

Canadian startup accelerates development of quantum photonics

Quantum computing is set to revolutionize our future by transforming how we process information. This could vastly enhance machine learning, optimize complex problems, and lead to breakthroughs in fields such as cryptography and drug discovery.

Although still in its early stages, the potential of quantum computing to reshape our world is immense, promising advancements that could redefine the boundaries of technology and knowledge.

Standing in the way of quantum application development—projected to become a \$5B market in the coming years—are complex technological hurdles. Among them are scalability, and in quantum photonics, the ability to harness and control the intricacies of light.

A Canadian quantum hardware startup spun from the University of Waterloo, Q-Block Computing, works to solve these challenges, delivering quantum devices for advanced computation, communication, and sensing applications.



Dr. Kyung Soo Choi,
Q-Block Computing
Founder and CEO.

“Our mission is to develop fault-tolerant quantum systems using the fundamental building blocks of nature—atoms and photons,” said Dr. Kyung Soo Choi, Q-Block Computing Founder and CEO. “Our solutions harness that immense power for computation, helping quantum researchers and developers explore the limits of what is computable, and providing critical solutions for applications around the world, including those related to defense and security.”

Q-BLOCK COMPUTING HELPS PROPEL QUANTUM TECHNOLOGY

Choi has been researching quantum science and technology for more than 20

years, serving as a professor at the University of Waterloo and its Institute for Quantum Computing, Korea Institute of Science Technology, and Caltech. During that time, he developed four critical photonic tools to aid his quantum research, including an ultra stable laser, quantum-limited photodetector, high-speed optical modulator, and ultra-high-Q optical resonator.

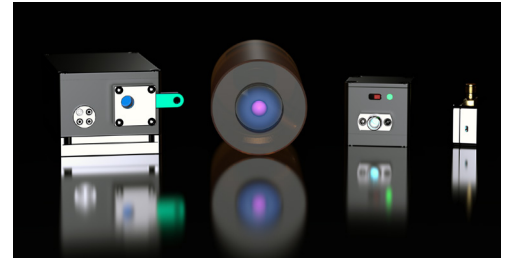
In 2020, he commercialized those tools for use by other researchers in quantum development and created Q-Block Computing to build on their potential. The photonics tools led to the creation of the company’s flagship product, the Q-block module, an integrated quantum photonic platform for scalable operations of hundreds of thousands of laser fields.

In addition to providing solutions for quantum R&D, the startup creates quantum sensing and communications solutions for the defense and security markets. The Canadian military is currently using prototypes of its Q-block modules, including AllanQ, a quantum clock solution for radar systems in long-range object detection and characterization, and LuciaQ, Q-Block Computing’s quantum memory solution for scalable quantum networking and in-network quantum computing.

US EXPANSION THROUGH LUMINATE NY

Q-Block Computing is looking to expand its defense and security applications to the U.S. market, including with the Department of Defense, and has turned to Luminate NY, an international accelerator program focused on helping early-stage companies advance their businesses and optics, photonics, and imaging (OPI) enabled technologies, for support. The startup is one of ten companies participating in cohort seven of Luminate and competing for additional funding.

Luminate has helped Q-Block Computing strengthen relationships with sever-



Ultra stable laser, quantum-limited photodetector, high-speed optical modulator, and ultra-high-Q optical resonator.

al suppliers in the Rochester region, and provided valuable networking opportunities within the OPI community to help the startup expand its reach in the US defense and security industries.

“The skills we have learned from Luminate workshops have helped us align our business to better serve our existing customers, and to win some very important new contracts,” said Choi. “Coming from a purely academic background, we also benefited from the leadership and general business training Luminate has provided.”

“Rochester’s tech and OPI expertise and resources allows Q-Block to further develop its quantum solutions and access the talent it needs to expand its reach,” said Dr. Sujatha Ramanujan, Managing Director of Luminate and Chief Investment Officer at NextCorps. “With the support of the Rochester region, they are empowered to accelerate the development of quantum and enable its use in important photonics applications.

Luminate is a program that helps startups working on OPI-enabled technologies improve their investability and scale their businesses faster. Companies selected for the program receive an initial investment of \$100,000 to participate in the six-month hybrid program, along with support to improve their path to commercialization. On September 26 at Finals 2024 at The Theatre at Innovation Square, the companies in Cohort 7 will compete for up to \$2 million in follow-on investment. The program is funded by Empire State Development’s Finger Lakes Forward Upstate Revitalization Initiative. For more about the program and to register to attend Finals 2024 in person or via live streaming, visit luminate.org.