

115TH CONGRESS  
2D SESSION

# H. R. 6227

To provide for a coordinated Federal program to accelerate quantum research and development for the economic and national security of the United States.

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## IN THE HOUSE OF REPRESENTATIVES

JUNE 26, 2018

Mr. SMITH of Texas (for himself, Ms. EDDIE BERNICE JOHNSON of Texas, Mrs. COMSTOCK, Mr. LIPINSKI, Mr. WEBER of Texas, Ms. LOFGREN, Mr. LUCAS, Ms. ESTY of Connecticut, Mr. ROHRABACHER, Ms. BONAMICI, Mr. HULTGREN, Mr. BEYER, Mr. KNIGHT, Ms. ROSEN, Mr. BABIN, Mr. MCNERNEY, Mr. BIGGS, Mr. TONKO, Mr. MARSHALL, Mr. FOSTER, Mr. DUNN, Mr. TAKANO, Mr. HIGGINS of Louisiana, Ms. HANABUSA, Mr. NORMAN, Mrs. LESKO, Mr. SCHWEIKERT, Mr. HURD, Mr. BROOKS of Alabama, Mr. POSEY, Mr. LOUDERMILK, and Mr. ABRAHAM) introduced the following bill; which was referred to the Committee on Science, Space, and Technology

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## A BILL

To provide for a coordinated Federal program to accelerate quantum research and development for the economic and national security of the United States.

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

3 **SECTION 1. SHORT TITLE; TABLE OF CONTENTS.**

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

6 (b) TABLE OF CONTENTS.—

- Sec. 1. Short title; table of contents.  
 Sec. 2. Definitions.  
 Sec. 3. Purposes.

TITLE I—NATIONAL QUANTUM INITIATIVE

- Sec. 101. National Quantum Initiative Program.  
 Sec. 102. National Quantum Coordination Office.  
 Sec. 103. Subcommittee on Quantum Information Science.  
 Sec. 104. National Quantum Initiative Advisory Committee.  
 Sec. 105. Sunset.

TITLE II—NATIONAL INSTITUTE OF STANDARDS AND  
 TECHNOLOGY QUANTUM ACTIVITIES

- Sec. 201. National Institute of Standards and Technology activities and quantum workshop.

TITLE III—NATIONAL SCIENCE FOUNDATION AND MULTIDISCIPLINARY CENTERS FOR QUANTUM RESEARCH AND EDUCATION

- Sec. 301. Quantum information science research and education program.  
 Sec. 302. Multidisciplinary Centers for Quantum Research and Education.

TITLE IV—DEPARTMENT OF ENERGY RESEARCH AND NATIONAL QUANTUM INFORMATION SCIENCE RESEARCH CENTERS

- Sec. 401. Quantum Information Science Research program.  
 Sec. 402. National Quantum Information Science Research Centers.  
 Sec. 403. Spending limitation.

1 **SEC. 2. DEFINITIONS.**

2 In this Act, the following definitions apply:

3 (1) **ADVISORY COMMITTEE.**—The term “Advisory Committee” means the National Quantum Initiative Advisory Committee established under section  
 4  
 5  
 6 104(a).

7 (2) **COORDINATION OFFICE.**—The term “Coordination Office” means the National Quantum Coordination Office established under section 102(a).  
 8  
 9

10 (3) **INSTITUTIONS OF HIGHER EDUCATION.**—  
 11 The term “institutions of higher education” has the

1 meaning given the term in section 101(a) of the  
2 Higher Education Act of 1965 (20 U.S.C. 1001(a)).

3 (4) PROGRAM.—The term “Program” means  
4 the National Quantum Initiative Program imple-  
5 mented under section 101(a).

6 (5) QUANTUM INFORMATION SCIENCE.—The  
7 term “quantum information science” means the  
8 storage, transmission, manipulation, or measurement  
9 of information that is encoded in systems that can  
10 only be described by the laws of quantum physics.

11 (6) SUBCOMMITTEE.—The term “Sub-  
12 committee” means the Subcommittee on Quantum  
13 Information Science of the National Science and  
14 Technology Council established under section  
15 103(a).

