

119TH CONGRESS
2D SESSION

H. R. 8462

To reauthorize the National Quantum Initiative Act, and for other purposes.

IN THE HOUSE OF REPRESENTATIVES

APRIL 23, 2026

Mr. WEBER of Texas (for himself, Mr. BABIN, and Mr. OBERNOLTE) introduced the following bill; which was referred to the Committee on Science, Space, and Technology

A BILL

To reauthorize the National Quantum Initiative Act, and
for other purposes.

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*

3 **SECTION 1. SHORT TITLE.**

4 This Act may be cited as the “National Quantum Ini-
5 tiative Reauthorization Act”.

6 **SEC. 2. DEFINITIONS.**

7 Section 2 of the National Quantum Initiative Act (15
8 U.S.C. 8801) is amended—

9 (1) by redesignating paragraphs (3), (4), (5),
10 (6), (7), the first paragraph (8) (relating to the defi-

1 nition of the “Subcommittee on Economic and Secu-
2 rity Implications”), and the second paragraph (8)
3 (relating to the definition of the “Subcommittee on
4 Quantum Information Science”) as paragraphs (4),
5 (8), (10), (13), (14), (16), and (17), respectively;

6 (2) by inserting after paragraph (2) the fol-
7 lowing new paragraph:

8 “(3) CONFUCIUS INSTITUTE.—The term ‘Con-
9 fucius Institute’ has the meaning given such term in
10 section 10339A of the Research and Development,
11 Competition, and Innovation Act (division B of Pub-
12 lic Law 117–167; 42 U.S.C. 19039).”;

13 (3) by inserting after paragraph (4), as so re-
14 designated, the following new paragraphs:

15 “(5) FEDERAL LABORATORY.—The term ‘Fed-
16 eral laboratory’ has the meaning given such term in
17 section 4 of the Stevenson-Wydler Technology Inno-
18 vation Act of 1980 (15 U.S.C. 3703).

19 “(6) FOREIGN COUNTRY OF CONCERN.—The
20 term ‘foreign country of concern’ has the meaning
21 given such term in section 10638 of the Research
22 and Development, Competition, and Innovation Act
23 (division B of Public Law 117–167; 42 U.S.C.
24 19237).

1 “(7) FOREIGN ENTITY OF CONCERN.—The
2 term ‘foreign entity of concern’ has the meaning
3 given such term in section 10638 of the Research
4 and Development, Competition, and Innovation Act
5 (division B of Public Law 117–167; 42 U.S.C.
6 19237).”;

7 (4) in paragraph (8), as so redesignated, by
8 striking “section 1001(a)” and inserting “section
9 1001”;

10 (5) by inserting after paragraph (8), as so re-
11 designated, the following new paragraph:

12 “(9) NATIONAL LABORATORY.—The term ‘Na-
13 tional Laboratory’ has the meaning given such term
14 in section 2 of the Energy Policy Act of 2005 (42
15 U.S.C. 15801).”;

16 (6) by inserting after paragraph (10), as so re-
17 designated, the following new paragraphs:

18 “(11) QUANTUM APPLICATIONS.—The term
19 ‘quantum applications’ means applications that use
20 quantum information science, engineering, and tech-
21 nology, including quantum algorithms and software,
22 quantum computing and quantum-classical hybrids,
23 quantum sensing, quantum networking, quantum
24 encryption, or quantum communications applica-
25 tions.

1 “(12) QUANTUM COMPUTING.—The term ‘quan-
2 tum computing’ means any of a variety of quantum
3 computing technologies, including quantum anneal-
4 ing and quantum gate-model systems that utilize a
5 variety of qubit architectures, such as super-
6 conducting, ion traps, photonics, neutral atoms,
7 atomic spin, electron spin, or topological qubits.”;

8 (7) by amending paragraph (13), as so redesign-
9 nated, to read as follows:

10 “(13) QUANTUM INFORMATION SCIENCE, ENGI-
11 NEERING, AND TECHNOLOGY.—The term ‘quantum
12 information science, engineering, and technology’
13 means the understanding, translation, use, or appli-
14 cation of the laws of quantum physics for the stor-
15 age, transmission, manipulation, computing, simula-
16 tion, or measurement of information.”; and

17 (8) by inserting after paragraph (14), as so re-
18 designated, the following new paragraph:

19 “(15) STEM.—The term ‘STEM’ means the
20 academic and professional disciplines of science,
21 technology, engineering, and mathematics, including
22 computer science.”.

23 **SEC. 3. PURPOSES.**

24 Section 3 of the National Quantum Initiative Act (15
25 U.S.C. 8802) is amended—

(1) in the matter preceding paragraph (1), by striking “science and its technology applications” and inserting “science, engineering, and technology”;

(2) in paragraph (1)—

(A) in the matter preceding subparagraph (A), by striking “science and technology” and inserting “science, engineering, and technology”;

(B) by amending subparagraph (A) to read as follows:

“(A) to expand the number of researchers, educators, and students with training in quantum information science, engineering, and technology to develop domestic workforce pathways and retain international talent to the extent consistent with national security and international competitiveness;”;

(C) in subparagraph (B), by striking “science at the” and inserting “science, engineering, and technology at the primary, secondary,”;

(D) in subparagraph (C), by striking “basic”;

(E) in subparagraph (D)—

1 (i) by striking “science and tech-
2 nology” and inserting “science, engineer-
3 ing, and technology”; and

4 (ii) by striking “and” after the semi-
5 colon; and

6 (F) by adding at the end the following new
7 subparagraphs:

8 “(F) to support development of quantum
9 applications, including quantum-hybrid applica-
10 tions, to promote innovation and commercializa-
11 tion; and

12 “(G) to support other emerging tech-
13 nologies that could benefit from or benefit the
14 development of quantum technology and pro-
15 mote research, development, demonstration, and
16 application of such technologies in quantum in-
17 formation science, engineering, and tech-
18 nology.”;

19 (3) in paragraph (2), by striking “science and
20 technology” and inserting “science, engineering, and
21 technology”;

22 (4) in paragraph (3), by striking “science and
23 technology” and inserting “science, engineering, and
24 technology”;

25 (5) in paragraph (4)—

1 (A) by inserting “National Laboratories,”
2 after “Federal laboratories,”; and

3 (B) by striking “and” after the semicolon;
4 (6) in paragraph (5)—

5 (A) in the matter preceding subparagraph
6 (A)—

7 (i) by inserting “partnerships, re-
8 search collaborations, and” after “inter-
9 national”; and

10 (ii) by striking “science and tech-
11 nology security” and inserting “science,
12 engineering, and technology”;

13 (B) in subparagraph (A)—

14 (i) by inserting “, social benefit,”
15 after “innovation”; and

16 (ii) by striking “and” after the semi-
17 colon;

18 (C) in subparagraph (B), by striking the
19 period and inserting “; and”; and

20 (D) by adding at the end the following new
21 subparagraph:

22 “(C) to facilitate cooperative investment in
23 quantum capabilities between the United States
24 and its allies and partners to strengthen and se-

1 cure the domestic supply chain and related eco-
2 system; and”; and

3 (7) by adding at the end the following new
4 paragraph:

5 “(6) improving the maturity, scale, and short-
6 and long-term viability of the quantum technology
7 industry, including small and medium-sized busi-
8 nesses and startups representing a diversity of quan-
9 tum specialties, and commercialization of domestic
10 quantum capacity across modalities.”.

11 **SEC. 4. NATIONAL QUANTUM INITIATIVE PROGRAM.**

12 Subsection (b) of section 101 of the National Quan-
13 tum Initiative Act (15 U.S.C. 8811) is amended—

14 (1) in paragraph (1)—

15 (A) by striking “development” and insert-
16 ing “research development, and near- and me-
17 dium-term, and long-term demonstration”;

18 (B) by striking “information science and
19 technology”; and

20 (C) by inserting “in diverse sectors” after
21 “applications”;

22 (2) in paragraph (2)—

23 (A) by striking “fundamental”;

1 (B) by striking “science and technology”
2 and inserting “science, engineering, and tech-
3 nology”; and

4 (C) by inserting “infrastructure,” after
5 “demonstration,”;

6 (3) in paragraph (3)—

7 (A) by striking “science and technology”
8 and inserting “science, engineering, and tech-
9 nology”; and

10 (B) by striking “pipeline” and inserting
11 “pathway”;

12 (4) by amending paragraph (4) to read as fol-
13 lows:

14 “(4) provide for interagency planning and co-
15 ordination of Federal quantum information science,
16 engineering, and technology research, development,
17 demonstration, standards engagement, and other ac-
18 tivities under the Program, including activities au-
19 thorized pursuant to section 234 of the John S.
20 McCain National Defense Authorization Act for Fis-
21 cal Year 2019 (10 U.S.C. 4001 note), quantum edu-
22 cational activities and programs authorized pursuant
23 to section 10661 of the Research and Development,
24 Competition, and Innovation Act (42 U.S.C. 19261),

1 and activities conducted at any Federal laboratory;”;

2 and

3 (5) in paragraph (5)—

4 (A) by striking “industry and universities”

5 and inserting “industry, universities, nonprofit

6 research organizations, and strategic allies”;

7 and

8 (B) by inserting “, including human re-

9 sources” after “resources”.

10 **SEC. 5. NATIONAL QUANTUM COORDINATION OFFICE.**

11 Section 102 of the National Quantum Initiative Act

12 (15 U.S.C. 8812) is amended—

13 (1) in subparagraph (A) of subsection (a)(2),

14 by inserting “, and who shall serve a four year term,

15 subject to renewal” before the semicolon; and

16 (2) in subsection (b)—

17 (A) in paragraph (3)—

18 (i) by striking “science and tech-

19 nology” and inserting “science, engineer-

20 ing, and technology research and work-

21 force”; and

22 (ii) by inserting “, nonprofit research

23 organizations,” after “universities”;

24 (B) by amending paragraph (4) to read as

25 follows:

“(4) ensure coordination among the collaborative ventures or consortia established under this Act;”;

(C) in paragraph (6), by striking “and” after the semicolon;

(D) in paragraph (7)—

(i) by inserting “nonprofit research organizations,” after “universities,”; and

(ii) by striking the period at the end and inserting a semicolon; and

(E) by adding at the end the following new paragraphs:

“(8) promote understanding and adoption of quantum capabilities throughout the United States economy, as appropriate; and

“(9) track and promote policies that will ensure stability of the United States quantum workforce, quantum supply chain, domestic quantum industry, and international trade.”.

**SEC. 6. SUBCOMMITTEE ON QUANTUM INFORMATION
SCIENCE.**

Section 103 of the National Quantum Initiative Act (15 U.S.C. 8813) is amended—

(1) in subsection (b)—

1 (A) in paragraph (8), by striking “and”
2 after the semicolon;

3 (B) by redesignating paragraph (9) as
4 paragraph (14); and

5 (C) by inserting after paragraph (8) the
6 following new paragraphs:

7 “(9) the Department of Health and Human
8 Services;

9 “(10) the Department of State;

10 “(11) the Department of Homeland Security;

11 “(12) the National Oceanic and Atmospheric
12 Administration;

13 “(13) the Department of Education; and”;

14 (2) in subsection (d)—

15 (A) in paragraph (1), by striking “the
16 quantum information science and technology re-
17 search” and inserting “quantum information
18 science, engineering, and technology research
19 and quantum application development, dem-
20 onstration, and commercialization”;

21 (B) in paragraph (4), by inserting “, engi-
22 neering, and technology” after “science”;

23 (C) in paragraph (5),

24 (i) by inserting “, engineering, and
25 technology” after “science”; and

1 (ii) by inserting “, and conduct com-
2 parative benchmarking of Federal invest-
3 ments and research strategies relative to
4 the investments and research strategies of
5 the United States’ strategic partners and
6 other countries” after “development ef-
7 forts”;

8 (D) in paragraph (6)—

9 (i) by striking “science and tech-
10 nology” and inserting “science, engineer-
11 ing, and technology”; and

12 (ii) by striking “and” after the semi-
13 colon;

14 (E) in paragraph (7)—

15 (i) by inserting “, engineering and
16 technology” after “science”; and

17 (ii) by striking the period and insert-
18 ing “; and”; and

19 (F) by adding at the end the following new
20 paragraph:

21 “(8) facilitate interagency partnership opportu-
22 nities to advance quantum applications related to
23 the environment, advanced manufacturing, bio-
24 technology, space, and other sectors.”;

1 (3) in subsection (h)(2)(A), by inserting “, in-
2 cluding a description of agency roles and responsibil-
3 ities” before the period; and

4 (4) by adding at the end the following new sub-
5 section:

6 “(i) QUANTUM USE CASES.—

7 “(1) IN GENERAL.—The Subcommittee shall
8 identify potential use cases with respect to which
9 quantum computing could advance the missions of
10 participating agencies, including through on-prem-
11 ises, cloud-based, hybrid, or networked approaches.

