amended Pub. L. 117–81, div. F, title LXVI, § 6606(a)(1), (b)(1), Dec. 27, 2021, 135 Stat. 2442, 2443.)

Editorial Notes

AMENDMENTS

2021—Pub. L. 117–81, § 6606(b)(1), substituted ''8813, 8814, and 8814a'' for ''8813, and 8814''.

Statutory Notes and Related Subsidiaries

EFFECTIVE DATE OF 2021 AMENDMENT

Amendment by section 6606(a)(1) of Pub. L. 117–81 effective as if included in the enactment of the National Quantum Initiative Act, see section 6606(b)(2) of Pub. L. 117–81, set out as an Effective Date note under section 8814a of this title.

SUBCHAPTER II—NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY QUANTUM ACTIVITIES

§ 8831. National Institute of Standards and Technology activities and quantum consortium

(a) National Institute of Standards and Technology activities

As part of the Program, the Director of the National Institute of Standards and Technology—

(1) shall continue to support and expand basic and applied quantum information science and technology research and development of measurement and standards infrastructure necessary to advance commercial development of quantum applications;

(2) shall use the existing programs of the National Institute of Standards and Technology, in collaboration with other Federal departments and agencies, as appropriate, to train scientists in quantum information science and technology to increase participation in the quantum fields;

(3) shall carry out research to facilitate the development and standardization of quantum cryptography and post-quantum classical cryptography;

(4) shall carry out research to facilitate the development and standardization of quantum networking, communications, and sensing technologies and applications;

(5) for quantum technologies determined by the Director of the National Institute of Standards and Technology to be at a readiness level sufficient for standardization, shall provide technical review and assistance to such other Federal agencies as the Director considers appropriate for the development of quantum networking infrastructure standards;

(6) shall establish or expand collaborative ventures or consortia with other public or private sector entities, including industry, universities, and Federal laboratories for the purpose of advancing the field of quantum information science and engineering; and

(7) may enter into and perform such contracts, including cooperative research and development arrangements and grants and cooperative agreements or other transactions, as may be necessary in the conduct of the work of the National Institute of Standards and Technology and on such terms as the Director considers appropriate, in furtherance of the purposes of this chapter.

(b) Quantum consortium

(1) In general

Not later than 1 year after December 21, 2018, the Director of the National Institute of Standards and Technology shall convene a consortium of stakeholders to identify the future measurement, standards, cybersecurity, and other appropriate needs for supporting the development of a robust quantum information science and technology industry in the United States.

(2) Goals

The goals of the consortium shall be—

(A) to assess the current research on the needs identified in paragraph (1);

(B) to identify any gaps in the research necessary to meet the needs identified in paragraph (1); and

(C) to provide recommendations on how the National Institute of Standards and Technology and the Program can address the gaps in the necessary research identified in subparagraph (B).

(3) Report to Congress

Not later than 2 years after December 21, 2018, the Director of the National Institute of Standards and Technology shall submit to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science, Space, and Technology of the House of Representatives a report summarizing the findings of the consortium.

(c) Funding

The Director of the National Institute of Standards and Technology shall allocate up to $80,000,000 to carry out the activities under this section for each of fiscal years 2019 through 2023, subject to the availability of appropriations. Amounts made available to carry out this section shall be derived from amounts appropriated or otherwise made available to the National Institute of Standards and Technology.

(Pub. L. 115–368, title II, § 201, Dec. 21, 2018, 132 Stat. 5098; Pub. L. 117–167, div. B, title VI, § 10661(c)(1), Aug. 9, 2022, 136 Stat. 1684.)

Editorial Notes

AMENDMENTS

2022—Subsec. (a)(3) to (7). Pub. L. 117–167 added pars. (3) to (5) and redesignated former pars. (3) and (4) as (6) and (7), respectively.