16 **SEC. 3. PURPOSES.**

17 The purposes of this Act are to ensure the continued  
18 leadership of the United States in quantum information  
19 science and its technology applications by—

20 (1) supporting research, development, dem-  
21 onstration, and application of quantum information  
22 science and technology in order to—

23 (A) expand the number of researchers,  
24 educators, and students with training in quan-

1           tum information science and technology to de-  
2           velop a workforce pipeline;

3           (B) promote the development and inclusion  
4           of multidisciplinary curriculum and research op-  
5           portunities for quantum information science at  
6           the undergraduate, graduate, and postdoctoral  
7           level;

8           (C) address basic research knowledge gaps;

9           (D) promote the further development of fa-  
10          cilities and centers available for quantum infor-  
11          mation science and technology research, testing  
12          and education; and

13          (E) stimulate research on and promote  
14          more rapid development of quantum-based tech-  
15          nologies;

16          (2) improving the interagency planning and co-  
17          ordination of Federal research and development of  
18          quantum information science and technology and  
19          maximizing the effectiveness of the Federal Govern-  
20          ment's quantum information science and technology  
21          research and development programs;

22          (3) promoting collaboration among government,  
23          Federal laboratories, industry, and universities; and

1           (4) promoting the development of standards for  
2           quantum information science and technology secu-  
3           rity.

4           **TITLE I—NATIONAL QUANTUM**  
5           **INITIATIVE**

6           **SEC. 101. NATIONAL QUANTUM INITIATIVE PROGRAM.**

7           The President shall implement a 10-year National  
8           Quantum Initiative Program. In carrying out the Pro-  
9           gram, the President shall, acting through appropriate  
10          Federal agencies, councils, working groups, subcommit-  
11          tees, and the Coordination Office—

12           (1) establish the goals, priorities, and metrics  
13           for a 10-year plan to accelerate development of  
14           quantum information science and technology applica-  
15           tions in the United States;

16           (2) invest in fundamental Federal quantum in-  
17           formation science and technology research, develop-  
18           ment, demonstration, and other activities to achieve  
19           the goals established in paragraph (1);

20           (3) invest in activities to develop a quantum in-  
21           formation science and technology workforce pipeline;

22           (4) provide for interagency coordination of Fed-  
23           eral quantum information science and technology re-  
24           search, development, demonstration, and other ac-  
25           tivities undertaken pursuant to the Program;

1           (5) partner with industry and academia to le-  
2           verage knowledge and resources; and

3           (6) leverage existing Federal investments effi-  
4           ciently to advance Program goals and objectives.

5 **SEC. 102. NATIONAL QUANTUM COORDINATION OFFICE.**

6           (a) ESTABLISHMENT.—The President shall establish  
7 a National Quantum Coordination Office, which shall  
8 have—

9           (1) a Director appointed by the Director of the  
10          Office of Science and Technology Policy, in consulta-  
11          tion with the Secretary of Commerce, the Director  
12          of the National Science Foundation, and the Sec-  
13          retary of Energy; and

14          (2) staff that shall be comprised of employees  
15          detailed from the Federal agencies that are members  
16          of the Subcommittee.

17          (b) RESPONSIBILITIES.—The Coordination Office  
18 shall—

19               (1) provide technical and administrative support  
20               to—

21                       (A) the Subcommittee; and

22                       (B) the Advisory Committee;

23               (2) oversee interagency coordination of the Pro-  
24               gram, including encouraging and supporting joint

1 agency solicitation and selection of applications for  
2 funding of projects under the Program;

3 (3) serve as the point of contact on Federal ci-  
4 vilian quantum information science and technology  
5 activities for Government organizations, academia,  
6 industry, professional societies, State governments,  
7 and others to exchange technical and programmatic  
8 information;

9 (4) ensure coordination between the Multidisci-  
10 plinary Centers for Quantum Research and Edu-  
11 cation established under section 302(b) and the Na-  
12 tional Quantum Information Science Research Cen-  
13 ters established under section 402(a);

14 (5) conduct public outreach, including dissemi-  
15 nation of findings and recommendations of the Advi-  
16 sory Committee, as appropriate; and

17 (6) promote access to and early application of  
18 the technologies, innovations, and expertise derived  
19 from Program activities to agency missions and sys-  
20 tems across the Federal Government, and to United  
21 States industry, including startup companies.

