U.S. DEPARTMENT OF ENERGY | Office of Science

Office of Science Program Update

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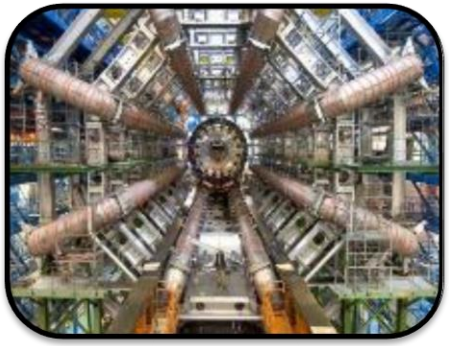
March 2, 2020

Outline

- **Budget update**
  - FY 2020 Appropriation Enacted
  - FY 2021 President's Budget Request
- **SC Reorganization**

Office of Science at a Glance

FY 2021 Request: $5.838B



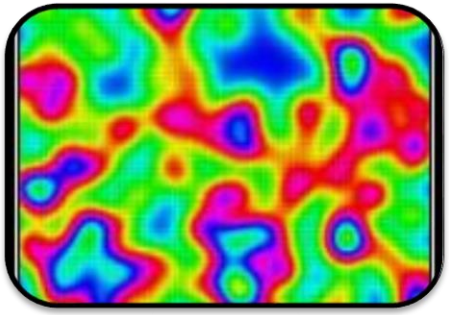
Largest Supporter of Physical Sciences in the U.S.

Funding at >300 Institutions, including 17 DOE Labs

Over 23,000 Researchers Supported

Over 33,000 Users of 28 SC Scientific Facilities

~38% of Research to Universities



Research: 41.7%, $2.432B

Facility Operations: 40.3%, $2.352B

Projects/Other: 18.0%, $1.054B

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

Office of Science Priorities

- Support High Priority research investments
  - Integrated Computational and Data Infrastructure for Scientific Discovery, Next Generation Biology Initiative, Rare Earth / Separation Science Initiative, Revolutionizing Polymer Upcycling, Strategic Accelerator Technology, and Data and Computational Collaboration with NIH.
- Continue investments in Exascale Computing, Artificial Intelligence/ Machine Learning, Quantum Information Science, Microelectronics, DOE Isotope Initiative, Biosecurity, and U.S. Fusion Program Acceleration.
- Continue operations of the national laboratories
  - SC oversees the operation of 10 DOE national laboratories. SC conducts a formal laboratory strategic planning process annually with its labs to understand future directions, immediate and long-range challenges, and resource needs.
  - Look to strengthen smaller/single purpose laboratories to be more multidiscipline
  - Strengthen/upgrade core laboratory infrastructure, i.e. utilities and laboratory workspace.
- Initiate new Infrastructure Projects
  - Reduce backlog of deferred maintenance
  - Improve obsolete infrastructure at National Laboratories
- Maintain all on-going line-item construction and MIE projects.

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 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 - FY 2021 New Research Initiatives*

- **Integrated Computational and Data Infrastructure for Scientific Discovery**: Design and deploy a flexible multi-tiers data and computational management architecture that enables a diverse array of on-demand scientific workflows and simulations for SC mission research.
- **Next Generation Biology Initiative**: Support research in areas of neuromorphic computing, programmable biomaterials and biocatalysts, and next-generation tools for characterization of biological, biomaterials, and biohybrid systems.
- **Rare Earth/Separation Science Initiative**: Understanding the fundamentals of rare earth properties; enhancing separations and chemical processing for rare earths.
- **Revolutionizing Polymer Upcycling**: Elucidating the chemical and biological pathways for transforming polymers and synthesizing high-value chemicals or new polymers.
- **Strategic Accelerator Technology Initiative**: Support investments in accelerator technologies, advanced magnet Revolutionary Light Sources.
- **Data and Computational Collaboration with NIH**: Support DOE laboratories in partnership with NIH to expand the capabilities of DOE's tools and address NIH's rapidly growing data and computational challenges.

