MARCH 2026

Chicago's Emerging Quantum Innovation Cluster

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A Report of CSIS Renewing American Innovation

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Center for Strategic & International Studies
1616 Rhode Island Avenue, NW
Washington, DC 20036
202-887-0200 | www.csis.org

Acknowledgments

This report is made possible in part by support from the National Institute of Standards and Technology via SRI International.

Acronyms and Abbreviations

AQNET-SD – Advanced Quantum Networks for Scientific Discovery

CBA – Community Benefits Agreement

CHIPS – Creating Helpful Incentives to Produce Semiconductors

CMQT – Center for Molecular Quantum Transduction

CNM – Center for Nanoscale Materials

CQE – Chicago Quantum Exchange

CQI – Chicago Quantum Institute

CQN – Chicago Quantum Network

CZI – Chan Zuckerberg Initiative

DARPA – Defense Advanced Research Projects Agency

DCEO – Department of Commerce and Economic Opportunity

DOE – Department of Energy

EDA – Economic Development Administration

EDC – Economic Development Corporation

EDGE – Economic Development for a Growing Economy

H-QUAN – Hybrid Quantum Architectures and Networks

IEQNET – Illinois Express Quantum Network

INQUIRE – Institute for Quantum Information Research and Engineering

INVENT – Illinois Innovation Venture

IQMP – Illinois Quantum and Microelectronics Park

IQUIST – Illinois Quantum Information Science and Technology Center

MAGIS-100 – Matter-Wave Atomic Gradiometer Interferometric Sensor

MICRO – Manufacturing Illinois Chips for Real Opportunity

NIST – National Institute of Standards and Technology

NQAC – National Quantum Algorithm Center

NSF – National Science Foundation

QuBBE – Quantum Sensing for Biophysics and Bioengineering

NWIRPC – Northwest Indiana Regional Planning Commission

Q-NEXT – Quantum Next Generation Exploration of Novel Technologies

QBI – Quantum Benchmarking Initiative

QED-C – Quantum Economic Development Consortium

QEZ – Quantum Enterprise Zone

QISE-NET – Quantum Information Science and Engineering Network

QIST – Quantum Information Science and Technology

QuPIDC – Quantum Photonics Integrated Design Center

QUIET – Quantum Underground Instrumentation Experimental Testbed

SBIR – Small Business Innovation Research

SQMS – Superconducting Quantum Materials and Systems

SRP – Site Remediation Program

STEM – Science, technology, engineering, and mathematics

STTR – Small Business Technology Transfer

WQI – Wisconsin Quantum Institute

Contents

Introduction

An innovation hub for quantum science and technology is emerging in the Chicago region, built upon the area's excellent research universities and national laboratories and driven by ambitious policy measures by the state of Illinois. The effort is supported by significant federal research programs and strong regional economic development organizations. The principal challenges facing Chicago's innovation hub are moving quantum technologies from laboratories into the commercialization stage—going from research to development—and scaling up the necessary workforce.

While the opportunity is ripe, the challenge of aligning the region's resources and capabilities is complex. It requires facilitating collaboration across the competencies and operational cultures of a variety of federal agencies, including the Department of Energy (DOE), the National Institute of Standards and Technology (NIST), the National Science Foundation (NSF), NASA, the National Institutes of Health, the Department of Homeland Security, and the Department of Defense. Connections also need to be forged across large and small companies with quantum-related operations, and universities and economic development organizations need to communicate to address common problems and identify successful policies that can lay the basis for pragmatic regional collaboration.

These efforts are well underway, with the emerging Illinois hub well positioned to assume a key role in the national quantum technology development effort. Highlighting these efforts, the Chicago Quantum Summit, convened in November 2025, drew 1,100 attendees—including the DOE's Undersecretary for Science Dario Gil, Deputy Secretary of Commerce Paul Dabbar, and

representatives from at least 15 countries, 32 universities, and 168 companies.[1] The summit served to underscore the emergence of a quantum science and innovation cluster in the Midwest region, comprising the states of Illinois, Indiana, and Wisconsin.[2]

Federal policy is supporting efforts to grow regional quantum clusters across the United States. The U.S. government, recognizing the enormous national security and economic stakes involved in developing and deploying quantum technologies, enacted the National Quantum Initiative Act in 2018 and is preparing for its upcoming reauthorization. This legislation sets forth a whole-of-government approach to the promotion of quantum science and technology, including the establishment of quantum research centers and consortia in concert with industry and academia.[3] With this infusion of federal funding, support from the CHIPS and Science Act, and backing by major state investments, quantum hubs are now emerging in regions around the United States, including Maryland, Colorado, California, New York, and the Chicago region. Each of these hubs builds on decades of basic research in quantum science and related disciplines underway in local universities and laboratories.

Among these new hubs, "Chicagoland" has advantages that place it in an unusually strong position to grow a robust and commercially successful quantum ecosystem:

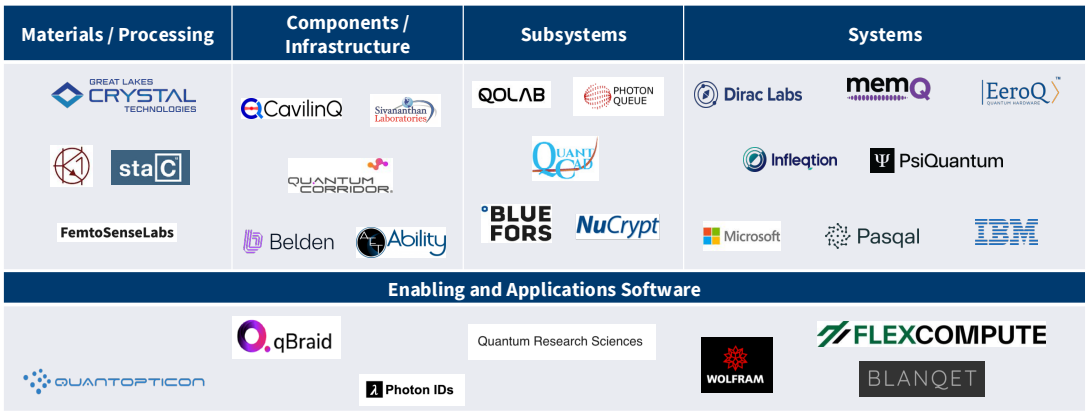
- **Multiple Research Centers:** The region is the site of seven world-class research institutions, all of which have strong quantum research, education, and training programs, and which are supporting startups.
- **State Investment:** The Illinois state government has pursued the most aggressive investment and public policy agenda in quantum of any state in the country, totaling $700 million—including perhaps most notably a plan to create a 182-acre quantum-specific science park in Chicago through a $9 billion public-private fund.[4]
- **National Laboratories:** The federal government supports two national DOE laboratories in the region, Argonne and Fermilab. It has made major investments in local research programs, quantum testbeds, and workforce development support.
- **Cross-Agency Efforts:** The two DOE laboratories are carrying out cross-agency efforts in quantum, such as the Defense Advanced Research Projects Agency's (DARPA) program and the SQMS Quantum Garage.
- **Supportive Organizations:** The region enjoys unusually effective economic development organizations—most notably the Chicago Quantum Exchange (CQE)—mobilizing local public, private, and philanthropic resources and providing sophisticated networks to spur collaborations in the quantum space.
- **Existing Industrial Base:** The Chicago region has a diverse established industrial and service base, ranking third in the country in IT-using firms—a large source of potential demand for emerging quantum commercial products and services.
- **Global Private Sector Players:** Global quantum players are present and expanding, providing linkages across regions and continents. They can draw technology and talent to the Chicago area from across the United States and the world.

- IBM, arguably the most active quantum computing company in the world, already announced major quantum footprints in the region, including an over-$200 million quantum education and skill development accelerator jointly run with the University of Illinois at Urbana-Champaign (UIUC). IBM will also collaborate with the state to build the National Quantum Algorithm Center and move its most advanced quantum computer available to researchers there—IBM Quantum System Two, currently housed at the University of Chicago.[5] The state has committed $25 million for equipment, with IBM's total investment expected to reach "tens of millions," potentially scaling to the "low hundreds" of millions within two years.[6]
- California-based quantum computing company PsiQuantum announced over $1 billion to build a utility-scale quantum computing campus in Chicago's new science park, including a dedicated workforce development center, with $200 million in state support.[7]
- Other quantum players, like Colorado-based Infleqtion and French quantum computing firm Pasqal, are also planning to set up operations in the new science park.[8]

Despite all these advantages, the Chicago region's aspiration to create a quantum innovation cluster also comes up against serious challenges—similar to those faced by quantum clusters nationwide—which must be addressed if the effort is to succeed.

- **Insufficient Training Infrastructure:** Most importantly, the infrastructure needed to scale up the necessary quantum workforce (substantial quantum-relevant university and community college faculty and curricula, worker training programs, K12 teachers and coursework) is lacking.
- **Skilled Workforce Shortage:** The region suffers from a shortage of quantum-skilled professionals and faces a prospective shortage of quantum-relevant support workers—such as technicians, operators, and quantum-knowledgeable business professionals.[9]
- **Limited Commercial Base:** The existing quantum commercial base is as yet underdeveloped, with the several dozen small firms currently present only employing a cumulative total of roughly 400 quantum workers across the tristate region.
- **Limited Visibility:** While some quantum supply chain firms and manufacturing capabilities are present in the Chicago area, they represent only a limited portion of the supply chain needed to sustain local quantum manufacturing and support a rapidly evolving and complex ecosystem.

