



U.S. DEPARTMENT OF
ENERGY

OFFICE OF
SCIENCE

Report from DOE

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Glen Crawford
Director, Research and Technology R&D
Office of High Energy Physics
Office of Science, U.S. Department of Energy

HEP Strategic Plan

Plan is based on High Energy Physics
Advisory Panel “P5” report

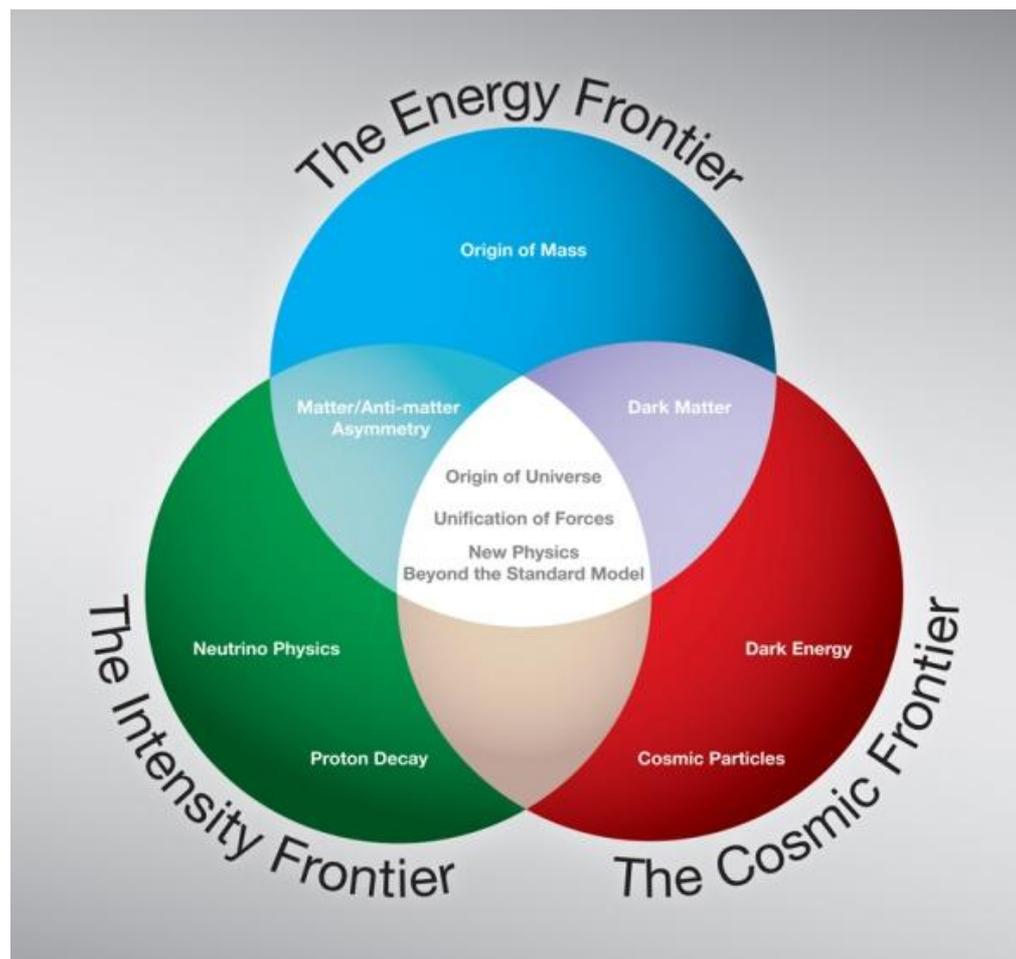
This is still the plan.

Implementation at the **Energy** and
Cosmic Frontiers is clear

- LHC (+upgrades)
- Dark Matter + Dark Energy

Implementation at the **Intensity
Frontier** has been more
challenging.

