



U.S. DEPARTMENT OF
ENERGY

Office of
Science

Office of Science Update

ASCAC Meeting

Dr. Harriet Kung
Deputy Director for Science Programs
Office of Science
U.S. Department of Energy

September 24, 2020

Outline

- **Office of Science Reorganization**
- **QIS Research Centers**
- **FY 2021 Budget Update**
- **DOE COVID-19 Response**
- **SC Program Activities**

Office of Science

Effective
04/12/2020

Office of the Director
Chris Fall

Deputy Director for Science Programs
Harriet Kung

Principal Deputy Director
J. Stephen Binkley

Deputy Director for Field Operations
Juston Fontaine

Advanced Scientific Computing Research
Barbara Helland

Basic Energy Sciences
Linda Horton

Biological & Environmental Research
Sharlene Weatherwax

Fusion Energy Sciences
James Van Dam

High Energy Physics
James Siegrist

Nuclear Physics
Timothy Hallman

Office of Communications & Public Affairs
Rick Borchelt

Office of Scientific & Technical Information
Brian Hitson

Office of Workforce Development for Teachers & Scientists
Ping Ge (A)

Office of Grants & Contracts Support
Michael Zarkin

Office of Budget
Kathleen Klausing

Office of Management
Paul Shlesinger

Office of Project Assessment
Kurt Fisher

Office of Engr & Tech
Edward McGinnis

Office of SBIR/STTR Programs
Manuel Oliver

Office of Accelerator R&D and Production
Eric Colby (A)

Office of Isotope R&D and Production
Jehanne Gillo (A)

Office of Diversity, Inclusion & Research Integrity
Julie Carruthers (A)

Office of Strategic Planning & Interagency Coordination
Susannah Howieson

Office of International S&T Cooperation and Trusted Research
Helena Fu

Office of Crosscutting & Special Initiatives
Ashley Predith

Ames Site Office
Cynthia Baebler

Argonne Site Office
Joanna Livengood

Bay Area Site Office
Paul Golan

Brookhaven Site Office
Robert Gordon

Fermi Site Office
Roger Snyder (A)

ORNL Site Office
Johnny Moore

Pacific Northwest Site Office
Theodore Pietrok (A)

Princeton Site Office
Peter Johnson

Thomas Jefferson Site Office
Joseph Arango

Consolidated Service Center
Kenneth Tarcza

Office of Field Safety, Security & Infrastructure
Marcus Jones

Office of Laboratory Policy
John LaBarge

Office of Information Management
Mike Bartell (A)

Office of Cyber Security
Gina Fisk (A)

