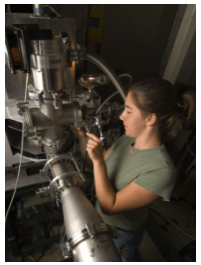
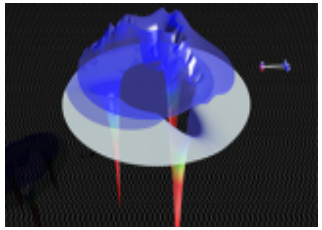
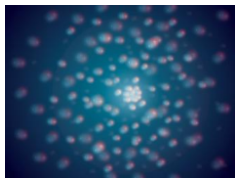


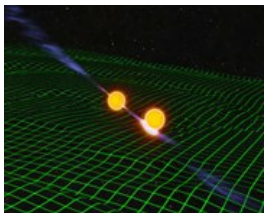


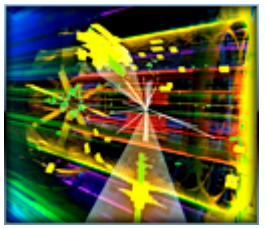


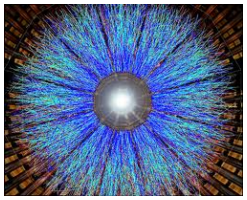
Physics Division Overview

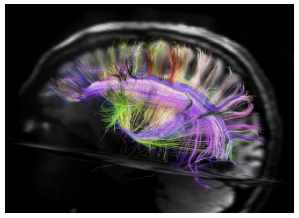
NSAC Meeting
July 16, 2015

Bradley D. Keister, Deputy Division Director



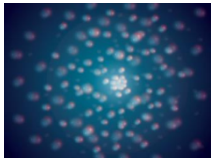






Physics Division Research Portfolio

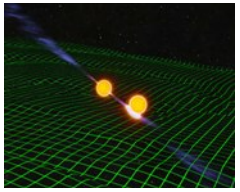
Hot – Active Galactic Nuclei Produce High Energy Cosmic Rays in Pierre Auger Observatory

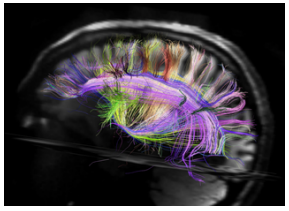


Cold – Ultracold Molecules at JILA

Large – Nucleosynthesis in Accreting White Dwarfs at JINA

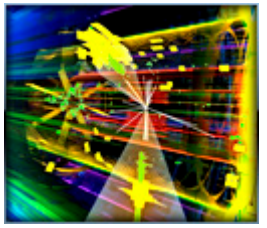
Small – Inspirals Produce Space-Time Distortion Less than Diameter of Proton in LIGO

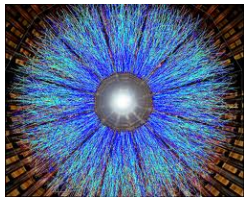




Living – Brain Wave Images with Diffusion MRI

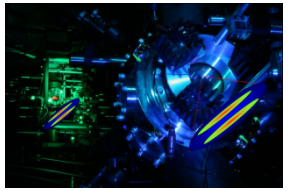
Non-Living – Proton-Proton Collisions at CERN

