



U.S. DEPARTMENT OF
ENERGY

Office of
Science

Office of High Energy Physics (HEP) Program and Budget Updates

Astronomy & Astrophysics Advisory Committee (AAAC)

February 26, 2020

Cosmic Frontier program

*Karen Byrum, Drew Baden, **Eric Linder**, Kathy Turner*

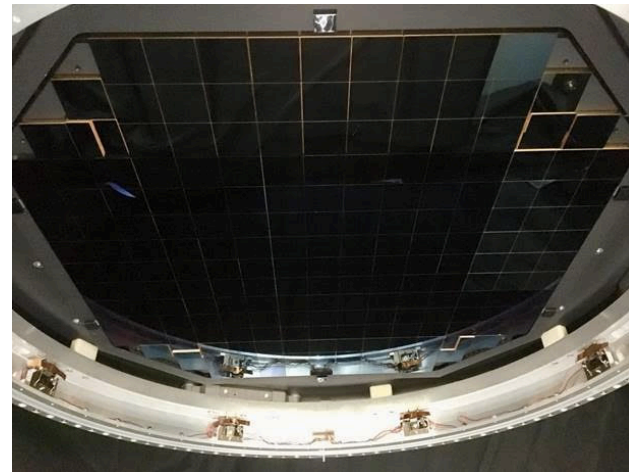
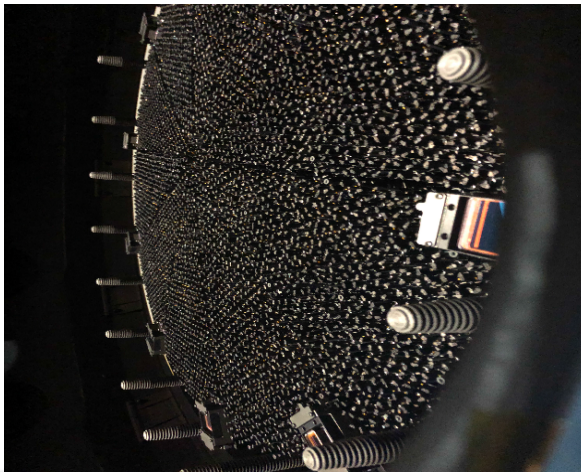
OUTLINE

Kathy Turner provided a comprehensive overview of the DOE-HEP program and budget in her January 2020 presentation.

Today I will present some updates and developments since then.

- Budget
- Project Highlight
- Office of Science Diversity/Equity/Inclusion
- Snowmass Community Planning

DESI focal plane – in operation



LSSTcam sensors – complete



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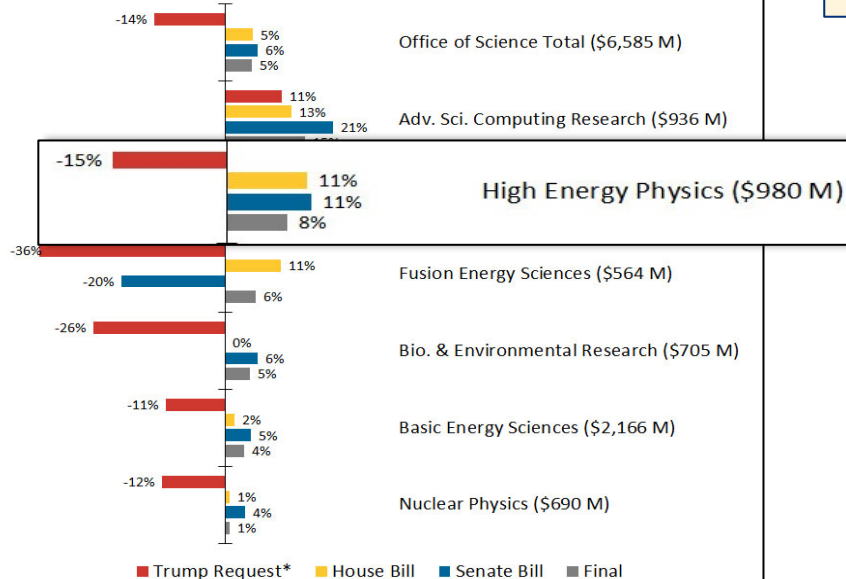
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Budget

