

**AMENDMENT IN THE NATURE OF A SUBSTITUTE  
TO H.R. 6213  
OFFERED BY MR. LUCAS OF OKLAHOMA**

Strike all after the enacting clause and insert the following:

**1 SECTION 1. SHORT TITLE.**

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

**4 SEC. 2. DEFINITIONS.**

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

7           (1) by redesignating paragraphs (4), (5), (6),  
8           (7), the first paragraph (8) (relating to the defini-  
9           tion of the “Subcommittee on Economic and Secu-  
10          rity Implications”), and the second paragraph (8)  
11          (relating to the definition of the “Subcommittee on  
12          Quantum Information Science”) as paragraphs (7),  
13          (9), (12), (13), (15), and (16), respectively;

14          (2) by inserting after paragraph (3) the fol-  
15          lowing new paragraphs:

16           “(4) FEDERAL LABORATORY.—The term ‘Fed-  
17          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 designating, 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 designating, the following new paragraphs:

22 “(10) QUANTUM APPLICATIONS.—The term  
23 ‘quantum applications’ means applications that use  
24 quantum information science engineering and tech-  
25 nology, including quantum algorithms and software,

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

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 qubit architectures, such as super-  
10 conducting, ion traps, photonics, neutral atoms, spin  
11 atoms, or spin electrons.”;

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

14 “(12) QUANTUM INFORMATION SCIENCE, TECH-  
15 NOLOGY, AND ENGINEERING.—The term ‘quantum  
16 information science, technology, and engineering’  
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 new paragraph:

23 “(14) STEM.—The term ‘STEM’ means the  
24 academic and professional disciplines of science,

1 technology, engineering, and mathematics, including  
2 computer science.”.

3 **SEC. 3. PURPOSES.**

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

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

9 (2) in paragraph (1)—

10 (A) in the matter preceding subparagraph  
11 (A), by striking “science and technology” and  
12 inserting “science, engineering, and tech-  
13 nology”;

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

16 “(A) to expand the number of researchers,  
17 educators, and students with training in quan-  
18 tum information science, engineering, and tech-  
19 nology to develop a domestic workforce pipeline  
20 and retain international talent to the extent  
21 consistent with national security and inter-  
22 national competitiveness;”;

23 (C) in subparagraph (B), by striking  
24 “science at the” and inserting “science, engi-

1           neering, and technology at the primary, sec-  
2           ondary,”;

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

5           (E) in subparagraph (D)—

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

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

11          (F) in subparagraph (E), by inserting  
12          “and” after the semicolon; and

13          (G) by adding at the end the following new  
14          subparagraph:

15                 “(F) to support development of quantum  
16                 applications, including quantum-hybrid applica-  
17                 tions, to promote innovation and commercializa-  
18                 tion.”;

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

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

25          (5) in paragraph (4)—

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

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

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

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

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

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

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

17 (D) by adding at the end the following new  
18 subparagraph:

19 “(C) to facilitate cooperative investment in  
20 quantum capabilities between the United States  
21 and its allies and partners to strengthen and se-  
22 cure the domestic supply chain and related eco-  
23 system; and”; and

24 (7) by adding at the end the following new  
25 paragraph:

1           “(6) improving the maturity, scale, and short-  
2           and long-term viability of the quantum technology  
3           industry and commercialization of domestic quantum  
4           capacity across modalities.”.

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

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

8           (1) in paragraph (1)—

9                   (A) by striking “development” and insert-  
10                   ing “research development, and near- and me-  
11                   dium-term, and long-term demonstration”; and

12                   (B) by striking “information science and  
13                   technology”;

14           (2) in paragraph (2)—

15                   (A) by striking “fundamental”;

16                   (B) by striking “science and technology”  
17                   and inserting “science, engineering, and tech-  
18                   nology”; and

19                   (C) by inserting “infrastructure,” after  
20                   “demonstration,”;

21           (3) in paragraph (3)—

22                   (A) by inserting “and retain” after “to de-  
23                   velop”; and

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

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

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

19 (5) in paragraph (5)—

20 (A) by striking “industry and universities”  
21 and inserting “industry, universities, and stra-  
22 tegic allies”; and

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

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

2 Section 102 of the National Quantum Initiative Act  
3 (15 U.S.C. 8812) is amended—

4 (1) in subsection (a)(2)—

5 (A) in subparagraph (A)—

6 (i) by inserting “who shall be” before  
7 “appointed”; and

8 (ii) by inserting “, and who shall serve  
9 a four year term, subject to renewal” be-  
10 fore the semicolon; and

11 (B) by amending subparagraph (B) to read  
12 as follows:

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

16 (2) in subsection (b)—

17 (A) in paragraph (3), by striking “science  
18 and technology” and inserting “science, engi-  
19 neering, and technology research and work-  
20 force”; and

21 (B) by amending paragraph (4) to read as  
22 follows:

23 “(4) ensure coordination among the collabo-  
24 rative ventures or consortia established under this  
25 Act;”.

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

3 Section 103 of the National Quantum Initiative Act  
4 (15 U.S.C. 8813) is amended—

5 (1) in subsection (b)—

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

8 (B) by redesignating paragraph (9) as  
9 paragraph (13); and

10 (C) by inserting after paragraph (8) the  
11 following new paragraphs:

12 “(9) the Department of Health and Human  
13 Services;

14 “(10) the Department of State;

15 “(11) the Department of Homeland Security;

16 “(12) the National Oceanic and Atmospheric  
17 Administration; and”;

18 (2) in subsection (d)—

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

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

1 (C) in paragraph (5), by inserting “, engi-  
2 neering, and technology” after “science”;

3 (D) in paragraph (6)—

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

7 (ii) by striking “and” after the semi-  
8 colon;

9 (E) in paragraph (7)—

10 (i) by inserting “, engineering and  
11 technology” after “science”; and

12 (ii) by striking the period and insert-  
13 ing “; and”; and

14 (F) by adding at the end the following new  
15 paragraph:

16 “(8) facilitate interagency partnership opportu-  
17 nities to advance quantum applications related to en-  
18 vironment, biotechnology, space, and other sectors.”;  
19 and

