



U.S. DEPARTMENT OF
ENERGY

OFFICE OF
SCIENCE

Office of High Energy Physics Report to HEPAP

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**Michael Procaro
Office of High Energy Physics
Office of Science, U.S. Department of Energy**

Outline

Status of the FY 2011 Budget

FY 2012 Request

Office News

STATUS OF THE FY 2011 BUDGET

FY 2011 Continuing Resolution

	FY 2010 Actual	FY 2011 Request	FY 2011 CR
HEP	810,483	829,000	799,500
SC	4,789,288	5,129,574	4,826,000

- **We have been operating under a CR for almost 6 full months now.**
 - We are below the FY 2010 level, since the CFO is holding back the funds for PED for Mu2e and LBNE. They are considered new starts.
 - The House has passed a budget with SC at \$4.17B, but the Senate rejected it.
 - There was no HEP bottom line in that budget.
 - This action has produced a lot of uncertainty about what the final budget will be for SC.
 - The House just passed another 3 week CR with no change for SC.

Working under the CR

- HEP formulates a plan for the \$799,500,000.
 - We make a financial plan for the laboratories much like a normal year.
 - The CFO allocates a fraction of the funds
 - Typically based on the length of the CR.
 - This year the CFO is being conservative and allocating even less.
 - The labs have some freedom to move funds around during the CR to solve short term problems.
 - When the CR ends they have to hit totals specified by the program office.
- HEP is holding minimal reserves at this point. Any withholding of funds you may see is being done in other parts of DOE or the labs.
- MicroBooNE, Mu2e, and LBNE are considered new starts and are not receiving any equipment funding, which includes PED for Mu2e and LBNE.
- Mu2e was instructed by HEP to slow work to avoid a gap in funding.
- LBNE has been slowed down due to dealing with the DUSEL situation.

Impacts on Grant Funding

- Long Continuing Resolution (again) has delayed grants. Uncertain funding situation dictates some conservatism , at many levels:
 - DOE CFO has limited total funding allocation for SC
 - DOE CH office initially limited which grants could be processed
 - HEP program managers holding back funding in some cases
- Current status of FY11 actions (226 total currently planned, as of 3/14):
 - 45 grant actions awarded
 - 13 grant actions approved by HEP, in CH for final paperwork
 - 33 grant actions in HEP for concurrence
 - 135 actions to go
- Average delay for awards is 50 days (award issued-expected start date)
 - Some of this due to startup delays at beginning of FY, but most of this is in HEP.
 - Better than FY2009-10 but still not acceptable.
- Given continuing budget uncertainties, all HEP new/renewal/supplemental funding actions for FY11 are currently ON HOLD.
 - If this causes an urgent problem at your institution let us know ASAP.

FY 2012 HEP REQUEST

The High Energy Physics Budget Request

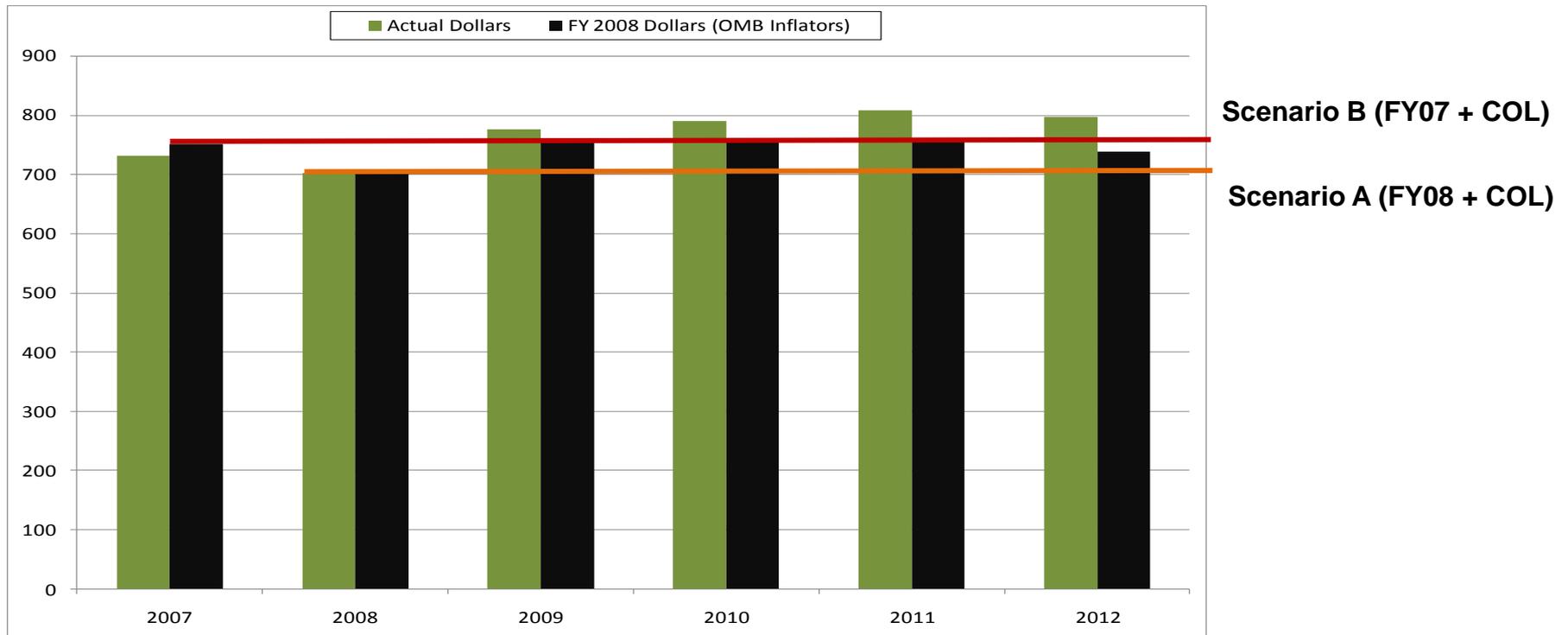
Description	FY 2010	FY 2011 Request	FY 2011 March	FY 2012 Request	FY12 vs FY10
Proton Accelerator-Based Physics	438,369	439,262	439,462	412,707	-25,662
Electron Accelerator-Based Physics	30,212	24,707	20,805	22,319	-7,893
Non-Accelerator Physics	97,469	88,539	88,539	81,852	-15,617
Theoretical Physics	68,414	69,524	68,024	68,914	500
Advanced Technology R&D	156,347	189,968	173,346	171,908	15,561
Construction	0	17,000	0	39,500	39,500
Total, High Energy Physics	790,811	829,000	794,078	797,200	6,389

