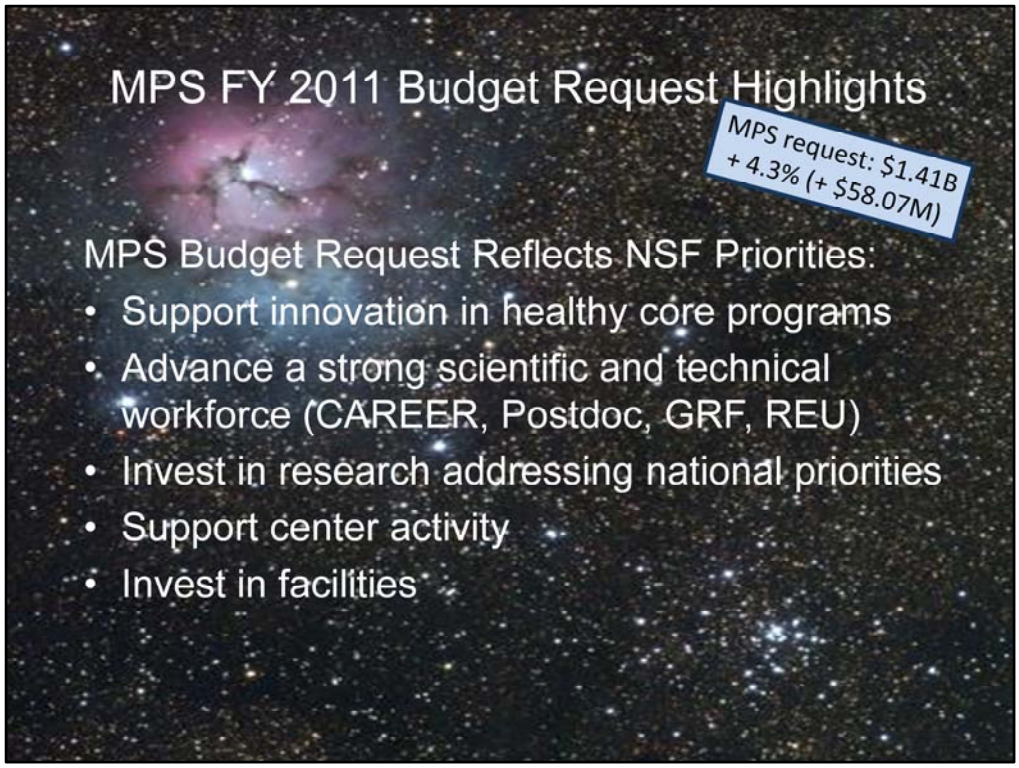
Welcome.

I'm Ed Seidel, Acting AD for MPS, and I'm excited to be here to talk to you about the MPS FY 2011 Budget Request. You've probably heard about the overall budget request from NSF Director Arden Bement. The primary themes of innovation in fundamental scientific research, support of young scientists, which is where many new ideas come from, and targeted investments in science that serves national priorities are strongly reflected in the MPS budget request.



NSF, as you have already heard today, fared well in the President's FY 2011 Budget Request to Congress. With the potential increases, MPS is able to request funding to meet our top priorities across the board.

After a decade of strong growth, MPS requests nearly $60M in new funding, which would bring the total funding in the Directorate to over $1.41B.

Of course, maintaining healthy core programs in all of our Divisions remains our highest priority. We've also requested increases in particular areas of national interest. We've requested robust funding for programmatic areas like SEBML, which helps the nation secure its economic stability, and SEES, a new priority investment in energy and climate research. MPS will also increase its investment in the future S&T workforce, through the NSF CAREER and GRF programs.

We're planning to add additional centers to two of our Center programs, and we've requested funding to maintain the same excellent operations the community has come to expect at our user facilities.

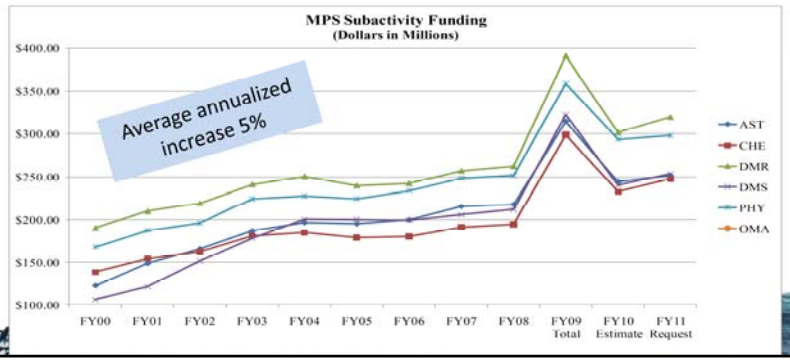
(image: taken at Kitt Peak National Observatory as part of the REU student program – this is the Trifid in Sagittarius (5200ly away), which is a nice illustration of how young hot blue stars make an ionized red nebula (one of the amusing paradoxes of astronomy that blue stars create red nebulae))

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	Change Over FY 2010 Estimate 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%
Total, MPS	**$1,243.88**	**$474.97**	**$1,351.84**	**$1,409.91**	**$58.07**	**4.3%**

Discovery +6.7%



MPS requests a 4.3% increase. As you can see, all of our Divisions received an increase under this request.

