



# HEPAP Committee Meeting: NSF/MPS FY 2011 Budget Request

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# MPS FY 2011 Budget Request Highlights

MPS request: \$1.41B  
+ 4.3% (+ \$58.07M)

## MPS Budget Request Reflects NSF Priorities:

- Support innovation in healthy core programs
- Advance a strong scientific and technical workforce (CAREER, Postdoc, GRF, REU)
- Invest in research addressing national priorities
- Support center activity
- Invest in facilities



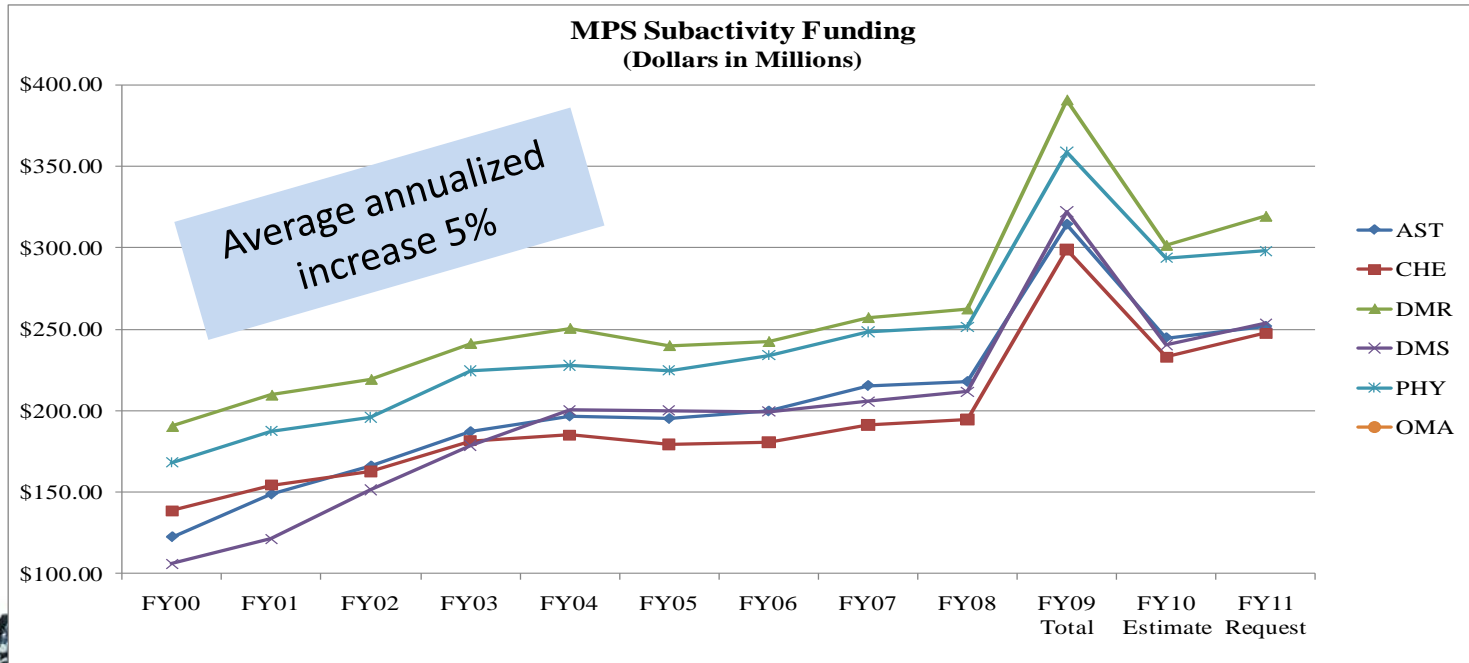
# MPS FY 2011 Budget Request

(Dollars in Millions)

	FY 2009 Omnibus Actual	FY 2009 ARRA Actual	FY 2010 Estimate	FY 2011 Request	Change Over	
					FY 2010 Estimate	
					Amount	Percent
Astronomical Sciences	\$228.67	\$85.80	\$245.69	\$251.77	\$6.08	2.5%
Chemistry	211.67	87.36	233.73	247.56	13.83	5.9%
Materials Research	282.52	108.17	302.67	319.37	16.70	5.5%
Mathematical Sciences	224.84	97.34	241.38	253.46	12.08	5.0%
Physics	262.47	96.30	290.04	298.19	8.15	2.8%
OMA	33.70	-	38.33	39.56	1.23	3.2%
<b>Total, MPS</b>	<b>\$1,243.88</b>	<b>\$474.97</b>	<b>\$1,351.84</b>	<b>\$1,409.91</b>	<b>\$58.07</b>	<b>4.3%</b>

