

118TH CONGRESS
2D SESSION

S. _____

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

IN THE SENATE OF THE UNITED STATES

Ms. CANTWELL (for herself, Mr. YOUNG, Mr. DURBIN, and Mr. DAINES) introduced the following bill; which was read twice and referred to the Committee on _____

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; TABLE OF CONTENTS.**

4 (a) **SHORT TITLE.**—This Act may be cited as the
5 “National Quantum Initiative Reauthorization Act of
6 2024”.

7 (b) **TABLE OF CONTENTS.**—The table of contents for
8 this Act is as follows:

- Sec. 1. Short title; table of contents.
- Sec. 2. Definitions.
- Sec. 3. Purposes.
- Sec. 4. National Quantum Initiative Program.
- Sec. 5. National Quantum Coordination Office.

- Sec. 6. Subcommittee on Quantum Information Science.
- Sec. 7. National Quantum Initiative Advisory Committee.
- Sec. 8. Subcommittee on the Economic and Security Implications of Quantum Information Science.
- Sec. 9. International Quantum Cooperation Strategy.
- Sec. 10. Prize challenges.
- Sec. 11. Sunset of National Quantum Initiative.
- Sec. 12. National Institute of Standards and Technology activities and quantum consortium.
- Sec. 13. National Institute of Standards and Technology Quantum Centers.
- Sec. 14. National Science Foundation quantum information science research and education activities.
- Sec. 15. Multidisciplinary centers for quantum research and education.
- Sec. 16. Quantum Reskilling, Education, and Workforce (QREW) Coordination Hub, quantum testbeds, and research security.
- Sec. 17. National Science Foundation cryptography research.
- Sec. 18. National Aeronautics and Space Administration quantum activities.
- Sec. 19. National Institute of Health quantum activities.
- Sec. 20. Department of State quantum activities.
- Sec. 21. Comptroller General review and report.
- Sec. 22. Clerical amendments.

1 **SEC. 2. DEFINITIONS.**

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

4 (1) by redesignating paragraphs (4), (5), (6),
5 (7), the first paragraph (8) (relating to the defini-
6 tion of the “Subcommittee on Economic and Secu-
7 rity Implications”), and the second paragraph (8)
8 (relating to the definition of the “Subcommittee on
9 Quantum Information Science”) as paragraphs (7),
10 (9), (12), (13), (17), and (18), respectively;

11 (2) by inserting after paragraph (3) the fol-
12 lowing:

13 “(4) FEDERAL LABORATORY.—The term ‘Fed-
14 eral laboratory’ has the meaning given such term in

1 section 4 of the Stevenson-Wydler Technology Inno-
2 vation Act of 1980 (15 U.S.C. 3703).

3 “(5) FOREIGN COUNTRY OF CONCERN.—The
4 term ‘foreign country of concern’ means—

5 “(A) a country that is a covered nation (as
6 such term is defined in section 4872(d) of title
7 10, United States Code); and

8 “(B) any country that the Secretary of
9 Commerce, in consultation with the Secretary of
10 Defense, the Secretary of State, and the Direc-
11 tor of National Intelligence, determines to be
12 engaged in conduct that is detrimental to the
13 national security or foreign policy of the United
14 States.

15 “(6) FOREIGN ENTITY OF CONCERN.—The
16 term ‘foreign entity of concern’ means a foreign en-
17 tity that is—

18 “(A) designated as a foreign terrorist orga-
19 nization by the Secretary of State under section
20 219(a) of the Immigration and Nationality Act
21 (8 U.S.C. 1189(a));

22 “(B) included on the list of specially des-
23 ignated nationals and blocked persons main-
24 tained by the Office of Foreign Assets Control

1 of the Department of the Treasury (commonly
2 known as the ‘SDN list’);

3 “(C) owned by, controlled by, or subject to
4 the jurisdiction or direction of a government of
5 a foreign country that is a covered nation (as
6 such term is defined in section 4872 of title 10,
7 United States Code);

8 “(D) alleged by the Attorney General to
9 have been involved in activities for which a con-
10 viction was obtained under—

11 “(i) chapter 37 of title 18, United
12 States Code (commonly known as the ‘Es-
13 pionage Act’);

14 “(ii) section 951 or 1030 of title 18,
15 United States Code;

16 “(iii) chapter 90 of title 18, United
17 States Code (commonly known as the ‘Eco-
18 nomic Espionage Act of 1996’);

19 “(iv) the Arms Export Control Act
20 (22 U.S.C. 2751 et seq.);

21 “(v) section 224, 225, 226, 227, or
22 236 of the Atomic Energy Act of 1954 (42
23 U.S.C. 2274, 2275, 2276, 2277, and
24 2284);

1 “(vi) the Export Control Reform Act
2 of 2018 (50 U.S.C. 4801 et seq.); or

3 “(vii) the International Emergency
4 Economic Powers Act (50 U.S.C. 1701 et
5 seq.); or

6 “(E) determined by the Secretary of Com-
7 merce, in consultation with the Secretary of De-
8 fense and the Director of National Intelligence,
9 to be engaged in unauthorized conduct that is
10 detrimental to the national security or foreign
11 policy of the United States.”;

12 (3) in paragraph (7), as so redesignated, by
13 striking “(a)” each place it appears;

14 (4) by inserting after paragraph (7), as so re-
15 designated, the following new paragraph:

16 “(8) NATIONAL LABORATORY.—The term ‘Na-
17 tional Laboratory’ has the meaning given such term
18 in section 2 of the Energy Policy Act of 2005 (42
19 U.S.C. 15801).”;

20 (5) by inserting after paragraph (9), as so re-
21 designated, the following:

22 “(10) QUANTUM APPLICATIONS.—The term
23 ‘quantum applications’ means uses of quantum in-
24 formation science, engineering, and technology, in-
25 cluding quantum algorithms and software, quantum

1 computing and quantum-classical hybrids, quantum
2 sensing, quantum networking, quantum encryption,
3 quantum simulation, or quantum communications
4 applications.

5 “(11) QUANTUM COMPUTING.—The term ‘quan-
6 tum computing’ means any of a variety of quantum
7 computing technologies, including quantum anneal-
8 ing and quantum gate-model systems that utilize a
9 variety of architectures, such as superconductors,
10 ion traps, photonics, neutral atoms, atomic spin,
11 electronic spin, or topological qubits.”;

12 (6) by amending paragraph (12), as so redesign-
13 nated, to read as follows:

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

21 (7) by inserting after paragraph (13), as so re-
22 designated, the following:

23 “(14) QUANTUM NETWORKING.—The term
24 ‘quantum networking’ means the transmission of
25 quantum information and the distribution and use of

1 entanglement across nodes to enable new informa-
2 tion technology applications and fundamental
3 science.

4 “(15) QUANTUM SENSING.—The term ‘quan-
5 tum sensing’—

6 “(A) means the use of quantum mechanics
7 to enhance or enable new sensors; and

8 “(B) can include uses of superposition and
9 entanglement, nonclassical states, and advances
10 in accuracy and precision enabled by quantum
11 control.

12 “(16) STEM.—The term ‘STEM’ means the
13 academic and professional disciplines of science,
14 technology, engineering, and mathematics, including
15 computer science.”.

16 **SEC. 3. PURPOSES.**

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

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

22 (2) in paragraph (1)—

23 (A) in the matter preceding subparagraph
24 (A), by striking “science and technology” and

1 inserting “science, engineering, and tech-
2 nology”;

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

5 “(A) to expand the number of researchers,
6 educators, and students with training in quan-
7 tum information science, engineering, and tech-
8 nology to develop a domestic workforce pipeline
9 and retain international talent to the extent
10 consistent with national security and inter-
11 national competitiveness;”;

12 (C) in subparagraph (B), by striking
13 “science at the” and inserting “science, engi-
14 neering, and technology at the primary, sec-
15 ondary,”;

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

18 (E) in subparagraph (D)—

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

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

24 (F) by adding at the end the following:

1 “(F) to facilitate development of quantum
2 applications, including quantum-hybrid applica-
3 tions, to promote innovation and domestic com-
4 mercialization; and

5 “(G) to support advancements in emerging
6 technologies that could benefit from or benefit
7 the development of quantum technology and
8 promote research, development, demonstration,
9 and application of such emerging technologies
10 in quantum information science, engineering,
11 and technology and scientific discovery.”;

12 (3) in paragraph (2), by striking “science and
13 technology” and inserting “science, engineering, and
14 technology”;

15 (4) in paragraph (3), by striking “science and
16 technology” and inserting “science, engineering, and
17 technology”;

18 (5) in paragraph (4)—

19 (A) by inserting “National Laboratories,”
20 after “Federal laboratories,”; and

21 (B) by striking “and” after the semicolon;

22 (6) in paragraph (5)—

23 (A) in the matter preceding subparagraph

24 (A)—

1 (i) by inserting “partnerships, re-
2 search collaborations, and” after “inter-
3 national”; and

4 (ii) by striking “science and tech-
5 nology security” and inserting “science,
6 engineering, and technology”;

7 (B) in subparagraph (A)—

8 (i) by inserting “, social benefit,”
9 after “innovation”; and

10 (ii) by striking “and” after the semi-
11 colon;

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

14 (D) by adding at the end the following:

15 “(C) to facilitate cooperation in the ad-
16 vancement of quantum capabilities, including
17 through investment, among the United States
18 and its strategic allies and partners to strength-
19 en and secure the quantum-relevant domestic
20 supply chain and related ecosystem; and

21 “(D) to coordinate on potential export or
22 strategic trade controls where appropriate.”;
23 and

24 (7) by adding at the end the following:

1 “(6) improving the maturity and scale of the
2 quantum industry, including small- and medium-
3 sized businesses and startups representing a diver-
4 sity of quantum specialties, and commercialization of
5 domestic quantum capacity across modalities.”.

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

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

9 (1) in paragraph (1)—

10 (A) by striking “development” and insert-
11 ing “research development, and near-, medium-
12 , and long-term demonstration and commer-
13 cialization”;

14 (B) by striking “information science and
15 technology”; and

16 (C) by inserting “in diverse sectors” after
17 “applications”;

18 (2) in paragraph (2)—

19 (A) by striking “fundamental”;

20 (B) by striking “science and technology”
21 and inserting “science, engineering, and tech-
22 nology”; and

23 (C) by inserting “infrastructure,” after
24 “demonstration,”;

25 (3) in paragraph (3)—

1 (A) by inserting “and retain” after “to de-
2 velop”; and

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

6 (4) by amending paragraph (4) to read as fol-
7 lows:

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

21 (5) in paragraph (5)—

22 (A) by striking “industry and universities”
23 and inserting “industry, universities, small
24 businesses, and strategic allies and partners”;
25 and

1 (B) by inserting “, including human re-
2 sources” after “resources”.