FY 2019, 2020, 2021 Office of Science

FY19 Appropriations: DOE Office of Science

% change from FY18 enacted
\$ in () are the FY19 amounts



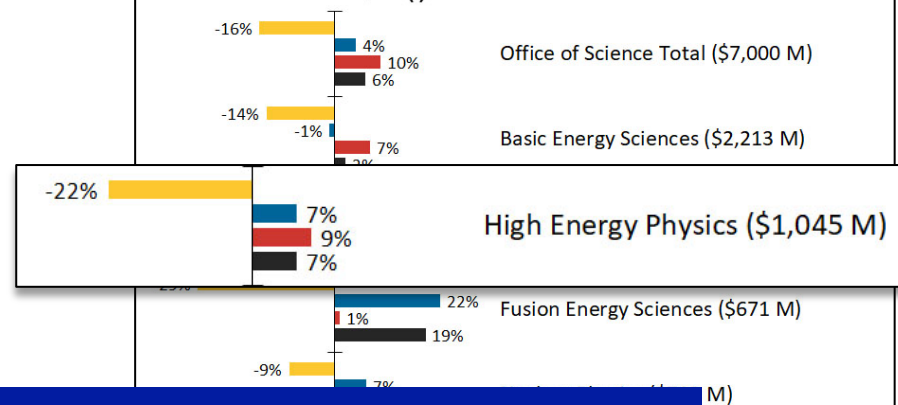
* The administration submitted the budget request to Congress before the final amount was determined.

American Institute of Physics

- ▶ HEP **increase of +8%** from 908M in FY 2018 to 980M in FY 2019
- ▶ All projects were addressed at their baseline levels. Five projects receive final planned funding:
 - ▶ Mu2e, LZ, DESI, SuperCDMS-SNOLAB, and FACET-II