Discovery  
+6.7%

Physics  
Discovery  
11.2%

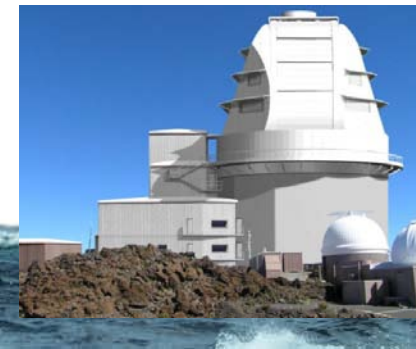




# MPS FY 2009 ARRA

\$490M total investment in MPS R&RA + \$146M MREFC

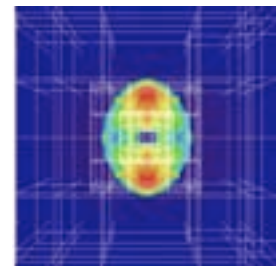
- Research and Education grants - \$402M
  - Close to 400 new PIs
  - 85 CAREER awards
  - Major investments in GRF, REU, post-doc programs
  - Over 70 energy and over 25 climate awards
- Facilities and Instrumentation support - \$88M
  - 10 MPS-supported user facilities received funding, for operations, maintenance, safety upgrades, saving jobs
    - \$2M for NSCL
- Advanced Technology Solar Telescope (ATST)
  - \$146M in MREFC construction





# MPS Core Programs

- Support researchers to investigate
  - Structure/evolution of the universe, fundamental particles, processes of matter
  - Behavior and control of molecules at nanoscale, complexity of their chemical interactions in materials and life processes
  - New mathematical structures and theories, connections to computation, experiment, observation
- Fundamental for advances in all science, medicine, industry, technology

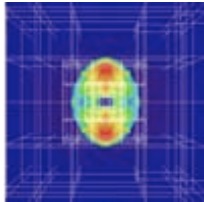




# CF21: Cyberinfrastructure Framework for 21<sup>st</sup> Century Science & Engineering



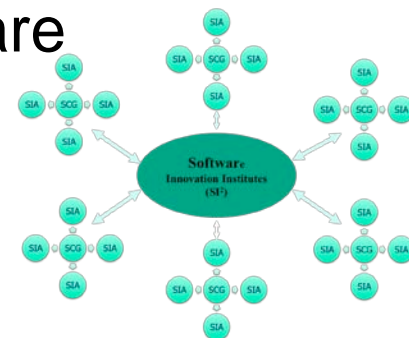
- High-end computation, data, visualization for transformative science; *sustainability, extensibility*
- MREFCs and collaborations including large-scale NSF collaborative facilities, international partners
- Software, tools, science applications, and VOs critical to science, integrally connected to hardware
- Campuses fundamentally linked; grids, clouds, loosely coupled campus services, policy to support
- People. Comprehensive approach workforce development for 21st century science and engineering





# Emerging CF21 Concepts

- CF21 HPC program to replace Track 2
  - Sustainability, hubs of innovation + experimental
- CF21 Software Institutes and Innovators
  - Transform innovation into sustainable software
  - Significant multiscale, long-term program
    - Connected institutes, teams, investigators
    - Integrated into CF21 framework w/Directorates
- CF21 Fellowships for Transformative Computational Science
  - Goal: People!
    - *Use CI to make revolutionary advances in their disciplines*
    - *Research and develop CI for innovation in any discipline*





# Science, Engineering and Education for Sustainability (SEES)

MPS is partnering with other NSF Directorates to invest in climate and energy research

- Energy
  - Energy Storage
    - New battery materials could “charge in seconds”
  - SOLAR program
    - Novel earth-abundant materials for solar energy harvesting, creating efficient solar cells
    - Efficient materials for direct conversion of photons into hydrogen via water electrolysis
- Climate
  - New algorithms improve atmospheric and ocean simulations with parameterized uncertainties in physical processes, which typically hamper climate change predictions

