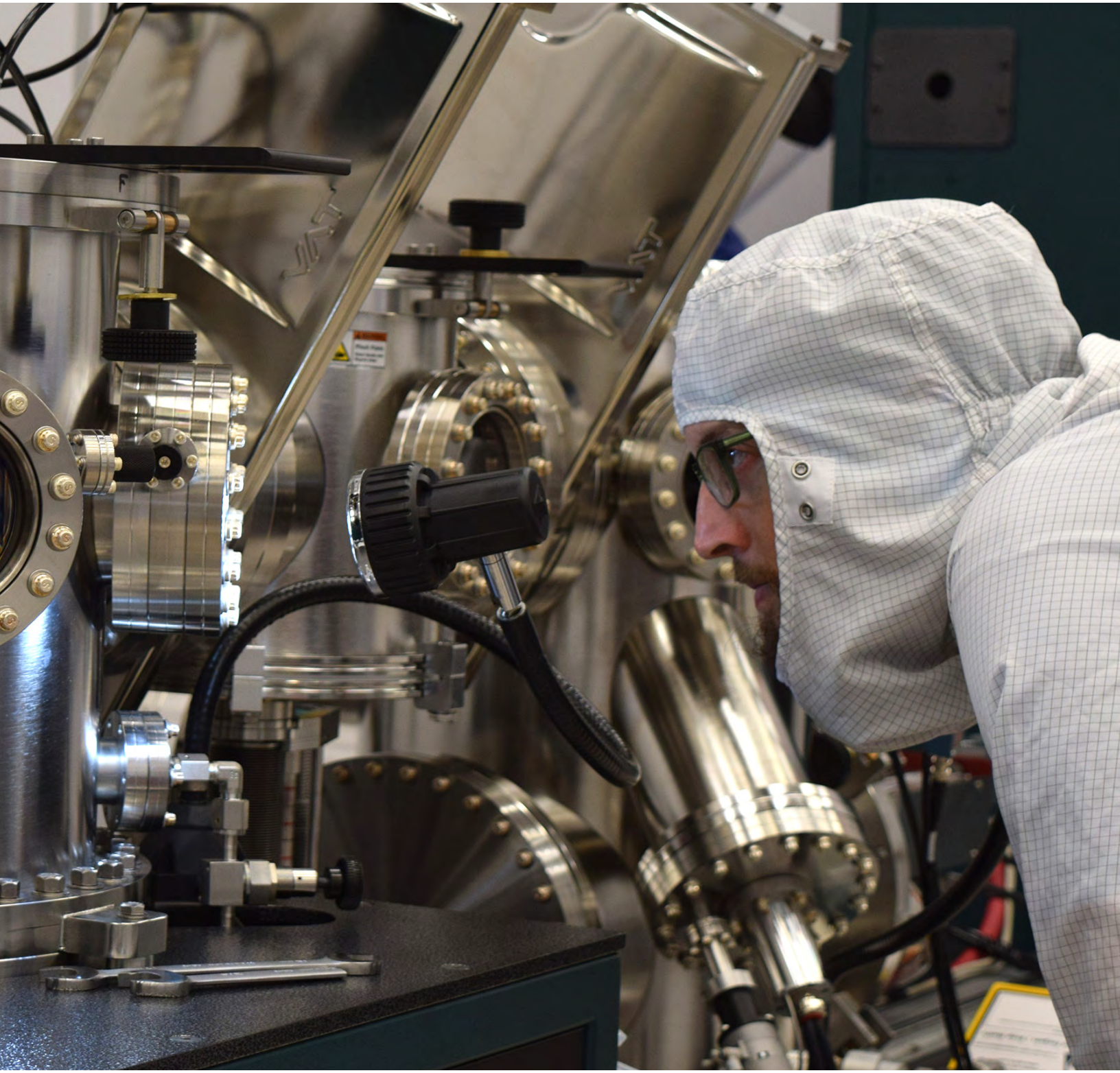
Impact Report and Strategic Plan (2025–2029)

ADVANCED SCIENCE RESEARCH CENTER
THE GRADUATE CENTER
CITY UNIVERSITY OF NEW YORK



Overview

Our Mission

The Advanced Science Research Center (ASRC) at The Graduate Center of The City University of New York (GC CUNY) catalyzes interdisciplinary science and technology research, training, and education for the public good and engages in outreach across West Harlem, the CUNY campuses, nearby academic institutions, and industry partners of the greater New York City region.

Our Vision

We see the CUNY ASRC positioned as a central hub for innovative science at CUNY. Building upon our strong foundations and successes over the past decade as a premier public resource for a transformative scientific research and engagement culture in New York City, we aim to accelerate discovery, expand our reach, amplify its impact, and broaden the scope of our transformative work, making a positive, lasting impact in and beyond New York.

Our Inclusivity

The CUNY ASRC is committed to fostering an inclusive research, training, and learning community by serving diverse groups and creating equitable opportunities for upward economic mobility. We actively cultivate pathways for students to access state-of-the-art research training, attentive and careful mentorship, and meaningful career trajectories, empowering the next generation of scientists and innovators.

Our New Goals

- Establish collaborative and integrative pathways for the CUNY ASRC as a leading hub for interdisciplinary STEM research and workforce development across CUNY, New York, and the nation
- Establish a new computational core for Artificial Intelligence (AI) engagement that will serve the future research and technological needs within and beyond CUNY
- Enhance financial resiliency and diversify extramural funding sources
- Forge new meaningful partnerships with local communities to address societal challenges through STEM education and training, workforce development, and civic engagement.


MAGNETOM Prisma
SIEMENS
STOP
MAGNET IS ON!
AEGYS
Camera Setup

Greetings from the CUNY ASRC Community

As the executive director of the Advanced Science Research Center at The Graduate Center of the City University of New York, I am proud and honored for us to present to you a vision for 2025–2029, an update on our past five years, and a look towards our strategic direction for the next five years. As we embark on this journey, our commitment to our core mission remains strong: to improve human and environmental well-being through basic, applied, and interdisciplinary scientific discovery and education.

Located in West Harlem, New York, the CUNY ASRC is uniquely positioned within New York City's scientific and cultural ecosystems. Our location offers unparalleled opportunities to inspire young people from diverse communities to pursue STEM careers, while simultaneously contributing to the growing technological and entrepreneurial workforce of our city. Through partnerships and collaboration, we aim to complement and amplify the world-class life sciences and engineering research happening throughout New York, creating a transformative pipeline for talent and innovation.

Over the next five years, we will deepen connections among our leading scientists across the five CUNY ASRC initiatives—Nanoscience, Photonics, Structural Biology, Neuroscience, and Environmental Sciences—integrating physical and environmental sciences, engineering, and biology to collaboratively address complex questions, with implications that resonate across society and the natural world.

In continuing our path with distinction, we are committed to positioning the CUNY ASRC as a leading source of expertise in these critical areas for CUNY, and with prominent and emerging members of the New York City and State academic and applied research ecosystems. We are now more than ever committed to interdisciplinary exploration, fostering innovation, and building strategic partnerships along the way.

We are also dedicated to fostering innovation through the use and further development of cutting-edge materials and technologies, and application of our advanced student mentoring programs within our initiatives and core facilities.