12 “(2) QUANTUM ON-RAMP.—For each potential
13 use case identified pursuant to paragraph (1), the
14 relevant Federal agency, in consultation with the
15 Subcommittee, may develop a plan to enable such
16 agency to address each such potential use case.

17 “(3) REPORTING.—The Subcommittee, as part
18 of the annual report on the budget for the Program
19 under subsection (g), shall report progress in car-
20 rying out the activities under this section, including
21 information relating to the following:

22 “(A) The potential use cases identified
23 pursuant to paragraph (1).

24 “(B) The status of plans developed pursu-
25 ant to paragraph (2).

1 “(C) Any obstacles to implementing
2 such—

3 “(i) potential use cases; or

4 “(ii) plans.”.

5 **SEC. 7. NATIONAL QUANTUM INITIATIVE ADVISORY COM-**
6 **MITTEE.**

7 Section 104 of the National Quantum Initiative Act
8 (15 U.S.C. 8814) is amended—

9 (1) by amending subsection (b) to read as fol-
10 lows:

11 “(b) **QUALIFICATIONS.**—The Advisory Committee
12 shall consist of members, appointed by the President, who
13 are—

14 “(1) representative of industry, including end
15 users likely to benefit from quantum technology and
16 small and medium-sized businesses and startups rep-
17 resenting a diversity of quantum specialties, univer-
18 sities, nonprofit research organizations, and Federal
19 laboratories; and

20 “(2) qualified to provide advice and information
21 on quantum information science, engineering, and
22 technology research, development, demonstrations,
23 standards, STEM education, technology transfer,
24 commercial application, or national security and eco-
25 nomic concerns.”;

1 (2) in subsection (d)(2)—

2 (A) in subparagraph (A), by striking
3 “science and technology” and inserting
4 “science, engineering, and technology”;

5 (B) by redesignating subparagraphs (D),
6 (E), (F), and (G) as subparagraphs (E), (F),
7 (G), and (H), respectively;

8 (C) by inserting after subparagraph (C)
9 the following new subparagraph:

10 “(D) other countries’ quantum programs
11 and the progress of such countries and such
12 programs relative to the Program;”;

13 (D) in subparagraph (E), as so redesign-
14 nated—

15 (i) by striking “to” and inserting
16 “promote innovation, foster a robust
17 United States quantum industry, and”;
18 and

19 (ii) by striking “science and tech-
20 nology” and inserting “science, engineer-
21 ing, and technology”; and

22 (E) in subparagraph (F), as so redesign-
23 nated, by inserting “, including to address any
24 gaps that may exist” before the semicolon;

1 (F) in subparagraph (G), as so redesignated,
2 nated, by striking “open standards for, quantum
3 information science and technology; and”
4 and inserting “international standards in open
5 and transparent standardization systems for
6 quantum information science, engineering, and
7 technology;”;

8 (G) in subparagraph (H), as so redesignated—
9 nated—

10 (i) by inserting “educational, environmental,
11 health,” after “legal,”; and

12 (ii) by striking the period and inserting
13 a semicolon; and

14 (H) by adding at the end the following new
15 subparagraphs:

16 “(I) the domestic and international co-
17 operation needs and goals of the Program, in-
18 cluding needs and goals related to infrastruc-
19 ture and the supply chain of quantum informa-
20 tion science, engineering, and technology; and

21 “(J) the degree to which quantum infor-
22 mation science, engineering, and technology is
23 enhancing or can enhance the capabilities of the
24 United States advanced industrial economy and
25 protect or optimize critical infrastructure (as

1 such term is defined in section 1016(e) of Pub-
 2 lic Law 107–56 (42 U.S.C. 5195c(e)).”;

3 (3) in subsection (e), by inserting “through De-
 4 cember 31, 2030” after “thereafter”; and

5 (4) by amending subsection (g) to read as fol-
 6 lows:

7 “(g) FACA EXEMPTION.—The President shall char-
 8 ter the Advisory Committee in accordance with chapter 10
 9 of title 5, United States Code (commonly referred to as
 10 the ‘Federal Advisory Committee Act’), except that the
 11 Advisory Committee shall be exempt from section 1013
 12 of such title.”.

13 **SEC. 8. SUBCOMMITTEE ON THE ECONOMIC AND SECURITY**
 14 **IMPLICATIONS OF QUANTUM INFORMATION**
 15 **SCIENCE.**

16 Section 105 of the National Quantum Initiative Act
 17 (15 U.S.C. 8814a) is amended—

18 (1) in subsection (b)—

19 (A) in paragraph (10), by striking “and”
 20 after the semicolon;

21 (B) by redesignating paragraph (11) as
 22 paragraph (14); and

23 (C) by inserting after paragraph (10) the
 24 following new paragraphs:

1 “(11) the Department of Health and Human
2 Services;

3 “(12) the Department of State;

4 “(13) the National Aeronautics and Space Ad-
5 ministration; and”;

6 (2) in subsection (c)—

7 (A) in paragraph (1)—

8 (i) by striking “Office and Manage-
9 ment and Budget” and inserting “Office of
10 Management and Budget”; and

11 (ii) by striking “information science”
12 and inserting “information science, engi-
13 neering, and technology”;

14 (B) in paragraph (2), by inserting “or to
15 supply chains” before the semicolon;

16 (C) in paragraph (3), by inserting “or sup-
17 ply chains” before the semicolon;

18 (D) in paragraph (5), by inserting “and
19 engineering” after “quantum information
20 science”;

21 (E) in paragraph (6), by striking “infor-
22 mation science” and inserting “information
23 science, engineering, and technology”;

24 (F) in paragraph (7), by striking “and”
25 after the semicolon;

1 (G) in paragraph (8), by striking the pe-
 2 riod and inserting a semicolon; and

3 (H) by adding at the end the following new
 4 paragraphs:

5 “(9) in coordination with the Subcommittee on
 6 Quantum Information Science, identify opportunities
 7 to increase coordination between civilian, military,
 8 and intelligence quantum research entities, reduce
 9 unnecessary duplicative quantum research activities,
 10 and facilitate collaboration between quantum re-
 11 search agencies with specialized capabilities or ex-
 12 pertise in one or more aspects of quantum informa-
 13 tion science, engineering, or technology; and

14 “(10) recommend strategies for attracting and
 15 retaining students and scholars with expertise in
 16 quantum-related fields to Federal departments and
 17 agencies.”.

18 **SEC. 9. INTERNATIONAL QUANTUM COOPERATION STRAT-**
 19 **EGY.**

20 The National Quantum Initiative Act is amended by
 21 inserting after section 105 the following new section:

22 **“SEC. 105A. INTERNATIONAL QUANTUM COOPERATION**
 23 **STRATEGY.**

24 “(a) STRATEGY REQUIRED.—Not later than one year
 25 after the date of the enactment of this section, the Direc-

1 tor of the Office of Science and Technology Policy, in con-
2 sultation with the Secretary of Commerce, the Secretary
3 of State, the Secretary of Energy, the Director of the Na-
4 tional Science Foundation, the Administrator of the Na-
5 tional Aeronautics and Space Administration, and the
6 heads of other Federal agencies, as appropriate, shall sub-
7 mit to the Committee on Commerce, Science, and Trans-
8 portation, the Committee on Energy and Natural Re-
9 sources, and the Committee on Foreign Relations of the
10 Senate, and the Committee on Science, Space, and Tech-
11 nology and the Committee on Foreign Affairs of the
12 House of Representatives a strategy to carry out the fol-
13 lowing:

14 “(1) Establish collaborative international part-
15 nerships, including co-funded international pro-
16 grams, to advance research and development, testing
17 and evaluation, commercialization, and interoper-
18 ability in quantum information science, engineering,
19 and technology with allies and partners of the
20 United States, and other countries, when in the se-
21 curity, strategic, technological, and scientific inter-
22 ests of the United States.

23 “(2) Ensure continued United States participa-
24 tion in bilateral and multilateral efforts to advance

1 quantum information science, engineering, and tech-
2 nology on the international stage.

3 “(3) Promote the integrity and impartiality of
4 international standards organizations and processes
5 related to quantum information science, engineering,
6 and technology.

7 “(4) Ensure ethical application of quantum in-
8 formation science, engineering, and technology to
9 protect civil liberties and basic human rights.

10 “(b) DESIGNATION.—The strategy under subsection
11 shall be known as the ‘International Quantum Cooperation
12 Strategy’ (in this section referred to as the ‘Strategy’).

13 “(c) ELEMENTS.—In the development of the Strat-
14 egy, the Director of the Office of Science and Technology
15 Policy, the National Quantum Coordination Office, the
16 Subcommittee on Quantum Information Science, the Sub-
17 committee on the Economic and Security Implications,
18 and other appropriate Federal agencies should consider
19 the following:

20 “(1) The establishment of international part-
21 nerships to advance research and development in
22 quantum information science, engineering, and tech-
23 nology.

24 “(2) Key partners that are allies of the United
25 States and have demonstrated unique capabilities in

1 one or more areas of quantum information science,
2 engineering, or technology.

3 “(3) Efforts and plans to address risks to the
4 national security or economic interests of the United
5 States during development or deployment of quan-
6 tum technologies worldwide, including plans for dip-
7 lomatic engagement with allies and partners, and
8 other countries.

9 “(4) Efforts and plans to promote responsible
10 global development and deployment of quantum
11 technologies, including through international engage-
12 ment and leadership in the development of inter-
13 national standards.

14 “(5) Efforts and plans to develop, attract, and
15 retain international talent.

16 “(6) The ability and risks of domestic manufac-
17 turers and suppliers and those of allies and partners
18 of the United States to satisfy the needs of the glob-
19 al quantum supply chain, including raw materials
20 such as Helium-3, plans for engagement with allies
21 and partners, manufacturers, and suppliers, and op-
22 tions to mitigate gaps and vulnerabilities in the glob-
23 al quantum supply chain.

24 “(7) A plan to safeguard research and tech-
25 nology supported through international cooperation,

1 as appropriate, in whole or in part, including in
 2 quantum technologies critical to national security,
 3 from malign influence, theft, or exfiltration by for-
 4 eign entities of concern.

5 “(8) As necessary, a description of such legisla-
 6 tive or administrative action needed to carry out the
 7 Strategy.

8 “(d) BRIEFING.—Not later than 30 days after the
 9 date on which the Strategy is completed, the Director shall
 10 brief the committees specified in subsection (a) on the
 11 Strategy.”.

12 **SEC. 10. SUNSET.**

13 Subsection (a) of section 106 of the National Quan-
 14 tum Initiative Act (15 U.S.C. 8815) is amended by strik-
 15 ing “the date that is 11 years after the date of enactment
 16 of this Act” and inserting “December 30, 2032”.