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

4 Section 102 of the National Quantum Initiative Act
5 (15 U.S.C. 8812) is amended—

6 (1) in subsection (a)(2)—

7 (A) in subparagraph (A)—

8 (i) by inserting “who shall be” before
9 “appointed”; and

10 (ii) by inserting “, and who may serve
11 a 4-year term, subject to renewal” before
12 the semicolon; and

13 (B) by amending subparagraph (B) to read
14 as follows:

15 “(B) staff comprised of employees detailed
16 from the Federal departments and agencies
17 specified in section 103(b).”; and

18 (2) in subsection (b)—

19 (A) in paragraph (3), by striking “science
20 and technology” and inserting “science, engi-
21 neering, and technology research, development,
22 workforce, and international”;

23 (B) by amending paragraph (4) to read as
24 follows:

1 “(4) ensure coordination among the collabo-
2 rative ventures or consortia established under this
3 Act;” and

4 (C) in paragraph (6), by striking “; and”
5 and inserting a semicolon;

6 (D) in paragraph (7)—

7 (i) by inserting “small businesses,
8 nonprofit research organizations,” after
9 “universities;” and

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

12 (E) by adding after paragraph (7), the fol-
13 lowing:

14 “(8) promote understanding and adoption of
15 viable quantum capabilities that strengthen the
16 United States economy as appropriate; and

17 “(9) track, monitor, and promote policies that
18 will ensure the stability of the United States quan-
19 tum workforce, quantum supply chain, domestic
20 quantum industry, and international trade.”.

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

23 Section 103 of the National Quantum Initiative Act
24 (15 U.S.C. 8813) is amended—

25 (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 (16); 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 Department of Education;

12 “(13) the Department of Labor;

13 “(14) the National Oceanic and Atmospheric
14 Administration;

15 “(15) the Small Business Administration; and”;

16 (2) in subsection (d)—

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

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

25 (C) in paragraph (5)—

1 (i) by inserting “, engineering, and
2 technology” after “science”; and

3 (ii) by inserting “and conduct com-
4 parative benchmarking of Federal invest-
5 ments and research strategies relative to
6 those of strategic allies and partners of the
7 United States and other countries,” after
8 “development efforts”;

9 (D) in paragraph (6)—

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

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

15 (E) in paragraph (7)—

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

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

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

22 “(8) facilitate interagency partnership opportu-
23 nities to advance quantum applications related to en-
24 vironment, advanced manufacturing, biotechnology,
25 chemistry, space, and other sectors.”;

1 (3) in subsection (g)(2)—

2 (A) in paragraph (A), by inserting “num-
3 bers” after “budget”;

4 (B) in paragraph (B), by inserting “num-
5 bers” after “budget”; and

6 (C) by adding at the end the following new
7 paragraph:

8 “(D) Metrics for measuring the impact of
9 the Program for the current fiscal year, for
10 each Federal department and agency described
11 in subsection (b).”;

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

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

17 “(i) QUANTUM USE CASES.—

18 “(1) IN GENERAL.—The Subcommittee shall
19 identify potential use cases for quantum technologies
20 that could advance the missions of Federal depart-
21 ments and agencies participating in the Program.

22 “(2) QUANTUM ON-RAMP.—For each potential
23 use case identified pursuant to paragraph (1) for a
24 Federal department or agency, the head of the Fed-
25 eral department or agency may, in consultation with

1 the Subcommittee, develop a plan to enable such de-
2 partment or agency to address the potential use
3 case.

4 “(3) COMPARISON TO ARTIFICIAL INTEL-
5 LIGENCE TECHNOLOGIES.—For any potential use
6 case identified under paragraph (1) for a Federal
7 department or agency, the head of the department
8 or agency may, in consultation with the Sub-
9 committee, consider the quantum use case’s inter-
10 play with artificial intelligence.

11 “(4) REPORTING.—The Subcommittee, as part
12 of the annual report on the budget for the Program
13 under subsection (g), shall report progress in car-
14 rying out the activities under this subsection, includ-
15 ing information relating to the following:

16 “(A) The potential use cases identified
17 pursuant to paragraph (1).

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

20 “(C) Any obstacles to addressing such po-
21 tential use cases, including lack of funding.”.

22 **SEC. 7. NATIONAL QUANTUM INITIATIVE ADVISORY COM-**
23 **MITTEE.**

24 Section 104 of the National Quantum Initiative Act
25 (15 U.S.C. 8814) is amended—

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

3 “(b) QUALIFICATIONS.—The Advisory Committee
4 shall consist of members, appointed by the President, who
5 are—

6 “(1) representative of industry, including end
7 users likely to benefit from quantum technology and
8 companies that are part of quantum-relevant supply
9 chains;

10 “(2) small- and medium-sized businesses and
11 startups representing a diversity of quantum special-
12 ties;

13 “(3) universities and Federal laboratories; and

14 “(4) qualified to provide advice and information
15 on quantum information science, engineering, and
16 technology research, development, demonstrations,
17 standards, STEM education and workforce, tech-
18 nology transfer, commercial application, national se-
19 curity and economic concerns, or research security.”;

20 (2) in subsection (d)(2)—

21 (A) in subparagraph (A), by striking
22 “science and technology” and inserting
23 “science, engineering, and technology”;

1 (B) by redesignating subparagraphs (D),
2 (E), (F), and (G) as subparagraphs (F), (G),
3 (H), and (I), respectively;

4 (C) by inserting after subparagraph (C)
5 the following new subparagraphs:

6 “(D) other countries’ quantum programs
7 and the progress of such countries and such
8 programs relative to the Program;

9 “(E) the competitiveness of the United
10 States in quantum technologies, with respect to
11 quantum computing, sensing, and networking;”;

12 (D) in subparagraph (F), as so redesign-
13 nated—

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

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

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

24 (F) in subparagraph (H), as so redesign-
25 nated, by striking “open standards for, quan-

1 tum information science and technology; and”
2 and inserting “international standards in open
3 and transparent standardization systems for
4 quantum information science, engineering, and
5 technology;”;

6 (G) in subparagraph (I), as so redesign-
7 nated—

8 (i) by inserting “educational, environ-
9 mental, health,” after “legal;” and

10 (ii) by striking the period and insert-
11 ing “; and”; and

12 (H) by adding at the end the following new
13 subparagraphs:

14 “(J) the domestic and international co-
15 operation needs and goals of the Program, in-
16 cluding those related to infrastructure and the
17 supply chain of quantum information science,
18 engineering, and technology; and

19 “(K) the degree to which quantum infor-
20 mation science, engineering, and technology—

21 “(i) is enhancing or can enhance—

22 “(I) the capabilities of the United
23 States advanced industrial economy;
24 and

1 “(II) Federal, State, and local
2 government capabilities and services;
3 and

4 “(ii) can protect or optimize critical
5 infrastructure (as such term is defined in
6 section 1016(e) of Public Law 107–56 (42
7 U.S.C. 5195c(e))).”;

8 (3) in subsection (e)—

9 (A) by inserting “through December 31,
10 2030” after “thereafter”; and

11 (B) by adding at the end the following new
12 sentence: “In the first such report required
13 after the date of the enactment of this sentence,
14 the Advisory Committee shall assess the advis-
15 ability and feasibility of establishing a quantum
16 communications corridor in which Federal lab-
17 oratories, institutions of higher education, and
18 other entities conducting quantum information
19 science, engineering, and technology research
20 are connected via quantum communication net-
21 works capable of securely transmitting informa-
22 tion.”; and

23 (4) by amending subsection (g) to read as fol-
24 lows:

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

7 **SEC. 8. SUBCOMMITTEE ON THE ECONOMIC AND SECURITY**
8 **IMPLICATIONS OF QUANTUM INFORMATION**
9 **SCIENCE.**

10 Section 105 of the National Quantum Initiative Act
11 (15 U.S.C. 8814a) is amended—

12 (1) in subsection (b)—

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

15 (B) by redesignating paragraph (11) as
16 paragraph (15); and

17 (C) by inserting after paragraph (10) the
18 following new paragraphs:

19 “(11) the Department of Health and Human
20 Services;

21 “(12) the Department of State;

22 “(13) the Small Business Administration;

23 “(14) the National Aeronautics and Space Ad-
24 ministration; and”;

25 (2) in subsection (c)—

24

1 (A) in paragraph (1), by striking “infor-
2 mation science” and inserting “information
3 science, engineering, and technology”;

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

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

8 (D) in paragraph (5)—

9 (i) by inserting “and engineering”
10 after “quantum information science”; and

11 (ii) by inserting “any” before “export
12 controls”;

13 (E) in paragraph (6), by striking “infor-
14 mation science” and inserting “information
15 science, engineering, and technology”;

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

18 (G) in paragraph (8)—

19 (i) by striking “information science”
20 and inserting “information science, engi-
21 neering, and technology”; and

22 (ii) by striking the period and insert-
23 ing a semicolon; and

24 (H) by adding at the end the following:

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

10 “(10) recommend strategies for attracting and
11 retaining students and scholars with expertise in
12 quantum related fields to Federal departments and
13 agencies.”.

14 **SEC. 9. INTERNATIONAL QUANTUM COOPERATION STRAT-**
15 **EGY.**

16 The National Quantum Initiative Act (15 U.S.C.
17 8801 et seq.) is amended by inserting after section 105
18 the following new section:

19 **“SEC. 105A. INTERNATIONAL QUANTUM COOPERATION**
20 **STRATEGY.**

21 “(a) STRATEGY REQUIRED.—Not later than one year
22 after the date of the enactment of this section, the Direc-
23 tor of the Office of Science and Technology Policy, in con-
24 sultation with the Secretary of Commerce, the Secretary
25 of State, the Secretary of Energy, the Director of the Na-

1 tional Science Foundation, and the heads of other Federal
2 agencies, as appropriate, shall develop and submit to the
3 Committee on Commerce, Science, and Transportation,
4 the Committee on Energy and Natural Resources, and the
5 Committee on Foreign Relations of the Senate, and the
6 Committee on Science, Space, and Technology and the
7 Committee on Foreign Affairs of the House of Representa-
8 tives a strategy—

9 “(1) to establish collaborative international
10 partnerships, including co-funded international pro-
11 grams, to advance research and development, testing
12 and evaluation, commercialization, and interoper-
13 ability in quantum information science, engineering,
14 and technology with allies and partners of the
15 United States, and other countries, when in the se-
16 curity, strategic, technological, and scientific inter-
17 ests of the United States;

18 “(2) to ensure continued United States partici-
19 pation in bilateral and multilateral efforts to ad-
20 vance quantum information science, engineering, and
21 technology on the international stage;

22 “(3) to promote the integrity and impartiality
23 of international standards organizations and proc-
24 esses related to quantum information science, engi-
25 neering, and technology; and

1 “(4) to ensure ethical application of quantum
2 information science, engineering, and technology to
3 protect civil liberties and basic human rights.

