



NATIONAL
SCIENCE
FOUNDATION

F I S C A L
Y E A R

2 0 1 3

B U D G E T
R E Q U E S T

Edward Seidel, Assistant Director
Directorate for Mathematical and
Physical Sciences



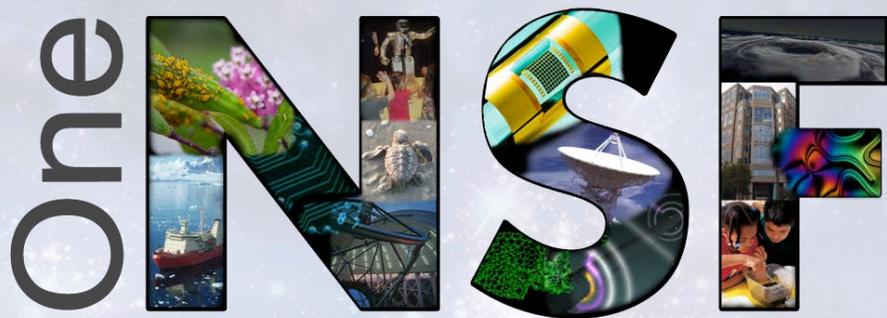
One NSF

- Transform the Frontiers
- Innovate for Society
- Perform as a Model Organization

One NSF

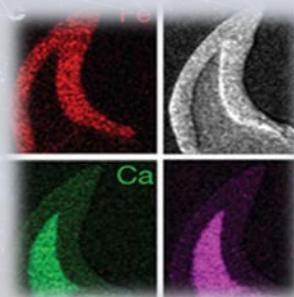
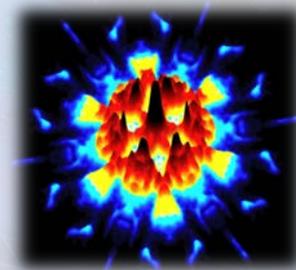
- CEMMSS
- CIF21
- E²
- INSPIRE
- I-Corps
- SaTC
- SEES

- Transform the Frontiers
- Innovate for Society
- Perform as a Model Organization



Directorate for Mathematical and Physical Sciences

- Advancing Discovery
- Building Blocks for Innovation
- Forefront Facilities
- Educating the Next Generation



Advancing Discovery

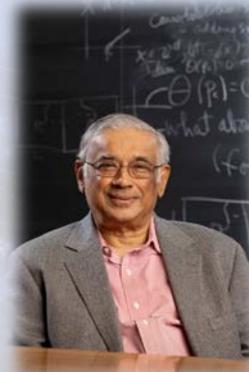
- 2011 Physics Nobel Prize

Discovery of the accelerating expansion of the universe through observations of distant supernovae

- 2011 National Medal of Science

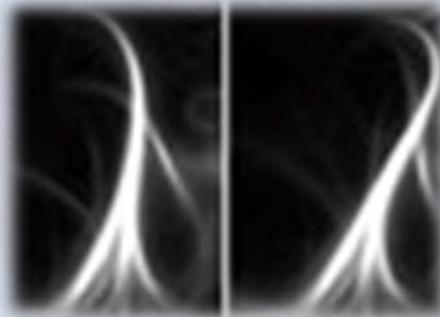
Theory of large variations; probability of rare events

**NOBEL
PRIZE**



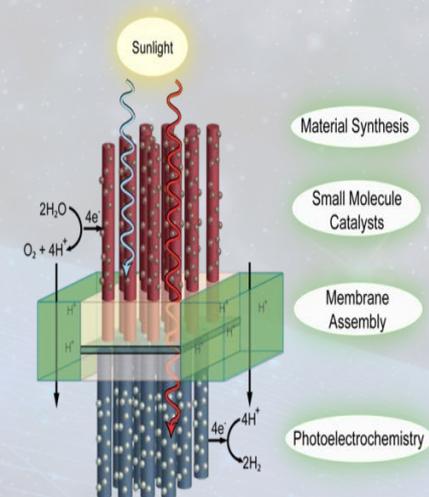
Building Blocks for Innovation

- Catalyze advances in science impacting innovation in medicine, industry, and technology
- Green Chemistry
 - SusChEM
- Materials Genome Initiative
 - DMREF