Since our founding, we have also been committed to sharing our discoveries with the world through high-profile research publications and experiential engagement with the public to promote our research, ensuring our ability to continue making meaningful contributions to science and society.

Central to our mission is a distinctive and inclusive research culture—one that is creative, collaborative, convergent, and diversified both in topics and contributors. Building upon CUNY's pioneering status as an engine of upward social mobility, we remain steadfast in our commitment to welcoming students and other collaborators from all backgrounds to learn here and to advance our mission.

As a central hub for groundbreaking science and collaborations within CUNY, the CUNY ASRC is dedicated to advancing research and driving innovations that have real-world impact. We invite our supporters to join us in this mission. With your help, we can expand both our research and outreach and make significant strides in tackling the pressing challenges of our time. Together, we can enhance student experiences, support pioneering science, and make a lasting impact on society and the environment.

We, the CUNY ASRC community, are poised to continue to make significant strides in advancing scientific knowledge and innovation and addressing pressing challenges of our time. We can say with confidence that with the continued support of our funders, benefactors, scientific contributors, research staff, and students, we shall realize our vision of a better future for all. Thank you all for contributing to our mission.

Sincerely,

Mark E. Hauber, Ph.D., D.Sc.
Executive Director of the CUNY ASRC
New York, New York, 2025

Key Outcomes from the Previous Five Years and their Goals

Previous Strategic Plan Goals

Goal 1: Investigate critical scientific and societal challenges

Goal 2: Encourage interdisciplinary research and scholarship

Goal 3: Support student learning and training

Goal 4: Promote community engagement and awareness

Goal 5: Develop solutions to benefit the people of New York City and the larger community

Outcomes from the Previous 5 Years

Over the past five years, the CUNY ASRC has made significant strides towards addressing critical scientific and societal challenges, fostering student learning and training, and building impactful industrial and community partnerships. The CUNY ASRC has also continued to serve as a powerhouse for CUNY-wide research and discoveries through its critical SEED grant program to collaborate with other CUNY campuses, its placement of 50% of the tenure-line CUNY ASRC faculty into four additional research-active CUNY campuses beyond the research-intensive (R1) CUNY Graduate Center, and the extensive use (up to 50%) of the CUNY ASRC's core facilities by CUNY's own researchers.

In fact, 2024 yielded CUNY's highest ever extramural research income and expenditures in our 10 years since founding!

Within the building itself, from transformative research on glial cells to advance neurological disease treatments, through pioneering radio wave manipulation in next-generation materials and a brand new local research program on understanding the structural basis of red-blood cell integrity, to global-scale analysis of business opportunities to realize sustainable water security, the CUNY ASRC has achieved numerous research milestones aligned with its mission.

To achieve our goal of training the next generation of scientists, the CUNY ASRC has already welcomed over 500 research trainees through its doors.

- Notably, the Nanoscience Initiative's Connected to Life (NanoBioNYC) doctoral training program, funded by the National Science Foundation, alone has mentored over 50 students, preparing them for diverse STEM careers in health care, renewable energy, and sustainable materials.
- Through initiatives like the Center for Advanced Technology (CAT) Program and the FloodNet partnership, the CUNY ASRC has supported over 30 industry collaborations and established New York City as a hub for innovations in sensors, biomaterials, and sustainable energy production, helping both local communities and scientific advancement.
- Regarding community engagement, the IlluminationSpace has welcomed over 2,000 participants through field trips, collaborating with organizations across New York City to launch new science-driven community programs each year.
- Quantitative measures of the CUNY ASRC's achievements over the last five years support these achievements, including publications, grants, and awards, showcasing the center's impact on scientific research, education, and public good.

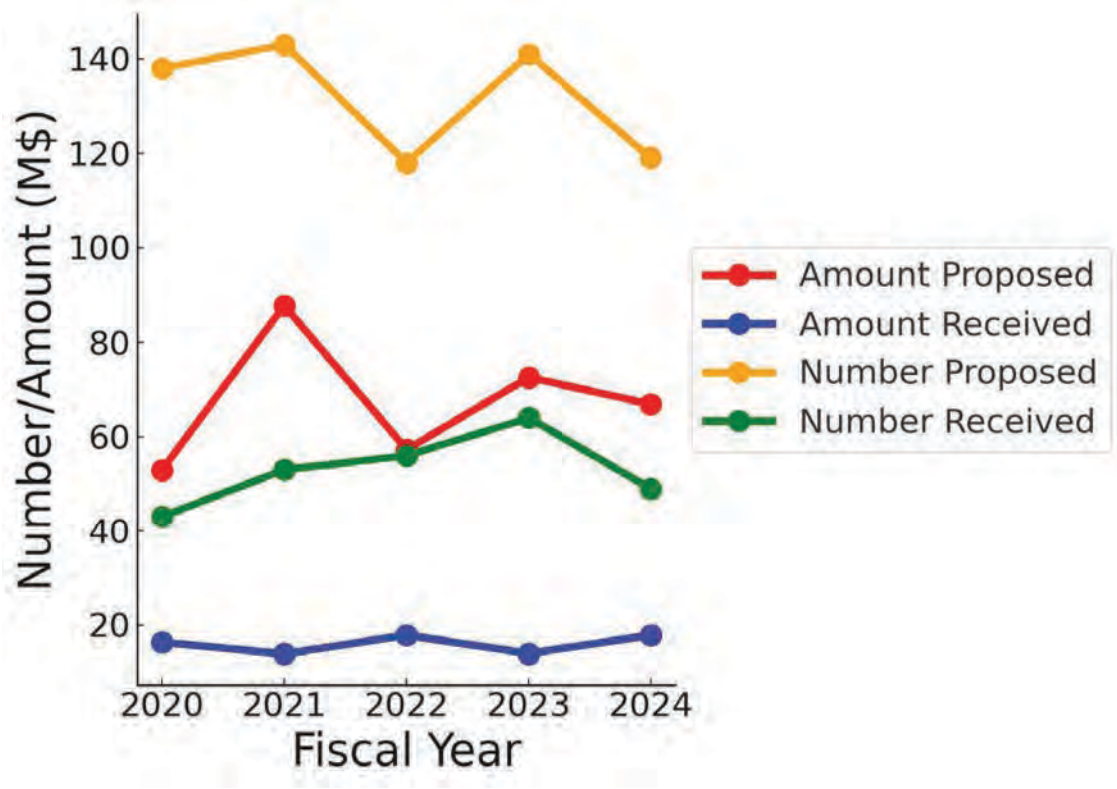

What war has done to science in Russia p. 632
Why property wildfire risks are rising pp. 638 & 702
AI that anticipates emergent illicit drugs wins NOMIS & Science Award p. 656
Science
$15
10 NOVEMBER 2023
science.org
AAAS
CHIP
LASER
Powerful mode-locked lasers miniaturized to chip scale p. 708


www.nature.com/natecolevol / May 2025 Vol. 9 No. 5
nature ecology & evolution
Cavity convergence


ENVIRONMENTAL
PHOTONICS

CUNY ASRC Publications and Grant Income, 2020–2024

Category	Data
Number of Peer-Reviewed Publications ➢ Number in Science, Nature, and PNAS	752 ➢ 15
Number of Citations ➢ Total without self-citations	12,390 ➢ 11,452
Number of Research Awards ➢ Amount from US federal agencies	269 ➢ 142
Research Award Income ➢ Amount from US federal agencies	$80M+ ➢ $63M+




NOTICE
SHARPS ONLY!!!
SOLVENTS
UHV

Our Research Initiatives

The CUNY ASRC unites leading scientists across five initiatives—Nanoscience, Photonics, Structural Biology, Neuroscience, and Environmental Sciences—to collaboratively address complex questions with profound implications for both scientific discovery and societal well-being. Each initiative distinguishes itself nationally and internationally through pioneering research, interdisciplinary collaboration, and contributions that advance the CUNY ASRC's strategic goals.