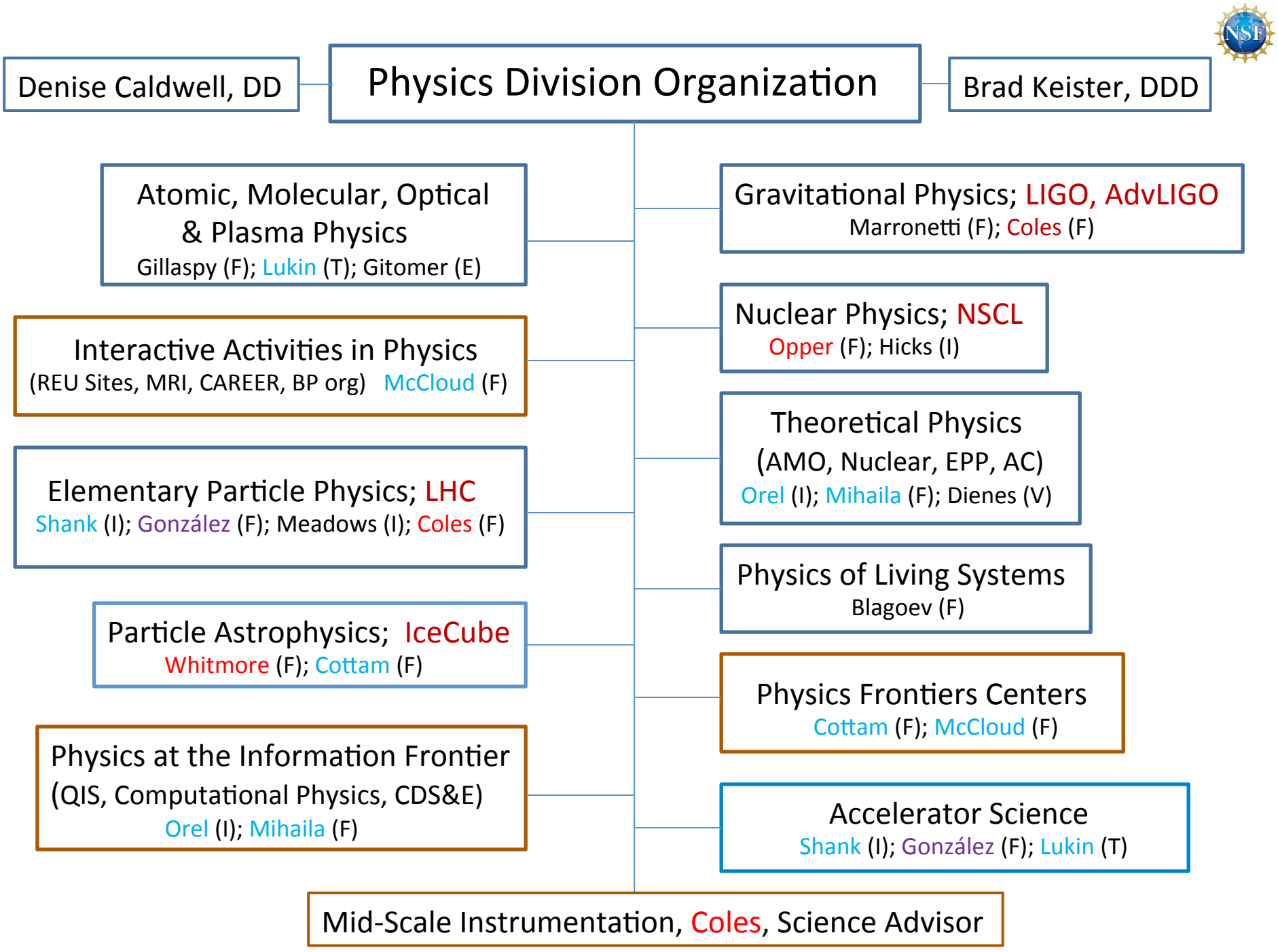




Old – Big-Bang Soup Recreated in Quark-Gluon Plasma at RHIC

New – Quantum Network at Caltech




Denise Caldwell, DD
Physics Division Organization
Brad Keister, DDD
Atomic, Molecular, Optical & Plasma Physics
Gillaspy (F); Lukin (T); Gitomer (E)
Interactive Activities in Physics
(REU Sites, MRI, CAREER, BP org) McCloud (F)
Elementary Particle Physics; LHC
Shank (I); González (F); Meadows (I); Coles (F)
Particle Astrophysics; IceCube
Whitmore (F); Cottam (F)
Physics at the Information Frontier
(QIS, Computational Physics, CDS&E)
Orel (I); Mihaila (F)
Gravitational Physics; LIGO, AdvLIGO
Marronetti (F); Coles (F)
Nuclear Physics; NSCL
Opper (F); Hicks (I)
Theoretical Physics
(AMO, Nuclear, EPP, AC)
Orel (I); Mihaila (F); Dienes (V)
Physics of Living Systems
Blagoev (F)
Physics Frontiers Centers
Cottam (F); McCloud (F)
Accelerator Science
Shank (I); González (F); Lukin (T)
Mid-Scale Instrumentation, Coles, Science Advisor

