U.S. DEPARTMENT OF ENERGY

Office of Science

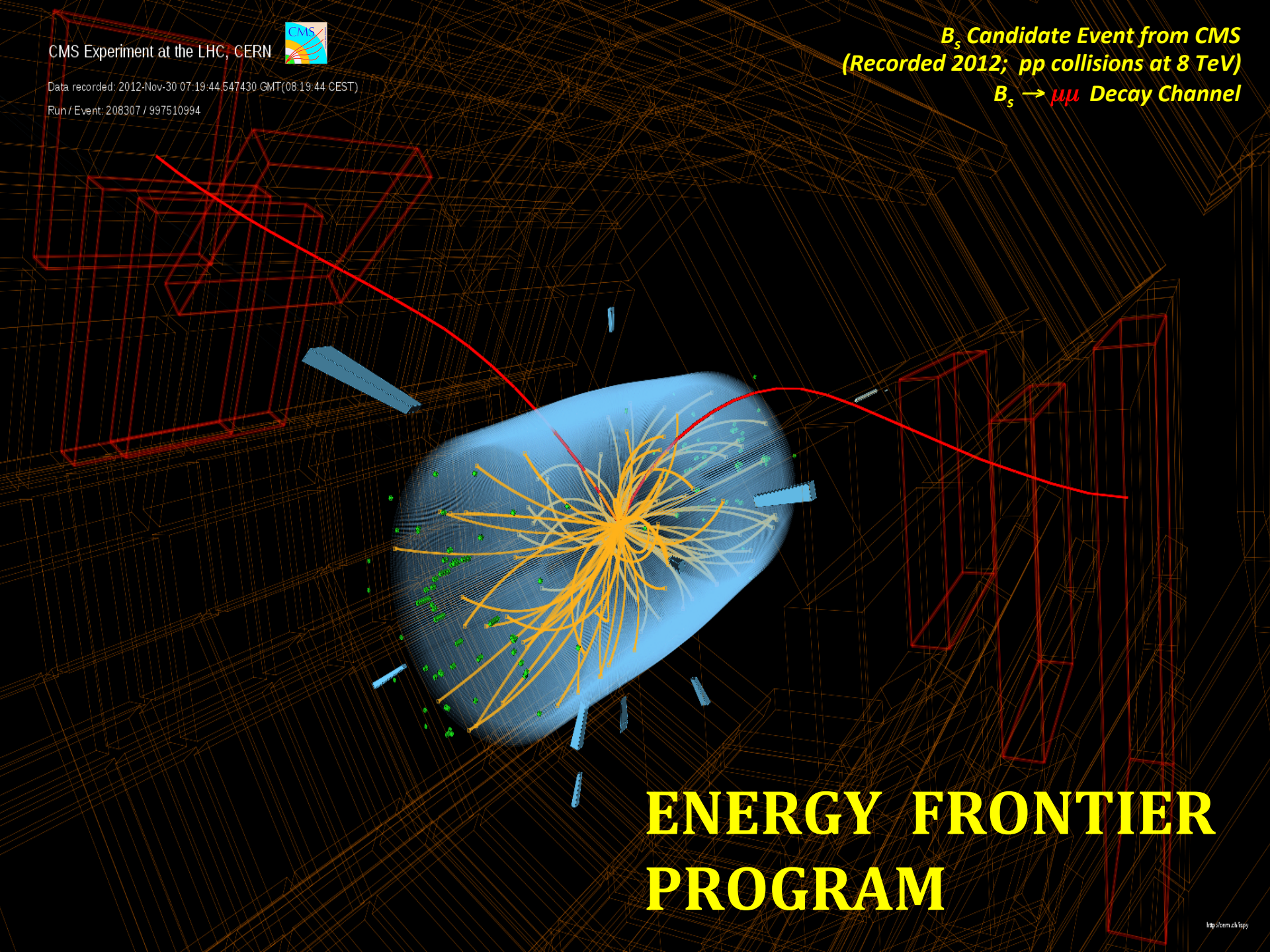
DOE Program Managers' Meeting with Principal Investigators

CSS2013 • Snowmass on the Mississippi
Minneapolis, Minnesota
July 29 – August 6, 2013

Abid Patwa
Program Manager
Office of High Energy Physics
Office of Science, U.S. Department of Energy

Outline

- Energy Frontier Program & Issues
- Budget and Issues
- FY2014 HEP Comparative Review Process
- FY2013 HEP Comparative Review Statistics
- Early Career Research Program
- Questions & Answers


CMS Experiment at the LHC, CERN
Data recorded: 2012-Nov-30 07:19:44.547430 GMT(08:19:44 CEST)
Run / Event: 208307 / 997510994
B_s Candidate Event from CMS
(Recorded 2012; pp collisions at 8 TeV)
$B_s \rightarrow \mu\mu$ Decay Channel
ENERGY FRONTIER PROGRAM

HEP Energy Frontier Experiments

Experiment	Location	CM Energy; Status	Description	# Institutions; # Countries	#US Institutions	#US Coll.
DZero	Fermilab Tevatron Collider [Batavia, Illinois, USA]	1.96 TeV; Operations ended: Sept. 30, 2011	Higgs, Top, Electroweak, SUSY, New Physics, QCD, B-physics	74 Institutions; 18 Countries	33 Univ., 1 National Lab	192
CDF (Collider Detector at Fermilab)	Fermilab Tevatron Collider [Batavia, Illinois, USA]	1.96 TeV; Operations ended: Sept. 30, 2011	Higgs, Top, Electroweak, SUSY, New Physics, QCD, B-physics	55 Institutions; 14 Countries	26 Univ., 1 National Lab	224
ATLAS (A Toroidal LHC ApparatuS)	CERN, Large Hadron Collider [Geneva, Switzerland / Meyrin, Switzerland]	7-8 TeV; 13-14 TeV Run 1 ended: Dec. 2012 Run 2 start: 2015	Higgs, Top, Electroweak, SUSY, New Physics, QCD, B-physics, and Heavy-Ion	174 Institutions; 38 Countries	40 Univ., 4 National Labs	556
CMS (Compact Muon Solenoid)	CERN, Large Hadron Collider [Geneva, Switzerland / Cessy, France]	7-8 TeV; 13-14 TeV Run 1 ended: Dec. 2012 Run 2 start: 2015	Higgs, Top, Electroweak, SUSY, New Physics, QCD, B-physics, and Heavy-Ion	179 Institutions; 41 Countries	46 Univ., 1 National Lab	676

Collaboration data as of May 2013.

- **US-ATLAS comprises ~21% of the international ATLAS Collaboration**
- **US-CMS comprises ~33% of the international CMS Collaboration**

Energy Frontier Status

Fermilab Tevatron (DØ and CDF)

- Working with DØ and CDF collaborations on orderly completion of **legacy** analyses as part of its ramp-down program.

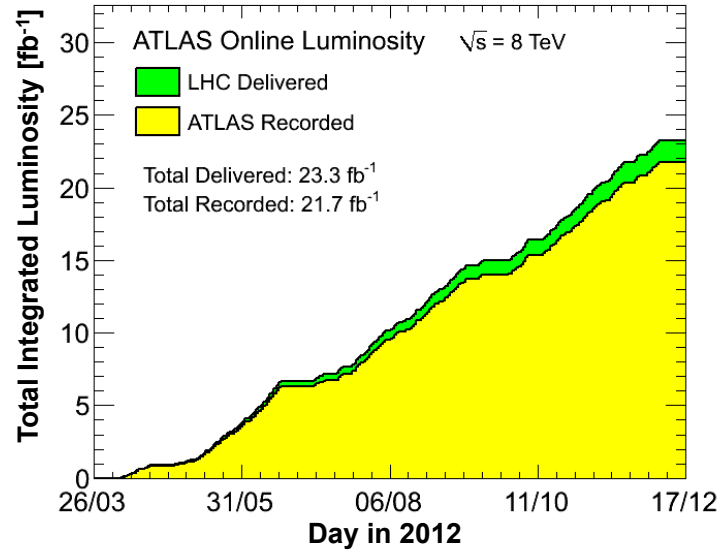
Large Hadron Collider (LHC) at CERN

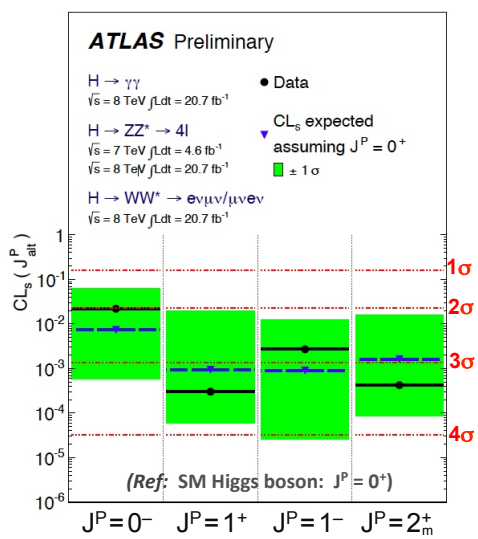
- **Run 1 (proton) completed in Dec. 2012**
- Working with experiments to develop plan for contributions to "Phase-1" upgrades
  - CD-0 approval last September 2012 ($22-34M each experiment: ATLAS and CMS).
  - CD-1 reviews scheduled in August 2013.