Office of IT Services
Vasilios Kountouris

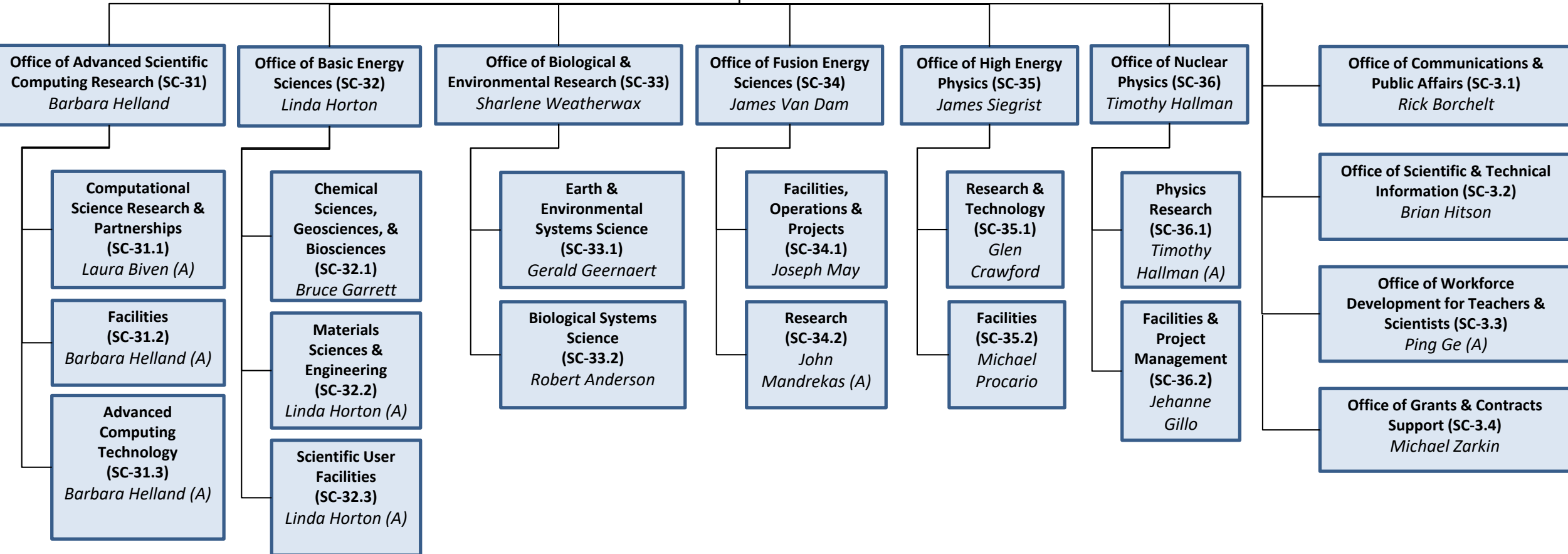
Office of the Principal Deputy Director (SC-2)

- **Office of Engineering and Technology**
 - Office of Accelerator R&D and Production
 - Established in recognition of the central importance of accelerators and related technologies to the current and future scientific capabilities stewarded by SC programs. Related technologies to be considered may include, e.g., next-generation magnets, control systems, and high-power lasers. Activities will be tightly integrated with those in BES, FES, HEP, and NP.
 - Office of Isotope R&D and Production
 - The DOE Isotope Program is transferred in its entirety from the Office of Nuclear Physics. The scope of the Isotope Program is unchanged.
- **Office of Strategic Planning & Interagency Coordination**
 - Develop and maintain a Strategic Plan for the Office of Science. Planning process is currently underway. This Office will also track and coordinate interactions across and between other Federal Agencies and the White House Office of Science and Technology (OSTP) and the National Science Technology Council.
- **Office of Diversity, Inclusion & Research Integrity**
 - Established to recognize the importance diversity and inclusion across all aspects of the SC programs and national laboratories.

Deputy Director For Science Programs

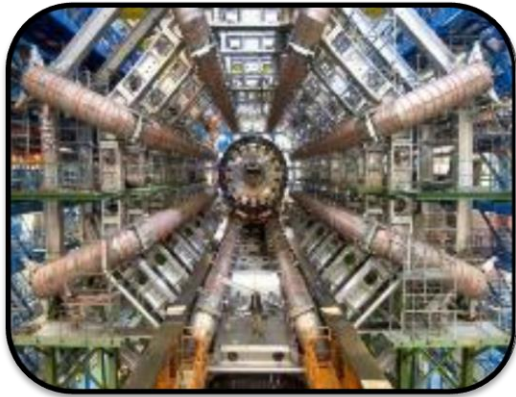
Effective
04/12/2020

Deputy Director for Science Programs (SC-3)
Harriet Kung



Office of Science at a Glance

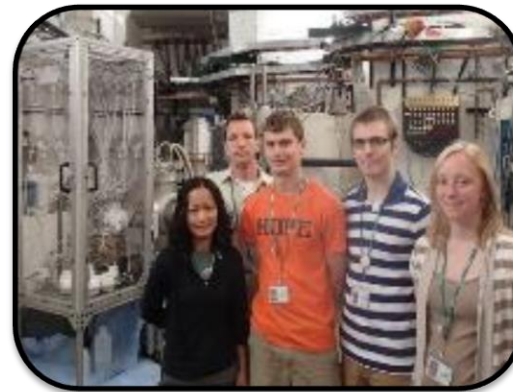
FY 2020 Enacted: \$7.0B + \$99.5M (CARES Act)



Largest Supporter of Physical Sciences in the U.S.



