



News from NSF

Denise Caldwell

Division Director
Division of Physics

With Input from Program Directors: Saul Gonzalez*; Jim Shank; Randy Ruchti;
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*Now at OSTP

HEPAP 29 September 2014



Physics Division Allocation for FY 2014 was \$266.3 M

Approximately 2% for Operations -
Panels, IPA Appointments, IPA Travel, M&S

Approximately 30% for M&O for Facilities –
ATLAS and CMS, IceCube, LIGO, NSCL

Approximately 8% for Physics Frontiers Centers – Currently Ten

Approximately 3% for Education and Broadening Participation –
REU Sites, LIGO Education Center, QuarkNet

Leaves 57% (\$151.8 M) to Cover Six Major Areas of Physics –
Experimental and Theoretical

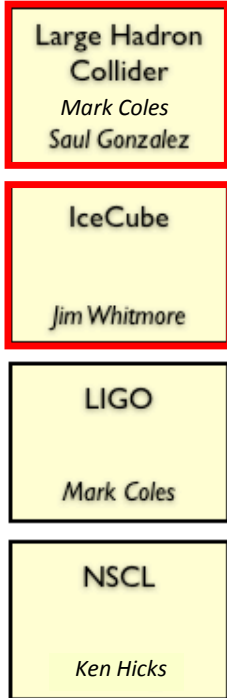


Division of Physics

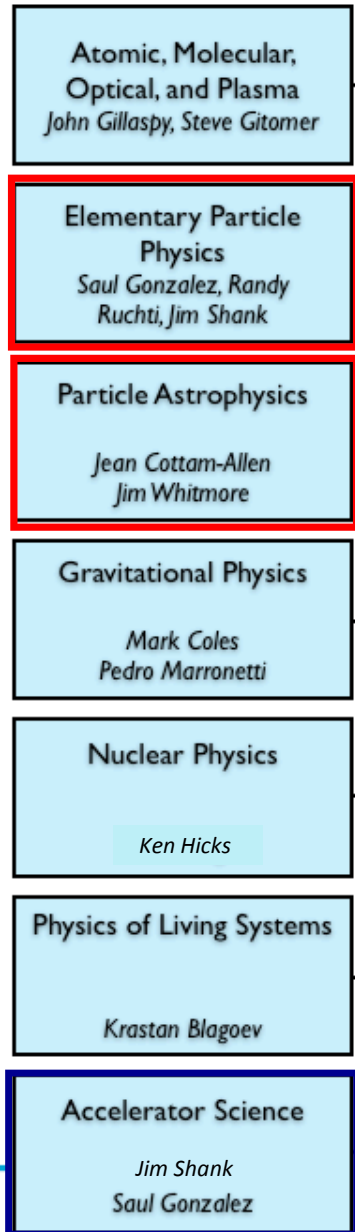
Denise Caldwell
Director

Brad Keister
Deputy Director

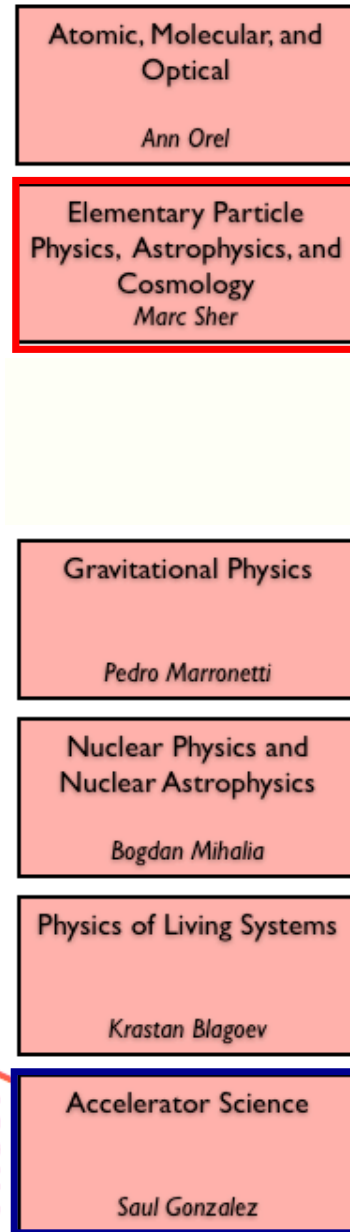
Facilities



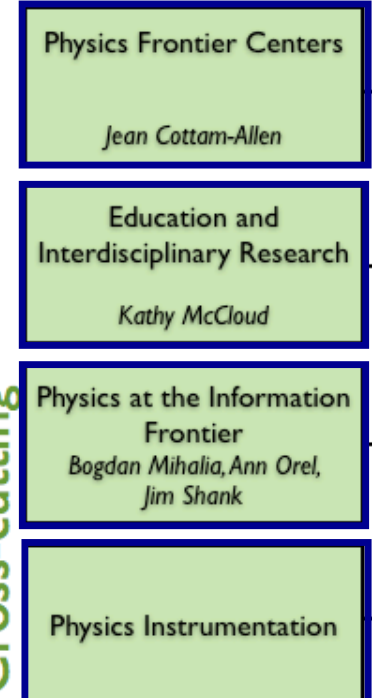
Experiment



Theory



Cross-cutting



- Core Particle Physics
- Cross-Cutting PHY Programs



FY 2015 PHY Funding Request

MPS Funding

(Dollars in Millions)

	FY 2013 Actual	FY 2014 Estimate	FY 2015 Request	Change Over FY 2014 Estimate	
				Amount	Percent
Astronomical Sciences (AST)	\$232.17	\$239.06	\$236.24	-\$2.82	-1.2%
Chemistry (CHE)	229.39	235.79	237.23	1.44	0.6%
Materials Research (DMR)	291.09	298.01	298.99	0.98	0.3%
Mathematical Sciences (DMS)	219.02	225.64	224.40	-1.24	-0.5%
Physics (PHY)	250.45	266.30	263.70	-2.60	-1.0%
Office of Multidisciplinary Activities (OMA)	27.22	35.00	35.00	-	-
Total, MPS	\$1,249.34	\$1,299.80	\$1,295.56	-\$4.24	-0.3%



NSF FY 2015 Budget Request

R&RA Funding

(Dollars in Millions)

	FY 2013 Actual	FY 2014 Estimate	FY 2015 Request	Change over FY 2014 Estimate	
				Amount	Percent
Biological Sciences	\$679.21	\$721.27	\$708.52	-\$12.75	-1.8%
Computer & Information Science & Engineering	858.13	894.00	893.35	-0.65	-0.1%
Engineering	820.18	851.07	858.17	7.10	0.8%