The following stories provide a unique window into how each initiative is advancing these goals, showcasing specific successes that illustrate the CUNY ASRC's impact on diverse scientific and societal challenges. We invite you to explore each story as a testament to the depth and breadth of ASRC's scientific and outreach work, from cutting-edge discoveries and technological advancements to training the next generation of STEM leaders.

Nanoscience

The Nanoscience Initiative draws inspiration from the living world at the smallest scale to create groundbreaking technological innovations. Led by Rein Ulijn, Einstein Professor of Chemistry, Biochemistry, and Nanoscience at Hunter College and the CUNY Graduate Center, the initiative conducts research that transcends biological possibilities to develop bio-inspired materials and devices that advance biomedicine, sustainable materials, and green energy harvesting. These efforts have led to many impactful publications, patents and disclosures, and transformative applications that drive progress across a range of disciplines.

A cornerstone of the initiative is its commitment to fostering the next generation of STEM leaders with a particular emphasis on engaging New Yorkers in STEM careers, including the interface of AI technology, materials science, and biotechnology. By creating stronger STEM pipelines within the region, and through prioritizing inclusivity, the Nanoscience Initiative provides educational opportunities for diverse groups to engage in mentorship and outreach. These efforts benefit the West Harlem community, New York City, and beyond, inspiring future leaders to unlock advancements with profound societal impact.

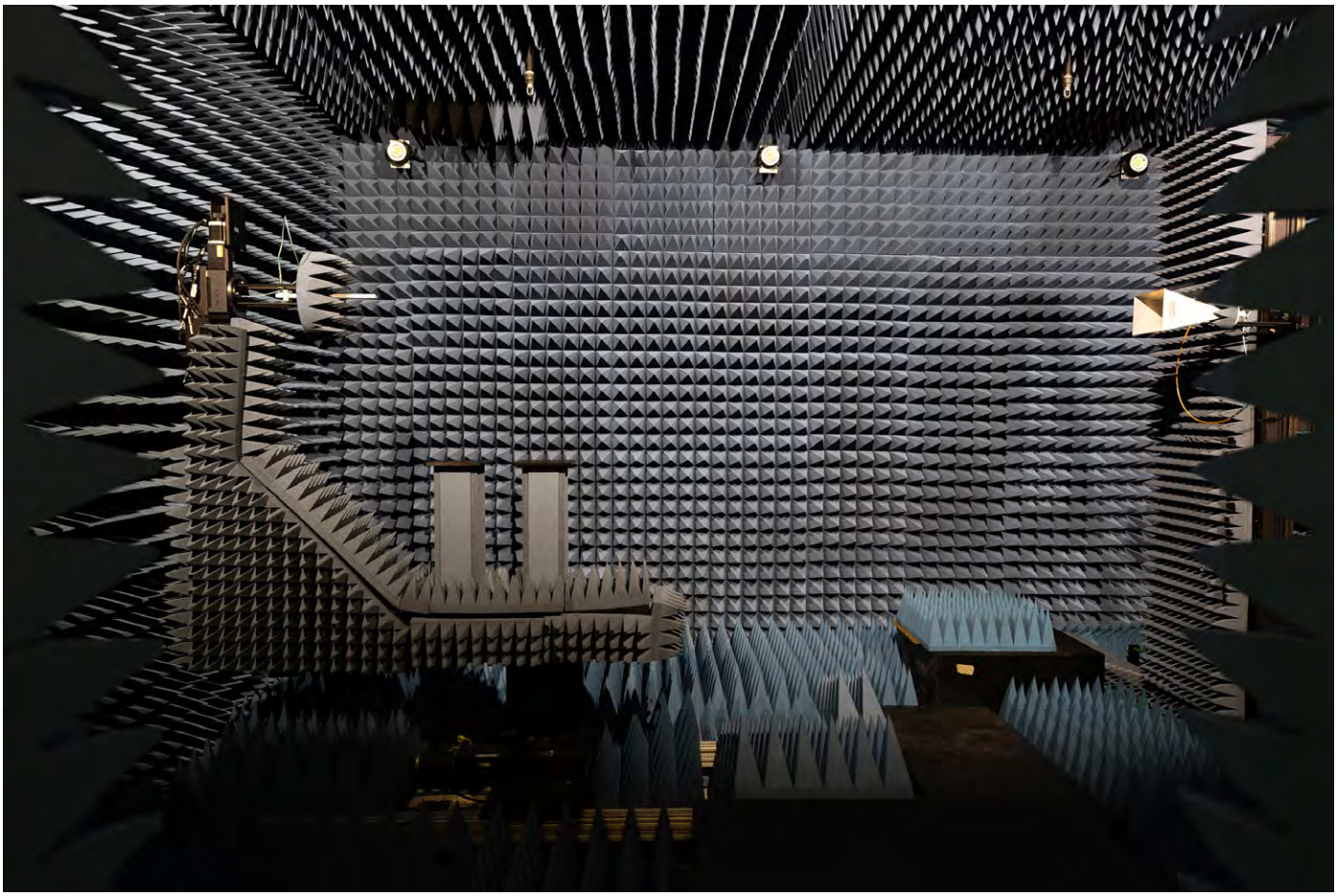
Strategic partnerships and interdisciplinary training are central to the initiative's mission. The National Science Foundation-funded Nanoscience Connected to Life (NanoBioNYC) Ph.D. traineeship program at the CUNY Graduate Center, launched in 2022, trains diverse cohorts of Ph.D. students for careers that integrate life and physical sciences. The program provides funding, mentorship, and professional development opportunities, equipping students to address environmental and health challenges. Meanwhile, an NSF-funded Research Experiences for Undergraduates (REU) program, co-led with Columbia University, offers undergraduates access to cutting-edge STEM research, with over 80% of participants identifying as women and/or minorities.

Critically, this initiative's New York State-funded Center for Advanced Technology (CAT) Program bridges academic research with industry by advancing basic science inventions into real-world applications across fields such as agriculture, medical devices, and quantum computing. The CAT ensures that start-up industry researchers have access to critical tools and opportunities, accelerating the development of new technologies and making them more accessible. For students, it provides a unique platform to transition from basic science to real-world applications, preparing them for leadership roles in STEM fields.

For New York, these industry-driven innovations and the infusion of fresh scientific talent contribute to economic growth. They strengthen the state as a hub for cutting-edge technology, a STEM-driven workforce, and other growth opportunities.