17 **SEC. 11. NATIONAL INSTITUTE OF STANDARDS AND TECH-**
 18 **NOLOGY ACTIVITIES AND QUANTUM CONSOR-**
 19 **TIUM.**

20 Section 201 of the National Quantum Initiative Act
 21 (15 U.S.C. 8831) is amended—

22 (1) in subsection (a)—

23 (A) in paragraph (1)—

24 (i) by striking “basic and applied”;

25 and

1 (ii) by striking “science and tech-
2 nology” and inserting “science, engineer-
3 ing, and technology”;

4 (B) in paragraph (2)—

5 (i) by inserting “attract, educate,
6 and” before “train”; and

7 (ii) by striking “science and tech-
8 nology” and inserting “science, engineer-
9 ing, and technology”;

10 (C) by amending paragraph (3) to read as
11 follows:

12 “(3) shall carry out research to facilitate the
13 development and standardization of quantum cryp-
14 tography, post-quantum cryptography (as such term
15 is defined in section 3 of the Quantum Computing
16 Cybersecurity Preparedness Act (6 U.S.C. 1526
17 note; Public Law 117–260)), and practices to re-
18 place cryptographic keys or algorithms with minimal
19 disruption to current applications and systems;”.

20 (D) by amending paragraph (4) to read as
21 follows:

22 “(4) shall carry out research, development, and
23 demonstration projects, as appropriate, to facilitate
24 the development and standardization of quantum
25 networking, communications, computing, metrology,

1 sensing technologies and quantum applications, in-
2 cluding supply chain enabling technologies and other
3 supporting technologies;”.

4 (E) by redesignating paragraphs (5), (6),
5 and (7) as paragraphs (8), (9), and (11), re-
6 spectively;

7 (F) by inserting after paragraph (4) the
8 following new paragraphs:

9 “(5) shall carry out, in coordination with the
10 Director of the Defense Advanced Research Projects
11 Agency, research to support the measurement of
12 comparative performance and progress of quantum
13 technologies, including, as practicable, technology
14 readiness assessments of quantum technologies;

15 “(6) shall promote United States participation
16 in international standards organizations related to
17 quantum information science, engineering, and tech-
18 nology;

19 “(7) shall establish or expand partnerships with
20 the public sector and private sector to—

21 “(A) accelerate the development of domes-
22 tic quantum supply chain and supply chain-sup-
23 porting technologies; and

24 “(B) reduce quantum supply chain
25 vulnerabilities;”;

1 (G) in paragraph (8), as so redesignated,
2 by striking “infrastructure” and inserting “,
3 communications, sensing, and computing”;

4 (H) in paragraph (9), as so redesignated—

5 (i) by inserting “nonprofit research
6 organizations,” after “universities,”; and

7 (ii) by striking “and engineering;
8 and” and inserting “, engineering, and
9 technology, and expanding the domestic
10 STEM workforce,”; and

11 (I) by inserting after paragraph (9) the
12 following new paragraph:

13 “(10) shall establish such infrastructure as is
14 necessary to carry out title II; and”;

15 (2) in subsection (b)—

16 (A) in paragraph (1)—

17 (i) by striking “future” and inserting
18 “research”; and

19 (ii) by striking “science and tech-
20 nology” and inserting “science, engineer-
21 ing, and technology”;

22 (B) in paragraph (2)—

23 (i) by amending subparagraph (A) to
24 read as follows:

1 “(A) to gather and assess information on
2 the quantum industry to address the needs
3 identified in paragraph (1);”;

4 (ii) by striking subparagraphs (B) and
5 (C) and inserting the following new sub-
6 paragraphs:

7 “(B) to provide recommendations regard-
8 ing how the National Institute of Standards
9 and Technology, the Program, and other Fed-
10 eral agencies, as appropriate, can address the
11 gaps in the research necessary to satisfy the
12 needs identified in paragraph (1) and accelerate
13 real-world uses of quantum information science,
14 engineering, and technology;

15 “(C) to identify enabling technologies and
16 the relevant supply chain essential to foster re-
17 search and industrial competitiveness in quan-
18 tum information science, engineering, and tech-
19 nology, and communicate findings to Federal
20 agencies and other domestic and international
21 stakeholders; and

22 “(D) to assess and identify key areas for
23 establishing, expanding, or developing inter-
24 national partnerships that will facilitate United
25 States quantum-related business engagement.”;

1 (C) in paragraph (3)—

2 (i) by striking “Not later than 2 years
3 after the date of enactment of this Act,
4 the” and inserting “The”; and

5 (ii) by inserting “periodically, but not
6 less frequently than once every five years,”
7 after “shall”; and

8 (D) by adding at the end the following new
9 paragraph:

10 “(4) COORDINATION.—As appropriate, Federal
11 agencies specified in section 103(b) that—

12 “(A) are involved in the transition or
13 translation of practical quantum applications,
14 or

15 “(B) have a mission that could benefit
16 from the development of quantum technologies,
17 may engage with the consortium to inform and ac-
18 celerate progress in such applications or tech-
19 nologies, as the case may be.”; and

20 (3) by striking subsection (c) and inserting the
21 following new subsections:

22 “(c) INTERNATIONAL QUANTUM RESEARCH AND ME-
23 TROLOGY.—

24 “(1) IN GENERAL.—The Director of the Na-
25 tional Institute of Standards and Technology, in co-

1 ordination with the Secretary of State and the Di-
2 rector of the National Science Foundation, shall
3 support international quantum information science,
4 engineering, and technology research, metrology re-
5 search, and standardization, as appropriate, to en-
6 hance international cooperation, satisfy United
7 States commitments, and support United States en-
8 gagement in international standards for quantum in-
9 formation science, engineering, and technology.

10 “(2) ALIGNMENT.—In carrying out this section,
11 the Director of the National Institute of Standards
12 and Technology shall ensure alignment with the Na-
13 tional Quantum Information Science Strategy and
14 the U.S. Government National Standards Strategy
15 for Critical and Emerging Technology, or successor
16 strategies.

17 “(3) RESTRICTIONS.—

18 “(A) CONFUCIUS INSTITUTES.—None of
19 the funds made available under this section
20 may be obligated or expended to an institution
21 of higher education that maintains a contract
22 or agreement between such institution and a
23 Confucius Institute or any successor of a Con-
24 fucius Institute.

1 “(B) FOREIGN COUNTRIES OF CONCERN
2 OR ENTITIES OF CONCERN.—None of the funds
3 made available under this section may be obli-
4 gated or expended to promote, establish, or fi-
5 nance quantum research activities between a
6 United States entity and a foreign country of
7 concern or foreign entity of concern, except
8 such restriction shall not apply to participation
9 by awardees in consensus-based international
10 standardization activities.

11 “(d) POST QUANTUM CRYPTOGRAPHY DEPLOY-
12 MENT.—

13 “(1) IN GENERAL.—The Director of the Na-
14 tional Institute of Standards and Technology, in
15 consultation with the Secretary of Homeland Secu-
16 rity, the heads of Sector Risk Management Agencies
17 (as such term is defined in section 2200 of the
18 Homeland Security Act of 2002 (6 U.S.C. 650)),
19 and private sector entities, as appropriate, shall pro-
20 mote the voluntary development, adoption, and de-
21 ployment of standards relating to post-quantum
22 cryptography (as such term is defined in section 3
23 of the Quantum Computing Cybersecurity Prepared-
24 ness Act (6 U.S.C. 1526 note; Public Law 117–
25 260)), including by carrying out the following:

1 “(A) Disseminating and making publicly
2 available guidance and resources to help organi-
3 zations adopt and deploy standards relating to
4 post-quantum cryptography and minimize dis-
5 ruptions to current applications and systems
6 caused by cryptographic updates.

7 “(B) Providing technical assistance, as
8 practicable, to entities that are at high risk of
9 quantum cryptanalytic attacks, such as enti-
10 ties determined to be critical infrastructure (as
11 such term is defined in section 1016(e) of Pub-
12 lic Law 107–56 (42 U.S.C. 5195c(e))) or dig-
13 ital infrastructure providers.

14 “(C) Conducting such other activities as
15 determined necessary by the Director to pro-
16 mote the development, adoption, and deploy-
17 ment across the United States of standards re-
18 lating to post-quantum cryptography.

19 “(2) GRANT PROGRAM.—

20 “(A) IN GENERAL.—Subject to the avail-
21 ability of appropriations, the Director of the
22 National Institute of Standards and Technology
23 may establish a program to identify and provide
24 technical assistance through the award of
25 grants to entities that are at high risk of quan-

1 tum cryptoanalytic attacks, including by award-
2 ing grants for the adoption of such standards
3 and the remediation of quantum-related
4 vulnerabilities.

5 “(B) USE OF FUNDS.—Grants awarded to
6 entities under this paragraph may be used to
7 cover reasonable costs, up to a specified amount
8 established by the Director of the National In-
9 stitute of Standards and Technology, for activi-
10 ties to adopt standards relating to post-quantum
11 cryptography and remediate quantum-related
12 vulnerabilities.

13 “(C) GUIDANCE.—The Director of the Na-
14 tional Institute of Standards and Technology
15 may develop, and periodically update, guidance,
16 including relating to eligibility, application dis-
17 closure requirements, grant amount and dura-
18 tion, and any additional requirements regarding
19 the award of grants under this paragraph.

20 “(D) CONSULTATION.—If the grant pro-
21 gram described in this paragraph is established,
22 the Director of the National Institute of Stand-
23 ards and Technology shall consult with the Di-
24 rector of the Cybersecurity and Infrastructure
25 Security Agency of the Department of Home-

1 land Security, the heads of other Sector Risk
 2 Management Agencies, and appropriate rep-
 3 resentatives of private sector entities, including
 4 nonprofit organizations, to share information
 5 regarding such grant program and guidance de-
 6 veloped and updated under subparagraph (C).”.

7 **SEC. 12. NATIONAL INSTITUTE OF STANDARDS AND TECH-**
 8 **NOLOGY QUANTUM ACCELERATION CEN-**
 9 **TERS.**

10 Title II of the National Quantum Initiative Act is
 11 amended by adding at the end the following new sections:

12 **“SEC. 202. NATIONAL INSTITUTE OF STANDARDS AND**
 13 **TECHNOLOGY QUANTUM ACCELERATION**
 14 **CENTERS.**

15 “(a) ESTABLISHMENT.—

16 “(1) IN GENERAL.—Subject to the availability
 17 of appropriations, the Director of the National Insti-
 18 tute of Standards and Technology, in consultation
 19 with the heads of other Federal departments and
 20 agencies, as appropriate, shall carry out a program
 21 to establish at least one, but not more than three,
 22 centers to accelerate research, development, deploy-
 23 ment, and standardization of quantum information
 24 science, engineering, and technology.

25 “(2) PROGRAM DETAILS.—

1 “(A) COMPETITIVE, MERIT-REVIEWED
2 PROCESS.—The centers described in paragraph
3 (1) shall be established through a competitive,
4 merit-reviewed process.

5 “(B) APPLICATIONS.—An eligible applicant
6 described in subparagraph (C) shall submit to
7 the Director of the National Institute of Stand-
8 ards and Technology an application at such
9 time, in such manner, and containing such in-
10 formation as the Director determines to be ap-
11 propriate.

12 “(C) ELIGIBLE APPLICANTS.—Eligible ap-
13 plicants described in this subparagraph are the
14 following:

15 “(i) Institutions of higher education.

16 “(ii) Nonprofit organizations.

17 “(iii) Multi-institutions collaborations,
18 including multiple types of research insti-
19 tutions, private sector entities, Federal lab-
20 oratories, and nonprofit organizations, or a
21 consortia thereof.

22 “(iv) Any other entity the Director de-
23 termines appropriate.

