Expanding the Frontiers of Quantum Science

FACTSHEET

As a leading federal funder of quantum information, science, engineering and technology (QISET), the U.S. National Science Foundation is at the forefront of discovery, exploring the fundamental research questions that have enabled the innovations of today and will drive the quantum revolution of tomorrow.

FAST FACTS

$347,790,000

NSF annual investments in QISET research in FY2022.

9,250

Faculty, research students and postdoctoral fellows engaged in QISET research funded by NSF in 2023.

261

Universities and colleges with NSF grants on QISET active in 2023.

281

Granted QISET patents which acknowledge NSF funding[1].

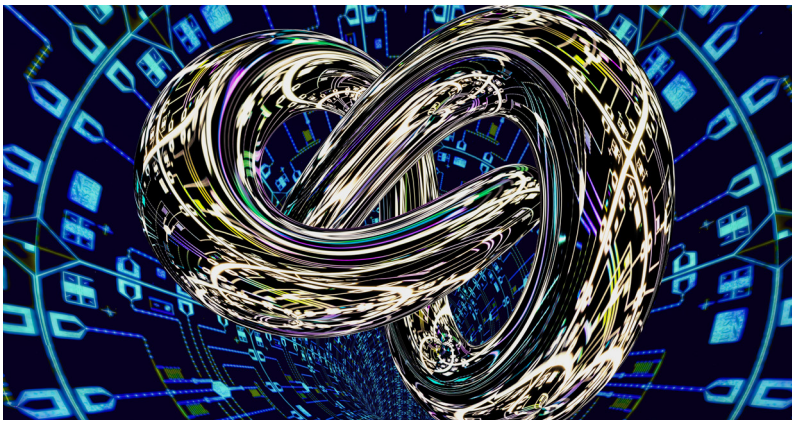
44

Nobel laureates honored for quantum science during 1964-2024 who received funding from NSF.

99

NSF Graduate Research Fellowship Program Fellows working on QISET topics in 2023.

[1] As found through the Dimensions database.

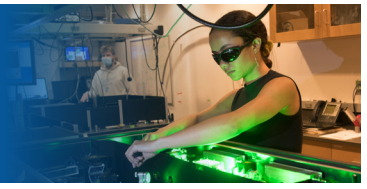


NSF 75 YEARS OF DISCOVERY & INNOVATION

2025 marks the 75th anniversary of NSF. Throughout the year, the agency will host in-person and virtual activities to commemorate this significant milestone.
For more information, visit: new.nsf.gov/75years

GPS navigation, MRI scanners and lasers that enable today's internet are a few examples of quantum technologies that have already transformed society and the American economy. The quantum future promises new possibilities with even more profound scientific and societal impacts. Companies and nations worldwide are accelerating quantum research and development (R&D), as new quantum sensing, computing, modeling and networking technologies have global economic and security implications. This rapidly developing environment magnifies the value of major research, workforce development and infrastructure efforts. Building upon decades of discovery-oriented research, NSF funding in QISET continues to propel the nation forward as a leading developer of quantum technology. NSF investments are a key component of the National Quantum Initiative and align with the National Science and Technology Council's *National Strategic Overview for Quantum Information Science*.

NSF partners in quantum research with private organizations such as Amazon, Microsoft and IBM as well as the Department of Energy, the National Institutes of Standards and Technology and other government agencies.



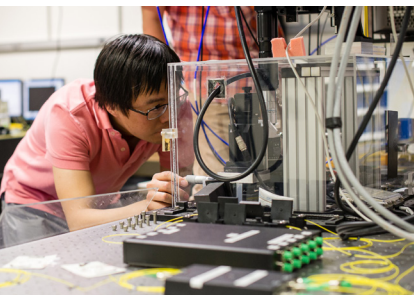
NSF'S QUANTUM PORTFOLIO

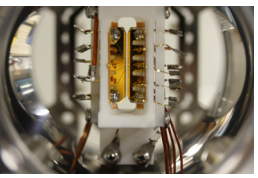
NSF investments continue to enable cutting-edge science and engineering in quantum computing, sensing, networking and simulation. Goals include answering key science and engineering questions; delivering proof-of-concept devices and systems with demonstrable quantum advantages; and empowering the full spectrum of talent to engage in the QISET R&D enterprise. NSF investments in QISET build upon the agency's long-standing foundational and translational activities as well as more recent opportunities for interdisciplinary teams, centers and targeted workforce development efforts.