Alumni of the Nanoscience Initiative have gone on to become tenure-track professors, company founders and entrepreneurs, biotech finance experts, and research and development leaders in industry in New York City and elsewhere. This reflects the program's emphasis on reimagining Ph.D. and postdoctoral training to create stronger pathways to diverse STEM careers beyond academia. The initiative's success is also a testament to its ability to address critical challenges through partnerships among academia, industry, and government. Programs like NanoBioNYC and the New York State CAT exemplify its commitment to linking academic excellence with industry needs.

With future donor support, the Nanoscience Initiative seeks to establish funded fellowships for graduate students with exceptional leadership potential, expand interdisciplinary training opportunities, and enhance technological innovations. These investments will drive breakthroughs in growth areas, including green manufacturing, bio-nanotechnology, and sustainable materials, directly impacting global health and sustainability. By continuing to link academic research with real-world applications, the Nanoscience Initiative is both advancing scientific understanding and preparing New Yorkers as tomorrow's contributors and leaders to seize emerging opportunities and address urgent challenges.



Photonics

The multiple-award winning work of the Photonics Initiative, led by Andrea Alù, Einstein and Distinguished Professor of Physics at the CUNY Graduate Center, is at the national and global forefront of groundbreaking research aiming to discover novel ways to control light, heat, radio, and sound waves. Research in the initiative achieves this through the engineering of materials at the nanoscale, benefitting the next generation of quantum computers, ultrasensitive cameras, biomedical sensors, green energy, and wireless technology.

Among several externally funded projects, the initiative leads the Simons Collaboration on Extreme Wave Phenomena Driven by Symmetry, funded by the Simons Foundation based in New York City and headed by Professor Alù. This theme of studies aims to revolutionize our understanding of wave phenomena and enable technological breakthroughs in wave-based devices, such as lasers, computer chips, and fiber-optics communication technology. The project brings together an interdisciplinary team of 16 principal investigators and over 50 junior scientists from the United States and Europe, encompassing broad expertise in mathematics, physics, materials science, and engineering. The primary objective is to investigate how symmetry principles govern the response of waves, such as light and sound, in natural and engineered materials. Traditionally, natural symmetry laws have defined wave propagation. However, recent advancements suggest that these principles can be manipulated and even newly created within engineered materials, leading to unprecedented control over waves. This innovation opens vast possibilities for new technologies in areas including telecommunications, biomedical devices, laser systems, energy harvesting, and computing.

More broadly, the Simons collaboration integrates advanced physics and engineering modeling tools with cutting-edge equipment and nanofabrication techniques to explore how engineered materials can enable exotic wave properties in materials driven by different symmetry classes. The ultimate aim is to develop a unified theory for wave transport based on symmetry, paving the way for new forms of synthetic matter and groundbreaking technologies. The CUNY ASRC-led team uses a framework that blends geometrical, dynamical, folding, duality, and supersymmetry classes, enabling extreme control over wave propagation. Since the project's inception in 2020, the team's innovative approach has brought important breakthroughs, including the discovery of new wave phenomena, expanding the limits of how we control light, sound, and mechanical waves, accompanied with proof-of-principle experiments paving the way to new technologies.

This project underscores the Photonics Initiative's commitment to both pioneering research and real-world applications. By advancing our fundamental understanding of wave phenomena and developing materials with tailored properties, the Simons Collaboration, spearheaded at the CUNY ASRC, is poised to drive next-generation technologies and solidify the Photonics Initiative's role as a leader in photonics research.

With donor support, we can continue to push the boundaries of what's possible, creating innovative applications that address essential needs in health care, energy efficiency, and data security. Support for the Photonics Initiative plays a pivotal role in accelerating life-changing solutions and driving the future of technology.


WARNING!
m technology
m-technology.com
ntum technology
HELIUM
UN 1963
REFRIGERATED LIQUID

Structural Biology

The Structural Biology Initiative is a vibrant hub of collaboration and innovation, redefining how scientists at various career stages engage with one another and their work. What began as a diverse community of individually excellent research groups has evolved into a unified network that fosters both groundbreaking discoveries and meaningful connections both within the CUNY ASRC and through collaborations with City College's Center of Discovery and Innovation and the New York Structural Biology Center , all three situated on City College's south campus. The initiative is directed by Kevin Gardner, Einstein Professor of Biochemistry, Biology, and Chemistry at City College and the CUNY Graduate Center, who has been a driving force behind this unification.

Over the years, the initiative has focused on hiring exceptional faculty, establishing state-of-the-art core facilities, and revitalizing the seminar series, all towards the end of creating an inclusive environment where students and faculty engage in dialogue, share insights, and advance structural biology as a discipline. The initiative's regular seminar series now attracts over 70 participants, bringing together experts from across CUNY, other institutions, and even neighboring states. This gathering of minds provides a platform for exchanging ideas and building partnerships that extend far beyond the ASRC.

Training and mentorship are central to the initiative's mission, with programs designed to support students across all career stages. Undergraduate trainees receive guidance in research and securing fellowships, while graduate students and postdocs benefit from hands-on experience in cutting-edge research and exposure to world-class experts. This commitment to training ensures that participants are prepared for diverse career paths in academia, industry, or nonprofit organizations.

The initiative's collaborative approach has also driven remarkable research achievements. By bringing together experts from different fields, the Structural Biology Initiative catalyzed the creation of a drug startup for kidney cancer that is now valued at $500 million. Faculty members have earned recognition from major grant agencies, including the National Institutes of Health and private foundations such as the Mathers Foundation. These successes underscore the initiative's role in making New York a hub for biotech innovation and excellence.

The Structural Biology Initiative's impact extends far beyond its own community. Its core facilities in mass-spectroscopy, macromolecular crystallization, and nuclear magnetic resonance, draw users from across the city and neighboring states, and its leadership often consults with other universities looking to replicate its successful community-building model. This outward focus ensures that the SBI's influence is felt throughout the broader scientific landscape.

As the Structural Biology Initiative continues to grow, it remains committed to advancing structural biology, fostering the next generation of scientific leaders, and contributing to a thriving biotech ecosystem in New York. With donor support, we can deepen these research efforts, continue to provide advanced training to many more students, and deliver the scientific discoveries of tomorrow accessible to those in need. Through a culture of collaboration and excellence, the Structural Biology Initiative is not only transforming research but also empowering its community to make meaningful contributions to the world.


MAGNETOM Prisma
SIEMENS

Neuroscience

The Neuroscience Initiative, led by Patrizia Casaccia, Einstein Professor of Biochemistry, Biology, and Neuroscience at the CUNY Graduate Center, is dedicated to advancing our understanding of the brain and addressing urgent challenges, such as the ongoing mental health crisis. Through its interdisciplinary and collaborative environment, the initiative investigates how environmental factors, including diet, social interactions, urban stressors, and pollution, affect brain function and mental health. Its ultimate goal is to uncover the mechanisms behind neurological disorders and to develop innovative therapeutic strategies to mitigate neural disease effects.

