



Atomic, Molecular and Optical Physics

Program Directors

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AMO Experiments

Ann Orel
AMO Theory, Quantum Information Science (QIS)



AMO Physics at NSF FY12 (\$25.30M)

AMO Experiments \$16.68M

Precision Measurements, \$4.38M, 20 awards

Optical Physics, \$3.84 M, 28 awards

Atomic and Molecular Dynamics, \$7.05M, 56 awards

Atomic and Molecular Structure, \$1.41 M, 10 awards

AMO theory \$4.41M

\$4.41M, 57 awards

Minus ITAMP, \$3.81M, 55 awards (~\$70k average)

QIS \$4.21M

\$4.21M, 37 awards

12 experiments, 21 theory, 3 Centers (1 full, 2 partial support)



FY13 Request

R&RA – Research and Related Activities

(Direct Support for Research and Facilities)

MPS is 22.5% of NSF Total

R&RA Funding

(Dollars in Millions)

	FY 2011 Actual	FY 2012 Estimate	FY 2013 Request	Change over FY 2012 Estimate	
				Amount	Percent
Biological Sciences	\$712.27	\$712.38	\$733.86	\$21.48	3.0%
Computer & Information Science & Engineering	636.06	653.59	709.72	56.13	8.6%
Engineering	763.33	826.17	876.33	50.16	6.1%
Geosciences	885.32	885.27	906.44	21.17	2.4%
Mathematical & Physical Sciences	1,312.42	1,308.94	1,345.18	36.24	2.8%
Social, Behavioral & Economic Sciences	247.33	254.25	259.55	5.30	2.1%
Office of Cyberinfrastructure	300.75	211.64	218.27	6.63	3.1%
Office of International Science & Engineering	49.03	49.85	51.28	1.43	2.9%
Office of Polar Programs ¹	440.70	435.87	449.74	13.87	3.2%
Integrative Activities	259.60	349.59	431.52	81.93	23.4%
U.S. Arctic Research Commission	1.58	1.45	1.39	-0.06	-4.1%
Total, R&RA	\$5,608.38	\$5,689.00	\$5,983.28	\$294.28	5.2%

Totals may not add due to rounding.

¹ Funding for FY 2011 Actual excludes a one-time appropriation transfer of \$54.0 million, less the 0.2% rescission, to the U.S. Coast Guard per P.L. 112-110.



In FY 2013, funding within the broad and flexible R&RA portfolio highlights the Administration's priorities for science and innovation, including a focus on interdisciplinary science and engineering; innovative research on clean energy and sustainability; key investments in advanced manufacturing, break-through materials, wireless communications, and smart systems; an emphasis on bolstering our Nation's cyber security; strong support for new faculty and young investigators; and vital evidence-based educational activities at every level of learning that build the science and engineering workforce of tomorrow.

FY 2013 OneNSF Framework Priorities

(Dollars in Millions)

	FY 2011 Actual	FY 2012 Estimate	FY 2013 Request
Cyber-enabled Materials, Manufacturing, and Smart Systems (CEMMSS) ¹	-	\$141.65	\$257.42
Cyberinfrastructure Framework for 21 st Century Science and Engineering (CIF21)	-	78.00	106.08
Expeditions in Education (E ²)	-	-	49.00
NSF Innovation Corps (I-Corps)	1.06	7.50	18.85
Integrated NSF Support Promoting Interdisciplinary Research and Education (INSPIRE)	-	20.35	63.00
Secure and Trustworthy Cyberspace (SaTC) ¹	-	111.75	110.25
Science, Engineering, and Education for Sustainability (SEES) ¹	87.96	157.00	202.50
Total, NSF	\$89.02	\$516.25	\$807.10

Totals may not add due to rounding.

¹The FY 2011 number shown above for SEES, and the FY 2012 numbers for CEMMSS, SaTC, and SEES, represent estimated levels for directly related activities in these areas.