22 (c) FUNDING.—Funds necessary to carry out the ac-  
23 tivities of the Coordination Office shall be made available  
24 each fiscal year by the participating agencies of the Sub-

1 committee, as determined by the Director of the Office  
2 of Science and Technology Policy.

3 **SEC. 103. SUBCOMMITTEE ON QUANTUM INFORMATION**  
4 **SCIENCE.**

5 (a) ESTABLISHMENT.—The President shall establish,  
6 through the National Science and Technology Council, a  
7 Subcommittee on Quantum Information Science.

8 (b) MEMBERSHIP.—The Subcommittee shall in-  
9 clude—

10 (1) the National Institute of Standards and  
11 Technology;

12 (2) the National Science Foundation;

13 (3) the Department of Energy;

14 (4) the National Aeronautics and Space Admin-  
15 istration;

16 (5) the Department of Defense;

17 (6) the Office of the Director of National Intel-  
18 ligence;

19 (7) the Office of Management and Budget;

20 (8) the Office of Science and Technology Policy;

21 and

22 (9) any other Federal agency as considered ap-  
23 propriate by the President.

24 (c) CHAIRS.—The Subcommittee shall be jointly  
25 chaired by the Director of the National Institute of Stand-



1 ards and Technology, the Director of the National Science  
2 Foundation, and the Secretary of Energy.

3 (d) RESPONSIBILITIES.—The Subcommittee shall—

4 (1) coordinate the quantum information science  
5 and technology research and education activities and  
6 programs of the Federal agencies;

7 (2) establish goals and priorities of the Pro-  
8 gram, based on identified knowledge and workforce  
9 gaps and other national needs;

10 (3) assess and recommend Federal infrastruc-  
11 ture needs to support the Program; and

12 (4) evaluate opportunities for international co-  
13 operation with strategic allies on research and devel-  
14 opment in quantum information science and tech-  
15 nology.

16 (e) STRATEGIC PLAN.—Not later than 1 year after  
17 the date of enactment of this Act, the Subcommittee shall  
18 develop a 5-year strategic plan, and 6 years after enact-  
19 ment of the Act develop an additional 5-year strategic  
20 plan, with periodic updates as appropriate to guide the  
21 activities of the Program, meet the goals, priorities, and  
22 anticipated outcomes of the participating agencies.

23 (f) REPORTS.—The Chairs of the Subcommittee shall  
24 submit to the President, the Advisory Committee, the  
25 Committee on Science, Space, and Technology of the

1 House of Representatives, the Committee on Commerce,  
2 Science, and Transportation and the Committee on En-  
3 ergy and Natural Resources of the Senate, and other ap-  
4 propriate committees of Congress the strategic plans de-  
5 veloped under subsection (e) and any updates to such  
6 plans.

7 **SEC. 104. NATIONAL QUANTUM INITIATIVE ADVISORY COM-**  
8 **MITTEE.**

9 (a) IN GENERAL.—The President shall establish a  
10 National Quantum Initiative Advisory Committee.

11 (b) QUALIFICATIONS.—The Advisory Committee es-  
12 tablished by the President under subsection (a) shall con-  
13 sist of members from industry, academic institutions, and  
14 Federal laboratories. The President shall appoint mem-  
15 bers to the Advisory Committee who are qualified to pro-  
16 vide advice and information on quantum information  
17 science and technology research, development, demonstra-  
18 tions, education, technology transfer, commercial applica-  
19 tion, or national security and economic concerns.