A key aspect of this research is understanding how different types of environmental exposure contribute to neurological disease causation and progression. Recent studies at the CUNY ASRC, for example, have revealed that individual factors like diet and the gut microbiome play a crucial role in neurodegeneration. Specifically, regarding multiple sclerosis, this initiative has identified diet-derived toxic lipids and neurotoxic metabolites produced by gut bacteria in the cerebrospinal fluid of patients with severe disease progression — insights that have informed targeted neuroprotective strategies. Similarly, in Alzheimer's disease, our researchers have shown that stress-induced changes in the brain's immune system lead to the secretion of toxic lipids, harming neurons. Blocking lipid synthesis or stress pathways in experimental models has been shown to reverse disease symptoms, paving the way for new therapeutic interventions. Ongoing collaborations between the Nanoscience and Structural Biology Initiatives further explore these molecular mechanisms to develop strategies that may mitigate or potentially reverse neurodegeneration.

The effects of urban living and climate-related stressors on brain function form another major research focus in the CUNY ASRC Neuroscience Initiative. Partnering with the fifth floor's Environmental Sciences Initiative, the Neuroscience Initiative developed Mouse City, a complex, naturalistic environment designed to measure the combined effects of light, sound, and soil pollution. Given the association between urban living and increased risks of human anxiety and psychosis, this work uses an animal model to seek to identify causal links between environmental stressors and changes in brain function.

The initiative also utilizes advanced methods for imaging brain metabolites and analyzing nucleic acids, using molecular and robotic technologies and the CUNY ASRC's 3 Tesla (3T) human MRI apparatus, to explore how environmental stimuli influence brain function in animal models and in humans. Partnerships with psychiatric clinics enable the application of Transcranial Magnetic Stimulation (TMS) technology to treat patients' anxiety, depression, and migraines. This work contributes to a national clinical trial with 1,000 enrolled adults, demonstrating the initiative's ability to translate research into health solutions.

Community engagement is another cornerstone of the ASRC Neuroscience Initiative's mission. Programs like NeuroZen bring mindfulness and stress resilience awareness to visiting members of the West Harlem community, while a pilot study with CUNY students explores how music alleviates stress and anxiety, and even modulates the expression of stress-related genes. These efforts reflect the initiative's commitment to creating a two-way dialogue with the public, sharing discoveries and addressing community concerns.

With donor support, the Neuroscience Initiative can deepen its research into brain-body connections, expand mental health resources for New York's many communities, and ensure its diverse body of students and researchers have the tools to drive real-world impacts in neuroscience and beyond.

Environmental Sciences

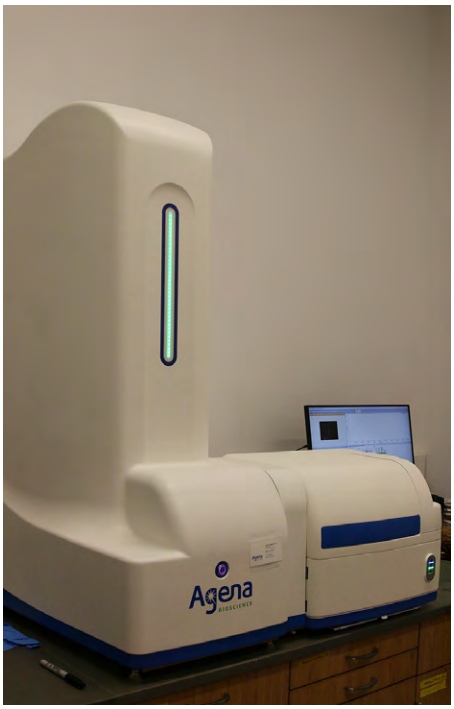
The Environmental Sciences Initiative, directed by Charles J. Vörösmarty, Einstein Professor of Geography and Environmental Science at Hunter College and the CUNY Graduate Center, is redefining how science addresses urgent environmental challenges by connecting research across scales. Human-caused disturbance and change impacts the world on multiple levels, from molecular and cellular shifts to ecosystem-wide transformations and societal disruptions. As such, the Environmental Sciences Initiative recognizes that effective solutions must also operate across these interconnected scales. With a mission to empower the next generation, its work encompasses cutting-edge research, public outreach, and workforce training to build a more sustainable and equitable future.

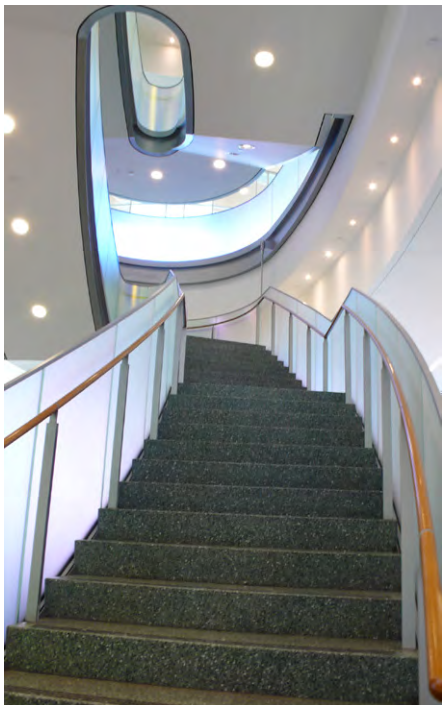
From examining microscopic changes in waterways to addressing how global climate patterns define the availability of water resources, the initiative integrates science across disciplines, tackling challenges at every level and engaging with diverse audiences of all ages to drive systemic applications. Through this approach, the research sheds light on new issues arising in modern society, such as the genetic and reproductive impacts of microplastics and the effects of land fragmentation on ecosystems and extreme climate. A recent workshop led by the initiative in collaboration with both the Neuroscience and Structural Biology initiatives brought together experts to discuss the effects of climate change across scales — from cellular changes to ecosystem-wide transformations — highlighting the interconnectedness of environmental issues and the need for systemic approaches to address them. These efforts reflect the initiative's ability to bridge diverse scientific disciplines, fostering collaborations that yield innovative solutions to pressing problems.

The initiative's interdisciplinary approach is demonstrated by numerous partnerships across scientific fields. Projects like EvapoFlex, developed in partnership with the Nanoscience Initiative, illustrate how evaporation-driven systems can generate clean energy. The NextGen Sensor Lab has developed advanced sensing systems to monitor urban tidal and rainfall flooding in the FloodNet NYC project, while ongoing research with the Neuroscience Initiative uses the Mouse City experimental environment to study urban stressors and their impact on behavior and brain function. These joint efforts exemplify the initiative's unique ability to connect research from the molecular to the global level, bringing together new ideas that can be transformed into actionable solutions.

The Environmental Sciences Initiative also prioritizes dialogue beyond the scientific community. Specifically, the Community Sensor Lab, a cornerstone of the initiative's outreach efforts, empowers local communities by providing tools and training to collect and analyze real-time environmental data, fostering a deeper understanding of environmental health challenges. The commitment to public engagement extends to partnerships with organizations such as the American Museum of Natural History, which educates the public about conservation and environmental stewardship. The initiative also actively engages with policymakers and industry leaders to ensure its research informs decision-making at local and national levels. The newly established NASA-funded Global Learning and Observations to Benefit the Environment (GLOBE) participatory science office at the CUNY ASRC, in collaboration with the Graduate Center and Brooklyn College, further amplifies these efforts within communities while expanding intercampus collaborations, involving citizen scientists of all ages in environmental monitoring to contribute to a comprehensive understanding of our planet.