Science, Engineering, and Education for Sustainability (SEES)

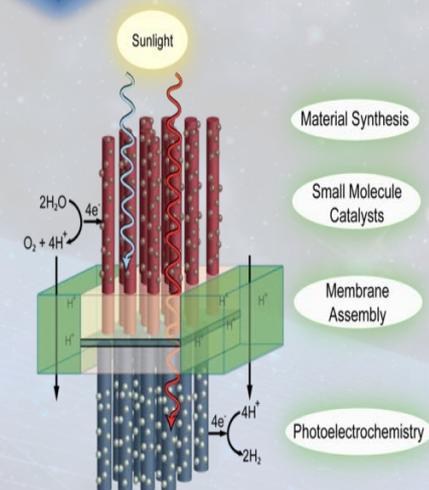
- Inform the societal actions needed for environmental and economic sustainability and sustainable human well-being
 - Resilience to natural and technological disasters
 - Coastal and Arctic systems
 - Sustainable Chemistry, Engineering and Materials
 - Improvements in IT energy efficiency



Science, Engineering, and Economic Sustainability (SEES)

MPS: \$27.2M in
FY 2013

- Inform the societal actions needed for environmental and economic sustainability and sustainable human well-being
 - Resilience to natural and technological disasters
 - Coastal and Arctic systems
 - Sustainable Chemistry, Engineering and Materials
 - Improvements in IT energy efficiency



Cyberinfrastructure Framework for 21st Century Science and Engineering (CIF21)

- Cyberinfrastructure to transform research, innovation, and education
- Involves all directorates and offices
- Major components
 - Computational and Data-enabled Science
 - Core Technologies, Tools, Algorithms
 - Big Data Projects
 - Workforce Development



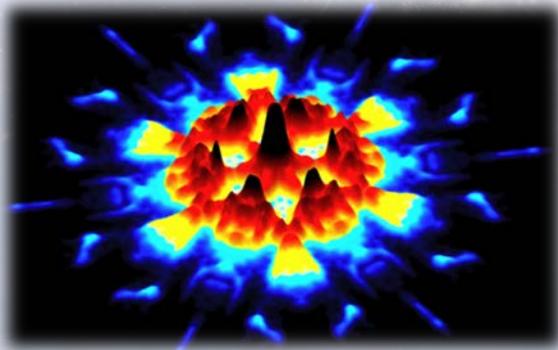
Cyberinfrastructure Framework Century Science and Engineering

MPS: \$19.5M in
FY 2013

- Cyberinfrastructure to transform research, innovation, and education
- Involves all directorates and offices
- Major components
 - Computational and Data-enabled Science
 - Core Technologies, Tools, Algorithms
 - Big Data Projects
 - Workforce Development



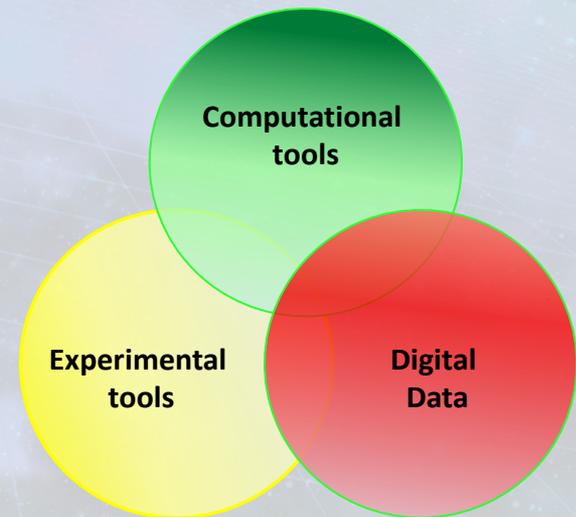
Cyber-Enabled Materials Manufacturing and Smart Systems (CEMMSS)



