DOE Perspectives

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HEPAP

Sept 6 2013

Outline

- **HEP Budget Status**
- **Comments on P5**
  - Roles and responsibilities
- **DOE HEP Committee of Visitors**
- **HEP FY 2014 Funding Opportunities**
  - Comparative Review
  - Early Career

HEP BUDGET

HEP Budget Overview

- **FY2014 budget philosophy was to enable new world-leading HEP capabilities in the U.S. through investments on all three frontiers**
  - **Accomplished through ramp-down Research and operations of existing Projects**
  - **When we were not able to fully implement this approach (*i.e.,* start new projects), converted planned project funds to R&D: Research → ~~Projects~~ → Research**
    - **Therefore, the FY14 Request shows *increases* for Research that are due to this added R&D "bump", while Construction/MIE funding is only slightly increased**
- **Impact of these actions:**
  - **Several new efforts are delayed:**
    - **LHC detector upgrades, LBNE, 2nd Generation Dark Matter detectors, MS-DESI**
  - **US leadership/partnership capabilities will be challenged by others**
  - **Workforce reductions at universities and labs**
- **Key areas in FY2014 Request**
  - **Maintaining forward progress on new projects via Construction and Research (incl. R&D for projects) funding lines**
- **Congressional response**
  - **House and Senate Marks add $$ for SURF Ops and LBNE (both houses) and accelerator stewardship (Senate). Senate adds $$, House reallocates within reduced bottom-line**
  - **Uncertain whether we will see an actual appropriation or full-year CR**

Major Item of Equipment (MIE) Issues

- **We were not able to implement [most] new MIE-fabrication starts in the FY14 request**
  - **Muon g-2 experiment is the only new start in HEP that was not requested in FY13**
  - **LSST-Camera and Belle-II, which didn't receive approval in FY13, are requested again in FY14**

- **This upsets at least 2 major features of our budget strategy:**
  - **Strategic plan: "Trading Research for Projects"**
  - **Implementation of facilities balanced across Frontiers**

FY 2014 High Energy Physics Budget

(Dollars in thousands)

Description	FY 2012 Actual	FY 2013 July Plan	FY 2014 Request	Explanation of Change [FY14 Request vs. FY12 Actual]
Energy Frontier Exp. Physics	159,997	148,164	154,687	Ramp-down of Tevatron Research
Intensity Frontier Exp. Physics	283,675	287,220	271,043	Completion of NOνA (MIE), partially offset by Fermi Ops
Cosmic Frontier Exp. Physics	71,940	78,943	99,080	Ramp-up of LSST-Camera
Theoretical and Computational Physics	66,965	66,398	62,870	Continuing reductions in Research
Advanced Technology R&D	157,106	131,885	122,453	Completion of ILC R&D
Accelerator Stewardship	2,850	3,132	9,931	FY14 includes Stewardship-related Research
SBIR/STTR	0	0	21,457	
Construction (Line Item)	28,000	11,781	35,000	Mostly Mu2e; no LBNE ramp-up
Total, High Energy Physics:	**770,533**[a]	**727,523**[b,c]	**776,521**	**wrt FY13: Up +3.6% after SBIR correction** **wrt FY12: Down -2% after SBIR correction**
***Ref:* Office of Science (SC):**	**4,873,634**	**4,621,075**[c]	**5,152,752**	

SBIR = Small Business Innovation Research
STTR = Small Business Technology Transfer

[a] The FY 2012 Actual is reduced by $20,327,000 for SBIR/STTR.

[b] The FY 2013 July Plan is reduced by $20,791,000 for SBIR/STTR.

[c] Reflects sequestration.

HEP Physics Funding by Activity

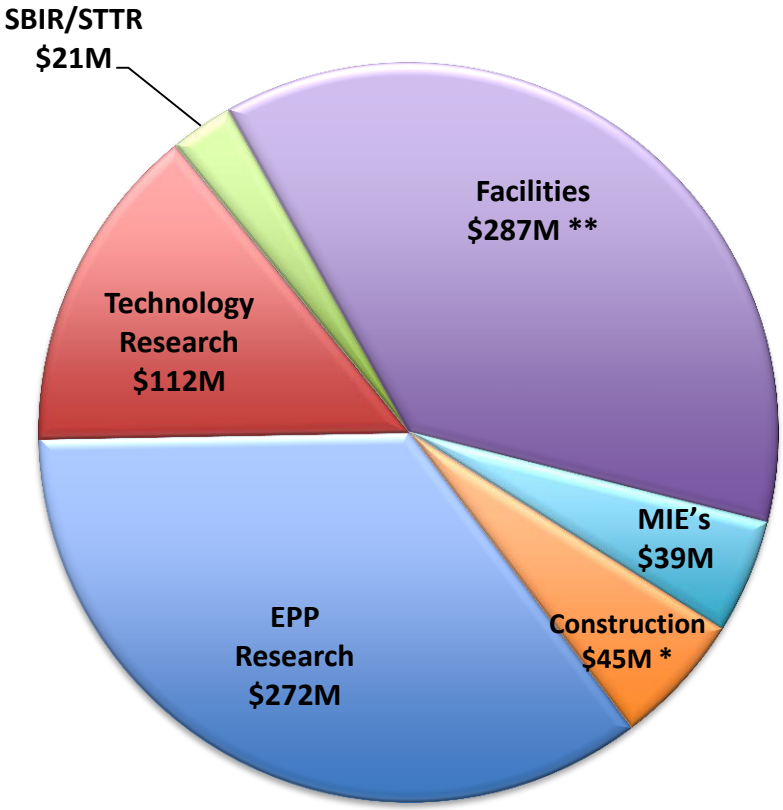
Funding (in $K)	FY 2012 Actual	FY 2013 July Plan	FY 2014 Request	Explanation of Change wrt FY12
Research	**391,329**	**362,284**	**383,609**	Reduction mostly ILC R&D
Facility Operations and Exp't Support	**249,241**	**265,305**	**271,561[a]**	NOνA ops start-up and Infrastructure improvements
Projects	**129,963**	**99,934**	**99,894**	
Energy Frontier	0	3,000	0	Phase-1 LHC detector upgrades
Intensity Frontier	86,570	62,794	37,000	NOνA ramp-down, start Muon g-2
Cosmic Frontier	12,893	19,159	24,694	LSST
Other	2,500	3,200	3,200	LQCD hardware
Construction (Line Item)	28,000	11,781	35,000	Mostly Mu2e; no LBNE ramp-up
SBIR/STTR	**0**	**0**	**21,457**	
TOTAL, HEP	**770,533**	**727,523[b]**	**776,521**	