20 (c) MEMBERSHIP CONSIDERATION.—In selecting an  
21 Advisory Committee, the President may seek and give con-  
22 sideration to recommendations from the Congress, indus-  
23 try, the scientific community (including the National  
24 Academy of Sciences, scientific professional societies, and

1 academia), the defense community, and other appropriate  
2 organizations.

3 (d) DUTIES.—The Advisory Committee shall advise  
4 the President and the Subcommittee and make rec-  
5 ommendations that shall be considered in reviewing and  
6 revising the Program. The Advisory Committee shall pro-  
7 vide the President and the Subcommittee with an inde-  
8 pendent assessment of—

9 (1) trends and developments in quantum infor-  
10 mation science and technology;

11 (2) progress made in implementing the Pro-  
12 gram;

13 (3) whether the Program activities, priorities,  
14 and technical goals developed by the Subcommittee  
15 are helping to maintain United States leadership in  
16 quantum information science and technology;

17 (4) the management, coordination, implementa-  
18 tion, and activities of the Program;

19 (5) the need to revise the Program;

20 (6) whether or not there are opportunities for  
21 international cooperation with strategic allies on re-  
22 search and development in quantum information  
23 science and technology; and

1           (7) whether national security, societal, eco-  
2           nomic, legal, and workforce concerns are adequately  
3           addressed by the Program.

4           (e) REPORTS.—The Advisory Committee shall report,  
5           not less frequently than once every 2 years, to the Presi-  
6           dent on the assessments required under subsection (d) and  
7           any recommendations to improve the Program. The first  
8           report under this subsection shall be submitted not later  
9           than 6 months after the date of enactment of this Act.  
10          The Director of the Office of Science and Technology Pol-  
11          icy shall transmit a copy of each report under this sub-  
12          section to the Committee on Science, Space, and Tech-  
13          nology of the House of Representatives, the Committee on  
14          Commerce, Science, and Transportation of the Senate, the  
15          Committee on Energy and Natural Resources of the Sen-  
16          ate, and other appropriate committees of the Congress.

17          (f) TRAVEL EXPENSES OF NON-FEDERAL MEM-  
18          BERS.—Non-Federal members of the Advisory Committee,  
19          while attending meetings of the Advisory Committee or  
20          while otherwise serving at the request of the head of the  
21          Advisory Committee away from their homes or regular  
22          places of business, may be allowed travel expenses, includ-  
23          ing per diem in lieu of subsistence, as authorized by sec-  
24          tion 5703 of title 5, United States Code, for individuals  
25          in the Government serving without pay. Nothing in this

1 subsection shall be construed to prohibit members of the  
2 Advisory Committee who are officers or employees of the  
3 United States from being allowed travel expenses, includ-  
4 ing per diem in lieu of subsistence, in accordance with ex-  
5 isting law.

6 (g) EXEMPTION.—The Advisory Committee shall be  
7 exempt from section 14 of the Federal Advisory Com-  
8 mittee Act (5 U.S.C. App.).

9 **SEC. 105. SUNSET.**

10 (a) IN GENERAL.—Except as provided for in sub-  
11 section (b), the authority to carry out sections 101, 102,  
12 103, and 104 shall terminate on the date that is 11 years  
13 after the date of enactment of this Act.

14 (b) EXTENSION.—The President may continue the  
15 activities under such sections if the President determines  
16 that such activities are necessary to meet national eco-  
17 nomic or national security needs.

1 **TITLE II—NATIONAL INSTITUTE**  
2 **OF STANDARDS AND TECH-**  
3 **NOLOGY QUANTUM ACTIVI-**  
4 **TIES**

5 **SEC. 201. NATIONAL INSTITUTE OF STANDARDS AND TECH-**  
6 **NOLOGY ACTIVITIES AND QUANTUM WORK-**  
7 **SHOP.**

8 (a) NATIONAL INSTITUTE OF STANDARDS AND  
9 TECHNOLOGY ACTIVITIES.—As part of the Program de-  
10 scribed in title I, the Director of the National Institute  
11 of Standards and Technology shall—