- Partnership with ENG and CISE
- Advanced Manufacturing
- DMREF

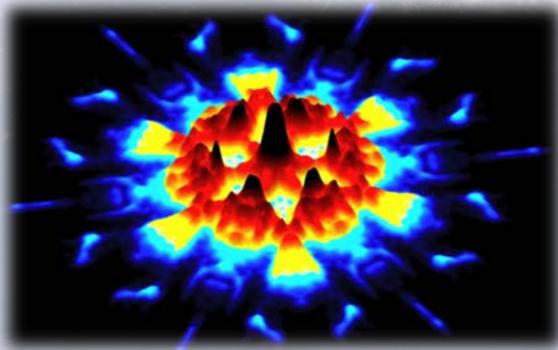
- Fundamental research for discovering, making, modeling, optimizing, and manufacturing with new materials and material systems

Materials Innovation Infrastructure



Cyber-Enabled Materials Manufacturing and Smart Systems (CEMMS)

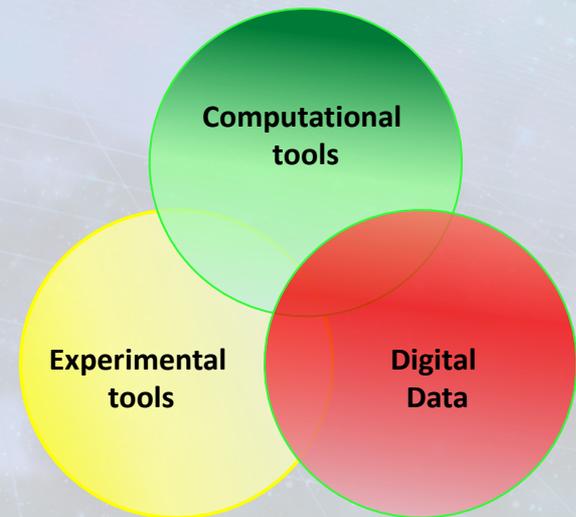
MPS: \$50.0M in
FY 2013



- Partnership with ENG and CISE
- Advanced Manufacturing
- DMREF

- Fundamental research for discovering, making, modeling, optimizing, and manufacturing with new materials and material systems

Materials Innovation Infrastructure



Secure and Trustworthy Cyberspace (SaTC)

- Cross-foundation partnership to build a cybersecure society
- Produce high-quality digital systems and a well-trained cybersecurity workforce
- *Strategic Plan for the Federal Cybersecurity Research and Development Program*
- Comprehensive National Cybersecurity Initiative



Secure and Trustworthy Cyberspace

MPS: \$2.0M in
FY 2013

- Cross-foundation partnership to build a more cybersecure society
- Produce high-quality digital systems and a well-trained cybersecurity workforce
- *Strategic Plan for the Federal Cybersecurity Research and Development Program*
- Comprehensive National Cybersecurity Initiative



Expeditions in Education (E²)

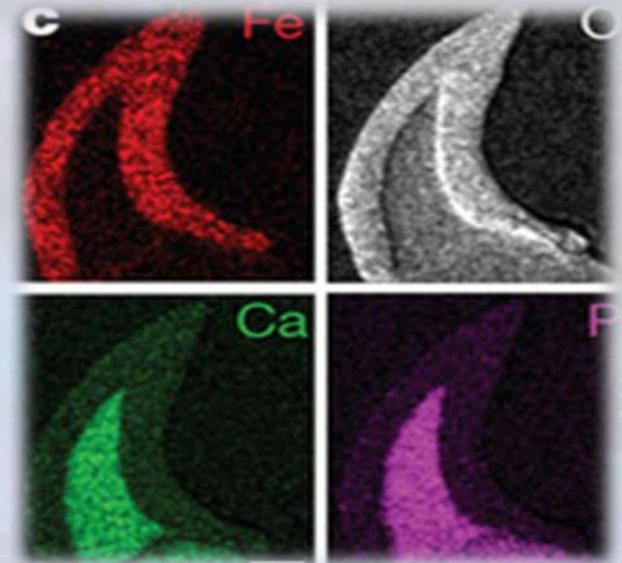
- Transform STEM learning for the Nation through cognitive research and frontier science
 - Transforming Learning for STEM Undergraduates
 - People and the Planet
 - Cyberlearning and Big Data