Current program

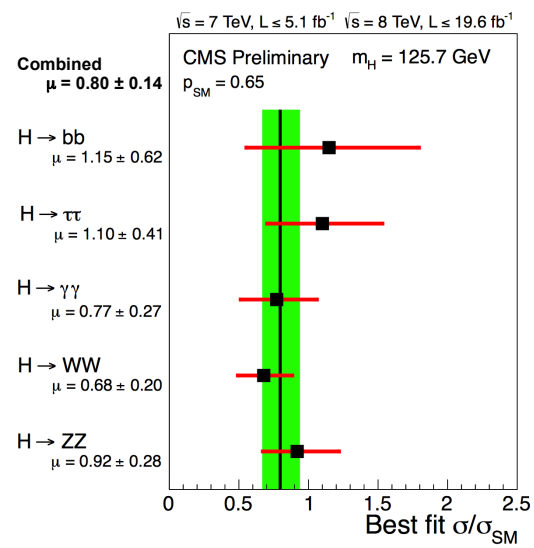
- Analyze and publish results from LHC Run 1
- 2013-2014 shutdown: repair splices in LHC magnets; detector maintenance and consolidation, upgrades and repairs
- In 2015: resume running at 13~14 TeV
- Still no smoking guns for BSM physics
  - What will 13~14 TeV running tell us?
  - **Focus on new physics**

Completion of Run I; CMS & ATLAS recorded: ~22 fb^{-1}





ATLAS Spin-Parity
[Lepton-Photon 2013]



CMS Signal Strength
[Lepton-Photon 2013]

Planning

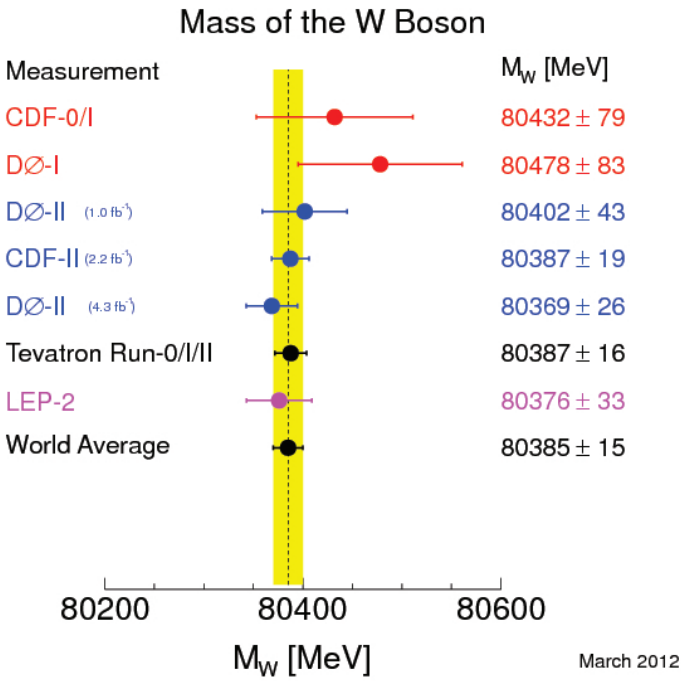
- **HEP is putting in place a comprehensive program across the frontiers**
  - In five years,
    - The CMS and ATLAS upgrades will be installed at CERN
    - NOνA, Belle-II, Muon g-2 will be running on the Intensity Frontier
    - Mu2e will be in commissioning, preparing for first data
    - DES will have completed its science program and new mid-scale dark energy spectroscopic instrument and DM-G2 should begin operation
    - The two big initiatives, LSST and LBNE, will be well underway
- **Need to start planning now for what comes next**
  - Engaging with DPF community planning process – [Snowmass] that will conclude this summer
  - Now setting up a prioritization process – [á la P5] using that as input
- **Research funding will decrease for the next several years**
  - Programmatic priorities and comparative reviews will be used to optimize the resources
  - See also 'Budget' slides, this talk…
- **Both the universities and the laboratories will be affected**
  - University Comparative Reviews (held annually each ~Fall)
  - Lab Comparative Reviews in: Detector R&D (July 2012); Energy Frontier (July 2012); Accelerator Science (March 2013); Intensity Frontier (May 2013); Cosmic Frontier (this Sept.)

Energy Frontier Issues

- **Discussions with CERN about follow-on to LHC Agreement proceeding**
  - Necessary precursor to planning for "Phase-II" upgrades; US scope for "Phase-II" TBD.
- **Energy Frontier science plan will require high-energy, high-luminosity LHC running**
  - What is the real physics of the TeV scale?
    - this will likely take a few years to sort itself out
  - US "Snowmass/P5" process is an important element, along with European and Japanese HEP strategies
- **Significant collaborations with other regions on future colliders will require a high-level approach between governments**
  - Modest ground-level R&D efforts can continue as funding allows
  - We support an international process to discuss future HEP facilities that respects the interests of major national and regional partners as well as realistic schedule and fiscal constraints
  - Once Snowmass/P5 studies and the community input are complete, we will be in a better position to evaluate future US priorities for the HEP program in detail
  - We encourage active engagement by all interested parties

Energy Frontier Research:
Next Steps and General Observations (I)

- **Tevatron**
  - **Complete ramp-down of Tevatron research program during next ~year with final physics results**
    - **Final statement on Higgs with full dataset & analysis improvements** (this year)
    - **Legacy measurements**
      - **W mass ($\delta M_W^{Tevatron} \rightarrow$ 10 MeV) with ~10 fb^{-1}**
      - **Top quark: precision mass, forward-backward asymmetry**
      - **QCD, heavy-flavor physics**

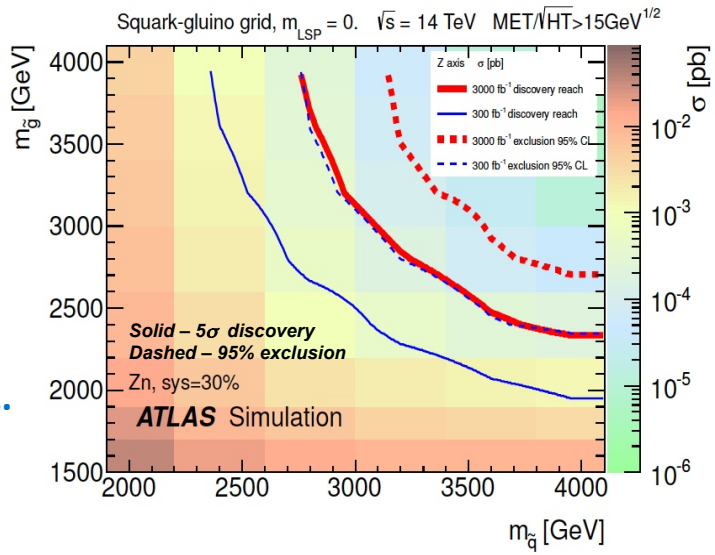


- **General observations of Tevatron program**
  - **During peer-conducted reviews, questions panelists frequently must answer**
    - **are results from the analysis superseded by the LHC experiments (CMS, ATLAS, or LHCb)?**
    - **is the analysis "publishable" within reasonable timescales?**

- **As budgets continue to be under pressure, guidance provided to complete Tevatron analyses efforts as soon as possible**

Energy Frontier Research:
Next Steps and General Observations (II)

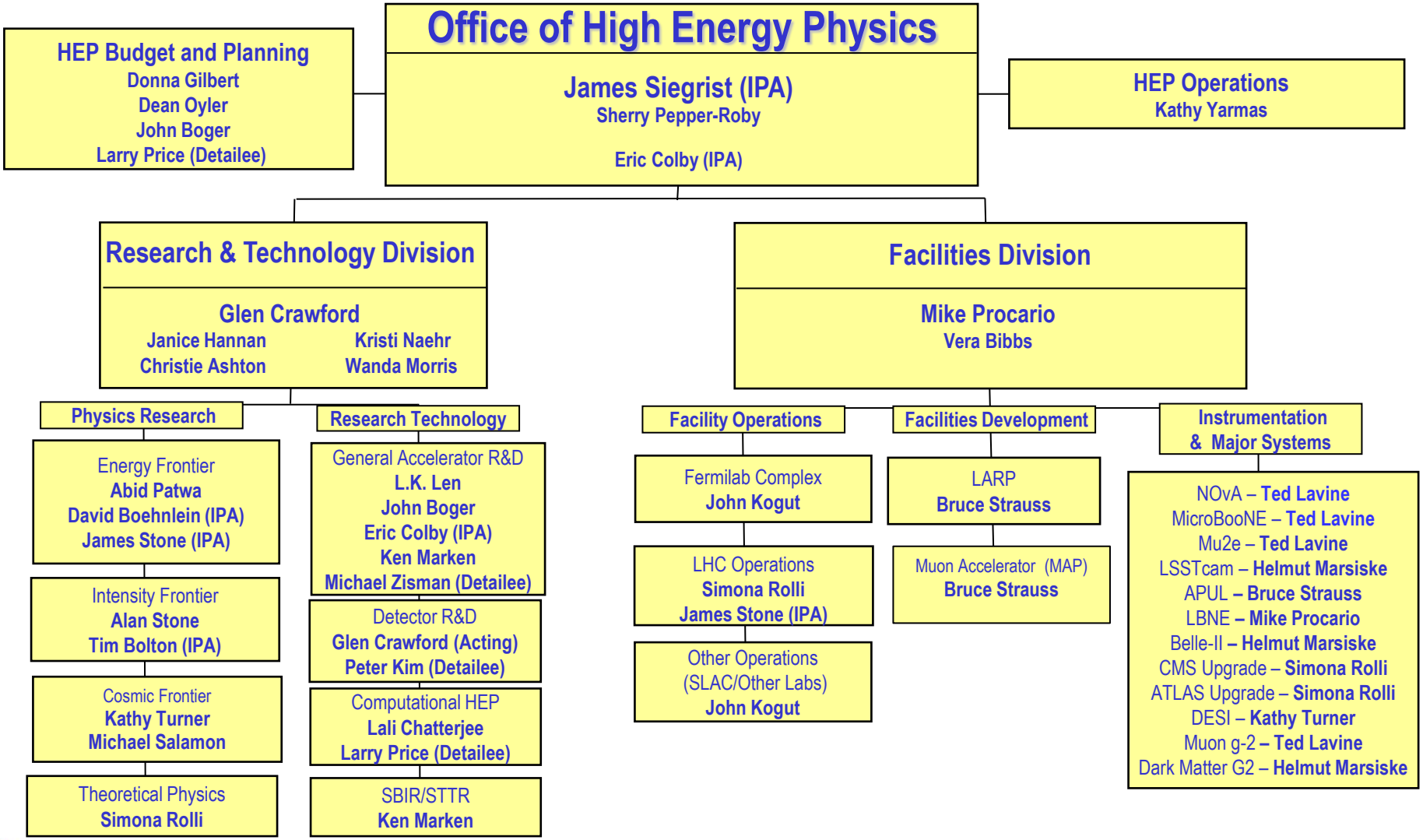
- **LHC**
  - Discovery of Higgs-like boson by CMS and ATLAS
    ⇒ measure properties: couplings, spin/parity
    - is it consistent with one predicted in SM?
  - Publish physics results with $\sqrt{s}$ = 8 TeV data [Run I]
    - Higgs, top, and electroweak measurements
    - Search for new physics BSM: exotic particles, SUSY, …
    - QCD, heavy-flavor physics



