



# Q-NEXT

## NEXT GENERATION QUANTUM SCIENCE AND ENGINEERING

*We advance the state-of-the-art in quantum information science and technology to ensure U.S. leadership in this economically crucial arena.*

Q-NEXT, a U.S. Department of Energy (DOE) National Quantum Information Science Research Center led by Argonne National Laboratory, is a partnership of national laboratory, academic and industry collaborators, formed to accelerate progress in quantum information science (QIS). Advances in QIS have the potential to revolutionize a range of information technologies, including quantum computing, quantum communications and quantum sensing.

### STRENGTHENING U.S. LEADERSHIP

The U.S. must maintain a leadership position in research and development to ensure its global competitiveness in the new quantum economy and to maintain an edge in national security. Q-NEXT is uniquely qualified to help realize that vision.

### OUR TEAM

Q-NEXT brings together world-leading facilities and infrastructure needed to advance QIS technology. In addition to Argonne, Q-NEXT also includes DOE's SLAC National Accelerator Laboratory and Pacific

Northwest National Laboratory, nine universities and ten U.S. industry partners from across the country.

Q-NEXT member institutions are leaders in QIS, including quantum information theory, high-performance computation, quantum experimental science, basic discovery science, advanced computing and high-energy physics.

### OUR MISSION

The Q-NEXT mission is to develop the science and technology to control and distribute quantum information. The center will develop technologies to enable secure communication over long distances using quantum repeaters; quantum sensors that will achieve unprecedented sensitivities; and processing and test beds for quantum simulators and future full-stack universal quantum computers.

Q-NEXT will also create two national foundries for quantum materials, establish a first-ever National Quantum Devices Database for the standardization of next-generation quantum devices, and train the next-generation quantum workforce through innovative programs with industry, academia and government.

### SECTORS IMPACTED

- Computing
- Telecommunications
- Energy
- Financial services
- Materials and chemicals
- Meteorology
- Pharmaceuticals
- Transportation and logistics

### INNOVATION ECOSYSTEM

Q-NEXT will achieve its mission through science at scale. In bringing together nearly 100 leading experts in quantum science and engineering from national laboratories, universities and industry, Q-NEXT will provide a quantum ecosystem that will enhance U.S. competitiveness by accelerating technology commercialization for the emerging "quantum economy."

## QUANTUM FOUNDRIES

Q-NEXT will establish two quantum foundries as a national resource to provide new sources of pristine, standardized materials and devices that will support both known and yet-to-be-discovered quantum-enabled applications. The center will also establish the first-ever National Quantum Devices Database, which will promote the development and fabrication of next-generation quantum devices.

## GROUNDBREAKING TECHNOLOGIES

Q-NEXT research will focus on communications, to distribute quantum information robustly and securely over long distances; sensing, with transformational applications in physics, materials and life sciences; and processing and testing, with applications in quantum simulators, cryptanalysis and logistics optimization.

## CAREERS FOR THE NEXT GENERATION

Q-NEXT will develop our nation's future quantum workforce. The quantum computers of the future will need scientists and engineers — in training now — to build, program and maintain them. As we learn more about quantum materials, quantum scientists will be needed to harness this barely tapped potential. Our universities and national labs provide some of the very first and few available training and hands-on experiences.

Q-NEXT member institutions are preparing tomorrow's quantum workforce through novel institutional degree programs, cooperative training programs with industry and re-training certificate programs that help classically trained scientists and engineers prepare for careers in QIS.

## NATIONAL LABORATORIES



## ACADEMIA



Cornell University



PennState

Stanford

UC SANTA BARBARA



ILLINOIS



## INDUSTRY



### WE BRING TOGETHER

- World-leading experts
- State-of-the-art research facilities
- Existing projects and collaborations

### OUR TEAM

- 3 national laboratories
- 9 universities
- 10 industry partners

## CONTACT

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