NSF UPDATE

Tony F. Chan
Assistant Director
Directorate for Mathematical & Physical Sciences

NSAC,
March 17, 2008
Washington, DC

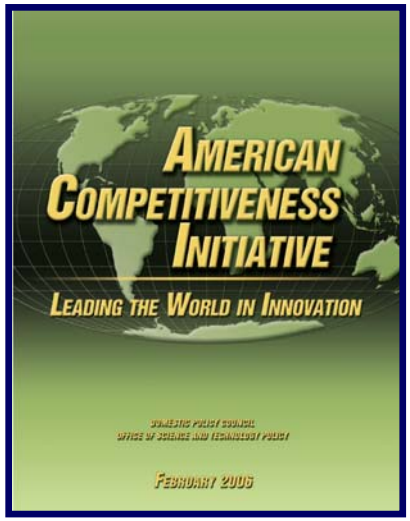
Joint NSF-DOE Stewardship

- Facilities and users: JLAB & RHIC at DOE, NSCL at NSF
- Jointly funded projects: CUORE, nEDM
- DUSEL R&D (more from J. Dehmer)
- Advice from NSAC, including current Long-Range Plan
- Committed to advancing the frontiers of nuclear physics in partnership with DOE

American Competitiveness Initiative

"…We must trust in…our scientists and engineers and empower them to pursue the breakthroughs of tomorrow. [American Competitiveness Initiative] funding is essential to keeping our scientific edge. So I ask the Congress to double federal support for critical basic research in the physical sciences…"

President Bush, State of the Union address
January 28, 2008



- **Tie fundamental discoveries to marketable technologies.**
- **Facilities and instrumentation**
- **World class science and engineering workforce**

FY 2009 NSF Request

(Dollars in Millions)

	FY 2007 Actual	FY 2008 Estimated	FY 2009 Request	Change over FY 2008 Estimated Amount	Percent
R&RA	$4,758.44	$4,821.47	$5,593.99	$772.52	16.0%
EHR	695.65	725.60	790.41	64.81	8.9%
MREFC	166.21	220.74	147.51	-73.23	-33.2%
AOAM (S&E)	248.49	281.79	305.06	23.27	8.3%
National Science Board	3.65	3.97	4.03	0.06	1.5%
Office of Inspect. General	11.92	11.43	13.10	1.67	14.6%
Total, NSF	$5,884.36	$6,065.00	$6,854.10	$789.10	13.0%

Totals may not add due to rounding.

FY 2009 NSF R&RA Request

(Dollars in Millions)

	FY 2007 Actual	FY 2008 Estimated	FY 2009 Request	Change over FY 2008 Estimated Amount	Percent
BIO	$608.54	$612.02	$675.06	$63.04	10.3%
CISE	526.68	534.53	638.76	104.23	19.5%
ENG (less SBIR/STTR)	521.33	527.50	632.33	104.83	19.9%
SBIR/STTR	108.67	109.37	127.00	17.63	16.1%
GEO	745.85	752.66	848.67	96.01	12.8%
MPS	1,150.73	1,167.31	1402.67	235.36	20.2%
SBE	214.54	215.13	233.48	18.35	8.5%
OCI	182.42	185.33	220.08	34.75	18.8%
OISE	40.36	41.34	47.44	6.10	14.8%
OPP	438.43	442.54	490.97	48.43	10.9%
IA	219.45	232.27	276.00	43.73	18.8%
US Arctic Research Comm.	1.45	1.47	1.53	0.06	4.1%
Total, NSF	$4,758.45	$4,821.47	$5,593.99	$772.52	16.0%

Totals may not add due to rounding.