- **… and steps in next ~5 years**
  - LHC will increase energy ($\sqrt{s}$ = 13~14 TeV) and luminosity (L > 10^{34} cm^{-2}s^{-1}) for 2015-2017 Run 2 (~100 fb^{-1}); and post-Phase-1: 2019-2021 Run 3 (~300 fb^{-1})
    - expand sensitivity reach for new physics
  - Phase-1 upgrade activities will mix with physics research-related efforts
    - proposals are encouraged to address a *balanced* effort in both
- **Other general observations**
  - Encourage community to exploit and interact with LHC Physics Center (LPC, CMS) or Analysis Support Center (ASC, ATLAS)

HEP BUDGETS

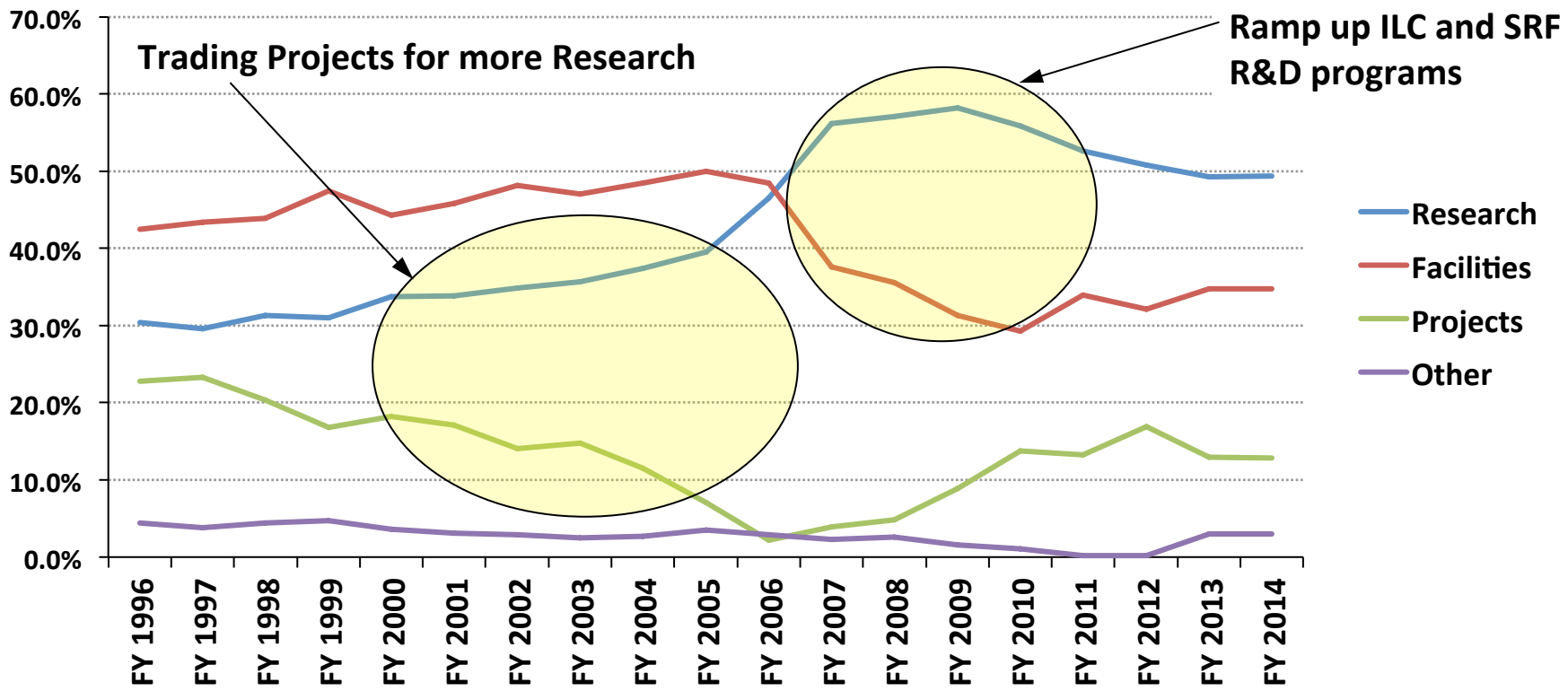
DOE OHEP Organization



HEP Budget Overview

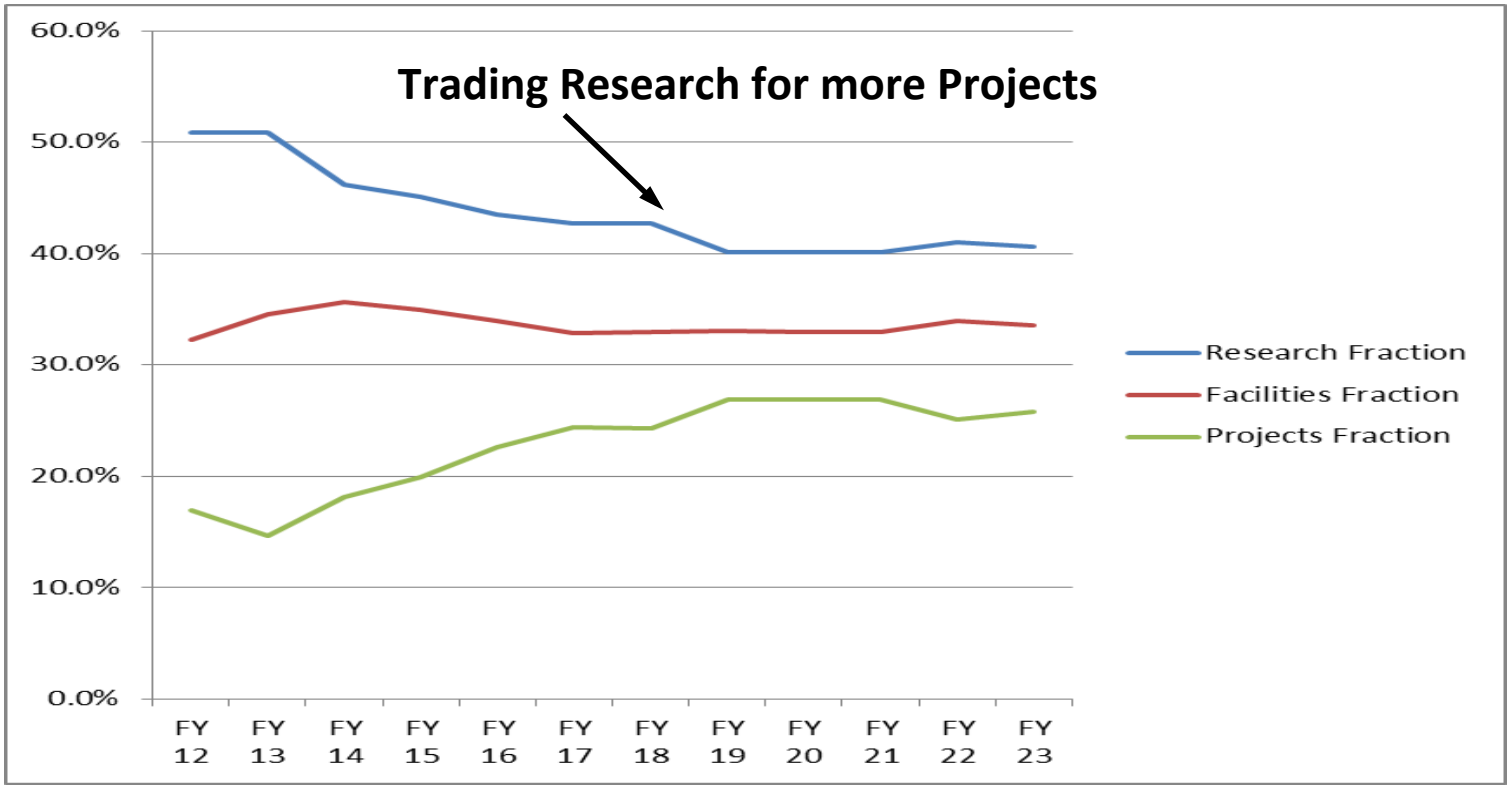
- FY2014 budget philosophy was to enable new world-leading HEP capabilities in the U.S. through investments on all three frontiers
  - Accomplished through ramp-down Research and operations of existing Projects
  - When we were not able to fully implement this approach (*i.e.,* start new projects), converted 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/project funding is only slightly increased
    - In the interim (since submission of FY14 Request), actual FY13 Research funding also increased because of inability to get projects started
    - Initial FY14 plan for Research will be down more than the originally advertised 2-3% relative to FY13
  - Details in following slides…
- 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

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.
- The projects started in 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**

FY 2014 High Energy Physics Budget

(Data in new structure, 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 Energy Frontier