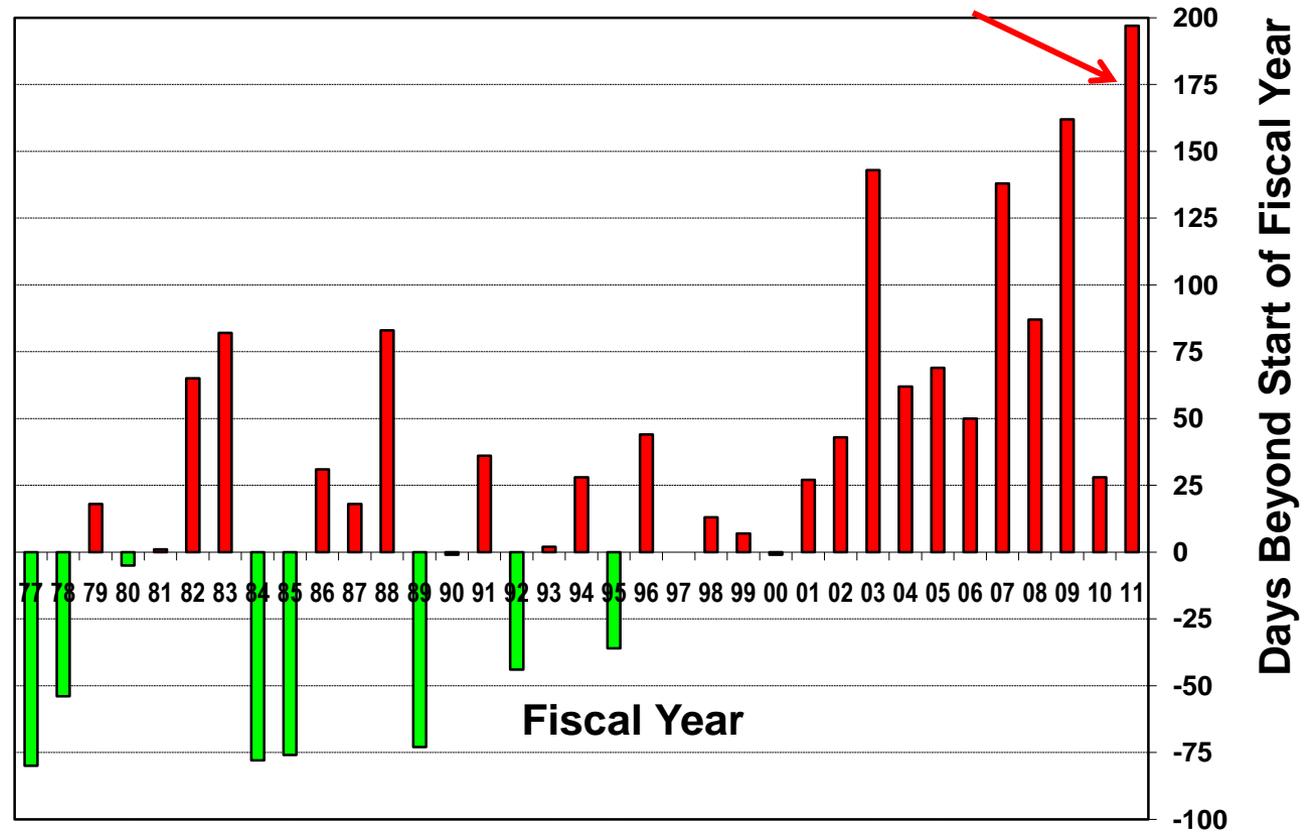
- Funding levels at lower end of P5
Scenarios
- CR uncertainties + “no new
starts”
- DUSEL difficulties



BUDGETS

History of the Energy and Water Development Appropriation

FY 2011 – a new record!



The budget uncertainty associated a significant delay in the appropriation creates havoc with agency planning.

