

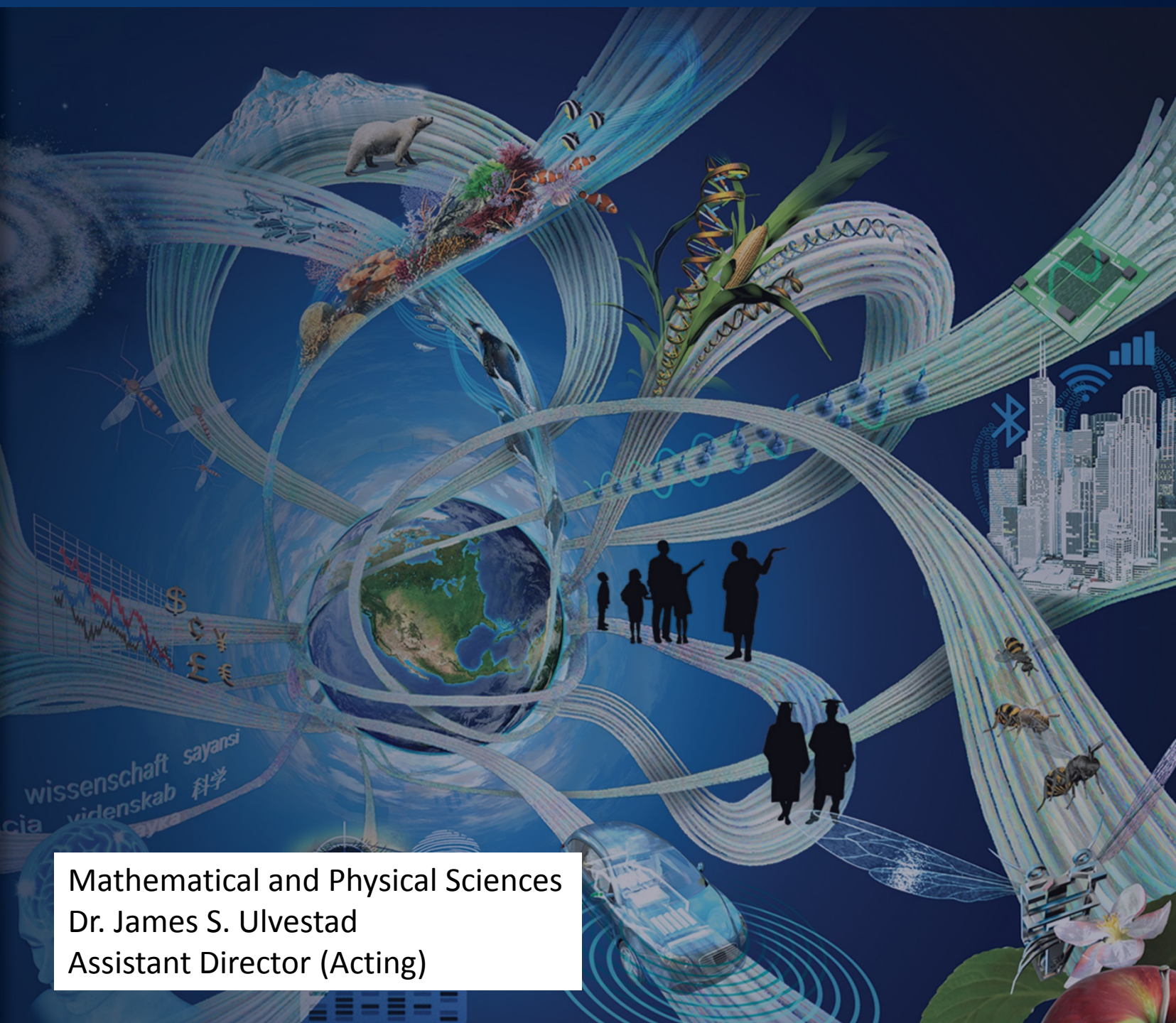
NATIONAL  
SCIENCE  
FOUNDATION

FISCAL  
YEAR  
2018

BUDGET  
REQUEST



Dr. France A. Córdoba  
Director, National Science Foundation

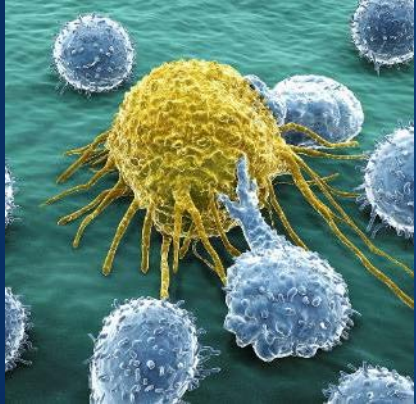


Mathematical and Physical Sciences  
Dr. James S. Ulvestad  
Assistant Director (Acting)

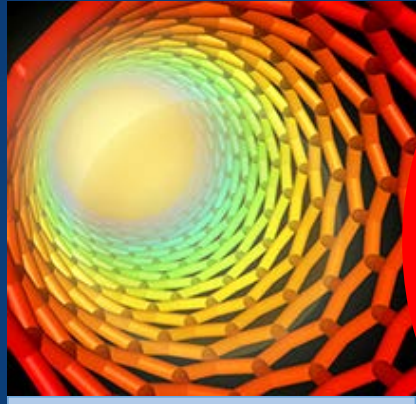




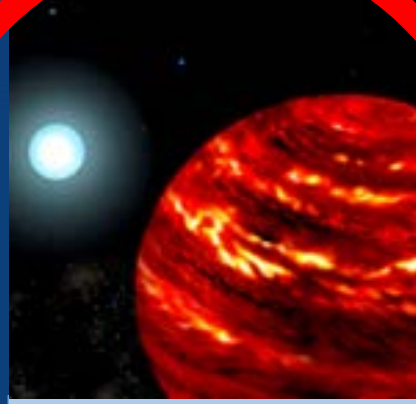
# NSF Funds Research and Education across all Fields of Science and Engineering



