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(Original Signature of Member)

118TH CONGRESS
1ST SESSION

H. R. _____

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

IN THE HOUSE OF REPRESENTATIVES

Mr. Lucas introduced the following bill; which was 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.**

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

6 **SEC. 2. DEFINITIONS.**

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

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

8 (2) by inserting after paragraph (3) the fol-
9 lowing new paragraphs:

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

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

16 “(A) a country that is a covered nation (as
17 such term is defined in section 4872(d) of title
18 10, United States Code); and

19 “(B) any country that the Secretary of
20 Commerce, in consultation with the Secretary of
21 Defense, the Secretary of State, and the Direc-
22 tor of National Intelligence, determines to be
23 engaged in conduct that is detrimental to the
24 national security or foreign policy of the United
25 States.

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

4 “(A) designated as a foreign terrorist orga-
5 nization by the Secretary of State under section
6 219(a) of the Immigration and Nationality Act
7 (8 U.S.C. 1189(a));

8 “(B) included on the list of specially des-
9 ignated nationals and blocked persons main-
10 tained by the Office of Foreign Assets Control
11 of the Department of the Treasury (commonly
12 known as the ‘SDN list’);

13 “(C) owned by, controlled by, or subject to
14 the jurisdiction or direction of a government of
15 a foreign country that is a covered nation (as
16 such term is defined in section 4872 of title 10,
17 United States Code);

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

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

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

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

4 “(iv) the Arms Export Control Act
5 (22 U.S.C. 2751 et seq.);

6 “(v) section 224, 225, 226, 227, or
7 236 of the Atomic Energy Act of 1954 (42
8 U.S.C. 2274, 2275, 2276, 2277, and
9 2284);

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

12 “(vii) the International Emergency
13 Economic Powers Act (50 U.S.C. 1701 et
14 seq.); or

15 “(E) determined by the Secretary of Com-
16 merce, in consultation with the Secretary of De-
17 fense and the Director of National Intelligence,
18 to be engaged in unauthorized conduct that is
19 detrimental to the national security or foreign
20 policy of the United States.”;

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

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

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

5 (5) by inserting after paragraph (9), as so re-
6 designated, the following new paragraphs:

7 “(10) QUANTUM APPLICATIONS.—The term
8 ‘quantum applications’ means applications that use
9 quantum information science engineering and tech-
10 nology, including quantum algorithms and software,
11 quantum computing and quantum-classical hybrids,
12 quantum sensing, quantum networking, quantum
13 encryption, or quantum communications applica-
14 tions.

15 “(11) QUANTUM COMPUTING.—The term ‘quan-
16 tum computing’ means any of a variety of quantum
17 computing technologies, including quantum anneal-
18 ing and quantum gate-model systems that utilize a
19 variety of qubit architectures, such as super-
20 conducting, ion traps, photonics, neutral atoms, spin
21 atoms, or spin electrons.”;

22 (6) by amending paragraph (12), as so redesign-
23 ated, to read as follows:

24 “(12) QUANTUM INFORMATION SCIENCE, TECH-
25 NOLOGY, AND ENGINEERING.—The term ‘quantum

1 information science, technology, and engineering’
2 means the understanding, translation, use, or appli-
3 cation of the laws of quantum physics for the stor-
4 age, transmission, manipulation, computing, simula-
5 tion, or measurement of information.”; and

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

8 “(14) STEM.—The term ‘STEM’ means the
9 academic and professional disciplines of science,
10 technology, engineering, and mathematics, including
11 computer science.”.

12 **SEC. 3. PURPOSES.**

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

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

18 (2) in paragraph (1)—

19 (A) in the matter preceding subparagraph
20 (A), by striking “science and technology” and
21 inserting “science, engineering, and tech-
22 nology”;

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

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

8 (C) in subparagraph (B), by striking
9 “science at the” and inserting “science, engi-
10 neering, and technology at the primary, sec-
11 ondary,”;

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

14 (E) in subparagraph (D)—

15 (i) by striking “science and tech-
16 nology” and inserting “science, engineer-
17 ing, and technology”; and

18 (ii) by striking “and” after the semi-
19 colon;

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

22 (G) by adding at the end the following new
23 subparagraph:

24 “(F) to support development of quantum
25 applications, including quantum-hybrid applica-

1 tions, to promote innovation and commercializa-
2 tion.”;

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

6 (4) in paragraph (3), by striking “science and
7 technology” and inserting “science, engineering, and
8 technology”;

9 (5) in paragraph (4)—

10 (A) by inserting “National Laboratories,”
11 after “Federal laboratories,”; and

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

13 (6) in paragraph (5)—

14 (A) in the matter preceding subparagraph

15 (A)—

16 (i) by inserting “partnerships, re-
17 search collaborations, and” after “inter-
18 national”; and

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

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

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

1 (D) by adding at the end the following new
2 subparagraph:

3 “(C) to facilitate cooperative investment in
4 quantum capabilities between the United States
5 and its allies and partners to strengthen and se-
6 cure the domestic supply chain and related eco-
7 system; and”;

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

10 “(6) improving the maturity, scale, and short-
11 and long-term viability of the quantum technology
12 industry and commercialization of domestic quantum
13 capacity across modalities.”.

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

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

17 (1) in paragraph (1)—

18 (A) by striking “development” and insert-
19 ing “research development, and near- and me-
20 dium-term, and long-term demonstration”;

21 (B) by striking “information science and
22 technology”;

23 (2) in paragraph (2)—

24 (A) by striking “fundamental”;

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

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

6 (3) in paragraph (3)—

7 (A) by inserting “and retain” after “to de-
8 velop”; and

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

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

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

1 and activities conducted at any Federal laboratory;”;

2 and

3 (5) in paragraph (5)—

4 (A) by striking “industry and universities”

5 and inserting “industry, universities, and stra-

6 tegic allies”; and

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

8 sources” after “resources”.