24 “(3) SELECTION OF TOPICS.—The Director of
25 the National Institute of Standards and Technology

1 shall solicit proposals and prioritize the following
2 topics in the initial selection of centers, subject to
3 merit-review:

4 “(A) Quantum sensing and measurement
5 technologies.

6 “(B) Advancing the manufacturing and
7 scale-up of quantum systems and quantum ena-
8 bling technologies.

9 “(C) Address technology barriers to quan-
10 tum networking and communications.

11 “(D) Quantum engineering.

12 “(b) REQUIREMENTS.—To the maximum extent
13 practicable, centers established under this section shall
14 serve the mission of the National Institute of Standards
15 and Technology, for the benefit of the broader United
16 States quantum information science community, to de-
17 velop processes for the following purposes:

18 “(1) Advancing research and standardization in
19 quantum information science, engineering, and tech-
20 nology.

21 “(2) Advancing technology development.

22 “(3) Improving the competitiveness of the
23 United States.

24 “(c) COORDINATION.—The Director of the National
25 Institute of Standards and Technology shall ensure coordi-

1 nation, and avoid unnecessary duplication of, the activities
2 carried out under this section with existing activities of
3 the Institute, other activities carried out under this Act,
4 and other related programs, as appropriate.

5 “(d) SELECTION AND DURATION.—

6 “(1) IN GENERAL.—The centers established
7 under this section are authorized to carry out activi-
8 ties for a period of five years.

9 “(2) RENEWAL.—Each center established under
10 this section may be renewed for additional periods of
11 five years following a successful merit-based review
12 by the Director.

13 “(3) TERMINATION.—Consistent with the au-
14 thorities of the National Institute of Standards and
15 Technology, the Director of the National Institute of
16 Standards and Technology may terminate an under-
17 performing center for cause during the performance
18 period.

19 **“SEC. 203. RESEARCH SECURITY.**

20 “The activities authorized under title II shall be ap-
21 plied in a manner consistent with subtitle D of title VI
22 of the Research and Development, Competition, and Inno-
23 vation Act (enacted as division B of Public Law 117–167;
24 42 U.S.C. 19231 et seq.).”.

1 **SEC. 13. NATIONAL SCIENCE FOUNDATION QUANTUM IN-**
2 **FORMATION SCIENCE RESEARCH AND EDU-**
3 **CATION ACTIVITIES.**

4 Section 301 of the National Quantum Initiative Act
5 (15 U.S.C. 8841) is amended—

6 (1) in the heading, by inserting “**, ENGINEER-**
7 **ING, AND TECHNOLOGY**” after “**SCIENCE**”;

8 (2) in subsection (a)—

9 (A) by striking “basic”; and

10 (B) by striking “science and engineering”
11 and inserting “science, engineering, and tech-
12 nology”;

13 (3) in subsection (b)—

14 (A) in paragraph (1)—

15 (i) in subparagraph (A)—

16 (I) by striking “basic”; and

17 (II) by striking “science and en-
18 gineering” and inserting “science, en-
19 gineering, and technology”; and

20 (ii) in subparagraph (B)—

21 (I) by striking “human re-
22 sources” and inserting “education and
23 workforce”; and

24 (II) by striking “science and en-
25 gineering” and inserting “science, en-
26 gineering, and technology”; and

1 (B) in paragraph (2)—

2 (i) in subparagraph (A)—

3 (I) in clause (i)—

4 (aa) by striking “science and
5 engineering” and inserting
6 “science, engineering, and tech-
7 nology”;

8 (bb) by inserting “K–12, vo-
9 cational,” before “under-
10 graduate”; and

11 (cc) by striking “and” after
12 the semicolon;

13 (II) in clause (ii), by inserting
14 “and” after the semicolon; and

15 (III) by adding at the end the
16 following new clause:

17 “(iii) to pursue research at the fron-
18 tiers of quantum information science, engi-
19 neering, and technology, and explore solu-
20 tions to important challenges for the devel-
21 opment, application, and commercialization
22 of quantum technologies;”;

23 (ii) in subparagraph (B), by striking
24 “science and engineering” and inserting

1 “science, engineering, and technology”;
2 and

3 (iii) in subparagraph (C), by striking
4 “science and engineering” and inserting
5 “science, engineering, and technology”;

6 (iv) in subparagraph (D), by striking
7 “and” after the semicolon;

8 (v) in subparagraph (E), by striking
9 the period and inserting “; and”; and

10 (vi) by adding at the end the following
11 new subparagraph:

12 “(F) providing infrastructure to support
13 academic quantum information science, engi-
14 neering, and technology, including through ex-
15 isting infrastructure programs and new activi-
16 ties.”;

17 (4) by amending subsection (c) to read as fol-
18 lows:

19 “(c) STUDENT TRAINEESHIPS, FELLOWSHIPS, AND
20 OTHER MODELS.—

21 “(1) IN GENERAL.—The Director of the Na-
22 tional Science Foundation, in consultation with
23 heads of Federal agencies the Director considers ap-
24 propriate, shall make awards to institutions of high-
25 er education or eligible nonprofit organizations (or

1 consortia thereof) to increase capacity and broaden
2 participation, including through provisioning of expe-
3 riential opportunities, where appropriate, in quan-
4 tum information science, engineering, and tech-
5 nology and other related disciplines.

6 “(2) QUANTUM TRAINEESHIPS.—The Director
7 of the National Science Foundation may establish or
8 use existing programs to make awards to institu-
9 tions of higher education or nonprofit organizations
10 (or consortia thereof) to provide traineeships to
11 graduate students at institutions of higher education
12 within the United States who are citizens of the
13 United States and who choose or plan to pursue
14 masters or doctoral degrees in quantum information
15 science, engineering, and technology, or related
16 fields, and by providing students with opportunities
17 for research experiences in government or industry
18 related to such students’ quantum studies.

19 “(3) QUANTUM FELLOWSHIPS AND SCHOLAR-
20 SHIPS.—

21 “(A) IN GENERAL.—The Director of the
22 National Science Foundation may establish or
23 use existing programs to support fellowships
24 and scholarships for students at institutions of
25 higher education for the purpose of increasing

1 quantum information science, engineering, and
2 technology exposure for undergraduate and
3 graduate STEM students and increasing post-
4 graduation employment opportunities for
5 STEM students.

6 “(B) REQUIREMENTS.—Eligible partici-
7 pants in the fellowship and scholarship program
8 shall—

9 “(i) be enrolled in or have graduated
10 from a STEM degree program at a domes-
11 tic institution of higher education; and

12 “(ii) have taken at least one quantum-
13 science or quantum-relevant course as part
14 of their degree programs.

15 “(C) CONSIDERATIONS.—Eligible fellow-
16 ships and scholarships may include temporary
17 quantum-related positions at Federal or State
18 agencies, National Laboratories, private sector
19 entities, institutions of higher education, the
20 quantum centers and institute established in
21 sections 202, 302, 402, and 502, or other quan-
22 tum-relevant entities, as determined appropriate
23 by the Director.

24 “(D) COMPETITIVE AWARDS.—Fellowships
25 and scholarships shall be competitively awarded

1 through a merit-review process. The Director of
2 the National Science Foundation may prioritize
3 fellowships that include an industry partner
4 that provides financial assistance to the appli-
5 cant for direct or indirect costs.

6 “(4) QUANTUM RESEARCH EXPERIENCES FOR
7 UNDERGRADUATES.—The Director of the National
8 Science Foundation shall seek to increase opportuni-
9 ties for quantum research for undergraduate stu-
10 dents by encouraging proposals in quantum informa-
11 tion science, engineering, and technology, through
12 the research experiences for undergraduates pursu-
13 ant to section 514 of the America COMPETES Re-
14 authorization Act of 2010 (42 U.S.C. 1862p-6).

15 “(5) CO-OPERATIVE EDUCATION PROGRAMS.—
16 The Director of the National Science Foundation
17 may establish or use existing programs to support
18 cooperative education programs between institutions
19 of higher education and employers that increase op-
20 portunities for undergraduate students to acquire
21 experiential learning and professional experiences in
22 quantum information sciences, engineering, and
23 technology.

24 “(6) PARTNERSHIPS.—In carrying out the ac-
25 tivities under this subsection, the Director of the

1 National Science Foundation shall encourage award-
2 ees to partner with relevant Federal agencies, Fed-
3 eral laboratories, industry and other private sector
4 organizations, and nonprofit organizations to facili-
5 tate the expansion of workforce pathways and
6 hands-on learning experiences.”;

7 (5) in subsection (d)—

8 (A) in the subsection heading, by striking
9 “QISE” and inserting “QISET”;

10 (B) in paragraph (1)—

11 (i) by striking “information science
12 and engineering (referred to in this sub-
13 section as ‘QISE’)” and inserting “infor-
14 mation science, engineering, and tech-
15 nology (referred to in this subsection as
16 QISET)”;

17 (ii) by inserting “and career and tech-
18 nical education entities” after “colleges”;

19 (C) in paragraph (2)—

20 (i) in subparagraph (A), by striking
21 “QISE” and inserting “quantum informa-
22 tion science, engineering, and technology”;

23 (ii) in subparagraph (D), by inserting
24 “, engineering, and technology” after
25 “science”;

1 (iii) in subparagraph (D), by inserting
2 “, including materials relevant to emerging
3 technologies” before the period;

4 (iv) by redesignating subparagraphs
5 (E) and (F) as subparagraphs (F) and
6 (H), respectively;

7 (v) by inserting after subparagraph
8 (D) the following new subparagraph:

9 “(E) Informal education methods to en-
10 hance experiences of students of all ages with
11 quantum information science, engineering, and
12 technology concepts and applications.”;

13 (vi) by inserting after subparagraph
14 (F), as so redesignated, the following new
15 subparagraph:

16 “(G) Methods to introduce into STEM
17 curricula security and other potential societal
18 dimensions associated with quantum informa-
19 tion science, engineering, and technology.”; and

20 (vii) in subparagraph (H), as so re-
21 designated, by inserting “, engineering,
22 and technology” after “science”;

23 (D) in paragraph (3), by striking “QISE”
24 and inserting “quantum information science,
25 engineering, and technology”; and

1 (E) by striking paragraph (4); and

2 (6) by adding at the end the following new sub-
3 sections:

4 “(e) QUANTUM RESEARCH EXPERIENCES FOR
5 TEACHERS.—The Director of the National Science Foun-
6 dation shall seek to increase opportunities to engage edu-
7 cators, principals, or other school leaders of K-12 students
8 in professional learning opportunities to enhance quantum
9 information science, engineering, and technology knowl-
10 edge, including by carrying out the following:

11 “(1) Providing hands-on training and research
12 opportunities at Federal Laboratories, institutions of
13 higher education, or in industry for such educators,
14 principals, or other school leaders.

15 “(2) Developing best practices.

16 “(f) EXPANDING CAPACITY IN QUANTUM INFORMA-
17 TION SCIENCE, ENGINEERING, AND TECHNOLOGY
18 (QISET).—

19 “(1) IN GENERAL.—The Director of the Na-
20 tional Science Foundation, in consultation with the
21 heads of Federal agencies the Director considers ap-
22 propriate, shall make awards on a competitive,
23 merit-reviewed basis to eligible institutions of higher
24 education or eligible nonprofit organizations (or con-
25 sortia thereof) to increase research capacity, edu-

1 cation and infrastructure capacity, and broaden par-
2 ticipation in quantum information science, engineer-
3 ing, and technology and related disciplines, including
4 by carrying out the following:

5 “(A) Supporting curriculum development
6 in quantum information science, engineering,
7 and technology as described in subsection (d).

8 “(B) Building upon the activities carried
9 out under the Next Generation Quantum Lead-
10 ers Pilot Program authorized under section
11 10661(f) of the Research and Development,
12 Competition, and Innovation Act (Public Law
13 117–167; 42 U.S.C. 19261(f)).