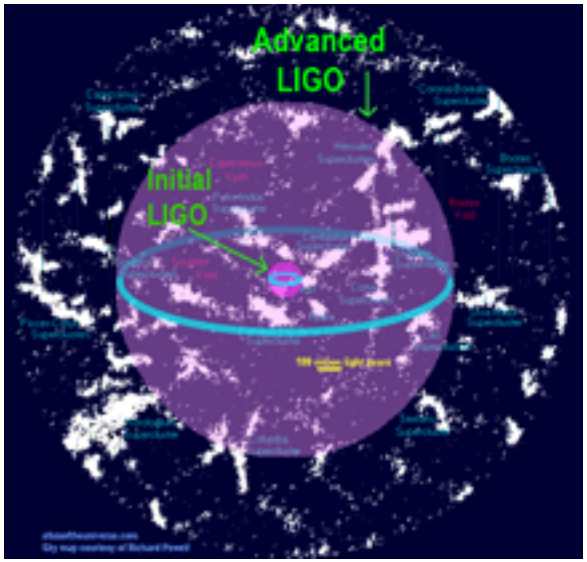
News and Highlights

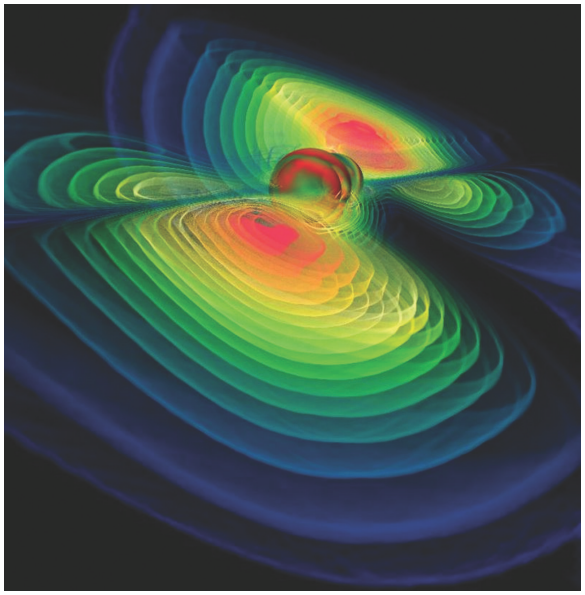
- Committee of Visitors
- Facilities
- Frontiers Centers
- Budgets
- OMB-OSTP Priorities

Physics Division Committee of Visitors
February 4-6, 2015

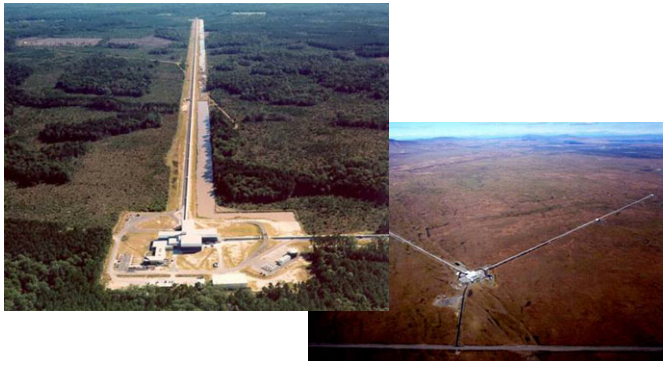
- 33 members across all division-related disciplines
- Eric Cornell (JILA), chair
- COV reports to MPS Advisory Committee
- Report and response available on-line:
  http://www.nsf.gov/mps/advisory/cov.jsp

Advanced LIGO Completion & Dedication





- Dedication: May 2015
- Commissioning: sensitivity now 4x original LIGO
- First science run: September 2015