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

1 **SEC. 7. NATIONAL QUANTUM INITIATIVE ADVISORY COM-**  
2 **MITTEE.**

3 Section 104 of the National Quantum Initiative Act  
4 (15 U.S.C. 8814) is amended—

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

7 “(b) **QUALIFICATIONS.**—The Advisory Committee  
8 shall consist of members, appointed by the President, who  
9 are—

10 “(1) representative of industry, including end  
11 users likely to benefit from quantum technology, uni-  
12 versities, and Federal laboratories; and

13 “(2) qualified to provide advice and information  
14 on quantum information science, engineering, and  
15 technology research, development, demonstrations,  
16 standards, STEM education, technology transfer,  
17 commercial application, or national security and eco-  
18 nomic concerns.”;

19 (2) in subsection (d)(2)—

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

23 (B) by redesignating subparagraphs (D),  
24 (E), (F), and (G) as subparagraphs (E), (F),  
25 (G), and (H), respectively;

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

3 “(D) other countries’ quantum programs  
4 and the progress of such countries and such  
5 programs relative to the Program;”;

6 (D) in subparagraph (E), as so redesign-  
7 nated—

8 (i) by striking “to” and inserting  
9 “promote innovation, foster a robust  
10 United States quantum industry, and”;  
11 and

12 (ii) by striking “science and tech-  
13 nology” and inserting “science, engineer-  
14 ing, and technology”; and

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

18 (F) in subparagraph (G), as so redesign-  
19 nated, by striking “open standards for, quan-  
20 tum information science and technology; and”  
21 and inserting “international standards in open  
22 and transparent standardization systems for  
23 quantum information science, engineering, and  
24 technology;”;

1 (G) in subparagraph (H), as so redesignated—  
2

3 (i) by inserting “educational,” after  
4 “legal,”; and

5 (ii) by striking the period and inserting  
6 “; and”; and

7 (H) by adding at the end the following new  
8 subparagraphs:

9 “(I) the domestic and international cooperation  
10 needs and goals of the Program, including  
11 needs and goals related to infrastructure  
12 and the supply chain of quantum information  
13 science, engineering, and technology; and

14 “(J) the degree to which quantum information  
15 science, engineering, and technology is  
16 enhancing or can enhance the capabilities of the  
17 United States advanced industrial economy and  
18 protect or optimize critical infrastructure (as  
19 such term is defined in section 1016(e) of Public  
20 Law 107–56 (42 U.S.C. 5195c(e)).”;

21 (3) in subsection (e), by inserting “through  
22 December 31, 2030” after “thereafter”; and

23 (4) by amending subsection (g) to read as follows:  
24

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

24               (2) in subsection (c)—

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 new  
25 paragraphs:

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 is amended by  
17           inserting after section 105 the following new section:

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

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

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

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

17           “(2) ensure continued United States participa-  
18           tion in bilateral and multilateral efforts to advance  
19           quantum information science, engineering, and tech-  
20           nology on the international stage;

21           “(3) promote the integrity and impartiality of  
22           international standards organizations and processes  
23           related to quantum information science, engineering,  
24           and technology; and

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

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

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

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

17           “(2) Key partners that are allies of the United  
18           States and have demonstrated unique capabilities in  
19           one or more areas of quantum information science,  
20           engineering, and technology.

21           “(3) Efforts and plans to address risks to the  
22           national security and economic interests of the  
23           United States during development and deployment  
24           of quantum technologies worldwide, including plans

1 for diplomatic engagement with allies and partners,  
2 and other countries.

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

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

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

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

9           Section 106(a) of the National Quantum Initiative  
10          Act (15 U.S.C. 8815(a)) is amended to read as follows:

11          “(a) IN GENERAL.—Except as provided in subsection  
12          (b), the authority to carry out sections 101, 102, 103, 104,  
13          and 105 shall terminate on December 30, 2030.”.

14   **SEC. 11. NATIONAL INSTITUTE OF STANDARDS AND TECH-**  
15                           **NOLOGY ACTIVITIES AND QUANTUM CONSOR-**  
16                           **TIUM.**

17          Section 201 of the National Quantum Initiative Act  
18          (15 U.S.C. 8831) is amended—

19                 (1) in subsection (a)—

20                         (A) in paragraph (1)—

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

22                                 and

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

1 (B) in paragraph (2)—

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

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

7 (C) by amending paragraph (4) to read as  
8 follows:

9 “(4) shall carry out research, development, and  
10 demonstration projects, as appropriate, to facilitate  
11 the development and standardization of quantum  
12 networking, communications, computing, metrology,  
13 and sensing technologies and quantum applica-  
14 tions;”.

15 (D) by redesignating paragraphs (5), (6),  
16 and (7) as paragraphs (7), (8), and (10), re-  
17 spectively;

18 (E) by inserting the following after para-  
19 graph (4) the following new paragraphs:

20 “(5) shall carry out research to support the  
21 measurement of comparative performance and  
22 progress of quantum technologies, including, as  
23 practicable, technology readiness assessments of  
24 quantum technologies;

1           “(6) shall promote United States participation  
2           in international standards organizations related to  
3           quantum information science, engineering, and tech-  
4           nology;”;

5           (F) in paragraph (7), as so redesignated,  
6           by striking “infrastructure” and inserting “,  
7           communications, sensing, and computing”; and

8           (G) in paragraph (8), as so redesignated—

9           (i) by striking “and engineering; and”  
10           and inserting “, engineering, and tech-  
11           nology and expanding the domestic STEM  
12           workforce;”; and

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

15           (H) by inserting after paragraph (8) the  
16           following the following new paragraph:

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

19           (2) in subsection (b)—

20           (A) in paragraph (1)—

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

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

1 (B) in paragraph (2)—

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

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

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

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

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

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

5 (C) in paragraph (3)—

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

9 (ii) by inserting “periodically, but not  
10 less than every five years,” after “shall”;  
11 and

12 (D) by adding at the end the following new  
13 paragraph:

14 “(4) COORDINATION.—As appropriate, the con-  
15 sortium is encouraged to engage with Federal agen-  
16 cies that fund research, have a mission to transition  
17 or translate research results to practical quantum  
18 applications, or have a mission that could benefit  
19 from the development of quantum technologies, to  
20 inform and accelerate progress in such areas.”; and

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

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

1           “(1) IN GENERAL.—The Director of the Na-  
2           tional Institute of Standards and Technology, in co-  
3           ordination with the Secretary of State and the Di-  
4           rector of the National Science Foundation, shall pro-  
5           mote, establish, and support international quantum  
6           information science, engineering, and technology re-  
7           search, metrology research, and standardization, as  
8           appropriate, to enhance international cooperation,  
9           meet United States commitments, and support  
10          United States engagement in international standards  
11          for quantum information science, engineering, and  
12          technology.