FY 2011 Funding Status

(\$M)	FY 2010 Actual	FY 2011 Request	FY 2011 CR	FY 2011 Approp.	FY2012 Request
HEP	810	829	800	(tbd)	797
SC	4,789	5,130	4,826	4,884*	5,418

- **We were operating under a CR for over 6 full months .**
 - We were below the FY 2010 level, since the CFO held back the funds for engineering design for Mu2e and LBNE. They are considered new starts.
- **Final distribution of FY2011 funding for Office of Science not yet determined**
 - Expect final FY11 HEP budget to be very close to FY11 CR level
 - “No new starts” held in FY11 Appropriation

**Does not include reductions for 0.2% rescission, \$16M contractor pay freeze, and unobligated Prior Year funds*

Working under the CR

- HEP formulated a plan for the \$799,500,000.
 - We made a financial plan for the laboratories much like a normal year.
 - Attempted to avoid any dire impacts until the FY11 Appropriation was known
- HEP is holding minimal reserves at this point.
 - **Very** limited ability to respond to problems or supplemental requests
- Several Intensity Frontier projects (MicroBooNE, Mu2e, and LBNE) are considered new starts and are not receiving any equipment funding, including engineering design
 - 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 (more on this later)
 - We are working to try to mitigate impacts of the extended CR but these projects will inevitably experience some delays.
 - These delays will be exacerbated if there is another CR in FY2012.
- **Now pushing to get remaining FY11 funding out as soon as possible.**

The High Energy Physics Budget Request

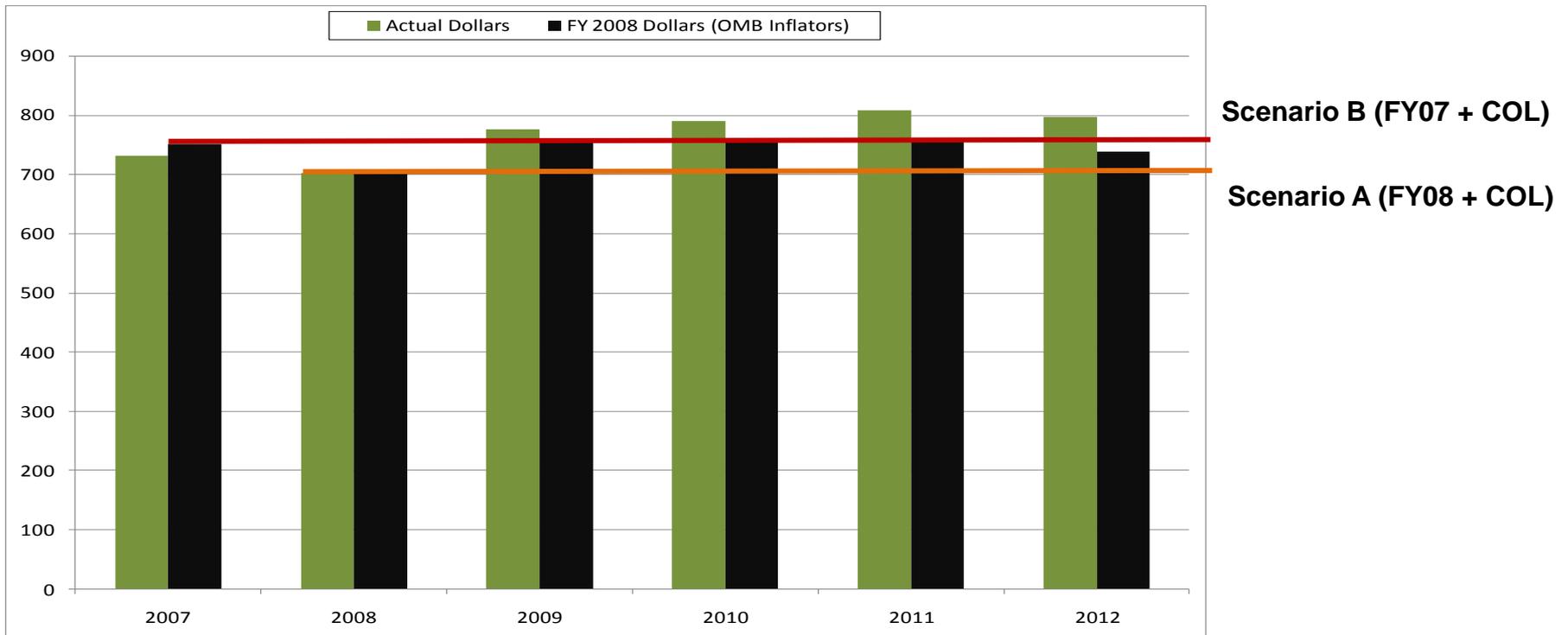
Description	FY 2010	FY 2011 Request	FY 2011 March	FY 2012 Request	FY12 vs FY10
Proton Accelerator-Based Physics	438,369	439,262	439,462	412,707	-25,662
Electron Accelerator-Based Physics	30,212	24,707	20,805	22,319	-7,893
Non-Accelerator Physics	97,469	88,539	88,539	81,852	-15,617
Theoretical Physics	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