12 (1) continue to support and expand basic quan-  
13 tum information science and technology research  
14 and development of measurement and standards in-  
15 frastructure necessary to advance commercial devel-  
16 opment of quantum applications;

17 (2) use its existing programs, in collaboration  
18 with other agencies, as appropriate, to train sci-  
19 entists in quantum information science and tech-  
20 nology to increase participation in the quantum  
21 fields;

22 (3) establish or expand collaborative ventures or  
23 consortia with other public or private sector entities,  
24 including academia, National Laboratories, and in-

1 industry for the purpose of advancing the field of  
2 quantum information science and engineering; and

3 (4) have the authority to enter into and per-  
4 form such contracts, including cooperative research  
5 and development arrangements and grants and coop-  
6 erative agreements or other transactions, as may be  
7 necessary in the conduct of the work of the Institute  
8 and on such terms as the Director considers appro-  
9 priate, in furtherance of the purposes of this Act.

10 (b) QUANTUM WORKSHOP.—

11 (1) IN GENERAL.—Not later than 1 year after  
12 the date of enactment of this Act, the Director of  
13 the National Institute of Standards and Technology  
14 shall convene a workshop of stakeholders to discuss  
15 the future measurement, standards, cybersecurity,  
16 and other appropriate needs for supporting the de-  
17 velopment of a robust quantum information science  
18 and technology industry in the United States. The  
19 goals of the workshop shall be to—

20 (A) assess the current research on the  
21 issues described in this paragraph;

22 (B) evaluate the research gaps relating to  
23 such issues; and

24 (C) provide recommendations on how the  
25 National Institute of Standards and Technology

1           and the Program can address the research  
2           needs identified.

3           (2) REPORT TO CONGRESS.—Not later than 2  
4           years after the date of enactment of this Act, the  
5           Director of the National Institute of Standards and  
6           Technology shall transmit to the Committee on  
7           Science, Space, and Technology of the House of  
8           Representatives and the Committee on Commerce,  
9           Science, and Transportation of the Senate a sum-  
10          mary report containing the findings of the workshop  
11          convened under this section.

12          (c) FUNDING.—The Secretary of Commerce shall de-  
13          vote \$400,000,000 to carry out this section, which shall  
14          include \$80,000,000 for each of fiscal years 2019 through  
15          2023, subject to the availability of appropriations, to come  
16          from amounts made available for the National Institute  
17          of Standards and Technology. This section shall be carried  
18          out using funds otherwise appropriated by law after the  
19          date of enactment of this Act.



1 **TITLE III—NATIONAL SCIENCE**  
2 **FOUNDATION AND MULTI-**  
3 **DISCIPLINARY CENTERS FOR**  
4 **QUANTUM RESEARCH AND**  
5 **EDUCATION**

6 **SEC. 301. QUANTUM INFORMATION SCIENCE RESEARCH**  
7 **AND EDUCATION PROGRAM.**

8 (a) IN GENERAL.—The Director of the National  
9 Science Foundation shall carry out a basic research and  
10 education program on quantum information science and  
11 engineering.

12 (b) PROGRAM COMPONENTS.—In carrying out the  
13 program required under subsection (a), the Director of the  
14 National Science Foundation shall carry out activities that  
15 continue to support basic interdisciplinary quantum infor-  
16 mation science and engineering research, and support  
17 human resources development in all aspects of quantum  
18 information science and engineering. Such activities shall  
19 include—

20 (1) using the existing programs of the National  
21 Science Foundation, in collaboration with other Fed-  
22 eral agencies, as appropriate, to—

23 (A) improve the teaching and learning of  
24 quantum information science and engineering

1 at the undergraduate, graduate, and post-  
2 graduate levels; and

3 (B) increase participation in the quantum  
4 fields, including by individuals identified in sec-  
5 tions 33 and 34 of the Science and Engineering  
6 Equal Opportunities Act (42 U.S.C. 1885a; 42  
7 U.S.C. 1885b);

8 (2) formulating goals for quantum information  
9 science and engineering research and education ac-  
10 tivities to be supported by the National Science  
11 Foundation;

12 (3) leveraging the collective body of knowledge  
13 from existing quantum information science and engi-  
14 neering research and education activities;

15 (4) coordinating research efforts funded  
16 through existing programs across the directorates of  
17 the National Science Foundation; and

18 (5) engaging with other Federal agencies, re-  
19 search communities, and potential users of informa-  
20 tion produced under this section.

