

# NSF/MPS Perspectives

NSAC

Dec 3, 2007

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Directorate for Math & Physical Sciences

# Introductory Remarks

- Sorry to have missed last 2 NSACs
- Read 2002 NSAC Long Range Plan
- Read 2007 NSAC Draft LRP
- Visited NSCL
- DUSEL recent activities
- NSAC to NSF\DOE:
  - Provides broad advice & priorities
  - Strong community input
  - Critical to our planning

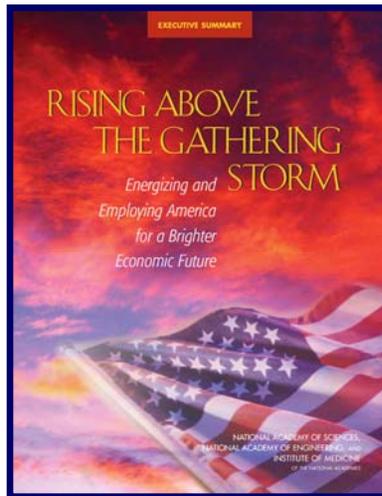
# NSF & DOE in NP

- Long history of cooperation & partnership
- DOE leads Facility for Rare Isotope Beam
- NSF leads Deep Underground S&E Lab
- Partner agency provide support for PIs, instruments.

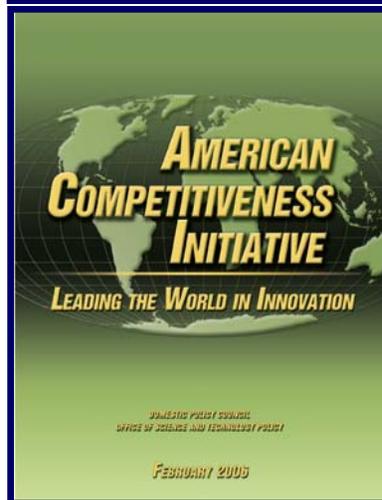
# Major Updates

- FY08 Budget in Conferencing; Continuing Resolution
- FY09 Budget submitted to OMB 9/07
- New OMB Examiner: Joel Parriott
- NSF-wide Transformative Research initiative
- CDI solicitation went public
- ACI, America Competes Act
- DUSEL S3 awarded to Homestake/UCB. Town Meeting Nov 2-4. S4 soon.
- Gender/URM Workshops in CHE, AST, PHYS, DMR
- COVs: CHE, DMS concluded; DMR, AST in 2008
- New MPS Senior Staff: Jack Lightbody (DAD), Zakya Kafafi (DMR DD), Lance Haworth (OMA Dir), Sue Hamm (Budget Dir)

# Call for Reinvestment in STEM



- **Increase US talent pool**
- **Strengthen basic research**
- **Develop, recruit & retain best/brightest**
- **Ensure innovation in America**