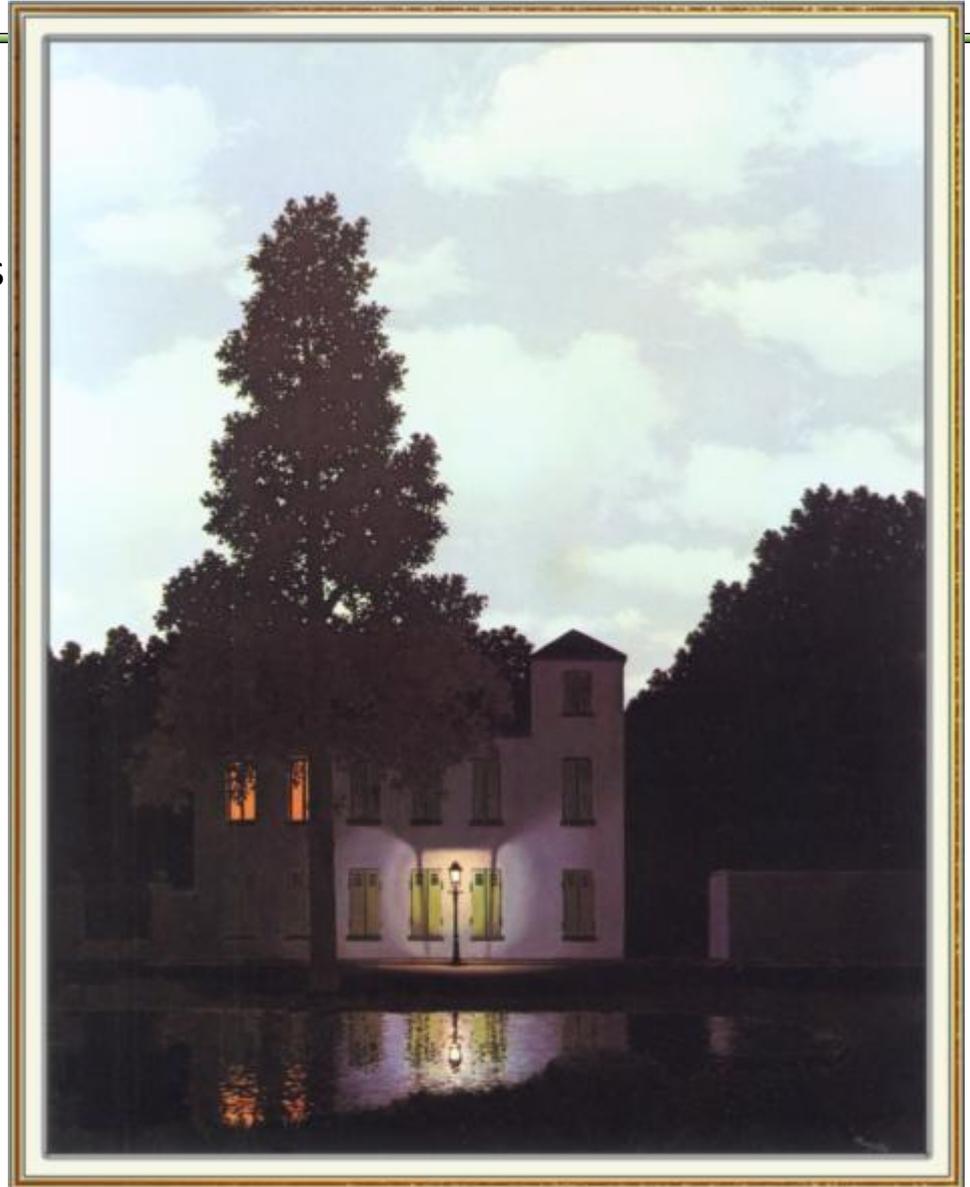
HEP is now between the HEPAP/P5 “A” and “B” scenarios.