[a] Includes $1,563K GPE.

[b] Reflects sequestration.

FY 2014 Request Crosscuts

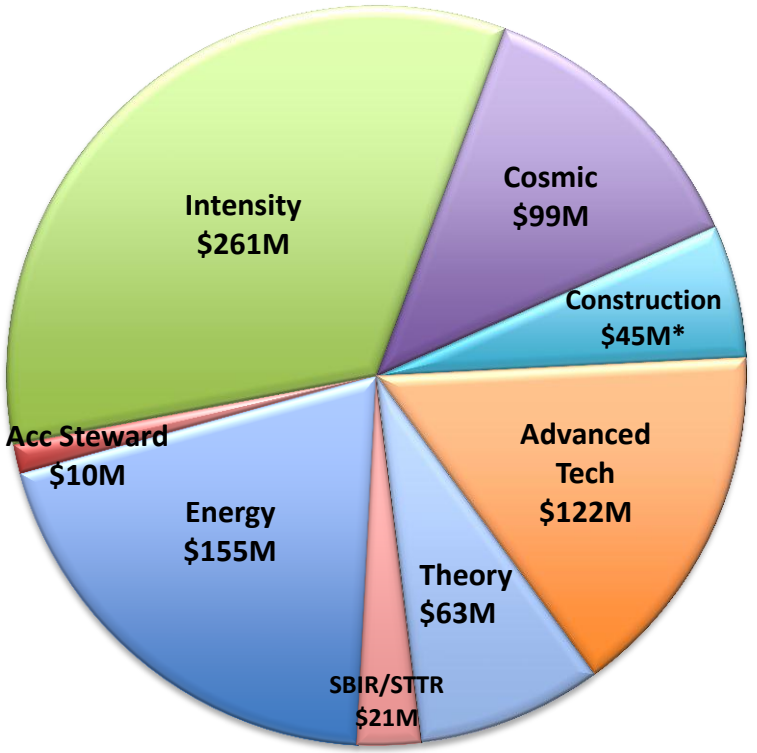
By Function



*Includes Other Project Costs (R&D) for LBNE

**Includes $15.9M Other Facility Support

By Frontier



*Includes Other Project Costs (R&D) for LBNE

Take-Away Messages

- **The U.S. HEP program is following the strategic plan laid out by the previous (2008+) HEPAP/P5 studies**
- **Though some of the boundary conditions have changed, we are still trying to implement that plan within the current constraints**
  - FY2014 Request generally supports this, though funding constraints have led to delays in some key projects
  - Need to maintain progress with projects currently "on the books"
  - Working to attract partnerships that will extend the science impact
- **Actively engaged with community in developing new strategic plan**
- **Increased emphasis on broader impacts via accelerator stewardship**
- **Our only hope to maintain leadership in the long-term is to out-innovate the competition, and exploit unique capabilities**
  - Focus on areas where US can have leadership
  - "High-risk, high-impact" as opposed to incremental advances
  - Note this not an either/or proposition, we need both with appropriate balance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P5 COMMENTS

Snowmass / P5 Interface

What we hoped to see from Snowmass:

- √ What are the most compelling science questions in HEP that can be addressed in the next 10 to 20 years and why
- √ What are the primary experimental approaches that can be used to address them? Are they likely to answer the question(s) in a "definitive" manner or will follow-on experiments be needed?
- √ What are the "hard questions" (science, technical, cost…) that a given experiment or facility needs to answer to respond to perceived limitations in its proposal?

These topics are covered in the Snowmass reports and white papers, and we heard cogent summaries yesterday. P5 will use these reports and white papers as its starting point.

- – Do not have to wait for final polished reports, drafts should be accessible to P5 ASAP!