Geosciences	1,273.77	1,303.03	1,304.39	1.36	0.1%
Mathematical & Physical Sciences	1,249.34	1,299.80	1,295.56	-4.24	-0.3%
Social, Behavioral & Economic Sciences	242.62	256.85	272.20	15.35	6.0%
International and Integrative Activities	434.28	481.59	473.86	-7.73	-1.6%
U.S. Arctic Research Commission	1.39	1.30	1.41	0.11	8.1%
Total, R&RA	\$5,558.88	\$5,808.92	\$5,807.46	-\$1.46	-



NSF FY 2015 Funding Priority Areas

Funding for Selected FY 2015 Priorities

(Dollars in Millions)

Investment Priority	FY 2013 Actual	FY 2014 Estimate	FY 2015 Request	FY 2015 Request Change Over FY 2014 Estimate	
				Amount	Percent
Cognitive Science and Neuroscience	-	\$13.85	\$29.00	\$15.15	109.4%
Cyber-Enabled Materials, Manufacturing and Smart Systems (CEMMSS)	181.43	230.05	213.20	-16.85	-7.3%
Cyberinfrastructure Framework for 21st Century Science, Engineering, and Education (CIF21)	109.13	145.41	124.75	-20.66	-14.2%
Science, Engineering, and Education for Sustainability (SEES)	183.67	161.75	139.00	-22.75	-14.1%
Secure and Trustworthy Cyberspace (SaTC)	108.01	124.75	99.75	-25.00	-20.0%

Priority Area Funding/Total R&RA Funding = 605.7/5807.46 = 10% of Total



Particle Physics – FY 2014 Budget

Base Program Funding		\$ in millions							
EPP Research		18.7							
PA Research		11.9							
Underground Physics		6.8							
LHC Operations		17.4							
IceCube Operations		3.5							
Theory		12.1							
		70.4			27% of total PHY R&RA Available				
Additional PHY Cross-Cutting Resources									
Midscale		8.4			LHC Phase-One Upgrades; XENON1T; SPT				
CDS&E		3.4			OSG; Using GPUs in HEP (LHCb)				
PFC		3.1			KICP at U of Chicago				
		14.9							
Additional NSF-Wide Resources									
MRI		1.8			LAr1ND; DarkLight Phase 1; ATLAS Electronics				
Indirect Funding (Funding through Independent Programs into Awards that Impact Particle Physics)									
AMO		1.9			Electron Electric Dipole Moment				
Accelerator Science		4.5			Possible Short-Term Impact				
		6.4							
Total		93.5							