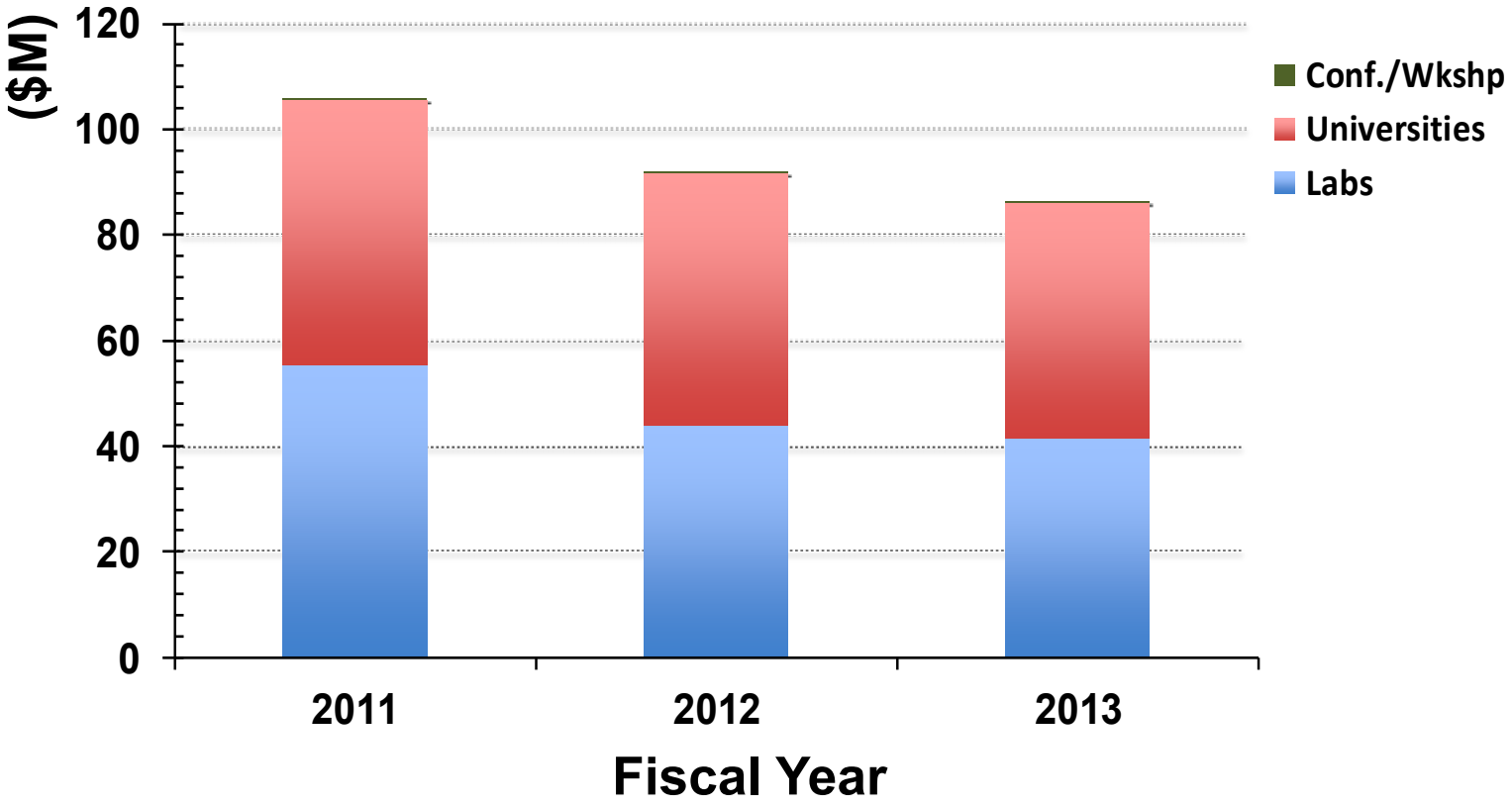
Funding (in $K)	FY 2012 Actual	FY 2013 July Plan	FY 2014 Request	Comment
Research	**91,757**	**86,172**	**96,129[a]**	Tevatron ramp-down offset by R&D for LHC detector upgrades
Facilities	**68,240**	**61,992**	**58,558**	
LHC Detector Ops	64,846[b]	56,912	56,774	LHC down for maintenance
LHC Upgrade Project	0	3,000	0	LHC detector upgrades (OPC)
Other	3,394	2,080	1,784	IPAs, Detailees, Reviews
TOTAL, Energy Frontier:	**159,997**	**148,164**	**154,687**	

OPC = Other Project Costs

[a] Includes $12M (= $6M CMS + $6M ATLAS) Phase-1 detector upgrades [R&D]; Therefore, Energy Frontier Core Research FY14 Request = 84,129k

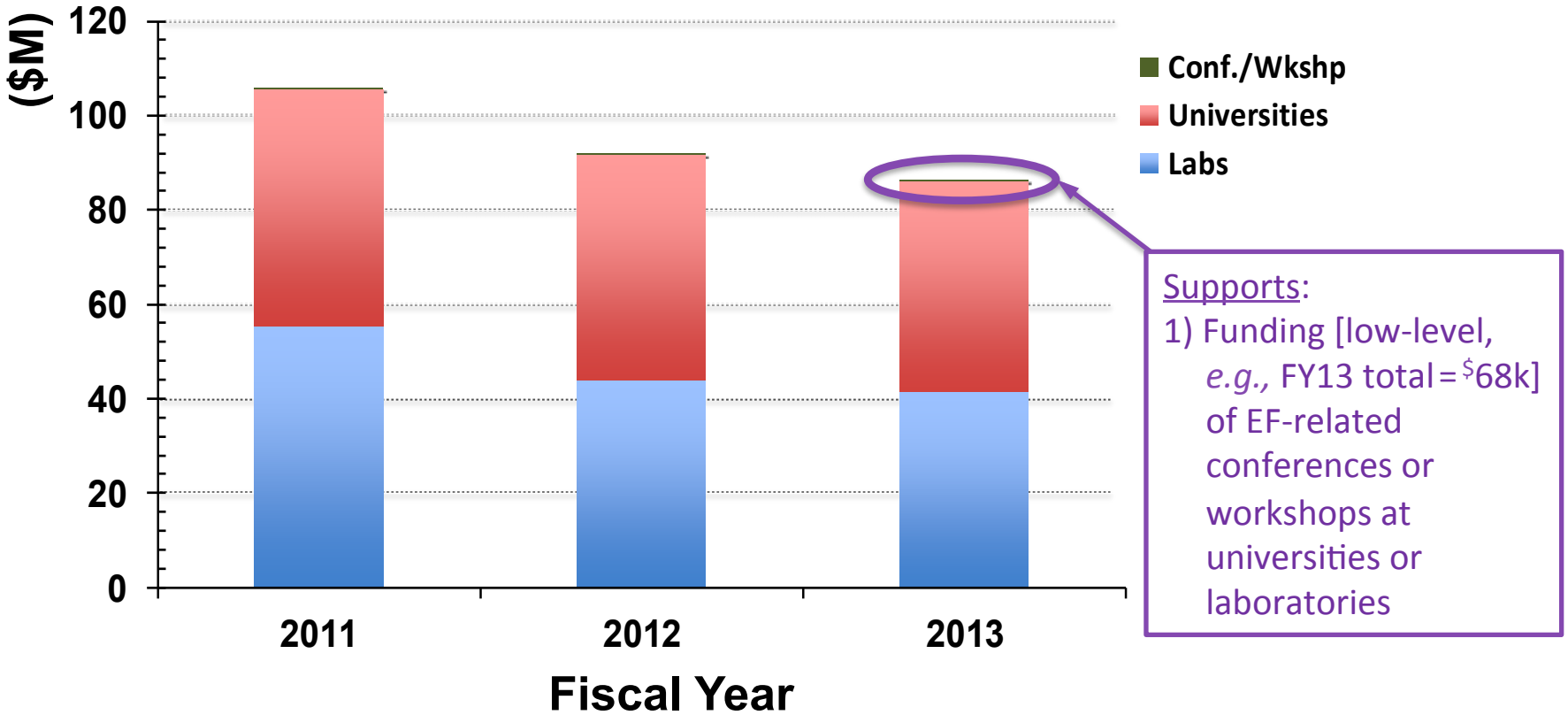
[b] Per interagency MOU, HEP provided LHC Detector Ops funding during FY12 CR to offset NSF contributions to Homestake de-watering activities.

Energy Frontier Research Budget



- **FY13 core research budget saw reduction of ~6% relative to FY12**
  - **driven by completion of Tevatron run [September 2011] and subsequent end-game of Tevatron physics program**

Energy Frontier Research Budget



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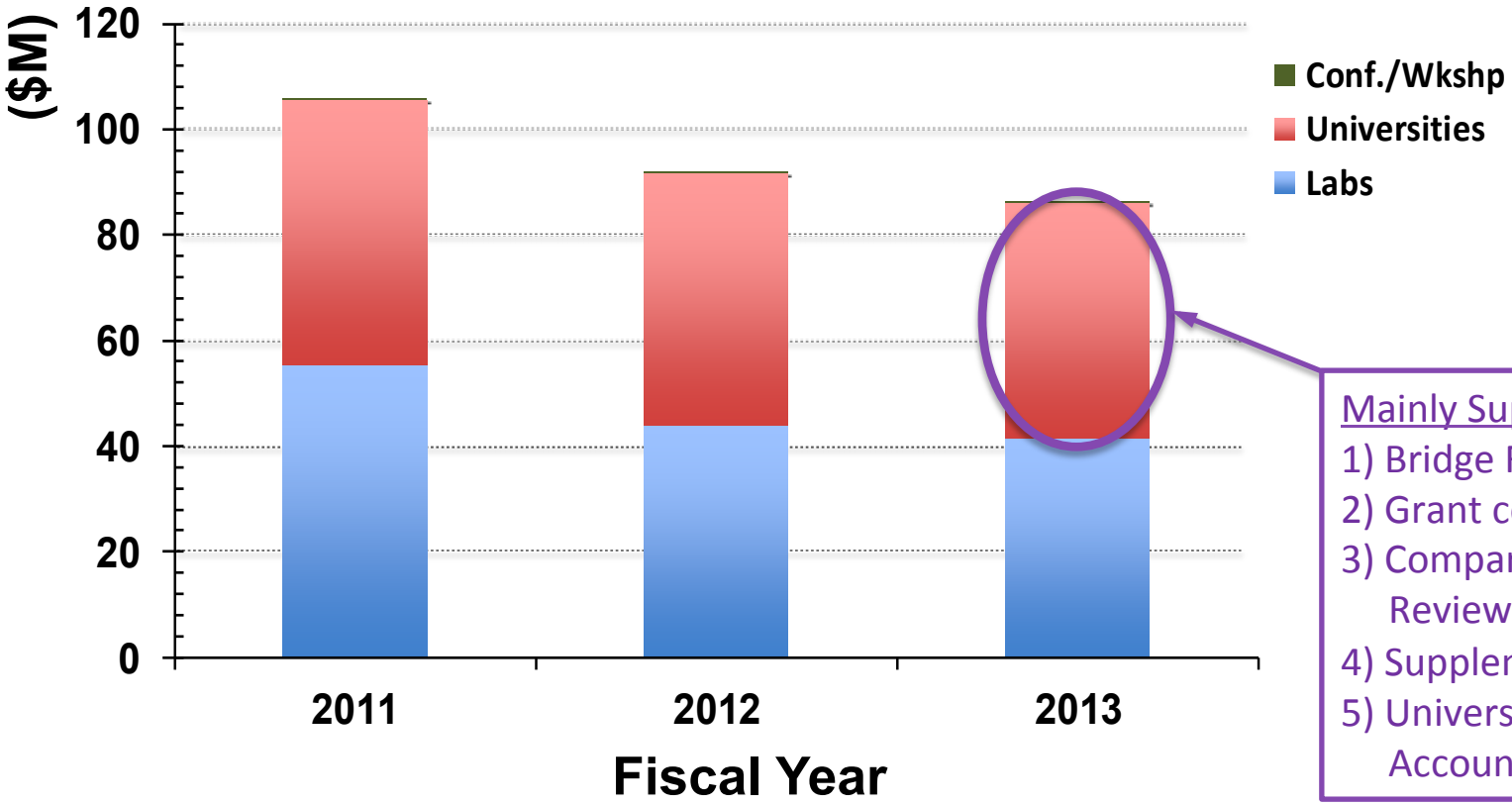