By fostering interdisciplinary collaboration, training systemic thinkers, and developing innovative tools to analyze and address global problems, the Environmental Sciences Initiative exemplifies the ASRC's mission to create tangible, scalable solutions for the challenges facing our natural systems and societies. With donor support, we can both advance knowledge and foster the next generation of environmental leaders and equip communities to drive meaningful change in their own neighborhoods and beyond. Support for this initiative helps to bridge the gap between science and society and builds a sustainable future for generations to come.


Agena




Chem
CellPress

An Ecosystem for Interdisciplinary ASRC Research

Interdisciplinary collaboration is central to the CUNY ASRC's mission of addressing complex global challenges by uniting diverse scientific fields to drive innovative discoveries. As such, interdisciplinary work across the five research initiatives has already begun in earnest. Structural Biology and Neuroscience researchers have joined forces to uncover the structural nature of experience-based epigenetic molecular markers, illuminating how life experiences shape gene expression. Meanwhile, Photonics and Environmental Sciences faculty, alongside undergraduate researchers from several CUNY campuses, have been working together to map radio-wave density across New York City's neighborhoods, providing critical insights into urban environmental exposure. In another cross-disciplinary effort, researchers from Neuroscience and Nanoscience are uniting to better understand the role of helper cells in neuronal function, a step toward developing novel treatments for neurological disorders.

One of the leading success stories exemplifying interdisciplinary collaboration at the CUNY ASRC is the EvapoFlex project, a pioneering effort transforming clean energy technology by harnessing the power of evaporation. Supported by an NSF Convergence Accelerator grant, the project is led Xi Chen, an associate professor in the ASRC's Nanoscience Initiative and at City College's Grove School of Engineering, and Environmental Sciences Initiative Director Charles Vörösmarty. Now one year into development, the project has assembled a diverse team of scientists, engineers, and industry leaders to accelerate the advancement and commercialization of cost-effective and environmentally sustainable evaporation energy harvesting devices.

The EvapoFlex team has developed an innovative energy-harvesting device that uses water-responsive films, which expand and contract with changes in humidity, to convert water evaporative energy into kinetic motion and ultimately electricity. The team envisions integrating these devices into cooling systems at existing power plants, as well as deploying them independently near lakes and coastal areas to harness natural evaporation.

The project is organized into multiple research "thrusts," each representing a unique but interlinked phase of development. These thrusts range from creating genetically engineered materials to scaling up manufacturing, testing system-wide platforms, and evaluating the economic viability of the generators. The collaboration unites institutions including City College of New York, Columbia University, New York University, Syracuse University, and the National Renewable Energy Laboratory, alongside industry partners like General Electric, Canon, ISEE Systems, and Ginkgo Bioworks.

"One technique cannot solve all of the energy issues we're facing today," said Chen. "This project brings together academics, various institutions, and company partners, each using their expertise to tackle different thrusts. If successful, we envision [that] our convergence research could provide an innovative method for society to harvest this untapped energy source of natural evaporation."

To promote public understanding of the emerging technology, the team has also partnered with the American Museum of Natural History. There, a small-scale prototype will be on display, allowing visitors to explore and interact with the device firsthand. "When building the team, it was important to us to gather people with different areas of expertise, including policy and marketing," said Vörösmarty. "We wanted to be able to inform the public about the potential the technology offers and help bring it from the lab to real life."

Through interdisciplinary collaborations, EvapoFlex not only advances a novel energy solution but also serves as a model for how interdisciplinary research can address urgent societal challenges. The CUNY ASRC continues to pave the way toward a sustainable future, proving that the most complex problems require diverse perspectives and collaborative ingenuity.

"A founding principle of these interdisciplinary projects is to cross-fertilize ideas across floors, to bring several members of the building together across different scales of science to promote interdisciplinary thinking," said Vörösmarty. "At the CUNY ASRC's Environmental Science Initiative, we work over the regional, national, global domains, while Professor Xi Chen and our collaborators cover the domain of molecules. We are teaming up to explore if this amazing materials science idea can be upscaled to the 21st century electrical grid. I can think of few research centers where such a collaboration could even be envisioned."


ENVIRONMENTAL SCIENCES
S THERE IMPORTANT INFRASTRUCTURE
N EVACUATION ZONES?
Greenpoint
YEP
COLUMBIA


Cafe

Outreach: Our IlluminationSpace Hub

STEM fields have long grappled with a lack of compositional diversity that spans both academic and workforce sectors, often resulting in critical perspectives and ideas being sidelined from scientific research and technological advancements. In response to these systemic barriers to inclusive community participation in STEM, the CUNY ASRC has initiated several highly successful outreach and communications programs over the years. In 2021, to amplify the impact of these efforts, the CUNY ASRC consolidated them under a unified umbrella known as the IlluminationSpace Hub based within the building of the CUNY ASRC.

The IlluminationSpace Hub, under the leadership of the ASRC's Kendra Krueger and Shawn Rhea from the science communication team at the CUNY Graduate Center, serves as a unique science education resource center for New York City schools, families, eager-to-learn young people, and CUNY STEM students seeking to hone their science communications skills. Located on the CUNY ASRC's first floor, the hub features a variety of interactive exhibits for visitors to explore, including technologies that read out human brainwaves, an extreme-weather simulation that demonstrates environmental outcomes based on human decision-making, and stations showing how light manipulation is crucial for everyday technologies. Additionally, the hub provides opportunities for visitors to engage in conversations with working scientists regarding the CUNY ASRC's five distinct yet interconnected research disciplines: Nanoscience, Photonics, Structural Biology, Neuroscience, and Environmental Sciences.

The mission of the CUNY ASRC's IlluminationSpace Hub is to foster collaboration between CUNY STEM and New York City's communities. The hub aims to make science more accessible and responsive to local needs while providing pathways for New Yorkers of all backgrounds to pursue STEM education and careers. This is achieved through partnerships within the CUNY ASRC, across CUNY's community college and senior college campuses, and with local public schools, community groups, and neighborhoods.

There is also growing interest from the West Harlem community in events that intersect science, arts, and culture. As such, in recent years the CUNY ASRC's outreach programming has expanded to include field trips, community family nights, neuroscience and mindfulness training, teacher residency programs, and community research initiatives. New additions such as the extramurally-funded Rita Allen Civic Science Fellowship, several CUNY Research Experiences for Undergraduates programs, and additional summer student research programs, aim to draw in scientists at different career stages and foster multidisciplinary projects that connect scientists with communities.

The hub hosts various science outreach programs, including the IlluminationSpace Immersive Visitor Center, the Community Sensor Lab, and the Graduate Center Science Communication Academy as well. These programs are designed to inspire young people to pursue STEM careers, offer hands-on science education, and enhance communication skills among graduate students.

The IlluminationSpace Hub exemplifies the CUNY ASRC's commitment to making science education inclusive and community focused. By linking academic excellence with public engagement, the hub not only advances scientific understanding but also empowers local communities and nurtures future STEM leaders.