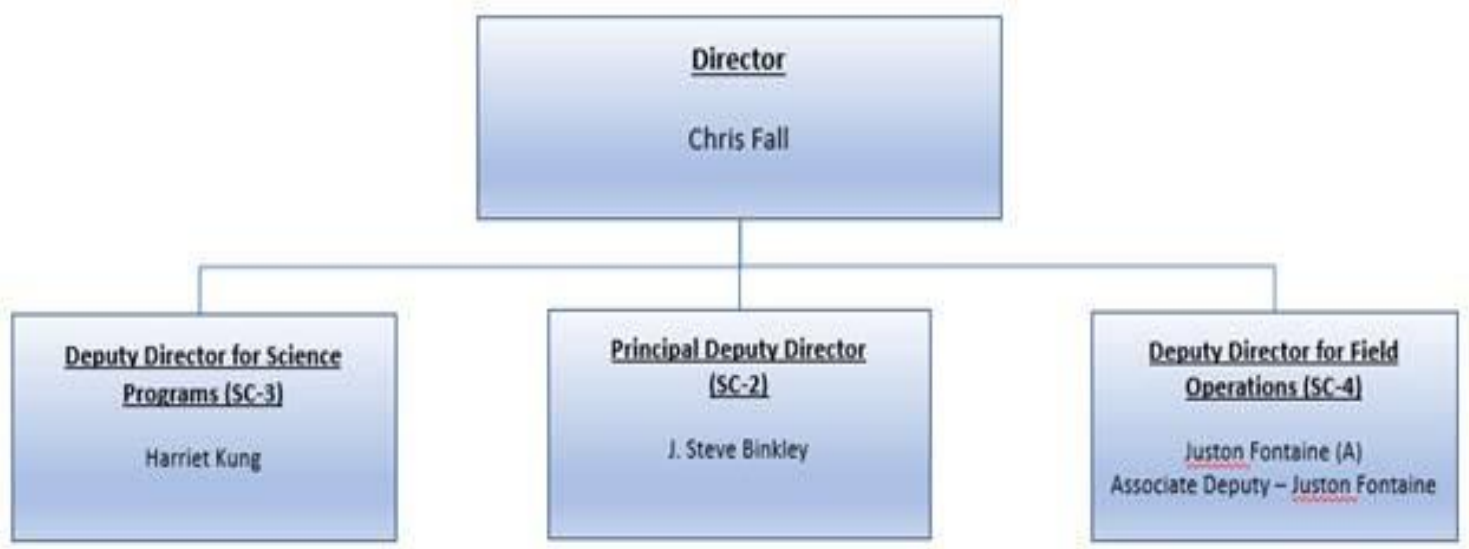
** Note FY 2021 is the first year of funding no previous funding requested.*

Office of Science - FY 2021 Ongoing Research Initiatives

- **Artificial Intelligence/Machine Learning**: Continues support of foundational research in artificial intelligence and machine learning to improve the reliability, robustness and interpretability of big data and AI technologies.
- **Biosecurity**: Supports development of new paradigm of biological research focused on molecular and gene-based systems biology.
- **DOE Isotope Initiative**: Expand and develop core competencies and technology critical for long-term U.S. leadership and independence in isotope production.
- **Exascale Computing Initiative**: In partnership with NNSA, supports deployment of the first exascale systems in calendar 2021.
- **Microelectronics Innovation**: Supports next-generation tools for synthesis, fabrication, and characterization of devices and systems.
- **Quantum Information Science**: Continue basic research investments in quantum algorithms, applications and networking and partnership with the other programs in SC.
- **U.S. Fusion Program Acceleration**: Continues funding for collaboration with industry and conducts a study to examine the benefits and opportunities for next generation future fusion experimental research facility.

Office of Science Reorganization

- Better aligns the organization to achieving strategic goals
- Mostly affects the top levels of the organization
- Establishes the Principal Deputy Director position
- Eliminates the Deputy Director for Resource Management
- Minimal changes below the Deputy Director level
- Currently going through the DOE approval process



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