- 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; cannot maintain leadership program at all 3 frontiers

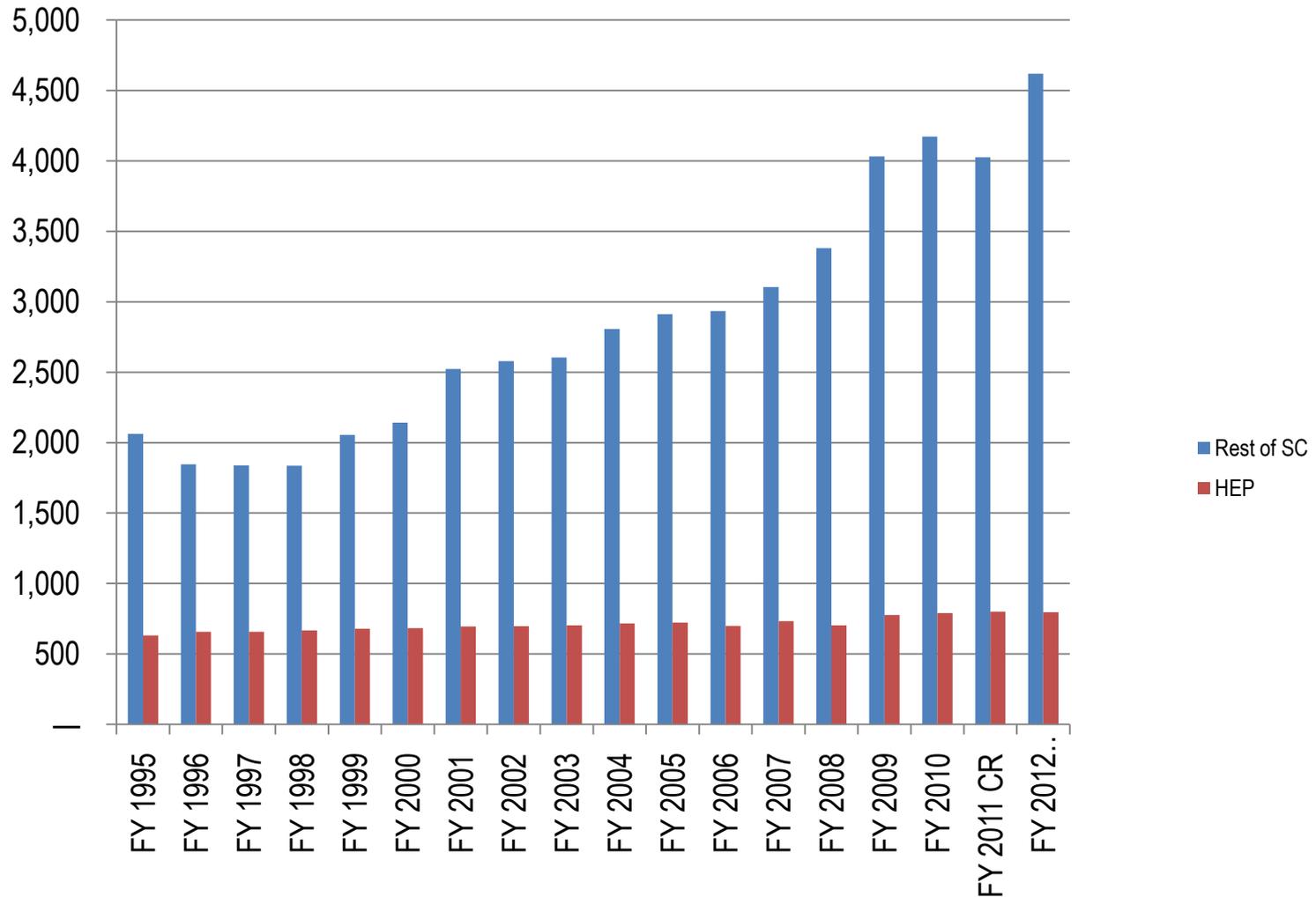


The Difficulties of Forecasting

- **General, bipartisan support for Science**
 - Administration has also made this a priority
- **However, Administration priorities within Science are elsewhere:**
 - Clean energy
 - Renewables
 - Advanced IT
- **Budget climate not conducive to increases in any discretionary spending area.**