21 **SEC. 302. MULTIDISCIPLINARY CENTERS FOR QUANTUM**  
22 **RESEARCH AND EDUCATION.**

23 (a) MULTIDISCIPLINARY CENTERS FOR QUANTUM  
24 RESEARCH AND EDUCATION.—

1           (1) IN GENERAL.—The Director of the National  
2           Science Foundation, in consultation with other Fed-  
3           eral agencies as appropriate, shall award grants to  
4           institutions of higher education or eligible nonprofit  
5           organizations (or consortia thereof) to establish up  
6           to 5 Multidisciplinary Centers for Quantum Re-  
7           search and Education.

8           (2) COLLABORATIONS.—A collaboration receiv-  
9           ing an award under this subsection may include in-  
10          stitutions of higher education, eligible nonprofit or-  
11          ganizations, and private sector entities.

12          (3) PURPOSE.—The purpose of the Centers  
13          shall be to conduct basic research and education ac-  
14          tivities in support of the goals and priorities of the  
15          Program as determined in title I, to—

16                (A) continue to advance quantum informa-  
17                tion science and engineering;

18                (B) support curriculum and workforce de-  
19                velopment in quantum information science and  
20                engineering; and

21                (C) foster innovation by bringing industry  
22                perspectives to quantum research and workforce  
23                development, including by leveraging industry  
24                resources and research capacity.

1           (4) REQUIREMENTS.—An institution of higher  
2 education or an eligible nonprofit organization (or a  
3 consortium thereof) seeking funding under this sec-  
4 tion shall submit an application to the Director at  
5 such time, in such manner, and containing such in-  
6 formation as the Director may require. The applica-  
7 tion shall include, at a minimum, a description of—

8           (A) how the Center will work with other  
9 research institutions and industry partners to  
10 leverage expertise in quantum science, edu-  
11 cation and curriculum development, and tech-  
12 nology transfer;

13           (B) how the Center will promote active col-  
14 laboration among researchers in multiple dis-  
15 ciplines involved in quantum research including  
16 physics, engineering, mathematics, computer  
17 science, chemistry, and material science;

18           (C) how the Center will support long-term  
19 and short-term workforce development in the  
20 quantum field;

21           (D) how the Center can support an innova-  
22 tion ecosystem to work with industry to trans-  
23 late Center research into applications; and

1           (E) a long-term plan to become self-sus-  
2           taining after the expiration of Foundation sup-  
3           port.

4           (5) SELECTION AND DURATION.—

5           (A) IN GENERAL.—The Centers selected  
6           and established under this section are author-  
7           ized to carry out activities for a period of 5  
8           years.

9           (B) REAPPLICATION.—An awardee may  
10          reapply for an additional, subsequent period of  
11          5 years on a competitive, merit-reviewed basis.

12          (C) TERMINATION.—Consistent with the  
13          existing authorities of the Foundation, the Di-  
14          rector of the National Science Foundation may  
15          terminate an underperforming Center for cause  
16          during the performance period.

17          (6) FUNDING.—The Director of the National  
18          Science Foundation shall devote \$250,000,000 to  
19          carry out this section, which shall include  
20          \$50,000,000 for each of fiscal years 2019 through  
21          2023, subject to the availability of appropriations, to  
22          come from amounts made available for Research and  
23          Related Activities and Education and Human Re-  
24          sources. This section shall be carried out using

1 funds otherwise appropriated by law after the date  
2 of enactment of this Act.

3 (b) GRADUATE TRAINEESHIPS.—The Director of the  
4 National Science Foundation may establish a program to  
5 provide traineeships to graduate students at institutions  
6 of higher education within the United States who are citi-  
7 zens of the United States and who choose to pursue mas-  
8 ters or doctoral degrees in quantum information science.