Major Research Equipment and Facilities Construction

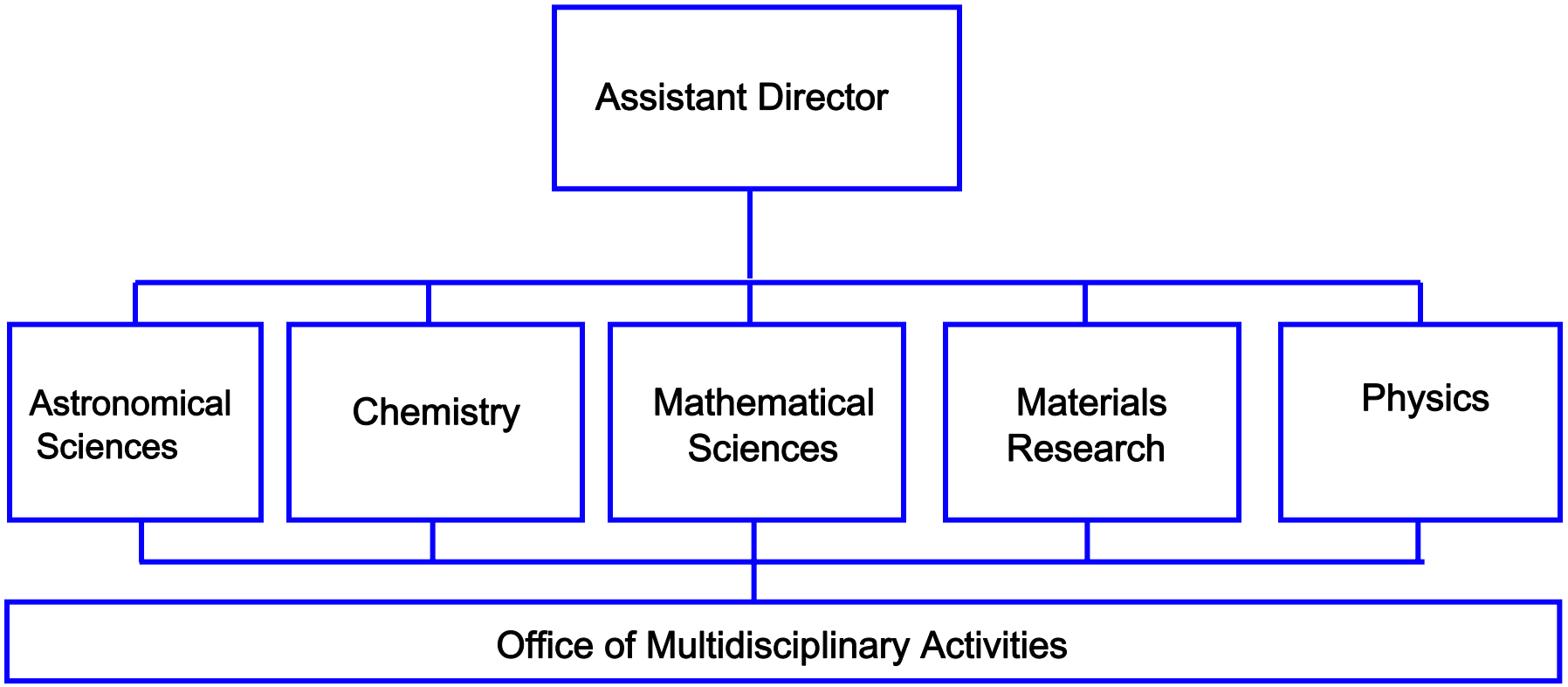
2009 BUDGET REQUEST

ALMA

IceCube

AdvLIGO

Mathematical & Physical Sciences



5 Main Features of MPS

- Largest of 7 directorates and 5 offices – ~20% of the total NSF budget
- Supports 7500 **university based** PIs, 2300 postdocs, and 14300 students
- **Broad portfolio** from individual PI grants, Centers/Institutes, to over 12 major facilities
- Spectrum of research from **fundamental discoveries to marketable technologies**
- Strong **international** ties throughout programs

CHALLENGES FOR THE 21st CENTURY

In partnership with other disciplines

- Understanding & exploiting **Quantum Nature** of matter, energy, space, time
- Creating the **Molecules** and materials for a sustainable 21st Century
- Understanding the complex physical behavior of the **Living World**
- Discovering & utilizing connections between **Mathematics** & the sciences
- Charting the origin, nature, and evolution of the **Universe**

FY 2009 Budget Request by Division

Mathematical and Physical Sciences Funding

(Dollars in Millions)

	FY 2007 Actual	FY 2008 Estimated	FY 2009 Request	Change over FY 2008 Estimated Amount	Change over FY 2008 Estimated Percent
Astronomical Sciences	$215.39	$217.86	$250.01	$32.15	14.8%
Chemistry	191.22	194.22	244.67	50.45	26.0%
Materials Research	257.27	260.22	324.59	64.37	24.7%
Mathematical Sciences	205.74	211.79	245.70	33.91	16.0%
Physics	248.47	250.52	297.70	47.18	18.8%
Multidisciplinary Activities	32.64	32.70	40.00	7.30	22.3%
Total, MPS	$1,150.73	$1,167.31	$1,402.67	$235.36	20.2%

Totals may not add due to rounding.