Core Deliverables

We request that HEPAP examine current, planned, and proposed U.S. research capabilities and assess:

- Their role and potential for scientific advancement;
- Their uniqueness and relative scientific impact in the international context;
- and estimate the time and resources needed (facilities, personnel, R&D and capital investments) to achieve their goals.

We also request that HEPAP consider the appropriate balance of small, mid-scale, and large experiments; and identify, where possible, multiple or complementary pathways to address the important scientific questions.

Additional Considerations

P5 will prioritize HEP projects over a 20 year timeframe within reasonable budget assumptions and position the U.S. to a be a leader in some (but not all) areas of HEP.

- This will include an explicit discussion of the necessity (or not) of domestic HEP facilities in order to maintain such a world leadership position. See Charge.
- Necessarily this will involve consideration of technical feasibility as well as plausible timescales and resources for future projects. Any new projects recommended should be technically and fiscally plausible on this timescale.
- Consideration of possible international partnerships will be required

The charge to P5 does NOT include explicit examination of

- Agency review processes (separate COV process for this, see later slides)
- Roles, responsibilities and funding of labs versus universities
- Relative funding of experimental HEP *vs* theory *vs* technology R&D
  - However the latter two items do impact the "balance" and "infrastructure" criteria

However we expect some of these issues to be addressed by HEPAP in the future. Working with HEPAP Chair to identify the key topics to review

- See Andy's talk later this AM

Important Supporting Efforts

To better focus the P5 process and minimize the burden on the panel, we have set up working groups to address the important "supporting" work:

- P5 tasked with updating the *Quantum Universe* questions in parallel with science priority discussions
  - For example, must be able to concisely and effectively communicate the excitement of the post-Higgs paradigm to non-scientists
- Two separate (non-P5) working groups:
  - *Science Connections*, highlighting the **scientific areas** where HEP advances, informs, and benefits from other DOE/SC programs. See e.g., 1998 National Academy EPP Decadal Survey (Winstein)
    - Co-chairs Shamit Kachru (Stanford/SLAC) and Curt Callan (Princeton)
  - *HEP Impact*, developing a potential list of messages for the U.S. HEP community to use in communicating the broad impact of HEP in **technology, workforce development, and other societal benefits**
    - Co-chairs Marcel Demarteau (ANL) and Katie Yurkewicz (FNAL)
  - These groups will produce short reports to HEPAP/P5 by the end of the calendar year in order to provide timely input that can be integrated by P5

Science Connections of Elementary Particle Physics

Co Chairs: Curtis Callan, Princeton University

Shamit Kachru, Stanford/SLAC

Key Questions (from the working group charge):

- What are the specific intellectual and scientific connections between HEP supported research in elementary particle physics and other areas such as condensed matter physics, climate science, chemistry, nuclear science, astronomy, mathematics, computer science, biology, plasma physics, and economics?
- How could the synergies identified in Q 1 be fostered to advance basic science, the mission of the Office of High Energy Physics, or the Office of Science mission?
- Can model systems and/ or experimental techniques in other science disciplines serve as test beds for particle physics ideas? Are there specific areas that are ripe for exploitation?
- Can advances be made by sharing mathematical and computational techniques among the disciplines?

Impacts and Interactions of Particle Physics

Co Chairs: Marcel Demarteau ANL and Katie Yurkewicz FNAL

Key issues to be addressed (from the working group charge):

- the impact of particle physics discoveries, as well as the tools and technologies driven by particle physics research, on other scientific fields and the nation;
- The benefits to particle physics from technological exchanges with other sciences and industry;
- the interactions of the particle physics workforce with society and industry

Note that both reports can (and we expect they will) be used more broadly than just input to P5, e.g.:

- To identify opportunities for possible crosscutting initiatives
- To develop HEP "messaging"

Roles and Responsibilities

- **HEPAP is a Federal Advisory Committee ("FACA committee") chartered to give advice to the federal government on the U.S. program in high-energy physics.**
- **This is the *only mechanism* by which the Agencies can get formal advice from the community, e.g.:**
  - What are the science opportunities and "vision" for the field
  - How best to address them
  - Relative priority of various efforts
- **Some of this work is done through limited-term subpanels (e.g. P5) that address specific charges from the Agencies**
  - HEPAP must review and approve (or not) subpanel reports and transmit them back to the Agencies
- **Agencies try to implement the advisory panel recommendations to the best of their ability**
- **Agencies have separate committees to provide for external review of funding decisions, review processes, outcomes (a.k.a. "Committee of Visitors")**
  - NSF COVs are independently chartered "mini" FACA panels
  - DOE COVs are formally subpanels of "parent" FACA panel (HEP COV → HEPAP)

Example: Sample Snowmass Questions

- How do we exploit science opportunities at the interfaces between the Frontiers? How do such opportunities receive funding?
- How do we exploit connections with nuclear physics in cases where the science questions are related? How do such opportunities receive funding?
- How do we ensure a robust program of experiments at different scales?
- How do we ensure that new ideas can find fertile ground to germinate?