SEES request:  
\$110.50 M





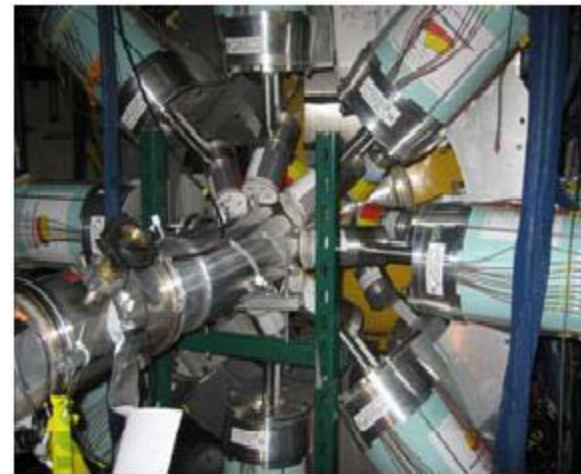


# MPS Funding for Facilities

	FY 2011 Request
<i>Adv. Tech. Solar Telescope (ATST)</i>	\$2.00
<i>Atacama Large Millimeter Array (ALMA)</i>	23.50
<i>Cornell High Energy Synchr. Source (CHESS)/ Cornell Electron Storage Ring (CESR)</i>	13.45
<i>GEMINI Observatory</i>	19.58
<i>IceCube Neutrino Observatory</i>	2.50
<i>Large Hadron Collider (LHC)</i>	18.00
<i>Laser Interfer. Grav. Wave Observatory (LIGO)</i>	30.30
<i>Nat'l Astronomy and Ionosphere Ctr. (NAIC)</i>	6.00
<i>Nat'l High Magnetic Field Laboratory (NHMFL)</i>	34.00
<i>Nat'l Nanotechnology Infra. Network (NNIN)</i>	3.38
<i>Nat'l Optical Astronomy Observatory (NOAO)</i>	33.33
<i>Nat'l Radio Astronomy Observatory (NRAO)</i>	44.37
<i>National Solar Observatory (NSO)</i>	9.51
<i>Nat'l Superconducting Cyclotron Lab (NSCL)</i>	21.50
<i>Other MPS Facilities</i>	7.65
	\$269.07



LIGO



NSCL





# DUSEL: Status Overview

- **Majority of Geotechnical Investigations complete**
- **Integrated Safety Management plan being developed**
- **EIS planning underway**
- **Design and development of potential DUSEL experiments underway**
  - **9 awards in MPS/Physics over 3 dozen institutions and 5 labs**
  - **7 awards in GEO and BIO**
- **Funding for preliminary design (through PDR) awarded to U.C. Berkeley**
  - **Initial deliverables from contractors received**
    - **Initial basis of estimate for design of DUSEL laboratory**
    - **Reports of final assessment of existing underground and surface infrastructure**
  - **Integration into overall design initiated**
- **Independent review of DUSEL by National Academy initiated**
  - **Report requested February 2011 as input to NSB MREFC portfolio review**
- **Ph.D.-granting program in physics established in South Dakota**





Celebrating  
**60** Years  
of Discovery

# DUSEL: Progress on NSF/DOE Collaboration

- Collaboration coordinated through Joint Oversight Group (JOG)
- JOG agreement December 2009 outlines joint responsibilities:
  - NSF will *steward* the DUSEL facility
  - DOE OHEP will *steward* the Long Baseline Neutrino Experiment (LBNE)
  - DOE ONP will *lead* neutrino-less double-beta decay
  - NSF will *lead* dark matter
  - NSF will *lead* the other science & engineering disciplines
- Partnership models to inform planning have been agreed to
- DOE “Critical Decision 0” (Approve mission need) granted to LBNE by DOE Deputy Secretary January 8, 2010. LBNE planning for “Critical Decision 1” (Approve alternate selection and cost range)
- OSTP now engaged to help guide NSF-DOE joint planning process





# DUSEL: NSF Reviews of Project

- **September 23-25, 2009**
  - Focus on cost, schedule, management
  - Safety walkthrough of mine
- **December 17, 2009**
  - Assessment of progress against plan for development of preliminary design
    - Satisfactory progress has been made
    - Additional staff have been added
    - Design development moving forward
- **January 18-22, 2010**
  - Large Cavity Advisory Board (including independent safety experts) review large cavity plans and facility infrastructure
  - Confirmed initial finding that rock is appropriate for large cavities (LBNE)
  - Other possible additions to design tasks under discussion
- **February 9-11, 2010**
  - **Focus on technical design basis and plan for achieving PDR in December 2010**
- **April 12-14, 2010, South Dakota School of Mines & Technology**
  - Full project review
- **Summer 2010, progress review of S4 physics awardees**
- **December 2010 – Preliminary Design Review (may extend to Q2 CY2011)**





## MPS FY 2011 Summary

\$1.41B budget requested for FY 2011 for MPS

- Sustaining research in fundamental science
- Supporting young researchers
  - REU to CAREER
- Investing in national priorities
  - SEBML, SEES
  - Interesting opportunities, input requested!
- DUSEL in PDR, is an MPS priority
  - Working through challenges





Thank You