LHC

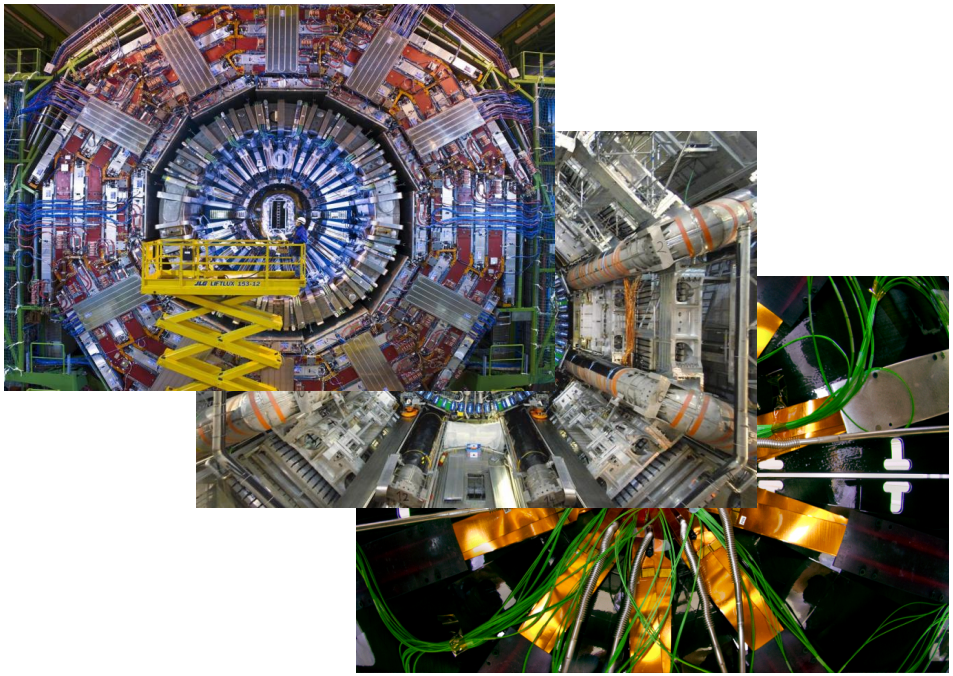
Now running at 13 TeV

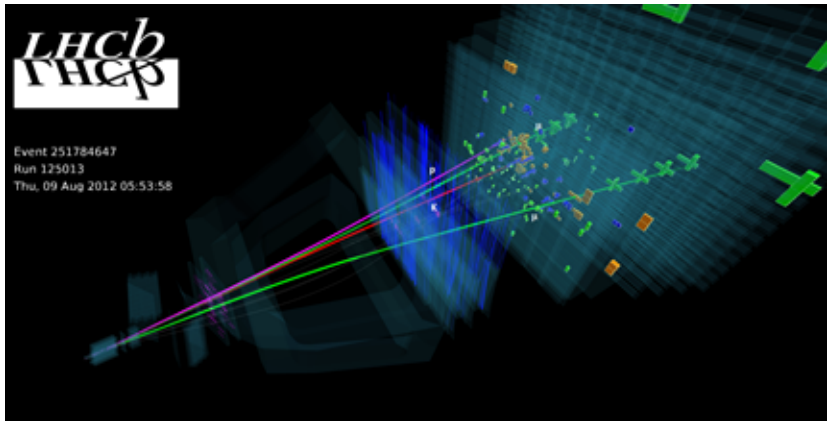
NSF supports researchers at ATLAS, CMS, ALICE

- Phase 1 upgrade (midscale)