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

10 Section 102 of the National Quantum Initiative Act

11 (15 U.S.C. 8812) is amended—

12 (1) in subsection (a)(2)—

13 (A) in subparagraph (A)—

14 (i) by inserting “who shall be” before

15 “appointed”; and

16 (ii) by inserting “, and who shall serve

17 a four year term, subject to renewal” be-

18 fore the semicolon; and

19 (B) by amending subparagraph (B) to read

20 as follows:

21 “(B) staff comprised of employees detailed

22 from the Federal departments and agencies

23 specified in section 103(b).”; and

24 (2) in subsection (b)—

1 (A) in paragraph (3), by striking “science
2 and technology” and inserting “science, engi-
3 neering, and technology research and work-
4 force”; and

5 (B) by amending paragraph (4) to read as
6 follows:

7 “(4) ensure coordination among the collabo-
8 rative ventures or consortia established under this
9 Act;”.

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

12 Section 103 of the National Quantum Initiative Act
13 (15 U.S.C. 8813) is amended—

14 (1) in subsection (b)—

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

17 (B) by redesignating paragraph (9) as
18 paragraph (13); and

19 (C) by inserting after paragraph (8) the
20 following new paragraphs:

21 “(9) the Department of Health and Human
22 Services;

23 “(10) the Department of State;

24 “(11) the Department of Homeland Security;

1 “(12) the National Oceanic and Atmospheric
2 Administration; and”;

3 (2) in subsection (d)—

4 (A) in paragraph (1), by striking “the
5 quantum information science and technology re-
6 search” and inserting “quantum information
7 science, engineering, and technology research
8 and quantum application development, dem-
9 onstration, and commercialization”;

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

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

14 (D) in paragraph (6)—

15 (i) by striking “science and tech-
16 nology” and inserting “science, engineer-
17 ing, and technology”; and

18 (ii) by striking “and” after the semi-
19 colon;

20 (E) in paragraph (7)—

21 (i) by inserting “, technology, and en-
22 gineering” after “science”; and

23 (ii) by striking the period and insert-
24 ing “; and”; and

1 (F) by adding at the end the following new
2 paragraph:

3 “(8) facilitate interagency partnership opportu-
4 nities to advance quantum applications related to en-
5 vironment, biotechnology, space, and other sectors.”;
6 and

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

10 **SEC. 7. NATIONAL QUANTUM INITIATIVE ADVISORY COM-
11 MITTEE.**

12 Section 104 of the National Quantum Initiative Act
13 (15 U.S.C. 8814) is amended—

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

16 “(b) **QUALIFICATIONS.**—The Advisory Committee
17 shall consist of members, appointed by the President, who
18 are—

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

22 “(2) qualified to provide advice and information
23 on quantum information science, engineering, and
24 technology research, development, demonstrations,
25 standards, STEM education, technology transfer,

1 commercial application, or national security and eco-
2 nomic concerns.”;

3 (2) in subsection (d)(2)—

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

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

10 (C) by inserting after subparagraph (C)
11 the following new subparagraph:

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

15 (D) in subparagraph (E), as so redesign-
16 ated—

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

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

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

4 (F) in subparagraph (G), as so redesign-
5 nated, by striking “open standards for, quan-
6 tum information science and technology; and”
7 and inserting “international standards in open
8 and transparent standardization systems for
9 quantum information science, engineering, and
10 technology;”;

11 (G) in subparagraph (H), as so redesign-
12 nated—

13 (i) by inserting “educational,” after
14 “legal,”; and

15 (ii) by striking the period and insert-
16 ing “; and”; and

17 (H) by adding at the end the following new
18 subparagraphs:

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

24 “(J) the degree to which quantum infor-
25 mation science, engineering, and technology is

1 enhancing or can enhance the capabilities of the
2 United States advanced industrial economy and
3 protect or optimize critical infrastructure (as
4 such term is defined in section 1016(e) of Pub-
5 lic Law 107–56 (42 U.S.C. 5195c(e))).”;

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

8 (4) by amending subsection (g) to read as fol-
9 lows:

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

16 **SEC. 8. SUBCOMMITTEE ON THE ECONOMIC AND SECURITY**
17 **IMPLICATIONS OF QUANTUM INFORMATION**
18 **SCIENCE.**

19 Section 105 of the National Quantum Initiative Act
20 (15 U.S.C. 8814a) is amended—

21 (1) in subsection (b)—

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

24 (B) by redesignating paragraph (11) as
25 paragraph (14); and

1 (C) by inserting after paragraph (10) the
2 following new paragraphs:

3 “(11) the Department of Health and Human
4 Services;

5 “(12) the Department of State;

6 “(13) the National Aeronautics and Space Ad-
7 ministration; and”;

8 (2) in subsection (c)—

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

12 (B) in paragraph (3), by inserting “, or
13 supply chains” after “investments”;

14 (C) in paragraph (5)—

15 (i) by inserting “and engineering”
16 after “quantum information science”; and

17 (ii) by inserting “any” before “export
18 controls”;

19 (D) in paragraph (6), by striking “infor-
20 mation science” and inserting “information
21 science, engineering, and technology”;

22 (E) in paragraph (7), by striking “and”
23 after the semicolon;

24 (F) in paragraph (8)—

1 (i) by striking “information science”
2 and inserting “information science, engi-
3 neering, and technology”; and

4 (ii) by striking the period and insert-
5 ing a semicolon; and

6 (G) by adding at the end the following new
7 paragraphs:

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

17 “(10) recommend strategies for attracting and
18 retaining students and scholars with expertise in
19 quantum related fields to Federal departments and
20 agencies.”.