Figure 1: Regional Quantum Information Science and Technology Companies Drive the Supply Chain



Source: QC Ware, "Q2B25 Silicon Valley: Kate Timmerman, CEO, Chicago Q. Exchange & Preeti Chalsani, VP & CQO, ILEDC," January 26, 2026, YouTube, https://www.youtube.com/watch?v=ML3F6gDl1zk.

- **Community Opposition:** Some local constituencies are pushing back on the region's drive to establish a quantum innovation cluster, a dynamic which could erode political support for the current quantum drive over the longer term.[10]
  - Residents of Chicago's South Side, where a major new quantum science park is being established, are concerned that their own job opportunities in the park will be limited, and that accompanying gentrification will drive up rents and displace local residents.
  - Residents adjacent to the new park worry that construction activities could release contaminants remaining from the era when a steel mill operated on the site.
  - Residents are concerned that the demand for electricity generated by the park will increase their own electric bills.

Growing Chicago's Quantum Ecosystem

Quantum remains an emerging field, and startup funders are not yet ready for institutional capital, considering the uncertainty in the scope of required timelines and applications. Illinois is trying to jump-start the process with two ambitious projects: the 2025 launch of a major quantum science park, the Illinois Quantum and Microelectronics Park, and the 2021 creation of the nation's first quantum-only startup accelerator, Duality.

The Illinois Quantum and Microelectronics Park (IQMP): The IQMP is a planned science park being constructed at an estimated cost of $9 billion on a lakeshore site on the South Side of Chicago, focusing primarily on quantum computing.[11] The project is being managed by a UIUC-led organization on behalf of the state of Illinois. The board includes one representative each from five universities (UIUC, the University of Chicago, Northwestern University, the City Colleges of Chicago, and Chicago State University); two national laboratories (Argonne and Fermilab); four private sector partners (P33, Illinois Economic Development Corporation, Cabrera Capital Markets, and Milhouse Engineering and Construction); and two representatives from the Illinois Department of Commerce and Economic Opportunity (DCEO).[12]

The vision underlying the project is that the IQMP will consist of a full ecosystem of quantum researchers, suppliers, and end users . . . At the core of this ambitious development is cryoplant technology, which will serve as the essential enabling infrastructure for cutting-edge quantum computing.

The vision underlying the project is that the IQMP will consist of a full ecosystem of quantum researchers, suppliers, and end users.[13] The campus will feature both the National Quantum Facility and the National Quantum Algorithm Center. At the core of this ambitious development is cryoplant technology, which will serve as the essential enabling infrastructure for cutting-edge quantum computing. This cryoplant technology was ordered from Linde Kryo Technic in November 2024 and is on an 18-month delivery schedule. Additional facilities will be added throughout project development.[14] Snowballing recent commitments already made by public and private actors suggest that this expectation is not unrealistic.

- **PsiQuantum:** PsiQuantum, a Palo Alto–based startup, is signed on as the IQMP's anchor tenant, and it will build a 300,000 square foot Quantum Computer Operations Center on the site of an old U.S. Steel mill with an initial investment of $1 billion. It plans to build the United States' first million-qubit scale fault-tolerant quantum computer on the site.[15] PsiQuantum will collaborate with the University of Chicago, the University of Illinois, and Northwestern University on research projects and the development of educational programs for the application of quantum technologies.[16]
- **Infleqtion:** Infleqtion is a Colorado-based global leader in neural atom quantum technology that designs and builds quantum computers, precision sensors, and software for companies, government organizations, and research institutions.[17] In July 2025, Governor Pritzker announced that Infleqtion would build a utility-scale neural atom quantum computer as a tenant at the IQMP, with an investment of roughly $50 million assisted by tax credits estimated at $5.3 million from the Illinois MICRO program.[18] Infleqtion (formerly ColdQuanta) built its technological competitiveness by acquiring Super.tech, a spinout from NSF-funded quantum computing research at the University of Chicago, in 2020. This acquisition is a noteworthy case combining the University of Chicago's entrepreneurship ecosystem with Argonne's Chain Reaction Innovations accelerator, and it functioned as a glue point for Infleqtion's Chicago office.
- **National Quantum Algorithm Center (NQAC):** In December 2024, IBM and the state of Illinois announced plans to establish the NQAC in the IQMP, which will feature IBM's Quantum System Two computer, powered by the IBM Quantum Heron system. This system will enable the generation of utility-scale algorithms beyond the ability of classical simulation methods.[19] NQAC and P33 launched two $125,000 awards for postdoctoral researchers developing industry-relevant quantum applications in Illinois. The program will be conducted through a collaboration among universities, national laboratories, and industry partners.[20]

- **Pasqal:** In October 2025, Governor Pritzker announced that the French company Pasqal—which is said to lead the world in neural atom quantum computing—would establish its U.S. headquarters in the IQMP, with an investment estimated to exceed $65 million. The Illinois Finance Authority and Climate Bank is supporting the project with a loan of $15 million.[21]
- **DARPA-Illinois Quantum Proving Ground:** DARPA and the state of Illinois are jointly developing a national proving ground for quantum technology that will be located at the IQMP. At this site, DARPA will test quantum prototypes pursuant to its Quantum Benchmarking Initiative. The state of Illinois is contributing $140 million to this initiative; DARPA's contribution will be determined by the quality of proposals, evaluation results, and the availability of federal funding.[22]
- **Diraq:** Diraq is an Australian quantum computing firm that has won distinction as a Stage A performer in DARPA's Quantum Benchmarking Initiative. It has committed to join the IQMP as a future tenant pursuant to the park's On-Ramp, a program designed to give future tenants access to the local quantum ecosystem while operating out of a local innovation facility while the IQMP is built.[23]
- **National Quantum Facility:** A 62,000 square foot facility is planned, with 46,000 square feet allocated for offices, research, amenities, and specialty tenant space and 16,000 square feet for a cryogenic plant.[24]
- **Quantum Works:** UIUC-led Discovery Partners Institute's new workforce development building will cover approximately 150,000 square feet and will include research areas, offices, amenities, and private sector tenant space.[25]

Duality: In 2021, the University of Chicago's Polsky Center and CQE jointly launched Duality, the nation's first accelerator program dedicated solely to startups in the field of quantum science and technology. Other founding partners included Argonne National Laboratory, UIUC, and P33.[26] The purpose of Duality is to enable promising quantum startups to bridge the gap between laboratory science and commercialization.

- The project was undertaken with an initial investment of $20 million to be spent over 10 years, provided by a broad range of industry and academic partners.
- Duality-hosted startups enjoy access to the network, facilities, and programming at UIUC and technical, business, and entrepreneurial expertise available from CQE, Polsky, Argonne, and P33.[27]
- In 2025, IBM and the University of Chicago jointly pledged to offer Duality startups resources and support to develop quantum software and to explore quantum algorithms to drive advances in quantum computing. This support includes access to IBM's Quantum System Two—to be deployed first at Hyde Park Labs—and access to IBM's computers over the cloud and IBM technical expertise.[28]
- Since its founding in 2021, Duality has supported over 25 startups, helped to raise over $50 million in follow-on funding, and substantially broadened its network of industry, academic, and investor partners.

- Among the initial cohort of six startups was qBraid, which has subsequently gone on to develop a highly successful platform, giving users access to leading quantum devices and software.[29]
- Another startup in the first Duality cohort was Great Lakes Crystal Technologies, which has grown into the leading U.S. provider of single-crystal high performance diamond plates, substrates, and wafers, with applications in quantum sensing and semiconductor packaging. In 2025, this company was awarded $2.7 million by the Department of Defense organization National Security Innovation Capital.[30]
- memQ emerged from Chicago's quantum startup pipeline, following Duality, Argonne's Chain Reaction Innovations, and the University of Chicago's Science Incubator.[31]

The Chicago regional cluster continues to provide support to startup companies or their seeds, creating a supportive environment for new companies and providing the necessary conditions for quantum startups to mature and thrive independently. For instance, the George Shultz Innovation Fund, managed by the Polsky Center for Entrepreneurship and Innovation, provides up to $250,000 in funding to more than 90 early-stage tech ventures emerging from the University of Chicago, Argonne National Laboratory, Fermilab, and the Marine Biological Laboratory since 2010. The fund has given awards to quantum-related companies including StaC12 ($250,000 in 2025), CavilinQ ($150,000 in 2025), and Super.Tech (acquired by ColdQuanta, now Infleqtion).[32]

Regional ecosystems are national strategic assets, and regional ecosystem building should be re-emphasized as a strategic asset in federal quantum policy as it serves as a critical anchor for quantum entrepreneurship.

Funding programs being carried out by universities, national laboratories, the state of Illinois, and the U.S. federal government have created a network of capital access for quantum entrepreneurs in Chicago. This successful regional model needs to be maintained and scaled to help address the significant funding gap that exists between early-stage quantum companies and institutional capital. The ecosystem is highly interconnected and well positioned to support emerging quantum ventures. Regional ecosystems are national strategic assets, and regional ecosystem building should be re-emphasized as a strategic asset in federal quantum policy as it serves as a critical anchor for quantum entrepreneurship. Federal programs, including quantum shared infrastructure development, fabrication facilities, and access to early-stage capital, can provide steady support and help lower market entry barriers.