Mainly Supports:
1) Bridge Funding
2) Grant continuations
3) Comparative Review proposals
4) Supplements
5) University Service Accounts (at labs)

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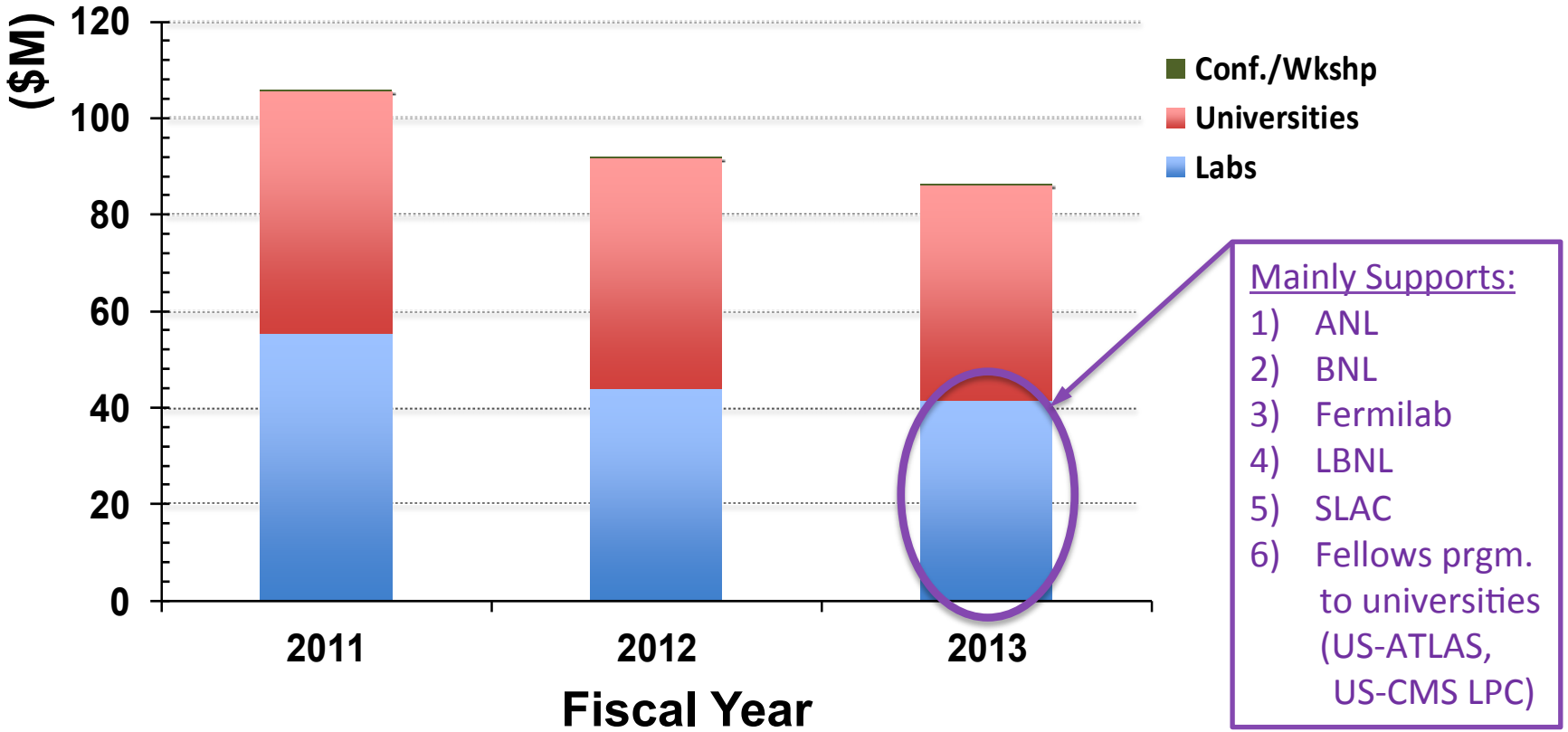

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  - **driven by completion of Tevatron run [September 2011] and subsequent end-game of Tevatron physics program**

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

HEP Physics MIE Funding

Funding (in $K)	FY 2012 Actual	FY 2013 July Plan	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 Plan	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

FY2014 HEP COMPARATIVE REVIEW PROCESS

Purpose

- 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.
- This change in process has been recommended by several DOE advisory committees, most recently the 2010 HEP Committee of Visitors (COV):
  - "In several of the cases that the panel read, proposal reviewers expressed negative views of the grant, but only outside of their formal responses. Coupled with the trend in the data towards very little changes in the funding levels over time, this suggests that grants are being evaluated based on the historical strength of the group rather than the current strength or productivity of the group. This is of particular concern when considering whether new investigators, new science, or high-risk projects can be competitive. Comparative reviews can be a powerful tool for addressing these issues and keeping the program in peak form."
  - Recommendation: Use comparative review panels on a regular basis.
- Currently with the FY14 FOA, we are in 3rd round of annual comparative review process
- 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 and potential

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

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

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  - as of today, deadline has past

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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**

HEP Data Management

Effective with all solicitations and invitations for research funding issued on or after October 1, 2013.

The DOE Office of Science Statement on Digital Data Management will require a Data Management Plan with all proposals submitted for Office of Science research funding.

See March 12, 2013 HEPAP presentation by Laura Biven:
http://science.energy.gov/~/media/hep/hepap/pdf/march-2013/2013_Spring_HEPAPBriefing_v3_NoBackup_LBiven.pdf

More information will also be available in the FOAs, via the DOE Office of Science website, and on the High Energy Physics webpage.

***Note*: Proposals submitted to the FY14 HEP Comparative Review FOA [DE-FOA-0000948] or to the FY14 Early Career Research Program FOA [DE-FOA-0000958] that have already been posted will not require Data Management Plans.**

Logistics (FY14 Comparative Review)

- **Post-FOA deadline**
  - **All applications are pre-screened for compliance to FOA, includes:**
    - **verification of senior investigator status**
    - **compliance with proposal requirements: *e.g.,* page limits, appendix material, use of correct DOE budget and budget justification forms, …**
    - **responsive to subprogram descriptions**
  - **Prior to submission, all PIs should carefully follow guidelines in FOA (and read FAQ)**
- **For review process, experts of panelists selected**
  - **Each panelist assigned to review 3-5 proposals**
    - **minimum 3 reviews per proposal, additional reviewers added depending on the size of a research group and scope of research activities**
    - **Panel convenes (in ~November 2013) to discuss *each* proposal and *each* senior investigator, provide additional reviews for proposal(s), and for comparative evaluation of proposals and senior investigators**
      - **size of each subprogram's panel and length of a panel meeting depends on number of applications to review**
- **Post-Review process**
  - **Assess reviews at DOE OHEP on *each* proposal and *each* senior investigator in order to develop guidance and funding levels**
    - **in addition to reviews, solicit input from other DOE Program Managers & Grant Monitors**
  - **PIs given [prioritized] guidance and funding levels (~mid-January 2014) and request Revised Budgets and Justifications $\Rightarrow$ route through SC and Chicago Office**
- **Funded grants to begin 1st year: on or about May 1, 2014**

HEP Research Activities Supported

- **What DOE supports**
  - Research efforts (mainly scientists) on R&D, experiment design, fabrication, data-taking, analysis-related activities
  - Theory, simulations, phenomenology, computational studies
  - Some engineering support may be provided in Particle Detector R&D subprogram
    - support depends on merit review process and programmatic factors
  - Consider funding efforts that are in direct support of our programs
- **Faculty support**
  - Typically, 2-months summer support assumes DOE "buys" 100% research time throughout the academic year
  - Summer support should be adjusted according to % time they are on research effort
    - associated funding (post-docs, travel) is also adjusted accordingly
- **Research Scientists**
  - Support may be provided, but due to long-term expectations, need to consider case-by-case on merits: whether the roles and responsibilities are well-matched with individual capabilities and cannot be fulfilled by a term position
  - Efforts are related towards research; not long-term operations and/or project activities

× **What's not supported by research grants**
  - Any significant operations and/or project-related activities:
    - Engineering, major items of equipment, consumables for prototyping or production
  - Non-HEP related efforts
    - Gravity waves (LIGO), Heavy Ion (RHIC), AMO Science, etc.

