



## FAST FACTS

**23**

Federal agencies involved in the National Quantum Initiative

**2018**

Year the National Quantum Initiative Act became law and the National Strategic Overview for Quantum Information Science was released

**\$2.6B**

Total U.S. Government investment in the National Quantum Initiative

**13**

Major National Quantum Initiative Research Centers and Institutes

**~2000**

Number of QIS R&D grants since the NQI, which engage over 1000 scientists and engineers from over 250 different institutions in 47 states

**>130**

Number of companies currently participating in the Quantum Economic Development Consortium

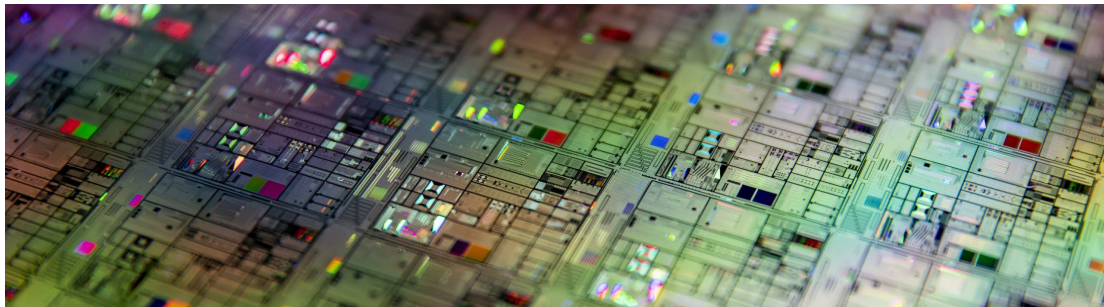
**41**

Number of U.S. Government-supported Nobel Laureates honored for quantum studies

**1994**

First U.S. Government workshop on quantum computing

## NATIONAL QUANTUM INITIATIVE



### OVERVIEW

Quantum-based technologies have already transformed society and the American economy. Examples include the Global Positioning System (GPS) for navigation, Magnetic Resonance Imaging (MRI) for medical imaging, semiconductors for computer chips, and lasers for telecommunications. Quantum information science (QIS), holds promise for another revolution in technology, with new, more powerful approaches to computing, networking, and sensing. **The National Quantum Initiative (NQI) is a whole-of-government approach to ensuring American leadership in QIS.**

The 2018 NQI Act, along with recent National Defense Authorization Acts (NDAA's), are accelerating U.S. research in QIS. A coordinated approach engaging over 20 Federal departments and agencies in QIS research and development (R&D), is creating new knowledge, broadening industrial capabilities and enhancing opportunities for prosperity and security.

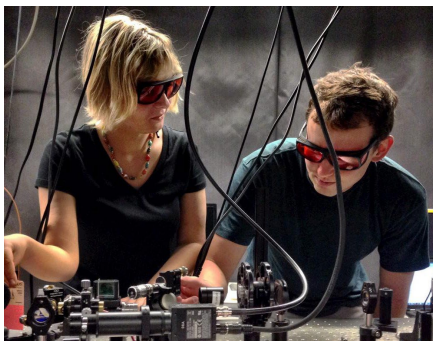
### THE STRATEGY

The National Strategic Overview for QIS outlines the U.S. strategy for QIS R&D, with an emphasis on the science, workforce, industry, infrastructure, security, and international cooperation. The strategy focuses on:

- **Getting the science right** by understanding the applications and timelines by which QIS will benefit society, and the roadblocks we must overcome to get there.
- **Enhancing competitiveness** by accelerating technology development toward useful economic and mission applications of QIS and working with international partners, while also protecting national security.
- **Enabling people** by building the necessary talent pathways and ensuring that QIS creates new opportunities for all Americans.