SUBCHAPTER III—NATIONAL SCIENCE FOUNDATION QUANTUM ACTIVITIES

§ 8841. Quantum information science research and education program

(a) In general

The Director of the National Science Foundation shall carry out a basic research and education program on quantum information science and engineering, including the competitive award of grants to institutions of higher edu-

cation or eligible nonprofit organizations (or consortia thereof).

(b) Program components

(1) In general

In carrying out the program under subsection (a), the Director of the National Science Foundation shall carry out activities that—

(A) support basic interdisciplinary quantum information science and engineering research; and

(B) support human resources development in all aspects of quantum information science and engineering.

(2) Requirements

The activities described in paragraph (1) shall include—

(A) using the existing programs of the National Science Foundation, in collaboration with other Federal departments and agencies, as appropriate—

(i) to improve the teaching and learning of quantum information science and engineering at the undergraduate, graduate, and postgraduate levels; and

(ii) to increase participation in the quantum fields, including by individuals identified in sections 1885a and 1885b of title 42;

(B) formulating goals for quantum information science and engineering research and education activities to be supported by the National Science Foundation;

(C) leveraging the collective body of knowledge from existing quantum information science and engineering research and education activities;

(D) coordinating research efforts funded through existing programs across the directorates of the National Science Foundation; and

(E) engaging with other Federal departments and agencies, research communities, and potential users of information produced under this section.

(c) Graduate traineeships

The Director of the National Science Foundation may establish a program to provide traineeships to graduate students at institutions of higher education within the United States who are citizens of the United States and who choose to pursue masters or doctoral degrees in quantum information science.

(d) Incorporating QISE into STEM curriculum

(1) In general

The Director of the National Science Foundation shall, through programs carried out or supported by the National Science Foundation, seek to increase the integration of quantum information science and engineering (referred to in this subsection as ''QISE'') into the STEM curriculum at all education levels, including community colleges, as considered appropriate by the Director.

(2) Curriculum integration

The curriculum integration under paragraph (1) may include the following:

(A) Methods to conceptualize QISE for elementary, middle, and high school curricula.

(B) Methods for strengthening foundational mathematics and science curricula.

(C) Methods for integrating students who are underserved or historically underrepresented groups in STEM.

(D) Age-appropriate materials that apply the principles of quantum information science in STEM fields.

(E) Recommendations for the standardization of key concepts, definitions, and curriculum criteria across government, academia, and industry.

(F) Materials that specifically address the findings and outcomes of the study to evaluate and make recommendations for the quantum information science workforce pursuant to subsection (d) of section 19261 of title 42 and strategies to account for the skills and workforce needs identified through such study.

(3) Coordination

In carrying out this subsection, the Director shall coordinate with relevant Federal agencies, and consult with nongovernmental entities with expertise in QISE, as appropriate, which may include institutions eligible to participate in the Established Program to Stimulate Competitive Research (EPSCoR).

(4) Definition

In this subsection, the term ''STEM'' means the academic and professional disciplines of science, technology, engineering, and mathematics, including computer science.

(Pub. L. 115–368, title III, § 301, Dec. 21, 2018, 132 Stat. 5099; Pub. L. 117–167, div. B, title VI, § 10661(e)(1), Aug. 9, 2022, 136 Stat. 1685.)

Editorial Notes

AMENDMENTS

2022—Subsec. (d). Pub. L. 117–167 added subsec. (d).

§ 8842. Multidisciplinary centers for quantum research and education

(a) In general

The Director of the National Science Foundation, in consultation with other Federal departments and agencies, as appropriate, shall award grants to institutions of higher education or eligible nonprofit organizations (or consortia thereof) to establish at least 2, but not more than 5, Multidisciplinary Centers for Quantum Research and Education (referred to in this section as ''Centers'').

(b) Collaborations

A collaboration receiving an award under this subsection may include institutions of higher education, nonprofit organizations, and private sector entities.

(c) Purpose

The purpose of the Centers shall be to conduct basic research and education activities in support of the goals and priorities established under section 8813(d)(2) of this title, including by—

(1) continuing to advance quantum information science and engineering;