21 **SEC. 9. INTERNATIONAL QUANTUM COOPERATION STRAT-**
22 **EGY.**

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

1 **“SEC. 105A. INTERNATIONAL QUANTUM COOPERATION**
2 **STRATEGY.**

3 “(a) STRATEGY REQUIRED.—Not later than one year
4 after the date of the enactment of this section, the Direc-
5 tor of the Office of Science and Technology Policy, in con-
6 sultation with the Secretary of Commerce, the Secretary
7 of State, the Secretary of Energy, the Director of the Na-
8 tional Science Foundation, and the heads of other Federal
9 agencies, as appropriate, shall develop and submit to the
10 Committee on Commerce, Science, and Transportation,
11 the Committee on Energy and Natural Resources, and the
12 Committee on Foreign Relations of the Senate, and the
13 Committee on Science, Space, and Technology and the
14 Committee on Foreign Affairs of the House of Representa-
15 tives a strategy to—

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

25 “(2) ensure continued United States participa-
26 tion in bilateral and multilateral efforts to advance

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

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

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

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

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

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

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

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

3 “(3) Efforts and plans to address risks of the
4 national security and economic interest of the
5 United States during development and deployment
6 of quantum technologies worldwide, including plans
7 for diplomatic engagement with allies and partners,
8 and other countries.

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

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

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

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

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

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

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

12 **SEC. 10. SUNSET.**

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

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

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

21 Section 201 of the National Quantum Initiative Act
22 (15 U.S.C. 8831) is amended—

23 (1) in subsection (a)—

24 (A) in paragraph (1)—

1 (i) by striking “basic and applied”;
2 and

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

6 (B) in paragraph (2)—

7 (i) by inserting “attract, educate,
8 and” before “train”; and

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

12 (C) by amending paragraph (4) to read as
13 follows:

14 “(4) shall carry out research, development, and
15 demonstration projects, as appropriate to facilitate
16 the development and standardization of quantum
17 networking, communications, computing, metrology,
18 and sensing technologies and quantum applica-
19 tions;”.

20 (D) by redesignating paragraphs (5), (6),
21 and (7) as paragraphs (7), (8), and (10), re-
22 spectively;

23 (E) by inserting the following after para-
24 graph (4) the following new paragraphs:

1 “(5) shall carry out research to support the
2 measurement of comparative performance and
3 progress of quantum technologies, including, as
4 practicable, technology readiness assessments of
5 quantum technologies;

6 “(6) shall promote United States participation
7 in international standards organizations related to
8 quantum information science, technology, and engi-
9 neering;”;

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

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

14 (i) by striking “and engineering; and”
15 and inserting “, engineering, and tech-
16 nology and expanding the domestic STEM
17 workforce;”; and

18 (ii) by striking “and” after the semi-
19 colon; and

20 (H) by inserting after paragraph (8) the
21 following the following new paragraph:

22 “(9) shall establish such infrastructure as is
23 necessary to advance the research program described
24 in this section; and”;

25 (2) in subsection (b)—

- 1 (A) in paragraph (1)—
- 2 (i) by striking “future” and inserting
- 3 “research”; and
- 4 (ii) by striking “science and tech-
- 5 nology” and inserting “science, engineer-
- 6 ing, and technology”;
- 7 (B) in paragraph (2)—
- 8 (i) by amending subparagraph (A) to
- 9 read as follows:
- 10 “(A) to gather and assess information on
- 11 the quantum industry to address the needs
- 12 identified in paragraph (1);”;
- 13 (ii) by striking subparagraphs (B) and
- 14 (C) and inserting the following new sub-
- 15 paragraphs:
- 16 “(B) to provide recommendations regard-
- 17 ing how the National Institute of Standards
- 18 and Technology, the Program, and other
- 19 agencies, as appropriate, can address the gaps in
- 20 the necessary research identified in subpara-
- 21 graph (B) and accelerate real-world uses of
- 22 quantum information science, engineering, and
- 23 technology;
- 24 “(C) to identify enabling technologies and
- 25 the relevant supply chain essential to foster re-

1 search and industrial competitiveness in quan-
2 tum information science, engineering, and tech-
3 nology, and communicate findings to Federal
4 agencies and other domestic and international
5 stakeholders; and

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

10 (C) in paragraph (3)—

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

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

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

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

1 (3) by striking subsection (c) and inserting the
2 following new subsections:

3 “(c) INTERNATIONAL QUANTUM RESEARCH AND ME-
4 TROLOGY.—

5 “(1) IN GENERAL.—The Secretary of Com-
6 merce, in coordination with the Secretary of State
7 and the Director of the National Science Founda-
8 tion, and acting through the Director of the Na-
9 tional Institute of Standards and Technology, shall
10 promote, establish, and support international quan-
11 tum information science, engineering, and tech-
12 nology research, metrology research, and standard-
13 ization, as appropriate, to enhance international co-
14 operation, meet United States obligations or commit-
15 ments , and support United States engagement in
16 international standards for quantum information
17 science, engineering, and technology.

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

25 “(3) RESTRICTIONS.—

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

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

18 “(d) FUNDING.—Of the funds authorized to be ap-
19 propriated for the National Institute of Standards and
20 Technology pursuant to section 10211 of the Research
21 and Development, Competition, and Innovation Act (Pub-
22 lic Law 117–167) for scientific and technical research and
23 services laboratory activities, there is authorized to be ap-
24 propriated to the Director of the National Institute of

1 Standards and Technology to carry out this section up to
2 \$85,000,000 for each of fiscal years 2024 through 2027.”.

3 **SEC. 12. NATIONAL INSTITUTE OF STANDARDS AND TECH-**
4 **NOLOGY QUANTUM CENTERS.**

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

7 **“SEC. 202. NATIONAL INSTITUTE OF STANDARDS AND**
8 **TECHNOLOGY QUANTUM CENTERS.**

9 “(a) ESTABLISHMENT.—

10 “(1) IN GENERAL.—Subject to the availability
11 of appropriations, the Director of the National Insti-
12 tute of Standards and Technology, in consultation
13 with the heads of other Federal departments and
14 agencies, as appropriate, shall establish and operate
15 at least one, but not more than three, centers to ac-
16 celerate research, development, deployment, and
17 standardization of quantum information science, en-
18 gineering, and technology.