FY20 Appropriations: DOE Office of Science

\$ in () are the FY20 amounts



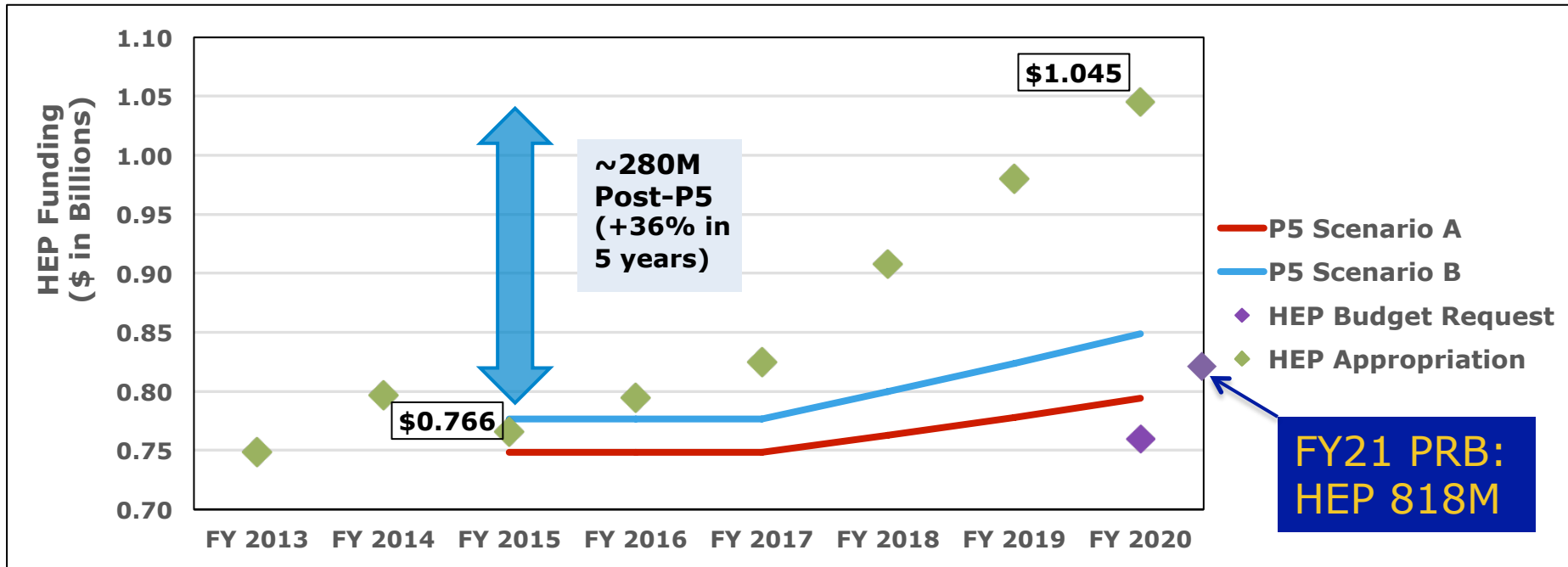
FY21 PBR has SC -16.6%, HEP -21.7% HEP

- ▶ HEP **increase of +7%** from 980M in FY 2019 to 1045M in FY 2020
- ▶ Strong support in QIS and Artificial intelligence Research
- ▶ Increased construction funding for LBNF/DUNE and PIP-II. Strong support for HL-LHC projects.
- ▶ Increased support for Sanford Underground Research Facility

American Institute of Physics | aip.org/fyi

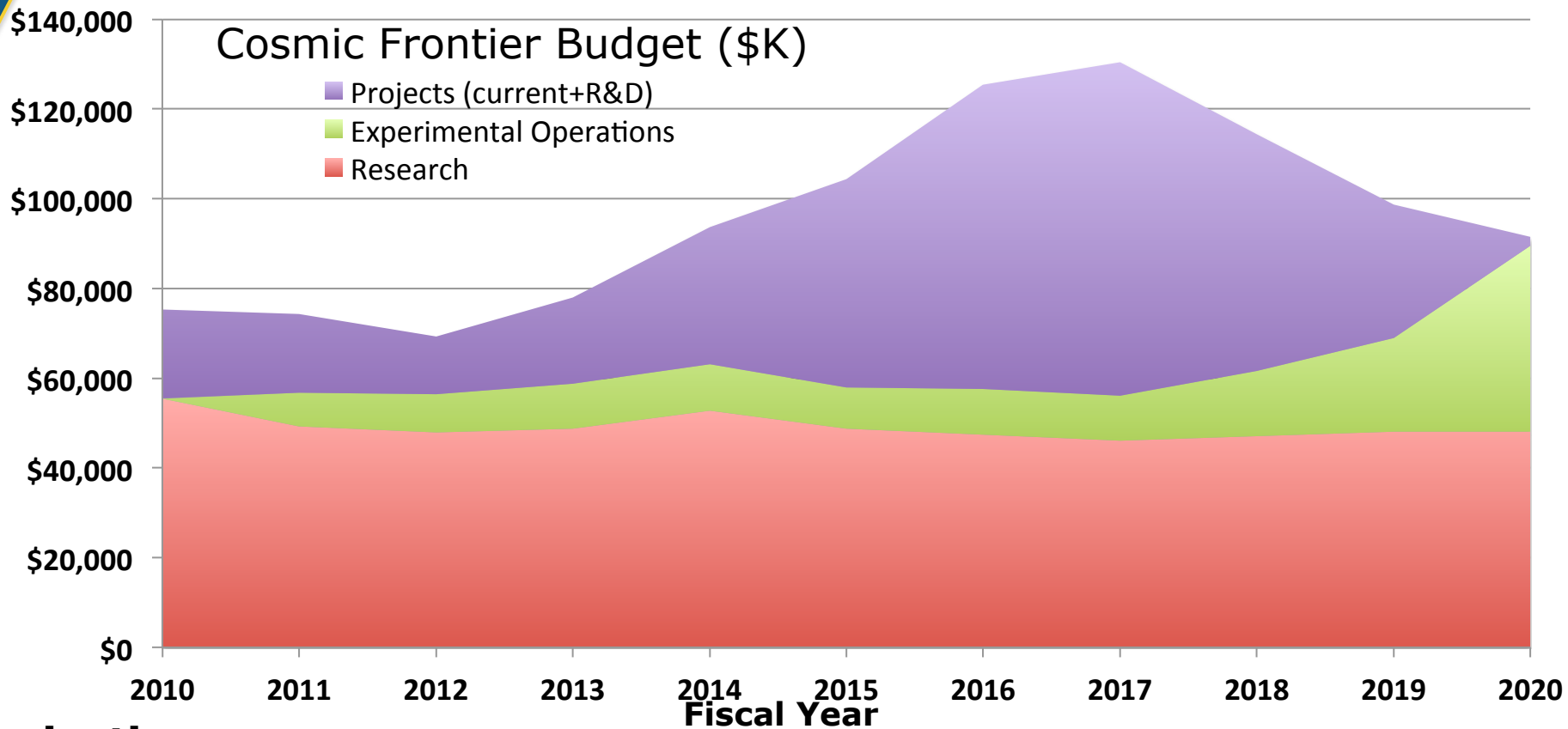
HEP Budget: U.S. Congress Supports P5 Strategy