A Supportive State and County Government

The rapid pace at which the Chicago quantum ecosystem is emerging is attributable in no small part to the vigorous support of the state's governor, J.B. Pritzker, strongly backed by bipartisan majorities in both houses of the Illinois General Assembly. Quantum efforts fit within the state's broader economic agenda. The *Illinois 2024 Economic Growth Plan*, which outlines the state's five-year economic plan, names "Quantum Computing, AI, and Microelectronics" as a top priority.[33] The state continues to back investments in these critical fields with dedicated marketing, job training, and capital investment. The Northwest Indiana Regional Planning Commission also includes quantum as an important area for investment in its *Comprehensive Economic Development Strategy* for its territory, which sits in close proximity to the city of Chicago.[34]

The state's strategy centers on funding shared infrastructure—especially the IQMP, which aims to anchor a world-class quantum ecosystem supported by state and private capital. This sustained high-level support, backed by substantial resources, has enabled the growth of the cluster while enhancing the region's reputation as a center of quantum activity at both the national and international level.

The state has provided direct financial support, tax incentives, support for startups, aggressive recruitment of established out-of-state quantum companies, a concerted and highly successful effort to attract federal investment, and the creation of the new Illinois Quantum and Microelectronics Park on Chicago's South Side. The state's strategy centers on funding shared infrastructure—especially the IQMP, which aims to anchor a world-class quantum ecosystem supported by state and private capital. This sustained high-level support, backed by substantial resources, has enabled the growth of the cluster while enhancing the region's reputation as a center of quantum activity at both the national and international level.

The DCEO is the state's lead agency coordinating support and incentives for quantum science and technology initiatives—the most substantial in the nation.[35]

- **Direct State Investments:** In March 2024, Governor Pritzker announced that the state would directly invest $500 million over five years to advance "beyond silicon quantum technology" through the construction of a greenfield quantum science park on Chicago's South Side, an investment that has since been approved by the state legislature.[36] In addition, the UIUC and the University of Chicago received a commitment of $200 million from the state in 2021–2022 pursuant to the Rebuild Illinois Capital Plan. This activity is in partnership with CQE, a regional quantum collaborative set up to fund the construction of a joint research building in Chicago.[37]
- **State Tax Benefits:** Illinois has provided a number of tax incentives and benefits to the quantum sector.
  - **QEZ:** Companies in the new quantum science park are eligible for "Quantum Enterprise Zone" incentives, including utility and building material tax exemptions.[38]
  - **MICRO:** Quantum companies enjoy access to the expanded Manufacturing Illinois Chips for Real Opportunity (MICRO) program, which previously provided tax credits only for semiconductors. PsiQuantum, which will be the anchor tenant at the IQMP, will reportedly receive tax credits worth $92.1 million as a result of its eligibility for MICRO benefits.[39]
  - **EDGE:** The state's Economic Development for a Growing Economy (EDGE) program provides tax benefits for companies investing and operating in designated areas—including the new quantum science park—and additional incentives for new hires and retained jobs in underserved areas, for which quantum companies scaling up in the new science park will qualify.[40]
  - **Angel Investment Tax Credit Program:** The state provides 25–35 percent state tax credits (up to $2 million per investment) to qualified investors. The state allocates $15 million annually for the program.[41]
- **County Tax Incentive and Investment:** Initiatives at the regional level are also encouraging investment in the area.

- The Cook County Board, which oversees the county home to the IQMP, approved a new property tax incentive to drive long-term investment in the park.
- The board also allocated $20 million to the IQMP in its FY 2025 budget.[42]

- **Bidding for Federal Investments:** The state has leveraged its own major investments in quantum to bid successfully for federal investments.
  - The state provides up to $16.9 million to Illinois-based proposals seeking competitive federal grants. The Department of Commerce and Economic Opportunity may provide a one-to-one grant of up to $2 million matching the applicant's cash contribution toward a project.[43]
  - A recent example of this dynamic is the 2024 decision by DARPA to locate a new Quantum Proving Ground at the new Chicago quantum science park. According to the Illinois Economic Development Corporation, DARPA's decision to partner with the state "is the result of investments made during the Pritzker Administration in quantum research and infrastructure, in addition to the state's strong local workforce, research, and university partners."[44] The state committed $140 million to the DARPA initiative, drawn from the total $500 million in state funding to support the new science park.[45]
  - The public-private partnership Innovate Illinois, chaired by the governor and backed by five major charitable foundations, has as its sole purpose the pursuit of federal funding opportunities. This entity has brought in nearly $1.5 billion in federal money.[46]

- **Business Development:** The state supports entrepreneurs through Small Business Development Centers, "Advantage Illinois" loans, and a $114 million Illinois Innovation Venture (INVENT) fund, among other initiatives. Illinois plans to leverage INVENT funding with further federal R&D opportunities by creating a dedicated fund for startup businesses in sectors that are aligned with the federal CHIPS and Science Act, including quantum science.
  - The state's Small Business Innovation Research (SBIR)/Small Business Technology Transfer (STTR) matching program provides up to $75,000 and $250,000 in state matching funds, respectively, for Illinois-based recipients of federal SBIR/STTR Phase I and Phase II awards.[47]
  - In the Advantage Illinois program, the state provides either a guarantee or participation in a portion of the loan to an eligible business, through lenders. These limits can range from $10,000 up to $2 million.[48]
  - The Innovation Voucher program covers up to 75 percent of the cost of the research engagement (up to $75,000) for the collaboration between enterprises in Illinois and higher education institutions within the state.[49]
  - The $114 million INVENT fund, administered by the DCEO through the Department of the Treasury's State Small Business Credit Initiative, provides direct equity capital for eligible small companies. INVENT has secured $20 million to fund critical technology areas such as quantum science in 2024.[50]

- **International Collaboration:** Illinois's commitment to becoming a world-leading quantum hub is reflected in its formal international agreement with the United Kingdom and its targeted trade missions and high-profile diplomatic outreach with Japan and Canada.
  - In April 2025, Illinois and the United Kingdom signed a memorandum of understanding (MOU) that aims to advance trade and investment, with engagement focusing on quantum and related sectors.[51]
  - Illinois has made quantum one of the centerpieces of its trade missions with both Canada and Japan.[52]
  - Australia-linked firms PsiQuantum and Diraq and France's Pasqal now form the core of Illinois's major international corporate partnerships in quantum. All are committing to the IQMP as anchor or early tenants.[53]

State-Led Activities to Secure Federal Funding

A number of federal laboratories are present in Illinois—most notably the DOE's Argonne National Laboratory and the Fermi National Accelerator Laboratory, both of which are deeply engaged in quantum research, quantum workforce initiatives, and support for local quantum startups. In addition to working closely with these institutions, the state has been very successful in attracting new federally supported quantum programs and grants. Some of these include the following:

- Two $25 million NSF research grants pursuant to Illinois's Quantum Leap Challenge Grant program: Hybrid Quantum Architectures and Networks (HQAN) and Quantum Sensing for Biophysics and Bioengineering (QuBBE), led by UIUC and the University of Chicago, respectively.[54] Illinois is the only state in the country to receive two such awards.
- Two $115 million grants from the DOE establishing National Quantum Information Science Research Centers in Illinois at the Argonne and Fermi National Labs.[55] In November 2025, the DOE renewed funding for five major quantum centers, awarding each $125 million for another five years. Two of these are Illinois-based: the Superconducting Quantum Materials and Systems (SQMS) Center, led by Fermilab, and Q-NEXT, led by Argonne National Laboratory.[56] Currently, Q-NEXT brings together two DOE national laboratories, 11 leading universities, and six technology companies, while SQMS unites more than 300 experts from 43 partner institutions across national laboratories, universities, and industry.[57] In 2023, the DOE awarded a further $9 million each to each Argonne and Fermilab over three years to explore quantum networking themes.[58]

- In 2024, a coalition led by CQE was awarded a $1 million NSF Engines Development Award.[59]
- Most recently, Quantum Connected, a coalition based in the Midwest and led by CQE, advanced to the final stage of the NSF Engines program. It is one of 15 finalists. If funded, Quantum Connected could receive as much as $160 million over 10 years to advance quantum technologies that protect the nation's most sensitive information from cyberattacks.[60]

Effective Regional Economic Development Organizations

Chicago and the surrounding region benefit from an array of unusually strong public-private economic development organizations that have driven the emergence of the region's burgeoning quantum ecosystem.