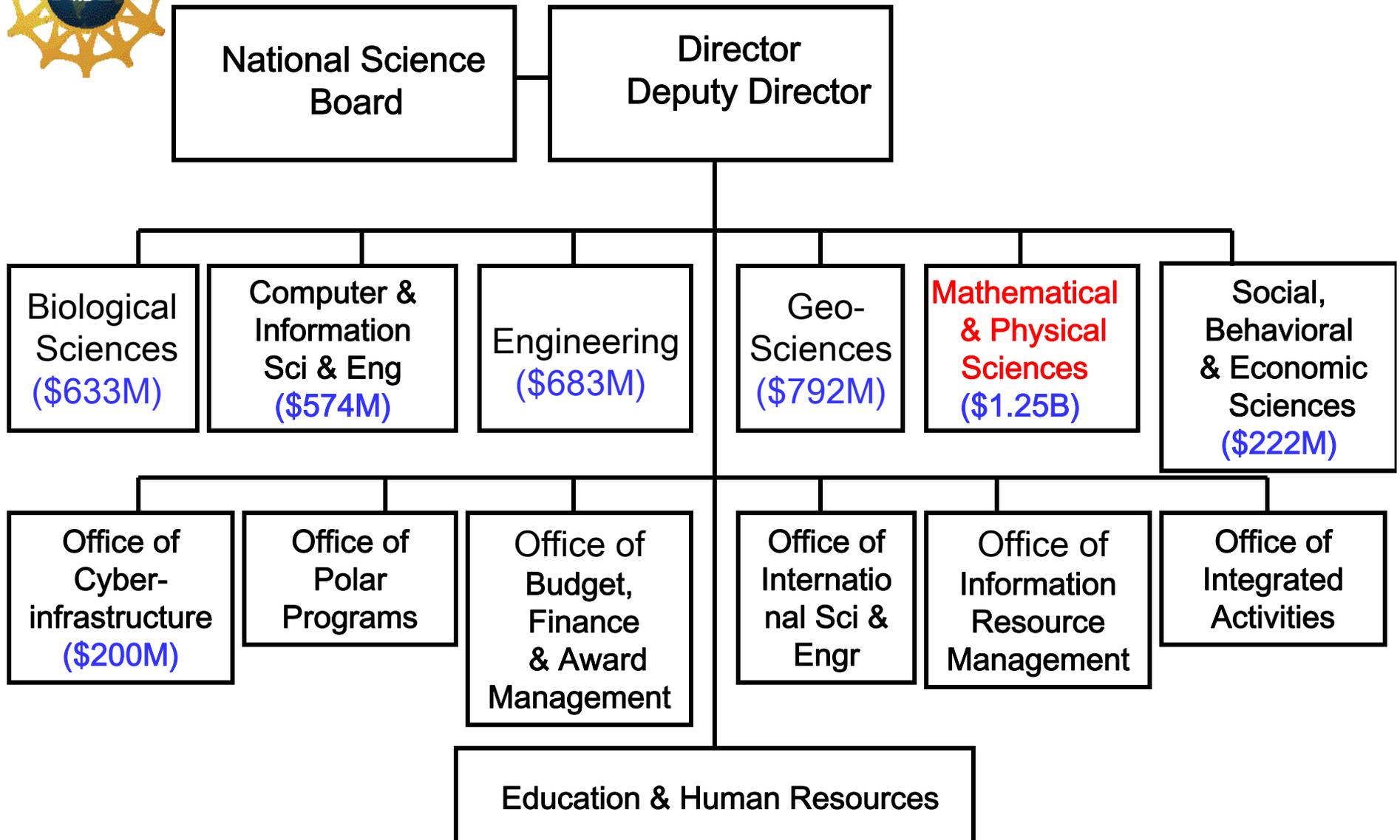
- **From fundamental discoveries to marketable technologies.**
- **Facilities and instrumentation**
- **World class science and engineering workforce**
- **Focus on Phys Sci & Engineering**
- **Doubles NSF, DOE-OS, NIST over 10 years**

America Competes Act (Aug 2007): authorizes doubling NSF \$ over 7 years.

MPS communities need to advocate society/economic benefits of their science.



# National Science Foundation



\$'s are FY08 request. % increase for NSF: 06-07 7.1%, 07-08 7.7%

# NSF Budget by Directorate

(Dollars in Millions)

	FY 2005 Actuals	FY 2006 Actuals	Change from 05 to 06	FY 2007 Request	Change from 06 to 07	FY 2008 Request	Change from 07 to 08
<b>BIO</b>	576.78	\$580.90	0.7%	\$607.85	4.6%	\$633.00	4.1%
<b>CISE</b>	490.20	496.35	1.3%	526.69	6.1%	574.00	9.0%
<b>ENG</b>	557.09	585.46	5.1%	628.55	7.4%	683.30	8.7%
<b>GEO</b>	697.17	703.95	1.0%	744.85	5.8%	792.00	6.3%
<b>MPS</b>	1,069.36	1,086.61	1.6%	1150.30	5.9%	1,253.00	8.9%
<b>SBE</b>	196.80	201.23	2.3%	213.76	6.2%	222.00	3.9%
<b>OCI</b>	123.40	127.14	3.0%	182.42	43.5%	200.00	9.6%
<b>OISE</b>	43.38	42.61	-1.8%	40.61	-4.7%	45.00	10.8%
<b>OPP</b>	348.53	390.54	12.1%	438.10	12.2%	464.90	6.1%
<b>OIA</b>	130.92	233.30	78.2%	231.37	-0.8%	263.00	13.7%
<b>USARC</b>	1.19	1.17	-1.7%	1.45	23.9%	1.49	2.8%
<b>NSF R&amp;RA</b>	4234.82	4449.25	5.1%	4,765.95	7.1%	5,131.69	7.7%