**Biological Sciences**



**Engineering**



**Mathematical & Physical Sciences**



**Computer & Information Science & Engineering**



**Geosciences (including Polar Programs)**



**Integrative Activities**



**Education & Human Resources**



**Social, Behavioral & Economic Sciences**

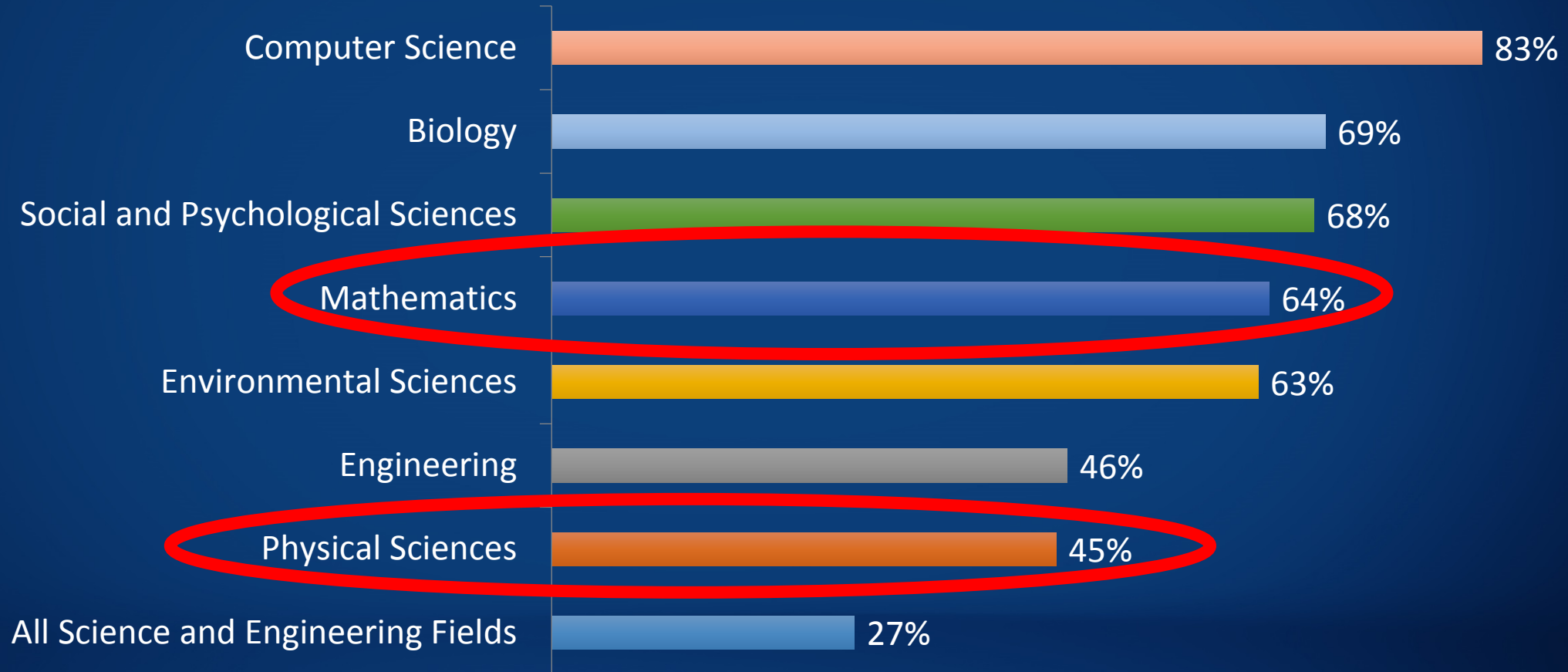


**International Science & Engineering**



# NSF Support of Academic Basic Research in Selected Fields

(as a percentage of total federal support)



**Note:** Biology includes Biological Science and Environmental Science. Biology and Psychological Sciences exclude National Institutes of Health funding from the total amount of federal support.

**Source:** NSF/National Center for Science and Engineering Statistics, Survey of Federal Funds for Research and Development





National Science Foundation  
**FY 2018 BUDGET REQUEST  
TO CONGRESS**



NSF FY 2018  
Budget Request  
Total: \$6.65 billion





# Continued Investment in NSF Research Infrastructure



Daniel K. Inouye Solar Telescope



LSST



RCRV



LIGO



CYBERINFRASTRUCTURE



ALMA



# NSF's 10 Big Ideas



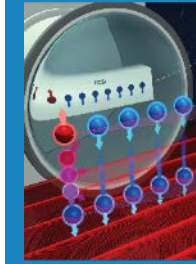
## RESEARCH IDEAS



Work at the Human-Technology Frontier: Shaping the Future



Windows on the Universe: The Era of Multi-messenger Astrophysics