- U.S. Congress continues to show strong support for executing the P5 strategy, and for accelerating the pace of projects



- When the P5 report was released in May 2014, the FY 2015 budget was already in Congress and the FY 2016 budget was being formulated
- Arguably the first impact (success!) of the P5 report was not seen until FY 2016, and continues today...

Cosmic Frontier Budget History (FY10-20)



Projections:

- **Experimental Operations:** As the current Projects complete, estimated needs ramps up to ~ \$55M to \$60M by FY2024; levels to ~ \$40M by FY2030.
- **Future opportunities:** Compelling Cosmic Frontier Projects will be considered and supported within available overall HEP Project funds. Guidance from Astro2020, next P5.

Cosmic Frontier FY 2020 Program

Cosmic Frontier (\$ in K)	FY 2018 Actual	FY 2019 Actual	FY 2020 Appropriation	FY 2020 Appropriation – FY 2019 Actual
Research	47,008	48,053	48,072	+19
Facilities/Operations	14,570	20,957	41,358	+20,401
Projects	52,835	29,615	2,000	-27,615
<i>LSSTcam</i>	<i>9,800</i>	<i>-</i>	<i>-</i>	<i>-</i>
<i>DESI</i>	<i>20,000</i>	<i>9,350</i>	<i>-</i>	<i>-9,350</i>
<i>LZ</i>	<i>14,100</i>	<i>14,450</i>	<i>-</i>	<i>-14,450</i>
<i>SuperCDMS</i>	<i>7,400</i>	<i>2,550</i>	<i>-</i>	<i>-2,550</i>
<i>CMB-S4</i>	<i>-</i>	<i>-</i>	<i>2,000</i>	<i>+2,000</i>
SBIR/STTR	2,487	2,869	3,471	+602
Total	116,900	101,494	94,901	-6,593

	FY19 Enacted	FY20 Enacted	FY21 Request
AI/ML			
ASCR	15,000	36,000	56,000
BES	3,214	10,000	20,000
BER	-	3,000	3,000
FES	-	7,000	7,000
HEP	3,750	15,000	34,500
NP	-	-	4,000
AI/ML SC Total	21,964	71,000	124,500