Funding at >300 Institutions, including 17 DOE Labs



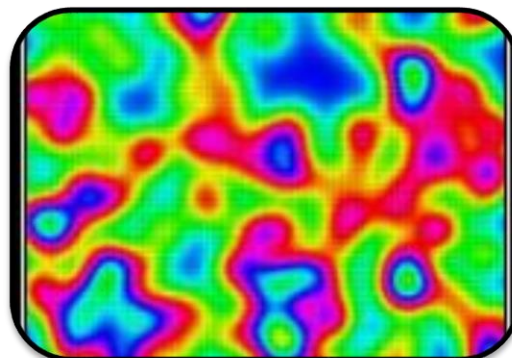
Over 23,000 Researchers Supported



Over 33,000 Users of 27 SC Scientific Facilities



~38% of Research to Universities



Research: 38.8%, \$2.7B

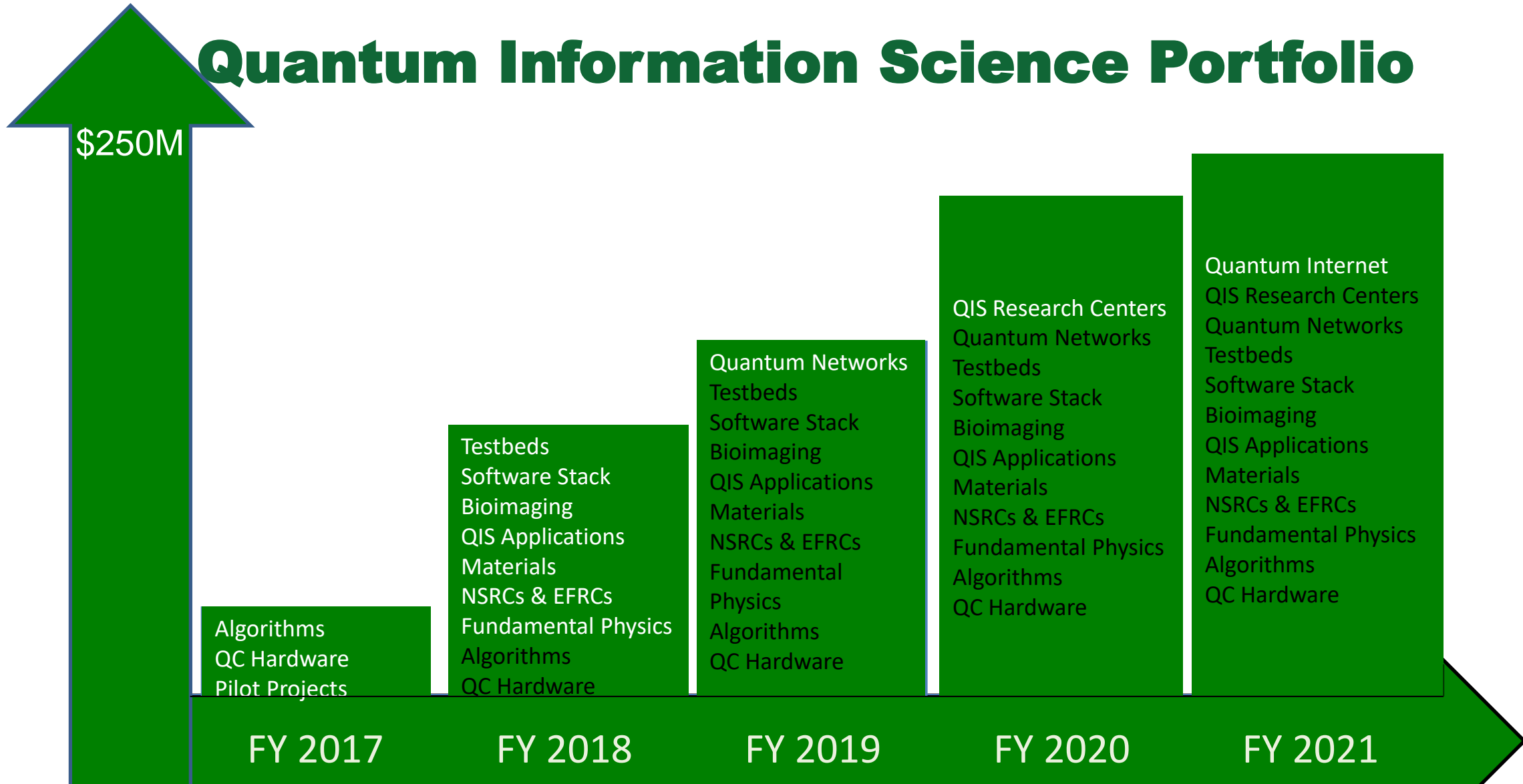


Facility Operations: 36.4%, \$2.5B



Projects/Other: 24.9%, \$1.7B

Quantum Information Science Portfolio

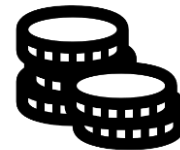


National QIS Research Centers

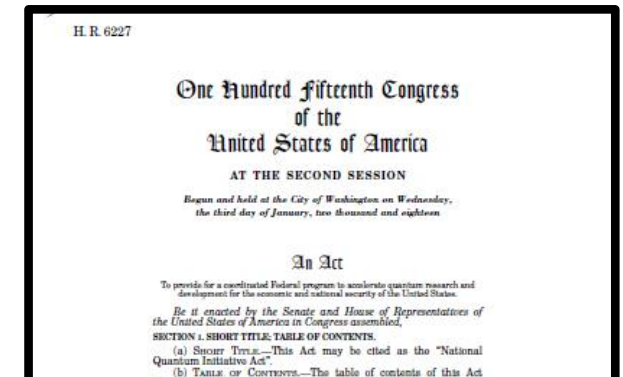
- First large-scale QIS effort that crosses the technical breadth of SC
- Scope built on extensive community-wide RFI inputs— from technical scope to partnership model to management construct
- Seamlessly integrates the S&T innovation chain to accelerate progress in QIS R&D
- Maximizes teaming flexibility and options (TIAs, cooperative agreements, field work authorizations, interagency agreements) to foster direct participation by academics, national/federal labs, and for-profits
- Leverages other federal agency investments such as NSF’s Quantum Leap Challenge Institutes and the NIST Quantum Economic Development Consortium (QED-C)