Goals of the CUNY ASRC for the Next Five Years

Goal 1: Establish collaborative and integrative pathways for the CUNY ASRC as a leading hub for interdisciplinary STEM research and workforce development across CUNY, New York, and the nation

The CUNY ASRC aims to solidify its standing as a premier center of excellence, enriching the academic journey of our students by providing them with a supportive, dynamic, and collaborative research environment. By integrating faculty and researchers from various campuses, we will create interdisciplinary opportunities for our students to receive mentoring from leading experts, engage in cross-cutting projects, and develop skills that prepare them for diverse STEM careers. We are committed to making these research and learning experiences enjoyable and fulfilling, ensuring that students are well-prepared for professional roles and public advocacy. Through these efforts, we shall cultivate a new generation of scientists comfortable working across disciplines and equipped to tackle complex societal challenges.

Goal 2: Establish a new computational core for AI engagement that will serve the future research and technological needs within and beyond CUNY

We aim to position the CUNY ASRC as a pivotal resource for technological advancement and computational research, serving not only the CUNY ecosystem but also New York City, New York State, and national and international research communities. Our objective is to develop a comprehensive technological infrastructure that embraces the new era of artificial intelligence and supports computationally-enhanced research across all of our disciplines. This involves developing a state-of-the-art CUNY ASRC Computational Core that will function as an interdisciplinary resource that catalyzes innovation and facilitates cutting-edge research. By partnering with the Graduate Center, City College, and other CUNY campuses, we will identify, integrate, and enhance the computational infrastructure and resources. Our upgraded technological framework will empower researchers from CUNY and beyond to undertake transformative projects, ensuring that the CUNY ASRC remains at the forefront of scientific advancement nationally in the future.

Goal 3: Enhance financial resiliency and diversify extramural funding sources.

We aim to continue broadening the funding sources for the ASRC's student- and training-focused missions through strategic partnerships, additional governmental and nonprofit grants, income from companies that use our core facilities, and increased private and foundational philanthropic support. By fostering collaborations with governmental agencies, non-profits, the private sector, and other philanthropists, we will secure and grow financial resources to support the CUNY ASRC's mission. Our goal is to effect innovative funding strategies that sustain our research and educational programs, ensuring long-term financial resiliency of the CUNY ASRC.

Goal 4: Forge new meaningful partnerships with local communities to address societal challenges through STEM education and training, workforce development, and civic engagement.

The CUNY ASRC is committed to bridging the gap between cutting-edge research and community needs by fostering meaningful partnerships that leverage science for societal impact. Through STEM education and training programs, citizen science initiatives, workforce development grants, and collaborations with local organizations, we aim to empower diverse communities with the tools and knowledge to address environmental, health, and technology-related challenges. By engaging policymakers, educators, and the public in data-driven decision-making, we strive to ensure that scientific advancements translate into tangible workforce benefits in and beyond New York City.

CUNY ASRC Core Facilities

The core facilities at the CUNY ASRC bolster CUNY's research capabilities, offering unparalleled resources for scientific exploration. These specialized cores provide cutting-edge equipment along with expert staff who enhance experimental design and data analysis, serving researchers across CUNY and academic and industry partners within and outside of New York City. The high-end facilities enable scientists not only to broaden the scope and scale of their research, but also to drive advancements integrating a diverse array of scientific fields and methodologies. The cores foster a unique interdisciplinary culture by allowing researchers from different initiative to work side by side, sharing some of the most sophisticated instrumentation available to solve common problems. Open to students, faculty, staff, as well as other academic, government, and industry users, the CUNY ASRC's core facilities stand for innovation and collaboration, expanding the boundaries of modern scientific knowledge. In just this past fiscal year (FY24), the core facilities boasted over 550 unique users, about half of them from CUNY campuses, bringing in nearly $2 million in revenue to continue our work of providing state-of-the-art technology to researchers across the New York STEM ecosystem.

Facility	Core Research Fields and Foci
Advanced Laboratory for Chemical and Isotopic Signatures (ALCIS)	Atmospheric chemistry, geochemistry, isotope ratio mass spectrometry, gas chromatography, stable isotope reference standardization, and calibration techniques
Biomolecular Nuclear Magnetic Resonance (NMR) Facility	Protein structure and dynamics using Nuclear Magnetic Resonance (NMR) spectroscopy, metabolomics, characterization of chemical material by solution and solid-state NMR
Comparative Medicine Unit (CMU)	A USDA- and other governmentally approved vivarium facility for the humane care of vertebrate research laboratory animals; supported by the ASRC's own IACUC committee and part-time veterinarians
Environmental Observatory	Monitoring the levels of natural and pollutant gases i New York City's urban environment
Epigenetics Facility	Epigenetic regulation and environmental impacts on gene expression changes
Imaging Facility	Electron microscopy, cryo-EM, single particle reconstruction, protein structures, DNA, self-assembly, bio-nanotechnology
Live Imaging and Bioenergetics Facility	Confocal microscopy, two photon, live imaging, and super resolution imaging, and 3D/4D imaging
Magnetic Resonance Imaging (MRI) Facility	Structural and functional neuroimaging (MRI, EEG), neuromodulation (TMS/TDCS), imaging biomarkers, multimodal and simultaneous MRI/EEG/TMS/TDCS/eye-tracking/physiological-sensing, and methods development
MALDI-TOF MS Imaging Facility	Label-free in situ profiling of proteins, lipids, metabolites, and small molecules; MALDI imaging including tissue preparation, matrix coating, MALDI-MS profiling, and imaging/data analysis
Macromolecular Crystallization Facility	Visualization and testing of three-dimensional structures of biological macromolecules, using crystallization robots, incubation chambers, and tray imagers
Mass Spectrometry Facility	Biomolecular mass spectrometry, protein structure and dynamics via HDX-MS and intact mass measurements, macromolecule/liquid interactions, metabolomics, and mass spec–based imaging
Nanofabrication Facility	Lithography, thin film deposition, dry etching, metrology, thermal processing and characterization
Next Generation Environmental Sensor Lab (NGENS)	Environmental sensor development and calibration, sensor deployment, in situ sensing, remote sensing
Photonics Facility	State-of-the-art laser systems, light sources, measurement instruments, optical and mechanical hardware, and photonics related software packages for computational work
Radio Frequency & Millimeter-wave (RF/mm-wave) Facility	In-house Printed Circuit Board prototyping, anechoic test chamber, high-end spherical nearfield measurement system, planar nearfield scanning, and RF instruments including network analyzers, spectrum analyzers, oscilloscopes, and (arbitrary) waveform generators
Rodent Behavioral Analysis Suite	Behavioral analysis in rodent models of neurological and psychiatric disorders, including learning, memory, anxiety, and depression tasks
Surface Science Facility	Soft materials, nanobioscience, nano-rheology, mechanobiochemistry, and nano-surface science
Future Unit: AI Computational Core	*Currently in development currently to complement the recruitment of Martin S. Spergel Computational Initiative for new AI faculty recruitment throughout the CUNY campuses*