1. These are all good and valid questions
2. The community (via HEPAP) can suggest mechanisms to address the "How do we…"
3. But actual implementation and funding is the Agencies' job

HEP COMMITTEE OF VISITORS

HEP COV

- **Review is Oct 9-11 in Germantown**
- **Chair : Paul Grannis**
- **Panel selected, charge issued. Seven subgroups:**
  - Energy (Jakobs, Roser, Schellman, Thomson, Wood*)
  - Intensity (Kettell, Ritchie, Scholberg*, Thomas, Van Kooten)
  - Cosmic (Burke*, Dingus, Flaugher, Gratta, Klein)
  - Theory (Albrecht, Dine, Hewett, Lykken*, Seiberg)
  - Accelerator R&D (Peggs*, Raubenheimer, Rosenzweig, Shiltsev)
  - Facilities (Ginther, Myers, O'Brien, Seeman*)
  - Projects (Gilchriese*, Rameika, Reichanadter, Ross)

  (subpanel chairs indicated by asterisk*)

COV Charge

The standard elements of the CoV charge from the Office of Science (given to HEPAP for transmittal to the CoV) are:

I. Assess the efficacy and quality of the processes used during the past three years [FY2010- FY2012] to:

- *a. solicit, review, recommend, and document application and proposal actions and*
- *b. monitor active awards, projects and programs.*

II. Within the boundaries defined by DOE missions and available funding, comment on how the award process has affected: (a) the breadth and depth of portfolio elements, and (b) the national and international standing of the portfolio elements

COV Documentation

- **Large (+growing) list of items requested:**
  - Travel summaries (Feds, IPAs)
  - Facility List
  - Active project list
  - Grants full listing with detail
  - Suggested grants list
  - Declination List
  - SBIR List
  - Solicitation List
  - Budget summaries
  - 2010 COV action items + results
  - Progress on long-term goals
  - Lab Review Reports
  - Project Review Reports
  - Comp Rev Panelist List
  - Presentation Templates
    - PMs
    - Overview
  - Various grants summary data
- **Most documentation will be provided to COV in advance on secure website. Some material will be provided on 1st day of review**

Sample COV Detailed Questions

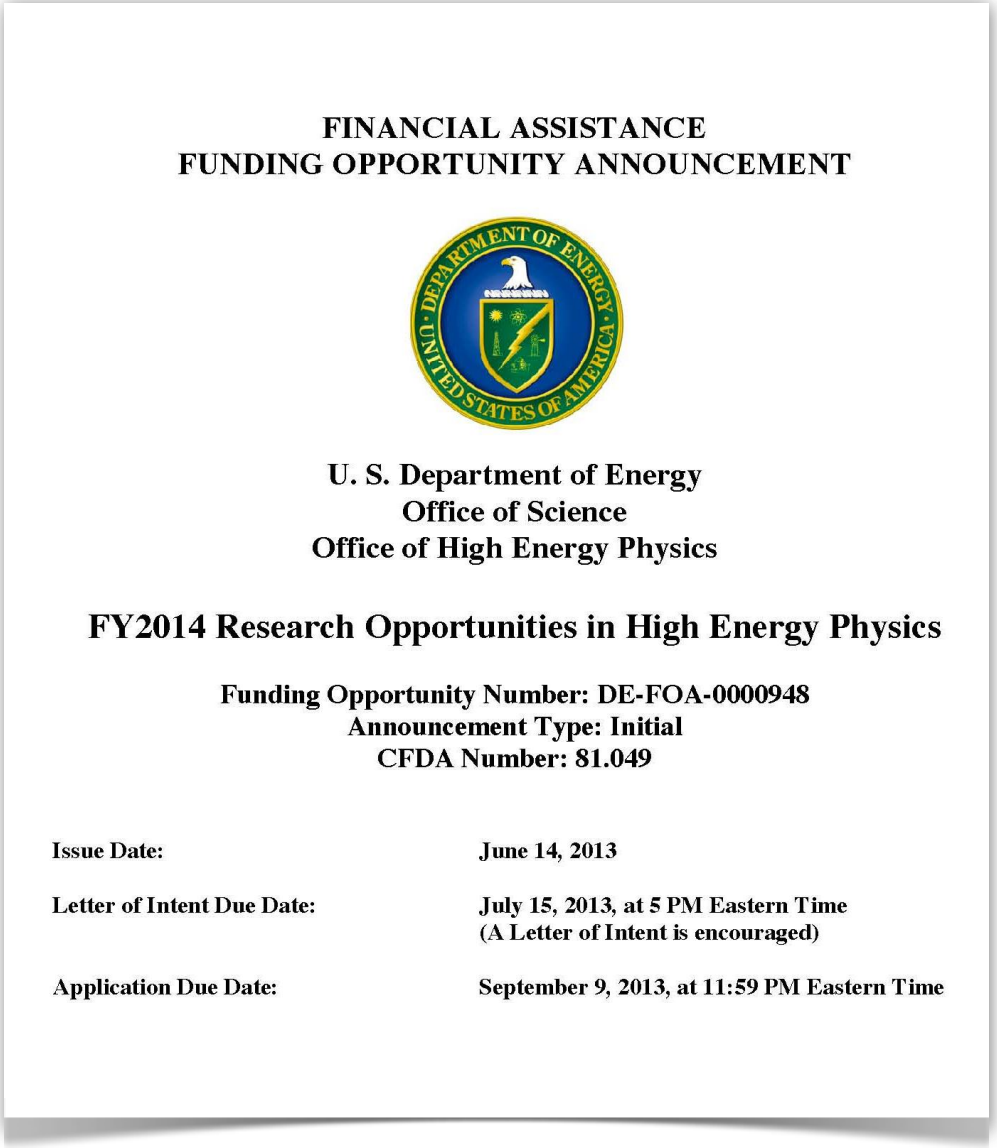
- Is the program well-balanced along axes such as those between Frontiers, new projects vs. continuing research, domestic vs. foreign experiments, experiment vs. theory, Labs vs. universities, transformative vs. incremental research?
- OHEP is organized into a Research and Technology Division and a Facilities Division. While this division is natural, does it cause problems in supporting those whose efforts are divided between operations and research?
- The Research organization was re-organized to align with the energy, intensity and cosmic frontier definitions from the last P5 report. Has this been effective? Are some adjustments appropriate? Does this organization adequately recognize activities or individuals that cross frontier boundaries? Should there be mechanisms that recognize cross-cutting activities among the frontiers?
- The last CoV recommended comparative reviews of university and lab programs. How have these comparative reviews worked, and are adjustments needed?
- Are the staffing levels appropriate? Is OHEP giving appropriate responsibilities to IPAs and detailees (visitors from universities or Labs)?