FY 2010 appropriation including SBIR/STTR was \$810 million, so the FY 2012 request is a reduction of \$13 million from FY 2010.

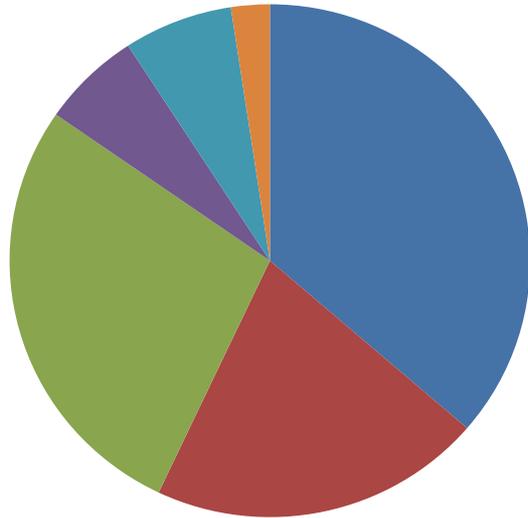
Funding Trends

HEP is now between the A and B scenarios.

- Funding FY 2009-2011: Program workforce and scope largely preserved – implementation slow
- Funding FY 2012 Target: Workforce will be downsized and the program de-scoped.



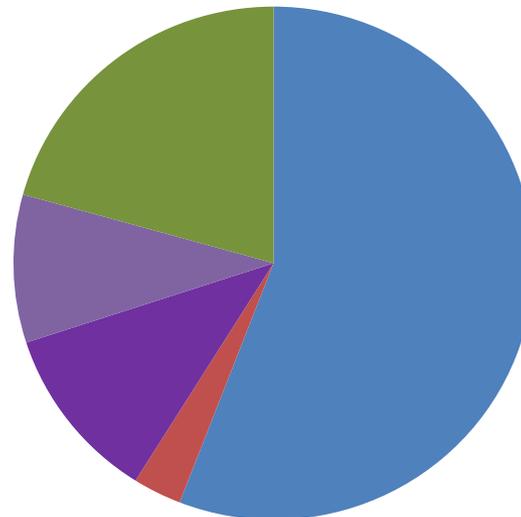
Cross cuts



- EPP Research
- Technology Research
- Facilities
- MIE
- Construction
- SBIR/STTR