January 10th, 2020: [FOA Issued](#)
February 10th, 2020: Pre-apps Due
March 10th, 2020: Pre-apps Response
April 17th, 2020: Proposals Due



2-5 Awards
\$10-25M/Year/Center
Up to \$625M in 5 Years



National Quantum Initiative Act

Five National QIS Research Centers

Q-NEXT • Next Generation
Quantum Science and Engineering
(David Awschalom, ANL)



C²QA • Co-design Center for
Quantum Advantage
(Steve Girvin, BNL)



SQMS • Superconducting Quantum
Materials and Systems Center
(Anna Grassellino, FNAL)



- ✓ Significant National Impact
- ✓ Major Cross-Cutting Challenge
- ✓ Science and Technology Innovation Chain
- ✓ QIS Ecosystem Stewardship
- ✓ Multi-Disciplinary Leadership
- ✓ Collaborative Management Structure
- ✓ Well-Structured Plan and Metrics



QSA • Quantum System Accelerator
(Irfan Siddiqi, LBNL)



QSC • The Quantum Science Center
(David Dean, ORNL)

<https://science.osti.gov/Initiatives/QIS>

Office of Science Guiding Principles

FY 2019 Enacted: \$6.585B

FY 2020 Enacted: \$7.000B

FY 2021 Request: \$5.838B

Guiding Principles:

- The Office of Science's (SC) mission is to deliver scientific discoveries and major scientific tools to transform our understanding of nature and advance the energy, economic and national security of the United States.
- The FY 2021 Request supports a balanced research portfolio, focused on cutting edge, early stage research and development, probing some of the most fundamental questions in areas such as: high energy, nuclear, and plasma physics; materials and chemistry; biological and environmental systems; applied mathematics; next-generation high-performance computing and simulation capabilities; and basic research for advancement in new energy technologies.
- The future of the Office of Science includes:
 - New research investments
 - Reduce deferred maintenance with upgrades/improvements to infrastructure

FY 2021 SC President's Budget Request

(Dollars in Thousands)

	FY 2019		FY 2020	FY 2021 President's Request	
	Enacted Approp.	Current Approp.	Enacted Approp.	President's Request	President's Request vs. FY 2020 Enacted
Office of Science					
Advanced Scientific Computing Research	935,500	910,031	980,000	988,051	+8,051 +0.8%
Basic Energy Sciences	2,166,000	2,105,873	2,213,000	1,935,673	-277,327 -12.5%
Biological and Environmental Research	705,000	680,246	750,000	516,934	-233,066 -31.1%
Fusion Energy Sciences	564,000	549,181	671,000	425,151	-245,849 -36.6%
High Energy Physics	980,000	955,905	1,045,000	818,131	-226,869 -21.7%
Nuclear Physics	690,000	669,888	713,000	653,327	-59,673 -8.4%
Workforce Development for Teachers and Scientists	22,500	22,500	28,000	20,500	-7,500 -26.8%
Science Laboratories Infrastructure	232,890	232,890	301,000	174,110	-126,890 -42.2%
Safeguards and Security	106,110	106,110	112,700	115,623	+2,923 +2.6%
Program Direction	183,000	183,000	186,300	190,306	+4,006 +2.2%
SBIR/STTR (SC)		169,376
Total Budget Authority and Obligations, Office of Science	6,585,000	6,585,000	7,000,000	5,837,806	-1,162,194 -16.6%
SBIR/STTR (DOE)	...	123,254
Total, Office of Science	6,585,000	6,708,254	7,000,000	5,837,806	-1,162,194 -16.6%