NSF supports US participation in LHCb

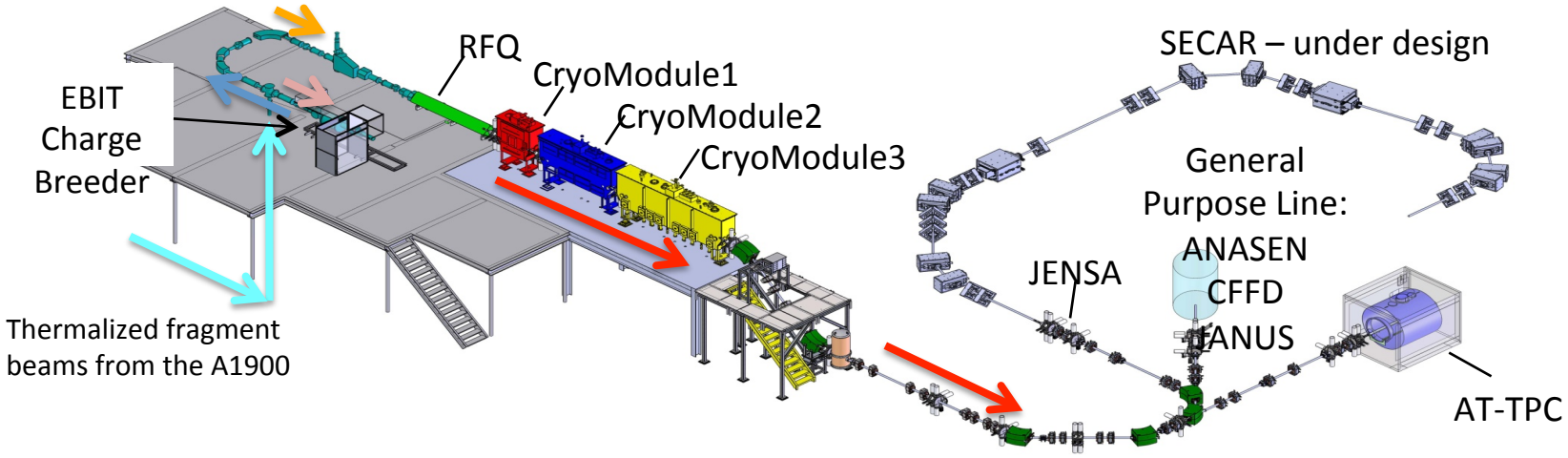
- Midscale upgrade
- Evidence for pentaquark-charmonium state



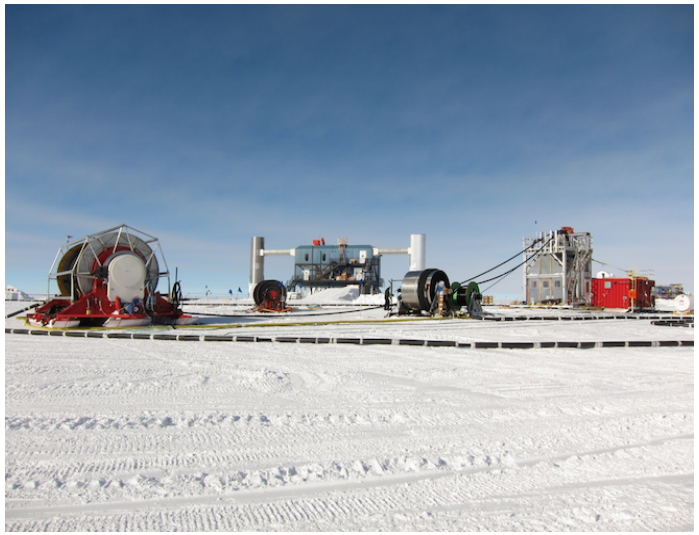


NSCL

- ReA3 now ready for science
- GRETINA to arrive July 2015



IceCube



- IC86-2014 run complete May 2015
  - 90,000 neutrinos
  - 90B muons
- Upper limits on non-standard flavor distributions
- Time-dependent astrophysical neutrino sources

Announced recompetition of IceCube management:
http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=505204
Deadline October 7, 2015

Physics Frontiers Centers

(RENEWED) The four core institutions of JINA-CEE, along with their eighteen associated domestic institutions and partnerships with other international centers, bring together nuclear physics and astrophysics for theoretical, computational, and laboratory investigations. JINA-CEE will explore two closely connected topics: the origin of the elements beyond those created in the Big Bang and the properties of the dense matter in neutron stars. This PFC will use interdisciplinary visitor, school, and workshop programs to engage K-12, undergraduate and graduate students, teachers, and the public.

University of Wisconsin - Milwaukee
(NEW) North American Nanohertz Observatory for Gravitational Waves
NANOGrav will look for gravitational waves with nanohertz frequencies-frequencies eleven orders of magnitude lower than those probed by LIGO. NANOGrav will observe and correlate signals of millisecond pulsars. This PFC will also interact with middle school, high school, and undergraduate students, engaging them in data collection and analysis along with public lecture programs.