SC and HEP Funding Trends



HEP Major Changes in 2012

- **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 LHC Accelerator Upgrade 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.**

SELECT PROGRAM HIGHLIGHTS

Energy Frontier: Transitioning

2010/11/05 08.35

Tevatron Program

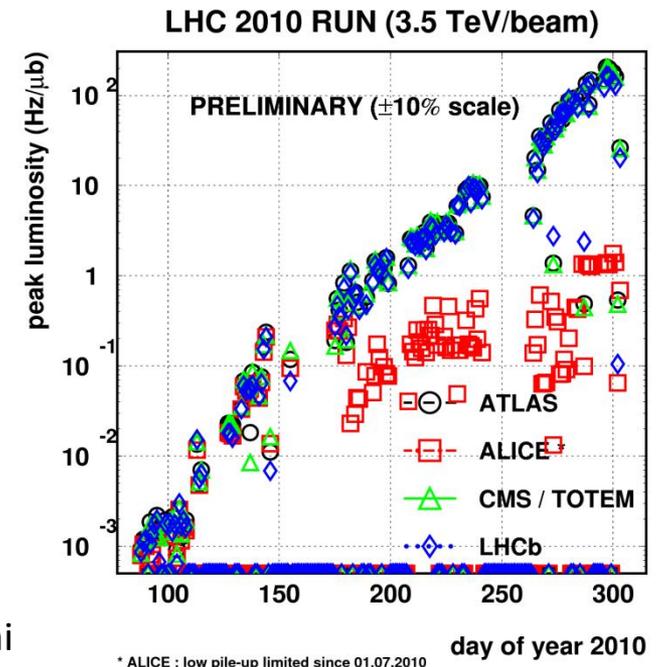
- The machine is running the best that it ever has.
- FY 2012 Request supports completion of the analyses with the full data sets.
 - Computing operations at Fermilab and universities.
 - Support of researchers

LHC Program

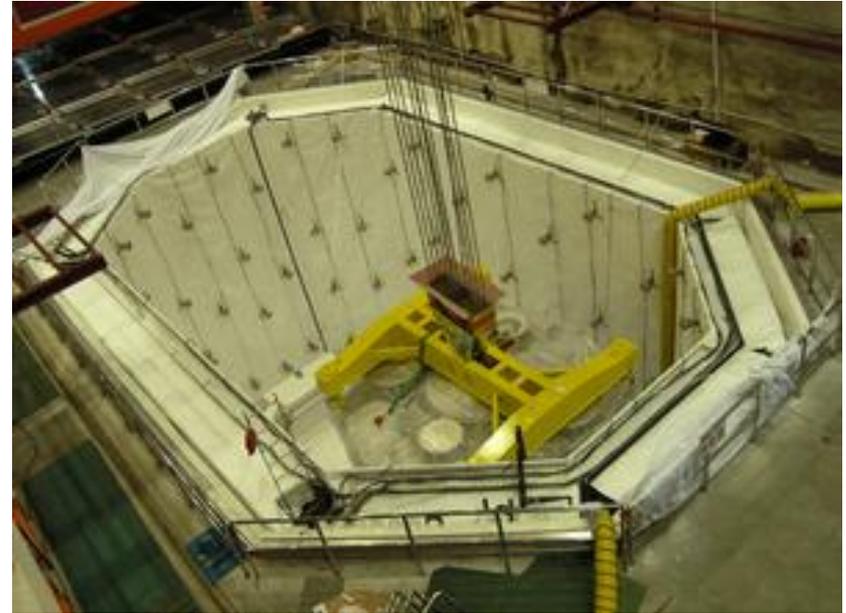
- Performance in 2010 improved dramatically.
 - 5 orders of magnitude improvement;
 - First SUSY limits already better than the Tevatron limit
- The LHC will run through 2012, then 18 month shutdown
 - Expect another factor of 10 improvement in luminosity.