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

20          “(3) RESTRICTIONS.—

21                 “(A) CONFUCIUS INSTITUTE.—None of the  
22                 funds made available under this section may be  
23                 obligated or expended to an institution of high-  
24                 er education that maintains a contract or agree-  
25                 ment between such institution and a Confucius

1 Institute or any successor of a Confucius Insti-  
2 tute.

3 “(B) FOREIGN COUNTRIES OR ENTITIES  
4 OF CONCERN.—None of the funds made avail-  
5 able under this section may be obligated or ex-  
6 pended to promote, establish, or finance quan-  
7 tum research activities between a United States  
8 entity and a foreign country of concern or for-  
9 eign entity of concern, except such restriction  
10 shall not apply to participation by awardees in  
11 consensus-based international standardization  
12 activities.

13 “(d) FUNDING.—Of the funds authorized to be ap-  
14 propriated for the National Institute of Standards and  
15 Technology pursuant to section 10211 of the Research  
16 and Development, Competition, and Innovation Act (Pub-  
17 lic Law 117–167) for scientific and technical research and  
18 services laboratory activities, there is authorized to be ap-  
19 propriated to the Director of the National Institute of  
20 Standards and Technology to carry out this section up to  
21 \$85,000,000 for each of fiscal years 2024 through 2027.”.

22 **SEC. 12. NATIONAL INSTITUTE OF STANDARDS AND TECH-**  
23 **NOLOGY QUANTUM CENTERS.**

24 Title II of the National Quantum Initiative Act is  
25 amended by adding at the end the following new section:

1 **“SEC. 202. NATIONAL INSTITUTE OF STANDARDS AND**  
2 **TECHNOLOGY QUANTUM CENTERS.**

3 “(a) ESTABLISHMENT.—

4 “(1) IN GENERAL.—Subject to the availability  
5 of appropriations, the Director of the National Insti-  
6 tute of Standards and Technology, in consultation  
7 with the heads of other Federal departments and  
8 agencies, as appropriate, shall carry out a program  
9 to establish and operate at least one, but not more  
10 than three, centers to accelerate research, develop-  
11 ment, deployment, and standardization of quantum  
12 information science, engineering, and technology.

13 “(2) PROGRAM DETAILS.—

14 “(A) COMPETITIVE, MERIT-REVIEWED  
15 PROCESS.—The centers shall be established  
16 through a competitive, merit-reviewed process.

17 “(B) APPLICATIONS.—An eligible applicant  
18 described in subparagraph (C) shall submit to  
19 the Director of the National Institute of Stand-  
20 ards and Technology an application at such  
21 time, in such manner, and containing such in-  
22 formation as the Director determines to be ap-  
23 propriate.

24 “(C) ELIGIBLE APPLICANTS.—Eligible ap-  
25 plicants described in this subparagraph are the  
26 following:

1 “(i) Institutions of higher education.

2 “(ii) Nonprofit organizations.

3 “(iii) Multi-institutions collaborations,  
4 including multiple types of research insti-  
5 tutions, private sector entities, Federal lab-  
6 oratories, and nonprofit organizations, or a  
7 consortia thereof.

8 “(iv) Any other entity the Director de-  
9 termines appropriate.

10 “(3) SELECTION OF TOPICS.—The Director of  
11 the National Institute of Standards and Technology  
12 shall solicit proposals and prioritize the following  
13 topics in the initial selection of centers, subject to  
14 merit-review:

15 “(A) Quantum sensing and measurement.

16 “(B) Quantum engineering.

17 “(b) REQUIREMENTS.—To the maximum extent  
18 practicable, centers developed, constructed, operated, or  
19 maintained under this section shall serve the mission of  
20 the National Institute of Standards and Technology, for  
21 the benefit of the broader United States quantum infor-  
22 mation science community, to develop processes for the  
23 following purposes—

1           “(1) Advancing research and standardization in  
2           quantum information science, engineering, and tech-  
3           nology.

4           “(2) Advancing technology transfer.

5           “(3) Improving the competitiveness of the  
6           United States.

7           “(c) COORDINATION.—The Director of the National  
8           Institute of Standards and Technology shall ensure coordi-  
9           nation, and avoid unnecessary duplication of, the activities  
10          carried out under this section with existing activities of  
11          the Institute, other activities carried out under this Act,  
12          and other related programs, as appropriate.

13          “(d) SELECTION AND DURATION.—

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

17                 “(2) RENEWAL.—Each center established under  
18                 this section may be renewed for an additional period  
19                 of five years following a successful merit-based re-  
20                 view by the Director.

21                 “(3) TERMINATION.—Consistent with the au-  
22                 thorities of the National Institute of Standards and  
23                 Technology, the Director of the National Institute of  
24                 Standards and Technology may terminate an under-

1 performing center for cause during the performance  
2 period.

3 “(e) FUNDING.—The Director of the National Insti-  
4 tute of Standards and Technology shall allocate up to  
5 \$18,000,000 for each center established under this section  
6 for each of fiscal years 2024 through 2028, subject to the  
7 availability of appropriations. Amounts made available to  
8 carry out this section shall be derived from amounts ap-  
9 propriated or otherwise made available to the National In-  
10 stitute of Standards and Technology.”