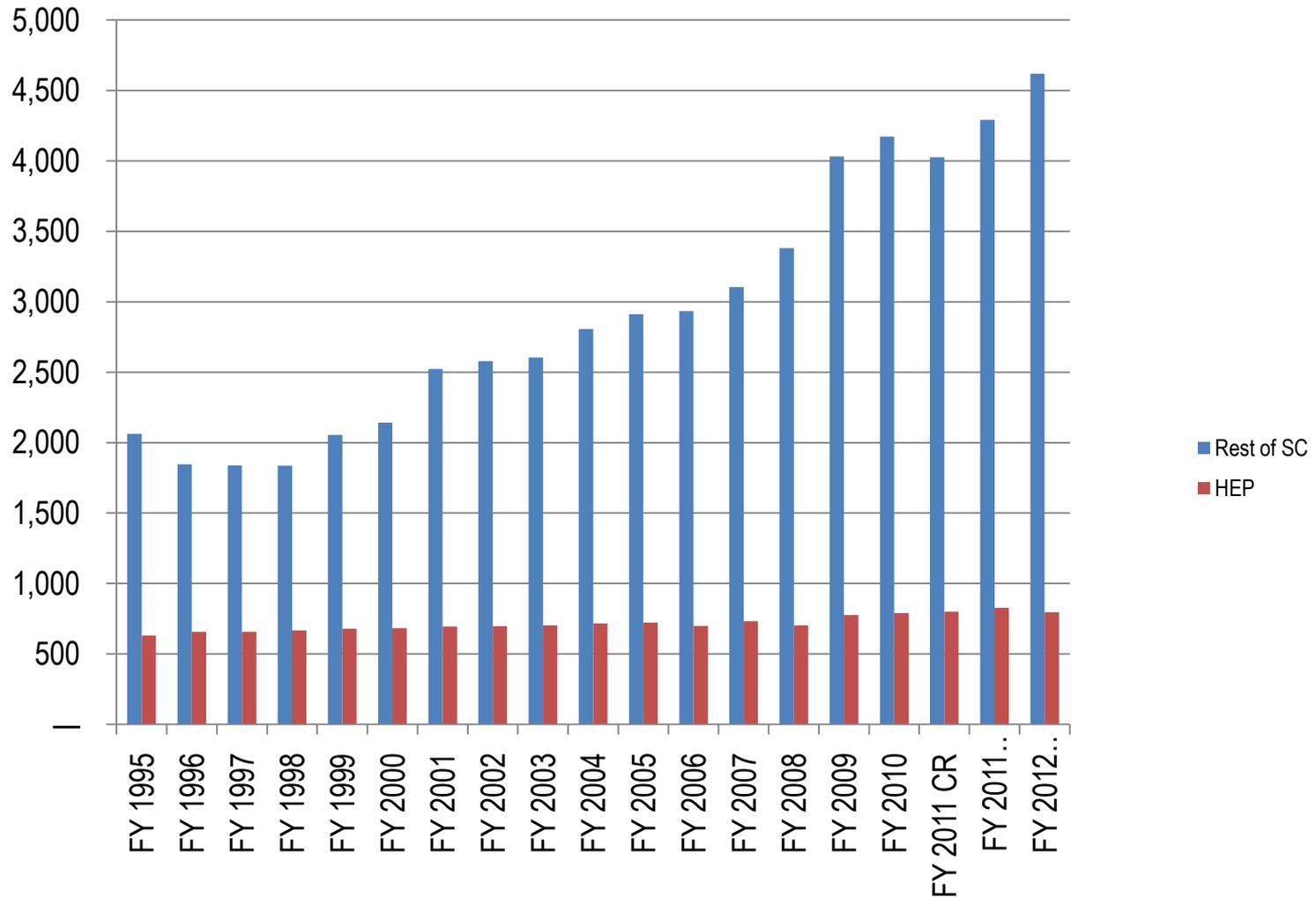
By function

By program

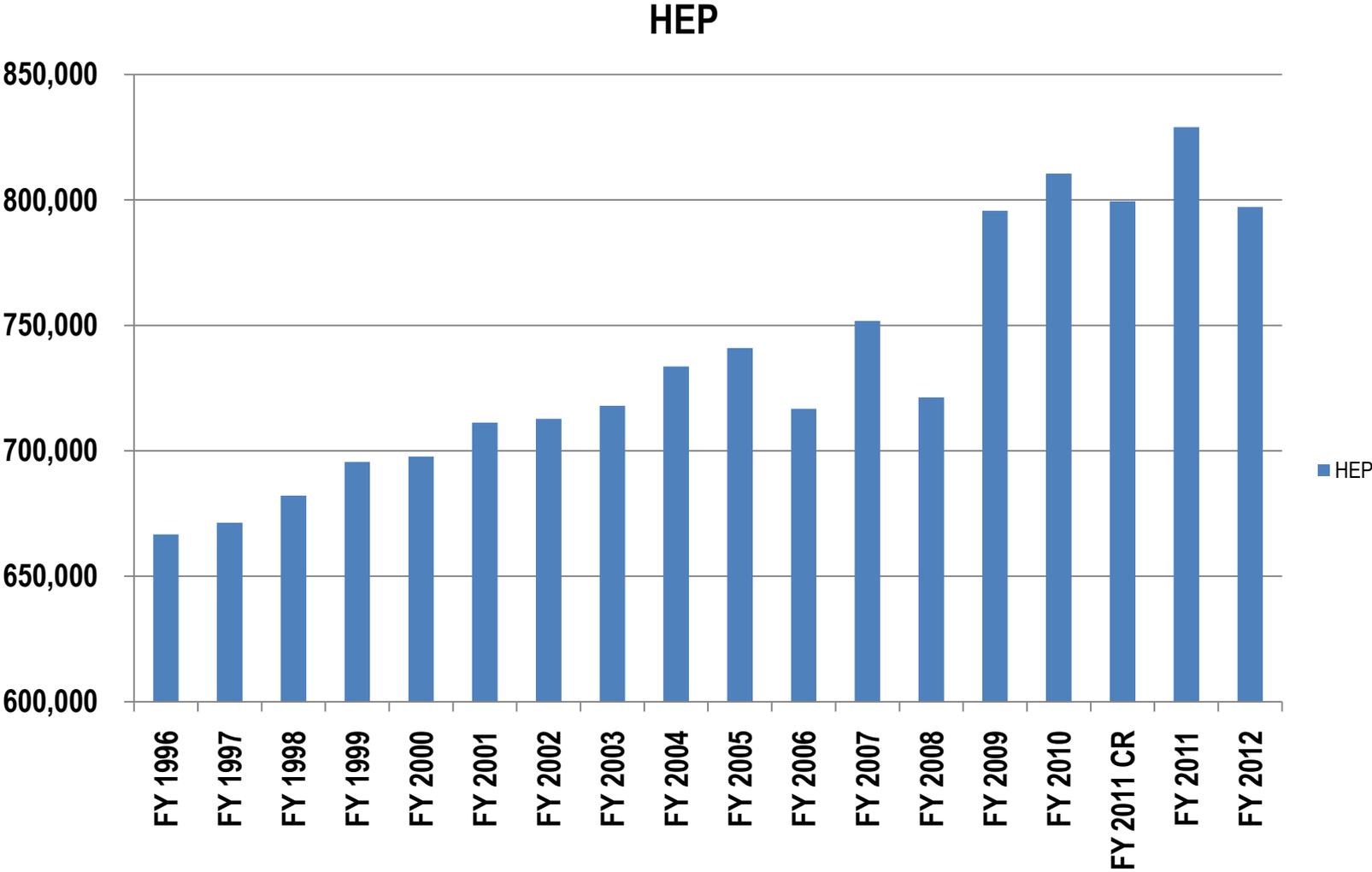


- Proton
- Electron
- Non-accelerator
- Theory
- Advanced Tech

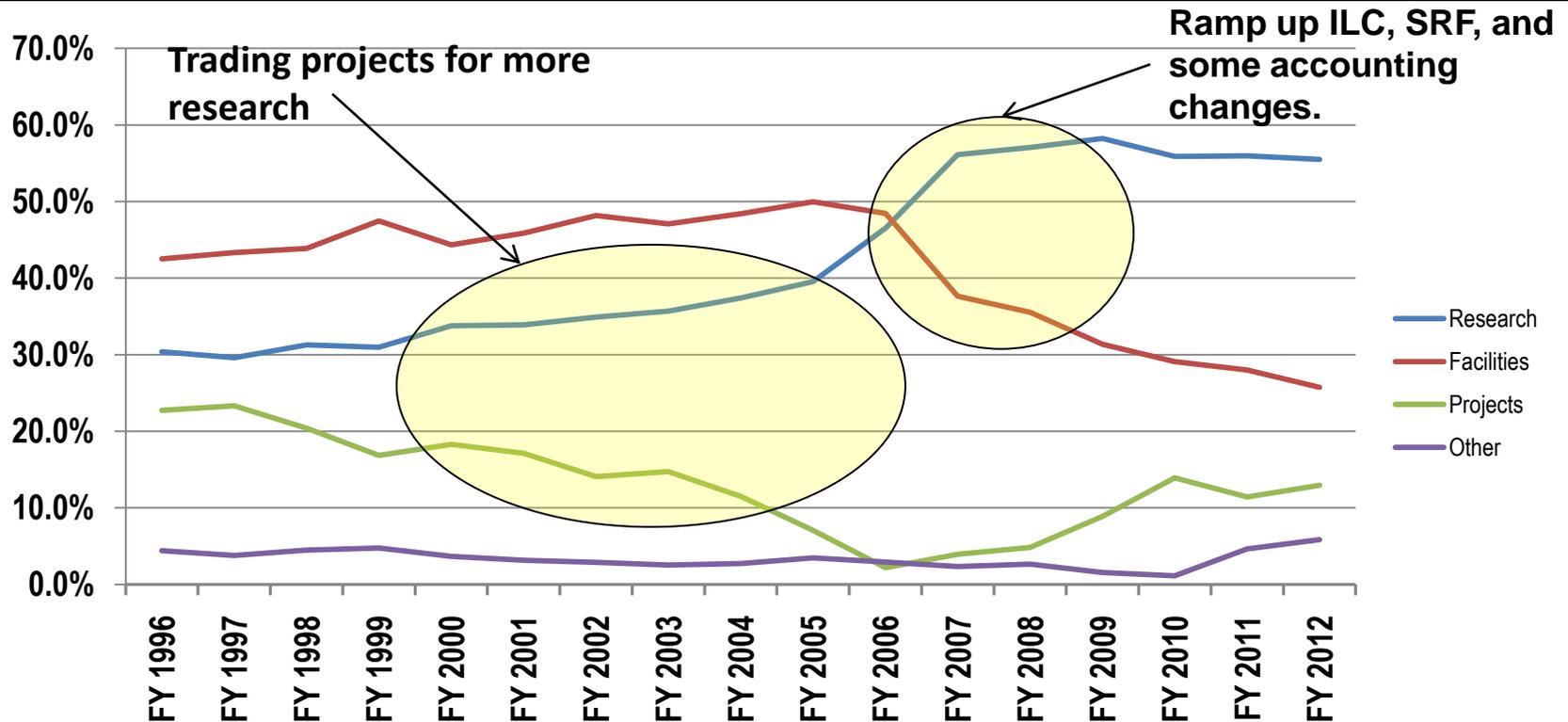
SC and HEP Funding Trends



HEP Funding History



Trends



- In the late 90's the fraction devoted to projects was about 20%.
- This fraction reached a minimum around 2006.
- The projects started since then are coming to completion.
- The HEP Committee of Visitors recommended projects should be ~20% of the budget.