	FY19 Enacted	FY20 Enacted	FY21 Request
QIS			
ASCR	33,666	54,680	86,162
BES	49,517	72,270	72,270
BER	4,500	12,000	12,000
FES	-	7,520	9,520
HEP	27,500	38,500	43,809
NP	8,300	10,300	13,000
QIS SC Total	123,483	195,270	236,761





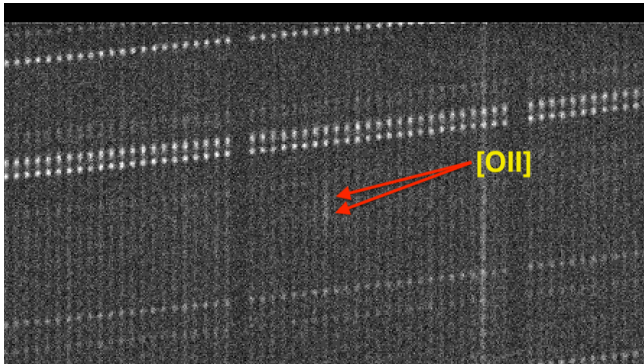
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Project Highlight

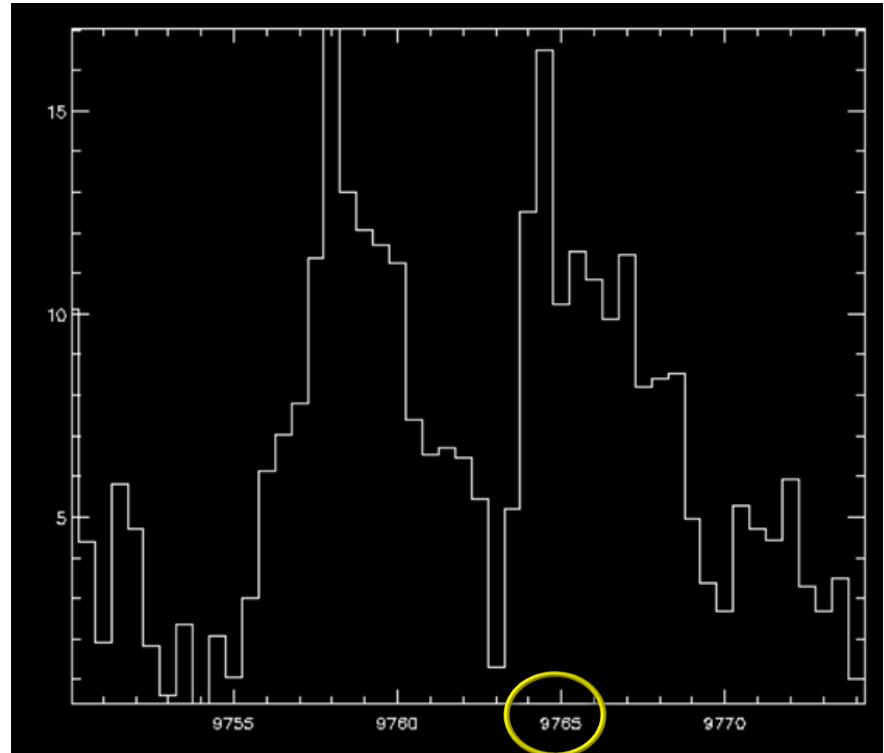
Science Highlight - DESI Operations

- ▶ **First Light achieved on Oct 22, 2019.** Commissioning is going great.
- ▶ 4 month Science Validation starting in April. But to give commissioners a breather...
- ▶ 5-day “mini-survey” to exercise downstream software components. Mini-SV run #2 underway, completes this week. ELG, QSO, LRG, BGS, MWS, standard stars. Data looks great!



Many fibers (across), each with spectrum (down)

Beautiful OII spectral lines
– but look at axis. DESI
tested and succeeds at its
highest redshift limit!