19 “(2) PROGRAM DETAILS.—

20 “(A) COMPETITIVE, MERIT-REVIEWED
21 PROCESS.—The centers shall be established
22 through a competitive, merit-reviewed process.

23 “(B) APPLICATIONS.—An eligible applicant
24 described in subparagraph (C) shall submit to
25 the Director of the National Institute of Stand-

1 ards and Technology an application at such
2 time, in such manner, and containing such in-
3 formation as the Director determines to be ap-
4 propriate.

5 “(C) ELIGIBLE APPLICANTS.—Eligible ap-
6 plicants described in this subparagraph are the
7 following:

8 “(i) Institutions of higher education.

9 “(ii) Nonprofit organizations.

10 “(iii) Multi-institutions collaborations.

11 “(iv) Any other entity the Director de-
12 termines appropriate.

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

18 “(A) Quantum sensing and measurement.

19 “(B) Quantum engineering.

20 “(b) REQUIREMENTS.—To the maximum extent
21 practicable, centers developed, constructed, operated, or
22 maintained under this section shall serve the mission of
23 the National Institute of Standards and Technology, for
24 the benefit of the broader United States quantum infor-

1 mation science community, to create and develop processes
2 for the following purposes—

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

6 “(2) Advancing technology transfer.

7 “(3) Improving the competitiveness of the
8 United States.

9 “(c) COLLABORATIONS.—A collaboration that re-
10 ceives an award under this section may include multiple
11 types of research institutions, private sector entities, Fed-
12 eral laboratories, and nonprofit organizations.

13 “(d) COORDINATION.—The Director of the National
14 Institute of Standards and Technology shall ensure award-
15 ees coordinate, and avoid unnecessary duplication of, the
16 activities carried out under this section with existing ac-
17 tivities of the Institute, other activities carried out under
18 this Act, and other related programs, as appropriate.

19 “(e) SELECTION AND DURATION.—

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

23 “(2) REAPPLICATION.—An awardee may re-
24 apply for an additional subsequent period of five
25 years following a successful, merit-based review.

1 “(3) **TERMINATION.**—Consistent with the au-
2 thorities of the National Institute of Standards and
3 Technology, the Director of the National Institute of
4 Standards and Technology may terminate an under-
5 performing center for cause during the performance
6 period.

7 “(f) **FUNDING.**—The Director of the National Insti-
8 tute of Standards and Technology shall allocate up to
9 \$18,000,000 for each Center supporter under this section
10 for each of fiscal years 2024 through 2028, subject to the
11 availability of appropriations. Amounts made available to
12 carry out this section shall be derived from amounts ap-
13 propriated or otherwise made available to the National In-
14 stitute of Standards and Technology.”.

15 **SEC. 13. NATIONAL SCIENCE FOUNDATION QUANTUM IN-**
16 **FORMATION SCIENCE RESEARCH AND EDU-**
17 **CATION ACTIVITIES.**

18 Section 301 of the National Quantum Initiative Act
19 (15 U.S.C. 8841) is amended—

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

22 (2) in subsection (a)—

23 (A) by striking “basic”; and

1 (B) by striking “science and engineering”
2 and inserting “science, engineering, and tech-
3 nology”;
4 (3) in subsection (b)—
5 (A) in paragraph (1)—
6 (i) in subparagraph (A)—
7 (I) by striking “basic”; and
8 (II) by striking “science and en-
9 gineering” and inserting “science, en-
10 gineering, and technology”; and
11 (ii) in subparagraph (B)—
12 (I) by striking “human re-
13 sources” and inserting “education and
14 workforce”; and
15 (II) by striking “science and en-
16 gineering” and inserting “science, en-
17 gineering, and technology”; and
18 (B) in paragraph (2)—
19 (i) in subparagraph (A)—
20 (I) in clause (i)—
21 (aa) by striking “science and
22 engineering” and inserting
23 “science, engineering, and tech-
24 nology”;

- 1 (bb) by inserting “K–12, vo-
2 cational,” before “under-
3 graduate”; and
- 4 (cc) by striking “and” after
5 the semicolon;
- 6 (II) in clause (ii), by inserting
7 “and” after the semicolon; and
- 8 (III) by adding at the end the
9 following new clause:
- 10 “(iii) to pursue basic and use inspired
11 research at the frontiers of quantum infor-
12 mation science, engineering, and tech-
13 nology, and explore solutions to important
14 challenges for the development, application,
15 and commercialization of quantum tech-
16 nologies;”;
- 17 (ii) in subparagraph (B), by striking
18 “science and engineering” and inserting
19 “science, engineering, and technology”;
20 and
- 21 (iii) in subparagraph (C), by striking
22 “science and engineering” and inserting
23 “science, engineering, and technology”;
- 24 (iv) in subparagraph (D), by striking
25 “and” after the semicolon;

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

3 (vi) by adding at the end the following
4 new subparagraph:

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

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

12 “(c) STUDENT TRAINEESHIPS, FELLOWSHIPS, AND
13 OTHER MODELS.—

14 “(1) IN GENERAL.—The Director of the Na-
15 tional Science Foundation, in consultation with
16 heads of agencies the Director considers appropriate,
17 shall award grants to institutions of higher edu-
18 cation or eligible nonprofit organizations (or con-
19 sortia thereof) to increase capacity and broaden par-
20 ticipation, including through provisioning of experi-
21 ential opportunities, where appropriate, in quantum
22 information science, engineering, and technology and
23 other related disciplines.

24 “(2) QUANTUM TRAINEESHIPS.—The Director
25 of the National Science Foundation may establish or

1 use existing programs to make awards to institu-
2 tions of higher education or nonprofit organizations
3 (or consortia thereof) to provide traineeships to
4 graduate students at institutions of higher education
5 within the United States who are citizens of the
6 United States and who choose or plan to pursue
7 masters or doctoral degrees in quantum information
8 science, engineering, and technology, or related
9 fields, and by providing students with opportunities
10 for research experiences in government or industry
11 related to such students' quantum studies.