Proton Accelerator Based Research

Description	FY 2010	FY 2011 Request	FY 2011 Feb	FY 2012	FY12 vs FY10
Proton Accelerator Based Physics	438,369	439,262	441,823	412,707	-25,662
Research	125,743	130,299	130,419	127,696	1,953
Facilities	312,626	308,963	311,404	285,011	-27,615
Proton Accelerator Complex Operations	125,945	123,215	135,830	103,374	-22,571
Proton Accelerator Complex Support	13,001	16,617	11,760	12,462	-539
Proton Accelerator Facility Projects	86,591	74,463	73,137	76,740	-9,851
Current Facility Projects	79,998	59,220	63,437	61,740	-18,258
NOvA	59,000	46,220	46,220	41,240	-17,760
MicroBooNE	2,043	8,000	8,000	6,000	3,957
Mu2e	4,777	5,000	6,467	7,500	2,723
LBNE	14,178	0	2,750	7,000	-7,178
Future Facility R&D	6,593	15,243	9,700	15,000	8,407
Large Hadron Collider Support	79,511	84,033	78,818	72,761	-6,750
Other Facilities	7,578	10,635	11,859	19,674	12,096

Major Changes

- **The Tevatron will not run in FY 2012. The proton accelerator complex will run for 6 months to support the neutrino program.**
 - Funding goes from \$126 million in FY 2010 to \$103 million in FY 2012.
 - The complex will then shutdown to install the accelerator upgrade components of NOvA.
 - Beam power will go from 400kW to 700kW.
- **The NOvA Project is now in the ramp down portion of its profile.**
 - From \$59 M in FY 10 to \$41 M in FY 12.
 - First detector modules will be installed in FY 2012. Completion is expected in 2013.
- **Future Complex R&D is increased to support the development of new ideas to improve the complex.**
 - The accelerator complex is over 40 years old and the portion of the complex that accelerates protons to 8 GeV is mostly the original equipment.
 - From \$6.6M in FY 10 to \$15M in FY 12 for R&D on a superconducting proton linac.
- **LHC support is decreased by \$6.8 M as the APUL project is completed.**
- **There is \$10 M in the other facilities category to support the Homestake mine, while decisions are made on whether DOE can use the mine for the SC program.**

Energy Frontier: Transitioning

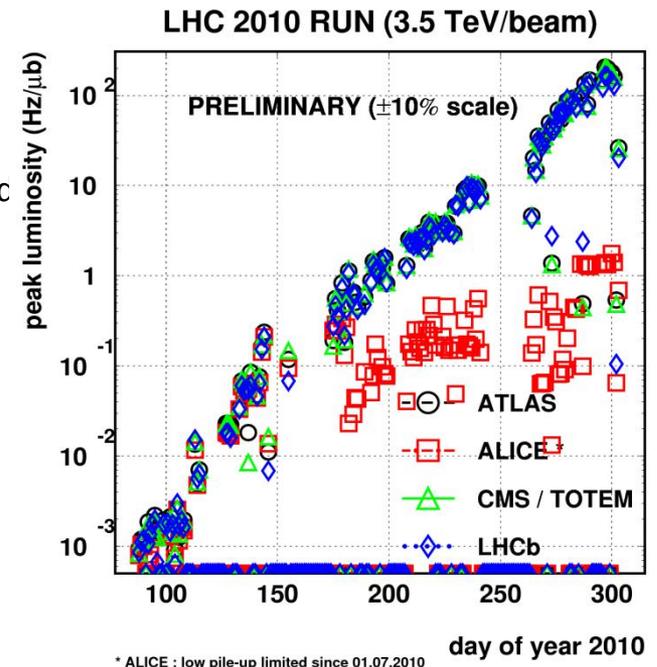
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Tevatron Program

- Operation of the Tevatron completes in FY 2011.
 - The machine is running the best that it ever has.
- P5 evaluated a proposal for 3 more years of ops; recommended only extending the run if new funding could be found.
- FY 2012 Request supports completion of the analyses with the full data sets.
 - Computing operations at Fermilab and universities.
 - Support of researchers
- Planning the disassembly of the detectors and Tevatron ring.
 - Look for opportunities to reuse components elsewhere.

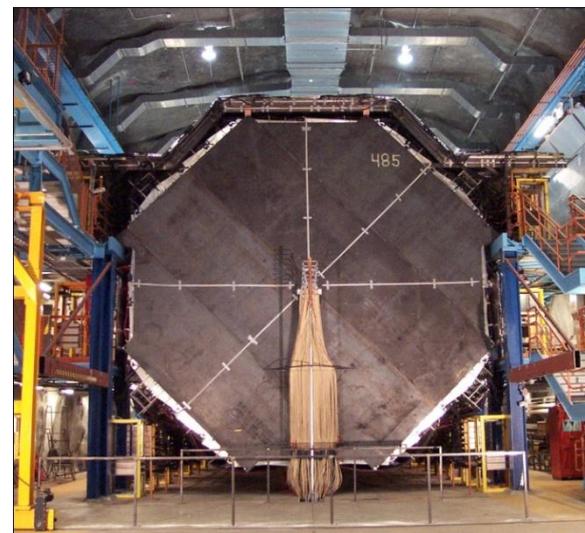
LHC Program

- Performance in 2010 improved dramatically.
 - 5 orders of magnitude improvement; Peak luminosity about a factor of 10 lower than the Tevatron.
 - First SUSY limits already better than the Tevatron limits.
- The LHC will run through 2012.
 - Expect another factor of 10 improvement in luminosity.