14 “(C) Leveraging the readiness for the in-
15 volvement of local research and education com-
16 munities to secure talent pathways in quantum
17 information science, engineering, and tech-
18 nology to satisfy the workforce needs of indus-
19 try, government, and academia.

20 “(2) COLLABORATIONS.—The Director of the
21 National Science Foundation shall—

22 “(A) require eligible institutions of higher
23 educations or eligible nonprofit organizations to
24 describe how such an institute or organization,

1 as the case may be, plans to partner with one
2 or more relevant private sector entities; and

3 “(B) may require such an institute or or-
4 ganization, as the case may be, to provide a let-
5 ter of support from any such entities.

6 “(3) REQUIREMENTS.—To receive an award
7 under this subsection, an eligible institution of high-
8 er education or eligible nonprofit organization, as
9 the case may be, shall submit to the Director of the
10 National Science Foundation an application that in-
11 cludes the following:

12 “(A) A plan to sustain proposed activities
13 beyond the duration of the award.

14 “(B) Proposed quantum information
15 science, engineering, and technology disciplines
16 or focus areas such eligible institution or orga-
17 nization, as the case may be, is prepared to en-
18 gage in to significantly build up its quantum in-
19 formation science, engineering, and technology
20 research and education capacity.

21 “(C) A plan for education and workforce
22 development, which may include K-12 and post-
23 secondary education programs and activities,
24 workforce training and career and technical
25 education programs and activities, under-

1 graduate, graduate, and postdoctoral education,
2 and informal education programs and activities.

3 “(4) ACTIVITIES.—Awards under this sub-
4 section to support research and related activities
5 may include the activities relating to the following:

6 “(A) Development or expansion of research
7 programs in disciplines and focus areas speci-
8 fied in paragraph (4)(B).

9 “(B) Faculty recruitment and professional
10 development in such disciplines and focus areas.

11 “(C) To build research capacity and infra-
12 structure at an eligible institution in such dis-
13 ciplines and focus areas.

14 “(D) An assessment of capacity-building
15 and research infrastructure needs identified in
16 such paragraph.

17 “(E) Bridge programs focused on pre-
18 paring post-baccalaureate students for graduate
19 programs in quantum information science, engi-
20 neering, and technology.

21 “(F) Administrative research development
22 support.

23 “(G) Other activities necessary to build re-
24 search capacity in quantum information science,
25 engineering, and technology.

1 “(5) ADDITIONAL CONSIDERATIONS.—In mak-
2 ing awards under this subsection, the Director of the
3 National Science Foundation may also consider the
4 following:

5 “(A) The extent to which the eligible insti-
6 tution of higher education or eligible nonprofit
7 organization, as the case may be, will support
8 students from diverse backgrounds, including
9 first-generation undergraduate students.

10 “(B) The geographic and institutional di-
11 versity of eligible institutions of higher edu-
12 cation and eligible nonprofit organizations.

13 “(C) How the eligible institution of higher
14 education or eligible nonprofit organization, as
15 the case may be, can leverage public-private
16 partnerships and existing research partnerships
17 with Federal agencies.

18 “(6) DUPLICATION.—The Director of the Na-
19 tional Science Foundation shall ensure awards made
20 under this subsection are complementary to and not
21 duplicative of existing programs.

22 “(7) ELIGIBLE INSTITUTION OF HIGHER EDU-
23 CATION DEFINED.—In this subsection, the term ‘eli-
24 gible institution of higher education’ means an insti-
25 tution of higher education, that, according to the

1 data published by the National Center for Science
2 and Engineering Statistics, is not, on average,
3 among the top 100 institutions in Federal research
4 and development expenditures during the 3- year pe-
5 riod prior to the year of the award.

6 “(g) FACULTY MID-CAREER DEVELOPMENT
7 AWARDS.—The Director of the National Science Founda-
8 tion may provide awards to support mid-career scientists
9 and faculty to upgrade, develop, or acquire essential re-
10 search instruments to start new research activities, or ex-
11 pand existing activities, focused on quantum information
12 science, engineering and technology.

13 “(h) INTERNATIONAL RESEARCH ON QUANTUM IN-
14 FORMATION SCIENCE, ENGINEERING, AND TECH-
15 NOLOGY.—

16 “(1) IN GENERAL.—The Director of the Na-
17 tional Science Foundation, in coordination with the
18 Secretary of State and the Secretary of Commerce,
19 shall support international quantum information
20 science, engineering, and technology research col-
21 laboration, as appropriate, to enhance international
22 cooperation and satisfy United States commitments,
23 including pursuant to bilateral or multilateral quan-
24 tum information science, engineering, and tech-
25 nology research agreements.

1 “(2) ALIGNMENT.—In carrying out this sub-
2 section, the Director of the National Science Foun-
3 dation shall ensure alignment with the strategy for
4 national quantum information science in accordance
5 with Executive Order 14073 (87 Fed. Reg. 27909;
6 relating to enhancing the National Quantum Advi-
7 sory Committee) or successor strategies.

8 “(3) PRIORITY.—The Director shall prioritize
9 research programs with countries that have signed a
10 Quantum Cooperation Statement with the United
11 States.

12 “(4) RESTRICTION.—None of the funds made
13 available under this section may be obligated or ex-
14 pended to an institution of higher education that
15 maintains a contract or agreement between such in-
16 stitution and a Confucius Institute or any successor
17 of a Confucius Institute.

18 “(i) UPGRADING AND IMPROVING ACCESS TO QUAN-
19 TUM RESEARCH RESOURCES.—

20 “(1) IN GENERAL.—In carrying out the activi-
21 ties described in this section, the Director of the Na-
22 tional Science Foundation, in consultation with the
23 heads of other Federal departments and agencies, as
24 appropriate, shall make awards to institutions of
25 higher education or eligible nonprofit organizations

1 (or consortia thereof) to upgrade research facilities
2 and improve access to research resources, such as
3 equipment and instrumentation, that is needed for
4 research and development in quantum information
5 science, engineering, and technology.

6 “(2) PURPOSE.—Grants under paragraph (1)
7 shall be used to facilitate quantum information
8 science, engineering, and technology research and
9 development, including by carrying out the following:

10 “(A) Upgrading or adding research re-
11 sources to accelerate the development of quan-
12 tum technologies, including capabilities focused
13 on addressing the roadblocks to implementa-
14 tion, and satisfy the materials, advanced mate-
15 rials development, high performance computing,
16 heterogeneous computing, networking, software,
17 data, clean room, and device needs of the sci-
18 entific community and the quantum supply
19 chain.

20 “(B) Enhancing access to equipment and
21 instrumentation, including at partnering insti-
22 tutions, by facilitating information sharing, co-
23 ordination, scheduling, education, and training,
24 including activities that provide meaningful

1 hands-on learning experiences for students, in-
 2 cluding at community and technical colleges.

3 “(C) Enabling professional staff to support
 4 the operation and improvement of research re-
 5 sources used for quantum information science,
 6 engineering, and technology.

7 “(3) REQUIREMENTS.—An institution of higher
 8 education or an eligible nonprofit organization (or a
 9 consortium thereof) and industry partners seeking
 10 funding under this subsection shall submit to the
 11 Director of the National Science Foundation an ap-
 12 plication at such time, in such manner, and con-
 13 taining such information as the Director may re-
 14 quire.”.

15 **SEC. 14. MULTIDISCIPLINARY CENTERS FOR QUANTUM RE-**
 16 **SEARCH AND EDUCATION.**

17 Section 302 of the National Quantum Initiative Act
 18 (15 U.S.C. 8842) is amended—

19 (1) in subsection (a), by striking “5” and in-
 20 serting “10”;

21 (2) in subsection (c)—

22 (A) in the matter preceding paragraph (1),
 23 by striking “basic”;

1 (B) in paragraph (1), by striking “science
2 and engineering” and inserting “science, engi-
3 neering, and technology”; and

4 (C) in paragraph (2), by striking “and en-
5 gineering” and inserting “, engineering, and
6 technology, including leveraging or expanding
7 activities established pursuant to section
8 301(d)”;

9 (3) in subsection (d)(2)—

10 (A) in subparagraph (A), by inserting
11 “quantum information science, engineering, and
12 technology” after “quantum science”;

13 (B) in subparagraph (B), by inserting
14 “health,” after “chemistry,”;

15 (C) in subparagraph (C), by inserting “,
16 including how each institution of higher edu-
17 cation or an eligible nonprofit organization (or
18 a consortium thereof), as the case may be, that
19 is applying for a grant under this section will
20 develop and implement outreach activities to in-
21 crease the participation of students in STEM,
22 including women and individuals from under-
23 represented groups (in accordance with section
24 526(a)(7) of the America COMPETES Reau-

1 thorization Act of 2010 (42 U.S.C. 1862p-
2 14(a)(7)))” before the semicolon;

3 (D) in subparagraph (D), by striking
4 “and” after the semicolon;

5 (E) in subparagraph (E), by striking the
6 period and inserting “; and”; and

7 (F) by adding at the end the following new
8 subparagraph:

9 “(F) how the Center will participate in
10 international collaborations, as appropriate, to
11 build a trusted global research network with al-
12 lies and partners of the United States and
13 other countries that share values with the
14 United States, including respect for inter-
15 national norms and a commitment to fair com-
16 petition.”;

17 (4) in paragraph (2) of subsection (e), by strik-
18 ing “on a competitive” and inserting “following a
19 successful”.

20 (5) in subsection (f), by striking “2019 through
21 2023” and inserting “2026”.

1 **SEC. 15. QUANTUM RESKILLING, EDUCATION, AND WORK-**
2 **FORCE (QREW) COORDINATION HUB.**

3 Title III of the National Quantum Initiative Act (15
4 U.S.C. 8841 et seq.) is amended by adding at the end
5 the following new sections:

6 **“SEC. 303. QUANTUM RESKILLING, EDUCATION, AND WORK-**
7 **FORCE (QREW) COORDINATION HUB.**

8 “(a) IN GENERAL.—The Director of the National
9 Science Foundation, in consultation with the Director of
10 the National Institute of Standards and Technology, the
11 Secretary of Energy, and the heads of other relevant Fed-
12 eral departments and agencies, as appropriate, shall make
13 an award to a consortium led by an institution of higher
14 education or an eligible nonprofit organization to establish
15 a Quantum Reskilling, Education, and Workforce Coordi-
16 nation Hub (in this section referred to as the ‘Hub’).

17 “(b) CONSORTIUM.—The Hub established pursuant
18 to subsection (a) shall include not fewer than four institu-
19 tions of higher education, including not fewer than two
20 community colleges, and may include career and technical
21 schools, nonprofit organizations, and private sector enti-
22 ties.

23 “(c) PURPOSE.—The purpose of this Hub shall be the
24 following:

25 “(1) To identify and address cross-cutting
26 workforce development challenges in quantum infor-

1 mation science, engineering, and technology, and the
2 quantum industry, by serving as a national and re-
3 gional clearinghouse.

4 “(2) To facilitate the establishment of programs
5 to disseminate to institutions of higher education
6 and career and technical education entities model
7 curricula, best practices, and instructional materials.

8 “(d) ACTIVITIES.—The activities of the Hub may in-
9 clude the following:

10 “(1) Testing, implementing, scaling, dissemi-
11 nating, and standardizing materials, methods, best
12 practices, and other outputs developed through ac-
13 tivities under this Act.

14 “(2) Increasing the integration of quantum in-
15 formation science, engineering, and technology con-
16 tent into STEM curricula at all education levels, in-
17 cluding career and technical education programs.

18 “(3) Providing opportunities for STEM degree
19 students to provide feedback on quantum informa-
20 tion science, engineering, and technology curricula.