12 “(3) QUANTUM FELLOWSHIPS AND SCHOLAR-
13 SHIPS.—

14 “(A) IN GENERAL.—The Director of the
15 National Science Foundation may establish or
16 use existing programs to support fellowships
17 and scholarships for students at institutions of
18 higher education for the purpose of increasing
19 quantum information science, engineering, and
20 technology exposure for undergraduate and
21 graduate STEM students and increasing post-
22 graduation employment opportunities for
23 STEM students.

1 “(B) REQUIREMENTS.—Eligible partici-
2 pants in the fellowship and scholarship program
3 shall—

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

7 “(ii) have taken at least one quantum-
8 science or quantum-relevant course as part
9 of their degree programs.

10 “(C) CONSIDERATIONS.—Eligible fellow-
11 ships and scholarships may include temporary
12 quantum-related positions at State or Federal
13 agencies, national laboratories, private sector
14 businesses, universities, Multidisciplinary Cen-
15 ters for Quantum Research and Education as
16 established in section 402, or other quantum-
17 relevant entities, as determined appropriate by
18 the Director.

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

1 cant for direct or indirect costs as estimated by
2 the fellowship sponsor.

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 pursu-
10 ant to section 514 of the America COMPETES Re-
11 authorization Act of 2021 (42 U.S.C. 1862p–6).

12 “(5) PARTNERSHIPS.—In carrying out the ac-
13 tivities under this section, the Director of the Na-
14 tional Science Foundation shall encourage awardees
15 to partner with relevant Federal agencies, Federal
16 laboratories, industry and other private sector orga-
17 nizations, and nonprofit organizations to facilitate
18 the expansion of workforce pathways and hands-on
19 learning experiences.”;

20 (5) in subsection (d)—

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

23 (B) in paragraph (1)—

24 (i) by striking “information science
25 and engineering (referred to in this sub-

1 section as ‘QISE’” and inserting “infor-
2 mation science, engineering, and tech-
3 nology”; and

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

6 (C) in paragraph (2)—

7 (i) in subparagraph (A), by striking
8 “QISE” and inserting “quantum informa-
9 tion science, engineering, and technology”;

10 (ii) in subparagraph (D), by inserting
11 “, engineering, and technology” after
12 “science”;

13 (iii) by redesignating subparagraphs
14 (E) and (F) as subparagraphs (F) and
15 (H), respectively;

16 (iv) by inserting after subparagraph
17 (D) the following new subparagraph:

18 “(E) Informal education methods to en-
19 hance experiences of students of all ages with
20 quantum information science, engineering, and
21 technology concepts and applications.”;

22 (v) by inserting after subparagraph
23 (F), as so redesignated, the following new
24 subparagraph:

1 “(G) Methods to introduce security and
2 other potential societal dimensions associated
3 with quantum information science, engineering,
4 and technology into STEM curricula.”; and

5 (vi) in subparagraph (H), as so reded-
6 igned—

7 (I) by inserting “, engineering,
8 and technology” after “science”; and

9 (II) by inserting “of the Re-
10 search and Development, Competition,
11 and Innovation Act (42 U.S.C.
12 19261(d))” after “section 10661 of
13 the Research and Development, Com-
14 petition, and Innovation Act”;

15 (D) in paragraph (3), by striking “QISE”
16 and inserting “quantum information science,
17 engineering, and technology”; and

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

19 (6) by adding at the end the following new sub-
20 sections:

21 “(e) INTERNATIONAL RESEARCH ON QUANTUM IN-
22 FORMATION SCIENCE, ENGINEERING, AND TECH-
23 NOLOGY.—

24 “(1) IN GENERAL.—The Director of the Na-
25 tional Science Foundation, in coordination with the

1 Secretary of State and the Secretary of Commerce,
2 shall promote, establish, and support international
3 quantum information science, engineering, and tech-
4 nology research, as appropriate, to enhance inter-
5 national cooperation and meet United States obliga-
6 tions or commitments, including as part of the terms
7 and conditions of bilateral or multilateral quantum
8 information science, engineering, and technology re-
9 search agreements.

10 “(2) ALIGNMENT.—In carrying out this sub-
11 section, the Director of the National Science Foun-
12 dation shall ensure alignment with the national
13 Quantum Information Strategy or successor strate-
14 gies.

15 “(3) PRIORITY.—The Directors shall prioritize
16 research programs with countries that have signed
17 Quantum Cooperation Statement with the United
18 States.

19 “(4) RESTRICTIONS.—

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

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

3 “(B) FOREIGN COUNTRY OF CONCERN AND
4 FOREIGN ENTITY OF CONCERN.—None of the
5 funds made available under this section may be
6 obligated or expended to promote, establish, or
7 finance quantum research activities between a
8 United States entity and a foreign country of
9 concern or foreign entity of concern.

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

18 **SEC. 14. MULTIDISCIPLINARY CENTERS FOR QUANTUM RE-**
19 **SEARCH AND EDUCATION.**

20 Section 302 of the National Quantum Initiative Act
21 (15 U.S.C. 8842) is amended—

22 (1) in subsection (a)—

23 (A) by striking “in consultation with other
24 Federal departments and agencies,”; and

25 (B) by striking “5” and inserting “10”;

1 (2) in subsection (c)—

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

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

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

12 (3) in subsection (d)(2)—

13 (A) in subparagraph (A), by striking
14 “quantum science” and inserting “quantum in-
15 formation science, engineering, and tech-
16 nology,”;

17 (B) in subparagraph (C), by inserting “,
18 including how each participant will develop and
19 implement outreach activities to increase the
20 participation of women and other students from
21 groups historically underrepresented in STEM”
22 before the semicolon;

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

1 (D) in subparagraph (E), by striking the
2 period and inserting “; and”; and .