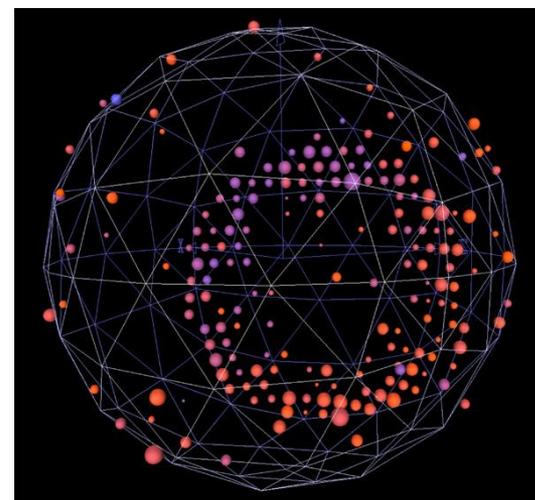


Intensity Frontier Status

- The Fermilab accelerator complex will run in FY 2012 for 6 months to support the neutrino program.
 - MINOS and MiniBooNE will be following up on antineutrino results that unexpectedly disagree with neutrino results.
 - Additional data is needed to reduce the statistical errors on the antineutrino data.
 - MINOS has proposed to run in the NOvA era.
 - MINERvA will be continuing its program of neutrino cross-section studies.
- The NOvA project will install the first detector modules and the required accelerator upgrades in FY 2012.
 - Completion is expected in FY 2013.



MINOS FAR DETECTOR



MINIBOONE EVENT

Intensity Frontier: Construction Status

Description	FY 2010	FY 2011 Request	FY 2011 Feb	FY 2012	FY12 vs FY10
Construction	0	17,000	0	39,000	22,000
Mu2e (PED)	0	5,000	0	22,500	17,500
MU2e (OPC)	4,777	5,000	6,467	7,500	4,777
Long Baseline Neutrino Experiment (PED)	0	12,000	0	17,000	5,000
Long Baseline Neutrino Experiment (OPC)	14,178	0	2,750	7,000	-7,178

- Both projects had their first request for PED funds in FY 2011. No funds have been approved in FY 2011.
- Work on both projects has been slowed to prevent a gap in funding.
 - Experience in FY 2008 when the NOvA project lost funding has shown that it takes 6 to 9 months to rebuild a project team after dispersing them.
 - It is better to slow work and keep a core team together.
 - The FY 2012 request includes OPC funding for both projects to prevent a funding gap in case there is a CR at the beginning of FY 2012.

Intensity Frontier: DUSEL

DOE and NSF had developed a partnership model for the physics program at the deep Underground Science and Engineering Lab (DUSEL), which would be in the Homestake Mine in Lead, South Dakota.

- DOE HEP would steward the Long Baseline Neutrino Experiment while NSF stewarded the DUSEL Facility.
 - DOE HEP would lead the construction of the neutrino beam, near detector, far detector, and the underground cavern for the far detector.
 - NSF would contribute a fixed dollar amount to the far detector and the underground cavern for the far detector.
 - NSF would provide the non-detector specific infrastructure such as the shafts, water pumping, ventilation, etc.
- NSF would steward the dark matter experiments and DOE HEP would partner.



Davis cavern refurbished by South Dakota.

- DOE NP would steward neutrinoless double beta decay and NSF would partner.
- The National Science Board rejected this arrangement and declined to fund the DUSEL project any further.
 - NSB suggested that this was more appropriate for DOE to build the facility.

Intensity Frontier: Homestake Mine

- The Office of Science has an interest in three experiments that had been planned for DUSEL.
 - Long Baseline Neutrino Experiment
 - Dark Matter
 - Neutrinoless Double Beta Decay
- The Office of Science has started a review process to determine if any of these can be carried out in a cost effective manner at the Homestake Mine.
 - Stakeholders were informed of the review process at the end of February.
 - Government of South Dakota
 - Universities and national labs that were involved with DUSEL.
 - Leaders of scientific collaborations that hoped to work at DUSEL.
- The FY 2012 request includes \$15 million to keep the Homestake Mine viable while decisions are made. (HEP \$10 M, NP \$10 M)
- Review process will inform the FY 2013 request.
- Dr. Brinkman will address this further in his talk.