Emission Line Galaxy [O II] doublet at $z=1.619$. This is at the very edge of DESI wavelength range at 976 nm (limit is ~ 980 nm).





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Diversity, Equity, Inclusion

The following slide material was presented to
Astro2020 State of the Profession panel
by Dr. Julie Carruthers, Senior Science and Technology Advisor,
DOE Office of Science

FY 2019 27 Scientific User Facilities



OLCF



ALCF



NERSC



ESnet



EMSL



ARM



JGI



SNS



HFIR



ALS



APS



LCLS



NSLS-II



SSRL



CFN



CINT



CNM



CNMS



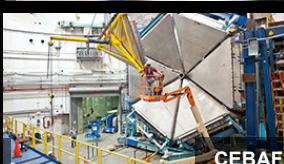
TME



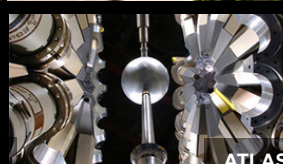
DIII-D



NSTX-U



CEBAF



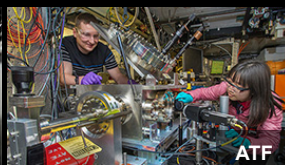
ATLAS



RHIC



FACET



ATF



Fermilab AC



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Diversity, Equity & Inclusion at DOE National Labs

- The DOE laboratories are required under their Management & Operating (M&O) Contracts to have in place “innovative strategies for increasing opportunities to fully use the talents and capabilities of a diverse work force,” including promoting diversity through:
 - The contractor’s workforce
 - Educational outreach
 - Community involvement
 - Subcontracting and technology transfer
- The DOE labs must also meet the requirements set forth in civil rights laws regarding the prohibition of discrimination and harassment and preventing hostile work environments.
- Since 2006, SC leadership has engaged its 10 DOE labs in annual laboratory planning (ALP) processes whereby SC’s senior management reviewed the labs’ S&T strategic plans, including looking at infrastructure needs and human resources. A recognized best practice in DOE.
- In October 2016, the former SC Director issued a memo to the 10 SC laboratories describing:
 1. The steps SC would take to establish uniform guidance for SC laboratories to communicate their DEI strategies to SC, and how SC would review and provide feedback on their strategies, and
 2. A new requirement for the SC laboratories to publically post their workforce demographic data on their public websites, and update the data annually.

A New SC Process for Review of SC Labs' DEI Efforts

This new process started a shift in oversight from compliance to requiring actionable strategies.

- SC guidance to the labs provided a common set topics the labs should address in their DEI Strategies, including describing their lab DEI challenges, leadership and staff roles and responsibilities, DEI goals, accomplishments and planned actions, and measures of progress.
- SC review of the labs' strategies would include Associate Director-level feedback and SC leadership feedback from Headquarters, as well as SC Site Office input.
- In 2017 and 2018, SC's review process coincided with the ALP review process, with high level feedback provided to DOE Lab senior management, followed by detailed written feedback.
- In 2019, SC's review process for the lab DEI strategies was decoupled from the ALP process to allow for more time to review and more detailed feedback discussions with Laboratory Leadership.
- After three years of this process, SC decided it was time to commence an external peer review of experts to evaluate the laboratories' DEI efforts – conducted in November 2019.

The intent of the panel review is to collect valuable, independent feedback from external peer reviewers to inform SC on how its DOE national laboratories can more effectively advance their diversity, equity, and inclusion efforts.

The review panel consists of reviewers with expertise ranging from leadership in managing large research organizations or departments; operations management, including human resources and civil rights compliance; social science research in diversity, harassment, and workplace civility; and professional leadership in promoting diversity in science and engineering fields.

Analysis of review input is underway.