21 “(4) Facilitating post-education employment
22 opportunities and workforce pathways for STEM de-
23 gree recipients in quantum-related industries, includ-
24 ing by facilitating opportunities for internships,
25 externships, fellowships, and other such activities as

determined by the Director, including through the establishment of a publicly accessible online portal.

“(5) Coordinating with quantum industry and nonprofit entities and small and medium-sized businesses and startups to inform and enhance the quality and availability of quantum education in STEM degree programs, including through the promotion of post-graduation opportunities for STEM students outside the classroom to increase exposure to quantum industries.

“(6) Supporting activities and programs to enhance the recruitment of students in STEM, including women and individuals from underrepresented groups (in accordance with section 526(a)(7) of the America COMPETES Reauthorization Act of 2010 (42 U.S.C. 1862p-14(a)(7))), to pursue undergraduate and graduate studies in quantum information science, engineering, or technology.

“(7) Developing, testing, implementing, and coordinating career development programs and strategies for pre-university and university educators for the purpose of increasing the number of quantum-informed educators at all levels of education, including by carrying out the following:

1 “(A) Hosting career development work-
2 shops.

3 “(B) Developing in-house and distance
4 learning career development tools for public
5 use.

6 “(C) Facilitating access to related quan-
7 tum technology, tools, and resources.

8 “(D) Developing training, research, and
9 professional development programs, including
10 innovative pre-service and in-service programs.

11 “(E) Facilitating relationships with State
12 and local entities to increase awareness of and
13 promote quantum-related career development
14 activities at the Hub.

15 “(8) Establishing a framework for performing
16 ongoing regular data collection and analysis for the
17 quantum workforce to report on trends, and perform
18 other activities that expand the understanding of the
19 current and future needs of the quantum industry,
20 and education capacity or readiness of the quantum
21 workforce. Such activities shall complement or align
22 with, as relevant, authorized quantum and STEM
23 workforce studies under section 10661(d) of the Re-
24 search and Development, Competition, and Innova-
25 tion Act (42 U.S.C. 19261(d)).

1 “(9) Facilitating public education and outreach
2 activities to enhance the understanding and aware-
3 ness of quantum information science, engineering,
4 and technology to a boarder community to satisfy
5 broader impact requirements of award applications.

6 “(10) Encouraging coordination on quantum
7 education in the broader STEM community.

8 “(e) QREW QUANTUM FELLOWSHIP PROGRAM.—
9 Subject to the restriction specified in subsection (h)(4) of
10 section 301, the Hub may support education or policy fel-
11 lowships for students at entities participating in the con-
12 sortium under subsection (a) or at other research centers
13 established pursuant to this Act at the National Science
14 Foundation, the National Institute of Standards and
15 Technology, the Department of Energy, or the National
16 Aeronautics and Space Administration, for the purpose of
17 supporting the activities described in subsection (d).

18 “(f) INDUSTRY COORDINATION.—The Hub shall col-
19 laborate with the Quantum Consortium established in sec-
20 tion 201(b) or other industry consortia to identify, pub-
21 lish, facilitate, or enable quantum-related education and
22 workforce development opportunities described in sub-
23 sections (c) and (d).

24 “(g) APPLICATION.—A consortium seeking funding
25 under this section shall submit to the Director of the Na-

1 tional Science Foundation an application at such time, in
2 such manner, and containing such information as the Di-
3 rector may require. Each application shall include a de-
4 scription of how the consortium shall carry out the fol-
5 lowing:

6 “(1) Contribute to the success of the Hub and
7 fulfill the purposes of the Hub.

8 “(2) Include industry participation in fulfilling
9 the purposes of the Hub.

10 “(3) Collaborate with other members of the
11 consortium to share expertise in integrating quan-
12 tum information science, engineering, and tech-
13 nology into existing STEM programs and other rel-
14 evant fields and disciplines.

15 “(4) Support long-term and short-term work-
16 force development in the quantum field.

17 “(5) Develop and implement outreach activities
18 to increase the participation of students in STEM,
19 including women and individuals from underrep-
20 resented groups (in accordance with section
21 526(a)(7) of the America COMPETES Reauthoriza-
22 tion Act of 2010 (42 U.S.C. 1862p-14(a)(7))).

23 “(h) SELECTION AND DURATION.—

1 “(1) IN GENERAL.—The Hub established under
2 this section is authorized to carry out activities for
3 a period of 5 years.

4 “(2) REAPPLICATION.—An awardee may re-
5 apply for an additional, subsequent period of 5 years
6 following a successful, merit-based review.

7 “(3) TERMINATION.—Consistent with the au-
8 thorities of the National Science Foundation, the Di-
9 rector of the National Science Foundation may ter-
10 minate the Hub if it is underperforming during the
11 performance period.

12 “(i) COORDINATION.—The Hub shall coordinate with
13 other research centers established under this Act at the
14 National Science Foundation, the National Institute of
15 Standards and Technology, the Department of Energy,
16 the National Aeronautics and Space Administration, and
17 other relevant Federal agencies, as appropriate, on activi-
18 ties and resources.

19 **“SEC. 304. QUANTUM TESTBEDS.**

20 “(a) IN GENERAL.—Not later than one year after the
21 date of the enactment of the National Quantum Initiative
22 Reauthorization Act, the Director of the National Science
23 Foundation, in coordination with the Director of the Na-
24 tional Institute of Standards and Technology, the Sec-
25 retary of Energy, and the heads of other Federal agencies,

1 as determined appropriate by the Director of the National
2 Science Foundation, shall make awards on a competitive,
3 merit-reviewed basis to institutions of higher education,
4 nonprofit organizations, federally funded research and de-
5 velopment centers, or consortia thereof, to establish not
6 more than five testbeds for quantum applications research
7 and development.

8 “(b) PURPOSES.—The quantum testbeds established
9 under subsection (a) shall focus on advancing research
10 and development for near-term and medium-term quan-
11 tum application use cases by providing accessible research
12 resources to academia and industry for developing and
13 testing such use cases, including through proof-of-concept
14 testing, demonstrations, pilot projects, and prototyping.

15 “(c) APPLICATION PROPOSALS.—An applicant for an
16 award under this section shall submit to the Director a
17 proposal at such time, in such manner, and containing
18 such information as the Director may reasonably require.
19 The proposal shall, at a minimum, describe the following:

20 “(1) How the applicant will assemble a work-
21 force, including women and individuals from under-
22 represented groups (in accordance with section
23 526(a)(7) of the America COMPETES Reauthoriza-
24 tion Act of 2010 (42 U.S.C. 1862p-14(a)(7))), with
25 the skills needed to operate a quantum testbed.

1 “(2) How the applicant will ensure broad access
2 to a quantum testbed, including for start-ups and
3 small businesses.

4 “(3) How a quantum testbed will operate after
5 Federal funding has ended.

6 “(d) PRIORITIZATION.—The Director of the National
7 Science Foundation shall prioritize the following:

8 “(1) Applicants that ensure not less than 25
9 percent of the cost for a testbed awarded under this
10 section is provided by private or non-Federal enti-
11 ties, including in-kind contributions.

12 “(2) Awards for consortia that include quantum
13 industry participation.

14 “(e) ROLES AND RESPONSIBILITIES.—The Director
15 of the National Science Foundation shall be responsible
16 for the following:

17 “(1) Maintaining a record of notable outcomes
18 from each quantum testbed established under this
19 section.

20 “(2) Partnering with other Federal agencies to
21 enable opportunities for quantum testbed outcomes
22 to be appropriately taken up by such agencies in
23 alignment with the missions of such agencies.

24 “(3) Not later than one year after the date of
25 the enactment of this section and every two years

1 thereafter until December 31, 2032, briefing the ap-
2 propriate committees of Congress on the status of
3 such quantum testbeds and providing recommenda-
4 tions for improving such quantum testbeds.

5 “(f) COORDINATION.—In establishing quantum
6 testbeds under this section, the Director of the National
7 Science Foundation shall ensure coordination with other
8 testbeds and other quantum facilities hosting Federal
9 quantum technology and infrastructure supported by the
10 National Science Foundation, including testbeds author-
11 ized pursuant to section 10390 of the Research and Devel-
12 opment, Competition, and Innovation Act (Public Law
13 117–167; 42 U.S.C. 19110), or by other Federal agencies
14 as determined appropriate by the Director, to avoid dupli-
15 cation and maximize use of Federal resources.

16 “(g) STAKEHOLDER COLLABORATION.—In carrying
17 out this section, the Director of the National Science
18 Foundation shall collaborate with the Quantum Consor-
19 tium established pursuant to section 201(b) to accomplish
20 the purposes of the quantum testbeds program described
21 in subsection (b) and ensure there is strong collaboration
22 with industry stakeholders. The Director may also engage
23 with National Laboratories, federally funded research and
24 development centers, industry, and other members of the
25 United States quantum ecosystem.

1 “(h) GEOGRAPHIC DIVERSITY.—The Director shall
 2 ensure regional and geographic diversity in issuing awards
 3 under this section.

4 **“SEC. 305. RESEARCH SECURITY.**

5 “The activities authorized under title III shall be ap-
 6 plied in a manner consistent with subtitle D of title VI
 7 of the Research and Development, Competition, and Inno-
 8 vation Act (enacted as division B of Public Law 117–167;
 9 42 U.S.C. 19231 et seq.).”.

10 **SEC. 16. DEPARTMENT OF ENERGY QUANTUM INFORMA-**
 11 **TION SCIENCE RESEARCH PROGRAM.**

12 Section 401 of the National Quantum Initiative Act
 13 (15 U.S.C. 8851) is amended—

14 (1) in subsection (a), by striking “basic re-
 15 search program on quantum information science”
 16 and inserting “research, development, and dem-
 17 onstration program on quantum information science,
 18 engineering, and technology”;

19 (2) in subsection (b)—

20 (A) in paragraph (1), by inserting “, engi-
 21 neering, and technology” after “science”;

22 (B) by redesignating paragraphs (3), (4),
 23 and (5) as paragraphs (5), (6), and (7), respec-
 24 tively;

1 (C) by inserting after paragraph (2) the
2 following new paragraphs:

3 “(3) operate National Quantum Information
4 Science Research Centers to accelerate and scale up
5 scientific and technical breakthroughs in quantum
6 information science, engineering, and technology,
7 and maintain state-of-the-art infrastructure for
8 quantum researchers and industry partners, in ac-
9 cordance with section 402;

10 “(4) conduct cooperative research with indus-
11 try, National Laboratories, institutions of higher
12 education, and other research institutions to facili-
13 tate the development and demonstration of quantum
14 information science, engineering, and technology, in-
15 cluding in the fields of—

16 “(A) quantum information theory;

17 “(B) quantum physics;

18 “(C) quantum computational science, in-
19 cluding hardware and software, including artifi-
20 cial intelligence, machine learning and data
21 science;

22 “(D) quantum data storage, including
23 hardware and software for energy efficient data
24 centers;

1 “(E) applied mathematics and algorithm
2 development;

3 “(F) quantum communications and net-
4 working, including hardware and software for
5 quantum communications and networking;

6 “(G) quantum sensing and detection;

7 “(H) materials science and engineering;

8 “(I) quantum modeling and simulation, in-
9 cluding molecular modeling;

10 “(J) near- and long-term application devel-
11 opment in a range of areas as determined by
12 the Secretary, such as materials discovery, ad-
13 vanced manufacturing, cybersecurity, energy ef-
14 ficiency and energy technologies, energy storage
15 and electric grid management;

16 “(K) quantum chemistry and chemical
17 sciences;

18 “(L) quantum biology; and

19 “(M) quantum security technologies;”;

20 (D) by amending paragraph (5), as so re-
21 designated, to read as follows:

22 “(5) provide research experiences and training
23 for additional undergraduate and graduate students
24 in quantum information science, engineering, and

1 technology, including in the fields specified in para-
2 graph (4);”;