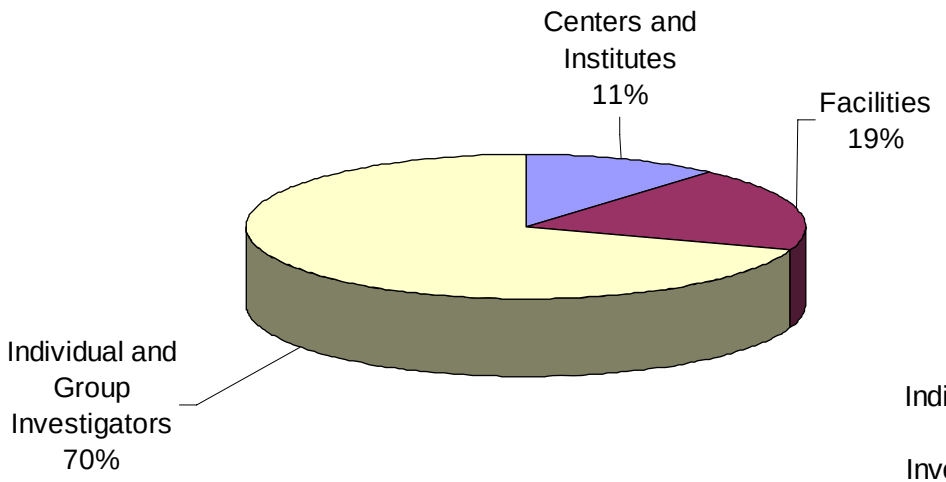
NSF: $6.854 B, +13.0%

Impacts of FY 2008 Budget on PHY

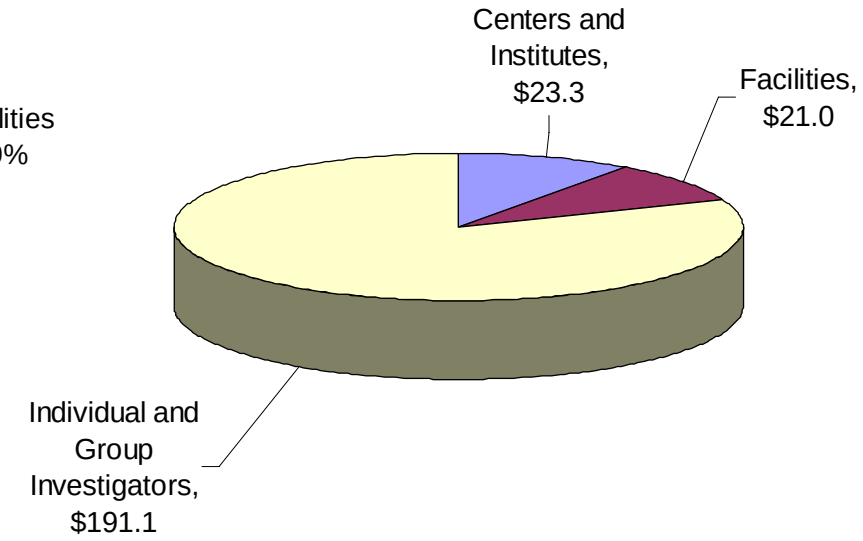
- Defer new PFC awards to FY 2009 (-4M)
- Three facilities funded below FY 2008 request (-3M)
- Cut most core programs 5% (-6M), except those related to CDI, QIS, and SBML
- Make planned investments in new core programs, Physics of Living Systems, and DUSEL R&D and design activities