MPS Funding

(Dollars in Millions)

	FY 2011 Actual	FY 2012 Estimate	FY 2013 Request	Change Over FY 2012 Estimate	
Division of Astronomical Sciences (AST)	\$236.78	\$234.55	\$244.55	\$10.00	4.3%
Division of Chemistry (CHE)	233.55	234.06	243.85	9.79	4.2%
Division of Materials Research (DMR)	294.91	294.55	302.63	8.08	2.7%
Division of Mathematical Sciences (DMS)	239.79	237.77	245.00	7.23	3.0%
Division of Physics (PHY)	280.34	277.37	280.08	2.71	1.0%
Office of Multidisciplinary Activities (OMA)	27.06	30.64	29.07	-1.57	-5.1%
Total, MPS	\$1,312.42	\$1,308.94	\$1,345.18	\$36.24	2.8%

Totals may not add due to rounding.

MPS Major Investments

(Dollars in Millions)

Area of Investment	FY 2011 Actual	FY 2012 Estimate	FY 2013 Request	Change Over FY 2012 Estimate	
				Amount	Percent
Advanced Manufacturing	\$23.42	\$32.15	\$40.00	\$7.85	24.4%
BioMaPS	3.37	7.69	11.60	3.91	50.8%
CAREER	66.08	54.02	56.74	2.72	5.0%
CEMSS	-	32.15	50.00	17.85	55.5%
CIF21	-	11.50	19.55	8.05	70.0%
Clean Energy Technology	132.00	137.31	137.31	-	-
E ²	-	-	5.00	5.00	N/A
EARS	0.03	3.00	12.00	9.00	300.0%
I-Corps	0.20	1.00	1.30	0.30	30.0%
INSPIRE	-	3.00	7.00	4.00	133.3%
SEES	2.72	16.50	27.20	10.70	64.8%
SaTC	-	0.50	2.00	1.50	300.0%

Major investments may have funding overlap and thus should not be summed.

Priority Funds are Imbedded in the Core Programs in Areas of Overlap with NSF Priorities

Priority Funds Represent 13.5% of Total Budget – Remaining 86.5% is Invested in open “Discovery” Projects



Physics Division Request for FY 2013 is \$280 M

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

Approximately 26% for M&O for Facilities –
ATLAS and CMS, IceCube, LIGO, NSCL

Approximately 7% for Physics Frontiers Centers – Currently Ten

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

Leaves 62% (\$173.6 M) to Cover Six Major Areas of Physics –
Experimental and Theoretical



Sequestration

5% Cut to NSF

No decision has been made on how the cuts will be implemented.

What we do know:

1. No furloughs.
2. No cuts on existing grants.
3. Will honor major construction projects already promised.

Will definitely impact program research funds



CDS&E Program

MPS, ENG, and OCI have recently established a new cross-directorate program in Computational and Data-Enabled Science and Engineering (CDS&E: PD 12-8084).

"The goal of the CDS&E program is to identify and capitalize on opportunities for major scientific and engineering breakthroughs through new computational and data analysis approaches. The intellectual drivers may be in an individual discipline or they may cut across more than one discipline in various Directorates. The key identifying factor is that the outcome relies on the development, adaptation, and utilization of one or more of the capabilities offered by advancement of both research and infrastructure in computation and data. The CDS&E program welcomes proposals in any area of research supported through the participating divisions that:

- Promote the creation, development, and application of the **next generation of mathematical, computational and statistical theories and tools** that are essential for addressing the challenges presented to the scientific and engineering communities by the ever-expanding role of computational modeling and simulation and the explosion and production of digital experimental and observational data.
- Promote and encourage **integrated research projects that create, develop and apply novel computational, mathematical and statistical methods, algorithms, software, data curation, analysis, visualization and mining tools to address major, heretofore intractable questions in core science and engineering disciplines**...
- Encourage adventurous ideas that generate **new paradigms and that create and apply novel techniques**, generating and utilizing digital data in innovative ways to complement or dramatically enhance traditional computational, experimental, observational, and theoretical tools for scientific discovery and application.
- **Encourage ideas at the interface between scientific frameworks, computing capability, measurements and physical systems that enable advances well beyond the expected natural progression of individual activities** .."