4 “(b) DESIGNATION.—The strategy under this sub-
5 section shall be known as the ‘International Quantum Co-
6 operation Strategy’ (in this section referred to as the
7 ‘Strategy’).

8 “(c) ELEMENTS.—In the development of the Strat-
9 egy, the Director of the Office of Science and Technology
10 Policy, the National Quantum Coordination Office, the
11 Subcommittee on Quantum Information Science, the Sub-
12 committee on Economic and Security Implications, and
13 the relevant agencies shall consider including the fol-
14 lowing:

15 “(1) The establishment of international part-
16 nerships to advance research and development in
17 quantum information science, engineering, and tech-
18 nology.

19 “(2) Key strategic allies and partners of the
20 United States that have demonstrated unique capa-
21 bilities in one or more areas of quantum information
22 science, engineering, and technology.

23 “(3) Efforts and plans to address risks to the
24 national security and economic interests of the
25 United States during development and deployment

1 of quantum technologies worldwide, including plans
2 for diplomatic engagement with allies and partners,
3 and other countries.

4 “(4) Efforts and plans to promote responsible
5 global development and deployment of quantum
6 technologies, including through international engage-
7 ment and leadership in the development of inter-
8 national standards.

9 “(5) Efforts and plans to develop, attract, and
10 retain international talent.

11 “(6) The ability and risks of domestic manufac-
12 turers and suppliers and those of allies and partners
13 of the United States to meet the needs of the global
14 quantum supply chain, including raw materials such
15 as Helium-3, plans for engagement with allies and
16 partners, manufacturers, and suppliers, and options
17 to mitigate gaps and vulnerabilities in the global
18 quantum supply chain.

19 “(7) A plan to safeguard research and tech-
20 nology supported through international cooperation,
21 as appropriate, in whole or in part, including in
22 quantum technologies critical to national security,
23 from malign influence, theft, or exfiltration by for-
24 eign entities of concern.

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

4 “(d) BRIEFING.—Not later than 30 days after the
5 date on which the Strategy is completed, the Director shall
6 brief the committees specified in subsection (a) on the
7 Strategy.”.

8 **SEC. 10. PRIZE CHALLENGES.**

9 The National Quantum Initiative Act (15 U.S.C.
10 8801 et seq.) is amended—

11 (1) by redesignating section 106 as section 107;

12 and

13 (2) by inserting after section 105A, as added by
14 section 9, the following:

15 **“SEC. 106. NATIONAL QUANTUM PRIZE CHALLENGES.**

16 “(a) IN GENERAL.—Subject to the availability of ap-
17 propriations, any head of a Federal agency with a rep-
18 resentative serving on the Subcommittee on Quantum In-
19 formation Science established under section 103, may, in-
20 dividually or in cooperation with one or more heads of
21 Federal agencies—

22 “(1) conduct a prize competition under section
23 24 of the Stevenson-Wydler Technology Innovation
24 Act of 1980 (15 U.S.C. 3719) to dramatically accel-
25 erate the development and commercialization of ap-

1 plications and algorithms in quantum information
2 science, engineering, and technology; and

3 “(2) define a measurable set of performance
4 goals for participants in the prize competitions to
5 demonstrate their solutions on a level playing field
6 while making a significant advancement over the
7 current state of the art.

8 “(b) PURPOSE.—Any prize competition carried out
9 under subsection (a) shall be for the purpose of stimu-
10 lating innovation to advance the ability of the United
11 States to achieve high-priority breakthroughs for applica-
12 tions in quantum information science, engineering, and
13 technology, such as in quantum computing, quantum sens-
14 ing, quantum communications, quantum networking,
15 quantum algorithms, and quantum cryptography.

16 “(c) COORDINATION WITH SUBCOMMITTEES.—Each
17 prize competition conducted under subsection (a) may be
18 conducted in coordination with members of the Sub-
19 committee on Quantum Information Science and the Sub-
20 committee on the Economic and Security Implications of
21 Quantum Information Science.

22 “(d) RECOMMENDATIONS.—To assist in the adminis-
23 tration of this section, the Subcommittee on Quantum In-
24 formation Science may provide recommendations on key
25 challenges in quantum information science, engineering,

1 and technology that would be well-suited for a prize com-
2 petition under subsection (a). The recommendations shall
3 include a scope for efforts carried out under such sub-
4 section.”.

5 **SEC. 11. SUNSET OF NATIONAL QUANTUM INITIATIVE.**

6 Subsection (a) of section 107 of the National Quan-
7 tum Initiative Act (15 U.S.C. 8815), as redesignated by
8 section 10, is amended to read as follows:

9 “(a) IN GENERAL.—Except as provided in subsection
10 (b), the authority to carry out sections 101, 102, 103, 104,
11 and 105 shall terminate on December 30, 2034.”.

12 **SEC. 12. NATIONAL INSTITUTE OF STANDARDS AND TECH-**
13 **NOLOGY ACTIVITIES AND QUANTUM CONSOR-**
14 **TIUM.**

15 Section 201 of the National Quantum Initiative Act
16 (15 U.S.C. 8831) is amended—

17 (1) in subsection (a)—

18 (A) in paragraph (1)—

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

20 and

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

24 (B) in paragraph (2)—

1 (i) by inserting “attract, educate,
2 and” before “train”; and

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

6 (C) by amending paragraph (3) to read as
7 follows:

8 “(3) shall carry out research to facilitate the
9 development and standardization, as appropriate, of
10 quantum cryptography, post-quantum cryptography
11 (as such term is defined in section 3 of the Quantum
12 Computing Cybersecurity Preparedness Act (6
13 U.S.C. 1526 note; Public Law 117–260)), and prac-
14 tices to replace cryptographic keys or algorithms
15 with minimal disruption to current applications and
16 systems;”;

17 (D) by amending paragraph (4) to read as
18 follows:

19 “(4) shall carry out research, development, and
20 demonstration projects, as appropriate, to facilitate
21 the development and standardization of quantum ap-
22 plications, including quantum supporting tech-
23 nologies;”;

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

4 (F) by inserting the following after para-
5 graph (4) the following:

6 “(5) shall carry out research to support the
7 measurement of comparative performance and
8 progress of quantum technologies, including, as
9 practicable, technology readiness assessments of
10 quantum technologies;

11 “(6) shall promote United States participation
12 in international standards organizations related to
13 quantum information science, engineering, and tech-
14 nology;

15 “(7) shall establish or expand partnerships with
16 the public sector and private sector—

17 “(A) to accelerate the development of do-
18 mestic quantum supply chain and supply chain-
19 supporting technologies;

20 “(B) to reduce quantum supply chain
21 vulnerabilities, including by promoting domestic
22 vendor diversification efforts and coordination
23 activities; and

1 “(C) to avoid offshoring to, or dependence
2 on, countries of concern for critical components
3 of capabilities in the quantum supply chain;”;

4 (G) in paragraph (8), as so redesignated,
5 by striking “infrastructure” and inserting “,
6 communications, sensing, and computing”;

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

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

10 (ii) by striking “and engineering;
11 and” and inserting “, engineering, and
12 technology and expanding the domestic
13 STEM workforce;”; and

14 (I) by inserting after paragraph (9), as so
15 redesignated, the following:

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

18 (2) in subsection (b)—

19 (A) in paragraph (1)—

20 (i) by striking “future” and inserting
21 “research”; and

22 (ii) by striking “science and tech-
23 nology” and inserting “science, engineer-
24 ing, and technology”;

25 (B) in paragraph (2)—

1 (i) by amending subparagraph (A) to
2 read as follows:

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

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

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

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

24 “(D) to assess and identify key areas for
25 establishing, expanding, or developing inter-

1 national partnerships that will facilitate United
2 States quantum-related business engagement
3 and growth; and

4 “(E) to provide recommendations on how
5 the National Institute of Standards and Tech-
6 nology, the Program, and other Federal agen-
7 cies, as appropriate, can incorporate small and
8 medium-sized businesses and startups into Fed-
9 eral quantum activities and promote the success
10 of small- and medium-sized startups.”;

11 (C) in paragraph (3)—

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

15 (ii) by inserting “periodically, but not
16 less than every five years,” after “shall”;
17 and

18 (D) by adding at the end the following new
19 paragraph:

20 “(4) COORDINATION ENCOURAGED.—As appro-
21 priate, the consortium is encouraged to engage with
22 Federal agencies that fund research, have a mission
23 to transition or translate research results to prac-
24 tical quantum applications, or have a mission that
25 could benefit from the development of quantum tech-

1 nologies, to inform and accelerate progress in such
2 areas. Federal agencies are also encouraged to en-
3 gage with the consortium.”; and

4 (3) by striking subsection (c) and inserting the
5 following new subsections:

6 “(c) QUANTUM SUPPLY CHAINS.—

7 “(1) MAPPING AND PLANNING.—

8 “(A) IN GENERAL.—The Secretary of
9 Commerce shall carry out quantum supply
10 chain mapping activities and design a plan to
11 strengthen quantum supply chains and enhance
12 the competitiveness of the United States in key
13 quantum technologies.

14 “(B) ACTIVITIES.—In carrying out sub-
15 paragraph (A), the Secretary shall carry out the
16 following activities:

17 “(i) Map and model supply chains for
18 quantum networking, quantum computing,
19 quantum communications, quantum sim-
20 ulation, and quantum sensing technologies
21 and applications.

22 “(ii) Identify current and future high-
23 priority gaps and vulnerabilities in quan-
24 tum supply chains.