Subprogram Review Panels

- **The Comparative Review process is very competitive and hard choices have to be made based on the reviews, as well as to fit into our limited funding availability**
  - **The process by definition implies that certain proposals and investigators will be ranked at the top, middle, and bottom.**
- **It is understood that the vast majority of people applying are working hard and their efforts are in support of the HEP program. Due to the rankings & comments by the reviewers and our constrained budgets, some people whose research activities and level of effort who are ranked lower in terms of priority and impact relative to others in the field will not be funded on the grant**
  - **This does not necessarily mean the person cannot continue working on the experiments; they are not being funded by the grant to do it. It could be that the person has a critical role in the program but this did not come out in the proposal or review process. That is why it is imperative to respond to the FOA solicitation and detail each person's efforts.**
- **The subprogram review panel sees all of the proposals and will make recommendations and rankings relative to each other. When the panel is faced with comparing efforts, impacts and a limited budget, rather than rank the whole proposal low, they may provide guidance regarding details of the proposals**
  - ***e.g.,* person X should not be funded; do not add additional postdoc on this effort**

Programmatic Considerations

- Generally very useful to have head-to-head reviews of PIs working in similar areas, particularly for large grants
- Lots of discussion of relative strengths and weaknesses of individual proposals and PIs
- Many factors weigh into final funding decisions
  - Compelling research proposal for next ~3 years
    - ☑ Interesting? Novel? Significant? Plausibly achievable?
    - ☒ Incremental? Implausibly ambitious? Poorly presented?
  - Significant recent contributions in last 3-4 years
    - Synergy and collaboration within group (as appropriate)
    - Contributions to the research infrastructure of experiments
  - Alignment with programmatic priorities

- Supportive of excellent people, including excellent *new* people, even when times are tough!

Comparative Review Criteria

(In descending order of importance)

- **1. Scientific and/or Technical Merit of the Project**
  For e.g., what is the likelihood of achieving valuable results? How might the results of the proposed research impact the direction, progress, and thinking in relevant scientific fields of research? How does the proposed research compare with other research in its field, both in terms of scientific and/or technical merit and originality? *Please comment individually on each senior investigator.*

- **2. Appropriateness of the Proposed Method or Approach**
  For e.g., how logical and feasible is the research approach of each senior investigator? Does the proposed research employ innovative concepts or methods? Are the conceptual framework, methods, and analyses well justified, adequately developed, and likely to lead to scientifically valid conclusions? Does the applicant recognize significant potential problems and consider alternative strategies?

- **3. Competency of Research Team and Adequacy of Available Resources**
  For e.g., what are the past performance and potential of each senior investigator? How well qualified is the research team to carry out the proposed research? Are the research environment and facilities adequate for performing the research? Does the proposed work take advantage of unique facilities and capabilities?

- **4. Reasonableness and Appropriateness of the Proposed Budget**
  Are the proposed resources and staffing levels adequate to carry out the proposed research? Is the budget reasonable and appropriate for the scope?

- **5. Relevance to the mission of the Office of High Energy Physics (HEP) program**
  How does the proposed research of each senior investigator contribute to the mission, science goals and programmatic priorities of the subprogram in which the application is being evaluated? I s it consistent with HEP's overall mission and priorities? How likely is it to impact the mission or direction of the HEP program?

- **6. General Comments and Overall Impression**
  Include any comments you may wish to make on the overall strengths and weaknesses of the proposal, especially as compared to other research efforts in this area. If there are significant or unique elements of the overall proposal, including institutional setting and resources, synergies with other relevant subprograms, or other broader considerations not noted above please include them here.

Scoring by Panelists

Table A: Scoring system definition.

Qualifier	Poor	Fair	Good	Very Good	Excellent	Outstanding
Score	1	2	3	4	5	6

- **Using the grading system in Table A above, please provide scores for the overall proposal in the respective Energy Frontier subprogram area.**
  - **Please provide scores from 1 [Poor] to 6 [Outstanding] for each of the five criteria in Sections 1-5 in Table B below. Your scores should be supported by your answers to questions 1-5.**

Table B: Overall Score in the Energy Frontier.

Criterion	Overall Score [1 to 6]
1) Scientific Merit	
2) Appropriateness	
3) Competency	
4) Budget	
5) Mission Relevance	

Rating by Panelists

Table C: In comparison with similar Energy Frontier research efforts, please indicate whether you judge this program to lie in the bottom, 2nd, 3rd, 4th, or top quintile. Enter an "X" in the appropriate

Bottom 1-20%	Bottom 21%-40%	Mid 41%-60%	Top 61%-80%	Top 81%-100%

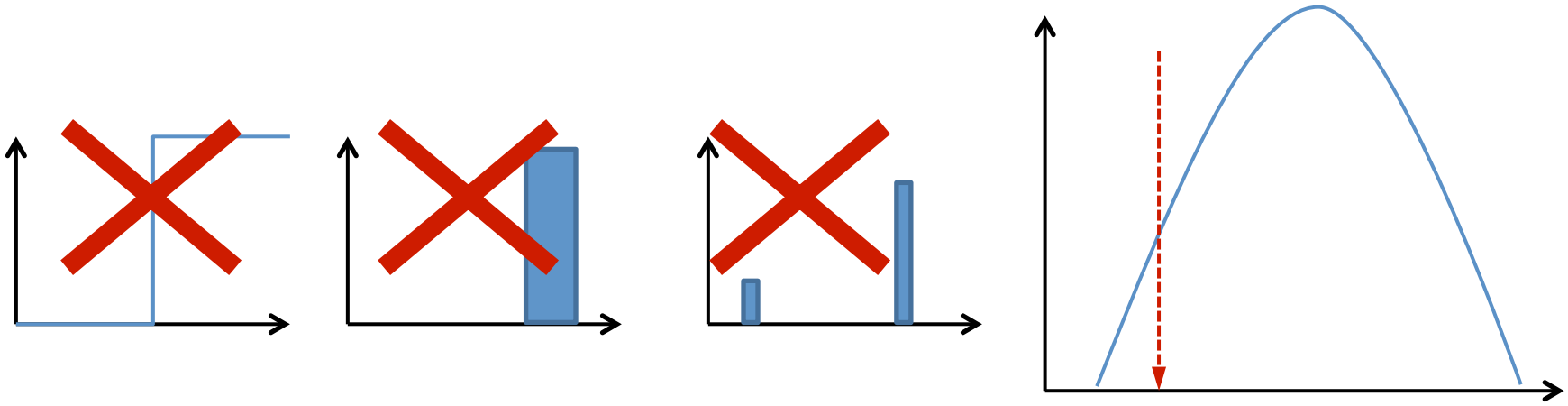
- **Next, *for each senior investigator listed in Table D,* provide scores for the following [two] criteria:**
  - **(1) the merit and potential impact of the proposed work**
  - **(2a) the competency of the investigator and the likelihood of success. Use grading system defined in Table A.**
  - **(2b) compared to other senior investigators working in the same area at this and other institutions, how would you rank this investigator overall in terms of quintiles?**
    - **Please put an "X" in the appropriate box in Table D. Your ratings below should be supported by your answers to questions 1 to 5 and the scores in Table D itself.**

Table D: Individual Energy Frontier senior investigator scores.

Senior Investigator	Scientific merit and potential impact of proposed work [enter 1 to 6]	Competency of senior investigator's team and likelihood of success [enter 1 to 6]	Compared to other senior investigators working in the same area, how would you rank this senior investigator overall? Please enter one "X" per senior investigator in one of the columns below.				
			Bottom 1%-20%	Bottom 21%-40%	Mid 41%-60%	Top 61%-80%	Top 81%-100%
Senior Investigator #1							
Senior Investigator #2							
Senior Investigator #3							

Comparative Evaluation

- **DOE Program Managers will need to determine:**
  - **The threshold for funding each proposal**
  - **The level of support for each funded proposal**
- **A "comparative" evaluation:**
  - **Reviewer scores / rankings of the proposals and senior investigators provide essential (additional) input to DOE's process of optimizing resource allocations for the University research program**
  - **Not everyone can be "<u>Above Average</u>"**



FY2013 HEP COMPARATIVE REVIEW STATISTICS

FY13 Submitted Proposals

- **FY 2013 cycle:**
  - **185 proposals requesting support totaling $335.782M in one or more of the six sub-programs received by the September 10, 2012 deadline in response to *"FY 2013 Research Opportunities in High Energy Physics"* [DE-FOA-0000733]**

- **After pre-screening all incoming proposals for responsiveness to the subprogram descriptions and for compliance with the proposal requirements: 12 were declined before the competition**
  - **There were hard page limits and other requirements. Proposals not respecting the page limits or other requirements were <u>NOT</u> reviewed**
    - **5 proposals declined without review for this reason**
    - **1 proposal was missing a research narrative**
    - **4 were outside the scope of HEP**
    - **2 proposals were non-responsive**
  - **PIs with proposals that were rejected for "technical" reasons could re-submit to general DOE/SC solicitation**

- **11 proposals were withdrawn by the respective sponsoring institutions**
  - **4 were duplicate submissions**
  - **6 were supplemental requests submitted to the incorrect FOA**
  - **1 proposal was submitted from a federal agency which was ineligible**

FY13 Reviewers & Panels

- **For the FY13 HEP Comparative Review process, 162 submitted proposals reviewed, evaluated and discussed by several panels of experts who met in the 6 HEP subprograms:**

Subprogram	Panel Deliberations	# of Total Proposals [includes proposals containing multiple subprograms]
Intensity Frontier	November 5-6, 2012	31
Theory	November 6-8, 2012	53
Particle Detector R&D	November 8-9, 2012	22
Energy Frontier	November 13-15, 2012	45
Accelerator Science and Technology R&D	November 13-14, 2012	40
Cosmic Frontier	November 14-16, 2012	28

- **30 of the proposals requested research support from 2 or more of the 6 subprograms, *e.g.*, "umbrella" proposals**
  - In such cases, the proposal was sent in its entirety to all relevant panels
  - However, the panels were asked to explicitly compare and rank only the section(s) of the proposal relevant to the sub-program they were reviewing
- **Each proposal that satisfied the requirements of the solicitation was sent out for review by at least 3 experts and then subsequent comparative evaluation by the panel**
  - 130 reviewers participated in the review process
    - for proposals on similar topics, reviewers were sent multiple proposals
  - 834 reviews were completed with an average 5.2 reviews per proposal

FY13 Review Data by Proposal

	Energy	Intensity	Cosmic	Theory	Acc. R&D	Det. R&D	HEP Total
Received	46	33	33	56	44	30	185
Declined/Withdrawn Without Review	1	2	5	3	4	8	23
Reviewed	45 (1)	31 (5)	28 (14)	53 (11)	40 (21)	22 (14)	162 (58)
Funded	40[a] (0)	24 (3)	18 (4)	35 (4)	17[b] (3)	12 (6)	101 (20)
Declined	5 (1)	7 (2)	10 (10)	18 (7)	23 (17)	10 (8)	61 (38)
"Success Rate" (%) (Previous/New)	89	77	64	66	43	55	62 (78/34)

NOTES:

- **Single proposals with multiple research subprograms are counted multiple times (1 /subprogram)**
- ( ) indicates number of proposals from research groups that did not receive DOE HEP funding in FY12.
- "Success Rate" is = # Funded/ # Reviewed.
- Most proposals are not fully funded at requested level.
- About 68% of the proposals reviewed were from research groups that received DOE HEP funding in FY12.
- Overall success rate of reviewed proposals for previously (newly) funded groups was 78% (34%).

