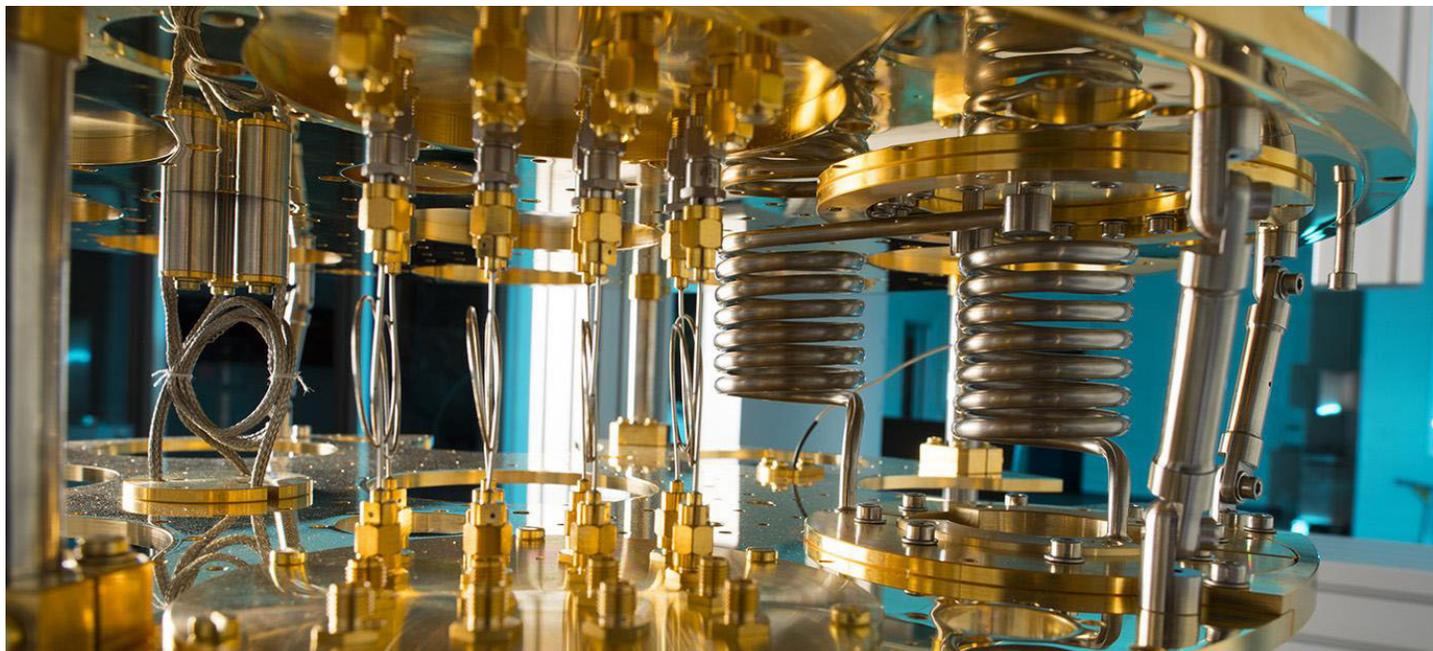


# Chicago Quantum Exchange

Quantum information science — which uses the properties of quantum physics to advance fields of science and engineering involving computation, communication, and precision measurement — was once purely theoretical. Today, Chicago Quantum Exchange scientists are accelerating discovery and innovation in this rapidly developing area of quantum technology, leading the effort to put it into practice.



## BY THE NUMBERS

## Leveraging expertise across disciplines

130+

Researchers in areas of quantum information technology

The Chicago Quantum Exchange (CQE) is an intellectual hub and research community dedicated to advancing academic and industrial efforts in the science and engineering of quantum information. CQE promotes the exploration of quantum information technologies and the development of new applications. It leads the nation in educating and training the quantum workforce of tomorrow. The CQE develops and fosters collaborations, joint projects, and information exchange between member and partner institutions.

\$260M+

Federal funding in FY20 to CQE member institutions

Headquartered at the University of Chicago's Pritzker School of Molecular Engineering, the CQE is a partnership between UChicago, Argonne National Laboratory, Fermi National Accelerator Laboratory, University of Illinois at Urbana-Champaign, University of Wisconsin-Madison, and Northwestern University. It brings together more than 130 researchers from across the Midwest.

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Institutions across the Chicago area

The CQE includes includes twenty corporate partners that enable industry-academic collaborations and provide opportunities to the next generation of quantum scientists and engineers. It also includes two international partners, QuTech and the Centre of Excellence for Quantum Computation and Communication Technology (CQC<sup>2</sup>T) at the University of New South Wales, Australia; and two non-profit partners, the Quantum Economic Development Corporation (QED-C) and P33.

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Corporate partners

[quantum@uchicago.edu](mailto:quantum@uchicago.edu) • [chicagoquantum.org](http://chicagoquantum.org) • 773.834.8054



# Chicago Quantum Exchange

## Solving real-world problems

Chicago Quantum Exchange (CQE) researchers are exploring quantum information to develop new applications with the potential to dramatically improve technology for communication, computing, and sensing. They pursue the invention of new technologies in which all of these components harness the quantum world.

- CQE researchers are using principles of quantum entanglement to develop encryption that could offer a revolutionary new scheme of securing information. This quantum-based security will be a game-changer for government, finance and other industries that depend on fast, encrypted communications.
- CQE researchers and other partners have developed a testbed, the quantum loop, a 52-mile fiber network in the Chicago suburbs for real world tests of quantum technology. It is among the longest land-based quantum networks in the nation and is a critical step in developing a national quantum internet. Argonne plans to scale the network by developing a two-way quantum link network with Fermilab.
- CQE researchers are improving superconducting and semiconductor qubit technology, lengthening the amount of time a qubit is operational. This could have an enormous impact on the performance of quantum computers.



## Training tomorrow's quantum engineers

As the field of quantum information science continues to expand, so will the demand for quantum scientists and engineers in industry, government, and at universities.

The Chicago Quantum Exchange is helping to educate the quantum scientists and engineers of the future at all levels through:

- **Undergraduate and graduate programs** at most of our member institutions, including a master's program in quantum computing at UW-Madison
- **Postdoctoral fellowships**, including a postdoctoral training program, funded through a partnership with IBM Q
- **Internships with industry partners**, such as Quantum Opus and HRL
- **The Quantum Information Science and Engineering Network (QISE-NET)**, a graduate student training opportunity that groups graduate students with an academic advisor and one from a national laboratory or industry
- **Certificates Program in Quantum Engineering and Technology**, a new series of certificates that help mid-career scientists and engineers pivot to a career in quantum research and technology

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