a teaching department to a research and teaching department. Together with Harry Lustig, then dean, he secured a large National Science Foundation departmental development grant that was instrumental in making this transformation possible. Professors Boyer, Callender, Gersten, Kikkawa, Sakita, and Smith joined the department in 1970 when he was the chairman. He was a prime force behind transforming an ROTC marching field into a 13 story science building, now called the Marshak Science Building. He is remembered as an excellent teacher - knowledgeable, clear, patient, and always willing to answer questions.

Bob Lea is survived by his wife Vickie Lea, daughter Jennie Clegg, step-daughter Sabina Curti, and two grandchildren, Rachel and Zelda Clegg.

On the cover: Scanning electron microscope image of a hybrid photonic micro-cavity formed by placing a 20-nm-thick flake of hexagonal boron nitride on silicon nitride micro-disks.

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