Nuclear Science Advisory Committee Meeting: NSF/MPS FY 2011 Budget Request and Updates

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Budget Context

• The budget climate is complex
  – President, OSTP, congress recognize basic research and NSF’s role
    • Still, need to make this case!
  – Discretionary spending frozen
    • Science still priority
    • Assume doubling over “next years”

• Priority areas of climate, energy prominent in Holdren-Orszag memos will be reflected in budgets
  – MPS is fundamental to advances
MPS FY 2011 Budget Request

- NSF overall budget request for FY 2011
  - $7.4B, 8.0% increase (+ $552M)

- MPS Budget Request Reflects NSF Priorities:
  - Support innovation in healthy core programs
  - Advance a strong scientific and technical infrastructure (CAREER, Postdoc, GRF, REU)
  - Invest in research addressing complex societal issues
  - Support center activity
  - Invest in facilities

Current Status: Senate and House appropriations not settled yet.
MPS activities since last meeting

- Division Directors
  - AST: Jim Ulvestad, NRAO
  - CHE: Matt Platz, OSU
  - DMS: Sastry Pantula, NC State
  - DMR: search underway
- AD search concluded
- MPS AC has been very active in helping us move forward
MPS/MPSAC Working Groups

- Fundamental Science
- Climate
- Energy
- Broadening Participation
- Computation
  - Data Enabled Science
  - Computational Science
- Life Sciences
- SEBML/QIS
- Matter by Design

White papers generated for all these activities; helping MPS plan future.
• 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
## MPS Funding for Facilities

<table>
<thead>
<tr>
<th>Facility</th>
<th>FY 2011 Request</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adv. Tech Solar Telescope (ATST)</td>
<td>22.00</td>
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<tr>
<td>Atacama Large Millimeter Array (ALMA)</td>
<td>24.50</td>
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<tr>
<td>Cornell High Energy Synchro, Source (CHESS)/ Cornell Electron Storage Ring (CESR)</td>
<td>13.45</td>
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<tr>
<td>Gemini Observatory</td>
<td>19.50</td>
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<tr>
<td>IceCube Neutrino Observatory</td>
<td>2.20</td>
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<tr>
<td>Large Hadron Collider (LHC)</td>
<td>18.00</td>
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<tr>
<td>Laser Interfer. Grav. Wave Observatory (LIGO)</td>
<td>30.30</td>
</tr>
<tr>
<td>Nat’l Astronomy and Ionosphere Ctr. (NAIC)</td>
<td>6.00</td>
</tr>
<tr>
<td>Nat’l High Magnetic Field Laboratory (NHMFL)</td>
<td>34.00</td>
</tr>
<tr>
<td>Nat’l Nanotechnology Infra. Network (NNIN)</td>
<td>3.35</td>
</tr>
<tr>
<td>Nat’l Optical Astronomy Observatory (NOAO)</td>
<td>33.31</td>
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<tr>
<td>Nat’l Radio Astronomy Observatory (NRAO)</td>
<td>44.17</td>
</tr>
<tr>
<td>National Solar Observatory (NSO)</td>
<td>9.51</td>
</tr>
<tr>
<td>Nat’l Superconducting Cyclotron Lab (NSCL)</td>
<td>21.50</td>
</tr>
<tr>
<td>Other MPS Facilities</td>
<td>2.85</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$269.07</strong></td>
</tr>
</tbody>
</table>

2011 request: + $0.5M over 2010

![LIGO](image1.png)

![NSCL](image2.png)
National Facility for Rare Isotope Research and Education at Michigan State

- 700 users, 10% US PhDs
- Facility construction follows NSAC, community priorities

Questions:

- Properties of extreme p/n nuclei ratios
  - Limits of existence, Structure
- Origin of the elements of the cosmos
  - novae, supernovae, stellar burning
- Properties of neutron rich nuclear matter
  - structure and dynamics of neutron stars
Status and Vision

- Current Operations Award ends September 2011
- Renewal for another five years will be proposed
- FRIB was highly recommended by NSAC as the next generation rare isotope facility
- FRIB would be sponsored by DOE and located at MSU using much of the detector instrumentation developed at NSCL
- An FRIB Joint Oversight Group has been established by DOE and NSF to coordinate the transition
- A very nice example of joint stewardship
DUSEL: Status Overview

- Majority of Geotechnical Investigations complete
- Integrated Safety Management plan being developed
- FIS 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
- Bridge Funding to cover the interval between PDR and a go/no-go decision has been proposed and is well along in the process.
- 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
NSF/DOE agreed to establish DUSEL Physics Joint Oversight Group (JOG) immediately after release of P5 report.

- Will jointly coordinate & oversee DUSEL experimental physics program.
- JOG meeting monthly.
- Both agencies closely collaborating in defining and realizing the DUSEL physics program.
- Agencies have agreed on DUSEL stewardship roles & core research program.

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<thead>
<tr>
<th>Program Element</th>
<th>Steward</th>
<th>Contributing Partners</th>
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<tbody>
<tr>
<td>Neutrino: less double beta decay</td>
<td>DOE: ONP</td>
<td>NSF</td>
</tr>
<tr>
<td>Long baseline neutrino studies</td>
<td>DOE: OHEP</td>
<td>NSF</td>
</tr>
<tr>
<td>Proton decay</td>
<td>DOE: OHEP</td>
<td>NSF</td>
</tr>
<tr>
<td>Direct dark matter detection</td>
<td>NSF</td>
<td>DOE: OHEP</td>
</tr>
<tr>
<td>DUSEL facility and infrastructure</td>
<td>NSF</td>
<td>N/A</td>
</tr>
<tr>
<td>Smaller physics experiments</td>
<td>NSF</td>
<td>TBD</td>
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Excellent cooperation with DOE!

Interagency MOU planned for end of FY 2010.
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 large cavity plans and facility infrastructure
  - Confirmed initial finding that rock is appropriate
  - Other possible additions to design tasks under consideration
- February 9-11, 2010
  - Focus on technical design basis and plan for action
- April 12-14, 2010, South Dakota School of Mines
  - Full project review
- Summer 2010, progress review of S4 physics areas
- December 2010 – Preliminary Design Review (may extend to Q2 CY2011)
Thank You