CDS&E Program Organization

The CDS&E program was created as a “meta-program.” Individual programs that reside in the divisions and directorates are integrated through a single funding announcement (PD 12-8084) and organized with a CDS&E Coordination Group.

Mathematical and Physical Sciences:

Division Mathematical Sciences: Computational and Data-Enabled Science and Engineering in Mathematical and Statistical Sciences

Physics Division: Physics at the Information Frontier

Division Materials Research: Computational and Data Driven Materials Research

Astronomy Division: Theoretical and Computational Networks
Astronomy and Astrophysics Research Grants
Advanced Technologies and Instrumentation

Chemistry Division: Chemical Theory, Models and Computational Methods,
Chemical Measurement and Imaging

Engineering Directorate:

Civil, Mechanical and Manufacturing Innovation (CMMI)

Chemical, Bioengineering, Environmental, and Transport Systems (CBET)

Office of Cyber Infrastructure

CDS&E Program Started in FY13

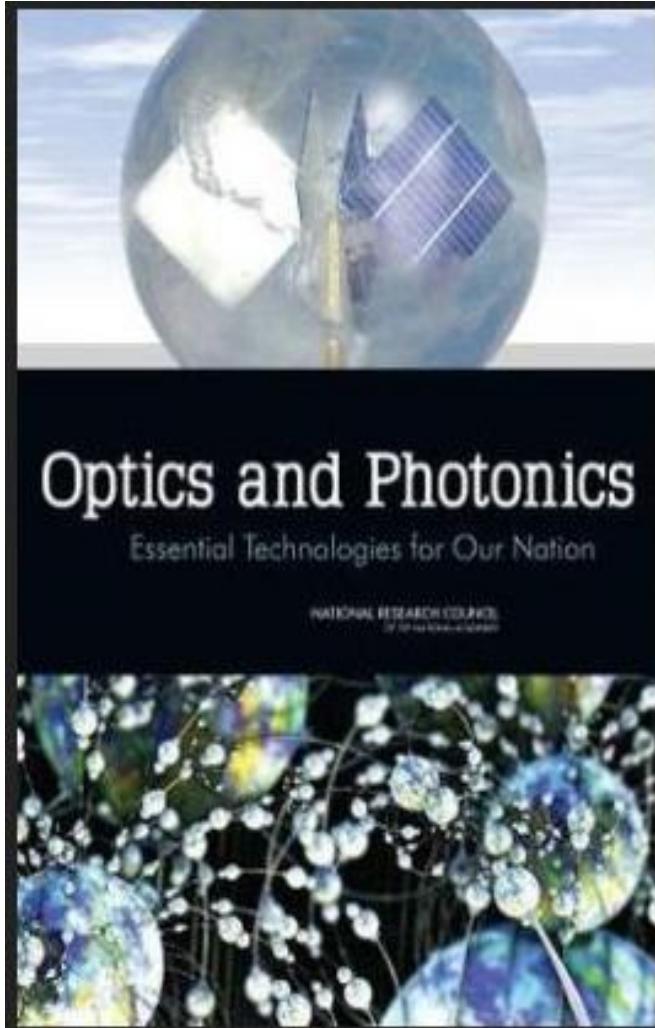


This is the first year of the integrated CDS&E program:

- The deadlines for proposal submission began in September.
- The response from the community has been very good.
- The Coordination Group is meeting regularly and has identified proposals for co-review between the divisions and directorates

➔ Everything is proceeding smoothly!

Optics and Photonics



- Possible priority area for funding
- Has initiated intense discussion at NSF
- MPS Advisory committee has commissioned a subpanel that will prepare report on MPS response
- Community will be asked for input (soon)