11 **SEC. 13. NATIONAL SCIENCE FOUNDATION QUANTUM IN-**  
12 **FORMATION SCIENCE RESEARCH AND EDU-**  
13 **CATION ACTIVITIES.**

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

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

18 (2) in subsection (a)—

19 (A) by striking “basic”; and

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

23 (3) in subsection (b)—

24 (A) in paragraph (1)—

25 (i) in subparagraph (A)—

1 (I) by striking “basic”; and

2 (II) by striking “science and en-  
3 gineering” and inserting “science, en-  
4 gineering, and technology”; and

5 (ii) in subparagraph (B)—

6 (I) by striking “human re-  
7 sources” and inserting “education and  
8 workforce”; and

9 (II) by striking “science and en-  
10 gineering” and inserting “science, en-  
11 gineering, and technology”; and

12 (B) in paragraph (2)—

13 (i) in subparagraph (A)—

14 (I) in clause (i)—

15 (aa) by striking “science and  
16 engineering” and inserting  
17 “science, engineering, and tech-  
18 nology”;

19 (bb) by inserting “K–12, vo-  
20 cational,” before “under-  
21 graduate”; and

22 (cc) by striking “and” after  
23 the semicolon;

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

1 (III) by adding at the end the  
2 following new clause:

3 “(iii) to pursue research at the fron-  
4 tiers of quantum information science, engi-  
5 neering, and technology, and explore solu-  
6 tions to important challenges for the devel-  
7 opment, application, and commercialization  
8 of quantum technologies;”;

9 (ii) in subparagraph (B), by striking  
10 “science and engineering” and inserting  
11 “science, engineering, and technology”;  
12 and

13 (iii) in subparagraph (C), by striking  
14 “science and engineering” and inserting  
15 “science, engineering, and technology”;

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

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

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

22 “(F) providing infrastructure to support  
23 academic quantum information science, engi-  
24 neering, and technology, including through ex-

1           isting infrastructure programs and new activi-  
2           ties.”;

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

5           “(c) STUDENT TRAINEESHIPS, FELLOWSHIPS, AND  
6           OTHER MODELS.—

7           “(1) IN GENERAL.—The Director of the Na-  
8           tional Science Foundation, in consultation with  
9           heads of Federal agencies the Director considers ap-  
10          propriate, shall award grants to institutions of high-  
11          er education or eligible nonprofit organizations (or  
12          consortia thereof) to increase capacity and broaden  
13          participation, including through provisioning of expe-  
14          riential opportunities, where appropriate, in quan-  
15          tum information science, engineering, and tech-  
16          nology and other related disciplines.

17          “(2) QUANTUM TRAINEESHIPS.—The Director  
18          of the National Science Foundation may establish or  
19          use existing programs to make awards to institu-  
20          tions of higher education or nonprofit organizations  
21          (or consortia thereof) to provide traineeships to  
22          graduate students at institutions of higher education  
23          within the United States who are citizens of the  
24          United States and who choose or plan to pursue  
25          masters or doctoral degrees in quantum information

1 science, engineering, and technology, or related  
2 fields, and by providing students with opportunities  
3 for research experiences in government or industry  
4 related to such students' quantum studies.

5 “(3) QUANTUM FELLOWSHIPS AND SCHOLAR-  
6 SHIPS.—

7 “(A) IN GENERAL.—The Director of the  
8 National Science Foundation may establish or  
9 use existing programs to support fellowships  
10 and scholarships for students at institutions of  
11 higher education for the purpose of increasing  
12 quantum information science, engineering, and  
13 technology exposure for undergraduate and  
14 graduate STEM students and increasing post-  
15 graduation employment opportunities for  
16 STEM students.

17 “(B) REQUIREMENTS.—Eligible partici-  
18 pants in the fellowship and scholarship program  
19 shall—

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

23 “(ii) have taken at least one quantum-  
24 science or quantum-relevant course as part  
25 of their degree programs.

1           “(C) CONSIDERATIONS.—Eligible fellow-  
2           ships and scholarships may include temporary  
3           quantum-related positions at State or Federal  
4           agencies, national laboratories, private sector  
5           entities, institutions of higher education, the  
6           Quantum Centers and Institute established in  
7           sections 202, 302, 402, and 502, or other quan-  
8           tum-relevant entities, as determined appropriate  
9           by the Director.

10           “(D) COMPETITIVE AWARDS.—Fellowships  
11           and scholarships shall be competitively awarded  
12           through a merit-review process. The Director of  
13           the National Science Foundation may prioritize  
14           fellowships that include an industry partner  
15           that provides financial assistance to the appli-  
16           cant for direct or indirect costs.

17           “(4) QUANTUM RESEARCH EXPERIENCES FOR  
18           UNDERGRADUATES.—The Director of the National  
19           Science Foundation shall seek to increase opportuni-  
20           ties for quantum research for undergraduate stu-  
21           dents by encouraging proposals in quantum informa-  
22           tion science, engineering, and technology, through  
23           the research experiences for undergraduates pursu-  
24           ant to section 514 of the America COMPETES Re-  
25           authorization Act of 2010 (42 U.S.C. 1862p–6).

1           “(5) PARTNERSHIPS.—In carrying out the ac-  
2           tivities under this subsection, the Director of the  
3           National Science Foundation shall encourage award-  
4           ees to partner with relevant Federal agencies, Fed-  
5           eral laboratories, industry and other private sector  
6           organizations, and nonprofit organizations to facili-  
7           tate the expansion of workforce pathways and  
8           hands-on learning experiences.”;

9           (5) in subsection (d)—

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

12           (B) in paragraph (1)—

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

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

21           (C) in paragraph (2)—

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

1 (ii) in subparagraph (D), by inserting  
2 “, engineering, and technology” after  
3 “science”;

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

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

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

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

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

20 (vi) in subparagraph (H), as so redesi-  
21 gnated, by inserting “, engineering, and  
22 technology” after “science”;

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

1 (E) by striking paragraph (4); and  
2 (6) by adding at the end the following new sub-  
3 sections:

4 “(e) INTERNATIONAL RESEARCH ON QUANTUM IN-  
5 FORMATION SCIENCE, ENGINEERING, AND TECH-  
6 NOLOGY.—

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

17 “(2) ALIGNMENT.—In carrying out this sub-  
18 section, the Director of the National Science Foun-  
19 dation shall ensure alignment with the national  
20 Quantum Information Strategy in accordance with  
21 Executive Order 14073 or successor strategies.

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

1           “(4) RESTRICTIONS.—

2                   “(A) CONFUCIUS INSTITUTE.—None of the  
3 funds made available under this section may be  
4 obligated or expended to an institution of high-  
5 er education that maintains a contract or agree-  
6 ment between such institution and a Confucius  
7 Institute or any successor of a Confucius Insti-  
8 tute.