Expeditions in Education (E²) MPS: \$5.0M in E² in FY 2013

- Transform STEM learning for the future through cognitive research and frontier science
 - Transforming Learning for STEM Undergraduates
 - People and the Planet
 - Cyberlearning and Big Data

Research at the Interface of Biological, Mathematical, and Physical Sciences (BioMaPS)

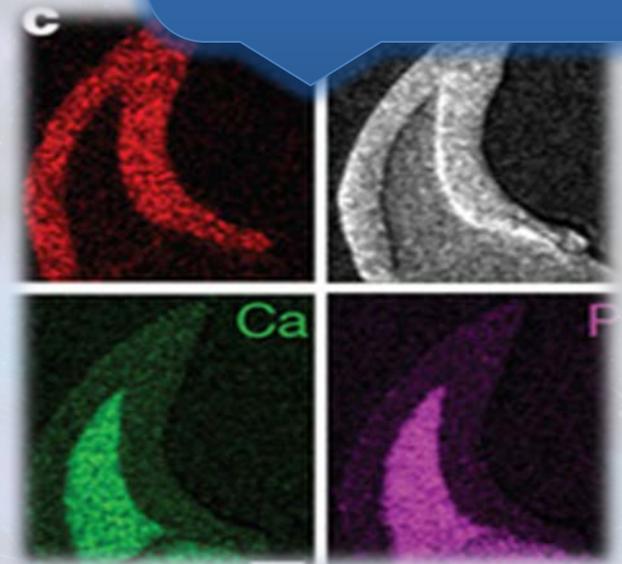
- Insight into and inspiration from the living world
 - Biological design strategy for better composite materials
 - Bio-imaging and bio-inspired sensors



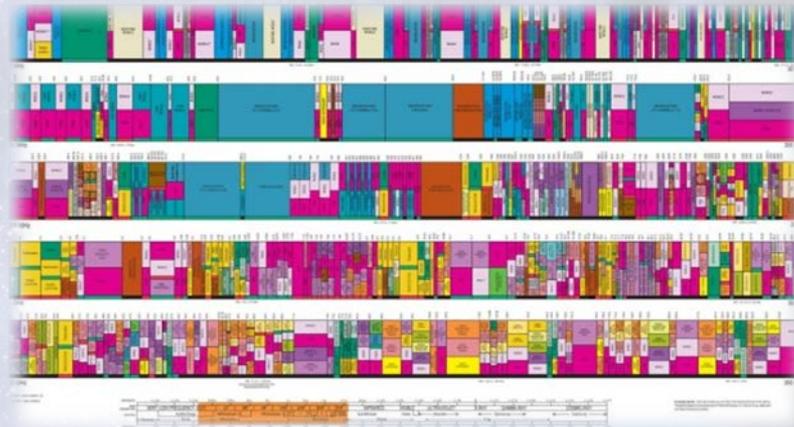
Research at the Interface of Biology, Mathematics, and Physical Science (BioMaPS)

- Insight into and inspiration from the living world
 - Biological design strategy for better composite materials
 - Bio-imaging and bio-inspired sensors

MPS: \$11.6M in
FY 2013

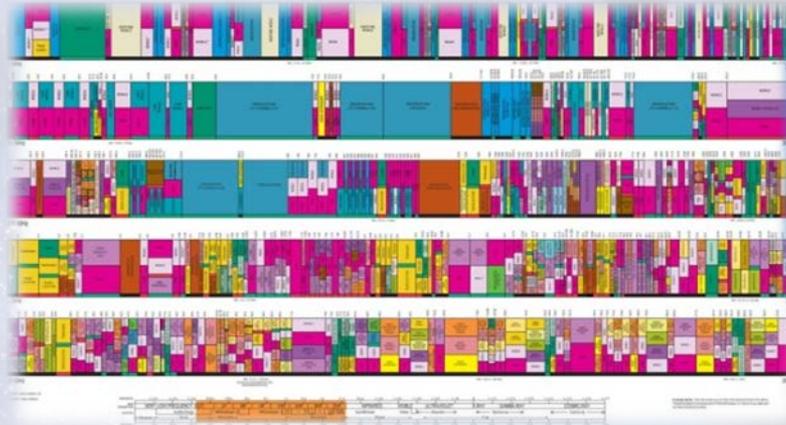


Enhancing Access to the Radio Spectrum (EARS)