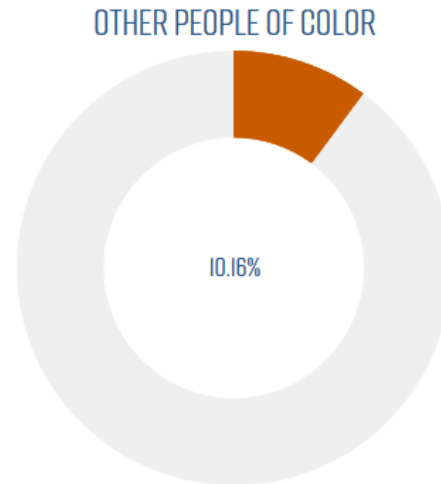
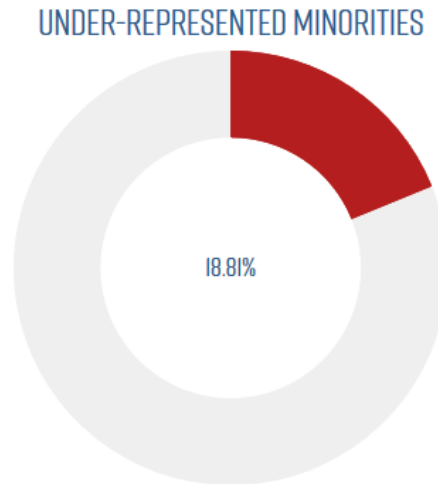
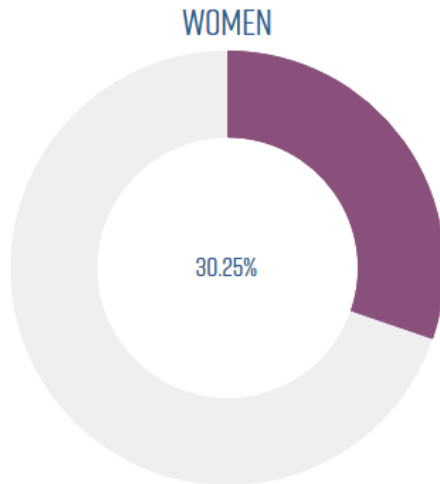
DOE National Labs Workforce Demographic Data (all 17)

<https://nationallabs.org/staff/diversity/> (NLDC Website)

CHANGE DATA VIEW:

ALL JOBS SENIOR LEADERSHIP RESEARCH/TECHNICAL MANAGEMENT OPERATIONS MANAGEMENT TECHNICAL RESEARCH STAFF OPERATIONS SUPPORT STAFF
POST DOCTORAL GRADUATE STUDENT UNDERGRADUATE STUDENT

ALL JOBS



Links to SC Labs from:

<https://science.osti.gov/sc-2/Research-and-Conduct-Policies/Diversity-Equity-and-Inclusion/Diversity-Equity-and-Inclusion-at-the-DOE-National-Laboratories>

Promoting DEI in SC's Business Practices – in Progress

- In 2018, the Office of Science initiated an internal review of its business practices to identify opportunities to better promote diversity, equity, and inclusion in our award making and awards management processes, and better communicate policies, practices, and procedures to our research community.
- SC established an internal D&I Working Group to carry out this review, with membership from each of the SC program offices (nominated by their ADs) and led by the Office of the Deputy Director for Science Programs.

Charge:

- Assess what SC is currently doing to improve diversity, equity and inclusion.
- Identify opportunities for SC to demonstrate that diversity, equity, and inclusion are foundation to SC business practices:
 - Through its processes and procedures for research awards to universities and the DOE labs;
 - Through its processes and procedures for PI meetings, workshops, and advisory committees; and
 - Through better outreach and communications (internally and with the SC research communities).

SC DEI Website: SC's Statement of Commitment

The DOE Office of Science (SC) is fully and unconditionally committed to fostering safe, diverse, equitable, and inclusive work, research, and funding environments that value mutual respect and personal integrity...