[a] 3 of 40 Energy funded proposals were provided term support (<1 year) for graduate students and post-docs.
[b] 5 of 17 Accelerator R&D funded proposals were provided term support (<1 year).

FY13 Review Data by Senior Investigator

	Energy	Intensity	Cosmic	Theory	Acc. R&D	Det. R&D	HEP Total
Received	127	56	61	155	57	47	504
Declined/Withdrawn Without Review	1	2	8	9	4	18	42
Reviewed	126 (7)	54 (8)	54 (30)	146 (24)	53 (25)	29 (19)	462 (113)
Funded	112 (3)	43 (6)	27 (7)	115 (11)	24 (4)	19 (9)	338 (40)
Declined	14 (4)	11 (2)	26 (23)	31 (13)	29 (21)	13 (10)	124 (73)
"Success Rate" (%) (Previous/New)	89	80	51	79	45	53	73 (85/35)

NOTES:
- ( ) indicates number of senior investigators that did not receive DOE HEP funding in FY12.
- "Success Rate" is = # Funded/ # Reviewed.
- Overall success rate for previously (newly) funded DOE HEP PIs was 85% (35%).
- Most (but not all) PIs who are funded, are funded at requested effort level.

FY13 Review Data

Jr. Faculty and Research Scientists

	Total # Jr. Faculty Reviewed (New)	# Jr. Faculty Funded (New)	Total # Res. Scientists Reviewed (New)	# Res. Scientists Funded (New)
Accelerator R&D	7 (7)	1 (1)	34 (11)	20 (0)
Cosmic Frontier	10 (8)	3 (3)	2 (2)	0 (0)
Detector R&D	3 (2)	1 (1)	10 (5)	6 (2)
Energy Frontier	16 (3)	15 (2)	28 (2)	18 (1) *
Intensity Frontier	9 (5)	7 (5)	5 (0)	4 (0)
Theory	15 (7)	13 (6)	3 (0)	0 (0)
HEP Total	60 (32)	40 (18)	81 (20)	47 (3)

* DOE worked with US-CMS and US-ATLAS management to find support for fraction of needed Research Scientists through the LHC Ops program.

More on Research Scientists (RS)

- Efforts of *all* RS that have support requested in a proposal are evaluated by the panel
- See also Q&A-40 of FAQ…
  - Requests to support RS dedicated full-time (and long-term) to operational and/or project activities for an experiment will not be supported by respective frontier research areas
  - If RS conducting physics research-related activities, requests [scaled to % of time on such efforts] can be included
    - any final support will be based on the merit review process

- Common reviewer comments that result in unfavorable merit reviews:
  - 'RS conducting scope of work typically commensurate at the postdoctoral-level…'
  - 'RS involved in long-term operation/project activities with minimum physics research efforts…'
    - such efforts may review well in a DOE review of the operation/project program but not as well in a review of the experimental research program

- What is physics research-related activities?
  - Object reconstruction/algorithm development, performance studies, data taking and analysis, and mentorship of students & postdocs in these areas
  - Scientific activities in support of detector/hardware design and development

- From the research program, cases become an issue when operations/projects become the *dominant* activity long-term
  - A well-balanced portfolio that includes physics research-related activities is encouraged

FY13 Proposals vs. FY12 Status

	New	Up	Flat	Down	No-Fund	Decline	Total
Accelerator R&D	3	2	4	8	6	17	40
Cosmic Frontier	4	7	1	6	0	10	28
Detector R&D	6	2	2	2	2	8	22
Energy Frontier	0	10	2	28[a]	1	4	45
Intensity Frontier	3	8	6	7	5	2	31
Theory	4	2	7	22	11	7	53
HEP Total	20	20	14	48	22	38	162

- **Single proposals with multiple research subprograms are counted multiple times (1 /subprogram)**
- New = HEP research effort was not funded at this institution in FY12.
- Up = FY13 funding level +2% or more compared to FY12.
- Flat = FY13 funding level within ±2% of FY12.
- **Down = FY13 funding -2% or more compared to FY12.**
- **No-Fund = No funding is provided in FY13. This effort was funded in FY12.**
- **Decline = This effort was <u>not</u> funded in FY12.**

- **Energy Frontier: 45 proposals reviewed in FY13 – request: $31.3M (12-month); funded: $18M (11-month)**

[a] 11 of 28 proposals had Tevatron (CDF or D0) research activities associated with them in addition to CMS/ATLAS research activities. In general, the Tevatron efforts saw a downward reduction with respect to FY12.

EARLY CAREER RESEARCH PROGRAM (ECRP)

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
    - all interested PIs encouraged to register as soon as possible in DOE/SC Portfolio Analysis and Management System (PAMS) for submission [link provided in EC website]
  - 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 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 experimental HEP proposals that are submitted to ECRP FOA
  - Looking for a *balanced* program
    - strong physics effort and hardware project attached to an experiment (*e.g.,* Phase-1 upgrades for LHC)
- 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

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)**

EC Recipients: Energy Frontier

FY10

"Model-Independent Dark-Matter Searches at the ATLAS Experiment and Applications of Many-core Computing to High Energy Physics"

— Dr. Amir Farbin (ATLAS Experiment)
University of Texas, Arlington

"Diamond Pixel Luminosity Telescopes"

— Dr. Valerie Halyo (CMS Experiment)
Princeton University

"Enhancing the LHC Discovery Potential with Jets, Missing E_T, and bit -tagging Physics Signature Reconstruction in ATLAS"

— Dr. Ariel Schwartzman (ATLAS Experiment)
SLAC National Accelerator Laboratory

FY11

"Taus and the Trigger for Discovery at ATLAS"

— Dr. Sarah Demers (ATLAS Experiment)
Yale University

"Precision Physics and Searches with Top and Bottom Quarks"

— Dr. Aran Garcia-Bellido (CMS Experiment)
University of Rochester

"Enhancement of the Trigger Capability for New Physics at the Large Hadron Collider"

— Dr. Jinlong Zhang (ATLAS Experiment)
Argonne National Laboratory

FY12

"Search for New Physics and Upgrade of the Muon Spectrometer at ATLAS"

— Dr. Junjie Zhu (ATLAS Experiment)
University of Michigan, Ann Arbor

FY13

"Quest for a Top Quark Partner and Upgrade of the Pixel Detector Readout Chain at the CMS"

— Dr. Andrew Ivanov (CMS Experiment)
Kansas State University

"Search for the Higgs and Physics Beyond the Standard Model with the CMS Electromagnetic Calorimeter"

— Dr. Toyoko J. Orimoto (CMS Experiment)
Northeastern University

EC Recipients: Energy Frontier

FY10

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Northeastern University

Congratulations
to recipients in the
Energy Frontier research program,
and
Congratulations to all
Early Career Research Award recipients!

REFERENCE SLIDES

Office of

High Energy Physics

Fundamental

to the

Frontiers of

Discovery

HEP's Mission:

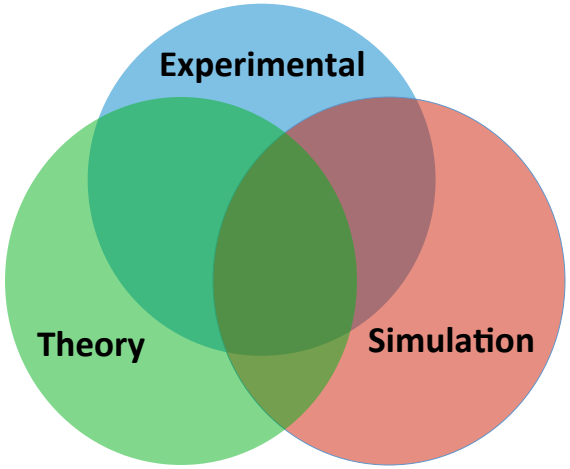
To explore the most fundamental questions about the nature of the universe at the Cosmic, Intensity, and Energy Frontiers of scientific discovery, and to develop the tools and instrumentation that expand that research.

HEP seeks answers to Big Questions:

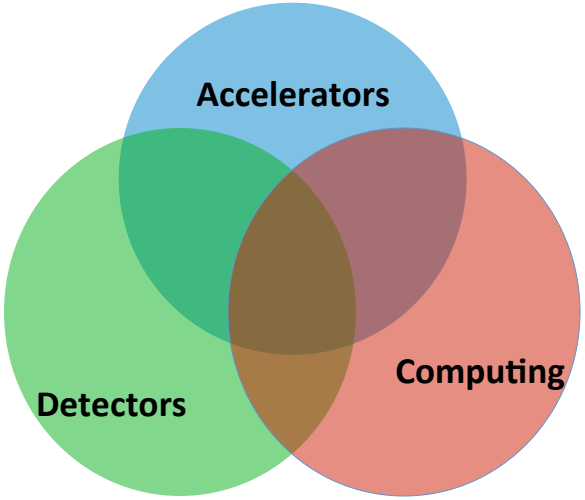
How does mass originate?
Why is the world matter and not anti-matter?
What is dark energy? Dark matter?
Do all the forces become one and on what scale?
What are the origins of the Universe?

HEP offers high-impact research opportunities from small-scale to large international collaborations at each of the three HEP Frontiers.
More than 20 physicists supported by the Office of High Energy Physics have received the Nobel Prize.