- MPS is home to electromagnetic spectrum management for NSF
- Cross-cutting research on efficient use of radio spectrum
- Technology, economics, social science, and public policy
- Responsive to national broadband plan

Enhancing Access to the Radio Spectrum (EARS)



MPS: \$12.0M in
FY 2013

- MPS is home to electromagnetic spectrum management for NSF
- Cross-cutting research on efficient use of radio spectrum
- Technology, economics, social science, and public policy
- Responsive to national broadband plan

Supporting Multidisciplinary Research Across NSF



- INSPIRE
 - High-risk/high-reward research across disciplines
- Innovation Corps (I-Corps)
 - First NSF award in MPS: solar irradiation to dissolve oil contaminants in water
- Science Across Virtual Institutes (SAVI)
 - 2 of NSF's first 3 awards in MPS: Virtual Institute for Mathematical and Statistical Sciences with India, and Physics of Living Systems Student Research Network with Brazil, Israel, Singapore, and Europe

Supporting Multidisciplinary Across NSF

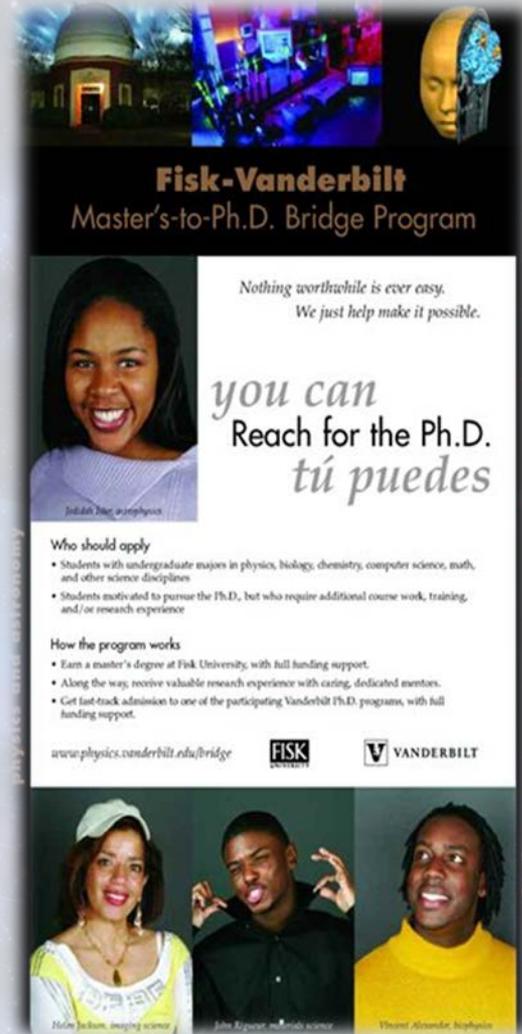
MPS: \$8.3M in FY
2013 for INSPIRE
and I-Corps

- INSPIRE
 - High-risk/high-reward research across disciplines
- Innovation Corps (I-Corps)
 - First NSF award in MPS: solar irradiation to dissolve oil contaminants in water
- Science Across Virtual Institutes (SAVI)
 - 2 of NSF's first 3 awards in MPS: Virtual Institute for Mathematical and Statistical Sciences with India, and Physics of Living Systems Student Research Network with Brazil, Israel, Singapore, and Europe



Building the Pipeline

- CAREER
 - MPS accounts for 25% of NSF CAREER awards
- MPS AGEP Graduate Research Supplements
 - MPS Dear Colleague Letter



Fisk-Vanderbilt
Master's-to-Ph.D. Bridge Program

*Nothing worthwhile is ever easy.
We just help make it possible.*

you can
Reach for the Ph.D.
tú puedes

Who should apply

- Students with undergraduate majors in physics, biology, chemistry, computer science, math, and other science disciplines
- Students motivated to pursue the Ph.D., but who require additional course work, training, and/or research experience

