



CHICAGO QUANTUM EXCHANGE

ANNUAL REPORT 2024



The Chicago Quantum Exchange connects leading academic talent, top scientific facilities, and prominent corporate and nonprofit partners to advance the science and engineering of quantum information, train the future quantum workforce, and drive the quantum economy. It is one of the largest collaborative teams working on quantum information science in the world.

OUR WORK



**Bridging Academia,
Industry, and
Government**



**Advancing Research,
Discovery, and
Impact**



**Training Quantum
Scientists and
Engineers**



**Driving the Local
and National
Quantum Economy**

OUR MEMBERS



ON THE COVER: Leon Wilson, manager of IT for the Urbana Free Library, volunteers as part of a demonstration to launch the world's first publicly available quantum network. University of Illinois Urbana-Champaign (UIUC) physics professors Virginia Lorenz (center background) and Paul Kwiat (right background) led the teams that developed the quantum link between the library and the UIUC campus. (Image by Lloyd DeGrane.)

MESSAGE FROM THE CQE LEADERSHIP

This past year brought transformative changes for the Chicago Quantum Exchange community. In October, the Biden-Harris administration designated the Chicago region as a US Tech Hub for quantum technologies, a distinction that recognizes our position as one of the world's leading zones of quantum innovation.

In addition to advancing pathbreaking research in 2023, CQE members saw millions of dollars in new government and corporate investment — including \$100 million from IBM and \$50 million from Google to the University of Chicago and the University of Tokyo in two separate plans to advance quantum computing. The year also brought the launch of the world's first publicly accessible quantum network in Urbana, Illinois, and the opening of two 6,000-square-foot quantum facilities at the US Department of Energy's Argonne National Laboratory and Fermi National Accelerator Laboratory.

The CQE continued its growth, welcoming new international and corporate partners and deepening our collaboration with Boeing, which committed \$3.5 million to support quantum research and education. Both the Chicago Quantum Summit and the Chicago Quantum Recruiting Forum drew record in-person attendance. The Open Quantum Initiative doubled in size, with 18 first-time undergraduate fellows joining research groups at six host institutions. Eight of the 2022 fellows secured internships in the field — six of them with CQE corporate partners.

We are pleased to share these stories and more in this year's Annual Report — and we look forward to continuing these bold strides forward in 2024.

DAVID AWSCHALOM

Liew Family Professor of Molecular Engineering, University of Chicago;
Senior Scientist, Argonne National Laboratory; Director, Chicago Quantum Exchange;
Director of Q-NEXT, a US Department of Energy Quantum Information Science Research Center

BONNIE FLEMING

Chief Research Officer & Deputy Director of Science and Technology, Fermi National Accelerator Laboratory; Professor of Physics, University of Chicago

SUPRATIK GUHA

Senior Scientist / Senior Advisor to Physical Sciences & Engineering, Argonne National Laboratory;
Professor of Molecular Engineering, University of Chicago

PAUL KWIAT

Professor of Physics, The Grainger College of Engineering, University of Illinois Urbana-Champaign

KATE WAIMEY TIMMERMAN

Chief Executive Officer, Chicago Quantum Exchange

CQE PARTNERS 2023

CORPORATE

Ally Financial
Applied Materials
Atom Computing
Boeing
Corning
Discover
EeroQ
Great Lakes Crystal Technologies
HRL Laboratories
IBM
Inflection
Intel
JPMorgan Chase
Lake Shore Cryotronics
memQ
Microsoft
Protiviti
PsiQuantum
qBraid
QuantCAD
Quantinuum
Quantopticon
Quantum Design
Quantum Machines
Quantum Opus
Qubitikk
QuEra Computing
Rigetti Computing
TOPTICA Photonics
Toshiba
Verizon
Zurich Instruments

DUALITY STARTUPS

Ki3 Photonics
Icarus Quantum
Ingenii
reOrbital

INTERNATIONAL PARTNERS

CQC:T
Indian Institute of Technology Bombay
QuTech
Technion - Israel Institute of Technology
Weizmann Institute of Science

NONPROFIT PARTNERS

Le Lab Quantique
P33
Quantum Economic Development Consortium

REGIONAL PARTNER

The Ohio State University



2023 SPOTLIGHTS



Biden administration names Chicago region US Tech Hub

The official designation strengthens Chicagoland as a globally competitive innovation center for quantum technologies, led by the CQE.

ABOVE: US President Joe Biden speaks during an event announcing the US Tech Hubs designations in October 2023. Members of each Tech Hub watch via Zoom. (Image by Al Drago/Bloomberg via Getty Images.)

OPPOSITE PAGE: Training and educating the future quantum workforce is an area of focus for The Bloch Tech Hub. Here, Tiarna Wise, an undergraduate fellow who was part of the first cohort of the CQE's Open Quantum Initiative, works in a quantum lab. (Image by Cyrus Zeledon.)