At the threshold of discovery (?)

- Already $3\sigma+$ evidence for new physics ... will it hold up?



Intensity Frontier Status (non-Fermi version)



- **The Daya Bay Reactor Neutrino Experiment is second only to the LHC as a major US HEP offshore investment.**
 - The scientific result is critical to the future of the Intensity Frontier program
 - First antineutrino detectors completed (above left) and being installed now
 - China contributes about 50% of detectors and all of civil construction
 - Initial commissioning in 2011 and full operations in 2012

Intensity Frontier: Homestake Mine

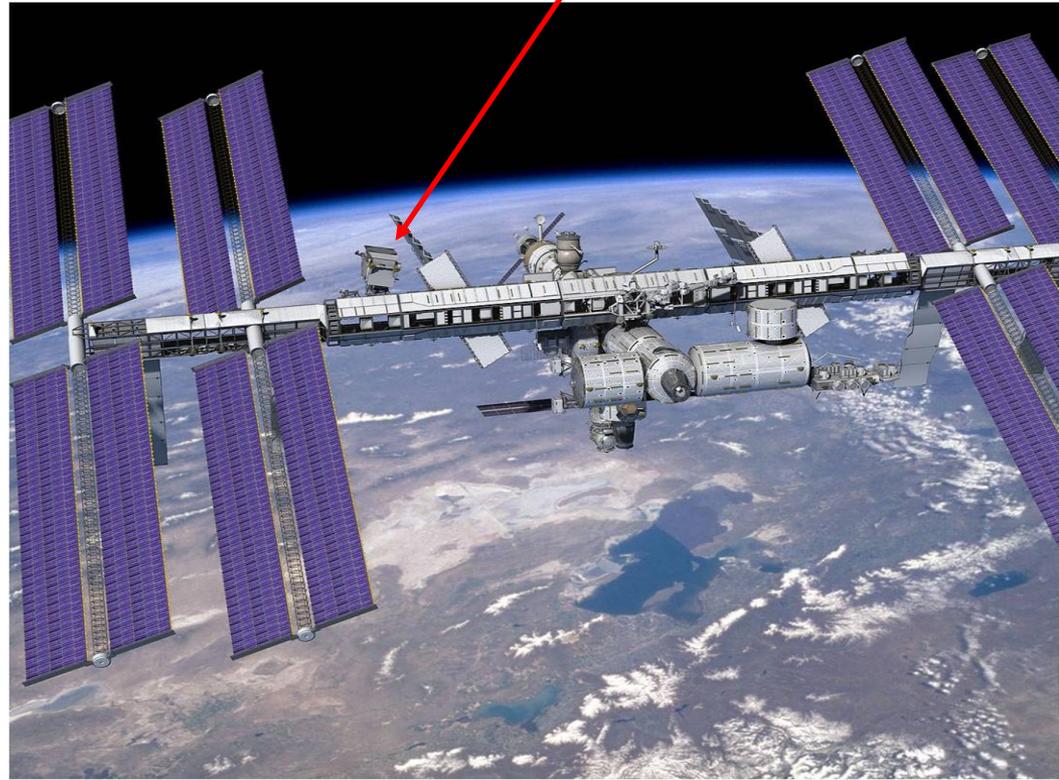
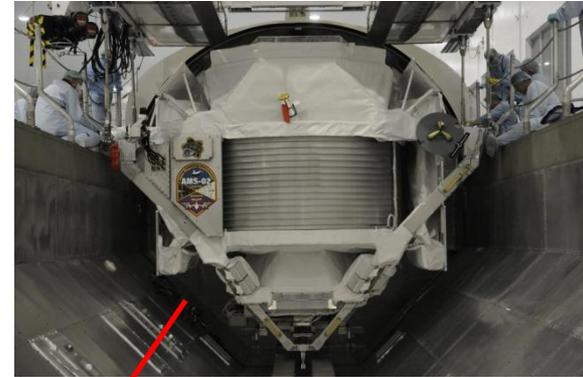
- The Office of Science has an interest in three experiments that had been planned for DUSEL.
 - Long Baseline Neutrino Experiment
 - Dark Matter
 - Neutrinoless Double Beta Decay
- The Office of Science has started a review process to determine if any of these can be carried out in a cost effective manner at the Homestake Mine.
 - Stakeholders were informed of the review process at the end of February.
 - Review committee met at SLAC in April and visited Homestake
 - Co-chairs briefed B. Brinkman on findings June 1
 - Final Report due June 15
- The FY 2012 request includes \$15 million to keep the Homestake Mine viable while decisions are made. (HEP \$10 M, NP \$5 M)
- Review process will inform the FY 2013 request.