How the program works

- Earn a master's degree at Fisk University, with full funding support.
- Along the way, receive valuable research experience with caring, dedicated mentors.
- Get fast-track admission to one of the participating Vanderbilt Ph.D. programs, with full funding support.

www.physics.vanderbilt.edu/bridge  

Helen Jackson, imaging scientist *John Kijour, astrophysics scientist* *Theresa Alexander, biologist*

Building the Pipeline

- CAREER
 - MPS accounts for 25% of NSF CAREER awards
- MPS AGEP Graduate Research Supplements
 - MPS Dear Colleague Letter

MPS: \$56.7M in CAREER in FY 2013

Nothing worthwhile is ever easy.
We just help make it possible.

you can
Reach for the Ph.D.
tú puedes

Who should apply

- Students with undergraduate majors in physics, biology, chemistry, computer science, math, and other science disciplines
- Students motivated to pursue the Ph.D., but who require additional course work, training, and/or research experience

How the program works

- Earn a master's degree at Fisk University, with full funding support.
- Along the way, receive valuable research experience with caring, dedicated mentors.
- Get fast-track admission to one of the participating Vanderbilt Ph.D. programs, with full funding support.

www.physics.vanderbilt.edu/bridge FISK UNIVERSITY VANDERBILT

Juliana Diaz, astrophysics

Haley Jackson, imaging science *John Kypour, astrophysics* *Theresa Alexander, biochemistry*

MPS Large Facilities in FY 2013

MPS Funding for Facilities (Dollars in Millions)

	FY 2012 Plan	FY 2013 Request	Change Over	
			FY 2012 Estimate Amount	Percent
Facilities (Total)	\$260.24	\$263.01	\$2.77	1.1%
Advanced Technology Solar Telescope (ATST)	2.00	2.00	-	-
Atacama Large Millimeter Array (ALMA)	28.61	32.92	4.31	15.1%
Cornell High Energy Synchr. Source (CHESS)	19.67	20.00	0.33	1.7%
GEMINI Observatory	22.07	18.15	-3.92	-17.8%
IceCube Neutrino Observatory (IceCube)	3.45	3.45	-	-
Large Hadron Collider (LHC)	18.00	18.00	-	-
Laser Interfer. Grav. Wave Observatory (LIGO)	30.40	30.50	0.10	0.3%
Arecibo Observatory	5.50	5.00	-0.50	-9.1%
Nat'l High Magnetic Field Laboratory (NHFML)	25.80	31.75	5.95	23.1%
Nat'l Nanotechnology Infra. Network (NNIN)	2.98	2.58	-0.40	-13.4%
Nat'l Optical Astronomy Observatory (NOAO)	25.50	25.50	-	-
Nat'l Radio Astronomy Observatory (NRAO)	43.14	41.00	-2.14	-5.0%
National Solar Observatory (NSO)	9.10	8.00	-1.10	-12.1%
Nat'l Superconducting Cyclotron Lab (NSCL)	21.50	21.50	-	-
Other MPS Facilities ¹	2.52	2.66	0.14	5.6%

Totals may not add due to rounding.



MPS Large Facilities



Facilities (Total)

Advanced Technology Solar Telescope (ATST)		2.00	-	-
Atacama Large Millimeter Array (ALMA)	28.61	32.92	4.31	15.1%
Cornell High Energy Synchr. Source (CHESS)	19.67	20.00	0.33	1.7%
GEMINI Observatory	22.07	18.15	-3.92	-17.8%
IceCube Neutrino Observatory (IceCube)	3.45	3.45	-	-
Large Hadron Collider (LHC)	18.00	18.00	-	-
Laser Interfer. Grav. Wave Observatory (LIGO)	30.40	30.50	0.10	0.3%
Arecibo Observatory	5.50	5.00	-0.50	-9.1%
Nat'l High Magnetic Field Laboratory (NHFML)	25.80	31.75	5.95	23.1%
Nat'l Nanotechnology Infra. Network (NNIN)	2.98	2.58	-0.40	-13.4%
Nat'l Optical Astronomy Observatory (NOAO)	25.50	25.50	-	-
Nat'l Radio Astronomy Observatory (NRAO)	43.14	41.00	-2.14	-5.0%
National Solar Observatory (NSO)	9.10	8.00	-1.10	-12.1%
Nat'l Superconducting Cyclotron Lab (NSCL)	21.50	21.50	-	-
Other MPS Facilities ¹	2.52	2.66	0.14	5.6%

Totals may not add due to rounding.