Funding Modality in the FY 2009 Budget Request

FY 2009 MPS Total Budget Request by Funding Modality



MPS Requested Increase of $235.36 by Funding Modality



New MPS Investments in NSF-wide and MPS-wide Activities

NSF-wide activities	FY 2009
Science and Engineering Beyond Moore's Law	$10.00 M
Cyber-enabled Discovery and Innovation	$19.05 M
Adaptive Systems Technology	$ 3.49 M

MPS-wide activities	
MPS – Life Science Interface	$ 6.00 M
Quantum Information Sciences	$ 5.00 M

Centers and Institutes

MPS Centers and Institutes Funding

(Dollars in Millions)

	FY 2007 Actual	FY 2008 Estimated	FY 2009 Request	Change over FY 2008 Estimated Amount	Percent
Center for Research at the Interface of the Mathematical and Biological Sciences	-	-	$0.20	$0.20	N/A
Centers for Chemical Innovation	$3.00	$7.50	20.00	12.50	166.7%
Materials Research Science and Eng. Centers	55.97	54.73	62.73	8.00	14.6%
Nanoscale Science and Engineering Centers	12.48	12.96	13.96	1.00	7.7%
Science and Technology Centers	20.02	18.60	17.28	-1.32	-7.1%
Mathematics Institutes	18.20	21.70	19.60	-2.10	-9.7%
Physics Frontier Centers	20.00	20.00	25.00	5.00	25.0%
Total, MPS	**$129.67**	**$135.49**	**$158.77**	**$23.28**	**17.2%**

Totals may not add due to rounding.

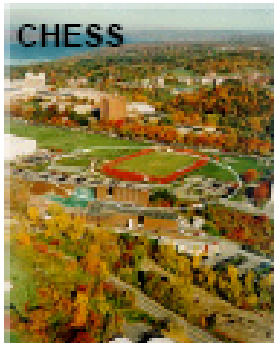
PHYSICS FRONTIERS CENTERS

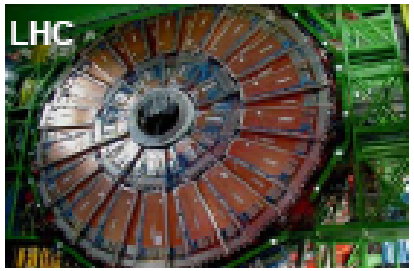
Physics Frontier Centers (started in FY 2001):

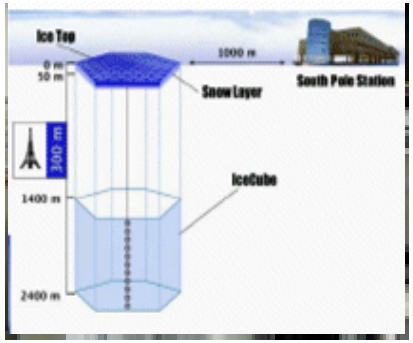
- Open competition across all PHY sub fields in FY 2008 with 58 preproposals, 19 invited to submit full proposals
- Expand from 9 PFCs in FY 2008 to 11-13 in FY 2009
- Track record for profound advances in physics
- Enhancing education, diversity, and public outreach
- Impacts on other field(s) and benefits to society
- Co-funding with other Divisions, Directorates, and Agencies (DOE & NIST)

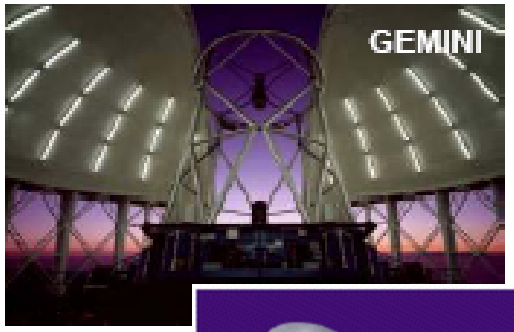
World Class Major Facilities

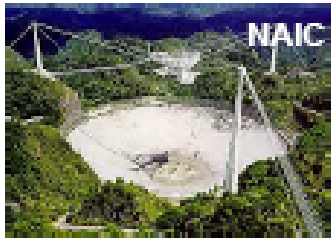
Keep University Researchers at the Frontier