Physics Division Operating Plan for FY 2015

(some good news…)

FY 2015 Budget Request	$263.70 M
FY 2015 Operating Plan	$274.99 M

Proposal and Award Processing Underway –
No Further Details Available

FY 2016 Budget Request	$277.37 M

NSF Budget Process: FY2016

FY 2016 Congressional Action on R&D in the National Science Foundation
(budget authority in millions of nominal dollars)

	FY 2014 Actual	FY 2015 Estimate	FY 2016 Budget	FY 2016 House	FY15 Change Amount	FY15 Change Percent	Request Change Amount	Request Change Percent	**FY 2016 Senate****	FY15 Change Amount	FY15 Change Percent	Request Change Amount	Request Change Percent
Total Estimated R&D	**5,800**	**5,999**	**6,309**	**6,077**	**78**	**1.3%**	**-232**	**-3.7%**	**6,031**	**33**	**0.5%**	**-277**	**-4.4%**
R&D by Character													
Conduct of R&D	5,403	5,562	5,864	5,640	78	1.4%	-224	-3.8%	5,596	34	0.6%	-267	-4.6%
R&D Facilities	397	437	445	437	0	0.0%	-8	-1.9%	435	-2	-0.4%	-10	-2.3%
Discretionary Budgets (include non-R&D)													
Research and Related Activities (R&RA)	5,775	5,934	6,186	5,984	50	0.8%	-203	-3.3%	5,934	0	0.0%	-253	-4.1%
Biological Sciences (BIO)*	721	731	748	780	49	6.7%	32	4.3%	731	0	0.0%	-17	-2.3%
Computer and Info Sci and Eng (CISE)*	893	922	954	995	73	7.9%	41	4.3%	922	0	0.0%	-33	-3.4%
Engineering (ENG)*	833	892	949	990	97	10.9%	40	4.3%	892	0	0.0%	-57	-6.0%
Geosciences (GEO)*	1,321	1,304	1,365	1,088	-217	-16.6%	-278	-20.3%	1,304	0	0.0%	-61	-4.5%
Mathematical and Physical Sci (MPS)*	1,268	1,337	1,366	1,424	88	6.6%	58	4.3%	1,337	0	0.0%	-30	-2.2%
Social, Behavioral, and Econ Sci (SBE)*	257	272	291	232	-40	-14.7%	-59	-20.3%	272	0	0.0%	-19	-6.6%
Integrative Activities*	433	425	459	425	0	0.0%	-34	-7.4%	425	0	0.0%	-34	-7.4%
Office of Internatl Sci and Engineering*	48	49	51	49	*0*	*0.0%*	*-3*	*-4.9%*	*49*	0	0.0%	-3	-4.9%
Arctic Research Commission*	1	1	1	1	0	0.0%	0	-4.7%	1	0	0.0%	0	-4.7%
Major Research Equip & Facils (MREFC)	200	201	200	200	-1	-0.4%	0	-0.1%	200	0	-0.2%	0	0.0%
Education & Human Resources (EHR)	832	866	963	866	0	0.0%	-97	-10.0%	866	0	0.0%	-97	-10.0%
Agency Ops & Award Mgmt (AOAM)	306	325	355	325	0	0.0%	-30	-8.4%	325	0	0.0%	-30	-8.4%
National Science Board (NSB)	4	4	4	4	0	0.0%	0	0.0%	4	0	0.0%	0	0.0%
Inspector General (OIG)	14	14	15	15	1	5.1%	0	0.0%	14	0	0.1%	-1	-4.7%
Total NSF Budget	**7,131**	**7,344**	**7,724**	**7,394**	**50**	**0.7%**	**-329**	**-4.3%**	**7,344**	**0**	**0.0%**	**-380**	**-4.9%**

*Appropriators do not allocate funding by directorate. However, the House Committee has said that the MPS, CISE, ENG, and BIO directorates shall receive at least 70 percent of R&RA funding, and that IA, OISE, and ARC are to remain flat from FY 2015 levels. The R&RA appropriation has thus been allocated proportionally under these constraints for illustrative purposes.