(+25 more…)

HEP FUNDING OPPORTUNITIES

FY14 HEP Comparative Review FOA

- **DE-FOA-0000948**
  - Issued June 14, 2013
- **Six HEP research subprograms**
  - Energy, Intensity, and Cosmic Frontiers
  - HEP Theory
  - Accelerator Science and Technology R&D
  - Particle Detector R&D
- ☑ **Letter of Intent due July 15, 2013 by 5 PM Eastern Time**
  - Strongly encouraged
- **Final Proposal (*i.e.*, Application) deadline Sept. 9, 2013 by 11:59 PM Eastern Time**



FINANCIAL ASSISTANCE
FUNDING OPPORTUNITY ANNOUNCEMENT

U. S. Department of Energy
Office of Science
Office of High Energy Physics

FY2014 Research Opportunities in High Energy Physics

Funding Opportunity Number: DE-FOA-0000948
Announcement Type: Initial
CFDA Number: 81.049

Issue Date:	June 14, 2013
Letter of Intent Due Date:	July 15, 2013, at 5 PM Eastern Time (A Letter of Intent is encouraged)
Application Due Date:	September 9, 2013, at 11:59 PM Eastern Time

Frequently Asked Questions (FAQs)

- **FAQ for FY14 HEP Comparative Review**
  - **available at:** http://science.energy.gov/~/media/hep/pdf/files/pdfs/Funding%20Opportunities/FY14_Comp_Review_FAQUPDATED_JULY11_2013.pdf
  - **updated: July 11, 2013**

- **In addition to information provided in FOA, FAQ addresses topics on:**
  - **Eligibility requirements**
  - **Proposal types and scope of proposals being considered**
  - **Guidance for new faculty members and those without current HEP grants**
  - **Guidance for PIs with existing HEP grants**
  - **Letter of Intent**
  - **Proposal and Application requirements**
  - **Budgets information, including guidance on scope of request(s)**
  - **Information on overall scientific merit review process**

Comparative Review History

- In FY2012, DOE/HEP started a process of comparative grant reviews for research grants which were scheduled for renewal (+ any new proposals as desired)
  - Existing grants which did not renew in FY2012 ("continuations") were not affected by this change in the 1st round
- Previously all HEP proposals responding to the general Office of Science (SC) call were individually peer-reviewed by independent experts.
- Currently with the FY14 FOA, we are in 3rd round of annual comparative review process
  - After this years cycle all existing DOE HEP grants will have gone through comparative review
- The goal of this effort is to improve the overall quality and efficacy of the HEP research program by identifying the best proposals with highest scientific impact potential
  - This process has previously been presented and extensively discussed at HEPAP.
  - Process and outcomes for FY2012 will be one of the main topics of the upcoming HEP COV

Early Career (EC): Next Round in FY14

- **FY14 FOA [DE-FOA-0000958] posted on July 23, 2013 at the Early Career website:**
  - http://science.energy.gov/early-career/
- **Read the FY14 FAQ, also on above web site**
  - addresses most of the common Q&A collected over the last 4 years
- **Features of FY14**
  - Entering 5th year
    - some population of candidates will no longer be eligible due to the "3-strikes rule"
  - Mandatory Pre-application requirement. Two pages.
    - Deadline: September 5, 2013, 5 PM Eastern
    - HEP received 94 pre-proposals (up from FY2013).
  - Full proposals due: November 19, 2013, 5 PM Eastern
    - candidates will have more than 3 months to develop a plan, write a narrative, and submit an application
- **Presidential Early Career Awards for Scientists and Engineers (PECASE)**
  - PECASE-eligible candidates are selected from the pool of Early Career awardees
    - http://science.energy.gov/about/honors-and-awards/pecase/