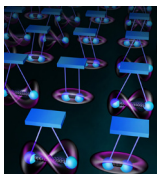
DID YOU KNOW?

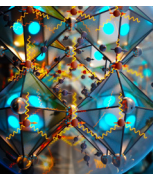
With NSF funding, researchers at the NSF Physics Frontiers Center for Ultracold Atoms and the startup company QuERA used trapped atoms to make a quantum computer prototype with 48 logical qubits.

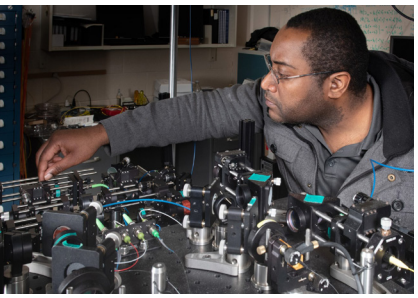
Learn more at: https://new.nsf.gov/focus-areas/quantum











Cutting-edge science and collaborations

NSF is uniquely positioned to build bridges across all quantum-related disciplines and to nurture partnerships with academia, industry and international allies — all of which are vital to advancing quantum discoveries. The following are some examples:

NSF Quantum Leap Challenge Institutes are large-scale interdisciplinary research centers that leverage expertise from various research institutions and industries to address research and workforce development challenges across all areas of QISET.

NSF Transformational Advances in Quantum Systems programs support teams of three or more investigators with collaborative, interdisciplinary projects that apply quantum information science engineering concepts. The most recent solicitation focused on developing new concepts, platforms and approaches to implementing and utilizing quantum sensors.

NSF Convergent Accelerated Discovery Foundries for Quantum Materials Science, Engineering and Information accelerate the translation of fundamental materials engineering and information research for quantum applications.

Expanding quantum innovation across America

In addition to sustaining the impactful work in QISET being done across the nation, NSF constantly strives to engage new individuals and institutions in leading the quantum revolution. Some examples include:

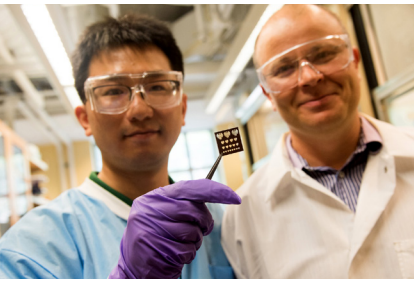
NSF Expanding Capacity in Quantum Information Science and Engineering program increases research capacity and broadens participation in quantum information science and engineering and related disciplines.

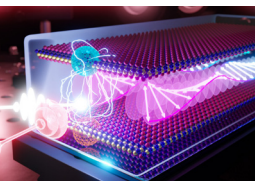
NSF National Quantum Virtual Laboratory will provide shared infrastructure to develop and translate use-inspired and application-oriented quantum technologies.

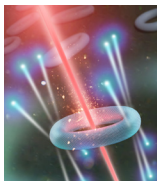
NSF Convergence Accelerator Track C: Quantum Technology projects develop quantum technologies — sensors, hardware, networks and simulations — to deploy in applications such as autonomous vehicles, health care and the development of a future quantum internet.

BUILDING ADVANCED QUANTUM COMPUTER AND NETWORK PROTOTYPES

Quantum computers have the potential to perform tasks currently impossible on even the world's most powerful supercomputers. Quantum networks will one day allow distributed quantum computing architectures, as well as sensing and communication technologies, to generate new quantum-based services and applications. NSF projects are helping to make both quantum computers and networks a reality. For example the NSF Software-Tailored Architecture for Quantum Codesign project at Duke University brings together physicists, computer scientists and engineers who have outlined a path to a practical quantum computer, while the NSF Engineering Research Center for Quantum Networks, led by the University of Arizona, is laying the foundations for a socially-responsible quantum Internet.







Training the quantum workforce

NSF trains and empowers a diverse, quantum-literate workforce that will drive and implement quantum innovations well into the future. Some examples include:

NSF Building "Triplets" to Bridge Academia and Industry initiative links the talents and resources of academia and industry by creating three-person teams of university faculty, industrial researchers and graduate students who work together on quantum challenges.

National Q-12 Education Partnership, established by NSF and the White House Office of Science and Technology Policy, works with America's educators to ensure a strong quantum learning environment by providing educational materials, classroom tools for hands-on experiences and career pathway support.

NSF funds teacher training programs, such as Quantum for All and Quantum Education for Students and Teachers, to provide high school science teachers with background materials, curriculum content and support for implementing QISET modules in their courses.

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