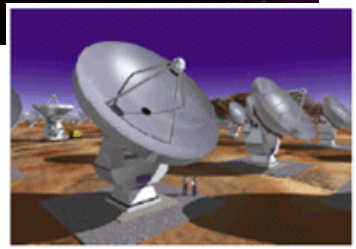












AMERICAN COMPETITIVENESS INITIATIVE

MPS Facilities in Operation

MPS Facilities Funding

(Dollars in Millions)

Facilities	FY 2007 Actual	FY 2008 Estimated	FY 2009 Request	Change over FY 2008 Estimated Amount	Percent
Cornell Electron Storage Ring (CESR)	$14.71	$13.71	$8.50	-$5.21	-38.0%
GEMINI Observatory	20.00	20.00	22.00	2.00	10.0%
IceCube	0.25	1.50	2.15	0.65	43.3%
Large Hadron Collider (LHC)	18.00	18.00	18.00	-	-
Laser Interferometer Gravit. Wave Obs. (LIGO)	33.00	29.50	28.50	-1.00	-3.4%
NSCL (MSU Cyclotron)	18.50	18.50	20.50	2.00	10.8%
Nanofabrication (NNUN/NNIN)	2.86	2.80	2.80	-	-
Nat'l High Magnetic Field Laboratory (NHMFL)	26.55	26.50	31.50	5.00	18.9%
Nat'l Astronomy and Ionosphere Center (NAIC)	10.46	10.45	9.60	-0.85	-8.1%
Nat'l Center for Atmospheric Research (NCAR)	-	1.12	0.45	-0.67	-59.8%
Nat'l Optical Astronomy Observatories (NOAO) [1]	39.28	38.55	41.83	3.28	8.5%
Nat'l Radio Astronomy Observatory (NRAO)	47.03	44.52	49.79	5.27	11.8%
Atacama Large Millimeter Array (ALMA)	3.71	8.22	11.77	3.55	43.2%
Other MPS Facilities	12.57	12.47	19.47	7.00	56.1%
Total, MPS	**$246.92**	**$245.84**	**$266.86**	**$21.02**	**8.6%**

Totals may not add due to rounding.

This table does not contain Digital Library funding.

[1]The NOAO total for FY 2009 includes funding for the Telescope System Instrumentation Program at $5.0 million, level with the FY 2008 Request.

MREFC FY 2009 Budget Request

MREFC Account Funding

(Dollars in Millions)

	FY 2007 Actual	FY 2008 Estimate	FY 2009 Request	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate
Ongoing Projects								
AdvLIGO	**-**	**$32.75**	**$51.43**	**$46.30**	**$15.21**	**$23.73**	**$15.50**	**$19.78**
ALMA	**64.30**	**102.07**	**82.25**	**42.76**	**13.91**	**3.00**	**-**	**-**
IceCube	**24.38**	**25.91**	**11.33**	**0.95**	**-**			
New MREFC Funding								
Advanced Technology Solar Telescope	**-**	**-**	**(D&D) 2.5**	**-**				

Totals may not add due to rounding.

Facilities in Planning & Development

- **DUSEL (Deep Underground Science and Engineering Laboratory):** funded for preliminary design. $15M/3 years for site-specific design of the facility (S3); $15M/3 years for design of initial suite of proposed experiments (S4; soon).
- **LSST (Large Synoptic Survey Telescope):** in final stages of design & development; passed NSF-led conceptual design review.
- **GSMT (Giant Segmented Mirror Telescope):** level $5.0M for design and development for 2 concepts.

Preparing Workforce of 21st Century

MPS supports workforce development throughout the educational continuum

- **Young investigators (*e.g.,* CAREER),**
- **Undergraduate students (*e.g.,* REU, URC, UBM),**
- **K-12 science educators (*e.g.,* RET),**
- **Broadening Participation *(e.g.,* PAARE, EDGE, PREM, Diversity Workshops co-sponsored with DOE).**
- **Pilot ACI-Fellows program**

Summary

- **Substantial increase in requested budget will allow MPS to:**
  - Increase # of PI grants
  - Start new centers & institutes to enable focus on transformative, interdisciplinary, problems
  - Operate, construct, and develop new facilities that will lead MPS to new frontiers
  - Maintain and expand investments in MPS workforce development, especially at the junior rank, and outreach activities

Thank You