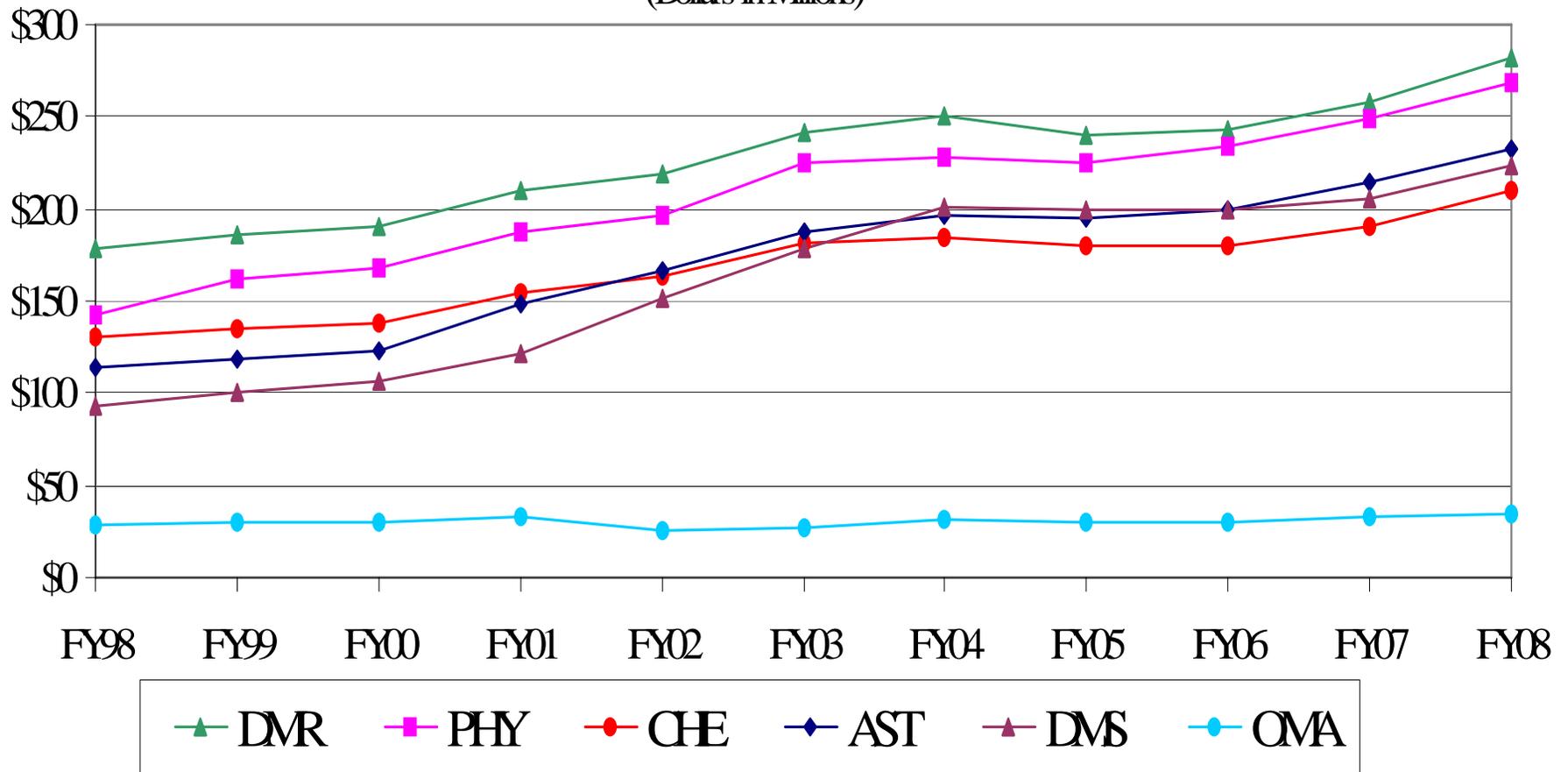
# MPS by Division

	FY 2005 Actuals	FY 2006 Actuals	Change from 05 to 06	FY 2007 Request	Change from 06 to 07	FY 2008 Request	Change from 07 to 08
<b>AST</b>	195.11	\$199.75	2.4%	\$215.11	7.7%	\$232.97	8.3%
<b>CHE</b>	179.26	180.70	0.8%	191.10	5.8%	210.54	10.2%
<b>DMR</b>	240.09	242.59	1.0%	257.45	6.1%	282.59	9.8%
<b>DMS</b>	200.24	199.52	-0.4%	205.74	3.1%	223.47	8.6%
<b>PHY</b>	224.86	234.15	4.1%	248.50	6.1%	269.06	8.3%
<b>OMA</b>	29.80	29.9	0.3%	32.40	8.4%	34.37	6.1%
<b>Total, MPS</b>	1,069.36	1,086.61	1.6%	1,150.30	5.9%	1253.00	8.9%
<b>R&amp;RA</b>	4234.82	4449.25	5.1%	4,765.95	7.1%	5,131.69	7.7%
<b>NSF</b>	5480.78	5645.79	3.0%	6,020.21	6.6%	6429.00	6.8%