Chicago Quantum Exchange (CQE): Hosted by the University of Chicago, CQE was established in 2017 as a hub for the science and engineering of quantum technology, connecting industry, universities, and government organizations to support quantum research, help build a workforce with quantum-relevant skills, and promote a sustainable quantum economy in the region.[61] CQE has established several international partnerships with leading organizations in India, Japan, the Netherlands, Israel, and Australia.[62] To date, CQE has launched or helped to launch a number of successful initiatives aimed at building out the regional quantum ecosystem:

- **The Bloch Quantum Tech Hub:** Having spearheaded CQE's successful bid for Economic Development Administration (EDA) Tech Hub designation, Bloch is a coalition of companies—from startups to Fortune 500—led by CQE to explore ways in which quantum technologies can be manufactured at scale, impact the regionwide and nationwide manufacturing sector, and rapidly transitioned to commercial markets. It also investigates how quantum can be used to address fundamental socioeconomic or national security problems, such as protecting the energy grid, developing life-saving drugs, and combating financial fraud.[63]
    - The CHIPS and Science Act of 2022 established the EDA's Tech Hubs program to stimulate regional innovation nationwide in strategic sectors critical to national security, such as semiconductors, critical materials, quantum, and energy transition.[64]

    - The Tech Hub designation awarded Bloch initial "Phase One" funding of $500,000 from the EDA to strengthen the organization and enable it to attract additional capital in 2023.[65]
    - Bloch is collaborating with Purdue University Northwest (PNW) to establish a quantum commercialization center as part of the Roberts Impact Lab, a regional technology transfer and commercialization hub being established by PNW in Hammond, Indiana.[66] The Roberts lab has secured $3 million in funding from philanthropic donors and $4.7 million from Indiana's Regional Economic Acceleration and Development Initiative (READI), which will be used to renovate an existing 44,000 square foot medical office building.[67]

- **Chicago Quantum Network (CQN):** CQE oversees the Chicago Quantum Network, a 124-mile optical fiber network using quantum technology to connect CQE and the University of Chicago with the Argonne National Laboratory. The university was the primary driver and home base for the creation of the network, which applies principles of quantum entanglement.[68]
- **NSF Engine Development Award:** In 2024, CQE headed a local multisector coalition in a successful competition to secure the University of Chicago a $1 million NSF Engine Award for advancing quantum technologies in the Midwest, to develop plans for commercializing quantum technologies and scaling a quantum workforce.[69] CQE serves as the institutional home of the project team.[70] The NSF Engines program was developed pursuant to the CHIPS and Science Act of 2022 to catalyze innovation ecosystems around the country to advance critical technologies, including quantum.[71]
- **Duality:** The nation's first entrepreneurial accelerator limited solely to startups in the quantum science and technology space, Duality was cofounded by CQE and the University of Chicago. This accelerator is focused on entrepreneurial programs that support early-stage companies.
- **Boeing Partnership:** Boeing has partnered with CQE since 2019, most recently making a $3.5 million commitment to CQE to support early-career scientists and technical workshops and the research projects that arise out of them.[72]
- **Collaboration with the National Quantum Economic Development Consortium (QED-C):** QED-C is a nationwide industry-led consortium managed by SRI International, based in Menlo Park, California, which functions as the de facto trade association of the nascent U.S. quantum industry.
    - CQE participates in QED-C's working groups to establish technical standards and technology roadmaps for emerging quantum ecosystems.[73]
    - CQE takes advantage of QED-C's nationwide networks to attract investment for local startups, facilitate partnerships, and accelerate the commercialization of the knowledge flowing from the Chicago region's research institutions.
    - Between 2018 and 2024, QED-C and Quantum Computing Report maintained job boards from which CQE leveraged 10,484 unique job postings for their job analysis.[74]

Innovate Illinois: Innovate Illinois is a public-private coalition whose mission is to pursue federal funding for technological, scientific, and climate projects within the state, particularly with respect to the CHIPS and Science Act of 2022 and the Infrastructure Investment and Jobs Act. Active across the high-tech spectrum, it partners with CQE with respect to quantum initiatives.[75] It is chaired by the governor and strongly backed by local philanthropic organizations.[76] Innovate Illinois is credited with attracting $1.5 billion in federal support for local projects.[77]

P33 (P for People, Purpose, Plan, and Progress; 33 for 1933, the year the Chicago World's Fair established the city as a world center for science): P33 is a Chicago-region nonprofit economic development organization focusing on technology-oriented sectors. Founded in 2019 by local civic and business leaders including former U.S. Secretary of Commerce Penny Pritzker, P33 has placed three big bets on future technologies as regional economic drivers: the nexus between computers and sustainable energy, the development of workforces for bleeding-edge future industries, and quantum technology and advanced microelectronics.[78] P33 and CQE occasionally co-lead large projects such as the creation of startup accelerator Duality.[79]

Illinois EDC: A resource for doing business in the state, the EDC provides white-glove service that includes site assistance and coordination, data analysis, and connections for companies looking to grow in Illinois.[80]

Regional Research Institutions

By far the Chicago region's greatest asset in pursuit of becoming a major global quantum hub is the presence of seven large and excellent research and educational institutions. These include five universities—the University of Chicago; the University of Illinois at Urbana-Champaign; Purdue University at West Lafayette, Indiana; Northwestern University in Evanston, Illinois; and the University of Wisconsin at Madison—as well as the Argonne National Laboratory in Lemont, Illinois, and the Fermi National Accelerator Laboratory in Batavia, Illinois.

By far the Chicago region's greatest asset in pursuit of becoming a major global quantum hub is the presence of seven large and excellent research and educational institutions.

University of Chicago: The University of Chicago has been the principal driver of the regional quantum ecosystem, establishing key organizations like CQE, fostering industry/government/academic partnerships, developing and offering groundbreaking curricula in quantum science, building out a regional quantum infrastructure, attracting commercial investments, and fostering quantum startups. In 2025, *Nature* magazine's Nature Index, which ranks institutions by their research contributions, ranked the University of Chicago sixth globally and first in the United States for quantum physics research.[81]

- **Pritzker School of Molecular Engineering (PME):** At the core of the university's efforts has been the Pritzker School of Molecular Engineering, which has conducted groundbreaking quantum research, collaborated with other regional research organizations, and provided leadership for CQE and other regional developmental initiatives.[82] The PME is structured to encourage interdisciplinary lab groups comprising faculty, graduate students, and postdocs. At least 11 of the PME's labs are pursuing primarily quantum-based research themes.
- The PME's 21-member Jiang Group has devised a novel approach to building secure quantum communications with ranges superior to those of any known alternative, based on vacuum-sealed tubes and an array of spaced-out lenses.[83]
- A PME study co-led by David Awschalom and Peter Maurer successfully demonstrated that a particular protein can act as a spin qubit.[84] This interdisciplinary approach combined quantum engineering and molecular biology, using quantum sensors to measure biological processes in real-time inside mammalian and bacterial cells. This work was funded by NSF QuBBE and the Gordon and Betty Moore Foundation.
- Solid materials frustrated examination at the subatomic level until the PME's 15-member High Lab "cracked this problem" through the use of germanium—an achievement which is "not just a breakthrough in technology . . . [but] a breakthrough in fundamental physics."[85]
- The Pritzker Nanofabrication Facility, located within the PME at the University of Chicago, is an open-access, 10,000 square foot ISO Class 5 research cleanroom that provides advanced lithographic processing of hard and soft materials. Researchers from the DOE SQMS Center are using this facility to fabricate superconducting quantum devices with different materials and processes.[86]
- The MRSEC Shared Facilities at the University of Chicago, which include the Quantum Transport Laboratory, are NSF-supported facilities that provide resources for creating, characterizing, measuring, and imaging many types of hard and soft materials.[87]

Chicago Quantum Institute (CQI): CQI is a research organization housed within the PME. It offers doctoral degrees in quantum science and engineering and in physical sciences as well as master's degrees in quantum engineering and bachelor's degrees with a major and minor in molecular engineering.[88] CQI's basic and applied research focuses on quantum hardware. The scope of its research is broad, embracing quantum computing, sensing, materials, and communications; nano mechanics; quantum theory and computation; and atomic, molecular, and optical physics.[89] CQI collaborates with national labs, universities, and the private sector.

NSF QuBBE: The NSF has established the Quantum Leap Challenge Institute for Quantum Sensing for Biophysics and Bioengineering (NSF QuBBE) at the University of Chicago to pursue the development of quantum sensors for biomedical applications. The NSF has committed $25 million to this effort.[90] The objectives of this center are to create quantum measurements and imaging systems that exceed current capabilities in order to extract new information from biological sources while training a workforce capable of implementing these discoveries.[91]

NSF Quantum Information Science and Engineering Network (QISE-NET): QISE-NET is a graduate funding and training program for students with both academic and industry mentors, co-led by the University of Chicago and Harvard University. The initiative is funded by a $2.5 million grant from NSF.[92]

CZ Biohub Chicago: In 2023, the Chan Zuckerberg Initiative (CZI) launched the Biohub to bring together the University of Chicago, Northwestern University, and UIUC with the goal of solving grand scientific challenges within 10 to 15 years.[93] An interdisciplinary team led by the PME's professors will receive $900,000 over three years to develop quantum-enabled identifiers.[94]

Berggren Center for Quantum Biology and Medicine: The University of Chicago received a $21 million philanthropic gift from Thea Berggren to establish the center this year. Building upon the foundation of NSF QuBBE, the center develops revolutionary quantum tools for biomedical applications and cultivates scientists and engineers capable of translating quantum advances into clinical solutions.[95]

Gordon and Betty Moore Foundation: The Moore Foundation grant provides $2.75 million over five years, from 2024 to 2029, for a team led by PME to scale up research on protein-based qubits.[96]

Hyde Park Labs: This 300,000-square-foot building is a new commercial laboratory facility that includes space for academic researchers from the University of Chicago—including those from the PME, the Biological Sciences Division, and the Science Incubator—and various companies to translate early-stage science and technology into commercial opportunities.[97] Thirteen startups have already signed tenant leases, and IBM plans to house its Quantum System Two there. Samir Mayekar, managing director of Polsky Center for Entrepreneurship and Innovation at the University of Chicago, pointed to the Polsky Center's 650 alumni companies, which together raised about $1 billion in the past year, as evidence of the capital networks available to new founders in Hyde Park Labs.[98]

Partnership with IonQ: In November 2025, the University of Chicago entered into a partnership with IonQ, a global quantum company based in College Park, Maryland, to pursue industry-relevant research themes in quantum computing, communications, and sensing. The partnership includes the construction at the university of the world-class IonQ Center for Engineering and Science, which will eventually house the PME and other university science and research activities.[99]

Quantum Supercomputer Initiative: In 2024, the University of Chicago formalized two agreements intended to accelerate the development of quantum computing.