MPS FY 2013 Budget Request

	FY 2011 Actual (\$M)	FY 2012 Current Plan (\$M)	FY 2013 Request (\$M)	Change FY 2012 to FY 2013 (%)	Change FY 2012 to FY 2013 (\$M)
Division of Astronomical Sciences (AST)	\$236.78	\$234.55	\$244.55	4.3%	\$10.00
Division of Chemistry (CHE)	\$233.55	\$234.06	\$243.85	4.2%	\$9.79
Division of Materials Research (DMR)	\$294.91	\$294.55	\$302.63	2.7%	\$8.08
Division of Mathematical Sciences (DMS)	\$239.79	\$237.77	\$245.00	3.0%	\$7.23
Division of Physics (PHY)	\$280.34	\$277.37	\$280.08	1.0%	\$2.71
MPS Total	\$1,312.42	\$1,308.94	\$1,345.18	2.8%	\$36.24

MPS FY 2013 Budget Request

OMA: \$30.0M in
FY 2013

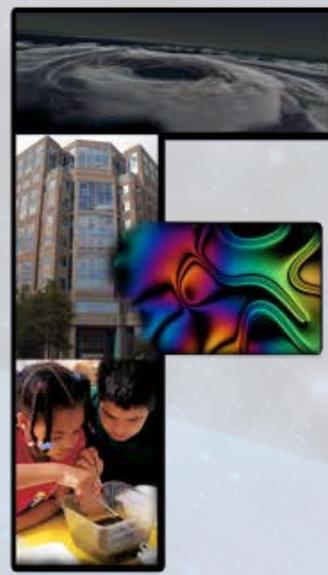
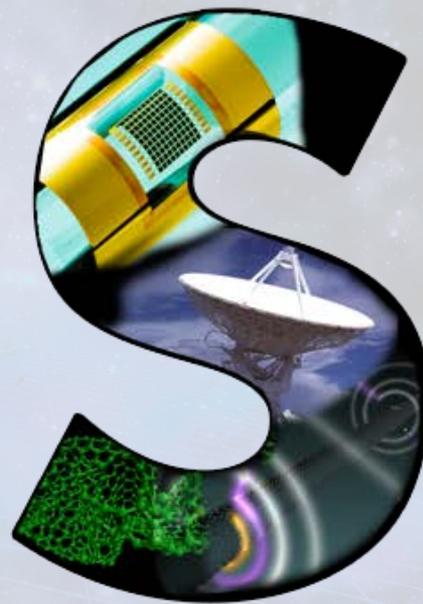
	FY 2011 Actual (\$M)	FY 2012 Current Plan (\$M)	FY 2013 Request (\$M)	2012 to FY 2013 (%)	2012 to FY 2013 (\$M)
Division of Astronomical Sciences (AST)	\$236.78	\$234.55	\$244.55	4.3%	\$10.00
Division of Chemistry (CHE)	\$233.55	\$234.06	\$243.85	4.2%	\$9.79
Division of Materials Research (DMR)	\$294.91	\$294.55	\$302.63	2.7%	\$8.08
Division of Mathematical Sciences (DMS)	\$239.79	\$237.77	\$245.00	3.0%	\$7.23
Division of Physics (PHY)	\$280.34	\$277.37	\$280.08	1.0%	\$2.71
MPS Total	\$1,312.42	\$1,308.94	\$1,345.18	2.8%	\$36.24

Performing as a Model Agency

- Career-Life Balance
 - MPS Dear Colleague Letter
 - No-cost extensions
 - Flexible start dates
 - Supplements for additional personnel
 - Virtual participation in NSF activities
 - Community Outreach and Engagement



One



One NSF

Questions?