Much of the MPS increase is in Discovery, which includes our fundamental "core" programs. Overall, MPS Division's Discovery lines increased 6.7%, with PHY being the highest increase in Discovery at 11.4%.

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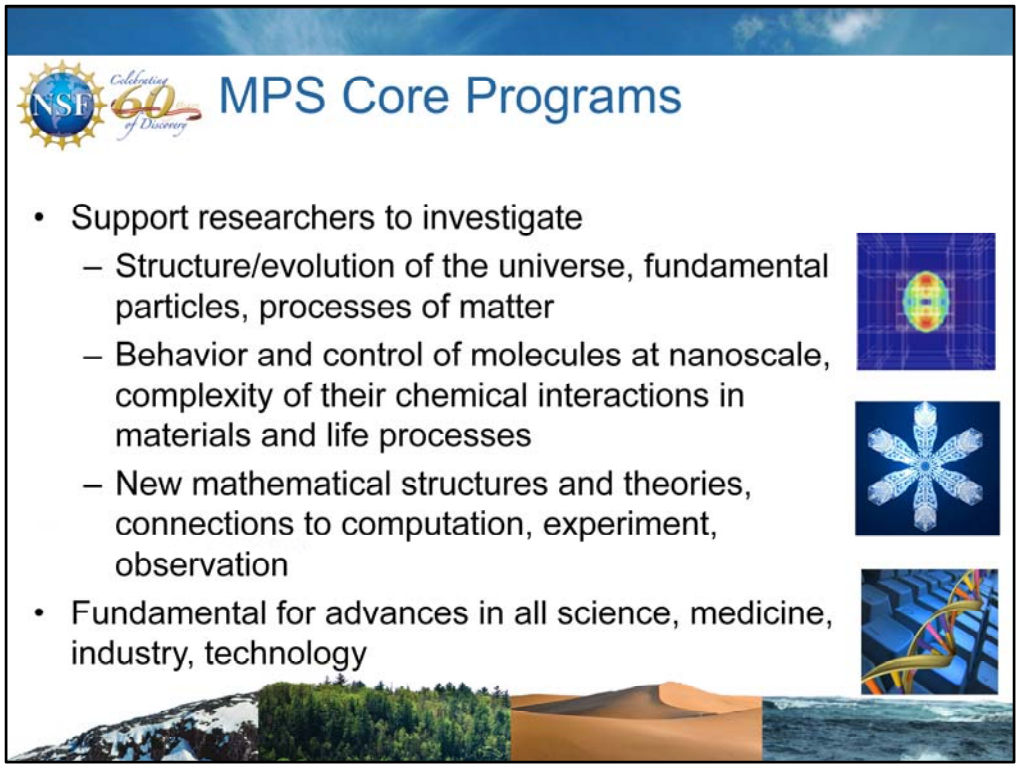
MPS FY 2009 ARRA

$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



In 386 AD Chinese astronomers noticed a “guest star”, now known to be a supernova explosion in the Crab Nebula. Today, for the first time we are able to simulate full 3D stellar core collapse, bounce and explosion, bringing togtether the most important physical processes from general relativity to sophisticated nuclear equations of state.

In 1611 Kepler first described the crystal structure of a snowflake in general terms, but only recently have new mathematical models of snowflakes been developed (at UC Davis and U-Wisc-Madison) that describe how many varieties of snowflakes grow from water molecules around a dust grain.