The Chicago region was named an official US Regional Technology and Innovation Hub for quantum technologies by the Biden-Harris administration, a designation that opens the door to new federal funding and recognizes the growing strength of an ecosystem poised to become the heart of the nation's quantum economy. The Bloch Tech Hub (pronounced "block"), a coalition of industry, academic, government, and nonprofit stakeholders led by the Chicago Quantum Exchange, was one of 31 designees from nearly 400 applications across the country.

The selection, announced in October by the White House and the US Department of Commerce’s Economic Development Administration (EDA), is the first phase of a federal initiative designed to “supercharge” innovation economies that have the potential to become global leaders in a critical technology within a decade. As a recipient of the US Tech Hubs designation, The Bloch is now eligible to apply for the program’s second phase, which could include millions of dollars in funding to implement the hub’s activities.

“Home to world-class institutions and first-rate research centers, Illinois is transforming technology, biomanufacturing, and innovation at every turn,” Illinois Governor JB Pritzker said. “I couldn’t be prouder that the Biden administration has selected the Chicago Quantum Exchange’s The Bloch There’s no doubt that the rest of the nation have caught on to our great state’s status as an innovation powerhouse — and our future couldn’t be brighter.”

Led by the CQE, The Bloch comprises a coalition of companies, colleges and universities, state and local governments, economic and workforce development organizations, and national labs. The quantum tech hub will leverage the region’s strengths, talent, and existing economy to speed the adoption of quantum technologies across a broad range of industries, employ a diverse workforce



“This designation speaks not only to our promising future but to the collaborative, cross-sector work we are already doing.”

CQE DIRECTOR DAVID AWSCHALOM

representative of the region as a whole, and invest in underserved communities. In Phase 2 of this program, the EDA expects to award approximately \$40 million to \$70 million each to a small number of implementation grant awardees. Only Phase 1 designees are eligible to apply.

“The Chicago region is a major player driving US leadership in quantum, in part because of the deep partnerships we have fostered among leading research institutions and industry partners — and in part because of strong federal and state government support,” said David Awschalom, the Liew Family Professor of

Molecular Engineering in the University of Chicago Pritzker School of Molecular Engineering and the director of the CQE. “This designation speaks not only to our promising future but to the collaborative, cross-sector work we are already doing to advance research, build a future quantum workforce, and drive the quantum economy, efforts that have been catalyzed by the CQE and its members and partners.”

[Read more >](#)



Researchers launch world's first public quantum network

Physics professors Virginia Lorenz and Paul Kwiat and their research teams from The Grainger College of Engineering at the University of Illinois Urbana-Champaign introduced the world's first publicly available quantum network before a packed crowd at the Urbana Free Library in November. Working with students, colleagues, and staff from Grainger Engineering, and in collaboration with the library, Lorenz and Kwiat linked the library to the Illinois campus. Grainger Engineering Dean Rashid Bashir said the public quantum network “is going to help our state and our nation as we further establish new developments in quantum computing.”

[Read more >](#)



“We want to get everyone excited about quantum technology. Maybe they’ll think about things in a way that scientists haven’t . . . or perhaps they will ask important ethical questions around the technology or be inspired to incorporate it in art.”

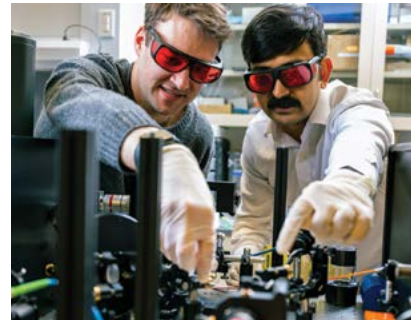
VIRGINIA LORENZ, Professor of Physics at the University of Illinois Urbana-Champaign, at the launch of the Public Quantum Network



Boeing invests \$3.5 million in new CQE collaboration

Boeing has deepened its partnership with the CQE through a new collaboration. The more than \$3.5 million commitment will support early-career scientists and seed new research, helping to grow the region's already robust quantum ecosystem and boosting efforts to develop next-generation quantum sensors and networks. The investment will support technical workshops and the new research projects that stem from them, as well as graduate student and postdoctoral fellows and a creator's prize that recognizes promising early-career researchers.