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

16           “(f) FUNDING.—Of the funds authorized to be appro-  
17 priated to the National Science Foundation pursuant to  
18 section 10303 of the Research and Development, Competi-  
19 tion, and Innovation Act (Public Law 117–167) for re-  
20 search and related activities, there is authorized to be ap-  
21 propriated to the Director of the National Science Foun-  
22 dation to carry out this section up to \$141,000,000 for  
23 each of fiscal years 2024 through 2027.”.

1 **SEC. 14. 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”; and

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 (3) in subsection (d)(2)—

19 (A) in subparagraph (A), by striking  
20 “quantum science” and inserting “quantum in-  
21 formation science, engineering, and tech-  
22 nology,”;

23 (B) in subparagraph (C), by inserting “,  
24 including how each participant will develop and  
25 implement outreach activities to increase the  
26 participation of women and other students from

1 groups historically underrepresented in STEM”  
2 before the semicolon;

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

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

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

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

16 (4) in subsection (e), by amending paragraph  
17 (2) to read as follows:

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

21 (5) in subsection (f), by striking “2019 through  
22 2023” and inserting “2024 through 2028”.

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

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

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

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

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

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

25 “(1) identify and address cross-cutting work-  
26 force development challenges in quantum informa-

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

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

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

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

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

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

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

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

3 “(5) Coordinating with quantum industry and  
4 nonprofit entities to inform and enhance the quality  
5 and availability of quantum education in STEM de-  
6 gree programs, including through the promotion of  
7 post-graduation opportunities for STEM students  
8 outside the classroom to increase exposure to quan-  
9 tum industries.

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

15 “(7) Developing, testing, implementing, and co-  
16 ordinating career development programs and strate-  
17 gies for pre-university and university educators for  
18 the purpose of increasing the number of quantum-  
19 informed educators at all levels of education, includ-  
20 ing by carrying 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 to increase awareness of and  
8           promote quantum-related career development  
9           activities at the Hub.

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

21          “(9) Facilitating public education and outreach  
22          activities to enhance the understanding and aware-  
23          ness of quantum information science, engineering,  
24          and technology to a boarder community to satisfy  
25          broader impact requirements of award applications.

1           “(10) Encouraging coordination on quantum  
2           education in the broader STEM community.

3           “(e) QREW QUANTUM FELLOWSHIP PROGRAM.—  
4           Subject to the restrictions outlined in subsection (c) of sec-  
5           tion 301, the Hub may support education or policy fellow-  
6           ships for students at entities participating in the consor-  
7           tium under subsection (a) or at other research centers es-  
8           tablished pursuant to this Act at the National Science  
9           Foundation, the National Institute of Standards and  
10          Technology, the Department of Energy, or the National  
11          Aeronautics and Space Administration, for the purpose of  
12          supporting the activities described in subsection (d).

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

19          “(g) APPLICATION.—A consortium seeking funding  
20          under this section shall submit to the Director of the Na-  
21          tional Science Foundation an application at such time, in  
22          such manner, and containing such information as the Di-  
23          rector may require. Each application shall include a de-  
24          scription of how the consortium shall carry out the fol-  
25          lowing:

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

3           “(2) Include industry participation in fulfilling  
4 the purposes of the Hub.

5           “(3) Collaborate with other members of the  
6 consortium to share expertise in integrating quan-  
7 tum information science, engineering, and tech-  
8 nology into existing STEM programs and other rel-  
9 evant fields and disciplines.

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

12          “(5) Develop and implement outreach activities  
13 to increase the participation of women and other  
14 students from groups historically underrepresented  
15 in STEM.

16          “(h) SELECTION AND DURATION.—

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

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

23           “(3) TERMINATION.—Consistent with the au-  
24 thorities of the National Science Foundation, the Di-  
25 rector of the National Science Foundation may ter-

1       minate the Hub if it is underperforming during the  
2       performance period.

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

10       “(j) FUNDING.—The Director of the National  
11 Science Foundation shall allocate up to \$10,000,000 for  
12 the Hub for each of fiscal years 2024 through 2028, sub-  
13 ject to the availability of appropriations. Amounts made  
14 available to carry out this section shall be derived from  
15 amounts appropriated or otherwise made available to the  
16 National Science Foundation.

17 **“SEC. 304. QUANTUM TESTBEDS.**

18       “(a) IN GENERAL.—The Director of the National  
19 Science Foundation, in coordination with the Director of  
20 the National Institute of Standards and Technology, the  
21 Secretary of Energy, and the heads of other Federal agen-  
22 cies, as determined appropriate by the Director of the Na-  
23 tional Science Foundation, shall make awards on a com-  
24 petitive, merit-reviewed basis to institutions of higher edu-  
25 cation, nonprofit organizations, or consortia thereof, to es-

1 tablish testbeds for quantum applications research and de-  
2 velopment.

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

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

15 “(1) How the applicant will assemble a work-  
16 force, including from populations that are histori-  
17 cally underrepresented in STEM, with the skills  
18 needed to operate a quantum testbed.

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

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

1           “(d) ROLES AND RESPONSIBILITIES.—The Director  
2 of the National Science Foundation shall be responsible  
3 for the following:

4           “(1) Maintaining a record of notable outcomes  
5 from each quantum testbed established under this  
6 section.

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

11           “(3) Not later than one year after the date of  
12 the enactment of this section and every two years  
13 thereafter until December 31, 2030, briefing the ap-  
14 propriate committees of Congress on the status of  
15 such quantum testbeds and providing recommenda-  
16 tions for improving such quantum testbeds.

17           “(e) COORDINATION.—In establishing quantum  
18 testbeds under this section, the Director of the National  
19 Science Foundation shall ensure coordination with other  
20 testbeds and other quantum facilities hosting Federal  
21 quantum technology and infrastructure supported by the  
22 National Science Foundation, including those authorized  
23 pursuant to section 10390 of the Research and Develop-  
24 ment, Competition, and Innovation Act (Public Law 117–  
25 167; 42 U.S.C. 10990), or by other Federal agencies as

1 determined appropriate by the Director, to avoid duplica-  
2 tion and maximize use of Federal resources.