3 (E) in paragraph (6), as so redesignated—

4 (i) in subparagraph (E), by striking
5 “and” after the semicolon;

6 (ii) by redesignating subparagraph
7 (F) as subparagraph (J); and

8 (iii) by inserting after subparagraph
9 (E) the following new subparagraphs:

10 “(F) the Office of Electricity;

11 “(G) the Office of Cybersecurity, Energy
12 Security, and Emergency Response;

13 “(H) the Office of Fossil Energy and Car-
14 bon Management;

15 “(I) the Office of Technology Transitions;
16 and”;

17 (F) in paragraph (7), as so redesignated,
18 by striking the period and inserting “and other
19 relevant efforts as defined by the Secretary of
20 Energy; and”; and

21 (G) by adding at the end the following new
22 paragraph:

23 “(8) leverage the collective body of knowledge
24 and data, including experience and resources from
25 existing Federal research activities and commer-

1 cially-available quantum computing hardware and
2 software to the extent practicable.”; and

3 (3) by adding at the end the following new sub-
4 sections:

5 “(c) QUANTUM HIGH PERFORMANCE COMPUTING
6 STRATEGIC PLAN.—Not later than one year after the date
7 of the enactment of this subsection, the Secretary of En-
8 ergy shall submit to Congress a report containing a 10-
9 year strategic plan to guide Federal programs in design-
10 ing, expanding, commercializing, and procuring hybrid,
11 high performance computing systems featuring the ability
12 to integrate a diverse set of resources, including artificial
13 intelligence and machine learning, accelerated by quantum
14 supercomputers to enable the Department of Energy’s
15 computing facilities to continuously advance computing re-
16 sources. Such strategic plan shall include the following:

17 “(1) A plan to leverage capabilities and infra-
18 structure from the exascale computing program, as
19 the Secretary determines necessary.

20 “(2) A plan to minimize disruptions to the ad-
21 vanced scientific computing workforce.

22 “(3) A consideration of a diversity of quantum
23 computing modalities.

24 “(4) A plan to integrate cloud access of com-
25 mercially available quantum hardware and software

1 to complement on-premises high performance com-
2 puting systems and resources consistent with the
3 QUEST program under section 404.

4 “(5) A description of how the Secretary will im-
5 plement the plan developed under this section.

6 “(d) INDUSTRY OUTREACH.—In carrying out the
7 program under subsection (a) the Secretary of Energy
8 shall engage with the quantum technology industry and
9 promote commercialization of applications of quantum
10 technology relevant to the Department of Energy’s activi-
11 ties by carrying out the following:

12 “(1) Educating the following:

13 “(A) The energy industry on near term
14 and commercially available quantum tech-
15 nologies.

16 “(B) The quantum industry on potential
17 energy applications.

18 “(2) Accelerating the advancements of United
19 States quantum computing, communications, net-
20 working, sensing, and security capabilities to protect
21 and optimize the energy sector.

22 “(3) Advancing relevant domestic supply
23 chains, manufacturing capabilities, and associated
24 simulations or modeling capabilities.

1 “(4) Facilitating commercialization of quantum
2 technologies from National Laboratories and engag-
3 ing with the Quantum Consortium established pur-
4 suant to section 201(b) and other organizations, as
5 applicable, to transition component technologies to
6 help facilitate, as appropriate, the development of a
7 quantum supply chain.

8 “(5) Where appropriate, promoting participa-
9 tion by small and medium-sized businesses and
10 startups.”.

11 **SEC. 17. DOE QUANTUM INSTRUMENTATION AND FOUNDRY**
12 **PROGRAM.**

13 Title IV of the National Quantum Initiative Act (15
14 U.S.C. 8851 et seq.) is amended by inserting after section
15 401 the following new section:

16 **“SEC. 401A. DEPARTMENT OF ENERGY QUANTUM INSTRU-**
17 **MENTATION AND FOUNDRY PROGRAM.**

18 “(a) IN GENERAL.—The Secretary of Energy shall
19 establish a quantum instrumentation and infrastructure
20 foundry program to carry out the following:

21 “(1) Maintain United States leadership in
22 quantum information science, engineering, and tech-
23 nology.

24 “(2) Develop domestic quantum supply chains.

1 “(3) Provide resources for the broader scientific
2 community.

3 “(4) Support activities carried out under sec-
4 tions 401, 403, and 404.

5 “(b) PROGRAM COMPONENTS.—In carrying out the
6 program under subsection (a), the Secretary of Energy
7 shall design, build, develop, purchase, and commercialize
8 specialized equipment, laboratory infrastructure, and
9 state-of-the-art instrumentation to advance quantum engi-
10 neering research and the development of quantum compo-
11 nent technologies at a scale sufficient to satisfy the needs
12 of the scientific community and enable commercialization
13 of quantum technology.

14 “(c) QUANTUM FOUNDRIES.—In carrying out the
15 program under subsection (a), and in coordination part-
16 nership with institutions of higher education and industry,
17 the Secretary of Energy shall support the development of
18 quantum foundries focused on satisfying the device, hard-
19 ware, software, and materials needs of the scientific com-
20 munity and the quantum supply chain.”.

21 **SEC. 18. NATIONAL QUANTUM INFORMATION SCIENCE RE-**
22 **SEARCH CENTERS.**

23 Section 402 of the National Quantum Initiative Act
24 (15 U.S.C. 8852) is amended—

25 (1) in subsection (a)—

1 (A) in paragraph (1)—

2 (i) by striking “basic”;

3 (ii) by striking “science and tech-
4 nology” and inserting “science, engineer-
5 ing, and technology, to expand capacity for
6 the domestic quantum workforce,”; and

7 (iii) by striking “section 401” and in-
8 serting “sections 401, 403, and 404”; and

9 (B) in paragraph (2)(C), by inserting
10 “that may include one or more commercial enti-
11 ties” after “collaborations”;

12 (2) in subsection (b), by inserting “, and should
13 be inclusive of the variety of viable quantum tech-
14 nologies, where appropriate” before the period;

15 (3) in subsection (c),

16 (A) by striking “basic”; and

17 (B) by inserting “, engineering, and tech-
18 nology, accelerating quantum workforce devel-
19 opment,” after “science”;

20 (4) in subsection (d)(1)—

21 (A) in subparagraph (C), by striking
22 “and” after the semicolon;

23 (B) by redesignating subparagraph (D) as
24 subparagraph (E); and

1 (C) by inserting after subparagraph (C)
 2 the following new subparagraph:

3 “(D) the Office of Technology Transitions;
 4 and”;

5 (5) in subsection (e), by amending paragraph
 6 (2) to read as follows:

7 “(2) RENEWAL.—Each Center under this sec-
 8 tion may be renewed for an additional period of 5
 9 years following a successful, merit-based review and
 10 approval by the Director.”; and

11 (6) by striking subsection (f).

12 **SEC. 19. DEPARTMENT OF ENERGY QUANTUM NETWORK IN-**
 13 **FRASTRUCTURE RESEARCH AND DEVELOP-**
 14 **MENT PROGRAM.**

15 Section 403 of the National Quantum Initiative Act
 16 (15 U.S.C. 8853) is amended—

17 (1) in subsection (a)—

18 (A) in paragraph (4)—

19 (i) by inserting “, including” after
 20 “networking”; and

21 (ii) by striking “and” after the semi-
 22 colon;

23 (B) in paragraph (5), by striking the pe-
 24 riod and inserting a semicolon; and

1 (C) by adding at the end the following new
2 paragraphs:

3 “(6) where applicable, leverage a diversity of
4 modalities and commercially-available quantum
5 hardware and software; and

6 “(7) develop education and training pathways
7 related to quantum network infrastructure invest-
8 ments, aligned with existing programmatic invest-
9 ments by the Department of Energy.”; and

10 (2) in subsection (b)—

11 (A) in paragraph (1)—

12 (i) by redesignating subparagraphs
13 (C) and (D) as subparagraphs (D) and
14 (E), respectively; and

15 (ii) by inserting after subparagraph
16 (B) the following new subparagraph:

17 “(C) the Administrator of the National
18 Aeronautics and Space Administration;”;

19 (B) in paragraph (2)—

20 (i) in subparagraph (A), by inserting
21 “ground-to-space and” after “channels,”;

22 (ii) in subparagraph (E), by striking
23 “photon-based” and inserting “all applica-
24 ble modalities of”;

25 (iii) in subparagraph (F)—

1 (I) by striking “large scale” and
2 inserting “large-scale”; and

3 (II) by inserting “, quantum sen-
4 sors,” after “quantum repeaters”;

5 (iv) in subparagraph (G)—

6 (I) by inserting “data centers,
7 quantum sensors” after “repeaters,”;
8 and

9 (II) by striking “and” after the
10 semicolon;

11 (v) in subparagraph (H)—

12 (I) by striking “the quantum
13 technology stack” and inserting
14 “quantum technology modality
15 stacks”; and

16 (II) by striking “National Lab-
17 oratories in” and inserting “National
18 Laboratories such as”; and

19 (vi) by adding at the end the following
20 new subparagraphs:

21 “(I) development of quantum network and
22 entanglement distribution protocols or applica-
23 tions, including development of network stack
24 protocols and protocols enabling integration
25 with existing technologies or infrastructure; and

1 “(J) development of high efficiency room-
2 temperature photon detectors for quantum
3 photonic applications, including quantum net-
4 working and communications;”;

5 (C) in paragraph (4)—

6 (i) by striking “basic”; and

7 (ii) by striking “material” and insert-
8 ing “materials”; and

9 (D) in paragraph (5), by striking “funda-
10 mental”;

11 (3) in subsection (c)—

12 (A) in paragraph (6), by inserting “, in-
13 cluding small and medium-sized businesses and
14 startups” before the semicolon;

15 (B) in paragraph (7), by striking “and” at
16 the end;

17 (C) by redesignating paragraph (8) as (9);
18 and

19 (D) by inserting after paragraph (7) the
20 following new paragraph:

21 “(8) nonprofit organizations; and”; and

22 (4) in subsection (d), by striking “basic re-
23 search” and inserting “research, development, and
24 demonstration”.

1 **SEC. 20. DEPARTMENT OF ENERGY QUANTUM USER EXPAN-**
2 **SION FOR SCIENCE AND TECHNOLOGY PRO-**
3 **GRAM.**

4 Section 404 of the of the National Quantum Initia-
5 tive Act (15 U.S.C. 8854) is amended—

6 (1) in subsection (a)—

7 (A) in the matter preceding paragraph (1),
8 by striking “and quantum computing clouds”
9 and inserting “, software, and cloud-based
10 quantum computers”;

11 (B) in paragraph (3), by striking “and”
12 after the semicolon;

13 (C) in paragraph (4), by striking the pe-
14 riod and inserting a semicolon; and

15 (D) by adding at the end the following new
16 paragraphs:

17 “(5) to enable development of software and ap-
18 plications, including estimation of resources needed
19 to scale applications; and

20 “(6) to develop near-term quantum applications
21 to solve public and private sector problems.”;

22 (2) in subsection (b)—

23 (A) in paragraph (4), by striking “and”
24 after the semicolon;

25 (B) in paragraph (5), by striking the pe-
26 riod and inserting a semicolon; and

1 (C) by at the end the following new para-
2 graphs:

3 “(6) enable users to develop algorithms, soft-
4 ware tools, simulators, and applications for quantum
5 systems using cloud-based quantum computers; and

6 “(7) partner with appropriate public and pri-
7 vate sector entities to develop training and education
8 opportunities on prototype and early-state devices.”;
9 and

10 (3) in subsection (c)—

11 (A) by redesignating paragraphs (4), (5),
12 (6), (7), and (8) as paragraphs (5), (6), (7),
13 (8), and (10), respectively;

14 (B) by inserting after paragraph (3) the
15 following new paragraph:

16 “(4) the National Oceanic and Atmospheric Ad-
17 ministration;”;

18 (C) in paragraph (7), as so redesignated,
19 by inserting “, including small- and medium-
20 sized businesses and startups” before the semi-
21 colon;

22 (D) in paragraph (8), as so redesignated,
23 by striking “and” after the semicolon; and

24 (E) by inserting after paragraph (8), as so
25 redesignated the following new paragraph:

1 “(9) nonprofit organizations; and”.