Major Undertakings in FY 2014

Launch of New Academic-Based Program in Accelerator Science

Initiation of Formal Midscale Funding Program

Initiation of Funding for Upgrades on LHC Detectors ATLAS, CMS, and LHCb

Review and Selection of Dark Matter G2 Experiments in Coordination with DoE
(See presentation from Jean Cottom Tuesday)

First Steps in NSF Response to P5 Report



Accelerator Science Program Description

PD 13-743: Particle accelerator systems have been key drivers for a broad array of fundamental discoveries and transformational scientific advances since the early 20th century. Since their inception, they have also been core components of U.S. technological innovation and economic competitiveness.

The Accelerator Science program will [support and foster research at universities that exploits the educational and discovery potential of basic accelerator physics research](#), and allows the development of [transformational discoveries](#) in this crosscutting [academic discipline](#). In particular, this program seeks to support research with the potential to [disrupt existing paradigms and advance accelerator science at a fundamental level](#), such as enabling discoveries that lead to [novel, compact, powerful, and/or cost-effective accelerators](#). Key questions that this program will address include: what are the fundamental limitations affecting the acceleration, control, intensity, and quality of particle beams? What novel approaches can be employed to substantially increase accelerating gradients? How can developments in other fields lead to new approaches in accelerator science and beam physics?

The goal of this program is to [seed and support fundamental accelerator science at universities as an academic discipline, providing the foundation in knowledge and workforce upon which major advances in accelerator-driven technologies will be based](#). An important component of the program will be the [support and training of the next generation of accelerator scientists, including students, postdoctoral researchers, and junior faculty](#), who will lead innovations in the field and will form the backbone of the nation's highly trained accelerator workforce.

Proposals for experimental, theoretical, and/or simulation-based research are welcome. [Priority will be given to those proposals that enable the discovery science supported by the MPS Division of Physics.](#)



Key Features of NSF Accelerator Science

- Focus on fundamental science best done at universities
 - High risk, transformational, academic discipline
 - Cross-cutting with other disciplines
 - Can take place on campus or off campus (national lab, etc.)
- Workforce
 - Attract the best students/postdocs by tackling hard and interesting problems
- This program is **NOT** intended to be
 - Directed R&D towards a foreseen project or facility
 - Incremental improvement to an existing facility (unless it is proof of concept of a new idea)
 - “Supplement” to an existing DOE award or program (does not mean that NSF award will not be issued to DOE award recipient; scope must be different than DOE’s)
- [Accelerator Science NSF web page](#)
- Next solicitation deadline: Feb. 4, 2015



Accelerator Science Program

- FY2014 Portfolio.

- 60 proposals, 52 projects (some proposals were collaborative)

- Request total

- \$70M

- 12 awards

- \$9M

	Amount \$	No. awards
Beam Dynamics	520,397	2
Plasma	1,469,900	3
Sources	1,006,910	2
SRF	4,522,786	2
Education	700,000	1
Other	720,000	2
Total	8,939,993	12



Mid-Scale Instrumentation

One of the most critical needs of research projects funded through the Physics Division is that of having cutting-edge instrumentation that enables investigators to remain competitive in a rapidly-changing scientific environment.

- The Physics Division has established a Mid-Scale Instrumentation Fund.
 - Dear Colleague Letter *NSF 13-118*: “Announcement of Instrumentation Fund to Provide Mid-Scale Instrumentation for FY2014 Awards in Physics Division”
 - http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf13118
- This is not a separate program to which investigators can apply directly. PI’s should request funding for specialized equipment as part of a regular proposal to a disciplinary program in the Division. The Program Officer can then request funds be provided through the Mid-Scale Instrumentation Fund.
- Mid-Scale Instrumentation Funds are one-time only, non-renewable and are not intended to cover the cost of operations for equipment constructed using the funds. These costs must be borne by the disciplinary program.