The Quantum Leap: Leading the Next Quantum Revolution

Harnessing Data for 21<sup>st</sup> Century Science and Engineering



Navigating the New Arctic



Understanding the Rules of Life: Predicting Phenotype



## PROCESS IDEAS

Mid-scale Research Infrastructure



NSF 2026



Growing Convergence Research at NSF



NSF INCLUDES: Enhancing STEM through Diversity and Inclusion

# Principles Applied for FY 2018 Request

- Continue to fund all S&E disciplines
- Support early career
- Protect the core
- Roll back “accretions” (programs scaled up substantially since 2008)
- Cross disciplinary programs are important
- Strategic and prioritized reductions within directorates

# MPS Overall Funding

## MPS Funding (Dollars in Millions)

	FY 2016 Actual	FY 2017 (TBD)	FY 2018 Request	Change Over FY 2016 Actual Amount	Percent
Astronomical Sciences (AST)	\$246.63	-	\$221.15	-\$25.48	-10.3%
Chemistry (CHE)	246.52	-	221.05	-25.47	-10.3%
Materials Research (DMR)	309.88	-	282.87	-27.01	-8.7%
Mathematical Sciences (DMS)	233.95	-	209.78	-24.17	-10.3%
Physics (PHY)	276.91	-	253.30	-23.61	-8.5%
Office of Multidisciplinary Activities (OMA)	34.89	-	31.28	-3.61	-10.3%
<b>Total</b>	<b>\$1,348.78</b>	<b>-</b>	<b>\$1,219.43</b>	<b>-\$129.35</b>	<b>-9.6%</b>