1 than 2 years after the date of the enactment of the
2 National Quantum Initiative Reauthorization Act of
3 2024, the Secretary of Commerce shall, in coordina-
4 tion with the Secretary of Energy, the Director of
5 the National Science Foundation, the Secretary of
6 Defense, the Administrator of the National Aero-
7 nautics and Space Administration, the Adminis-
8 trator of the Small Business Administration, and the
9 heads of such other Federal agencies as the Sec-
10 retary of Commerce considers relevant, develop and
11 submit to the appropriate committees of Congress
12 specific recommendations on potential Federal Gov-
13 ernment mechanisms to support the quantum supply
14 chains.

15 “(4) PLAN TO STRENGTHEN AND SECURE
16 QUANTUM SUPPLY CHAINS.—Not later than 3 years
17 after the date of the enactment of the National
18 Quantum Initiative Reauthorization Act of 2024, the
19 Secretary of Commerce shall submit to the appro-
20 priate committees of Congress—

21 “(A) a plan to strengthen and secure
22 quantum information science, engineering, and
23 technology supply chains, including a forecast
24 of future needs;

1 “(B) a roadmap to support a reliable sup-
2 ply of key components; and

3 “(C) a plan to develop, maintain, and ex-
4 pand quantum supply chain capacity.

5 “(d) INTERNATIONAL QUANTUM RESEARCH AND
6 METROLOGY.—

7 “(1) IN GENERAL.—The Director of the Na-
8 tional Institute of Standards and Technology shall,
9 in coordination with the Secretary of State and the
10 Director of the National Science Foundation, pro-
11 mote, establish, and support international quantum
12 information science, engineering, and technology re-
13 search, metrology research, and standardization, as
14 appropriate, to enhance international cooperation,
15 meet United States commitments, and support
16 United States engagement in international standards
17 for quantum information science, engineering, and
18 technology.

19 “(2) ALIGNMENT.—In carrying out this section,
20 the Director of the National Institute of Standards
21 and Technology shall ensure alignment with the Na-
22 tional Quantum Information Science Strategy and
23 the U.S. Government National Standards Strategy
24 for Critical and Emerging Technology, or successor
25 strategies.

1 “(3) PROHIBITIONS.—

2 “(A) CONFUCIUS INSTITUTE.—None of the
3 funds made available under this subsection may
4 be obligated or expended to an institution of
5 higher education that maintains a contract or
6 agreement between such institution and a Con-
7 fucius Institute (as defined in section 10339A
8 of the Research and Development, Competition,
9 and Innovation Act (42 U.S.C. 19039)) or any
10 successor of a Confucius Institute.

11 “(B) FOREIGN COUNTRIES OR ENTITIES
12 OF CONCERN.—None of the funds made avail-
13 able under this subsection may be obligated or
14 expended to promote, establish, or finance
15 quantum research activities between a United
16 States entity and a foreign country of concern
17 or foreign entity of concern, including the enti-
18 ty’s subsidiaries, except such restriction shall
19 not apply to participation by award recipients
20 in consensus-based international standardiza-
21 tion activities.

22 “(e) POST QUANTUM CRYPTOGRAPHY DEPLOY-
23 MENT.—

24 “(1) DEFINITION OF POST-QUANTUM CRYPTOG-
25 RAPHY.—In this subsection, the term ‘post-quantum

1 cryptography’ has the meaning given such term in
2 section 3 of the Quantum Computing Cybersecurity
3 Preparedness Act (Public Law 117–260; 6 U.S.C.
4 1526 note).

5 “(2) IN GENERAL.—The Director of the Na-
6 tional Institute of Standards and Technology shall,
7 in consultation with the Secretary of Homeland Se-
8 curity, the heads of Sector Risk Management Agen-
9 cies (as such term is defined in section 2200 of the
10 Homeland Security Act of 2002 (6 U.S.C. 650)),
11 and private sector entities, as the Director considers
12 appropriate, promote the voluntary development,
13 adoption, and deployment of standards relating to
14 post-quantum cryptography, including by—

15 “(A) disseminating and making publicly
16 available guidance and resources to help organi-
17 zations adopt and deploy standards relating to
18 post-quantum cryptography and minimize dis-
19 ruptions to current applications and systems
20 caused by cryptographic updates;

21 “(B) providing technical assistance, as
22 practicable, to entities that are at high risk of
23 quantum cryptoanalytic attacks, such as enti-
24 ties determined to be critical infrastructure (as
25 such term is defined in section 1016(e) of Pub-

1 lic Law 107–56 (42 U.S.C. 5195c(e))) or dig-
2 ital infrastructure providers; and

3 “(C) conducting such other activities as
4 determined necessary by the Director to pro-
5 mote the development, adoption, and deploy-
6 ment across the United States of standards re-
7 lating to post-quantum cryptography.

8 “(3) GRANT PROGRAM.—

9 “(A) IN GENERAL.—Subject to the avail-
10 ability of appropriations and after the date on
11 which the Director of the National Institute of
12 Standards and Technology has issued standards
13 relating to post-quantum cryptography, the Di-
14 rector may establish a program to identify and
15 provide technical assistance through the award
16 of grants to entities that are at high risk of
17 quantum cryptoanalytic attacks, including by
18 granting funds for the adoption of such stand-
19 ards and the remediation of quantum-related
20 vulnerabilities.

21 “(B) USE OF FUNDS.—Grants awarded to
22 entities under this paragraph may be used to
23 cover reasonable costs, up to a specified amount
24 established by the Director of the National In-
25 stitute of Standards and Technology, for activi-

1 ties to adopt standards relating to post-quantum
2 cryptography and remediate quantum-related
3 vulnerabilities.

4 “(C) GUIDANCE.—The Director of the National
5 Institute of Standards and Technology
6 may develop, and periodically update, guidance,
7 including relating to eligibility, application disclosure
8 requirements, grant amount and duration, and any additional
9 requirements regarding
10 the award of grants under this paragraph.

11 “(D) CONSULTATION.—If the program described
12 in this paragraph is established, the Director
13 of the National Institute of Standards and Technology
14 shall consult with the Director of the Cybersecurity
15 and Infrastructure Security Agency of the Department of
16 Homeland Security, the heads of other Sector Risk
17 Management Agencies, and appropriate representatives
18 of private sector entities, including non-profit
19 organizations, to share information regarding the grant
20 program under this paragraph and guidance developed
21 and updated under subparagraph (C).

22 “(f) FUNDING.—Of the funds authorized to be
23 appropriated for the National Institute of Standards and
24 Technology
25 Technology

1 nology pursuant to section 10211 of the Research and De-
2 velopment, Competition, and Innovation Act (Public Law
3 117–167) for scientific and technical research and services
4 laboratory activities, there is authorized to be appro-
5 priated to the Director of the National Institute of Stand-
6 ards and Technology to carry out this section up to
7 \$100,000,000 for each of fiscal years 2025 through
8 2029.”.

9 **SEC. 13. NATIONAL INSTITUTE OF STANDARDS AND TECH-**
10 **NOLOGY QUANTUM CENTERS.**

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

13 **“SEC. 202. NATIONAL INSTITUTE OF STANDARDS AND**
14 **TECHNOLOGY QUANTUM 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 shall, in consulta-
19 tion with such heads of other Federal departments
20 and agencies as the Director considers appropriate,
21 carry out a program to establish and operate at least
22 1, but not more than 3, centers to accelerate re-
23 search, development, deployment, and standardiza-
24 tion of quantum information science, engineering,
25 and technology.

1 “(2) PROGRAM DETAILS.—

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

6 “(B) APPLICATIONS.—An eligible applicant
7 described in subparagraph (C) seeking to estab-
8 lish and operate a center described in para-
9 graph (1) shall submit to the Director of the
10 National Institute of Standards and Technology
11 an application therefor at such time, in such
12 manner, and containing such information as the
13 Director determines to be appropriate.

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

17 “(i) Institutions of higher education.

18 “(ii) Nonprofit organizations.

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

24 “(iv) Any other entity the Director de-
25 termines appropriate.

1 “(3) SELECTION OF TOPICS.—The Director of
2 the National Institute of Standards and Technology
3 shall solicit proposals and prioritize the following
4 topics in the initial selection of centers, subject to
5 merit-review:

6 “(A) Quantum sensing and measurement.

7 “(B) Quantum engineering.

8 “(b) REQUIREMENTS.—To the maximum extent
9 practicable, centers established and operated under this
10 section shall serve the mission of the National Institute
11 of Standards and Technology, for the benefit of the broad-
12 er United States quantum information science community,
13 to develop processes for the following purposes:

14 “(1) Advancing research and standardization in
15 quantum information science, engineering, and tech-
16 nology.

17 “(2) Advancing technology transfer.

18 “(3) Improving the competitiveness of the
19 United States.

20 “(c) COORDINATION.—The Director of the National
21 Institute of Standards and Technology shall ensure coordi-
22 nation, and avoid unnecessary duplication of, the activities
23 carried out under this section with existing activities of
24 the Institute, other activities carried out under this Act,
25 and other related programs, as appropriate.

1 “(d) COMMERCIAL TECHNOLOGY.—Each center es-
2 tablished under this section may leverage commercially-
3 available hardware and software to carry out the activities
4 described in subsection (a).

5 “(e) SELECTION AND DURATION.—

6 “(1) IN GENERAL.—The centers established
7 under this section may carry out activities for a pe-
8 riod of 5 years.

9 “(2) RENEWAL.—Each center established under
10 this section may be renewed for successive periods of
11 5 years following a successful merit-based review by
12 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 “(f) FUNDING.—The Director of the National Insti-
20 tute of Standards and Technology shall allocate up to
21 \$18,000,000 for each center established under this section
22 for each of fiscal years 2025 through 2029, subject to the
23 availability of appropriations. Amounts made available to
24 carry out this section shall be derived from amounts ap-

1 appropriated or otherwise made available to the National In-
2 stitute of Standards and Technology.

3 “(g) BRIEFING REQUIREMENTS.—Not later than 1
4 year after the date of the enactment of the National Quan-
5 tum Initiative Reauthorization Act of 2024, and not less
6 frequently than once each year thereafter, the Director of
7 the National Institute of Standards and Technology shall
8 provide the Committee on Commerce, Science, and Trans-
9 portation of the Senate and the Committee on Space,
10 Science, and Technology of the House of Representatives
11 a briefing on current and planned activities under this sec-
12 tion.