Mid-Scale Instrumentation

- Resources from the Mid-Scale Instrumentation Fund can be used for off-the-shelf purchases or for construction of specialized equipment.
- Mid-Scale Instrumentation Fund resources are intended to be one-time investments in the research project and require that the project have a well-defined beginning and end.
- Merit reviews proceed through the base programs or special reviews.
- Funding Levels begin at TPC of ~\$4.0M and can go up to TPC of ~\$20.0M.
- **Prior year examples: formerly called the APPI Program**
 - Has provided significant instrumentation and development for PA experiments. \$25.9M over the period FY08 – FY13. Examples HAWC, XENON1T, SCDMS...
- **Mid-Scale awards for FY14:**
 - Phase-I Upgrades for ATLAS and CMS and the LHCb Upgrade.
 - \$28.9M over the period FY14 – FY18.



ALTAS Phase I Upgrade (NSF)

- 5 Year Cooperative Agreement started FY2014
- \$11.4 M Total. Current Funding Profile

FY14 (\$M)	FY15 (\$M)	FY16 (\$M)	FY17 (\$M)	FY17 (\$M)	Total (\$M)
3.3	1.95	3.2	2.75	0.2	11.4

- Lead Inst.: SUNY, StonyBrook
 - Sub-awards to
 - Columbia, Michigan State, Southern Methodist



CMS Phase I Upgrade (NSF)

- 5 Year Cooperative Agreement started FY2014
- \$11.4 M Total. Current Funding Profile

FY14 (\$M)	FY15 (\$M)	FY16 (\$M)	FY17 (\$M)	FY17 (\$M)	Total (\$M)
3.75	1.8	2.7	2.18	1.09	11.5

- Lead Inst.: University of Nebraska, Lincoln
 - Sub-awards to
 - Cornell, Kansas, Northeastern, Purdue, Rutgers, SUNY Buffalo, U. of Illinois Chicago, Notre Dame



LHCb Tracker Upgrade (NSF)

- Collaborative award to Syracuse University (lead)
 - Cincinnati, MIT, Maryland

FY14 (\$M)	FY15 (\$M)	FY16 (\$M)	FY17 (\$M)	FY17 (\$M)	Total (\$M)
1.4	1.25	1.48	1.43	0.44	6.0

- Co-Funding with MPS Office of Multidisciplinary Activities (OMA) FY14 funds



NSF Response to Recommendations of P5

MPSAC Subcommittee on NSF Response to Strategic Plan for Particle Physics Outlined in the May 2014 Particle Physics Project Prioritization Panel Report

Full Text of Charge can be Found at:

<http://www.nsf.gov/mps/advisory.jsp>

The committee is **not** expected to revisit the P5 charge, priorities, or conclusions. Rather, the committee is expected to focus on the balance of NSF investments [in particle physics] in light of the P5 report.

- Based on the science drivers identified in the P5 report, how should the NSF target its investments in such a way that they maximize the NSF impact and visibility? Should the Physics Division target specific areas or should it invest broadly?
- What criteria should the Physics Division use to balance support between small-scale, mid-scale and large projects?
- How should the Division of Physics define a unique role in areas of common interest with DOE?



In response to P5, the Division of Physics is considering the following scenario for major investments in the next 10 years: An investment in LHC Phase 2 Upgrades, which could range from the midscale to the MREFC level, and Midscale investments in other scientific priority areas identified by P5.

In the context of P5 and NSF priorities as elaborated in its Strategic Plan*, this subcommittee is asked to assess this scenario and how it contributes to and impacts the Physics Division mission. This analysis should be undertaken assuming both a budget that is flat at the FY 2014 level and a budget at constant FY2014 dollars for particle physics funding over the 10-year period of FY 2015 through FY 2024.

*http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf14043

Timeline: Charge Delivered to Panel – August, 2014

Interim Report Due to MPSAC: November 2014 MPSAC Meeting

Final Report Due to MPSAC: January 2015 MPSAC Meeting

Subcommittee Chair: Young-Kee Kim, University of Chicago



Particle Physics Program Staffing

- Incoming:
 - New Program Director in EPP – B. Meadows, Nov 2014
 - New Program Director in THY – K. Dienes, Jan 2014
- Outgoing:
 - EPP Program Director – R. Ruchti, Oct 10, 2014
 - THY Program Director – M. Sher, Jan 24, 2015
- Continuing:
 - EPP Program Director – J. Shank
 - PA Program Director – J. Whitmore
 - PA Program Director – J. Cottam
- On Detail:
 - To OSTP – S. Gonzalez, Sept 2014-2015
- On Facilities:
 - PHY Science Advisor – M. Coles, Sept 2014