HEP Early Career FY10-13 Demographics

L = National Laboratory Proposal
U = University Proposal

Subprogram Awards	FY10 (L/U)	FY11 (L/U)	FY12 (L/U)	FY13 (L/U)	Total (L/U)
Energy	3 (1/2)	3 (1/2)	1 (0/1)	2 (0/2)	9 (2/7)
Intensity	2 (1/1)	1 (0/1)	3 (2/1)	1* (0/1)	7 (3/4)
Cosmic	2 (0/2)	3 (2/1)	3 (1/2)	2 (1/1)	10 (4/6)
HEP Theory	6 (1/5)	4 (0/4)	3 (0/3)	3 (1/2)	16 (2/14)
Accelerator	1 (1/0)	2 (2/0)	2 (1/1)	1 (0/1)	6 (4/2)
HEP Awards	**14 (4/10)**	**13 (5/8)**	**12 (4/8)**	**9 (2/7)**	**48 (15/33)**
Proposals	**154 (46/108)**	**128 (43/85)**	**89 (34/55)**	**78 (29/49)**	**449 (152/297)**

* Funded by DOE Office of Basic Energy Sciences (BES) as an EPSCoR [Experimental Program to Stimulate Competitive Research] award with grant monitored by DOE Office of High Energy Physics (HEP).

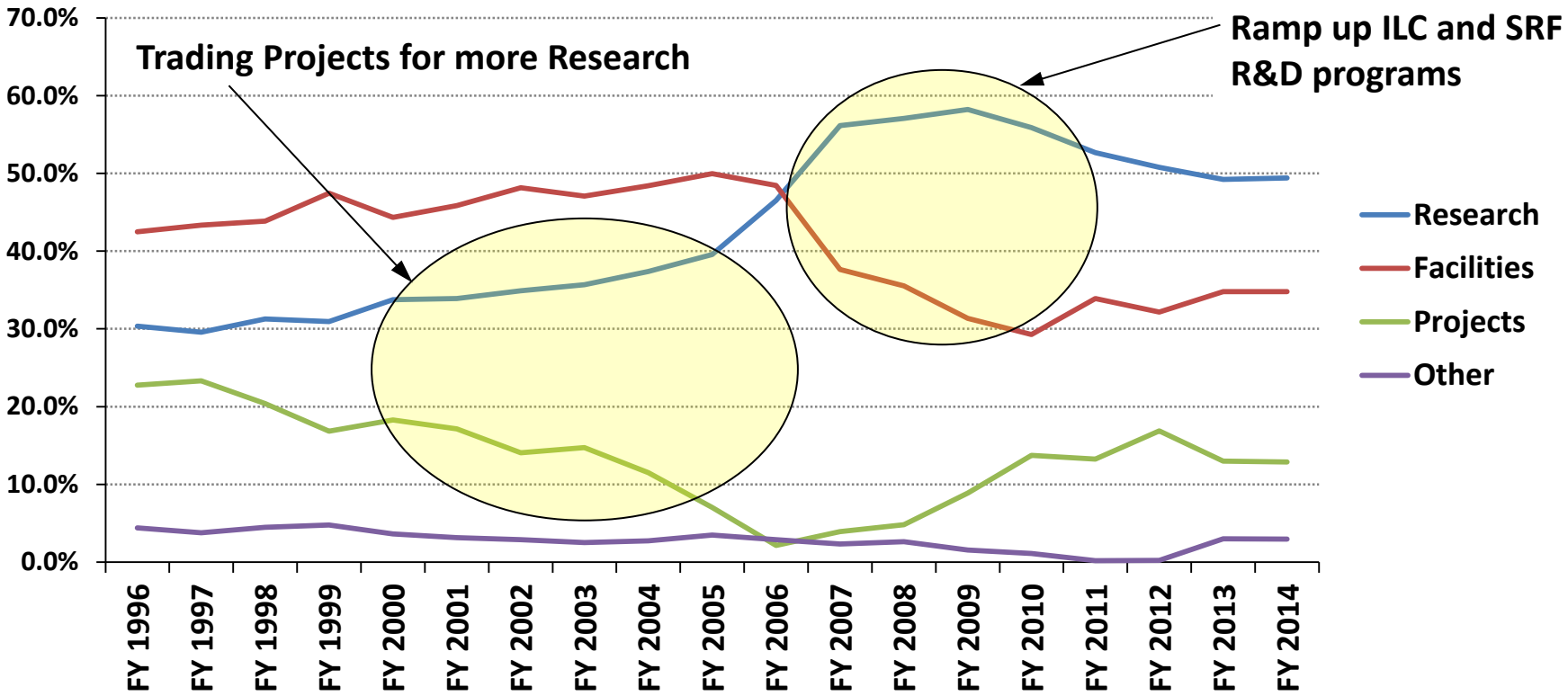
- **Early Career Research Program is very competitive (~10% success rate)**