13 **“SEC. 203. RESEARCH SECURITY.**

14 “The activities authorized under this title shall be
15 carried out in a manner consistent with subtitle D of title
16 VI of the Research and Development, Competition, and
17 Innovation Act (42 U.S.C. 19231 et seq.).”.

18 **SEC. 14. NATIONAL SCIENCE FOUNDATION QUANTUM IN-**
19 **FORMATION SCIENCE RESEARCH AND EDU-**
20 **CATION ACTIVITIES.**

21 Section 301 of the National Quantum Initiative Act
22 (15 U.S.C. 8841) is amended—

23 (1) in the section heading, by inserting “, **EN-**
24 **GINEERING, AND TECHNOLOGY**” after
25 **“SCIENCE”**;

1 “science, engineering, and tech-
2 nology”;

3 (bb) by inserting “kinder-
4 garten through grade 12, voca-
5 tional,” before “undergraduate”;
6 and

7 (cc) by striking “and” after
8 the semicolon;

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

11 (III) by adding at the end the
12 following:

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

19 (ii) in subparagraph (B), by striking
20 “science and engineering” and inserting
21 “science, engineering, and technology”;

22 (iii) in subparagraph (C), by striking
23 “science and engineering” and inserting
24 “science, engineering, and technology”;

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

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

5 (vi) by adding at the end the fol-
6 lowing:

7 “(F) providing infrastructure to support
8 academic quantum information science, engi-
9 neering, and technology, including through ex-
10 isting infrastructure programs and new activi-
11 ties.”;

12 (4) by striking subsection (c) and inserting the
13 following:

14 “(c) STUDENT TRAINEESHIPS, FELLOWSHIPS, AND
15 OTHER MODELS.—

16 “(1) IN GENERAL.—The Director of the Na-
17 tional Science Foundation, in consultation with
18 heads of Federal agencies the Director considers ap-
19 propriate, shall award grants to institutions of high-
20 er education or eligible nonprofit organizations (or
21 consortia thereof) to increase capacity and broaden
22 participation in quantum information science, engi-
23 neering, and technology and other related dis-
24 ciplines, including through provisioning of experien-
25 tial opportunities, where appropriate.

1 “(2) QUANTUM TRAINEESHIPS.—The Director
2 of the National Science Foundation, in consultation
3 with heads of Federal agencies as the Director con-
4 siders appropriate, may establish, or use existing,
5 programs to make awards to institutions of higher
6 education or nonprofit organizations (or consortia
7 thereof)—

8 “(A) to provide traineeships to graduate
9 students at institutions of higher education
10 within the United States who are citizens of the
11 United States and who choose or plan to pursue
12 master or doctoral degrees in quantum informa-
13 tion science, engineering, and technology, or re-
14 lated fields; and

15 “(B) to provide students with opportunities
16 for research experiences in government or in-
17 dustry related to such students’ quantum stud-
18 ies.

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

21 “(A) IN GENERAL.—The Director of the
22 National Science Foundation, in consultation
23 with heads of Federal agencies as the Director
24 considers appropriate, may establish, or use ex-
25 isting, programs to support fellowships and

1 summer school program that focuses on
2 quantum information science, engineering,
3 and technology.

4 “(C) CONSIDERATIONS.—Eligible fellow-
5 ships and scholarships under this paragraph
6 may include temporary quantum-related posi-
7 tions at Federal or State agencies, National
8 Laboratories, private sector entities, institutions
9 of higher education, the quantum centers estab-
10 lished under section 202, the Multidisciplinary
11 Centers for Quantum Research and Education
12 established under section 302, the Quantum
13 Reskilling, Education, and Workforce Coordina-
14 tion Hub under section 303, the National
15 Quantum Information Science Research Centers
16 established under section 402, and the initia-
17 tives established under section 503, or other
18 quantum-relevant entities, as determined appro-
19 priate by the Director.

20 “(D) COMPETITIVE AWARDS.—Fellowships
21 and scholarships awarded under this paragraph
22 shall be competitively awarded through a merit-
23 review process. The Director of the National
24 Science Foundation may prioritize fellowships
25 that include an industry partner that provides

1 financial assistance to awardees for direct or in-
2 direct costs.

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

13 “(5) COOPERATIVE EDUCATION PROGRAMS.—
14 The Director of the National Science Foundation, in
15 consultation with heads of Federal agencies the Di-
16 rector considers appropriate, may establish, or use
17 existing, programs to support cooperative education
18 programs between institutions of higher education
19 and employers that increase opportunities for under-
20 graduate students to acquire experiential learning
21 and professional experiences in quantum information
22 science, engineering, and technology.

23 “(6) PARTNERSHIPS.—In carrying out the ac-
24 tivities under this subsection, the Director of the
25 National Science Foundation shall encourage recipi-

1 (II) by inserting “, including
2 those principles relevant to emerging
3 technologies, such as artificial intel-
4 ligence, microelectronics, and nano-
5 technology” after “fields”;

6 (iii) by redesignating subparagraphs
7 (E) and (F) as subparagraphs (F) and
8 (H), respectively;

9 (iv) by inserting after subparagraph
10 (D) the following:

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

15 (v) by inserting after subparagraph
16 (F), as so redesignated, the following:

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

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

24 (E) by striking paragraph (4); and
25 (6) by adding at the end the following:

1 “(e) QUANTUM RESEARCH EXPERIENCES FOR
2 TEACHERS.—The Director of the National Science Foun-
3 dation shall seek to increase opportunities to engage edu-
4 cators, principals, or other school leaders of kindergarten
5 through grade 12 students in professional learning oppor-
6 tunities to enhance quantum information science, engi-
7 neering, and technology knowledge, including by—

8 “(1) providing hands-on training and research
9 opportunities for such educators at Federal labora-
10 tories or institutions of higher education, or in in-
11 dustry; and

12 “(2) developing best practices.

13 “(f) EXPANDING CAPACITY IN QUANTUM INFORMA-
14 TION SCIENCE, ENGINEERING, AND TECHNOLOGY.—

15 “(1) DEFINITIONS.—In this subsection:

16 “(A) ELIGIBLE CONSORTIUM.—The term
17 ‘eligible consortium’ means a consortium that—

18 “(i) includes not less than 1 institu-
19 tion of higher education or eligible non-
20 profit organization; and

21 “(ii) may include—

22 “(I) a private sector entity;

23 “(II) a Federal laboratory; or

24 “(III) a Federal, Tribal, State,
25 local, or territorial government entity.

1 “(B) ELIGIBLE INSTITUTION OF HIGHER
2 EDUCATION.—The term ‘eligible institution of
3 higher education’ means an institution of higher
4 education that, during the 3-year period prior
5 to the year of an award under this section and
6 according to the data published by the National
7 Center for Science and Engineering Statistics
8 was not, on average, among the top 70 institu-
9 tions in Federal research and development ex-
10 penditures.

11 “(2) AWARDS AUTHORIZED.—The Director of
12 the National Science Foundation, in consultation
13 with the heads of Federal agencies the Director con-
14 siders appropriate, shall make awards on a competi-
15 tive, merit-reviewed basis to eligible institutions of
16 higher education, eligible nonprofit organizations, or
17 eligible consortia to increase research capacity, in-
18 crease education and infrastructure capacity, and
19 broaden participation in quantum information
20 science, engineering, and technology and related dis-
21 ciplines, including by—

22 “(A) supporting curriculum development in
23 quantum information science, engineering, and
24 technology as described in subsection (d);

1 “(B) building upon the activities carried
2 out under the Next Generation Quantum Lead-
3 ers Pilot Program authorized under section
4 10661(f) of the Research and Development,
5 Competition, and Innovation Act (42 U.S.C.
6 19261(f)); and

7 “(C) leveraging the readiness for the in-
8 volvement of local research and education com-
9 munities to secure a talent pipeline in quantum
10 information science, engineering, and tech-
11 nology to meet the workforce needs of industry,
12 government, and academia.

13 “(3) REQUIREMENTS.—To receive an award
14 under this subsection, an eligible institution of high-
15 er education, eligible nonprofit organization, or eligi-
16 ble consortium shall submit to the Director of the
17 National Science Foundation an application that in-
18 cludes the following:

19 “(A) A plan to sustain proposed activities
20 beyond the duration of the award.

21 “(B) Proposed quantum information
22 science, engineering, and technology disciplines
23 and focus areas the eligible institution of higher
24 education or consortium is prepared to engage
25 in to significantly build up its quantum infor-

1 mation science, engineering, and technology re-
2 search and education capacity.

3 “(C) A plan for education and workforce
4 development, which may include—

5 “(i) kindergarten through grade 12
6 and postsecondary education programs and
7 activities;

8 “(ii) workforce training and career
9 and technical education programs and ac-
10 tivities;

11 “(iii) undergraduate, graduate, and
12 postdoctoral education programs and ac-
13 tivities; and

14 “(iv) informal education programs
15 and activities.

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

19 “(A) Development or expansion of research
20 programs in disciplines and focus areas speci-
21 fied in paragraph (3)(B).

22 “(B) Faculty recruitment and professional
23 development in disciplines and focus areas spec-
24 ified in paragraph (3)(B).

1 “(C) Bridge programs focused on pre-
2 paring postbaccalaureate students for graduate
3 programs in quantum information science, engi-
4 neering, and technology.

5 “(D) Building research capacity and infra-
6 structure at an eligible institution of higher
7 education in disciplines and focus areas speci-
8 fied in paragraph (3)(B).

9 “(E) An assessment of capacity-building
10 and research infrastructure needs identified in
11 paragraph (3)(B).

12 “(F) Administrative research development
13 support.

14 “(G) Other activities necessary to build re-
15 search capacity in quantum information science,
16 engineering, and technology.

17 “(5) ADDITIONAL CONSIDERATIONS.—In mak-
18 ing awards under this subsection, the Director of the
19 National Science Foundation may also consider the
20 following:

21 “(A) The extent to which the eligible appli-
22 cant will support students from diverse back-
23 grounds, including first-generation under-
24 graduate students.

1 “(B) The geographic and institutional di-
2 versity of eligible applicants.

3 “(C) How the eligible applicant can lever-
4 age public-private partnerships and existing re-
5 search partnerships with Federal agencies.

6 “(D) How the eligible applicant prioritizes
7 research security, including through educational
8 efforts and furtherance of best practices for
9 handling research that is supported by an
10 award under this subsection.