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

13 “(g) GEOGRAPHIC DIVERSITY.—The Director shall  
14 ensure regional and geographic diversity in issuing awards  
15 under this section.

16 “(h) FUNDING.—The Director of the National  
17 Science Foundation shall allocate up to \$50,000,000 for  
18 the quantum testbeds under this section for each fiscal  
19 years 2024 through 2028, subject to the availability of ap-  
20 propriations. Amounts made available to carry out this  
21 section shall be derived from amounts appropriated or oth-  
22 erwise made available to the National Science Founda-  
23 tion.”.

1 **SEC. 16. DEPARTMENT OF ENERGY QUANTUM INFORMA-**  
2 **TION SCIENCE RESEARCH PROGRAM.**

3 Section 401 of the National Quantum Initiative Act  
4 (15 U.S.C. 8851) is amended—

5 (1) by amending subsection (a) to read as fol-  
6 lows:

7 “(a) IN GENERAL.—The Secretary of Energy shall  
8 carry out a research, development, and demonstration pro-  
9 gram on quantum information science, engineering, and  
10 technology.”;

11 (2) in subsection (b)—

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

14 (B) by redesignating paragraphs (3), (4),  
15 and (5) as paragraphs (5), (6), and (7), respec-  
16 tively;

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

19 “(3) operate National Quantum Information  
20 Science Research Centers to accelerate and scale up  
21 scientific and technical breakthroughs in quantum  
22 information science, engineering, and technology,  
23 and maintain state-of-the-art infrastructure for  
24 quantum researchers and industry partners, in ac-  
25 cordance with section 402;

1           “(4) conduct cooperative research with indus-  
2           try, National Laboratories, institutions of higher  
3           education, and other research institutions to facili-  
4           tate the development and demonstration of quantum  
5           information science, engineering, and technology, in-  
6           cluding in the fields of—

7                   “(A) quantum information theory;

8                   “(B) quantum physics;

9                   “(C) quantum computational science, in-  
10           cluding hardware and software, including artifi-  
11           cial intelligence, machine learning and data  
12           science;

13                   “(D) applied mathematics and algorithm  
14           development;

15                   “(E) quantum communications and net-  
16           working, including hardware and software for  
17           quantum communications and networking;

18                   “(F) quantum sensing and detection;

19                   “(G) materials science and engineering;

20                   “(H) quantum modeling and simulation,  
21           including molecular modeling;

22                   “(I) near- and long-term application devel-  
23           opment in a range of areas as determined by  
24           the Secretary, such as materials discovery, cy-

1 bersecurity, energy storage and electric grid  
2 management;

3 “(J) quantum chemistry;

4 “(K) quantum biology;

5 “(L) superconductive and high-perform-  
6 ance microelectronics; and

7 “(M) quantum security technologies;”;

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

10 “(5) provide research experiences and training  
11 for additional undergraduate and graduate students  
12 in quantum information science, engineering, and  
13 technology, including in the fields specified in para-  
14 graph (4);”;

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

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

18 (ii) by redesignating subparagraph  
19 (F) as subparagraph (J); and

20 (iii) by inserting after subparagraph  
21 (E) the following new subparagraphs:

22 “(F) the Office of Electricity;

23 “(G) the Office of Cybersecurity, Energy  
24 Security, and Emergency Response;

1                   “(H) the Office of Fossil Energy and Car-  
2                   bon Management;

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

5                   (F) in paragraph (7), as so redesignated,  
6                   by striking the period and inserting “and other  
7                   relevant efforts as defined by the Secretary of  
8                   Energy; and”;

9                   (G) by adding at the end the following new  
10                  paragraph:

11                  “(8) leverage the collective body of knowledge  
12                  and data, including experience and resources from  
13                  existing Federal research activities and commer-  
14                  cially-available quantum computing hardware and  
15                  software to the extent practicable.”; and

16                  (3) by adding at the end the following:

17                  “(c) QUANTUM HIGH PERFORMANCE COMPUTING  
18                  STRATEGIC PLAN.—Not later than one year after the date  
19                  of the enactment of this subsection, the Secretary of En-  
20                  ergy shall submit to Congress a report containing a 10-  
21                  year strategic plan to guide Federal programs in design-  
22                  ing, expanding, commercializing, and procuring hybrid,  
23                  high performance computing systems featuring the ability  
24                  to integrate a diverse set of resources including artificial  
25                  intelligence, and machine learning accelerated by quantum

1 supercomputers to enable the Department of Energy's  
2 computing facilities to continuously advance computing re-  
3 sources. Such strategic plan shall include the following:

4           “(1) A conceptual plan to leverage capabilities  
5           and infrastructure from the exascale computing pro-  
6           gram, as the Secretary of Energy determines nec-  
7           essary.

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

10           “(3) A consideration of a diversity of quantum  
11           computing modalities.

12           “(4) A plan to integrate cloud access of com-  
13           mercially available quantum hardware and software  
14           to complement on-premises high performance com-  
15           puting systems and resources consistent with the  
16           QUEST program under section 404.

17           “(5) Implement the plan developed under this  
18           section.

19           “(d) INDUSTRY OUTREACH.—In carrying out the  
20           program under subsection (a) the Secretary of Energy  
21           shall support the quantum technology industry and pro-  
22           mote commercialization of applications of quantum tech-  
23           nology relevant to the Department's activities by carrying  
24           out the following:

25           “(1) Educating—

1           “(A) the energy industry on near term and  
2           commercially available quantum technologies;  
3           and

4           “(B) the quantum industry on potential  
5           energy applications.

6           “(2) Accelerating the advancements of United  
7           States quantum computing, communications, net-  
8           working, sensing, and security capabilities to protect  
9           and optimize the energy sector.

10          “(3) Advancing relevant domestic supply  
11          chains, manufacturing capabilities, and associated  
12          simulations or modeling capabilities.

13          “(4) Facilitating commercialization of quantum  
14          technologies from National Laboratories and engag-  
15          ing with the Quantum Consortium established pur-  
16          suant to section 201(b) and other organizations, as  
17          applicable, to transition component technologies to  
18          help facilitate, as appropriate, the development of a  
19          quantum supply chain.

