

# **The National Quantum Initiative Reauthorization Act**

## Section-by-Section

### **Section 1. Short Title:**

This section states the short title of the bill.

### **Section 2. Definitions:**

This section adds engineering and technology to the understood definition of “Quantum Information Science” to make it the more inclusive phrase, “Quantum Information Science, Engineering, and Technology” (QISET). It also defines “STEM,” “Foreign Country of Concern,” “Quantum Applications,” “Quantum Computing,” “Foreign Entity of Concern,” “Federal Laboratory,” and “National Laboratories” consistent with their use in the CHIPS and Science Act and other laws.

### **Section 3. Purposes:**

This section adds the facilitation of cooperative research investments with allies of the United States, the development and retention of a quantum workforce, the development of quantum applications, the promotion of commercialization, and strengthening and securing the quantum supply chain as purposes of the Act.

### **Section 4. National Quantum Initiative Program:**

This section adds near, medium, and long-term demonstration activities as a component of the quantum ten year plan. It also includes changes to ensure relevant quantum provisions of legislation outside the National Quantum Initiative Act are considered in interagency planning and coordination activities.

### **Section 5. National Quantum Coordination Office:**

This section establishes a four year term of service for the Director of the National Quantum Coordination Office, subject to renewal.

### **Section 6. Subcommittee on Quantum Information Science:**

This section directs the Subcommittee on Quantum Information Science (QIS) to promote application development, demonstration, and commercialization. It formally adds the Department of Health and Human Services, Department of State, Department of Homeland Security, and National Oceanic and Atmospheric Administration to the QIS. It also directs the QIS to facilitate interagency partnerships to advance quantum applications in other advanced technology sectors. It includes a technical edit to the application of the Federal Advisory Committee Act (5 USC App). The section also adds a requirement that the QIS describe agency roles and responsibilities in its Report on Quantum Networking and Communications.

### **Section 7. National Quantum Initiative Advisory Committee:**

This section adds ‘end users’ to the National Quantum Initiative Advisory Committee and directs the advisory committee to assess other countries quantum programs and progress relative to U.S. quantum programs. It also directs the advisory committee to assess the needs and goals of the Program, including infrastructure and supply chain needs. It also tasks the advisory committee with assessing how quantum technologies can enhance the advanced industrial economy and protect critical infrastructure.

### **Section 8. Subcommittee on the Economic and Security Implications of Quantum Information Science:**

This section adds the Department of Health and Human Services, Department of State, and the National Aeronautics and Space Administration to the Subcommittee on the Economic and Security Implications of Quantum Information Science. It directs the subcommittee to increase coordination between civilian, military, and intelligence quantum research entities and reduce unnecessary duplicative efforts, and also requires the subcommittee to recommend strategies for attracting and retaining students and scholars in quantum fields.

### **Section 9. International Quantum Cooperation Strategy:**

This section directs the Director of the Office of Science and Technology Policy to develop a strategy to establish collaborative international partnerships with allies and partners of the United States, ensure U.S. participation in bilateral and multilateral quantum science efforts, protect the integrity and impartiality of international standards organizations, and ensure ethical application of QISET. The Director is required to brief Congress on the Strategy once it is finished.

### **Section 10. Sunset:**

This section extends the sunset of the Quantum Office through December 30, 2030.

### **Section 11. National Institute of Standards and Technology Activities and Quantum Consortium:**

This section adds new activities for NIST to carry out under the Act, including: carrying out R&D and demonstration projects to facilitate the development and standardization of quantum applications; carrying out research to support measurement of comparative performance and progress of quantum technologies, including technology readiness assessments; promoting U.S. participation in international standards organizations related to quantum; and establishing infrastructure necessary to advance research programs.

The section also adds the acceleration of real-world uses of quantum systems to the goals of the Quantum Economic Development Consortium (QED-C) and directs the QED-C to identify enabling technologies and supply chains essential to the scientific and economic competitiveness of the U.S. quantum ecosystem. Other tasks added to the QED-C include: identifying supply-chain supporting technology to support quantum efforts; assessing, identifying, and expanding international research partnerships; and engaging with other Federal agencies to promote the use of quantum technologies.

The section also directs NIST to promote, establish, and support international quantum R&D, metrology research, and standardization activities to enhance U.S. participation in international standards and requires such activities align with the National Quantum Information Science Strategy. It includes guardrails that prohibit the obligation of funds to foreign entities of concern.

The section also authorizes, of the funds provided to NIST for scientific and technical research and services laboratory activities in the CHIPS and Science Act of 2022, up to \$85 million each year until 2027, to carry out the activities in this section.

**Section 12. NIST Quantum Centers:**

This section authorizes NIST to establish new, purpose driven Quantum Centers. Consistent with existing NSF and DOE centers, these new quantum centers (up to three) will accelerate R&D, deployment, and standardization activities at NIST and will prioritize quantum sensing and measurement and quantum engineering. The section authorizes up to \$54 million for each fiscal year 2024 through 2028 to support the Centers.