BACKUP

FY 2014 House and Senate Marks

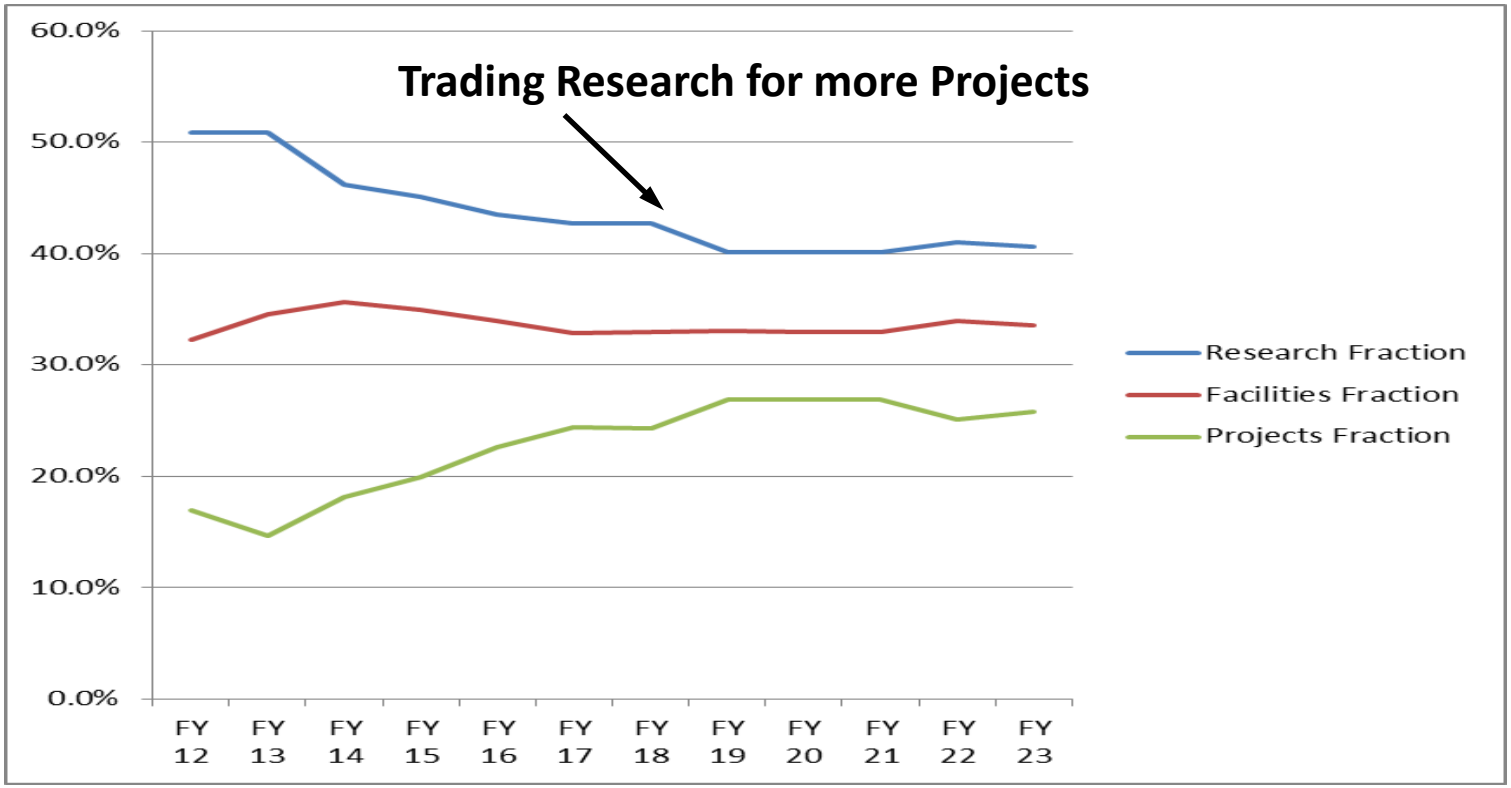
	FY 2013	FY 14 Request	FY 2014 House	FY 2014 Senate
Research	715,742	741,521	729,521	751,590
SURF (non-add)	14,000	10,000	12,000	15,000
SBIR (non-add)	-	21,457	21,213	21,762
Accelerator Stewardship (non-add)	-	9,931		20,000
LBNE (PED)	3,781	-	8,000	20,000
Mu2e	8,000	35,000	35,000	35,000
Total	727,523	776,521	772,521	806,590

Recent Funding Trends



- In the late 90's the fraction of the budget devoted to projects was about 20%.
- Progress in many fields require new investments to produce new capabilities.
- Many projects started since 2006 are coming to completion.
- New investments are needed to continue US leadership in well defined research areas.
- Possibilities for future funding growth are weak. Must make do with what we have.

One Possible Future Scenario



- About 20% (relative) reduction in Research fraction over ~5 years
  - *In order to address priorities, this will not be applied equally across Frontiers*
- This necessarily implies reductions in scientific staffing
  - Some can migrate to Projects but other transitions are more difficult
- We have requested Labs to help manage this transition as gracefully as possible

Note on HEP Research Funding

- The FY 2014 Request for HEP Research was $384M, about a 6% increase compared to FY 2013, but $26 million of this is planned to go to R&D for Dark Matter G2, DESI, and LHC upgrades.
- Our current FY 2014 planning is based on the House markup of the Energy and Water Appropriation which is overall slightly below the Request
  - The House mark directed HEP to move $8 million to LBNE PED, $2 million to SURF, and lower the overall HEP budget by $4 million. The choice was made to take all of these reductions from Research due to our priority to increase Project spending.
- These two effects reduce Research to $343M, about a 5% reduction w.r.t. FY 2013
- At the beginning of the year it is necessary to hold back funds for decisions to be made later in the year, such as the Early Career Program and other needs.
  - This results in an **approximately 6% reduction** relative to FY 2013 for the initial distribution of funds. This is the average effect on initial HEP research funding.
- There is some small variation in the impact to individual HEP subprograms, and program managers have the authority to provide more or less than the average reduction based on program priorities and the results of merit review.
- The House mark is a budget indicator but not the final word on FY 2014. When Congress passes a budget, there could be either an increase or a decrease in HEP research funding.