# Ten-Year Funding History

## MPS Subactivity Funding

(Dollars in Millions)



# FY 2008 MPS Focus Areas

- **Physical sciences at the nanoscale**
- **Science beyond “Moore’s Law”**
- **Physics of the universe**
- **Complex systems**
- **Fundamental mathematical and statistical science**
- **Sustainability**
- **Cyber-enabled Discovery and Innovation**



# Cyber-enabled Discovery and Innovation

- NSF-wide investment (\$52M)
  - MPS investment (\$10M)
    - *“Broaden the Nation’s capability for innovation by developing a new generation of computationally based discovery concepts and tools to deal with complex, data-rich, and interacting systems”*
- Focus areas:
  - From Data to Knowledge
  - Understanding Complexity in Natural, Built and Social Systems
  - Building Virtual organizations
- **Solicitation went public in Sept 2007.**
- **Expected to increase by \$50M per year for 5 yrs**



# MPS Advisory Committee

(Physics & Astronomy areas)

- Claude Canizares
- Larry Dalton
- Jose Onuchic
- Monica Olvera de la Cruz
- Mike Witherell (C)
- Ian Robertson
- Winston Soboyejo
- Robert Williams
- Joel Tohline
- Eric Cornell

# NSF Wide Issues

- Increasing #proposals, decreasing success rates (17% for 1<sup>st</sup> time proposers)
- Transformational Research: is NSF too conservative? Recent NSB report. Added to “Intellectual Merit” criterion.
- “Broader Impact” criterion not well understood
- Broadening Participation
- International competition vs collaboration



# Broadening Participation

- CHE Gender Equity Workshop (2006)
- AST/DMR/PHY Gender Equity Workshop (May 2007)
- CHE UnderRep Minority Equity Workshop (Sept 2007)
- CHE Disabled Persons Workshop (2008)
- NSF-Wide Diversity Working Group formed
  - co-chair: Celeste Rohlifing (CHE)
- Partnerships in Ast & Astrophysics Res & Educ (PAARE) 08



**LA-STEM**



**PREM**



**LIGO**

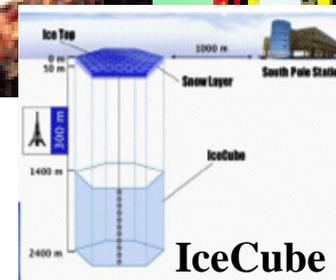
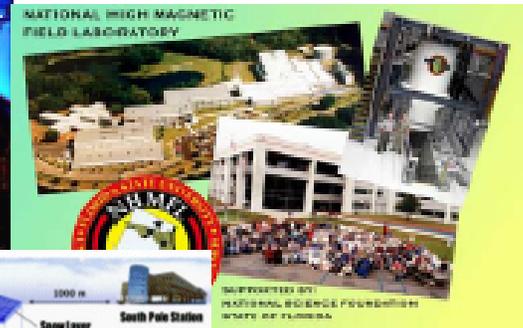
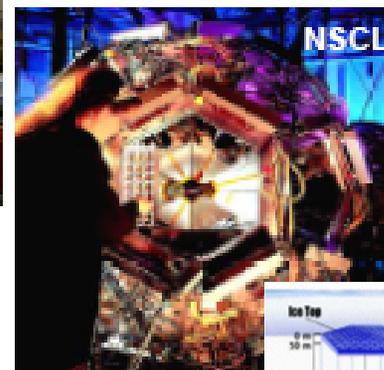
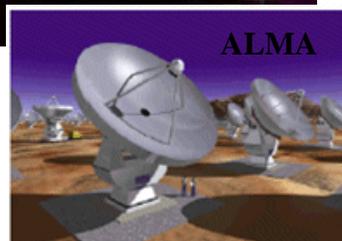
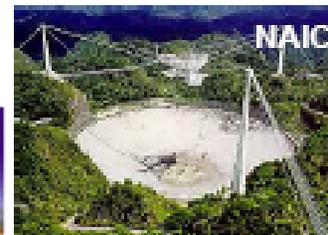
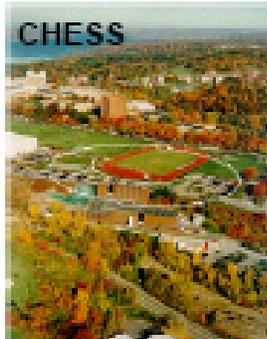