3 (E) by adding at the end the following new
4 subparagraph:

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

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

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

17 (5) in subsection (f)—

18 (A) by striking “established” and inserting
19 “supported”; and

20 (B) by striking “2019 through 2023” and
21 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 Consortium established
18 pursuant to subsection (a) shall include not fewer than
19 four institutions of higher education, including not fewer
20 than two community colleges, and may include career and
21 technical schools, nonprofit organizations, and private sec-
22 tor entities.

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 and maintenance of a publicly acces-
3 sible online portal.

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

11 “(6) 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 “(7) Developing, testing, implementing, and co-
17 ordinating career development programs and strate-
18 gies for pre-university and university educators for
19 the purpose of increasing the number of quantum-
20 informed educators at all levels of education, includ-
21 ing by carrying out the following:

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

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

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

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

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

13 “(8) 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 education capacity or readiness of the pipeline.
19 Such activities shall complement or align with, as
20 relevant, authorized quantum and STEM workforce
21 studies under section 10661(d) of the Research and
22 Development, Competition, and Innovation Act (42
23 U.S.C. 19261(d)).

24 “(9) Facilitating public education and outreach
25 activities to enhance the understanding and aware-

1 ness of quantum information science, engineering,
2 and technology to a boarder community to satisfy
3 broader impact requirements of award applications.

4 “(10) Encouraging coordination on quantum
5 education in the broader STEM community.

6 “(e) QREW QUANTUM FELLOWSHIP PROGRAM.—

7 Subject to the restrictions outlined in subsection (c)(2) of
8 section 401, the Hub may establish and administer a pro-
9 gram to 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)(4).

17 “(f) INDUSTRY COORDINATION.—The Hub shall col-
18 laborate with the Quantum Economic Development Con-
19 sortium established in section 301 or other industry con-
20 sortia to identify, publish, facilitate, or enable quantum-
21 related education and workforce development opportuni-
22 ties as described in subsections (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 to share
10 expertise in integrating quantum information
11 science, engineering, and technology into existing
12 STEM programs and other relevant fields and dis-
13 ciplines.

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.

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

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

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

16 “(j) FUNDING.—

17 “(1) IN GENERAL.—The Director of the Na-
18 tional Science Foundation shall allocate up to
19 \$10,000,000 for the Hub for each of fiscal years
20 2024–2028, subject to the availability of appropria-
21 tions.

22 “(2) SOURCE.—Amounts made available to
23 carry out this section shall be derived from amounts
24 appropriated or otherwise made available to the Na-
25 tional Science Foundation.

1 **“SEC. 304. QUANTUM TESTBEDS.**

2 “(a) IN GENERAL.—The Director of the National
3 Science Foundation, in coordination with the Director of
4 the National Institute of Standards and Technology, the
5 Secretary of Energy, and the heads of other Federal agen-
6 cies, as determined appropriate by the Director of the Na-
7 tional Science Foundation, shall make awards on a com-
8 petitive, merit-reviewed basis to institutions of higher edu-
9 cation, nonprofit organizations, or consortia thereof, to es-
10 tablish and operate testbeds for quantum applications re-
11 search and development.

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

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

24 “(1) How the applicant will assemble a work-
25 force, including from populations that are histori-

1 cally underrepresented in STEM, with the skills
2 needed to operate a quantum testbed.

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

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

8 “(d) ROLES AND RESPONSIBILITIES.—The Director
9 of the National Science Foundation shall be responsible
10 for the following:

11 “(1) Maintaining a record of notable outcomes
12 from each quantum testbed established under this
13 section.

14 “(2) Partnering with other Federal agencies to
15 enable opportunities for quantum testbed outcomes
16 to be appropriately taken up by such agencies in
17 alignment with the missions of such agencies.

18 “(3) Not later than one year after the date of
19 the enactment of this section and every two years
20 thereafter until December 31, 2030, briefing the ap-
21 propriate committees of Congress on the success of
22 such quantum testbeds and providing recommenda-
23 tions for improving such quantum testbeds.

24 “(e) COORDINATION.—In establishing quantum
25 testbeds under this section, the Director of the National

1 Science Foundation shall ensure coordination with other
2 testbeds and other quantum facilities hosting Federal
3 quantum technology and infrastructure supported by the
4 National Science Foundation, including those authorized
5 pursuant to section 10390 of the Research and Develop-
6 ment, Competition, and Innovation Act (Public Law 117-
7 167; 42 U.S.C. 10990), or by other Federal agencies as
8 determined appropriate by the Director, to avoid duplica-
9 tion and maximize use of Federal resources.

10 “(f) STAKEHOLDER COLLABORATION.—In carrying
11 out this section, the Director of the National Science
12 Foundation shall collaborate with the Quantum Economic
13 Development Consortium established pursuant to section
14 301 to accomplish the purposes of the quantum testbeds
15 program described in paragraph (b) and ensure there is
16 strong collaboration with industry stakeholders. The Di-
17 rector may also engage with National Laboratories, feder-
18 ally funded research and development centers, industry,
19 and other members of the United States quantum eco-
20 system.

21 “(g) GEOGRAPHIC DIVERSITY.—The Director shall
22 ensure regional and geographic diversity in issuing awards
23 under this section.

24 “(h) FUNDING.—

1 “(1) IN GENERAL.—The Director of the Na-
2 tional Science Foundation shall allocate up to
3 \$50,000,000 for the establishment and operation of
4 quantum testbeds under this section for each fiscal
5 years 2024 through 2028, subject to the availability
6 of appropriations.

7 “(2) SOURCE.—Amounts made available to
8 carry out this section shall be derived from amounts
9 appropriated or otherwise made available to the Na-
10 tional Science Foundation.”.