[Read more >](#)

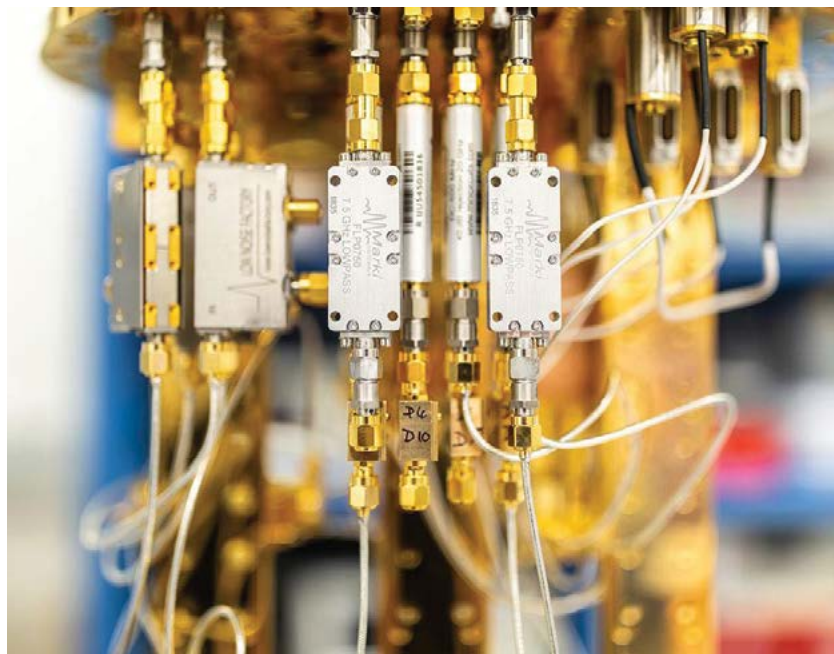


CQE welcomes new international and corporate partners

The CQE welcomed the Indian Institute of Technology Bombay as its fifth international partner. The agreement was highlighted during a meeting between President Joe Biden and Indian Prime Minister Narendra Modi at the G20 summit in New Delhi, India. The CQE also welcomed three new corporate partners, Quantopticon, Great Lakes Crystal Technologies, and memQ; four new Duality startups, Icarus Quantum, Ingenii, Ki3 Photonics, and reOrbital; and another international partner, the Technion – Israel Institute of Technology.

[Read more >](#)

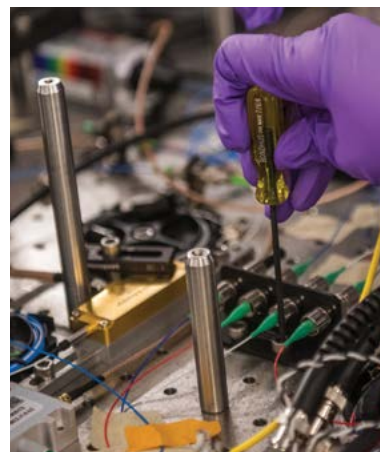
STRENGTHENING QUANTUM TIES BETWEEN CHICAGO AND JAPAN



IBM, Google give \$150 million to advance quantum computing

Alongside world leaders at the G7 Summit in Japan, the University of Chicago formalized two groundbreaking agreements. One is a 10-year, \$100 million plan with IBM and the University of Tokyo to develop the blueprints for building a quantum-centric supercomputer. The other is a strategic partnership with the University of Tokyo and Google, with Google investing up to \$50 million over 10 years to accelerate the development of a fault-tolerant quantum computer and to help train the quantum workforce of the future.

[Read more >](#)



US-Japan alliance to advance research, build workforce

Japan's Tohoku University and the University of Chicago are launching a collaboration to fuel quantum research and grow the international quantum workforce. The newly formed Chicago-Tohoku Quantum Alliance will focus on research in quantum sensing, quantum communication, and new materials development, and will work to promote student exchange, industry partnerships, and startups.

[Read more >](#)

636

Chicago Quantum Summit attendees in person and virtually from 36 countries

26

Open Quantum Initiative fellows in research labs and internships in 2023

51

CQE members and partners in 2023



RESEARCH AND DISCOVERY



New research facilities provide nation with unique quantum resources

Housed at DOE national labs, the new facilities enhance domestic supply chains and offer platforms for quantum computation, sensing, metrology, and communications.

New foundry to accelerate quantum information research at Argonne

Argonne National Laboratory has built the Argonne Quantum Foundry to support its mission of accelerating quantum information science. The foundry is a national source of materials and data for quantum research that is unique in the Midwest. In April, Argonne marked its official opening at a ribbon-cutting celebration during which attendees toured the 6,000-square-foot research facility.

ABOVE: Argonne scientist F. Joseph Heremans gives a tour of the Argonne Quantum Foundry to guests at the ribbon cutting. (Image by Argonne National Laboratory.)

The creation of the Argonne Quantum Foundry, a key part of the lab's quantum program, was led by Q-NEXT, a US Department of Energy (DOE) National Quantum Information Science Research Center hosted at Argonne and founded in 2020.

“I’m thrilled to see our state attract the best in quantum science, and I am committed to making Illinois the premier hub of quantum development.”