**Hampton**



# World Class Major Facilities

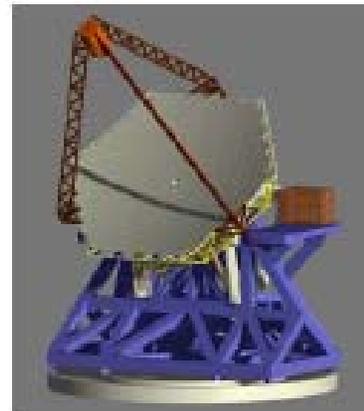
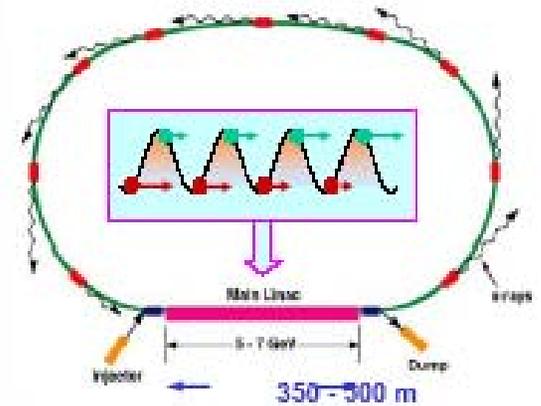
## Keep University Researchers at the Frontier





# Bold Dreams: Horizon to 2020

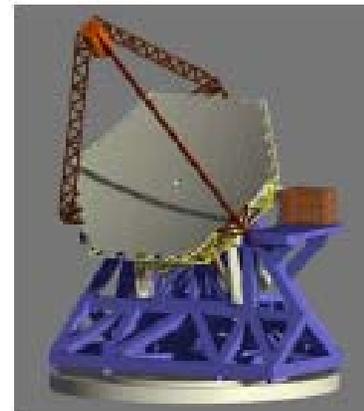
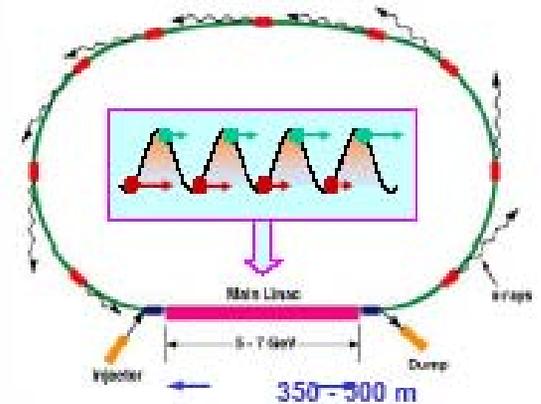
- Advanced Technology Solar Telescope (ATST)
- Deep Underground Science and Engineering Laboratory (DUSEL)
- Energy Recovery LINAC (ERL)
- Giant Segmented Mirror Telescope (GSMT)
- Large Synoptic Survey Telescope (LSST)
- Extended VLA (EVLA)
- Square Kilometer Array (SKA)





# Bold Dreams: Horizon to 2020

- Advanced Technology Solar Telescope (ATST)
- Deep Underground Science and Engineering Laboratory (DUSEL)
- Coherent X-ray Light Source
- Giant Segmented Mirror Telescope (GSMT)
- Large Synoptic Survey Telescope (LSST)
- Square Kilometer Array (SKA)



# Facilities in Development & Under Construction

## *Facilities under Construction:*

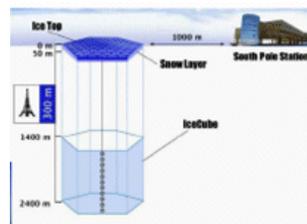
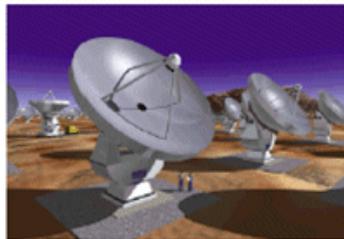
- ALMA: new baseline, early operations increases to \$8.2M.
- IceCube: operations initiated at \$1.5M level
- Advanced LIGO: construction begins FY 2008.
- LHC: coming online soon, delay?

## *Design and Development:*

- DUSEL: Just awarded S3 to Homestake/UCB (\$15M/3 yrs).  
Soon S4 on Initial Suite of Experiments.
- GSMT (TMT + GMT): \$5M R&D.
- ATST: In "readiness" stage. Cultural & EIS challenges.

## *Other Projects:*

- Light source: planning to convene panel on NSF role.
- ILC: Cost? When?



# Major Facilities Challenges

- Cost approaching O(\$1B) for new projects
- International competition & collaboration
- Accurate cost estimates & control
- R&D – MREFC – M&O process
- Balance: core programs vs facilities M&O
- Stewardship vs user facility: who pays?
- Competition: within MPS + other Directorates