Cosmic Frontier Status

- 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.
- Ground-based Dark Energy: Mission Need Statement signed by the Director of the Office of Science for a “Stage IV” experiment.
 - Working to coordinate LSST project planning with NSF.
- Space-based dark energy : JDEM R&D will be closed out this year.
 - NASA has the lead on WFIRST. We continue to talk with them.

New Frontiers?

- Latest \$B international science project: AMS-02
 - Large and bold ideas are still achievable
 - Need a clear vision and tenacity
- We hope for discoveries at LHC/Tevatron that will point to next steps at the Energy Frontier
- Similarly, neutrino experiments currently underway will inform future directions at the Intensity Frontier



OFFICE NEWS

Personnel Changes

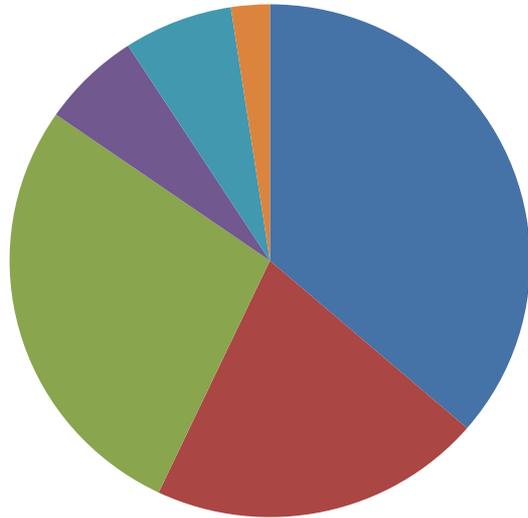
- Dennis Kovar retired at the end of year.
 - Mike Procaro been acting as Associate Director for HEP since January.
 - A search for a new AD is in progress.
- Positions filled:
 - New program managers in Computational HEP, Theory, LHC Operations (2 Feds, 1 IPA)
 - We have also hired a new financial analyst.
 - Moving paperwork for an additional IPA
- Departures:
 - Experienced managers in Computational HEP, Theory, LHC Operations (1 IPA, 1 detailee)
- **We were unable to fill a federal position for a program manager in accelerator science. We have re-advertised, closes June 3.**
- **We are still seeking another IPA or detailee to work in accelerator science and on the accelerator R&D strategic plan.**
- HEP Committee of Visitors (2010) reiterated the need for additional program staff

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.
 - Those nominated have been contacted by Dr. Dehmer and asked to apply.
- The posting for the position opened March 10th and closed **May 10th**.
- 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 Aug 9th.
 - Still needs several levels of approval after SC decision

BACKUP

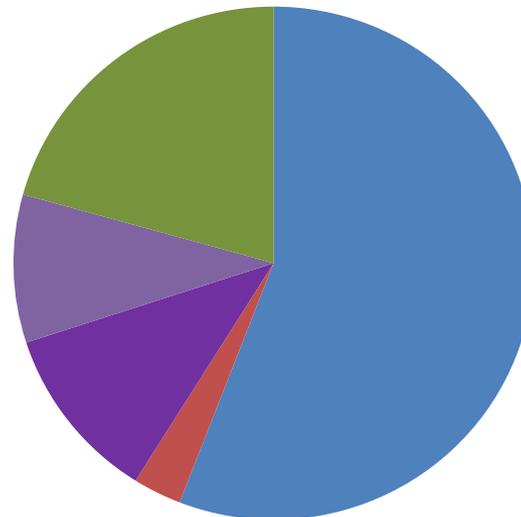
Cross cuts



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

By function

By program



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

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.

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

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.

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.

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