ILLINOIS GOVERNOR JB PRITZKER

“There are few places in the country dedicated to creating high-quality, standardized materials for quantum technologies, and we are pleased that one of them is now here at Argonne,” said Q-NEXT Director David Awschalom, who is also an Argonne senior scientist, Liew Family Professor of Molecular Engineering at the University of Chicago, and director of the Chicago Quantum Exchange.

As a resource for the United States, the foundry addresses a national need by providing a robust, domestic supply chain of materials for both foundational science and industry research. Researchers within Q-NEXT, who include members of academia and industry, will be able to use the foundry. It will be available for other national research efforts as well.

[Read more >](#)



Fermilab’s SQMS Center inaugurates The Quantum Garage

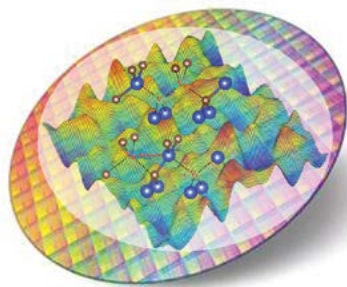
In November, Fermi National Accelerator Laboratory opened The Quantum Garage, a new flagship quantum research facility. The 6,000-square-foot facility was imagined, designed, and built by the Superconducting Quantum Materials and Systems (SQMS) Center to unite scientific communities, industries, and startups nationally and internationally to advance quantum information science and technology.

The facility features several newly commissioned, large dilution refrigerators capable of reaching cryogenic temperatures just a tick above absolute zero. The fridges host platforms developed by the SQMS collaboration for performing quantum computation, sensing, metrology, and communications. These quantum platforms include the first commercial quantum processor deployed

on-premise at Fermilab; quantum memories and transducers based on novel approaches that leverage Fermilab’s world-leading technology expertise; quantum metrology tools for developing materials standards; and quantum sensors for fundamental physics, with the potential to discover dark matter and detect gravitational waves.

“The SQMS Quantum Garage signals a new era in this field, and represents the best of our National Quantum Initiative,” Illinois Governor JB Pritzker said. “SQMS will accomplish what few others can — building on Fermilab’s unique strengths in related accelerator technology and particle physics, and creating a global partnership which spans across academia, national labs and industry, and federal agencies to reach a new quantum frontier. I’m thrilled to see our state attract the best in quantum science, and I am committed to making Illinois the premier hub of quantum development.”

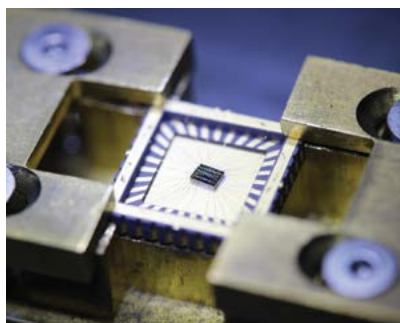
[Read more >](#)



Simulations reveal atomic-scale story of qubits

Researchers led by Professor Giulia Galli at the University of Chicago Pritzker School of Molecular Engineering report a computational study that predicts the conditions to create specific spin defects in silicon carbide. Their findings, published online in *Nature Communications*, represent an important step toward identifying fabrication parameters for spin defects useful for quantum technologies.

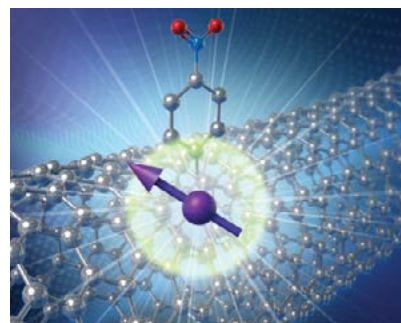
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New partnerships improve quantum operations, provide students hands-on industry experience

Two leading companies in semiconductor quantum computing are partnering with researchers at the University of Wisconsin–Madison. UW–Madison’s separate partnerships with Intel and HRL Laboratories are part of collaborations announced in June by the LPS Qubit Collaboratory, a national Quantum Information Science Research Center. UW–Madison students will conduct research using state-of-the-art chips provided by the new partners, which will in turn inform device improvements.

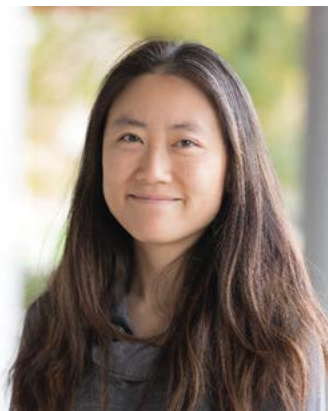
[Read more >](#)



Carbon nanotubes make ideal home for spinning quantum bits

Argonne scientists and researchers from Northwestern University and elsewhere have discovered a method for introducing spinning electrons as qubits in a host nanomaterial. Their test results revealed record-long coherence times — the key property for any practical qubit because it defines the number of quantum operations that can be performed in the lifetime of the qubit. Findings were reported in *Nature Communications*.