- An agreement between the university, IBM, and the University of Tokyo commits the parties to a 10-year $100 million effort to develop blueprints for building quantum-centric supercomputers with 100,000 qubits.[100]
- A 10-year strategic partnership between the university, Google, and the University of Tokyo to accelerate the development of a fault-tolerant quantum computer will support the exchange of researchers and ideas, promote quantum computing entrepreneurship and

business, and train the workforce needed for the next generation.[101] Google will contribute $50 million to this effort.[102]

Chicago-Tohoku Quantum Alliance: In 2024, the University of Chicago entered into a strategic alliance with Japan's Tohoku University to pursue research in quantum computing, communications, and sensing, and to promote student exchanges, startups, and industry partnerships. Tohoku's faculty are leaders in materials science and microelectronics. It is one of Japan's 10 national quantum technology innovation hubs and operates the country's only complete process line for 300 mm wafers, one of the nation's largest cleanrooms, and a significant nanofabrication facility.[103]

Argonne has been pursuing quantum research themes since 1980, and at present the Argonne Quantum Institute is promoting and expanding quantum research in partnership with universities and the private sector. Argonne is the recipient of around $20 million per year for quantum information science research and related technologies. It features world-class facilities that are available to researchers.

Argonne National Laboratory: The Argonne National Laboratory in Lemont, Illinois, is sponsored by the DOE and administered by the University of Chicago through a wholly-owned affiliate, UChicago Argonne LLC.[104] Argonne is staffed with over 1,900 scientists and engineers as well as nearly 8,000 researchers from around the world that use its facilities and expertise. Argonne participates in numerous public-private partnerships and partnered with 170 businesses in FY 2024.[105]

Argonne has been pursuing quantum research themes since 1980, and at present the Argonne Quantum Institute is promoting and expanding quantum research in partnership with universities and the private sector.[106] Argonne is the recipient of around $20 million per year for quantum information science research and related technologies. It features world-class facilities that are available to researchers:

- **Argonne's Advanced Photon Source (APS)** is used by scientists in the quantum field to measure and characterize materials for quantum devices. The APS can generate bright, high-energy X-ray beams that enable atomic-scale measurement of qubits, and that can map interactions of qubits with their environment for the purpose of creating new materials for applications in quantum science.[107]
- **The Argonne Quantum Foundry** is a 6,000 square foot facility where researchers develop scalable quantum systems. The foundry features a quantum computing test bed, diamond

growth tools, tools to create qubits and materials transfer, environment-controlled furnaces, and flip-chip bonders that can be used for device integration.[108]

- **The Center for Nanoscale Materials** supports materials research for quantum applications. The center's Quantum Matter and Devices Lab has extensive capabilities enabling the study of quantum materials and devices at ultra-low temperatures and for identifying new ways to produce single and entangled protons.[109]
- **The Argonne Leadership Computing Facility** uses supercomputers for reliable simulations of important properties of materials for quantum sensing, computing, and communications.[110] Argonne's efforts on quantum algorithms are also centered at this facility.
- Argonne operates several interconnected quantum networking testbeds as part of the broader Chicago quantum ecosystem, making progress on the Fermilab-led Illinois Express Quantum Network project. These testbeds include:
  - **The ArQNet testbed**, which connects quantum resources in five different buildings located at Argonne via deployed fiber optic cables.[111]
  - **The Quantum Loop**, a pair of connected 26-mile fiber optic cables that wind circuitously between Argonne and the Illinois tollway near Bolingbrook.[112]

Argonne engages with a broad number of partners to incubate new quantum technologies, build the regional quantum workforce, and accelerate the development of quantum devices and systems.

- Argonne is the lead laboratory for **Q-NEXT**, a DOE National Quantum Information Science Research Center tasked with developing the science and technology for controlling and distributing quantum information. Q-NEXT convenes researchers from over 20 government, academic, and industry organizations to pursue research themes in quantum communications, sensing, materials, and simulation.
  - In November 2025, the DOE awarded Q-NEXT $125 million over five years for research for "seamlessly integrating quantum and traditional information systems across optical networks" and for "demonstrating the potential of distributed quantum entanglement."[113] Q-NEXT will pursue three goals: (1) successful demonstration of algorithms that run across multiple remote, connected quantum processors; (2) development of sensors that can be used in fields such as medicine and navigation as well as for foundational scientific discoveries in areas such as gravitation and quantum mechanics; and (3) solutions to challenges in materials science that currently prevent distinct quantum materials systems from being merged together and integrated into quantum devices.[114]
  - Q-NEXT is building two new quantum foundries, one at Argonne and one at Stanford's SLAC National Accelerator, to provide sources of standardized, high-quality materials and devices supporting quantum applications. [115]
  - In 2022, Q-NEXT released "A Roadmap for Quantum Interconnects" outlining the scientific discoveries needed for the technologies that will enable distribution of quantum information on a 10-to-15-year time horizon.[116]

    - Q-NEXT is creating new academic programs that give students the opportunity to study in an environment that lies at the intersection of the national labs, industry, and universities.[117]

- Argonne leads several of the testing and evaluation (T&E) teams for the DARPA Quantum Benchmarking Initiative (QBI), which involves around 20 companies. Argonne leads three "Stage A" T&E teams and supports several others, with about $5 million per year.[118] QBI's T&E teams consist of about 300 scientists and engineers evaluating about 20 performers—particularly for deep targeted analysis, broad system-scale evaluation, and utility estimation.[119] As of September 2025, about 30 people from Argonne were involved in the T&E teams. In 2024, DARPA and the DOE signed an MOU to coordinate their quantum computing research, development, engineering, and evaluation initiatives.[120] These interagency collaborations serve as great models for leveraging the world's best scientists, engineers, and infrastructure to lead the way in quantum computing R&D.
- Argonne is the site of **Chain Reaction Innovations (CRI),** a two-year fellowship program that helps scientific innovators bring their discoveries to the market. Over seven years, CRI has accelerated 39 innovators and created 663 jobs through the startup of several quantum companies, including Photon Queue, a hardware company developing free space quantum memories; SynthBits, a quantum platform company; and memQ, a hardware and software company focusing on quantum memory with applications in quantum network infrastructure.[121]
- Argonne is leading **InterQnet**, a $9 million, three-year quantum communications project, with collaborators from the University of Chicago, Northwestern University, UIUC, and Fermilab.[122]
- Argonne is a founding member of CQE, a founding partner in Duality, and a member of the Bloch Quantum Tech Hub.

Fermi National Accelerator Laboratory (Fermilab): Fermilab, based near Chicago in Batavia, Illinois, is a DOE National Laboratory that specializes in particle physics. It has achieved numerous breakthroughs in that field, including the dissection of protons to reveal their underlying structure and the discovery of the top quark, the bottom quark, and the tau neutrino.[123]

- **Fermilab Quantum Division:** Fermilab's Quantum Division runs four quantum research organizations focusing respectively on quantum algorithms, sensing, networking, and "MAGIS-100."
    - MAGIS-100 stands for Matter-Wave Atomic Gradiometer Interferometric Sensor, a quantum sensor currently under construction to be housed in a 100-meter-deep shaft at Fermilab. This facility will combine established techniques utilizing state-of-the-art 10-meter scale interferometers with the latest technological discoveries from the world's most advanced atomic clocks.
    - In order to study themes of interest in quantum physics, MAGIS-100 scientists will drop groups of atoms down a vacuum tube, followed by laser beams—a detection technique

that is expected to enable the testing of various aspects of quantum mechanics and discover ultralight dark matter. MAGIS-100 will establish the groundwork for future gravitational wave detectors.[124]