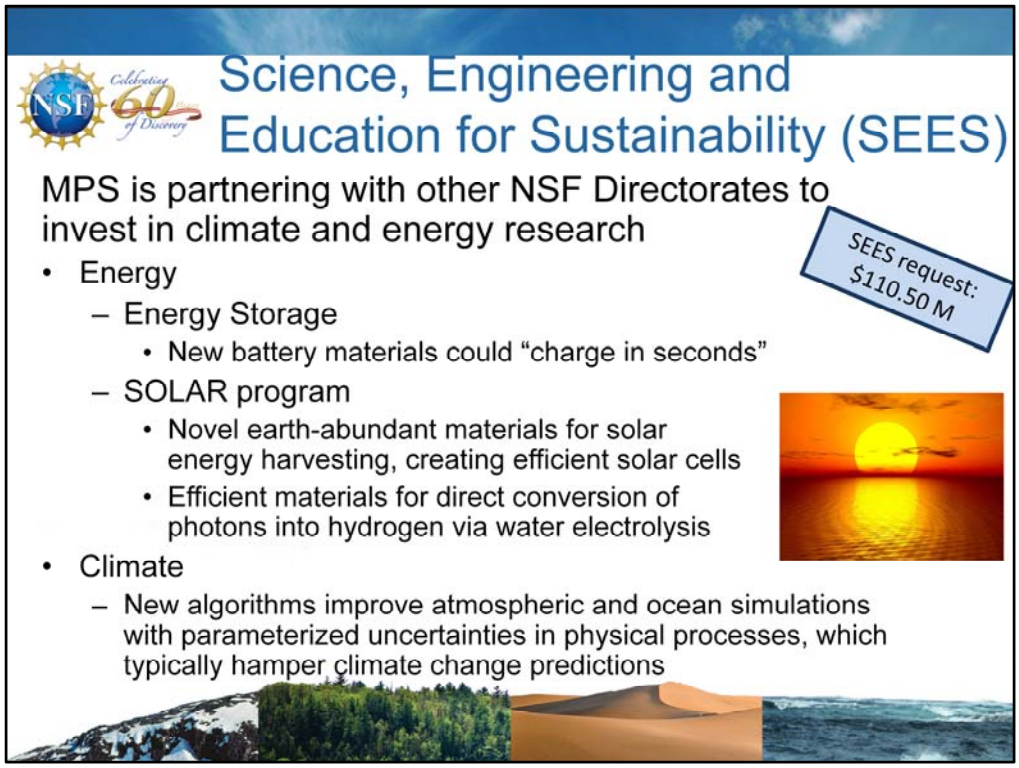
CF21: Cyberinfrastructure Framework for 21st Century Science & Engineering

- 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



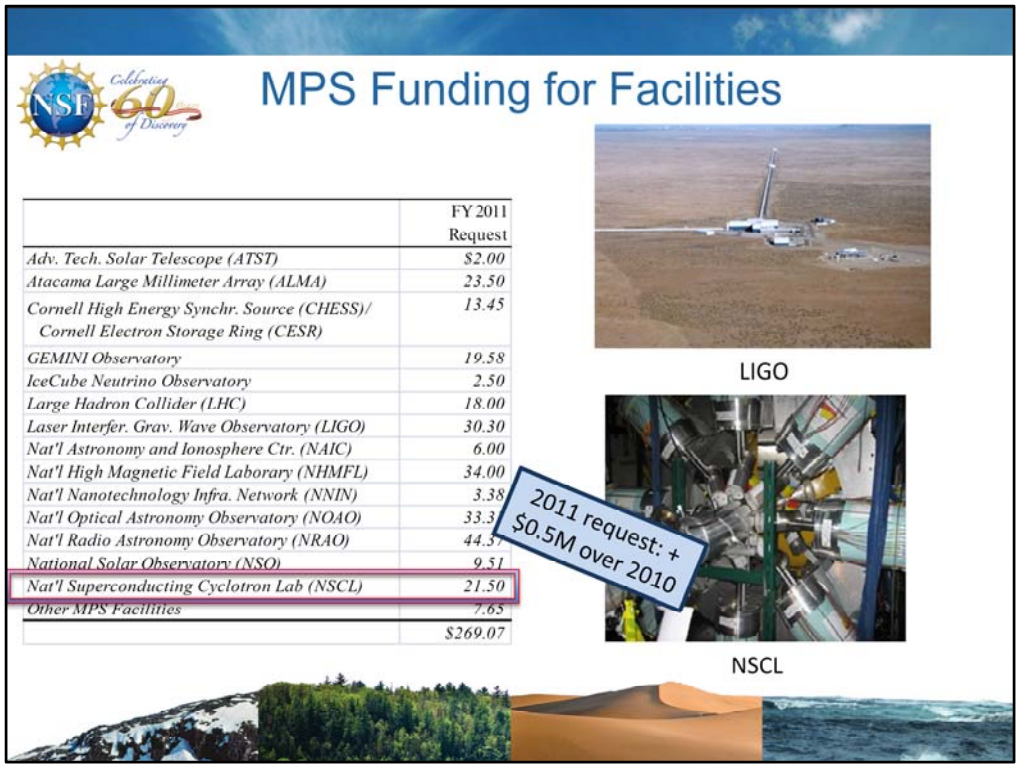
We want to see more PHY research in these areas.

Close to 15% of the entire SEES portfolio resides in MPS. We conduct research in areas as diverse as superconductivity for efficient electricity transmission and hydrocarbon conversion for renewable energies, and our computational simulation work makes sure all the modeling is as robust as possible.