[Read more >](#)



“Thanks to the cluster of universities and national labs with strong and diverse quantum research programs in Wisconsin and Illinois, I was able to become part of large research centers based in the Midwest that were started by the National Quantum Initiative. It’s a very supportive and collaborative ecosystem.”

JENNIFER CHOY, Assistant Professor of Electrical and Computer Engineering at the University of Wisconsin–Madison, on finding her quantum community in the Midwest, where she’s joined several multidisciplinary collaborations

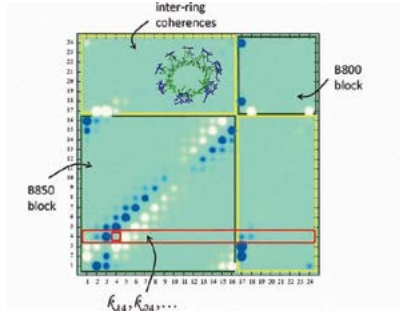


\$18 million to Argonne, Fermilab for two networking projects

Argonne and Fermilab have been awarded a total of \$18 million over three years in DOE funding for two different, collaborative projects in quantum networking. Argonne-led InterQnet will address multiple challenges with scaling up quantum networks. Fermilab-led Advanced Quantum Networks for Scientific Discovery (AQNET-SD) aims to improve the transmission of information over quantum networks.

[Read more about InterQnet >](#)

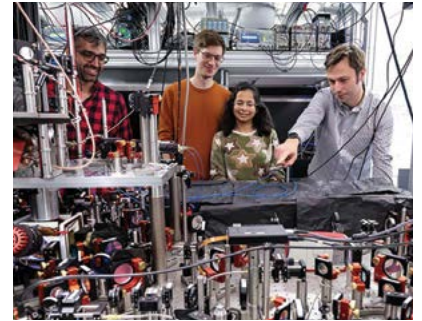
[Read more about AQNET-SD >](#)



Quantum visualization technique gives insight into photosynthesis

Systems obeying quantum mechanics are notoriously difficult to visualize, but researchers led by Professor Nancy Makri at the University of Illinois Urbana-Champaign have developed an illustration technique that displays quantum features in an easy-to-read diagram called a coherence map. The researchers used these maps to study the quantum mechanisms that underlay photosynthesis, the process by which plants and some bacteria use sunlight to convert carbon dioxide and water into food. The work was published in *The Journal of Physical Chemistry Letters*.

[Read more >](#)



'Noise-canceling' qubits could minimize errors in quantum computing

Researchers at the University of Chicago Pritzker School of Molecular Engineering have developed a new method to constantly monitor the noise around a quantum system and adjust the qubits in real time to minimize error. The approach, described online in *Science*, relies on spectator qubits: a set of qubits embedded in the computer with the sole purpose of measuring outside noise rather than storing data.

[Read more >](#)

150+

Researchers across member institutions

19

Honors to CQE researchers

12,000

Combined square footage of the new research facilities that opened at Argonne and Fermilab in 2023



TRAINING AND EDUCATION



Open Quantum Initiative deepens engagement with undergrads

Two-thirds of the 2022 fellows secured internships in the field and 18 first-time fellows gained invaluable lab experience.

They grew materials that could be used as memory qubits for a quantum network at Argonne National Laboratory and worked to design a quantum sensing system at the University of Wisconsin–Madison. They built an optical setup at the University of Illinois Urbana-Champaign and developed software to run and simulate quantum error codes at Fermi National Accelerator Laboratory. They learned to present their data in meaningful ways at The Ohio State University and learned how electron beam lithography is used at a nanofabrication laboratory at the University of Chicago.

ABOVE: The 2023 Open Quantum Initiative undergraduate fellows, along with several 2022 fellows, gather on the morning of the OQI Research Symposium. (Photo by Anne Ryan.)

For the 18 first-time undergraduate students who interned in quantum science laboratories and research groups as part of the second cohort of the Open Quantum Initiative (OQI) fellowship program, the summer of 2023 provided hands-on experiences in the field of quantum information science and engineering (QISE). And if the success of OQI's first cohort is any indication, this initiation to QISE could spur ongoing engagement: two-thirds of the 2022 fellows accepted 2023 internships in the field, six of them with Chicago Quantum Exchange corporate partners.

“I see now that industry and academia are not mutually exclusive. I’ve also come to realize that there is a lot of investment and momentum in this field, so I know it is a great time to be getting in.”

RACHELLE ROSILES, who spent the 2023 summer conducting research at Argonne

“I came into this program with almost no knowledge of how QISE research is done,” said 2023 fellow Jade Kaminska, who spent the summer at UW–Madison. “My work was purely theoretical, but I gained a lot of insight into how it can help experiments. I think now I understand much better how the various research questions in QISE are connected.”