...SC's effective stewardship and promotion of diverse and inclusive workplaces that value and celebrate a diversity of people, ideas, cultures, and educational backgrounds is foundational to delivering on our mission. Harnessing a diverse range of views, expertise, and experiences drives scientific and technological innovation and enables the SC community to push the frontiers of scientific knowledge for the betterment of America's prosperity and security.

Discrimination and harassment undermine SC's ability to achieve its mission by reducing productivity, discouraging or inhibiting talent retention and career advancement, and weakening the integrity of the SC enterprise overall. SC does not tolerate discrimination or harassment of any kind, including sexual or non-sexual harassment, bullying, intimidation, violence, threats of violence, retaliation, or other disruptive behavior in the federal workplace, including DOE field site offices, or at national laboratories, scientific user facilities, academic institutions, other institutions receiving SC funding, or other locations where activities funded by SC are carried out...

...Beyond issues that may rise to the level of legal action, SC expects the scientific community, particularly those engaging in SC-sponsored activities, to always conduct themselves in a manner that is respectful, ethical, and professional. This renewed commitment is part of SC's continuing effort to identify opportunities to improve its policies, practices, and communications in furtherance of its core values and its mission.

For the full SC Statement:

<https://science.osti.gov/sc-2/Research-and-Conduct-Policies/Diversity-Equity-and-Inclusion/SC-Statement-of-Commitment>

- SC established a website that consolidates DOE's policies and procedures as they apply to recipients of financial assistance (grants and cooperative agreements), DOE national laboratory contract staff and laboratory visitors, and DOE federal employees.

<https://science.osti.gov/sc-2/Research-and-Conduct-Policies/Diversity-Equity-and-Inclusion>



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HEP Snowmass Community Planning

HEP Snowmass Community Planning

- ▶ Involves 1000s members of the HEP community, every 6-10 years.
- ▶ 1.5 year long community process organized by APS Division of Particles and Fields (together with Div. Astrophysics, Gravitational Physics, etc.)
- ▶ Official process opens at APS April 2020 meeting, goes through a year+ of community workshops and discussions, culminating in Snowmass 2021, at UW Seattle in July 2021.
- ▶ Snowmass reports feed into Particle Physics Project Prioritization Panel (P5), a subpanel of HEPAP (FACA panel).
- ▶ P5 report aims to inform DOE-HEP, NSF-PHY budget requests FY24.



HEP Snowmass Community Planning

- ▶ Topic most relevant to AAAC is Cosmic Frontier, though this is also informed by Theory, Instrumentation, Computational Frontiers.
- ▶ Conveners of Cosmic Frontier topic are Aaron Chou (FNAL), Marcelle Soares-Santos (Brandeis), Tim Tait (UC Irvine).
- ▶ Subgroups on CMB, dark energy, dark matter, multimessenger, complementarity/connections, future concepts.
- ▶ P5 is a “10 year plan in the context of a 20 year vision”.



Summary

Excellent science results continue to be produced from our operating experiments!

P5 strategic plan is supported by Community and broad support is enabling it to be fully implemented.

HEP budget increased 7% in FY20; Cosmic operations ramp up, research flat. FY21 budget process is just starting.

HEP Cosmic Frontier projects from Astro2010 and P5 are about to commence observations and deliver Stage 4 dark energy science – and much more!

- DESI is in commissioning (and mini-survey), returning astrophysical spectra! DESI & LZ start science operations in FY2020.
- LSST camera project is 96% complete!
- CMB-S4 has DOE CD-0 and a NSF MSRI-1. The NSF-DOE Joint Oversight Group meets biweekly. The Project Office & Collaboration are working hard toward preparing for DOE CD-1 and NSF PDR, ready to start after Astro2020.

HEP looks forward to Astro2020 assessment of the most compelling science challenges, a comprehensive research strategy, and articulated decision rules with an eye to where DOE HEP researchers and investments can play a significant role in & make unique, significant & necessary contributions. And Snowmass is beginning.



AAAC meeting 2/26/20