9 **TITLE IV—DEPARTMENT OF EN-**  
10 **ERGY RESEARCH AND NA-**  
11 **TIONAL QUANTUM INFORMA-**  
12 **TION SCIENCE RESEARCH**  
13 **CENTERS**

14 **SEC. 401. QUANTUM INFORMATION SCIENCE RESEARCH**  
15 **PROGRAM.**

16 (a) IN GENERAL.—The Secretary of Energy shall  
17 carry out a basic research program on quantum informa-  
18 tion science.

19 (b) PROGRAM COMPONENTS.—In carrying out the  
20 program required under subsection (a), the Secretary  
21 shall—

22 (1) formulate goals for quantum information  
23 science research to be supported by the Department  
24 of Energy;

1           (2) leverage the collective body of knowledge  
2           from existing quantum information science research;

3           (3) coordinate research efforts funded through  
4           existing programs across the Office of Science; and

5           (4) engage with other Federal agencies, re-  
6           search communities, and potential users of informa-  
7           tion produced under this section.

8 **SEC. 402. NATIONAL QUANTUM INFORMATION SCIENCE RE-**  
9 **SEARCH CENTERS.**

10          (a) IN GENERAL.—The Secretary of Energy shall en-  
11          sure that the Office of Science carries out a program, in  
12          consultation with other Federal agencies, as appropriate,  
13          to establish and operate up to 5 National Quantum Infor-  
14          mation Science Research Centers to conduct basic re-  
15          search to accelerate scientific breakthroughs in quantum  
16          information science and technology and to support re-  
17          search conducted under section 401. Such centers shall  
18          be established through a competitive, merit-reviewed proc-  
19          ess, and consider applications from National Laboratories,  
20          institutions of higher education, research centers, multi-  
21          institutional collaborations, and other appropriate entities.

22          (b) COLLABORATIONS.—A collaboration receiving an  
23          award under this subsection may include multiple types  
24          of research institutions and private sector entities.

1           (c) REQUIREMENTS.—To the maximum extent prac-  
2 ticable, the Centers developed, constructed, operated, or  
3 maintained under this section shall serve the needs of the  
4 Department of Energy, industry, the academic commu-  
5 nity, and other relevant entities to create and develop  
6 processes for the purpose of advancing basic research in  
7 quantum information science and improving the competi-  
8 tiveness of the United States.

9           (d) COORDINATION.—The Secretary shall ensure the  
10 coordination of, and avoid unnecessary duplication of, the  
11 activities of each Center with the activities of—

12                 (1) other research entities of the Department,  
13 including the Nanoscale Science Research Centers,  
14 the Energy Frontier Research Centers, and the En-  
15 ergy Innovation Hubs; and

16                 (2) industry.

17           (e) SELECTION AND DURATION.—

18                 (1) IN GENERAL.—The centers selected and es-  
19 tablished under this section are authorized to carry  
20 out activities for a period of 5 years.

21                 (2) REAPPLICATION.—An awardee may reapply  
22 for an additional, subsequent period of 5 years on a  
23 competitive, merit-reviewed basis.

24                 (3) TERMINATION.—Consistent with the exist-  
25 ing authorities of the Department, the Secretary



1        may terminate an underperforming Center for cause  
2        during the performance period.

3        (f) **FUNDING.**—The Secretary of Energy shall devote  
4        \$625,000,000 to carry out this section, which shall include  
5        \$125,000,000 for each of fiscal years 2019 through 2023,  
6        subject to the availability of appropriations, to come from  
7        amounts made available for the Office of Science. This  
8        section shall be carried out using funds otherwise appro-  
9        priated by law after the date of enactment of this Act.

10    **SEC. 403. SPENDING LIMITATION.**

11        No additional funds are authorized to be appro-  
12        priated to carry out this Act and the amendments made  
13        by this Act, and this Act and such amendments shall be  
14        carried out using amounts otherwise available for such  
15        purpose.

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