20          “(e) FUNDING.—Of the funds authorized to be ap-  
21          propriated for the Department of Energy’s Office of  
22          Science pursuant to section 317 of the Department of En-  
23          ergy Research and Innovation Act, there is authorized to  
24          be appropriated to the Secretary to carry out the activities

1 under this section up to \$130,000,000 for each fiscal years  
2 2024 through 2027.”.

3 **SEC. 17. DOE QUANTUM INSTRUMENTATION AND FOUNDRY**  
4 **PROGRAM.**

5 Title IV of the National Quantum Initiative Act (15  
6 U.S.C. 8851 et seq.) is amended by inserting after section  
7 401 the following new section:

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

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

13 “(1) Maintain United States leadership in  
14 quantum information science, engineering, and tech-  
15 nology.

16 “(2) Develop domestic quantum supply chains.

17 “(3) Provide resources for the broader scientific  
18 community.

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

21 “(b) PROGRAM COMPONENTS.—In carrying out the  
22 program under subsection (a), the Secretary of Energy  
23 shall design, build, develop, purchase, and commercialize  
24 specialized equipment, laboratory infrastructure, and  
25 state-of-the-art instrumentation to advance quantum engi-

1 neering research and the development of quantum compo-  
2 nent technologies at a scale sufficient to meet the needs  
3 of the scientific community and enable commercialization  
4 of quantum technology.

5 “(c) **QUANTUM FOUNDRIES.**—In carrying out the  
6 program under subsection (a), and in coordination part-  
7 nership with institutions of higher education and industry,  
8 the Secretary of Energy shall support the development of  
9 quantum foundries focused on meeting the device, hard-  
10 ware, software, and materials needs of the scientific com-  
11 munity and the quantum supply chain.

12 “(d) **FUNDING.**—The Secretary of Energy shall allo-  
13 cate up to \$25,000,000 for each of fiscal years 2024  
14 through 2028 to carry out this section, subject to the  
15 availability of appropriations. Amounts made available to  
16 carry out this section shall be derived from amounts ap-  
17 propriated or otherwise made available to the Department  
18 of Energy’s Office of Science.”.

19 **SEC. 18. NATIONAL QUANTUM INFORMATION SCIENCE RE-**  
20 **SEARCH CENTERS.**

21 Section 402 of the National Quantum Initiative Act  
22 (15 U.S.C. 8852) is amended—

23 (1) in subsection (a)—

24 (A) in paragraph (1)—

25 (i) by striking “basic”;

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

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

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

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

13 (3) in subsection (c),

14 (A) by striking “basic”; and

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

18 (4) in subsection (d)(1)—

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

21 (B) by redesignating subparagraph (D) as  
22 subparagraph (E); and

23 (C) by inserting after subparagraph (C)  
24 the following new subparagraph:

1 “(D) the Office of Technology Transitions;  
2 and”;

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

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

9 (6) in subsection (f)—

10 (A) by striking “\$25,000,000” and insert-  
11 ing “\$35,000,000”; and

12 (B) by striking “2019 through 2023” and  
13 inserting “2024 through 2028”.

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

17 Section 403 of the National Quantum Initiative Act  
18 (15 U.S.C. 8853) is amended—

19 (1) in subsection (a)—

20 (A) in paragraph (4)—

21 (i) by inserting “, including” after  
22 “networking”; and

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

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

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

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

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

12 (2) in subsection (b)—

13 (A) in paragraph (1)—

14 (i) by redesignating subparagraphs  
15 (C) and (D) as subparagraphs (D) and  
16 (E), respectively; and

17 (ii) by inserting after subparagraph  
18 (B) the following new subparagraph:

19 “(C) the Administrator of the National  
20 Aeronautics and Space Administration;”;

21 (B) in paragraph (2)—

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

1 (ii) in subparagraph (E), by striking  
2 “photon-based” and inserting “all applica-  
3 ble modalities of”;

4 (iii) in subparagraph (F), by inserting  
5 “, quantum sensors,” after “quantum re-  
6 peaters”;

7 (iv) in subparagraph (G)—

8 (I) by inserting “data centers,”  
9 after “repeaters,”; and

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

12 (v) in subparagraph (H)—

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

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

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

22 “(I) development of quantum network and  
23 entanglement distribution protocols or applica-  
24 tions, including development of network stack

1 protocols and protocols enabling integration  
2 with existing technologies or infrastructure; and

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

7 (C) in paragraph (4)—

8 (i) by striking “basic”; and

9 (ii) by striking “material” and insert-  
10 ing “materials”; and

11 (D) in paragraph (5), by striking “funda-  
12 mental”; and

13 (3) in subsection (d), by striking “basic re-  
14 search” and inserting “research, development, and  
15 demonstration”.

16 **SEC. 20. DEPARTMENT OF ENERGY QUANTUM USER EXPAN-**  
17 **SION FOR SCIENCE AND TECHNOLOGY PRO-**  
18 **GRAM.**

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

21 (1) in subsection (a)—

22 (A) in the matter preceding paragraph (1),  
23 by striking “and quantum computing clouds”  
24 and inserting “, software, and cloud-based  
25 quantum computers”;

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

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

5 (D) by adding at the end the following new  
6 paragraphs:

7 “(5) to enable development of software and ap-  
8 plications, including estimation of resources needed  
9 to scale applications; and

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

12 (2) in subsection (b)—

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

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

17 (C) by at the end the following new para-  
18 graphs:

19 “(6) enables users to develop algorithms, soft-  
20 ware tools, simulators, and applications for quantum  
21 systems using cloud-based quantum computers; and

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

25 (3) in subsection (c)—

1 (A) by redesignating paragraphs (4), (5),  
2 (6), (7), and (8) and paragraphs (5), (6), (7),  
3 (8), and (9), respectively; and

4 (B) by inserting after paragraph (3) the  
5 following new paragraph:

6 “(4) the National Oceanic and Atmospheric Ad-  
7 ministration;”; and

8 (4) in subsection (e)—

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

11 (B) in paragraph (5), by striking the pe-  
12 riod and inserting “; and”; and

13 (C) by adding at the end the following new  
14 paragraph:

15 “(6) \$38,000,000 for fiscal year 2028.”.