**The Senate Committee passed its Commerce, Justice, Science Appropriations bill June 11.

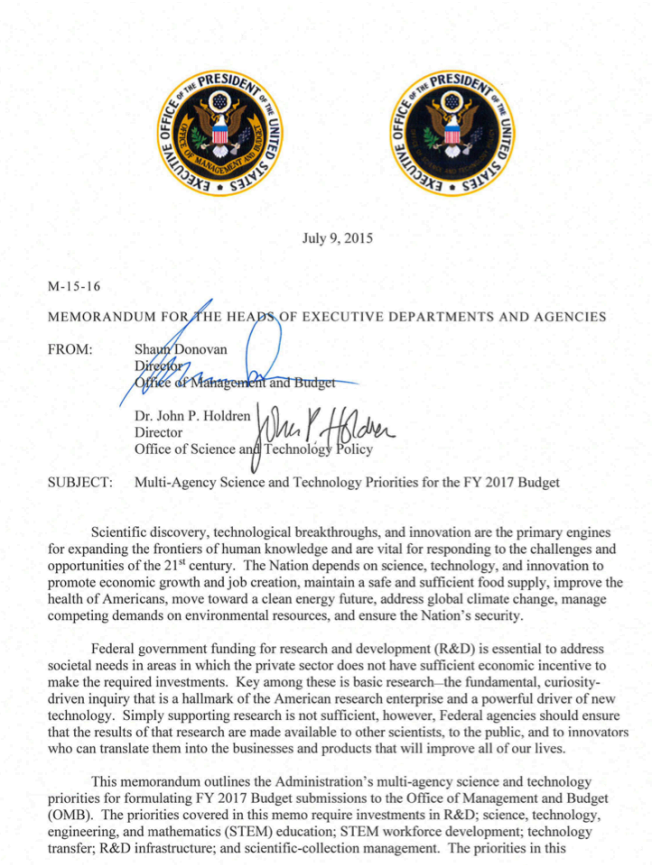
The House reported its Commerce, Justice, Science Appropriations bill (HR 2578) on June 3.

Source: OMB R&D data, *Budget of the U.S. Government FY 2016,* agency budget documents, and appropriations bills and reports.

All figures rounded to the nearest million. Changes calculated from unrounded figures.

June 17, 2015

OMB-OSTP Priorities Memo for FY2017



July 9, 2015

M-15-16

MEMORANDUM FOR THE HEADS OF EXECUTIVE DEPARTMENTS AND AGENCIES

FROM: Shaun Donovan
Director
Office of Management and Budget

Dr. John P. Holdren
Director
Office of Science and Technology Policy

SUBJECT: Multi-Agency Science and Technology Priorities for the FY 2017 Budget

Scientific discovery, technological breakthroughs, and innovation are the primary engines for expanding the frontiers of human knowledge and are vital for responding to the challenges and opportunities of the 21st century. The Nation depends on science, technology, and innovation to promote economic growth and job creation, maintain a safe and sufficient food supply, improve the health of Americans, move toward a clean energy future, address global climate change, manage competing demands on environmental resources, and ensure the Nation's security.

Federal government funding for research and development (R&D) is essential to address societal needs in areas in which the private sector does not have sufficient economic incentive to make the required investments. Key among these is basic research–the fundamental, curiosity-driven inquiry that is a hallmark of the American research enterprise and a powerful driver of new technology. Simply supporting research is not sufficient, however, Federal agencies should ensure that the results of that research are made available to other scientists, to the public, and to innovators who can translate them into the businesses and products that will improve all of our lives.

This memorandum outlines the Administration's multi-agency science and technology priorities for formulating FY 2017 Budget submissions to the Office of Management and Budget (OMB). The priorities covered in this memo require investments in R&D; science, technology, engineering, and mathematics (STEM) education; STEM workforce development; technology transfer; R&D infrastructure; and scientific-collection management. The priorities in this

- Priorities apply across executive branch
- Priorities affect Δs in budget process

Priority Area	Overlap with Physics	Overlap with Nuclear Physics
Global climate change		
Clean Energy		
Earth Observations		
Advanced Manufacturing		
Innovation in Life Science, Biology, and Neuroscience		
National and Homeland Security		
Information Technology and High-Performance Computing		
Ocean and Arctic Issues		
R&D for Informed Policy-Making and Management		
R&D Infrastructure		

- Physics of Living Systems
- Cyberinfrastructure Framework for the 21st Century (CIF21)