# Principles Applied to MPS

- Support early career
  - CAREER request kept relatively stable. Targeted REU reductions if undergraduate students could be supported through national facilities and normal research awards. 8,000 graduate students to be supported through MPS research awards.
- Protect the core; cross disciplinary programs
  - Major research facilities are “core” to MPS.
  - Reduced dedicated funds to cross-disciplinary programs.
  - Rolled cross-disciplinary efforts into existing grants programs to retain flexibility to fund the best science.
- Strategic and prioritized reductions within directorates
  - Highest priority facilities fully funded; small reductions to a few facilities in transition.
  - Reduced mid-scale and instrumentation; support individual investigators.
  - Prioritized programs leading to “Big Ideas”.

## MPS Funding for Facilities

(Dollars in Millions)

	FY 2016 Actual	FY 2017 (TBD)	FY 2018 Request	Change Over FY 2016 Actual	
				Amount	Percent
<b>Total, Facilities</b>	<b>\$289.42</b>	<b>-</b>	<b>\$291.08</b>	<b>\$1.66</b>	<b>0.6%</b>
Atacama Millimeter Array (ALMA)	\$37.65	-	\$43.48	5.83	15.5%
Arecibo Observatory	4.80	-	3.90	-0.90	-18.8%
Cornell High Energy Synchrotron Source (CHESS)	10.03	-	8.00	-2.03	-20.2%
Daniel K. Inouye Solar Telescope (DKIST)	13.50	-	16.00	2.50	18.5%
Gemini Observatory	19.88	-	21.03	1.15	5.8%
IceCube Neutrino Observatory (IceCube)	3.48	-	3.50	0.02	0.6%
Large Hadron Collider (LHC) <sup>1</sup>	20.00	-	22.30	2.30	11.5%
Laser Interferometer Gravitational Wave Observatory (LIGO)	39.43	-	39.43	-	-
National High-Magnetic Field Laboratory (NHMFL)	35.34	-	34.77	-0.57	-1.6%
National Nanotechnology Coordinated Infrastructure (NNCI)	2.88	-	2.50	-0.38	-13.2%
National Optical Astronomy Observatories (NOAO)	21.99	-	20.67	-1.32	-6.0%
National Radio Astronomy Observatories (NRAO) <sup>2</sup>	43.84	-	32.86	-10.98	-25.0%
National Solar Observatory (NSO) <sup>3</sup>	9.50	-	5.00	-4.50	-47.4%
National Superconducting Cyclotron Laboratory (NSCL)	24.00	-	23.00	-1.00	-4.2%
Other MPS Facilities (Total)	3.10	-	14.64	11.54	372.3%
Center for High Resolution Neutron Scattering (CHRNS)	2.77	-	2.79	0.02	0.7%
Other Astronomical Facilities (LBO, GBO) <sup>2</sup>	-	-	11.85	11.85	N/A
OMA co-funding of special activities in facilities	0.33	-	-	-0.33	-100.0%

<sup>1</sup> Includes \$6.30 million in FY 2018 for High-Luminosity LHC Upgrade planning.

<sup>2</sup> The decrease in NRAO is chiefly due to the separation of the Green Bank Observatory and the Very Long Baseline Array from NRAO and ALMA. That funding is now shown under the "Other Astronomical Facilities" line in this table.

<sup>3</sup> Totals do not include \$11.50 million in FY 2016 and \$14.0 million in FY 2018 for operations and maintenance support for the DKIST facility construction project. That funding is captured as part of the total presented on the DKIST line above.



# Our Mission from the Beginning



*“To promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense...”*

# Some Strategic Questions for MPS

- How do we balance the core facility funding vs. other core science in a very diverse directorate?
  - AST facility fraction went from 60% in FY 2016 to 70% in FY 2018 Request.
  - DMS facility fraction is 0%.
- How do we participate in interdisciplinary research effectively, given a potentially smaller budget and continuing staff workload issues?
- How aggressively do we pursue the Big Ideas in the context of a limited budget, and what are we willing to give up to do so?
- To what degree should we try to protect support for early-career investigators and workforce programs?