HEP Physics MIE Funding

Funding (in $K)	FY 2012 Actual	FY 2013 July	FY 2014 Request	Description
MIE's	**55,770**	**45,687**	**39,000**	
Intensity Frontier	41,240	19,480	0	NOνA ramp-down
Intensity Frontier	6,000	5,857	0	MicroBooNE
Intensity Frontier	500	0	0	Reactor Neutrino Detector at Daya Bay
Intensity Frontier	1,030	5,000	8,000	Belle-II
Intensity Frontier	0	5,850	9,000	Muon g-2 Experiment
Cosmic Frontier	1,500	1,500	0	HAWC
Cosmic Frontier	5,500	8,000	22,000	Large Synoptic Survey Telescope (LSST) Camera
TOTAL MIE's	**55,770**	**45,687**	**39,000**	

HEP Physics Construction Funding

Funding (in $K)	FY 2012 Actual	FY 2013 July	FY 2014 Request
Construction - TPC	**53,000**	**28,388**	**45,000**
Long Baseline Neutrino Experiment	**21,000**	**17,888**	**10,000**
TEC	4,000	3,781	0
OPC	17,000	14,107	10,000
TPC	21,000	17,888	10,000
Muon to Electron Conversion Experiment	**32,000**	**10,500**	**35,000**
TEC	24,000	8,000	35,000
OPC	8,000	2,500	0
TPC	32,000	10,500	35,000

TEC = Total Estimated Cost (refers to Capital Equipment expenses)
OPC = Other Project Costs
TPC = Total Project Cost

HEP Project Status

Subprogram	TPC ($M)	CD Status	CD Date
INTENSITY FRONTIER			
Long Baseline Neutrino Experiment (LBNE)	TBD	CD-1	December 10, 2012
Muon g-2	40	CD-0	September 18, 2012
Mu2e	249	CD-1	July 11, 2012
Next Generation B-Factory Detector Systems (BELLE-II)	16	CD-3a	November 8, 2012
NuMI Off-Axis Electron Neutrino Appearance Exp't (NOνA)	278	CD-3b	October 29, 2009
Micro Booster Neutrino Experiment (MicroBooNE)	19.9	CD-3b	March 29, 2012
Main INjector ExpeRiment for ν-A (MINERνA)	16.8	CD-4	June 28, 2010 [Finished]
Daya Bay Reactor Neutrino Experiment	35.5	CD-4b	August 20, 2012 [Finished]
ENERGY FRONTIER			
LHC ATLAS Detector (Phase-1) Upgrade	TBD	CD-0	September 18, 2012
LHC CMS Detector (Phase-1) Upgrade	TBD	CD-0	September 18, 2012
COSMIC FRONTIER			
Dark Matter (DM-G2)	TBD	CD-0	September 18, 2012
Mid-Scale Dark Energy Spectroscopic Instrument (MS-DESI)	TBD	CD-0	September 18, 2012
Large Synoptic Survey Telescope (LSST)	173	CD-1	April 12, 2012
Dark Energy Survey (DES)	35.1	CD-4	June 4, 2012 [Finished]
ADVANCED TECHNOLOGY R&D			
Accelerator Project for the Upgrade of the LHC (APUL)	11.5	CD-2/3	July 29, 2011
Berkeley Lab Laser Accelerator (BELLA)	27.2	CD-4	January 17, 2013 [Finished]
Facility for Advanced Accelerator Experimental Tests (FACET)	14.5	CD-4	January 31, 2012 [Finished]

HEP Early Career General Observations

- Reviewers often look for innovative proposals
  - Usually something a bit off the beaten track that the PI can claim as their own
    - during preparation, PIs should address "why is it critical that I carry-out this research?"
  - Somewhat speculative but not too risky
  - Provide unique capabilities. What does not get done?
- In the LHC experimental proposals that are submitted to ECRP FOA
  - Looking for a *balanced* program
    - strong physics effort and hardware project attached to the Phase-1 upgrade or current LHC shutdown
- Many lab and some university proposals suffered from "isn't the lab/project going to do that anyway?"
  - Some proposals were clear efforts to start funding some project or R&D that HEP has not yet approved – "the camel's nose under the tent"
  - The theory lab proposals were questioned on cost-effectiveness
- Prior to submission, applicants may want to seek guidance from senior faculty and/or staff while preparing proposals (including budget material)
- Because different reviewers weigh the criteria differently (or have their own physics biases) there is a larger spread in panel rankings