11 “(6) DUPLICATION.—The Director of the Na-
12 tional Science Foundation shall ensure awards made
13 under this subsection are complementary to, and not
14 duplicative of, existing programs.

15 “(g) FACULTY MID-CAREER DEVELOPMENT
16 AWARDS.—The Director of the National Science Founda-
17 tion may provide merit-based, competitive awards to sup-
18 port mid-career scientists and faculty of institutions of
19 higher education to upgrade, develop, or acquire essential
20 research instruments to start new research activities on,
21 or expand existing activities that show promise for ad-
22 vancements within, quantum information science, engi-
23 neering, and technology.

1 “(h) INTERNATIONAL RESEARCH ON QUANTUM IN-
2 FORMATION SCIENCE, ENGINEERING, AND TECH-
3 NOLOGY.—

4 “(1) IN GENERAL.—The Director of the Na-
5 tional Science Foundation, in coordination with the
6 Secretary of State and the Secretary of Commerce,
7 shall support international quantum information
8 science, engineering, and technology research, as ap-
9 propriate, to enhance international cooperation and
10 meet United States commitments, including as part
11 of the terms and conditions of bilateral or multilat-
12 eral quantum information science, engineering, and
13 technology research agreements.

14 “(2) ALIGNMENT.—In carrying out this sub-
15 section, the Director of the National Science Foun-
16 dation shall ensure alignment with the national
17 quantum information strategy in accordance with
18 Executive Order 14073 (87 Fed. Reg. 27909; relat-
19 ing to enhancing the National Quantum Advisory
20 Committee) or successor strategies.

21 “(3) PRIORITY.—The Director shall prioritize
22 research programs with countries that have signed a
23 Quantum Cooperation Statement with the United
24 States.

25 “(4) RESTRICTIONS.—

1 “(A) CONFUCIUS INSTITUTE.—None of the
2 funds made available under this subsection may
3 be obligated or expended to an institution of
4 higher education that maintains a contract or
5 agreement between such institution and a Con-
6 fucius Institute, as defined in section 10339A
7 of the Research and Development, Competition,
8 and Innovation Act (42 U.S.C. 19039) or any
9 successor of a Confucius Institute.

10 “(B) FOREIGN COUNTRY OF CONCERN AND
11 FOREIGN ENTITY OF CONCERN.—None of the
12 funds made available under this subsection may
13 be obligated or expended to promote, establish,
14 or finance quantum research activities between
15 a United States entity and a foreign country of
16 concern or foreign entity of concern, including
17 the entity’s subsidiaries.

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 award grants 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—

12 “(i) accelerate the development of
13 quantum technologies, including capabili-
14 ties focused on addressing the roadblocks
15 to implementation; and

16 “(ii) meet the materials, advanced
17 materials development, high performance
18 computing, heterogeneous computing, net-
19 working, software, data, clean room, and
20 device needs of the scientific community
21 and the quantum supply chain.

22 “(B) Enhancing access to equipment and
23 instrumentation, including at partnering insti-
24 tutions, by facilitating information sharing, co-
25 ordination, education, and training, including

1 activities that provide meaningful hands-on
2 learning experiences for students, including at
3 community and technical colleges.

4 “(C) Enabling professional staff to support
5 the operation, scheduling, and improvement of
6 research resources used for quantum informa-
7 tion science, engineering, and technology.

8 “(3) REQUIREMENTS.—An institution of higher
9 education or an eligible nonprofit organization (or a
10 consortium thereof) seeking funding under this sub-
11 section shall submit to the Director of the National
12 Science Foundation an application at such time, in
13 such manner, and containing such information as
14 the Director may require.

15 “(j) FUNDING.—Of the funds authorized to be appro-
16 priated to the National Science Foundation pursuant to
17 section 10303 of the Research and Development, Competi-
18 tion, and Innovation Act (Public Law 117–167; 136 Stat.
19 1507) for research and related activities, there is author-
20 ized to be appropriated to the Director of the National
21 Science Foundation to carry out this section up to
22 \$190,000,000 for each of fiscal years 2025 through
23 2029.”.

1 **SEC. 15. MULTIDISCIPLINARY CENTERS FOR QUANTUM RE-**
2 **SEARCH AND EDUCATION.**

3 Section 302 of the National Quantum Initiative Act
4 (15 U.S.C. 8842) is amended—

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

7 (2) in subsection (c)—

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

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

13 (C) in paragraph (2), by striking “and en-
14 gineering” and inserting “, engineering, and
15 technology, including leveraging or expanding
16 activities established pursuant to section
17 301(d)”;

18 (D) in paragraph (3), by inserting “, such
19 as commercially-available hardware and soft-
20 ware” after “resources”;

21 (3) in subsection (d)(2)—

22 (A) in subparagraph (A), by striking
23 “quantum science,” and inserting “quantum in-
24 formation science, engineering, and tech-
25 nology,”;

1 (B) in subparagraph (B), by inserting
2 “health,” after “chemistry,”;

3 (C) in subparagraph (C), by inserting “,
4 including how each participant will develop and
5 implement outreach activities to increase the
6 participation of women and other students from
7 groups historically underrepresented in STEM”
8 before the semicolon;

9 (D) in subparagraph (D), by striking
10 “and” after the semicolon;

11 (E) in subparagraph (E), by striking the
12 period and inserting a semicolon; and

13 (F) by adding at the end the following:

14 “(F) how the Center will participate in
15 international collaborations, as appropriate, to
16 build a trusted global research network with al-
17 lies and partners of the United States and
18 other countries that share values with the
19 United States, including respect for inter-
20 national norms of fair competition; and

21 “(G) how the Center will protect research
22 from foreign countries of concern and foreign
23 entities of concern, and the subsidiaries of such
24 foreign entities, to ensure the competitiveness of
25 the United States.”;

1 (4) in subsection (e), by striking paragraph (2)
2 and inserting the following:

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

6 (5) in subsection (f), by striking “2019 through
7 2023” and inserting “2025 through 2029”; and

8 (6) by adding at the end the following:

9 “(g) BRIEFING REQUIREMENTS.—Not later than 1
10 year after the date of the enactment of the National Quan-
11 tum Initiative Reauthorization Act of 2024, and not less
12 frequently than annually thereafter, the Director of the
13 National Science Foundation shall brief the appropriate
14 committees of Congress on current and planned activities
15 under this section.”.

16 **SEC. 16. QUANTUM RESKILLING, EDUCATION, AND WORK-**
17 **FORCE (QREW) COORDINATION HUB, QUAN-**
18 **TUM TESTBEDS, AND RESEARCH SECURITY.**

19 Title III of the National Quantum Initiative Act (15
20 U.S.C. 8841 et seq.) is amended by adding at the end
21 the following:

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

24 “(a) IN GENERAL.—The Director of the National
25 Science Foundation, in consultation with the Director of

1 the National Institute of Standards and Technology, the
2 Secretary of Energy, and the heads of other relevant Fed-
3 eral agencies, shall make an award to a consortium led
4 by an institution of higher education or an eligible non-
5 profit organization to establish a Quantum Reskilling,
6 Education, and Workforce Coordination Hub (in this sec-
7 tion referred to as the ‘Hub’).

8 “(b) CONSORTIUM.—The consortium established pur-
9 suant to subsection (a) shall include not fewer than 4 in-
10 stitutions of higher education, including not fewer than
11 2 community colleges, and may include career and tech-
12 nical schools, nonprofit organizations, and private sector
13 entities.

14 “(c) PURPOSE.—The purpose of the Hub shall be
15 to—

16 “(1) identify and address cross-cutting work-
17 force development challenges in quantum informa-
18 tion science, engineering, and technology, the quan-
19 tum industry, and other critical and emerging tech-
20 nology areas that share similar workforce challenges
21 by serving as a national and regional clearinghouse;
22 and

23 “(2) facilitate the establishment of programs to
24 disseminate, to institutions of higher education (in-
25 cluding community colleges) and career and tech-

1 nical education entities, model curricula, best prac-
2 tices, and instructional materials related to the ac-
3 tivities described in subsection (d).

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

6 “(1) Testing, implementing, scaling, dissemi-
7 nating, and standardizing materials, methods, best
8 practices, and other outputs developed through ac-
9 tivities under this Act.

10 “(2) Promoting core competencies, such as
11 computer science, data science, and mathematics,
12 that are shared with other critical and emerging
13 technologies, such as artificial intelligence.

14 “(3) 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 “(4) Providing opportunities for STEM degree
19 students to provide feedback on quantum informa-
20 tion science, engineering, and technology curricula.

21 “(5) 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

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

3 “(6) Coordinating with quantum industry and
4 nonprofit entities and small- and medium-sized busi-
5 nesses and startups to inform and enhance the qual-
6 ity and availability of quantum education in STEM
7 degree programs, including through the promotion of
8 postgraduation opportunities for STEM students
9 outside the classroom to increase exposure to quan-
10 tum industries.

11 “(7) Supporting activities and programs to en-
12 hance the recruitment of students from groups his-
13 torically underrepresented in STEM to pursue un-
14 dergraduate and graduate studies in quantum infor-
15 mation science, engineering, and technology.

16 “(8) Developing, testing, implementing, and co-
17 ordinating career development programs and strate-
18 gies to increase the number of quantum-informed
19 educators at all levels of education, including by car-
20 rying out the following:

21 “(A) Hosting career development work-
22 shops.

23 “(B) Developing in-house and distance
24 learning career development tools for public
25 use.

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

3 “(D) Developing training, research, and
4 professional development programs, including
5 innovative pre-service and in-service programs.

6 “(E) Facilitating relationships with State
7 and local entities, such as a State board or local
8 board (as such terms are defined in section 3
9 of the Workforce Innovation and Opportunity
10 Act (29 U.S.C. 3102)), to increase awareness of
11 and promote quantum-related career develop-
12 ment activities at the Hub.

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

24 “(10) Facilitating public education and out-
25 reach activities to enhance the understanding and

1 awareness of quantum information science, engineer-
2 ing, and technology to a broader community to sat-
3 isfy broader impact requirements of award applica-
4 tions.

5 “(11) Encouraging coordination on quantum
6 education in the broader STEM community.

7 “(e) QREW QUANTUM FELLOWSHIP PROGRAM.—
8 Subject to the restrictions described in section 301(c), the
9 Hub may support education or policy fellowships for stu-
10 dents at entities participating in the consortium under
11 subsection (a) or at other research centers established pur-
12 suant to this Act at the National Science Foundation, the
13 National Institute of Standards and Technology, the De-
14 partment of Energy, or the National Aeronautics and
15 Space Administration, for the purpose of supporting the
16 activities described in subsection (d).