AFTERNOON
SESSION


10

LEADERSHIP

Mark E. Hauber, Ph.D., D.Sc.
Executive Director, CUNY ASRC

Professor of Psychology, CUNY Graduate Center

mhauber@gc.cuny.edu

Andrea Alù, Ph.D.
Director, Photonics Initiative

Einstein and Distinguished Professor of Physics, CUNY Graduate Center

aalu@gc.cuny.edu

Patrizia Casaccia, M.D., Ph.D.
Director, Neuroscience Initiative

Einstein Professor of Biology, Biochemistry, and Neuroscience, CUNY Graduate Center

pcasaccia@gc.cuny.edu

Kevin H. Gardner, Ph.D.
Director, Structural Biology Initiative

Einstein Professor of Chemistry and Biochemistry, The City College of New York and CUNY Graduate Center

kgardner@gc.cuny.edu

Rein V. Ulijn, Ph.D.
Director, Nanoscience Initiative; Director, CUNY ASRC Sensor CAT; Director, NanoBioNYC;

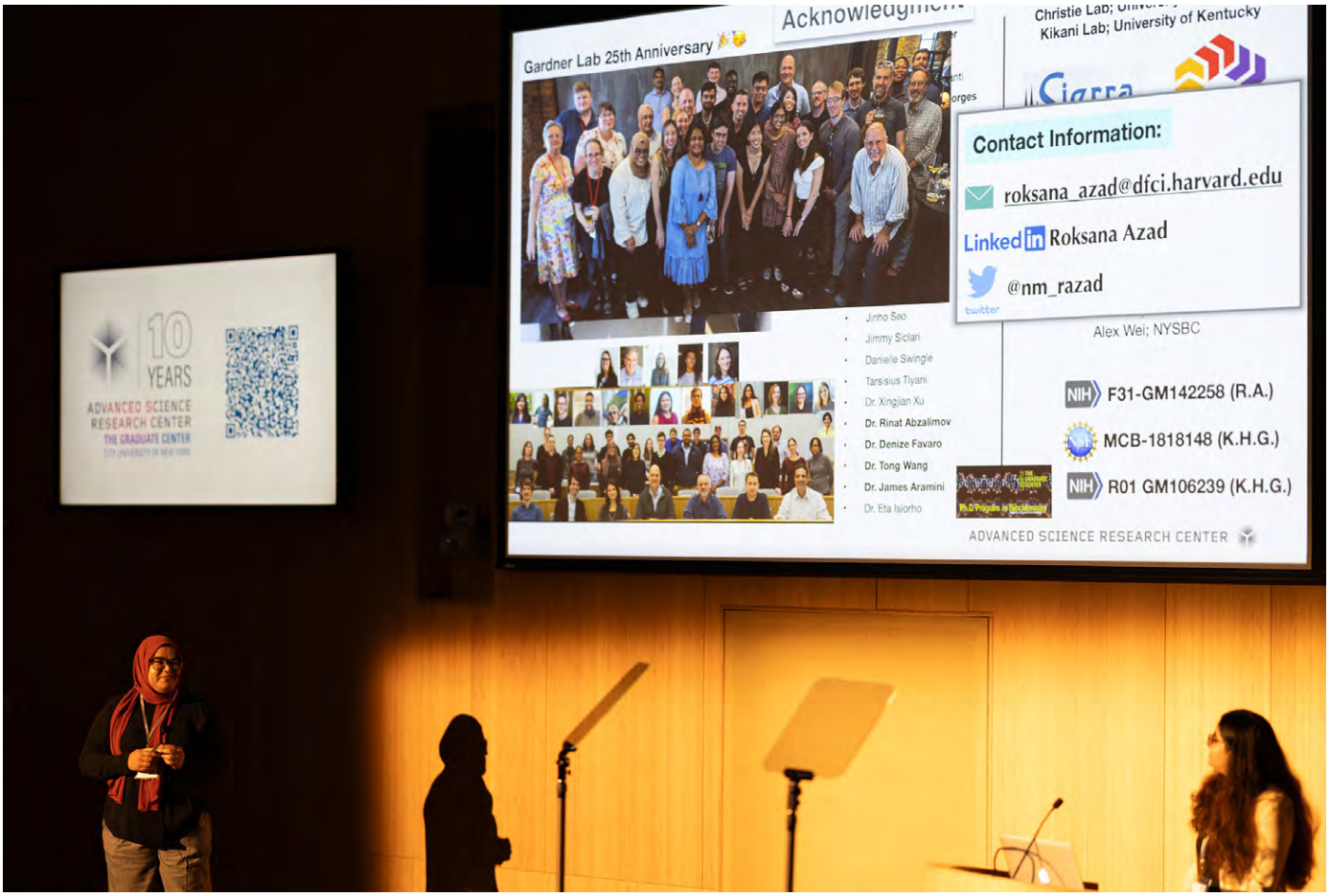
Einstein Professor of Chemistry, Biochemistry, and Nanoscience, Hunter College and CUNY Graduate Center

rulijn@gc.cuny.edu

Charles J. Vörösmarty, Ph.D.
Director, Environmental Sciences Initiative

Einstein Professor of Geography and Environmental Science, Hunter College and CUNY Graduate Center

cvorosmarty@gc.cuny.edu


10 YEARS
ADVANCED SCIENCE RESEARCH CENTER
THE GRADUATE CENTER
Gardner Lab 25th Anniversary
Acknowledgment
Christie Lab; University of Kentucky
Kikani Lab; University of Kentucky
Contact Information:
roksana_azad@dfci.harvard.edu
Roksana Azad
@nm_razad
Alex Wei; NYSBC
Jinho Seo
Jimmy Siciari
Danielle Swingle
Tarsisius Tiyani
Dr. Xingjian Xu
Dr. Rinat Abzalimov
Dr. Denize Favaro
Dr. Tong Wang
Dr. James Aramini
Dr. Eta Isiorho
F31-GM142258 (R.A.)
MCB-1818148 (K.H.G.)
R01 GM106239 (K.H.G.)
ADVANCED SCIENCE RESEARCH CENTER


EXIT

Acknowledgments: We thank Shelby Lawson (lead writer and editor) for her principal work on this report, Miranda Tyson for her leadership of this project, Shawn Rhea and Shanté Booker for their communication contributions, Bonnie Eissner for finalizing an earlier draft, and the many other members of the CUNY ASRC and the CUNY Graduate Center community for writing, editing, and commenting on several draft versions of the text. My predecessors, Nina Gray and Josh Brumberg (x2) have kept the ASRC on course. Here's to a successful next five years! Thank you all from me, Mark E. Hauber.

Design: Worksight

We envision a future where the ASRC, as a central hub for innovation and science at CUNY, and a premier public resource for transformative scientific research and engagement culture, discovers new frontiers, solves urgent societal problems, and cultivates the next generation of innovators. Join us in realizing that future by supporting one of our fundraising priorities. Thank you for your support!

https://asrc.gc.cuny.edu/about/support-the-asrc/#donate-now

CUNY Advanced Science Research Center
85 St. Nicholas Terrace
New York, NY 10031, USA
www.asrc.gc.cuny.edu
+1.212.413.3305

ADVANCED SCIENCE RESEARCH CENTER
THE GRADUATE CENTER
CITY UNIVERSITY OF NEW YORK