As an example of recent work in energy storage, MIT researchers are demonstrating changes in battery materials that could lead to ultra-fast recharging of devices. They created a modified composition of $LiFePO_4$ and processing scheme to improve movement of ions. This research was written up just last year in Nature magazine. The idea here is to dispel the myth that batteries have low power rates and make some transformative breakthroughs in this area.

Very exciting to us is our SOLAR solicitation, which we began in 2009 and will continue in FY 2011. What makes this really special is the collaborative nature: SOLAR awards support a group of at least 3 PIs – one from Chemistry, one from Materials and one from Mathematical sciences. The first set of awards are addressing a wide array of Solar Energy issues, including finding better ways to harvest energy, better ways to store that energy and more efficient ways to convert energy.

MPS is not the biggest player in the climate research arena, but our work in climate modeling will make a real difference. The research described here, published this year, works to ameliorate structural instabilities in climate statistics to make models work better.



Nearly a century ago Albert Einstein gave us his famous general theory of relativity. Among its very early predictions were the new possibilities that black holes and gravitational waves might exist in the Universe. Nearly a century later, we have for the first time the ability to solve the equations governing black hole binary coalescence to predict the gravitational waveforms expected, as well as the ability to detect the waves themselves. Never before seen, LIGO, the Laser Interferometric Gravitational Wave Observatory may soon be able to see these waves. Most of what we know about the Universe comes from observations of electromagnetic radiation, but gravitational waves are generated by coherent, bulk motion of matter, which totally different. Therefore, be prepared for many surprises when we begin to detect these waves.

LIGO recently achieved one of its original science goals by placing the most stringent limit yet in its frequency band on gravitational waves from the Big Bang. Actual detections of these waves, a completely new window on the universe, may occur during the LIGO science run now underway or, as is more probable, must await the completion of Advanced LIGO, an upgrade to increase detection likelihood by a factor of 1000. Advanced LIGO installation is scheduled to begin less than one year from now.

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

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

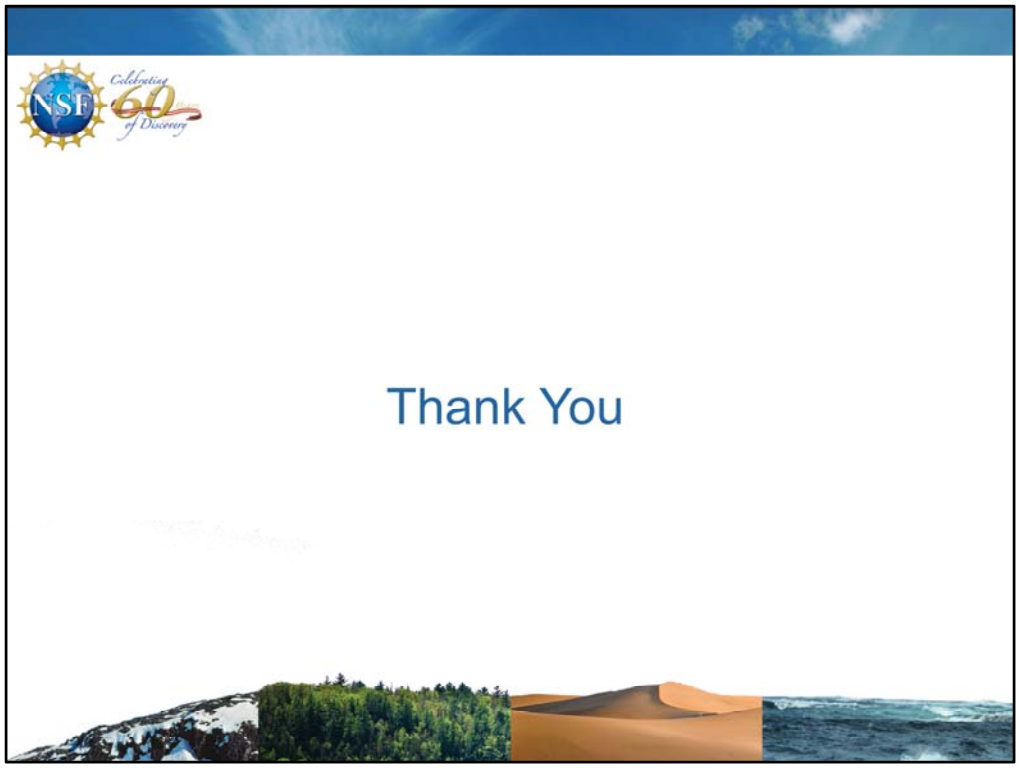
DUSEL: NSF Reviews of Project

- 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
  - AST, CHE, DMR, DMS, PHY
- Supporting young researchers
  - REU to CAREER
- Investing in national priorities
  - SEBML, SEES
- DUSEL in PDR, NSCL, both are MPS priorities


Thank You