Office of Science - FY 2021 Research Initiatives

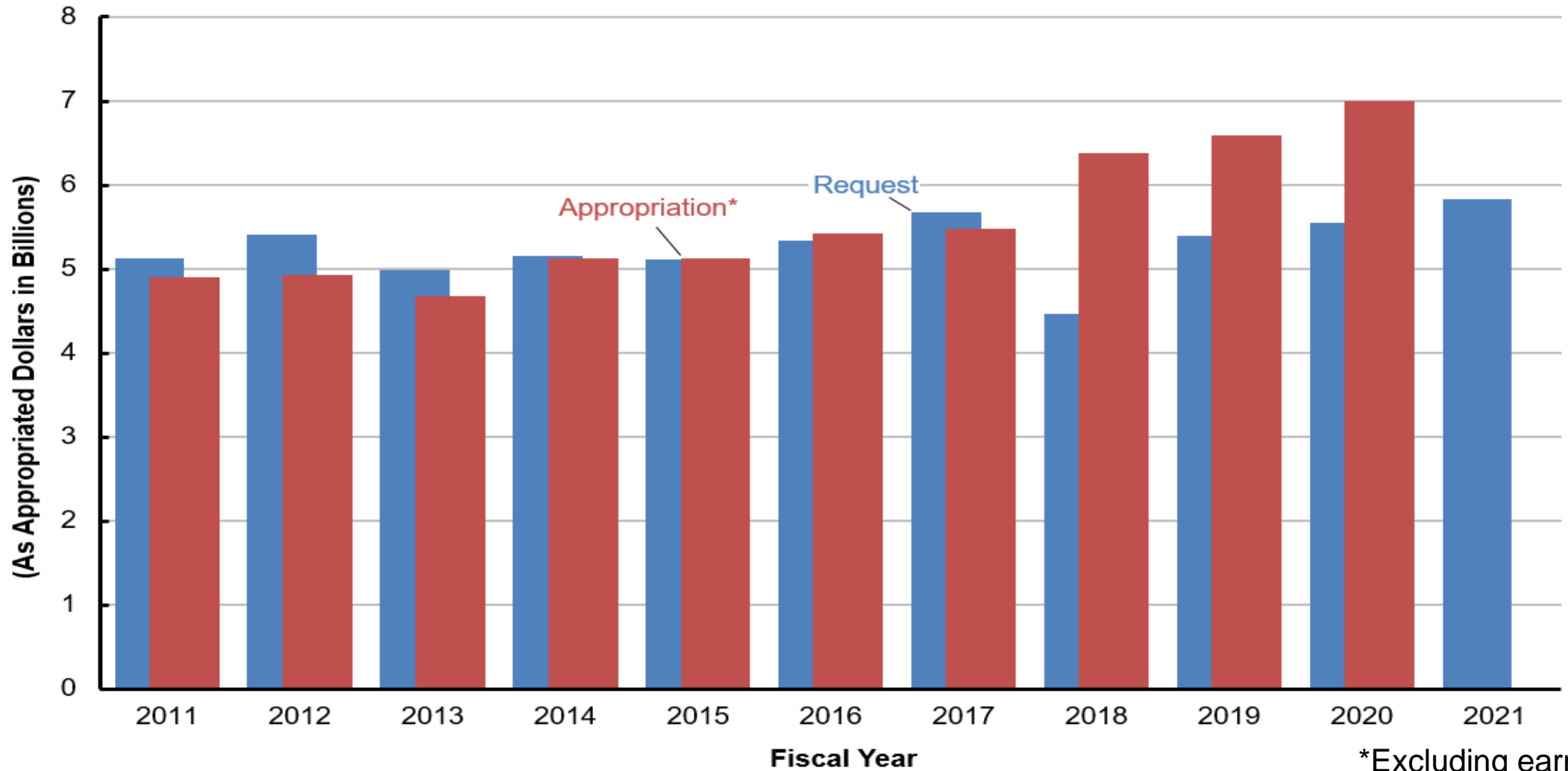
New Research Initiatives

1. Integrated Computational and Data Infrastructure for Scientific Discovery
2. Next Generation Biology Initiative
3. Rare Earth / Separation Science Initiative
4. Revolutionizing Polymer Upcycling
5. Strategic Accelerator Technology Initiative
6. Data and Computational Collaboration with NIH