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

13 Section 401 of the National Quantum Initiative Act
14 (15 U.S.C. 8851) is amended—

15 (1) by amending subsection (a) to read as fol-
16 lows:

17 “(a) IN GENERAL.—The Secretary of Energy shall
18 carry out a research, development, and demonstration pro-
19 gram on quantum information science, engineering, and
20 technology.”;

21 (2) in subsection (b)—

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

1 (B) by redesignating paragraphs (3), (4),
2 and (5) as paragraphs (5), (6), and (7), respec-
3 tively;

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

6 “(3) operate National Quantum Information
7 Science Research Centers to accelerate and scale up
8 scientific and technical breakthroughs in quantum
9 information science, engineering, and technology,
10 and maintain state-of-the-art infrastructure for
11 quantum researchers and industry partners, in ac-
12 cordance with section 202;

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

19 “(A) quantum information theory;

20 “(B) quantum physics;

21 “(C) quantum computational science, in-
22 cluding hardware and software, including artifi-
23 cial intelligence, machine learning and data
24 science;

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

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

6 “(F) quantum sensing and detection;

7 “(G) materials science and engineering;

8 “(H) quantum modeling and simulation,
9 including molecular modeling;

10 “(I) near- and long-term application devel-
11 opment in a range of areas as determined by
12 the Secretary, such as materials discovery, cy-
13 bersecurity, energy storage and electric grid
14 management, financial modeling, energy stor-
15 age, traffic optimization, and improved weather
16 climate forecasting;

17 “(J) quantum chemistry;

18 “(K) quantum biology;

19 “(L) superconductive and high-perform-
20 ance microelectronics; and

21 “(M) quantum security technologies;”;

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

24 “(5) provide research experiences and training
25 for additional undergraduate and graduate students

1 in quantum information science, engineering, and
2 technology, including in the fields specified in para-
3 graph (4);”;

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

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

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

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

11 “(F) the Office of Electricity;

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

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

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

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

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

24 “(8) leverage the collective body of knowledge
25 and data, including experience and resources from

1 existing Federal research activities and commer-
2 cially-available quantum computing hardware and
3 software to the extent practicable.”; and

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

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

17 “(1) A conceptual plan to leverage capabilities
18 and infrastructure from the exascale computing pro-
19 gram, as the Secretary of Energy determines nec-
20 essary.

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

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

1 “(4) A plan to integrate cloud access of com-
2 mercially available quantum hardware and software
3 to complement on-premises high performance com-
4 puting systems and resources consistent with section
5 404 of the CHIPS and Science Act.

6 “(d) INDUSTRY OUTREACH.—In carrying out the
7 program under subsection (a) the Secretary of Energy
8 shall support the quantum technology industry and pro-
9 mote commercialization of applications of quantum tech-
10 nology relevant to the Department’s activities by carrying
11 out the following:

12 “(1) Educating—

13 “(A) the energy industry on near term and
14 commercially available quantum technologies;
15 and

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

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

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

1 “(4) Facilitating commercialization of quantum
2 technologies from the Department of Energy na-
3 tional labs and engaging with the Quantum Eco-
4 nomic Development Consortium and other organiza-
5 tions, as applicable, to transition component tech-
6 nologies to help facilitate, as appropriate, the devel-
7 opment of a quantum supply chain.

8 “(e) FUNDING.—Of the funds authorized to be ap-
9 propriated for the Department of Energy’s Office of
10 Science in section 10102(a)(4) of the Research and Devel-
11 opment, Competition, and Innovation Act (Public Law
12 117–167), there is authorized to be appropriated to the
13 Secretary to carry out the activities under this section up
14 to \$130,000,000 for each fiscal years 2024 through
15 2027.”.

16 **SEC. 17. DOE QUANTUM INSTRUMENTATION AND FOUNDRY**
17 **PROGRAM.**

18 Title IV of the National Quantum Initiative Act (15
19 U.S.C. 8851 et seq.) is amended by inserting after section
20 401 the following new section:

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

23 “(a) IN GENERAL.—The Secretary of Energy shall
24 establish an instrumentation and infrastructure program
25 to carry out the following:

1 “(1) Maintain United States leadership in
2 quantum information science, engineering, and tech-
3 nology.

4 “(2) Develop domestic quantum supply chains.

5 “(3) Provide resources for the broader scientific
6 community.

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

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

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

1 “(d) FUNDING.—The Secretary of Energy shall allo-
2 cate up to \$25,000,000 for each of fiscal years 2024
3 through 2028 to carry out this section, subject to the
4 availability of appropriations. Amounts made available to
5 carry out this section shall be derived from amounts ap-
6 propriated or otherwise made available to the Department
7 of Energy’s Office of Science.”.

8 **SEC. 18. NATIONAL QUANTUM INFORMATION SCIENCE RE-**
9 **SEARCH CENTERS.**

10 Section 402 of the National Quantum Initiative Act
11 (15 U.S.C. 8852) is amended—

12 (1) in subsection (a)—

13 (A) in the heading, by striking “ESTAB-
14 LISHMENT” and inserting “**REAUTHORIZA-**
15 **TION**”;

16 (B) in paragraph (1)—

17 (i) by striking “establish” and insert-
18 ing “maintain”;

19 (ii) by striking “basic”;

20 (iii) by striking “science and tech-
21 nology” and inserting “science, engineer-
22 ing, and technology, expand capacity for
23 the domestic quantum workforce,”; and

24 (iv) by striking “section 401” and in-
25 serting “sections 401, 403, and 404”; and

1 (C) in paragraph (2)(C), by inserting “that
2 may include one or more commercial entities,”
3 after “collaborations,”;

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

7 (3) in subsection (c), by inserting “, engineer-
8 ing, and technology, accelerating quantum workforce
9 development,” after “science”;

10 (4) in subsection (d)(1)—

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

13 (B) by redesignating subparagraph (D) as
14 subparagraph (E); and

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

17 “(D) the Office of Technology Transitions;
18 and”;

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

21 “(2) RENEWAL.—Each Center established
22 under this section may be renewed for an additional
23 period of 5 years following a successful, merit-based
24 review and approval by the Director.”; and

25 (6) in subsection (f)—

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

3 (B) by striking “2019 through 2023” and
4 inserting “2024 through 2028”.