16 **SEC. 21. NATIONAL AERONAUTICS AND SPACE ADMINIS-**  
17 **TRATION QUANTUM ACTIVITIES.**

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

1 **“TITLE V—NATIONAL AERO-**  
2 **NAUTICS AND SPACE ADMIN-**  
3 **ISTRATION QUANTUM ACTIVI-**  
4 **TIES**

5 **“SEC. 501. QUANTUM INFORMATION SCIENCE, ENGINEER-**  
6 **ING, AND TECHNOLOGY RESEARCH FOR**  
7 **SPACE AND AERONAUTICS.**

8 “(a) IN GENERAL.—The Administrator of the Na-  
9 tional Aeronautics and Space Administration is authorized  
10 to carry out research on quantum information science, en-  
11 gineering, and technology.

12 “(b) COOPERATION.—In carrying out subsection (a),  
13 the Administrator of the National Aeronautics and Space  
14 Administration—

15 “(1) shall consider cooperative arrangements  
16 with the Department of Energy and other Federal  
17 Government agencies, as practicable, on areas of  
18 shared benefit; and

19 “(2) may enter into memoranda of under-  
20 standing or memoranda of agreement to establish  
21 such cooperative arrangements.

22 “(c) STRATEGY.—Not later than 180 days after the  
23 date of the enactment of this title, the Administrator of  
24 the National Aeronautics and Space Administration shall  
25 submit to the appropriate committees of Congress a strat-

1 egy for National Aeronautics and Space Administration  
2 research on quantum information science, engineering,  
3 and technology. The strategy shall identify resources re-  
4 quired to support implementation of the strategy, includ-  
5 ing budgets, workforce, and infrastructure, describe coop-  
6 erative efforts with other Federal Government agencies,  
7 and address areas of research and applications, including  
8 the following:

9           “(1) Quantum sensing.

10           “(2) Quantum networking.

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

13           “(4) Quantum computing.

14           “(5) Science, aeronautics, and exploration-re-  
15 lated applications.

16           “(6) Any other area on quantum information,  
17 science, engineering, and technology the Adminis-  
18 trator determines necessary.

19           “(d) CONSULTATION.—In developing the strategy de-  
20 scribed in subsection (c), the Administrator may seek  
21 input from relevant external stakeholders, including insti-  
22 tutions of higher education, industry, and nonprofit re-  
23 search organizations.

1 **“SEC. 502. NATIONAL AERONAUTICS AND SPACE ADMINIS-**  
2 **TRATION QUANTUM INSTITUTE.**

3 “(a) IN GENERAL.—Subject to the availability of ap-  
4 propriations, the Administrator of the National Aero-  
5 nautics and Space Administration, in consultation with  
6 the heads of other Federal departments and agencies, as  
7 appropriate, may carry out a program to establish an in-  
8 stitute focused on space and aeronautics applications of  
9 quantum information science, engineering, and tech-  
10 nology.

11 “(b) INSTITUTE DETAILS.—

12 “(1) COMPETITIVE, MERIT-REVIEWED PROC-  
13 ESS.—The institute under this section shall be es-  
14 tablished through a competitive, merit-reviewed proc-  
15 ess.

16 “(2) APPLICATIONS.—An eligible applicant  
17 under this section shall submit to the Administrator  
18 of the National Aeronautics and Space Administra-  
19 tion an application at such time, in such manner,  
20 and containing such information as the Adminis-  
21 trator determines to be appropriate.

22 “(3) ELIGIBLE APPLICANTS.—When admin-  
23 istering the process described in paragraph (1), the  
24 Administrator of the National Aeronautics and  
25 Space Administration shall consider applications  
26 from institutions of higher education, research cen-

1       ters, multi-institutional collaborations, and any other  
2       entity that the Administrator determines to be ap-  
3       propriate.

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

8           “(5) COORDINATION.—The Administrator of  
9       the National Aeronautics and Space Administration  
10      shall ensure an awardee under this section coordi-  
11      nates the activities carried out under this section  
12      with the National Aeronautics and Space Adminis-  
13      tration, and avoids unnecessary duplication of the  
14      existing activities of the National Aeronautics and  
15      Space Administration, other activities carried out  
16      under this Act, and other related programs, as ap-  
17      propriate.

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

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

24           “(1) support research focused on developing  
25      space and aeronautics applications for quantum in-

1 formation science, engineering, and technology, in-  
2 cluding as related to the results of the strategy  
3 under section 501(c); and

4 “(2) support quantum information science, en-  
5 gineering, and technology education and public out-  
6 reach.

7 “(d) INSTITUTE REQUIREMENTS.—To the maximum  
8 extent practicable, the institute under this section shall  
9 serve the needs of the National Aeronautics and Space Ad-  
10 ministration for the benefit of the broader United States  
11 quantum information science community, to create and  
12 develop processes for the purpose of advancing space and  
13 aeronautics applications in quantum information science,  
14 engineering, and technology, and improving the competi-  
15 tiveness of the United States.

16 “(e) INSTITUTE SELECTION AND DURATION.—

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

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

24 “(3) TERMINATION.—Consistent with the au-  
25 thorities of the National Aeronautics and Space Ad-

1       ministration, the Administrator of the National Aer-  
2       onautics and Space Administration may terminate  
3       the institute for cause during the performance pe-  
4       riod.

5       **“SEC. 503. AUTHORIZATION OF APPROPRIATIONS.**

6       “‘The Administrator of the National Aeronautics and  
7       Space Administration shall allocate up to \$25,000,000 to  
8       carry out the activities authorized in sections 501 and 502  
9       for each of fiscal years 2024 through 2028, subject to the  
10      availability of appropriations. Amounts made available to  
11      carry out sections 501 and 502 shall be derived from  
12      amounts appropriated or otherwise made available to the  
13      National Aeronautics and Space Administration.’”.

14      **SEC. 22. CLERICAL AMENDMENTS.**

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

17              (1) By inserting after the item relating to sec-  
18      tion 105 the following new item:

“Sec. 105A. International Quantum Cooperation Strategy.”.

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

“Sec. 202. National Institute of Standards and Technology Quantum Cen-  
ters.”;

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

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

“Sec. 304. Quantum testbeds.”.

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

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

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

“TITLE V—NATIONAL AERONAUTICS AND SPACE  
ADMINISTRATION QUANTUM ACTIVITIES

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

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

“Sec. 503. Authorization of appropriations.”.