Ongoing Research Initiatives

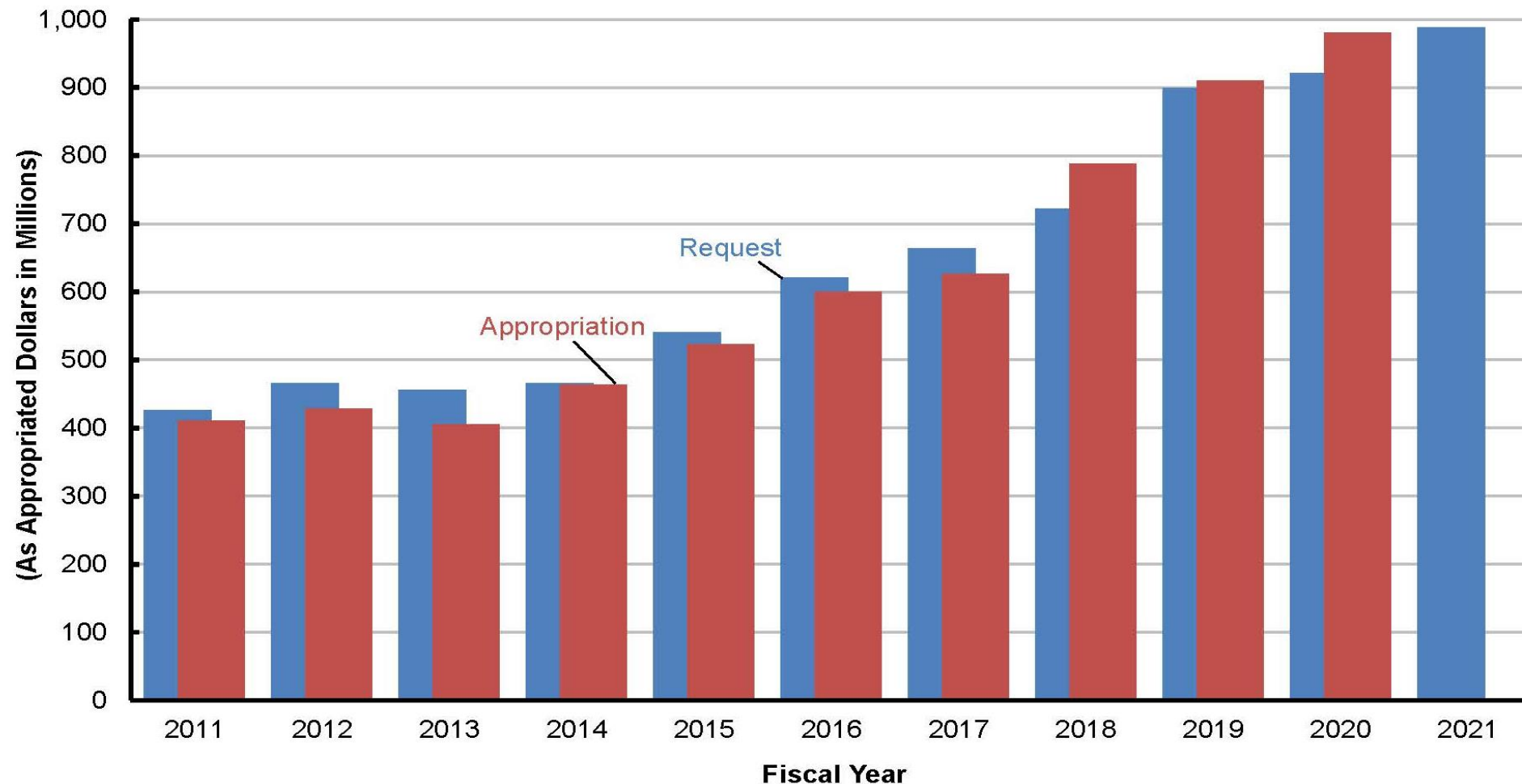
1. Artificial Intelligence and Machine Learning
2. Biosecurity
3. DOE Isotope Initiative
4. Exascale Computing Initiative
5. Microelectronics Innovation
6. Quantum Information Science
7. U.S. Fusion Program Acceleration

Office of Science Request vs. Appropriation History*



*Excluding earmarks

Advanced Scientific Computing Research Request vs. Appropriation History



FY 2021 House Mark

- **House Energy and Water Subcommittee Mark Up: Tuesday July 7, 2020**
- **House Appropriations Full Committee Mark Up: Monday July 13, 2020**
- **House floor vote, 2nd FY 2021 Consolidated Appropriations Act: July 31, 2020**
- **Office of Science – The bill provides \$7.05 billion, an increase of \$50 million above the FY 2020 level and \$1.2 billion above the request.**
- **Emergency funding – The bill provides \$6.25 billion for Office of Science national laboratories, scientific user facilities, and universities to accelerate ongoing construction projects across the country.**
 - \$75M for equipment and infrastructure for QIS Research Centers
 - \$340M for exascale systems at ALCF
 - \$332M for exascale systems at OLCF
 - \$100M for advanced computing systems at LCFs
 - \$20M for power upgrades at NERSC
 - \$4.53M for the Exascale Computing Project
 - \$2.25M for ESnet
 - \$1.5M for NERSC-9 infrastructure
 - \$1.3M for ALCF
 - \$0.7M for OLCF