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

23 “(g) APPLICATION.—A consortium seeking funding
24 under this section shall submit to the Director of the Na-
25 tional Science Foundation an application at such time, in

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

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

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

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

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

16 “(5) Develop and implement outreach activities
17 to increase the participation of women and other
18 students from groups historically underrepresented
19 in STEM.

20 “(h) SELECTION AND DURATION.—

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

24 “(2) REAPPLICATION.—A consortium receiving
25 an award under this section may reapply for an ad-

1 ditional, subsequent period of 5 years following a
2 successful, merit-based review.

3 “(3) TERMINATION.—Consistent with and in
4 addition to the authorities of the National Science
5 Foundation, the Director of the National Science
6 Foundation may also terminate the Hub if it is
7 underperforming during the performance period.

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

15 “(j) FUNDING.—The Director of the National
16 Science Foundation shall allocate up to \$10,000,000 for
17 the Hub for each of fiscal years 2025 through 2029, sub-
18 ject to the availability of appropriations. Amounts made
19 available to carry out this section shall be derived from
20 amounts appropriated or otherwise made available to the
21 National Science Foundation.

22 “(k) REPORTING REQUIREMENTS.—Not later than 3
23 years after the date of enactment of the National Quan-
24 tum Initiative Reauthorization Act of 2024, the Director
25 shall prepare and submit to the appropriate committees

1 of Congress a progress report that includes current (as
2 of the date of the report) and planned activities of the
3 Hub.

4 **“SEC. 304. QUANTUM TESTBEDS.**

5 “(a) IN GENERAL.—Not later than 1 year after the
6 date of the enactment of the National Quantum Initiative
7 Reauthorization Act of 2024, the Director of the National
8 Science Foundation, in coordination with the Director of
9 the National Institute of Standards and Technology, the
10 Secretary of Energy, the Administrator of the National
11 Aeronautics and Space Administration, and the heads of
12 other Federal agencies, as determined appropriate by the
13 Director of the National Science Foundation, shall make
14 awards on a competitive, merit-reviewed basis to institu-
15 tions of higher education, nonprofit organizations, feder-
16 ally funded research and development centers, or consortia
17 thereof, to establish testbeds for accelerating the develop-
18 ment of viable quantum applications.

19 “(b) PURPOSES.—The quantum testbeds established
20 under subsection (a) shall focus on advancing the develop-
21 ment of quantum application use cases that show promise
22 of commercialization in the near- to medium-term, as de-
23 termined by the Director, through proof-of-concept test-
24 ing, demonstrations, pilot projects, benchmarking, and
25 prototyping, by—

1 “(1) supporting translational quantum research
2 and development activities for quantum application
3 use cases, including, for testbeds featuring quantum
4 software and quantum algorithms driving toward
5 utility, leveraging approaches such as algorithm in-
6 novation and tools such as resource estimators;

7 “(2) providing accessible research resources for
8 developing, testing, and benchmarking the applica-
9 tion of quantum technologies to likely use cases, in-
10 cluding enabling quantum cloud access;

11 “(3) investing in quantum computing tech-
12 nologies that show promise for viability, including di-
13 recting funding to advance each layer of the stack
14 and related systems engineering and integration; and

15 “(4) establishing cost and benefit.

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

21 “(1) How the applicant will assemble a work-
22 force, including from populations that are histori-
23 cally underrepresented in STEM, with the skills
24 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 “(4) How the applicant will contribute to the
7 quantum testbed, such as through funding or other
8 resources required to develop quantum applications.

9 “(5) How the applicant will protect any re-
10 search or advancements made as a result of using
11 the quantum testbed.

12 “(d) PRIORITIZATION.—In awarding grants under
13 this section, the Director of the National Science Founda-
14 tion shall prioritize the following:

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

19 “(2) Awards for consortia that include quantum
20 industry participation.

21 “(e) ROLES AND RESPONSIBILITIES.—The Director
22 of the National Science Foundation shall be responsible
23 for the following:

1 “(1) Maintaining a record of notable outcomes
2 from each quantum testbed established under this
3 section.

4 “(2) Partnering with other Federal agencies to
5 enable opportunities for quantum testbed outcomes
6 to be appropriately taken up by such agencies in
7 alignment with the missions of such agencies.

8 “(3) Not later than 1 year after the date of the
9 enactment of this section and every 2 years there-
10 after until December 31, 2030, briefing the appro-
11 priate committees of Congress on the status of such
12 quantum testbeds and providing recommendations
13 for improving such quantum testbeds.

14 “(f) COORDINATION.—In establishing quantum
15 testbeds under this section, the Director of the National
16 Science Foundation shall ensure coordination with other
17 testbeds and other quantum facilities hosting Federal
18 quantum technology and infrastructure supported by the
19 National Science Foundation, including those testbeds and
20 facilities authorized pursuant to section 10390 of the Re-
21 search and Development, Competition, and Innovation Act
22 (42 U.S.C. 19110), or by other Federal agencies as deter-
23 mined appropriate by the Director, to avoid duplication
24 and maximize use of Federal resources.

1 “(g) **STAKEHOLDER COLLABORATION.**—In carrying
2 out this section, the Director of the National Science
3 Foundation shall collaborate with the Quantum Consor-
4 tium established pursuant to section 201(b) to accomplish
5 the purposes of the quantum testbeds program described
6 in subsection (b) and ensure there is strong collaboration
7 with industry stakeholders. The Director may also engage
8 with National Laboratories, federally funded research and
9 development centers, industry, and other members of the
10 United States quantum ecosystem.

11 “(h) **GEOGRAPHIC DIVERSITY.**—The Director shall
12 ensure regional and geographic diversity in issuing awards
13 under this section.

14 “(i) **FUNDING.**—The Director of the National Science
15 Foundation shall allocate up to \$50,000,000 for the quan-
16 tum testbeds under this section for each of fiscal years
17 2025 through 2029, subject to the availability of appro-
18 priations. Amounts made available to carry out this sec-
19 tion shall be derived from amounts appropriated or other-
20 wise made available to the National Science Foundation.

21 **“SEC. 305. RESEARCH SECURITY.**

22 “‘The activities authorized under this title shall be
23 carried out in a manner consistent with subtitle D of title
24 VI of the Research and Development, Competition, and
25 Innovation Act (42 U.S.C. 19231 et seq.).’”.

1 **SEC. 17. NATIONAL SCIENCE FOUNDATION CRYPTOGRAPHY**
2 **RESEARCH.**

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

9 **SEC. 18. NATIONAL AERONAUTICS AND SPACE ADMINIS-**
10 **TRATION QUANTUM ACTIVITIES.**

11 (a) IN GENERAL.—The National Quantum Initiative
12 Act (15 U.S.C. 8801 et seq.) is amended by adding at
13 the end the following new title:

14 **“TITLE V—NATIONAL AERO-**
15 **NAUTICS AND SPACE ADMIN-**
16 **ISTRATION QUANTUM ACTIVI-**
17 **TIES**

18 **“SEC. 501. DEFINITION OF ADMINISTRATOR.**

19 “In this title, the term ‘Administrator’ means the Ad-
20 ministrator of the National Aeronautics and Space Admin-
21 istration.

1 **“SEC. 502. QUANTUM INFORMATION SCIENCE, ENGINEER-**
2 **ING, AND TECHNOLOGY RESEARCH FOR**
3 **SPACE AND AERONAUTICS.**

4 “(a) IN GENERAL.—The Administrator is authorized
5 to carry out research on quantum information science, en-
6 gineering, and technology.

7 “(b) COOPERATION.—In carrying out subsection (a),
8 the Administrator—

9 “(1) shall consider cooperative arrangements
10 with the Department of Energy and other Federal
11 Government agencies, as practicable, on areas of
12 shared benefit; and

13 “(2) may enter into memoranda of under-
14 standing or memoranda of agreement to establish
15 such cooperative arrangements.

16 “(c) STRATEGY.—Not later than 180 days after the
17 date of the enactment of this title, the Administrator shall
18 submit to the appropriate committees of Congress a strat-
19 egy for National Aeronautics and Space Administration
20 research on quantum information science, engineering,
21 and technology. The strategy shall identify resources re-
22 quired to support implementation of the strategy, includ-
23 ing budgets, workforce, and infrastructure, describe coop-
24 erative efforts with other Federal Government agencies,
25 and address areas of research and applications, including
26 the following:

1 “(1) Quantum sensing.

2 “(2) Quantum networking.

3 “(3) Quantum communications, including quan-
4 tum satellite communications.

5 “(4) Quantum computing.

6 “(5) Science, aeronautics, and exploration-re-
7 lated applications.

8 “(6) Any other area on quantum information,
9 science, engineering, and technology the Adminis-
10 trator determines necessary.

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. 503. NATIONAL AERONAUTICS AND SPACE ADMINIS-
17 TRATION QUANTUM INITIATIVES.**

18 “(a) IN GENERAL.—Subject to the availability of ap-
19 propriations, the Administrator, in consultation with the
20 heads of other Federal departments and agencies, as ap-
21 propriate, may establish one or more initiatives focused
22 on space and aeronautics applications of quantum infor-
23 mation science, engineering, and technology.

24 “(b) INITIATIVE DETAILS.—

1 “(1) COMPETITIVE, MERIT-REVIEWED PROC-
2 ESS.—An initiative under this section shall be estab-
3 lished through a competitive, merit-reviewed process.

4 “(2) APPLICATIONS.—An eligible applicant
5 under this section shall submit to the Administrator
6 an application at such time, in such manner, and
7 containing such information as the Administrator
8 determines to be appropriate.

9 “(3) ELIGIBLE APPLICANTS.—In carrying out
10 the process under paragraph (1), the Administrator
11 shall consider applications from institutions of high-
12 er education, research centers, multi-institutional
13 collaborations, and any other entity the Adminis-
14 trator considers appropriate.

15 “(4) COLLABORATIONS.—A collaboration that
16 receives an award under this section may include
17 multiple types of research institutions, private sector
18 entities, and nonprofit organizations.

19 “(5) COORDINATION.—The Administrator shall
20 ensure that an awardee under this section—

21 “(A) coordinates with the National Aero-
22 nautics and Space Administration; and

23 “(B) avoids unnecessary duplication of ex-
24 isting activities of the National Aeronautics and
25 Space Administration, other activities carried

1 out under this Act, and other related programs,
2 as appropriate.