- **Fermilab Superconducting Quantum Materials and Systems Center (SQMS):** SQMS is one of five research centers around the United States funded by the DOE as part of a national effort to develop and produce the world's most powerful quantum computers and sensors.[125] It convenes over 550 experts drawn from 36 partner institutions, which include national labs, universities, and private companies. Its technical areas include superconducting qubits, algorithms, quantum sensing for fundamental physics, milli-kelvin cryogenics, and solutions to quantum decoherence.[126] SQMS received a $125 million renewal from the DOE in November 2025 for the next five years (2025–2030). In this second five-year period, SQMS will use Fermilab's expertise in ultra-high-coherence superconducting radio-frequency cavities and scalable cryogenics for three major efforts:
  - pursuing new materials and fabrication methods to deliver progressively higher-coherence superconducting devices for cavity-based quantum systems;
  - developing a 100-plus-qubit superconducting radio-frequency quantum processor; and
  - prototyping the cryogenic and microwave infrastructure required for large-scale interconnection to enable the development of a quantum data center unit.[127]
- **Quantum Garage:** In 2024, SQMS opened the Quantum Garage, a 6,000 square foot facility to join up scientific communities, startups, and industrial players to advance quantum science and information technology. The facility features several large cryogenic freezers capable of near-absolute zero temperatures; the world's first commercial quantum processor; quantum memories and transducers developed at Fermilab; quantum metrology tools for developing materials standards; and quantum sensors for fundamental physics, capable of detecting gravitational waves and dark matter.[128] This facility further advances the collaborative efforts of the 34 SQMS partners across industry, academia, and federal agencies, including Ames National Laboratory, NASA, and the NIST.[129] This is another example of interfederal agency collaboration at the regional level.
- **Fermilab Quantum Computing Lab One (QCL-1):** QCL-1 operates two extra-large Bluefors dilution refrigerators. This facility also includes state-of-the-art radio frequency electronics systems for controlling and measuring muti-qubit and superconducting cavity-qubit systems.[130]
- **Illinois-Express Quantum Network (IEQNET) and Advanced Quantum Networks for Scientific Discovery (AQNET-SD):** Fermilab received $9 million in DOE funding over three years for AQNET-SD, building on IEQNET's success.[131]
- **Quantum Underground Instrumentation Experimental Testbed (QUIET) and LOUD lab:** QUIET and LOUD are two facilities that are part of Oak Ridge National Lab's Quantum Science Center, located at Fermilab. QUIET is a 250 square foot underground test facility that is used to study the performance of qubits isolated from cosmic radiation. The facility

is located 100 meters below the surface, while LOUD provides the laboratory on the surface. Researchers can study the performance of quantum chips in different radiation environments at QUIET and LOUD.[132]

Northwestern University: Northwestern University offers a panoply of undergraduate and graduate-level programs in foundational quantum science and quantum computing, sensing, and communications.[133] Its researchers have achieved distinction through innovations such as quantum teleportation over standard fiber optic cables, proving the feasibility of the potential coexistence of quantum and conventional communications in existing systems. The lead researcher, Professor Prem Kumar, commented that "this is incredibly exciting because nobody thought it was possible," and it means that "we won't have to build new infrastructure" for quantum communications.[134]

- **Northwestern University Center for Molecular Quantum Transduction (CMQT):** The CMQT, founded in August 2020, is composed of 10 U.S. research universities, headed by Northwestern. The CMQT pursues research themes in quantum transduction, which is the transfer of information between quantum systems. It is supported by the DOE, most recently being awarded $14.5 million in 2024.[135]
- **Northwestern University Institute for Quantum Information Research and Engineering (INQUIRE):** INQUIRE combines the talents of over 50 faculty from a number of Northwestern organizations—including the Weinberg College of Arts and Sciences, the McCormick School of Engineering, and several other university research institutes and centers—for an interdisciplinary approach to quantum science and engineering. INQUIRE functions as Northwestern's quantum hub, disseminating information and facilitating connections within and outside the university.[136]

Purdue University: Purdue University ranks number one in the United States in total number of undergraduate and graduate engineering degrees, and it offers curricula, research, and training in quantum technology.[137] Purdue is a core member of the DOE's Quantum Science Center, a participant in the NSF-backed Center for Quantum Technologies, and a member of CQE.[138]

- **Purdue Quantum Science and Engineering Institute (PQSEI):** PQSEI convenes over 60 faculty members with quantum expertise to develop "practical and impactful aspects of quantum science."[139]
  - Researchers focus on both basic and applied themes in atomic and molecular science, quantum photonics, quantum materials and devices, and quantum applications in communications, computing, and sensing.[140]
  - PQSEI is one of the organizations comprising Purdue Computes, an interdisciplinary entity that brings together university resources in computing, semiconductors, artificial intelligence, and quantum science and engineering.[141]
- **Purdue Quantum Photonics Integrated Design Center (QuPIDC) Energy Frontier Research Center (EFRC):** In 2024, the DOE selected Purdue University to lead the QuPIDC EFRC, which convenes the Los Alamos National Laboratory, the University of Chicago,

Stanford, and three other universities to pursue research to drive forward the frontiers of quantum photonics. The DOE is committing $13.9 million to this effort.[142]

University of Illinois at Urbana-Champaign (UIUC): UIUC, Illinois's Land Grant university, is currently spearheading the state's ambitious initiative to create the Illinois Quantum and Microelectronics Park (IQMP). In addition, it possesses deep strengths in quantum science and engineering, with its Grainger College of Engineering regularly achieving research breakthroughs and attracting federal funding.

- The Grainger College has one of the largest materials science departments in the United States, the Department of Materials Science and Engineering, which is deeply engaged in research and education in quantum science and engineering.
- In September 2025, an assistant professor in the Department, Chris Anderson, won a DARPA Young Faculty Award for his research on strontium titanate (STO) optical modulators. The discovery that strontium titanate is the world's most tunable optical material at cryogenic temperatures means that interconnects can be created that are orders of magnitude more efficient that other technologies. Anderson observes that his discovery "is the difference between quantum computers remaining laboratory curiosities and becoming practical machines that solve real-world problems."[143]
- In 2022, Grainger and IBM jointly launched the IBM-Illinois Discovery Accelerator Institute—backed by a $200 million investment—to increase access to technology education and skill development in four technology spheres, including quantum science and technology.[144]
- The Illinois Quantum Information Science and Technology Center (IQUIST) quantum testbed, established in 2018 with an initial investment of $15 million, is part of the Department of Materials Science and Engineering's Materials Research Laboratory. IQUIST research teams explore fundamental science, implement novel quantum algorithms, and use state-of-the-art equipment to fabricate quantum materials and devices with applications in computing, simulation, and sensing.[145] Concurrently, IQUIST develops curricula for what will be the next-generation quantum workforce.[146]
- Grainger is leading the NSF Quantum Leap Challenge Institute for Hybrid Quantum Architectures and Networks (H-QUAN), funded by the NSF with $25 million, in a partnership intended to develop distributed quantum networks composed of a "hybrid" architecture integrating quantum technology (e.g., qubits based on trapped ion, superconducting, or photonic technology) with conventional software and electronics.[147]

University of Wisconsin at Madison: UW-Madison has been active in the field of quantum science since around the year 2000, and initial activities in the Department of Physics have subsequently grown to engage multiple departments, including computing and networking, statistics, chemistry, materials engineering, electrical and computing engineering, and engineering physics.[148] In 2024, the Quantum Insider ranked Madison as number two in the nation in the category of future quantum ecosystems, citing the university's strengths in quantum-relevant fields.[149]

- **Wisconsin Quantum Institute (WQI):** WQI is the hub for quantum engineering and science at UW-Madison, coordinating interdisciplinary research across numerous academic departments. Its principal areas of focus are quantum sensing, computing, networking, and materials, with qubit modalities that include superconducting, semiconducting, neural atom, and quantum dot qubits.[150]
    - WQI is directed by eminent professors in the field, such as Mark Saffman, who earned his doctorate at the University of Colorado at Boulder and who is known for his expertise in neural atom quantum computing. Dr. Saffman also serves as the chief scientist for quantum information at Colorado-based Infleqtion, a global leading company in neural atom quantum computers.[151]
    - WQI offered the nation's first MS degree in quantum science, introduced to the curriculum in 2019.
    - The Wisconsin Quantum Computing Club is a forum for interdisciplinary discussion and information exchange.
    - WQI has been a member of CQE since 2019 and today is considered one of the anchor research organizations of CQE.[152]
- **Industry Partnerships:** In 2023, UW-Madison entered into two separate industry partnerships under the leadership of physics professor Mark Eriksson, engaging Intel Corporation and HRL Laboratories, each of which send state-of-the-art silicon-based qubits to Eriksson's research group at UW-Madison for experimentation aimed at improving their performance.[153]

The Workforce Challenge

Despite the extensive array of quantum educational and research programs underway in the Chicago region's universities and national labs—many of them emphasizing the "lab-to-fab" vision—the region's commercial quantum industry is small, comprising about 30 pioneering firms in Illinois, Indiana, and Wisconsin. CQE's Bloch Tech Hub affiliate estimates that at present a total of 400 people are working in permanent, direct quantum-related jobs in the Chicago area—about 13 percent as many as the oft-stated estimate of 3000 for the state of Colorado, for instance.[154] Consequently, some promising technologies developed in the Chicago region remain in the proof-of-concept phase, awaiting near-term commercial demand.[155]

The Midwest quantum ecosystem has succeeded in attracting companies from other states, including Infleqtion and PsiQuantum.

- PsiQuantum, which will be the anchor tenant at the IQMP, has 321 global employees; while only four of them are currently based in Chicago, this number is expected to grow to 150 in the future.[156]
- Similarly, Infleqtion has 163 employees globally and 14 in the Chicago area, likely growing to 50 in the future.[157]

Nonetheless, the number of commercial quantum firms that have originated in the Chicago region remains modest. The handful of supply chain firms include K1 Semiconductor, StaC12, memQ, Flexcompute, and Great Lakes Crystal Technologies. While a good start, these firms do not comprise a complete supply chain sufficient for supporting local quantum manufacturing.