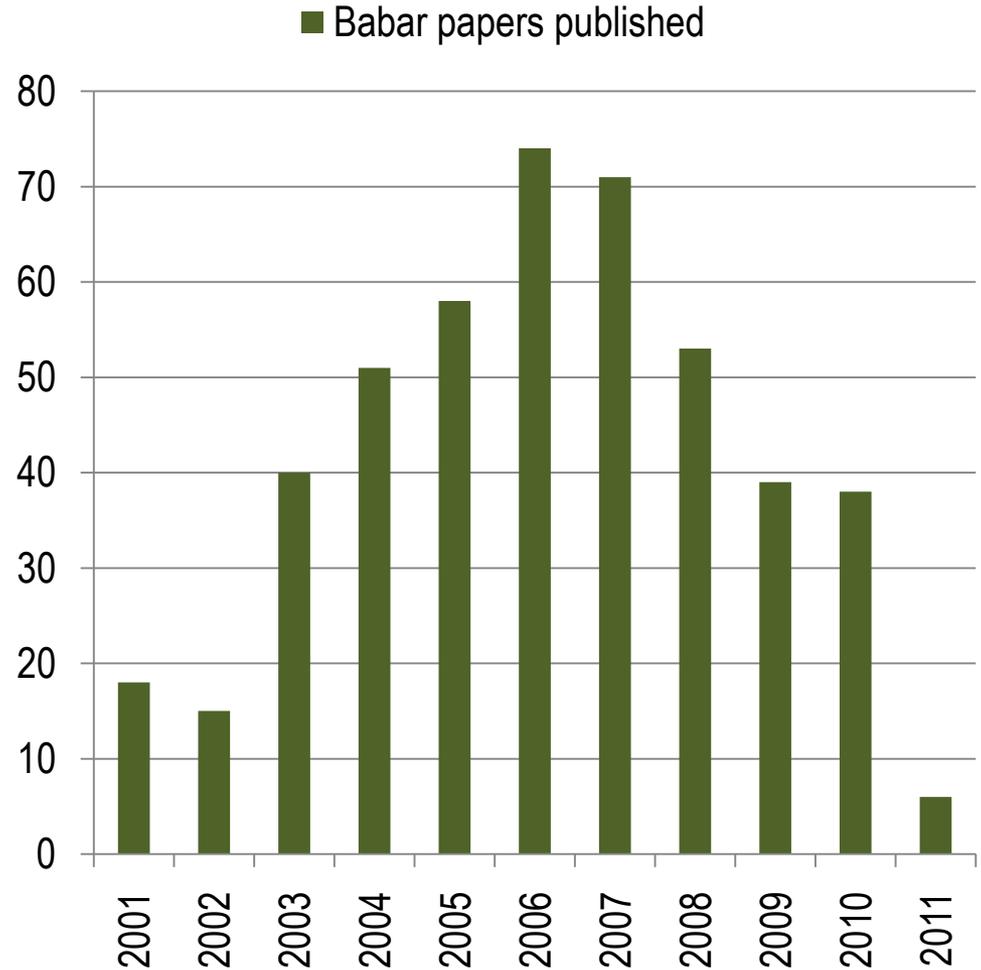
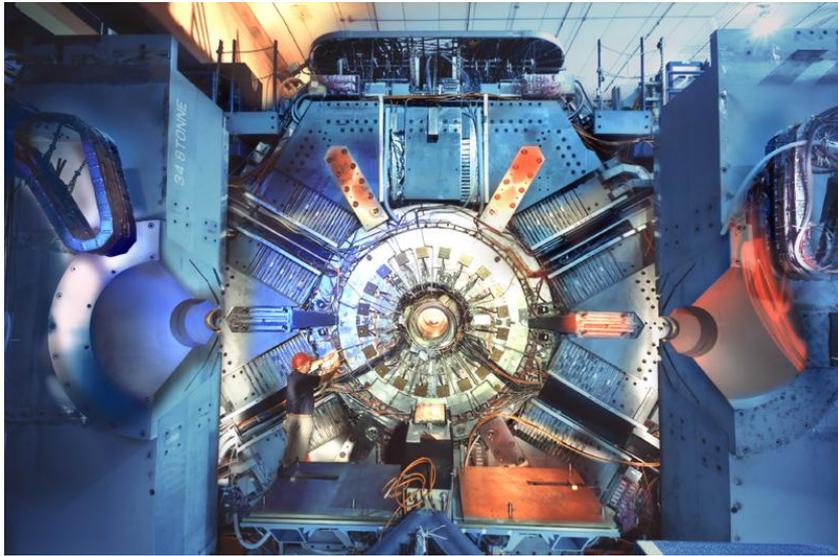
Electron Accelerator-based Physics

	FY 2010	FY 2011 Request	FY 2011 February	FY 2012	FY 2012 – FY 2010
Electron Accelerator-Based Physics	30,212	24,707	24,707	22,319	-7,893
Research	15,263	14,927	14,927	13,069	-2,194
Grants Research	5,959	6,337	6,692	5,192	-767
National Laboratory Research	9,278	8,565	8,235	7,877	-1,401
University Service Accounts	26	25	0	0	-26
Facilities	14,949	9,780	9,780	9,250	-5,699
Electron Accelerator Complex Operations	12,019	8,880	8,880	8,350	-3,669
Electron Accelerator Complex Support	2,930	900	900	900	-2,030

- The SLAC B-factory shutdown in 2008.
- Funding for support for researchers and computing continues to ramp down.
- Funding is provided to disassemble the Babar detector and PEP-II accelerator.
 - HEP is investigating giving accelerator components to Italy for their use.
 - This would be less expensive than disposing of them.

Continuing Analysis of B-Factory Data

- HEP has supported the completion of the analysis of the data.
- There have been over 100 publications since the shutdown.



Non-accelerator Physics

	FY 2010	FY 2011 Request	FY 2011 Feb	FY 2012 Request	FY 12 – FY 10
Non-Accelerator Physics	97,469	88,539	88,539	81,852	-15,617
Research	97,469	88,539	88,539	81,852	-15,617
Grants Research	21,708	22,556	19,853	21,417	-291
National Laboratory Research	44,933	43,923	47,826	46,435	1,502
Projects	30,828	22,060	20,860	14,000	-16,828
Current Projects	21,110	6,060	6,060	2,000	-19,110
DES	8,610	4,000	4,000	0	-8,610
SuperCDMS	1,500	0	0	0	-1,500
Daya Bay	11,000	2,060	2,060	500	-10,500
HAWC	0	0	0	1,500	1,500
Future Projects R&D	9,718	16,000	14,800	12,000	2,282

- There is a \$17 million decrease in projects as Daya Bay, DES, and SuperCDMS complete.
- LSST and dark matter experiments are in an R&D phase before starting MIEs.