COVID-19 Flexibilities

- Investigators, staff, and students may continue to charge salaries and benefits to SC awards if the recipient institution permits salaries to continue to be paid in the event of emergencies or disasters.
- **Office of Science Actions**
 - Deadlines extended for proposals, preproposals, letters of intent, and progress reports
 - No-cost extensions awarded promptly
 - Supplemental requests considered, subject to availability of funds
- **OMB Memos on Administrative Relief: M-20-11 (March 9), M-20-17 (March 19), M-20-20 (April 9), and M-20-26 (June 18)**
 - Salaries and wages may continue to be charged to awards through September 30 if other sources of funding are exhausted (*if relying on this flexibility*)
 - No-cost extensions on expiring awards
 - Extension of financial, performance, and other reporting
 - *Flexibility with application deadlines
 - *Allowability of costs not normally chargeable to awards (eg. canceled events, travel)

**rescinded under M-20-26*

DOE broad capabilities for addressing COVID-19 crisis

- Light and neutron sources
- Nanoscience centers
- Computational resources
- People with deep expertise relevant to:
 - Testing
 - Antiviral drug discovery
 - Vaccine discovery
 - Supply chain bottlenecks
 - Modeling and understanding disease spread
 - Molecular and structural biology

HOW DOE AND OUR LABS ARE COMBATING COVID-19

UNDERSTANDING THE STRUCTURE –
DOE scientists are studying the components of the virus so we can determine how to fight it.

MODELING EPIDEMICS –
DOE scientists use previous experience they gained modeling Smallpox, Anthrax and Ebola spread to understand how COVID-19 might behave.

SCREENING DRUGS –
Our supercomputers are allowing us to expedite testing, screen more than 8,000 drug compounds and found 77 have potential to fight against COVID-19... what took days on Summit would take months with a MacBook.

COORDINATING AND EXPANDING ACCESS FOR COVID-19 RESEARCH –
DOE made a nationwide call to the scientific community to utilize our state-of-the-art facilities and technologies to understand and combat COVID-19 together.

ENERGY.GOV

National Virtual Biotechnology Laboratory (NVBL)

<https://science.osti.gov/nvbl>

- **Consortium of 17 DOE National laboratories**
- **Takes advantage of DOE user facilities**
- **Initial activities include:**
 - Epidemiological and logistical support
 - Addressing supply chain bottlenecks by harnessing advanced manufacturing
 - Medical therapeutics: computational drug discovery and structural biology
 - Innovations in testing capabilities
 - New project in understanding fate and transport of virus in the environment

SC Program Activities

- **BESAC Neutron Subcommittee report released.**
 - <https://science.osti.gov/bes/besac/Reports>
- **FESAC Long Range Planning Subcommittee is drafting a strategic plan to be delivered by Dec 2020.**
 - <https://sites.google.com/view/fesac-lrp-public/home>
- **Impact of COVID-19 on HEP Research**
 - https://science.osti.gov/-/media/hep/hepap/pdf/202007/07-Hildreth_Narain-Community_Gathered_COVID-19_Impacts_for_HEP.pdf
- **Electron Ion Collider project received CD-0, Approve Mission Need, and BNL selected as host**
 - <https://www.energy.gov/articles/us-department-energy-selects-brookhaven-national-laboratory-host-major-new-nuclear-physics> and <https://www.bnl.gov/eic/>
- **DOE Explains offers straightforward explanations of key words and concepts in fundamental science.**
 - <https://www.energy.gov/science/science-innovation/doe-explains>

Call for Nominations: 2020 E.O. Lawrence Awards

Recognizes: mid-career U.S. scientists and engineers for exceptional contributions and achievements in research, technical, and engineering supporting the broad missions of DOE and its programs to advance national, economic, and energy security of the U.S.

Awards considered in nine categories:

- Atomic, Molecular, and Chemical Sciences
- Biological and Environmental Sciences
- Computer, Information, and Knowledge Sciences
- Condensed Matter and Materials Sciences
- Energy Science and Innovation
- Fusion and Plasma Sciences
- High Energy Physics
- National Security and Nonproliferation
- Nuclear Physics

Eligibility:

- Mid-career, defined as within 20 years of earning highest degree;
- United States citizen;
- Recognized for achievement in research principally funded by DOE; and
- Recognized primarily on the scientific impact and technical significance of their work relative to its discipline and/or related mission.

Deadline for nominations: Thursday, October 1, 2020, 5:00 PM (ET)