While it is difficult to predict specific workforce needs, if the industry grows at anything like the rate forecast in some recent studies, the region will not be fully prepared to meet the challenge.

This may reflect the relative newness of this industry; as discussed in the Illinois Answers Project, "Quantum computing is still being brought out of science labs into commercial development, an end goal that some physicists and computer scientists think may be impossible."[158] But employer demand for qualified quantum workers in the Chicago region is expected to grow rapidly in the next decade. While it is difficult to predict specific workforce needs, if the industry grows at anything like the rate forecast in some recent studies, the region will not be fully prepared to meet the challenge; its excellent research universities are graduating students with quantum-relevant and quantum-specific degrees, but not in numbers sufficient to meet the forecast—graduating dozens each year, not the estimated thousands the industry will come to require. Community college and other programs intended to confer quantum-relevant skills, while promising, are only in their incipient stages. The region's best hope over the near term appears to lie in equipping its existing workforce with skills that can be adapted to the needs of an emerging quantum industry. However, even this falls short of projected demand. The most widely cited projection for the Midwest region (Illinois, Wisconsin, and Indiana) is a 2024 forecast by the Boston Consulting Group (BCG), which envisions a need for 29,000 trained workers within five years—and a staggering total of 191,000 in 10 years.[159]

Table 1: Projected QIST Workforce Needs by Occupation and Degree Requirement, 2027–2035

Category	Role	Degree Requirement	2027	2030	2035
Research and Development	Scientist	Master's or doctorate	2,000	6,000	26,000
	Engineer	Bachelor's	3,000	10,000	52,000
	Technician	Associate's or technical training	<1,000	3,000	26,000
Business and Translation	Applied scientist	Master's or doctorate	Few	<1,000	26,000
	Consultant	Bachelor's or master's	Few	<500	3,000
	Support	Associate's or bachelor's	<1,000	3,000	23,000
Adjacent	Construction or manufacturing worker	Associate's or technical training	2,000	7,000	35,000
Total	—	—	9,000	29,000	191,000

Source: "Quantum Job Projection," Chicago Quantum Exchange, 2024, https://chicagoquantum.org/jobprojectiondata.

Admittedly, there is an apparent disconnect between current realities and the BCG's high-end projections. It is unlikely that the regional demand for quantum workers will suddenly leap from considerably less than 1,000 at the end of 2025 to 9,000 in 2027—a ninefold increase in an interval of less than two years. Moreover, large-scale commercialization of quantum technology could call for more automated operations, dampening some of the demand for human labor.

To be sure, the launch of the IQMP is drawing a number of established quantum commercial companies to the region, creating new quantum jobs; but the first phase of construction, which will enable occupancy by tenants, is forecast to be completed in 2028, and will not generate many—if any—new jobs in 2027.[160] And the Illinois Answers Project notes that it is "hard to say exactly how many jobs, and what type, will be at the quantum hub because the state is still recruiting companies."[161] But the known employment projections for the IQMP suggest, at most, several hundred new jobs initially, not thousands:

- PsiQuantum, the IQMP's anchor tenant and largest employer, will bring around 150 direct quantum jobs, a third of which will be STEM professionals, a third technicians, and a third other professional and supporting roles.[162]
- Infleqtion will bring an estimated 36 jobs.
- Pasqal will bring an estimated 50 jobs.[163]
- Diraq, which has identified itself as a future tenant, has not forecast its anticipated employee totals for the IQMP, but is believed to have a total of 67 employees worldwide as of October 2025.[164]
- Related Midwest, the IQMP's co-developer, projects that the buildout of the park will generate 20,000 construction jobs, but virtually all of these are unlikely to directly involve quantum skills.[165]
- The BCG's ambitious quantum job projections for 2030 (29,000) and 2035 (191,000) are qualified by BCG as contingent on sustained government support, an assumption that is not unrealistic—but even assuming public support, the figures, particularly for 2035, appear improbable absent a veritable explosion in market demand for quantum-based products and services that has not yet begun to materialize.[166] For purposes of comparison, the semiconductor device industry—a mature high-tech industry—currently employs about 200,000–210,000 workers in the United States per year, and these are distributed all around the country, not concentrated in one region.[167]

With these points taken into consideration, the BCG study is likely correct in its assumption that quantum science and technology will create a growing demand for workers with quantum-relevant skills in the Chicago region by 2030, and that the demand within the region for quantum workers could well increase substantially thereafter. And, according to McKinsey, "roughly one in two jobs in quantum technology in 2022 remained vacant globally as companies struggled to find workers."[168] This is a problem that will worsen as "more quantum-enabled technologies go mainstream."[169]

The number of professors and experts in quantum is also limited, and there is a growing need to invest funding to train more experts in the field.

The Chicago region's universities have initiated broad-ranging curricula in quantum science and engineering. While no publicly available data exists with respect to the number of students enrolled and degrees awarded in quantum, many graduates of these institutions have degrees in quantum-relevant areas such as computer science, molecular and electrical engineering, statistics, and data science. In addition, anecdotal reports indicate that a trickle of graduates with quantum-specific degrees is developing, which can be expected to increase—if likely not in sufficient numbers to address the region's forecasted needs. The number of professors and experts in quantum is also limited, and there is a growing need to invest funding to train more experts in the field. This is essential to meet future demands in this interdisciplinary subject, yet academia lacks the industry-standard salaries, bonuses, and stock options needed to attract talent.

- The University of Chicago's Pritzker School of Molecular Science and Engineering reported that in its graduating class of 2025, some of its 47 master's degrees were awarded to students majoring in Quantum Science and Engineering, although the exact total is not available.[170]
- UW-Madison's one-year MS degree program in quantum computing enrolled 9 students in its first cohort, graduating in 2020, and 18 students in 2021. The program aspires to an annual enrollment of 20 to 25.[171]

In addition to new graduates, a significant number of quantum workers can be drawn from the existing workforce in the Chicago region. A study published in August 2023 in the Chicago Business Bulletin concluded that "Chicagoland has nearly 12,000 workers available for the quantum industry distributed throughout the region," noting among other regional advantages the region's universities and national laboratories.[172] But the study's assessment is based on a count of scientists and engineers only—categories which, while essential to quantum research and manufacturing, are likely to make up only a subset of the workforce needed. For example, CQE recently concluded that over half of all quantum jobs in the Chicago region will not require a graduate degree, and that in the commercial quantum space, roughly two-thirds of quantum positions will be open to workers with bachelor's degrees or less.[173] The remainder of the workforce must possess particular skill sets, but they will not require quantum knowledge or advanced degrees; this suggests that a broader pool of workers may be available to support the emerging quantum ecosystem than the cited 12,000.

CQE's conclusion on this critical point finds broad support among industry insiders, in the experience of the semiconductor industry, where similar ratios are found, and in other academic studies.[174]

There is currently no comprehensive plan for addressing the region's anticipated workforce needs comparable to Colorado's Quantum Workforce Roadmap. In most cases, programs—while promising—are in their initial phases; community colleges seeking to develop quantum-relevant curricula are hampered by "the uncertainties about what specific needs will arise and when."

A survey of the Chicago region's education and training programs for quantum workers in technician, supply chain management, and other support roles presents a mixed picture. There is currently no comprehensive plan for addressing the region's anticipated workforce needs comparable to Colorado's Quantum Workforce Roadmap. In most cases, programs–while promising–are in their initial phases; community colleges seeking to develop quantum-relevant curricula are hampered by "the uncertainties about what specific needs will arise and when."[175]

- In 2024, the chancellor of the City Colleges of Chicago (CCC), which enrolls 66,000 community college students, declared that "City Colleges stands ready . . . to work with employers to prepare Chicagoans for the skills to access and succeed in quantum careers."[176]
    - In March 2024, CCC Deputy Provost Stacia Edwards presented a comprehensive $22 million plan–"From Community to Quantum," proposed by the EDA "Tech Hubs" program–outlining a vision for an industry-driven curriculum; quantum apprenticeships; partnerships with employers, with major firms like Microsoft and IBM, and with local universities and national labs; centralized internships; and state-of-the-art physical and virtualization labs and simulation space for hands-on learning.[177]
    - The plan is promising, and the CCC currently offers a course in "Introduction to Quantum Physics and Optics." But a broader curriculum has not yet been put in place.[178]
    - The introduction of new courses at the CCC requires identifying hiring new faculty–a process which involves screening and interviewing candidates, at least one committee interview with a teaching demonstration, sometimes a second interview, and a final decision by a senior administrator.[179]
    - New courses must be approved by the Illinois Community Colleges Board, a process that takes at least one term and often takes longer.[180] So assuming that the CCC can develop a new curriculum, then identify and hire new faculty with sufficient quantum science and technology expertise–a significant challenge–the first graduates of two-year degree programs will enter the workforce in 2028, at the earliest.
- CQE and its partners are prioritizing quantum workforce development initiatives addressing jobs that do not require extensive quantum expertise, targeting workers with associate degrees, transferable laboratory and other skills, and technical backgrounds.[181]

- CQE is partnering with UChicago Professional to develop quantum technical skills in early- and mid-career professionals with both science and business backgrounds. Among other features, this program—designed by the Pritzker School of Molecular Engineering—includes a four-day intensive course in quantum technology and engineering for individuals with business backgrounds and an eight-week course aimed at science professionals covering quantum science, networking, and communications. The program features hands-on experience with quantum technologies and engagement with leading quantum researchers.[182]
- CQE is encouraging interested individuals to engage in DIY quantum education and training by providing links to courses offered by IBM, Microsoft, the Technical University of Delft, the University of Chicago, and other sources of quantum expertise.[183]
- CQE and its partners have launched a series of initiatives to raise awareness of quantum themes in the Chicago region's K-12 schools.[184]

Growing Local Pushback

Not all of the Chicago region's residents share the vision of a rapidly growing quantum innovation cluster. Some seek assurances that developments will directly benefit their community, and aspects of the effort may prove sufficiently contentious that they could weaken political support over the longer term.