[Read more >](#)



New CQE YouTube series engages future workforce

Quantum technology will revolutionize the US workforce in the coming decade. As part of a national effort to meet that demand, the CQE released a YouTube series to build interest among high school students — a generation essential to the field's skyrocketing advancement. Sponsored by Boeing and produced by the CQE with input from leading scientists, *Quick Quantum: For High Schoolers* includes episodes on superposition, qubits, entanglement, and careers in quantum.

[Read more >](#)

DID YOU KNOW?

CQE member universities rank second in the nation for number of quantum-related PhD graduates. The region has the third-highest number of universities engaged in quantum research activities.

Source: World Business Chicago



Recruiting event connects students to fast-growing field

In March, the annual Chicago Quantum Recruiting Forum drew students and trainees from undergraduate, graduate, and postdoctoral programs across the Midwest. Panelists discussed the growing number of quantum jobs available in industry and academia as quantum technologies enter the market. Drawing more than 230 attendees — the largest group in the event’s three-year history — the event signaled growing interest in the rapidly expanding field.

[Read more >](#)



Qupcakery game introduces K-12 students to quantum science

A digital puzzle game is introducing quantum concepts to young learners. Students learn about quantum gates through bakery roleplay in the unique food-style video game Qupcakery, part of a larger suite of similar quantum games. A team that includes researchers from the University of Chicago and the University of Illinois Urbana-Champaign developed the games with research funding from the National Science Foundation.

[Read more >](#)



Building an inclusive future in quantum

Leaders in the relatively new field of quantum information science and engineering see an opportunity — and a critical need — to embrace inclusion. A spring event explored approaches to supporting diverse talent in the growing quantum economy. The event was led by Infleqtion and the United Kingdom Department for Business and Trade, hosted in partnership with the CQE, P33, the Consulate General of Canada in Chicago, and Cresa.

[Read more >](#)



“Chicago is the best place in the world for quantum. Having this kind of blueprint for what a quantum ecosystem can look like is very important . . . I want to create a space where students can think freely and have a safe learning environment and become involved in the quantum ecosystem.”

THOMAS SEARLES, Associate Professor of Electrical & Computer Engineering at the University of Illinois Chicago, who will lead the new national, UIC-led ReACT-QISE Consortium through a \$4.8 million DOE award



Fermilab hosts first quantum summer school

Fermilab hosted the inaugural Quantum Information Science Summer School, one of the largest federally sponsored education programs to help build a quantum-ready workforce. Participants ranged from undergraduates to career scientists. The Fermilab-hosted Superconducting Quantum Materials and Systems Center organized the program with the Quantum Science Center based at the US Department of Energy's (DOE) Oak Ridge National Laboratory. The program drew experts from all five DOE Office of Science National QIS Research Centers. [Read more >](#)



“I really love how fast [quantum] is growing, and just how much progress has happened in the past five or ten years. And the best part is, it’s only going to get better from here.”

VICTORY OMOILE, Senior Quantum Software Engineer at Inflection, during an industry panel at the Chicago Quantum Recruiting Forum

109

Graduate and undergraduate quantum courses taught at CQE member and partner institutions

230+

Attendees at the 2023 Chicago Quantum Recruiting Forum

\$49,000

Total amount awarded to the 14 winners of the 2023 Boeing Quantum Creators Prize



BUILDING THE QUANTUM ECONOMY

The rising leaders of the Quantum Prairie

Startup founders, researchers, and students are calling the Midwest region ‘the premier hub for quantum’ — and their investments are strengthening the ecosystem.

As a postdoc at the University of Oxford in England, Mirella Koleva spent her nights and weekends developing a model that accurately predicted light-matter interactions at the quantum level. When it was clear that the model worked and could be valuable across industries to simulate quantum-photonic devices, Koleva left academia, incorporated a business called Quantopticon, and received a startup grant from the British government.

But finding additional funding proved difficult. To continue growing the business, she looked across the

ABOVE: An aerial view of the northern part of the Quantum Prairie, which stretches from Madison, Wisconsin, through Chicago to Urbana-Champaign, Illinois. (Source: Google Earth.)

Atlantic Ocean to Illinois. In 2021, the company was accepted into Duality, the first accelerator in the United States that exclusively supports startup companies focused on quantum technology. Two years later, Koleva still lives in Chicago, and the company is in the process of moving its headquarters here.

Koleva's story exemplifies those of many in the quantum information science and engineering (QISE) community. Professors, researchers, startup founders, and students are finding their way to the Midwest corridor that runs from Madison, Wisconsin, through Chicago and down to Urbana-Champaign, Illinois, to be part of the growing quantum ecosystem that some call the "Quantum Prairie."