Cosmic Frontier

- The Dark Energy Survey Project is nearing completion and will begin operations in FY 2012.
- The Particle Astrophysics Scientific Assessment Group, HEPAP subpanel, made several recommendations.
 - Fund the High Altitude Cerenkov Array (HAWC) in all funding scenarios.
 - Will be done in partnership with NSF.
 - FY 2012 request includes an MIE start of \$1.5 million of a total \$3 million.
 - Pursue R&D on at least two technologies to search for dark matter.
 - Dark matter searches are very sensitive to backgrounds.
 - Need to demonstrate excellent background rejection before choosing a technology.
 - FY 2012 request includes \$3 million for R&D on the technologies.
- Mission Need Statement signed by the Director of the Office of Science for a Stage IV ground based dark energy experiment.
- JDEM R&D will be closed out this year.
- NASA has the lead on WFIRST. We continue to talk with them.

Theoretical Physics Research

Description	FY 2010	FY 2011 Request	FY 2011 Feb	FY 2012	FY12 vs FY10
Theoretical Physics	68,414	69,524	68,024	68,914	500
Research	68,414	69,524	68,024	68,914	500
Grants Research	27,415	27,555	28,055	27,415	0
National Laboratory Research	25,838	26,290	25,303	26,074	236
Computational HEP	11,476	10,400	10,400	11,076	-400
SciDAC	6,000	5,600	5,600	5,600	-400
Computational QCD and Network Support	5,476	4,800	4,800	5,476	0
Other	3,685	5,279	4,266	4,349	664

Other is dominated by the Particle Data Group.

Advanced Technology R&D*

Description	FY 2010	FY 2011 Request	FY 2011 Feb	FY 2012	FY12 vs FY10
Advanced Technology R&D	156,347	169,941	161,941	152,744	-3,604
Accelerator Science	36,933	48,580	41,444	45,167	8,234
Grants Research	8,146	9,080	9,880	10,150	2,004
National Laboratory Research	28,787	39,500	31,564	35,017	6,230
Accelerator Development	94,206	95,166	94,302	82,096	-12,110
General Accelerator Development	31,721	34,171	28,021	33,146	1,425
Superconducting RF R&D	22,000	19,240	22,390	17,500	-4,500
Electron Beam Welder	0	3,200	3,200	0	0
Muon Accelerator Program	5,494	3,555	10,691	8,950	3,456
International Linear Collider R&D	34,991	35,000	30,000	22,500	-12,491
Other Technology R&D	25,208	46,222	46,222	44,645	19,437
Detector Development, Grants Research	3,679	3,688	2,906	3,952	273
Detector Development, National Laboratory	21,529	22,507	23,289	21,529	0

*excluding SBIR/STTR

Accelerator R&D Significant Changes

- The FACET Project to build a beam driven wakefield acceleration test facility completes this year.
 - Held a workshop to inform experimenters of its capabilities.
 - FY 2012 budget request includes \$6 million to operate it.
- The ILC R&D program is reduced by \$12.5 million from FY 2010.
 - There have been notable accomplishments in the program, but the time scale for starting an ILC continues to recede.
 - Advanced Energy Systems (Medford, NY) working with Thomas Jefferson National Accelerator Facility produced superconducting RF cavities that exceed 35 MeV/m gradient 90% of the time in 2010.
 - The overall program achieved 50% of the time in 2009.
 - Information from the LHC needed to make a decision may not be available until 2014 or 2015.
 - ART has prioritized the remaining R&D that was planned for the ILC Global Design Effort to maximize its impact.
- The Superconducting RF program ramps down as it completes developing SRF infrastructure at Fermilab.

OFFICE NEWS

Personnel Changes

- Dennis Kovar retired at the end of year.
 - I have been acting as Associate Director for HEP since January.
 - A search for a new AD has begun.
- Positions filled:
 - Dr. David Boehnlein (FNAL) joined the office as an IPA in January.
 - Dr. Lali Chatterjee has moved to our office to serve as the Computational HEP program manager in March.
 - Dr. Simona Rolli (Tufts) has accepted an offer to be a program manager.
 - We have hired a new financial analyst.
- Departures:
 - Dr. Chung Leung completed his IPA as theory program manager in January.
 - Dr. Amber Boehnlein will complete a detail, Computational HEP and LHC operations, at the end of March.
- We were unable to fill a federal position for a program manager in accelerator science.
- We are still seeking an IPA or detailee to work in accelerator science and on the accelerator R&D strategic plan.

Search for a New Associate Director

- The search is being headed by Patricia Dehmer, Deputy Director for Programs, Office of Science.
- Nominations were solicited from the field.
- The posting for the position opened March 10th and will be open until April 25th.
 - The HEP website has a link.
 - Interested individuals must apply electronically through that link.
- Those nominated will be contacted by Dr. Dehmer and asked to apply.
- A panel of three SES members from inside and outside the Office of Science will review all of the applications, and this panel will put forward the top candidates. Typically 4 to 8 candidates are put forward.
- There will be interviews with a team from HEP and Feds from outside HEP. The interview process may also include a presentation by each candidate to the HEP (as well as others in SC) staff.
- Dr. Brinkman will approve the selection.
- According to the rules set down by the Office of Personnel Management, a decision must be made within 90 days of the close of the posting – or about July 25th.