2 **SEC. 21. QUANTUM INFORMATION SCIENCE TO ENHANCE**
3 **THE RESILIENCE, SECURITY, AND EFFI-**
4 **CIENCY OF THE ELECTRIC GRID.**

5 Title IV of the National Quantum Initiative Act (15
6 U.S.C. 8851 et seq.) is amended by adding at the end
7 the following new section:

8 **“SEC. 405. QUANTUM INFORMATION SCIENCE TO ENHANCE**
9 **THE RESILIENCE AND SECURITY OF THE**
10 **ELECTRIC GRID.**

11 “(a) IN GENERAL.—The Secretary of Energy (re-
12 ferred to in this section as the ‘Secretary’) shall conduct
13 research, development, and demonstration activities fo-
14 cused on the use of quantum information science, engi-
15 neering, and technology, including through quantum appli-
16 cations and quantum computing, to enhance the resilience,
17 security, and efficiency of the electric grid in the United
18 States.

19 “(b) RESEARCH AREAS.—In carrying out subsection
20 (a), the Secretary may conduct research in the following
21 areas:

22 “(1) Fault detection and prediction.

23 “(2) Grid security and safety, including through
24 post-quantum cryptography.

25 “(3) Integrated grid planning.

1 “(4) Grid optimization.

2 “(5) Enhanced modeling.

3 “(6) Energy storage.

4 “(7) Energy market optimization.

5 “(8) Any other area in which, in the determina-
6 tion of the Secretary, quantum information science,
7 engineering, and technology can enhance the resil-
8 ience, security, and efficiency of the electric grid in
9 the United States.

10 “(c) COOPERATION.—To the extent practicable, the
11 Secretary shall conduct research, development, and dem-
12 onstration activities under subsection (a) in cooperation,
13 including through partnerships, as the Secretary deter-
14 mines appropriate, with members of relevant industries,
15 National Laboratories, institutions of higher education,
16 nonprofit organizations, and other relevant institutions,
17 including research institutions, as determined by the Sec-
18 retary.”.

19 **SEC. 22. RESEARCH SECURITY.**

20 Title IV of the National Quantum Initiative Act (15
21 U.S.C. 8851 et seq.), as amended by section 21, is further
22 amended by adding at the end the following new section:

23 **“SEC. 406. RESEARCH SECURITY.**

24 “The activities authorized under this title shall be ap-
25 plied in a manner consistent with subtitle D of title VI

1 of the Research and Development, Competition, and Inno-
2 vation Act (enacted as division B of Public Law 117–167;
3 42 U.S.C. 19231 et seq.).”.

4 **SEC. 23. NATIONAL AERONAUTICS AND SPACE ADMINIS-**
5 **TRATION QUANTUM ACTIVITIES.**

6 The National Quantum Initiative Act is amended by
7 adding at the end the following new title:

8 **“TITLE V—NATIONAL AERO-**
9 **NAUTICS AND SPACE ADMIN-**
10 **ISTRATION QUANTUM ACTIVI-**
11 **TIES**

12 **“SEC. 501. QUANTUM INFORMATION SCIENCE, ENGINEER-**
13 **ING, AND TECHNOLOGY RESEARCH FOR**
14 **SPACE AND AERONAUTICS.**

15 “(a) IN GENERAL.—The Administrator of the Na-
16 tional Aeronautics and Space Administration is authorized
17 to carry out the following:

18 “(1) Carry out research on quantum informa-
19 tion science, engineering, and technology.

20 “(2) Designate an individual responsible for co-
21 ordinating quantum activities across the agency.

22 “(b) COOPERATION.—In carrying out subsection (a),
23 the Administrator of the National Aeronautics and Space
24 Administration—

1 “(1) shall consider cooperative arrangements
2 with the Department of Energy and other Federal
3 departments and agencies, as practicable, on areas
4 of shared benefit; and

5 “(2) may enter into memoranda of under-
6 standing or memoranda of agreement to establish
7 such cooperative arrangements.

8 “(c) STRATEGY.—Not later than 180 days after the
9 date of the enactment of this title, the Administrator of
10 the National Aeronautics and Space Administration shall
11 submit to the appropriate committees of Congress a strat-
12 egy for National Aeronautics and Space Administration
13 research on quantum information science, engineering,
14 and technology. The strategy shall—

15 “(1) identify priority areas of quantum science,
16 engineering, and technologies, such as quantum
17 sensing, that have the highest potential to transform
18 and improve NASA’s missions, research, and devel-
19 opment activities;

20 “(2) identify opportunities for novel ways to in-
21 vestigate and explore the solar system and the uni-
22 verse;

23 “(3) identify resources required to support im-
24 plementation of the strategy, including budgets,
25 workforce, and infrastructure; and

1 “(4) describe cooperative efforts with other
2 Federal departments and agencies, and address
3 areas of research and applications, including—

4 “(A) quantum sensing;

5 “(B) quantum networking;

6 “(C) quantum communications, including
7 quantum satellite communications;

8 “(D) quantum computing; and

9 “(E) science, aeronautics, and exploration-
10 related applications.

11 “(d) CONSULTATION.—In developing the strategy de-
12 scribed in subsection (c), the Administrator may seek
13 input from relevant external stakeholders, including insti-
14 tutions of higher education, industry, and nonprofit re-
15 search organizations.

16 **“SEC. 502. NATIONAL AERONAUTICS AND SPACE ADMINIS-**
17 **TRATION QUANTUM INSTITUTE.**

18 “(a) IN GENERAL.—Subject to the availability of ap-
19 propriations, the Administrator of the National Aero-
20 nautics and Space Administration, in consultation with
21 the heads of other Federal departments and agencies, as
22 appropriate, may carry out a program to establish an in-
23 stitute focused on space and aeronautics applications of
24 quantum information science, engineering, and tech-
25 nology.

1 “(b) INSTITUTE DETAILS.—

2 “(1) COMPETITIVE, MERIT-REVIEWED PROC-
3 ESS.—If the institute under this section is estab-
4 lished, the institute shall be so established through
5 a competitive, merit-reviewed process.

6 “(2) APPLICATIONS.—An eligible applicant
7 under this section shall submit to the Administrator
8 of the National Aeronautics and Space Administra-
9 tion an application at such time, in such manner,
10 and containing such information as the Adminis-
11 trator determines to be appropriate.

12 “(3) ELIGIBLE APPLICANTS.—When admin-
13 istering the process described in paragraph (1), the
14 Administrator of the National Aeronautics and
15 Space Administration shall consider applications
16 from institutions of higher education, research cen-
17 ters, multi-institutional collaborations, and any other
18 entity that the Administrator determines appro-
19 priate.

20 “(4) COLLABORATIONS.—A collaboration that
21 receives an award under this section may include
22 multiple types of research institutions, private sector
23 entities, and nonprofit organizations.

24 “(5) COORDINATION.—The Administrator of
25 the National Aeronautics and Space Administration

1 shall ensure an awardee under this section coordi-
2 nates the activities carried out under this section
3 with the National Aeronautics and Space Adminis-
4 tration, and avoids unnecessary duplication of exist-
5 ing activities of the Administration, other activities
6 carried out under this Act, and other related pro-
7 grams, as appropriate.

8 “(6) COMMERCIAL TECHNOLOGY.—The insti-
9 tute under this section may leverage commercially-
10 available hardware and software to carry out the ac-
11 tivities described in subsection (c).

12 “(c) INSTITUTE ACTIVITIES.—The institute under
13 this section may carry out activities that—

14 “(1) support research focused on developing
15 space and aeronautics applications for quantum in-
16 formation science, engineering, and technology, in-
17 cluding as related to the results of the strategy
18 under section 501(c); and

19 “(2) support quantum information science, en-
20 gineering, and technology education and public out-
21 reach.

22 “(d) INSTITUTE REQUIREMENTS.—To the maximum
23 extent practicable, the institute under this section shall
24 serve the needs of the National Aeronautics and Space Ad-
25 ministration for the benefit of the broader United States

1 quantum information science community, to establish
2 processes for the purpose of advancing space and aero-
3 nautics applications in quantum information science, engi-
4 neering, and technology, and improving the competitive-
5 ness of the United States.

6 “(e) INSTITUTE SELECTION AND DURATION.—

7 “(1) IN GENERAL.—Subject to the availability
8 of appropriations, the institute under this section
9 may carry out activities for a period of 5 years.

10 “(2) REAPPLICATION.—Subject to the avail-
11 ability of appropriations, an awardee may reapply
12 for an additional, subsequent period of 5 years fol-
13 lowing a successful, merit-based review.

14 “(3) TERMINATION.—Consistent with the au-
15 thorities of the National Aeronautics and Space Ad-
16 ministration, the Administrator of the National Aer-
17 onautics and Space Administration may terminate
18 the institute for cause during the performance pe-
19 riod.

20 **“SEC. 503. RESEARCH SECURITY.**

21 “The activities authorized under title V shall be ap-
22 plied in a manner consistent with subtitle D of title VI
23 of the Research and Development, Competition, and Inno-
24 vation Act (enacted as division B of Public Law 117–167;
25 42 U.S.C. 19231 et seq.).”.

1 **SEC. 24. NATIONAL SCIENCE FOUNDATION CRYPTOGRAPHY**
 2 **RESEARCH.**

3 Subsection (a)(1)(A) of section 4 of the Cyber Secu-
 4 rity Research and Development Act (15 U.S.C. 7403) is
 5 amended by inserting “, including post-quantum cryptog-
 6 raphy (as such term is defined in section 3 of the Quan-
 7 tum Computing Cybersecurity Preparedness Act (6 U.S.C.
 8 1526 note; Public Law 117–260))” before the semicolon.

9 **SEC. 25. CLERICAL AMENDMENTS.**

10 The table of contents in section 1(b) of the National
 11 Quantum Initiative Act is amended as follows:

12 (1) By striking the items relating to sections
 13 105 and 106 and inserting the following new items:

“Sec. 105. Subcommittee on the Economic and Security Implications of Quan-
 tum Information Science.
 “Sec. 105A. International Quantum Cooperation Strategy.
 “Sec. 106. Sunset.”.

14 (2) By inserting after the item relating to sec-
 15 tion 201 the following new items:

“Sec. 202. National Institute of Standards and Technology quantum accelera-
 tion centers.
 “Sec. 203. Research security.”;

16 (3) By inserting after the item relating to sec-
 17 tion 302 the following new items:

“Sec. 303. Quantum Reskilling, Education, and Workforce (QREW) Coordina-
 tion Hub.
 “Sec. 304. Quantum testbeds.”.

18 (4) By inserting after the item relating to sec-
 19 tion 401 the following new item:

“Sec. 401A. Department of Energy Quantum Instrumentation and Foundry
 Program.”.

- 1 (5) By inserting after the item relating to sec-
 2 tion 404 the following new items:

“Sec. 405. Quantum information science to enhance the resilience and security
 of the electric grid.

“Sec. 406. Research security.”.

- 3 (6) By adding at the end the following new
 4 items:

“TITLE V—NATIONAL AERONAUTICS AND SPACE
 ADMINISTRATION QUANTUM ACTIVITIES

“Sec. 501. Quantum information science, engineering, and technology research
 for space and aeronautics.

“Sec. 502. National Aeronautics and Space Administration quantum institute.

“Sec. 503. Research security.”.