- The IQMP is being established on the South Side of Chicago, where disadvantaged communities are concerned that they might experience rising rents and will be displaced by businesses moving into the area. At present, South Side residents are seeking a community benefits agreement, a legally binding commitment to ensure that residents will not be pushed out and that business tenants in the science park will invest in the community.
- South Side residents are also seeking a commitment for meaningful jobs and training opportunities linked to the science park, including targeted local hiring and apprenticeship programs.
- Some area residents worry that construction operations at the IQMP site will dislodge pollutants that remain at the site as a result of U.S. Steel's operations there prior to 1993, including cadmium, mercury, lead, and toxic chemicals.[185]
- There is also concern that the science park will generate increased electricity demand, which will drive up residents' electric bills and increase the risk of blackouts and brownouts.[186]

A spokesman for the science park recently indicated that the developers and partners have participated in dozens of meetings with residents and are committed to local workforce

development, but they have not committed to a community benefits agreement. Meanwhile, Related Midwest, the park's principal developer, has indicated its intention to address environmental issues at the site and said that it would fully comply with all environmental laws and regulations; the developer has indicated that it is considering enrolling in a Site Remediation Program and committing to continue to remediate the soil as needed.[187] But the issues noted above have not yet been resolved.

Conclusion

The Chicago region is rapidly becoming one of the United States' most ambitious and well-resourced quantum technology hubs. This growth is driven by a combination of world-class research institutions, major state investments, strong federal support, and unusually effective regional economic development organizations. These elements in Chicago highlight a framework of vibrant and sustainable innovation ecosystems: interconnected networks of research, financial, entrepreneurial, educational, training, manufacturing, and distribution entities that each play a role in bringing quantum technologies from research to market.

The Chicago region is rapidly becoming one of the United States' most ambitious and well-resourced quantum technology hubs. This growth is driven by a combination of world-class research institutions, major state investments, strong federal support, and unusually effective regional economic development organizations.

Despite world-class research strength, the Chicago region at present lacks sufficient numbers of trained quantum workers, technicians, and support staff needed to sustain this new industry. The commercial quantum sector is still small, and the supply chain is incomplete—therefore requiring active connections to other national and international quantum clusters to reach scale both in terms of the supporting value chain and market.

Already, massive state investments, tax incentives, federal funding strategies, and international partnerships have accelerated the region's development. Without this sustained political and financial support, the quantum cluster would not be emerging at its current pace. Indeed, Illinois's recent commitment to the nascent quantum industry is unparalleled in the United States. It is a remarkable effort with solid institutional foundations.

About the Authors

Sujai Shivakumar directs Renewing American Innovation (RAI) at the Center for Strategic and International Studies (CSIS), where he also serves as a senior fellow. Dr. Shivakumar brings over two decades of experience in policy studies related to U.S. competitiveness and innovation. Previously, he directed the Innovation Policy Forum at the National Academies of Sciences, Engineering, and Medicine and led major studies of U.S. policies supporting advanced manufacturing, small business growth, workforce development, and entrepreneurship. He was also a lead contributor to a seminal National Academies study of strategies adopted by U.S. states and regions to foster entrepreneurship, drive technology transfer, and encourage regional high-tech ecosystems. He also helped prepare National Academy of Public Administration studies on laboratory technology transfer and the management of space situational awareness. Reflecting his expertise in innovation policy, Dr. Shivakumar has testified before the Senate Committee on Commerce, Science, and Transportation and has been quoted in leading publications such as the *Financial Times* and the *Wall Street Journal*. His academic background includes a doctorate in economics from George Mason University and service as an Earhart Foundation scholar at the Ostrom Workshop at Indiana University Bloomington, where he authored *The Constitution of Development* (Palgrave Macmillan, 2005) and coauthored with Nobel Laureate Elinor Ostrom *The Samaritan's Dilemma: The Political Economy of Development Aid* (Oxford University Press, 2005). During his tenure at the National Academies, he contributed to over 50 assessments of U.S. and foreign innovation programs.

Charles Wessner is currently a research professor at Georgetown University, where he teaches global innovation policy, and a senior adviser (non-resident) with RAI. He is active as a speaker, researcher, and writer with a global lens on innovation policy and frequently advises technology

agencies, universities, and governments on effective innovation policies. He served for two decades in the National Academy of Sciences, where he achieved the distinguished position of a National Academies scholar. He founded and directed the National Academies Technology, Innovation, and Entrepreneurship Program and its Innovation Forum and directed research addressing the importance of semiconductor research and production to innovation and national security. In collaboration with Gordon Moore of Intel and Sematech CEO William Spencer, he produced a series of influential reports including *Securing the Future: Regional and National Programs to Support the Semiconductor Industry* and *Innovative Flanders: Innovation Policies for the 21st Century*, which reviewed the role of IMEC. His most recent publication, *Regional Renaissance: How New York's Capital Region Became a Nanotechnology Powerhouse* (Springer, 2020) documents how state and private sector investments in universities, institutions, and infrastructure created a vibrant semiconductor cluster that drove regional growth. He is also a leading U.S. expert on Sematech, the U.S. semiconductor consortium; the Manufacturing Extension Partnership; and the Small Business Innovation Research (SBIR) program, which provides awards to promising small businesses and startups. Reflecting his commitment to transatlantic cooperation, he was awarded the Order of Merit by the president of France. Reflecting his expertise in global innovation policy, he closely cooperates with the director of CSIS's Renewing American Innovation.

Thomas Howell is an international trade attorney (currently in solo practice) serving as a consultant to CSIS's RAI. During the course of his 40-plus-year legal career, he has represented U.S.-based semiconductor companies and organizations in matters such as the U.S.-Japan trade disputes and litigation of the 1980s, the formation of Sematech in 1986–1987, trade disputes with China (including the first WTO dispute settlement challenge to that country in 2003), and numerous other public policy initiatives. He served as a member of the Defense Science Board on Secure Microchip Supply in 2004. He has also represented U.S.-based industries in trade disputes and litigation in telecommunications equipment, soda ash, photographic film and paper, flat-rolled steel, and renewable energy equipment. In conjunction with his legal work, he developed a specialization in field research in Asia and Europe to produce analytic studies for clients. His subjects include industrial, research, and science and innovation policies outside the United States and foreign market barriers to U.S. exports and investment. The National Academy of Sciences has commissioned and published many of his works, and he has contributed to the academy as a contract writer/researcher producing numerous peer-reviewed chapters and book-length studies. He has published numerous articles and books, the most recent of which was coauthored with Charles Wessner, *Regional Renaissance: How New York's Capital Region Became a Nanotechnology Powerhouse* (Springer Nature, 2020). He is a graduate of Harvard College (1971) and the Boston University School of Law (1977).

Phillip Singerman is a recognized national innovator in public–private partnerships to promote economic development, job creation, and national security and a senior adviser (non-resident) with CSIS's RAI. His five-decade career includes senior executive positions in the private and public sectors at the local, state, and federal levels. He currently serves as a senior advisor to the American Manufacturing Communities Collaborative; member of the board of directors, Maryland Technology Development Corporation; and an affiliate at the Technology Partnership Office, National Institute

of Standards and Technology (NIST), as well as an elected fellow at the National Academy of Public Administration. From 2010 to 2020, he was the first associate director for Innovation and Industry Services at NIST, one of the agency's three senior career executives, and responsible for NIST's Hollings Manufacturing Extension Partnership and the Manufacturing USA Innovation Institute National Network. From 1995 to 1999, he served as the U.S. assistant secretary of commerce for economic development, where he directed the Economic Development Administration. He was the founding chief executive of two of the best-known technology-led economic development public–private partnerships: Philadelphia's Ben Franklin Partnership for Technological Innovation (1983–1995) and the Maryland Technology Development Corporation (1999–2005). His private sector experience includes serving as venture partner with Toucan Capital Corporation, a $120 million private venture capital firm investing in early-stage life science companies, and senior vice president, B&D Consulting. He received his BA from Oberlin College and his PhD from Yale University and taught at Barnard College (Columbia University), Yale University, and the Fels Center of Government at the University of Pennsylvania.

Hideki Tomoshige is a fellow for RAI at CSIS, where he conducts research on U.S. science and technology policy, regional innovation hubs, export controls, and other economic security policies. He has written extensively on strategic investment policy for the semiconductor and quantum industry in the United States and the legislative process relative to Committee on Foreign Investment in the United States (CFIUS) reform. Prior to joining RAI, he conducted research on economic security policy and cybersecurity policy for a member of parliament in Japan's Diet. Hideki earned his MA in American foreign policy and international economics from the Johns Hopkins University School of Advanced International Studies (SAIS) and his BA in law from Keio University.

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