5 **SEC. 19. DEPARTMENT OF ENERGY QUANTUM NETWORK IN-**
6 **FRASTRUCTURE RESEARCH AND DEVELOP-**
7 **MENT PROGRAM.**

8 Section 403 of the National Quantum Initiative Act
9 (15 U.S.C. 8853) is amended—

10 (1) in subsection (a)—

11 (A) in paragraph (4)—

12 (i) by inserting “, including” after
13 “networking”; and

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

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

18 (C) by adding at the end the following new
19 paragraphs:

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

23 “(7) develop education and training pathways
24 related to quantum network infrastructure invest-

1 ments, aligned with existing programmatic invest-
2 ments by the Department of Energy.”; and

3 (2) in subsection (b)—

4 (A) in paragraph (1)—

5 (i) by redesignating subparagraphs
6 (C) and (D) as subparagraphs (D) and
7 (E), respectively; and

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

10 “(C) the Administrator of the National
11 Aeronautics and Space Administration;”;

12 (B) in paragraph (2)—

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

15 (ii) in subparagraph (E), by striking
16 “photon-based” and inserting “all applica-
17 ble modalities of”;

18 (iii) in subparagraph (F), by inserting
19 “, quantum sensors,” after “quantum re-
20 peaters”;

21 (iv) in subparagraph (G)—

22 (I) by inserting “data centers,”
23 after “repeaters;” and

24 (II) by striking “and” after the
25 semicolon;

1 (v) in subparagraph (H)—

2 (I) by striking “the quantum
3 technology stack” and inserting
4 “quantum technology modality
5 stacks”; and

6 (II) by striking “National Lab-
7 oratories in” and inserting “National
8 Laboratories such as”; and

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

11 “(I) development of quantum network and
12 entanglement distribution protocols or applica-
13 tions, including development of network stack
14 protocols and protocols enabling integration
15 with existing technologies or infrastructure; and

16 “(J) development of high efficiency room-
17 temperature photon detectors for quantum
18 photonic applications, including quantum net-
19 working and communications;”;

20 (C) in paragraph (4)—

21 (i) by striking “basic”; and

22 (ii) by striking “material” and insert-
23 ing “materials”; and

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

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

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

5 (C) by at the end the following new para-
6 graphs:

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

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

13 (3) in subsection (c)—

14 (A) by redesignating paragraphs (4), (5),
15 (6), (7), and (8) and paragraphs (5), (6), (7),
16 (8), and (9), respectively; and

17 (B) by inserting after paragraph (3) the
18 following new paragraph:

19 “(4) the National Oceanic and Atmospheric Ad-
20 ministration;”; and

21 (4) in subsection (e)—

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

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

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

3 “(6) \$38,000,000 for fiscal year 2028.”.

4 **SEC. 21. NATIONAL AERONAUTICS AND SPACE ADMINIS-**
5 **TRATION QUANTUM ACTIVITIES.**

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

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

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

15 “(a) IN GENERAL.—The Administrator of the Na-
16 tional Aeronautics and Space Administration is authorized
17 to carry out basic and applied research on quantum infor-
18 mation science, engineering, and technology.

19 “(b) COOPERATION.—In carrying out subsection (a),
20 the Administrator of the National Aeronautics and Space
21 Administration—

22 “(1) shall consider cooperative arrangements
23 with the Department of Energy and other Federal
24 Government agencies, as practicable, on areas of
25 shared benefit; and

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

4 “(c) STRATEGY.—Not later than 180 days after the
5 date of the enactment of this title, the Administrator of
6 the National Aeronautics and Space Administration shall
7 submit to the appropriate committees of Congress a strat-
8 egy for National Aeronautics and Space Administration
9 basic and applied research on quantum information
10 science, engineering, and technology. The strategy shall
11 identify resources required to support implementation of
12 the strategy, including budgets, workforce, and infrastruc-
13 ture, describe cooperative efforts with other Federal Gov-
14 ernment agencies, and address areas of research and ap-
15 plications, including the following:

16 “(1) Quantum sensing.

17 “(2) Quantum networking.

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

20 “(4) Quantum computing.

21 “(5) Science, aeronautics, and exploration-re-
22 lated applications.

23 “(6) Any other area on quantum information,
24 science, engineering, and technology the Adminis-
25 trator determines necessary.

1 “(3) ELIGIBLE APPLICANTS.—The Adminis-
2 trator of the National Aeronautics and Space Ad-
3 ministration shall consider applications from institu-
4 tions of higher education, research centers, multi-in-
5 stitutional collaborations, and any other entity that
6 the Administrator determines to be appropriate.

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

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

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

24 “(e) INSTITUTE ACTIVITIES.—The institute under
25 this section may carry out activities that—

1 “(1) support basic and applied research focused
2 on developing space and aeronautics applications for
3 quantum information science, engineering, and tech-
4 nology, including as related to the results of the
5 strategy under section 501(c); and

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

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

18 “(e) INSTITUTE SELECTION AND DURATION.—

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

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

1 “(3) **TERMINATION.**—Consistent with the au-
2 thorities of the National Aeronautics and Space Ad-
3 ministration, the Administrator of the National Aer-
4 onautics and Space Administration may terminate
5 the institute for cause during the performance pe-
6 riod.

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

8 “The Administrator of the National Aeronautics and
9 Space Administration shall allocate up to \$25,000,000 for
10 each of fiscal years 2024 through 2028 to carry out this
11 title, subject to the availability of appropriations. Amounts
12 made available to carry out this title shall be derived from
13 amounts appropriated or otherwise made available to the
14 National Aeronautics and Space Administration.”.


15 **SEC. 22. CLERICAL AMENDMENTS.**

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

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

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

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

 “Sec. 202. National Institute of Standards and Technology Quantum Centers.


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

“Sec. 303. Quantum Reskilling, Education, and Workforce (QREW) Coordination 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.”.