3 “(6) COMMERCIAL TECHNOLOGY.—An initiative
4 carried out under this section may leverage commer-
5 cially-available hardware and software to carry out
6 the activities described in subsection (c).

7 “(c) INITIATIVE ACTIVITIES.—An initiative estab-
8 lished under this section may carry out activities that—

9 “(1) support research focused on developing
10 and demonstrating space and aeronautics applica-
11 tions for quantum information science, engineering,
12 and technology, including research relating to the
13 strategy developed under section 502(c); and

14 “(2) support quantum information science, en-
15 gineering, and technology education and public out-
16 reach.

17 “(d) INITIATIVE REQUIREMENTS.—To the maximum
18 extent practicable, an initiative established under this sec-
19 tion shall serve the needs of the National Aeronautics and
20 Space Administration for the benefit of the broader
21 United States quantum information science community, to
22 create and develop processes for the purpose of advancing
23 space and aeronautics applications in quantum informa-
24 tion science, engineering, and technology, and improving
25 the competitiveness of the United States.

1 “(e) INITIATIVE SELECTION AND DURATION.—

2 “(1) IN GENERAL.—Subject to the availability
3 of appropriations, an initiative established under this
4 section may carry out activities for a period of 5
5 years.

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

10 “(3) TERMINATION.—Consistent with the au-
11 thorities of the National Aeronautics and Space Ad-
12 ministration, the Administrator may terminate the
13 initiative for cause during the performance period.

14 **“SEC. 504. RESEARCH SECURITY.**

15 “The activities authorized under this title shall be
16 carried out in a manner consistent with subtitle D of title
17 VI of the Research and Development, Competition, and
18 Innovation Act (42 U.S.C. 19231 et seq.).

19 **“SEC. 505. AUTHORIZATION OF APPROPRIATIONS.**

20 “The Administrator shall allocate up to \$45,000,000
21 for each of fiscal years 2025 through 2029 to carry out
22 this title, subject to the availability of appropriations.
23 Amounts made available to carry out this title shall be
24 derived from amounts appropriated or otherwise made

1 available to the National Aeronautics and Space Adminis-
2 tration.”.

3 **SEC. 19. NATIONAL INSTITUTE OF HEALTH QUANTUM AC-**
4 **TIVITIES.**

5 The National Quantum Initiative Act (15 U.S.C.
6 8801 et seq.), as amended by section 18, is further amend-
7 ed by adding at the end the following:

8 **“TITLE VI—NATIONAL INSTI-**
9 **TUTES OF HEALTH QUANTUM**
10 **ACTIVITIES**

11 **“SEC. 601. QUANTUM RESEARCH PROGRAM.**

12 “(a) IN GENERAL.—The Director of the National In-
13 stitutes of Health, in collaboration with other Federal de-
14 partments and agencies, may establish and carry out a
15 research program on quantum sensors and computing for
16 biomedical applications, including the competitive award
17 of grants to institutions of higher education or eligible
18 nonprofit organizations (or consortia thereof).

19 “(b) PROGRAM COMPONENTS.—In carrying out the
20 program under subsection (a) the Director of the National
21 Institutes of Health may carry out activities that sup-
22 port—

23 “(1) basic and applied research focused on de-
24 veloping quantum sensors for biomedical applica-
25 tions;

1 “(2) studies of end-use cases of quantum sen-
2 sors in biomedicine;

3 “(3) multi-disciplinary partnerships to explore
4 and develop capabilities at the intersection of quan-
5 tum computing, data science, and biomedical re-
6 search; and

7 “(4) development of a diverse biomedical quan-
8 tum information science workforce through training
9 and fellowship activities.”.

10 **SEC. 20. DEPARTMENT OF STATE QUANTUM ACTIVITIES.**

11 The National Quantum Initiative Act (15 U.S.C.
12 8801 et seq.), as amended by this Act, is further amended
13 by adding at the end the following new title:

14 **“TITLE VII—DEPARTMENT OF**
15 **STATE QUANTUM ACTIVITIES**

16 **“SEC. 701. DEPARTMENT OF STATE INTERNATIONAL QUAN-**
17 **TUM COOPERATION PROGRAM.**

18 “(a) IN GENERAL.—The Secretary of State may es-
19 tablish and carry out a program—

20 “(1) to enhance international cooperation in
21 quantum information science through the competi-
22 tive award of matching grants to institutions of
23 higher education or eligible nonprofit organizations
24 (or consortia thereof) engaged in international col-
25 laborative research; and

1 “(2) to support international scientist and engi-
2 neer exchange programs, including those that vary
3 in length from multi-day to multi-year and those
4 that include talent development programs.

5 “(b) PROGRAM ALIGNMENT.—

6 “(1) COORDINATION.—In carrying out the pro-
7 gram under subsection (a), the Secretary of State
8 shall coordinate with—

9 “(A) the Director of the Office of Science
10 and Technology Policy;

11 “(B) the Director of the National Quan-
12 tum Coordination Office;

13 “(C) the Co-Chairs of the Subcommittee
14 on Quantum Information Science of the Na-
15 tional Science and Technology Council; and

16 “(D) the Co-Chairs of the Subcommittee
17 on the Economic and Security Implications of
18 Quantum Information Science of the National
19 Science and Technology Council.

20 “(2) STRATEGIC ALIGNMENT.—In carrying out
21 the program under subsection (a), the Secretary of
22 State shall—

23 “(A) ensure alignment with the National
24 Quantum Information Science Strategy; and

1 “(B) fund collaborative research programs
2 with countries who have signed quantum co-
3 operation statements with the United States.

4 “(c) CONSULTATION.—In developing and operating
5 the program required under subsection (a), the Secretary
6 of State shall consult with—

7 “(1) the appropriate congressional committees;

8 “(2) the Special Envoy for Critical and Emerg-
9 ing Technologies;

10 “(3) United States industry leaders;

11 “(4) any technology experts the Secretary con-
12 siders relevant, including experts from academia;
13 and

14 “(5) representatives from any United States
15 Government agency the Secretary considers relevant.

16 “(d) ANNUAL REPORT.—Not later than 2 years after
17 the date of the enactment of this title, and annually there-
18 after, the Secretary shall submit to the appropriate con-
19 gressional committees a report that contains the following
20 elements:

21 “(1) A description of the activities pursued
22 under the authorities of this section during the prior
23 year.

1 “(2) A list of priority countries with which the
2 Department of State seeks to pursue increased col-
3 laboration on quantum information science.

4 “(e) SUNSET.—The authorities under this section
5 shall terminate on the date that is 10 years after the date
6 of the enactment of this title.

7 “(f) APPROPRIATE CONGRESSIONAL COMMITTEES.—
8 In this section, the term ‘appropriate congressional com-
9 mittees’ means the following:

10 “(1) The Committee on Foreign Relations in
11 the Senate.

12 “(2) The Committee on Foreign Affairs in the
13 House of Representatives.

14 “(3) The Committee on Commerce, Science,
15 and Transportation in the Senate.

16 “(4) The Committee on Science, Space, and
17 Technology in the House of Representatives.”.

18 **SEC. 21. COMPTROLLER GENERAL REVIEW AND REPORT.**

19 (a) REVIEW.—Not later than 1 year after the date
20 of the enactment of this Act, the Comptroller General of
21 the United States shall conduct a review of existing proc-
22 esses and reporting requirements associated with research
23 and development programs established within the National
24 Institute of Standards and Technology, the National
25 Science Foundation, and the Department of Energy pur-

1 suant to the National Quantum Initiative Act (15 U.S.C.
2 8801 et seq.) to identify potential opportunities—

3 (1) to reduce duplicative and unnecessary pa-
4 perwork and reporting requirements without com-
5 promising security, transparency, and accountability;
6 and

7 (2) to expedite access to facilities and equip-
8 ment of the Federal Government for researchers af-
9 filiated with such programs.

10 (b) RESEARCH AND DEVELOPMENT PROGRAMS COV-
11 ERED.—The review required under subsection (a) shall
12 cover all research and development programs established
13 pursuant to sections 201, 302, 402, 403, and 404 of the
14 National Quantum Initiative Act (15 U.S.C. 8831, 8842,
15 8852, 8853, and 8854).

16 (c) REPORT.—Not later than 180 days after com-
17 pleting the review under subsection (a), the Comptroller
18 General shall submit to the Committee on Commerce,
19 Science, and Transportation and the Committee on En-
20 ergy and Natural Resources of the Senate and the Com-
21 mittee on Energy and Commerce of the House of Rep-
22 resentatives a report on the findings of the review, which
23 shall include recommendations relating to paragraphs (1)
24 and (2) of such subsection.

1 **SEC. 22. CLERICAL AMENDMENTS.**

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

4 (1) By inserting after the item relating to sec-
5 tion 105 the following new items:

“Sec. 105A. International Quantum Cooperation Strategy.
“Sec. 106. National quantum prize challenges.”.

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

“Sec. 202. National Institute of Standards and Technology Quantum Centers.
“Sec. 203. Research security.”.

8 (3) By striking the item relating to section 301
9 and inserting the following new item:

“Sec. 301. Quantum information science, engineering, and technology research
and education program.”.

10 (4) By inserting after the item relating to sec-
11 tion 302 the following new items:

“Sec. 303. Quantum Reskilling, Education, and Workforce (QREW) Coordina-
tion Hub.
“Sec. 304. Quantum testbeds.
“Sec. 305. Research security.”.

12 (5) By inserting after the item relating to sec-
13 tion 404 the following new item:

“Sec. 405. Research security.”.

14 (6) By adding at the end the following new
15 items:

“TITLE V—NATIONAL AERONAUTICS AND SPACE
ADMINISTRATION QUANTUM ACTIVITIES

“Sec. 501. Definition of Administrator.
“Sec. 502. Quantum information science, engineering, and technology research
for space and aeronautics.
“Sec. 503. National Aeronautics and Space Administration quantum initiatives.
“Sec. 504. Research security.

“Sec. 505. Authorization of appropriations.

“TITLE VI—NATIONAL INSTITUTES OF HEALTH QUANTUM
ACTIVITIES

“Sec. 601. Quantum research program.

“TITLE VII—DEPARTMENT OF STATE QUANTUM ACTIVITIES

“Sec. 701. Department of State International Quantum Cooperation Pro-
gram.”.