It's an ecosystem built on a foundation of institutions that are home to some of the world's leaders in QISE research. And it's bolstered by hundreds of millions of dollars in government and corporate investment, well-supported business growth, and deep local and international partnerships.

Visit the Chicago Quantum Exchange website to read about six rising leaders — founders, scientists, and an undergraduate student — who have come to the region both for its quantum foundation and for the inclusive opportunities, robust collaboration, and deep business and entrepreneurial support that are helping create its quantum future.

[Read more >](#)



ABOVE: Two of the Quantum for Bio teams include members of the first cohort of the Duality quantum startup accelerator, shown here. (Image by Megan Rouse.)

Quantum for Bio funds projects in diagnostics and other healthcare applications

Two cross-sector teams that include researchers from CQE member and partner institutions were awarded funding from Wellcome Leap's Quantum for Bio (Q4Bio) program. A team that includes Infleqtion, the University of Chicago, and the Massachusetts Institute of Technology (MIT) aims to transform cancer care by harnessing the power of artificial intelligence and quantum algorithms to drive personalized diagnostics and treatments. The company qBraid, working alongside collaborators from MIT, the University of Chicago, Argonne, and QuEra, will develop a quantum software pipeline to study the underlying impacts of certain proteins on neurodegenerative diseases such as Alzheimer's and Parkinson's.

[Read more about the Infleqtion project >](#)

[Read more about the qBraid project >](#)

DID YOU KNOW?

Since 2017, Illinois quantum startups have raised \$33.2 million through 27 deals — the second-highest number of deals by quantum startups in the United States.

Source: World Business Chicago



Great Lakes Crystal Technologies closes oversubscribed seed round

Great Lakes Crystal Technologies (GLCT), a CQE partner and a member of the first cohort of the Duality quantum startup accelerator, closed a highly oversubscribed seed funding round in 2023. The funding will advance GLCT's mission to become the leading provider of high-performance crystalline diamond materials for high-technology applications. The company, which has an office in Chicago, is using the funds to build its Pilot Scale Plant in Lansing, Michigan, and to hire manufacturing and business development staff to accelerate penetration into the commercial market.

[Read more >](#)



CQE partner memQ announces \$2M seed funding

CQE partner memQ, a Chicago-based quantum memory startup and part of the second cohort of Duality, announced a \$2 million seed funding round in February 2023. Quantonation, Exposition Ventures, and the George Shultz Innovation Fund provided funding to memQ. The growing startup will use the funds to accelerate the development of an on-chip quantum repeater built on the company's solid-state platform, enabling the quantum internet. The company previously received non-dilutive funding from the US Department of Energy through Chain Reaction Innovations, the entrepreneurship program at Argonne National Laboratory.

[Read more >](#)



CQE and QuantX host novel quantum hackathon

The BIG Q Hackathon, hosted in Chicago this fall by the CQE and the Paris-based QuantX, offered a twist on the traditional hackathon, one that underscored the role of partnerships in the development of quantum technologies. It put technical and business experts from across the country and around the world together at a four-day, two-phase event that participants described as collaborative and cross-disciplinary. "The whole event was super interactive, really intersectional, and I think everyone came away with a new understanding of what quantum can really do," one participant said.

[Read more >](#)



"Chicago is the premier hub for quantum in the United States . . . there are just more players involved in the ecosystem who want to collaborate."

MIRELLA KOLEVA, Cofounder and Chief Executive Officer of Quantopticon, a UK-based company that is moving its headquarters to Chicago after participating in the Duality accelerator

CQE IN THE NEWS

Chicago Quantum Exchange researchers and institutions are strengthening the reputation of the Quantum Prairie. Here are highlights of their media coverage.

Quantum capital of the world: Emerging field that could solve ‘unsolvable’ problems

WGN

[Read more >](#)

IBM, Google Give \$150 Million for U.S.-Japan Quantum-Computing Push as China Looms

Wall Street Journal

[Read more >](#)

Chicago hopes to become a world centre for quantum research

The Economist

[Read more >](#)

Boeing Co. invests \$3.5 million in Chicago quantum

Chicago Business Journal

[Read more >](#)

IIT Bombay, University of Chicago join hands to promote cooperation in field of science & technology

Indian Express

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Pritzker’s a ‘geek’ for quantum computing; Emanuel calls it ‘cutting edge’

Chicago Sun-Times

[Read more >](#)

Chicago is emerging as a quantum technology hub

Axios

[Read more >](#)

Quantum tech needed to secure critical data from quantum decryption

Forbes

[Read more >](#)

SELECT CQE PATENTS

The following technologies from CQE-affiliated faculty members are available for licensing.