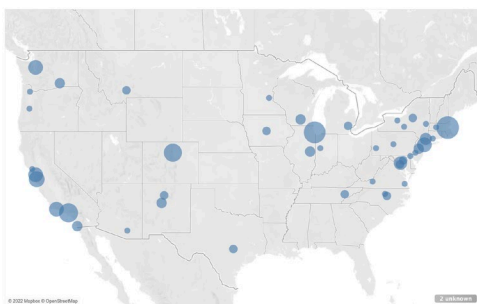
**DID YOU KNOW?** Planck's constant is a fundamental constant in quantum physics that plays a role in numerous phenomena, such as converting light into energy in solar cells. In 2019, the value of Planck's constant was defined to be  $6.62607015 \times 10^{-34}$  J·s (or  $4.1356679 \times 10^{-15}$  eV·s), and now the kilogram is based on Planck's constant.





## GETTING THE SCIENCE RIGHT

Today, the National Institute of Standards and Technology (NIST), National Science Foundation (NSF), National Aeronautics and Space Administration (NASA), Department of Energy (DOE), Department of Defense (DOD), and Intelligence Community (IC) fund centers and core programs that support thousands of scientists and students in national labs, in universities, and with industry partners across the country.

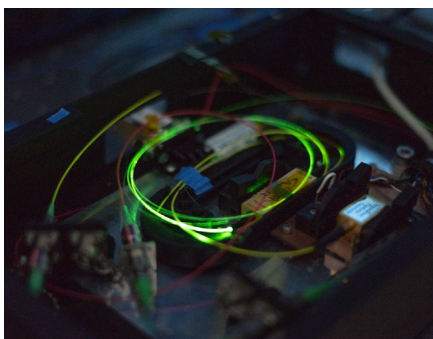


The 13 major NQI research centers and their affiliates. Core programs, which span much of the rest of the United States, are not shown.



## ENHANCING COMPETITIVENESS

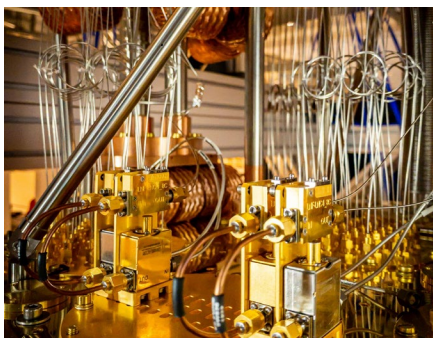
The Quantum Economic Development Consortium (QED-C), an industry-led consortium established as part of the NQI, is fostering collaborations to address gaps in technology, standards, applications, workforce, and supply chains for quantum technologies.



International collaboration accelerates discoveries and provides an avenue to deepen relationships between nations. With more than a dozen countries launching National-level programs in the last few years, it is critical to work with partners to identify and develop applications that will benefit the world. In support of such ideals, the United States has been party to several cooperation statements focused on QIS. These highlight the intention to deepen good-faith cooperation in quantum technologies, underpinned by our shared principles, including freedom of inquiry, openness, transparency, honesty, equity, fair competition, objectivity, and democratic values. These agreements can facilitate deeper cooperation such as a coordinated review process, reciprocal or joint funding, and student and researcher exchange to the benefit of both parties.

## ENABLING PEOPLE

There are a number of great jobs that use quantum technologies. Plans to grow opportunities and get more people involved are outlined in the recent QIS workforce development strategy. As one example, the National Q-12 Education Partnership was spearheaded by the Office of Science and Technology Policy (OSTP) and NSF to foster a range of opportunities for early engagement with quantum concepts. Companies, non-profits, universities, professional organizations, and teaching societies are engaging with this partnership to curate educational materials. This partnership created QuanTime to bring online and hands-on activities to students as part of World Quantum Day.



In addition to introducing broader audiences to QIS, the national strategy identifies ways to enhance QIS-specific professional education and training opportunities, and to make careers in QIS and related fields more accessible and equitable. As one example, a new solicitation engages institutions not yet deeply involved in QIS to help build capacity, providing new opportunities for students to participate in QIS research at a greater number of institutions.