**Section 13. Quantum Information Science Research and Education Program:**

This section adds the requirement that National Science Foundation (NSF) pursue basic and use-inspired research of QIS and explore solutions to important challenges for the development and application of QIS to NSF's activities. It also directs NSF to provide infrastructure to support QISET research and activities. It amends and enhances NSF's authorized workforce development activities by: adding fellowships and other models to existing traineeship activities at NSF; authorizing the NSF Director to establish fellowships and scholarships through a new program or existing programs to increase quantum science exposure for undergraduate and graduate STEM students; authorizing NSF to encourage proposals in quantum science as part of its Research Experiences for Undergraduates program; and directing NSF to encourage awardees to partner with industry, nonprofits, and Federal agencies to facilitate the expansion of workforce pathways.

The section also directs NSF to promote, establish, and support international quantum research, enhance international cooperation, and meet U.S. obligations or commitments in bilateral or multilateral quantum research agreements. NSF is directed to prioritize research with countries that have signed Quantum Cooperation Statements with the United States and restrict the use of funds for research activities at Confucius Institutes or with a foreign country of concern.

The section authorizes, of the funds provided to NSF for research and related activities in the CHIPS and Science Act of 2022, up to \$141 million each year until 2027, to carry out the activities in this section.

**Section 14. Multidisciplinary Centers for Quantum Research and Education:**

This section adds the requirement that center applicants describe how they will develop and implement activities to increase participation of women and other groups historically underrepresented groups from STEM fields (consistent with CHIPS and Science). It adds the requirement that center applicants describe how they will participate in international collaborations and build global research networks with allies and partners of the United States.

This section authorizes up to \$100 million for each fiscal years 2024 through 2028 to support up to ten Centers.

**Section 15. QREW Coordination Hub and Quantum Testbeds**

This section authorizes NSF to establish a new Quantum Reskilling, Education, and Workforce (QREW) Coordination Hub. This hub will be focused on addressing cross-cutting workforce development challenges in QISET and facilitating the establishment of programs to disseminate quantum educational curricula. The hub must be established as a consortium that includes at least two community colleges, technical schools, nonprofit organizations, or private sector entities. The section specifically directs the hub to facilitate post-education employment opportunities for STEM graduates in the quantum industry through various activities. The hub shall coordinate with the QED-C to ensure robust stakeholder participation and build employment pipelines.

This section authorizes \$10 million for each fiscal year 2024 through 2028 to carry out the section.

The section also authorizes NSF to establish new Quantum Testbeds for quantum technology application research and development. The testbeds are directed to support translational research for near-term and medium-term use cases and provide research and testing resources for likely use-cases. NSF is tasked with keeping a record of notable technology outcomes, establishing a process for identifying quantum technologies with significant utility potential for government use, and briefing Congress on testbed activities and outcomes. NSF must coordinate with the QED-C, National Laboratories, other NSF Centers, and quantum industry.

This section authorizes \$50 million for each fiscal year 2024 through 2028 to carry out the section.

**Section 16. Department of Energy Quantum Information Science Research Program:**

This section adds cooperative research with industry, National Laboratories, institutions of higher education, and others as a component of the Department of Energy's research program. It also adds quantum modeling or simulation and application development in a range of areas as authorized research activities. The section directs the Department to develop a ten year strategic plan to guide Federal programs in designing, developing, and commercializing quantum-centric high-performance computing systems.

The section authorizes, of the funds provided to Department of Energy's Office of Science in the CHIPS and Science Act of 2022, up to \$130 million each year until fiscal year 2027, to carry out the activities in this section.

**Section 17. DOE Quantum Instrumentation and Foundry Program:**

This section authorizes DOE to establish a quantum instrumentation and infrastructure program to meet technology challenges and infrastructure needs unique to quantum supply chains. It requires DOE to coordinate with academia and industry to support the program.

This section authorizes \$25 million for each fiscal year 2024 through 2028 to carry out the section.

**Section 18. National Quantum Information Science Research Centers:**

This section makes technical edits to existing DOE centers and directs the centers to ensure collaborations are inclusive of the variety of viable quantum technologies and authorizes up to \$175 million for each fiscal year 2024 through 2028 to support the Centers.

**Section 19. Department of Energy Quantum Network Infrastructure Research and Development Program:**

This section directs DOE to leverage a diversity of quantum technologies and commercially available hardware and software, where applicable, adds coordination with the NASA Administrator, and strengthens DOE's authorization to develop quantum network and communications technology.

**Section 20. Department of Energy Quantum User Expansion for Science and Technology Program:**

This section adds the development of software and applications for near-term use to the QUEST Program. It also directs DOE to partner with users, the public sector, and the private sector to develop algorithms and other applications for cloud-based quantum computers and to develop training and education opportunities. The section adds NASA to the list of agencies DOE can partner with to carry out the QUEST Program, and it extends the authorization of the program for one year, authorizing \$38 million for fiscal year 2028.

**Section 21. NASA Quantum Activities:**

This section formally authorizes NASA to carry out basic and applied research in quantum. It directs NASA to submit a strategy for its research activities and identify resources required to support implementation of the strategy.

The section also authorizes NASA to establish its own Quantum Institute focused on space and aeronautics applications of quantum science. The NASA institute will meet requirements for existing NSF and DOE centers.

This section authorizes \$25 million for each fiscal year 2024 through 2028 to carry out the section.

**Section 22. Conforming Amendments**