Title: Constant Overhead Fault-Tolerant Quantum Computation with Reconfigurable Atom Arrays

Owner: The University of Chicago

Inventors: Liang Jiang, Qian Xu, Hengyun Zhou, Juan Pablo Bonilla Ataides, Dolev Bluvstein, Jonathan Wurtz, Mikhail Lukin, Christopher Pattison, Nithin Raveendran

US or International Patent App. No.: Patent unpublished

Contact: Mike Hinton, mhinton@uchicago.edu

Title: Computationally Guided Design for Quantum-Relevant Spin Defect Systems

Owner: The University of Chicago

Inventors: David Awschalom, Jonathan Marcks, Mykyta Onizhuk, Yuxin Wang, Masaya Fukami, Nazar Deegan, Joseph Heremans, Giulia Galli, Aashish Clerk

US or International Patent App. No.: Patent unpublished

Contact: Mike Hinton, mhinton@uchicago.edu

Title: Strain Engineering of Diamond Membrane Heterostructures

Owner: The University of Chicago

Inventors: Alex High, Xinghan Guo, Zixi Li, Tianle Liu, Nazar Deegan, Joseph Heremans

US or International Patent App. No.: Patent unpublished

Contact: Mike Hinton, mhinton@uchicago.edu

Title: Active Cancellation of Frequency Noise in Lasers

Owner: Board of Trustees of the University of Illinois

Inventors: Jia Pern Neville Chen, Brian DeMarco, Lintao Li, William Huie, Jacob Covey,

US or International Patent App. No. 63/500,026

Publication link/doi: <https://doi.org/10.1103/PhysRevApplied.18.064005>

Contact: Svetlana Sowers, svsowers@illinois.edu

Title: Delay-Line Quantum Memory

Owner: Board of Trustees of the University of Illinois

Inventors: Virginia Lorenz, Kai Shinbrough, Michael Goggin, Nathan Arnold, Michelle Victora, Colin Lualdi, Paul Kwiat

US or International Patent App. No. 63/466,883

Publication link/doi: <https://doi.org/10.1364/QUANTUM.2022.QM4B.3>

Contact: Svetlana Sowers, svsowers@illinois.edu

Title: Quantum Transduction with Superconducting 3D Resonators

Owner: Fermi National Accelerator Laboratory

Inventor: Silvia Zorzetti

US or International Patent App. No. PCT/US23/14928

Contact: FNAL Office of Partnerships and Technology Transfer, optt@fnal.gov

Title: Treatment of SRF Cavities to Minimize TLS Losses

Owner: Fermi National Accelerator Laboratory

Inventors: Alexander Romanenko, Sam Posen, Anna Grassellino

US or International Patent App. No. 17/898,065

Contact: FNAL Office of Partnerships and Technology Transfer, optt@fnal.gov

Title: Methods of Fabricating Planar Infrared Photodetectors

Owner: Northwestern University

Inventor: Manijeh Razeghi

US or International Patent App. No. 17/106,937; 18/185,507

Contact: Arjan Quist, arjan.quist@northwestern.edu

Title: Monohydride Passivation of High Resistivity Si(111) for Quantum Information Technologies

Owner: Northwestern University

Inventors: Dominic P. Goronzy, Carlos G. Torres-Castanedo, Michael J. Bedzyk, Mark C. Hersam

US or International Patent App. No. 63/442,158

Publication link/doi: <https://doi.org/10.1063/5.0145090>

Contact: Phil Carter, phillip.carter@northwestern.edu

Title: Coherent Light Source Based on Collective Spontaneous Emission

Owner: University of Wisconsin–Madison

Inventors: Deniz Yavuz, Mark Saffman, David Gold, Thad Walker

US or International Patent App. No. 18/054004 or US-2023-0318249

Publication link/doi: <https://doi.org/10.1103/PRXQuantum.3.010338>

Contact: Emily Bauer, emily@warf.org

Title: Silicon–Germanium Heterostructures with Shear Strain and Germanium Concentration Oscillations for Enhanced Valley Splitting

Owner: University of Wisconsin–Madison

Inventors: Mark Friesen, Benjamin Woods, Mark Eriksson, Robert Joynt, Emily Joseph

US or International Patent App. No. 18/364148

Publication link/doi: <https://doi.org/10.48550/arXiv.2310.18879>

Contact: Emily Bauer, emily@warf.org

Title: Superconducting Qubits Protected Against Photon-Assisted Quasiparticle Poisoning

Owner: University of Wisconsin–Madison

Inventor: Robert McDermott

US or International Patent App. No. 17/903373

Publication link/doi: <https://doi.org/10.48550/arXiv.2203.06577>

Contact: Emily Bauer, emily@warf.org

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ABOVE: Nadya Mason, the dean of the University of Chicago Pritzker School of Molecular Engineering, and Arvind Krishna, the CEO of IBM, in conversation during the 2023 Chicago Quantum Summit. (Photo by Anne Ryan.)



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