HEP Physics and Technology



Along Three Paths



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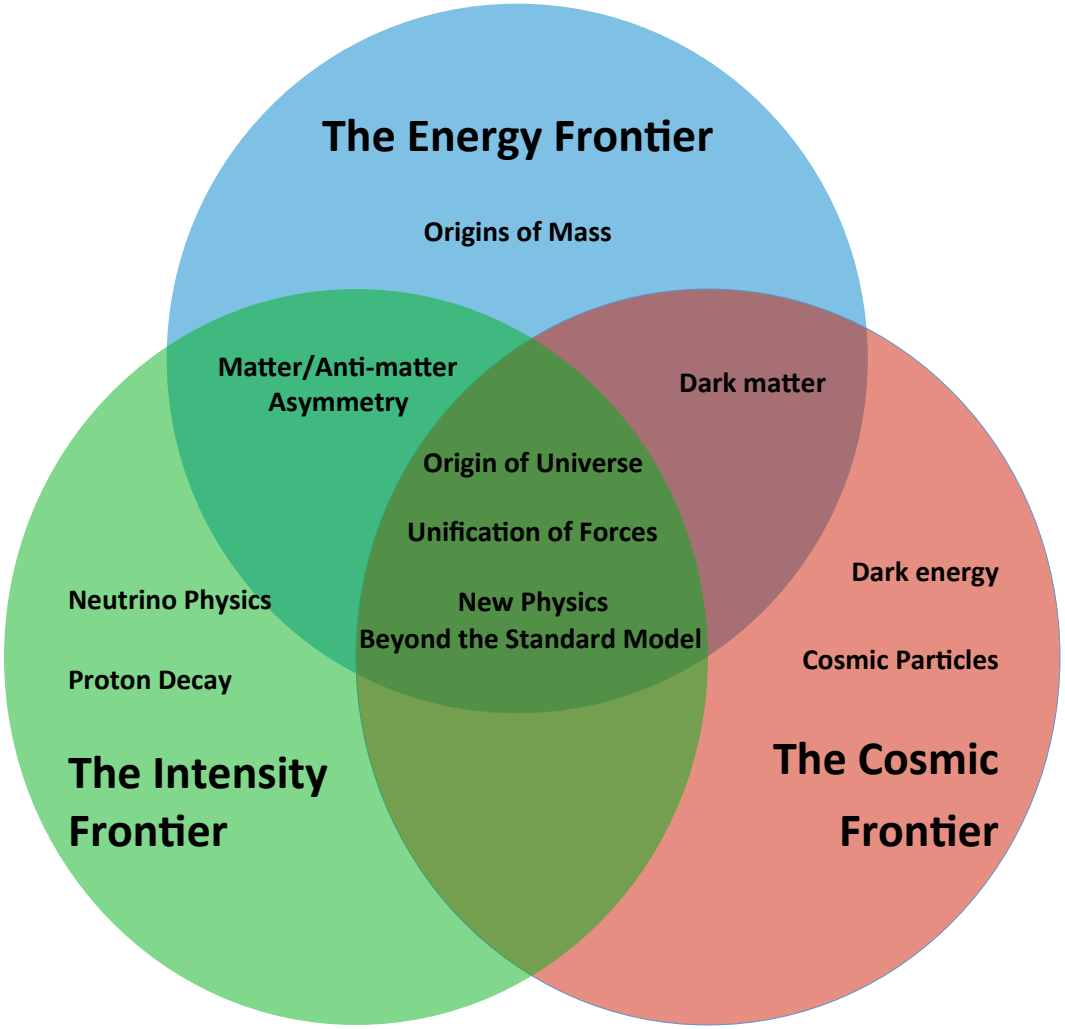
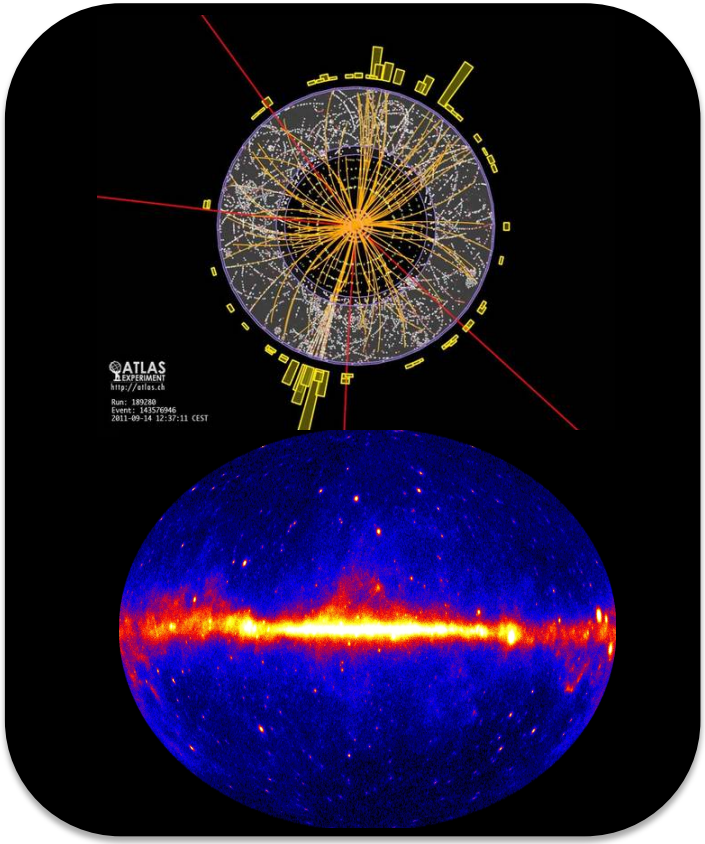


Physics Frontiers

From Deep Underground to the Tops of Mountains, HEP pushes the Frontiers of Research

Research at the Energy Frontier — HEP supports research where powerful accelerators such as the LHC are used to create new particles, reveal their interactions, and investigate fundamental forces, and where experiments such as ATLAS and CMS explore these phenomena.



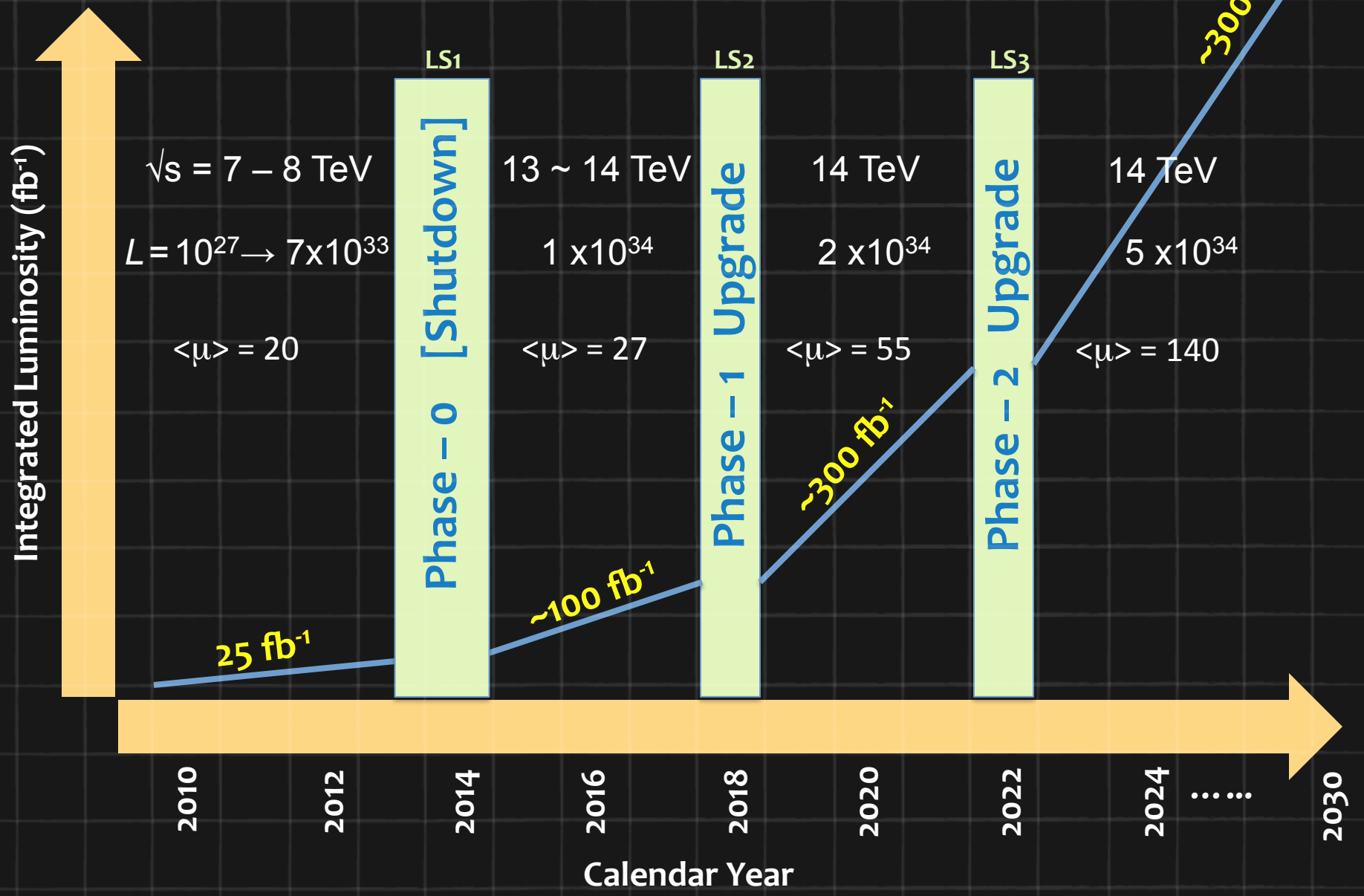
Research at the Intensity Frontier — Reactor and beam-based neutrino physics experiments such as Daya Bay and LBNE may ultimately answer some of the fundamental questions of our time: why does the Universe seem to be composed of matter and not anti-matter?

Research at the Cosmic Frontier — Through ground-based telescopes, space missions, and deep underground detectors, research at the cosmic frontier aims to explore dark energy and dark matter, which together comprise approximately 95% of the universe.

Theory and Computation — Essential to the lifeblood of High Energy Physics, the interplay between theory, computation, and experiment drive the science forward. Computational sciences and resources enhance both data analysis and model building.

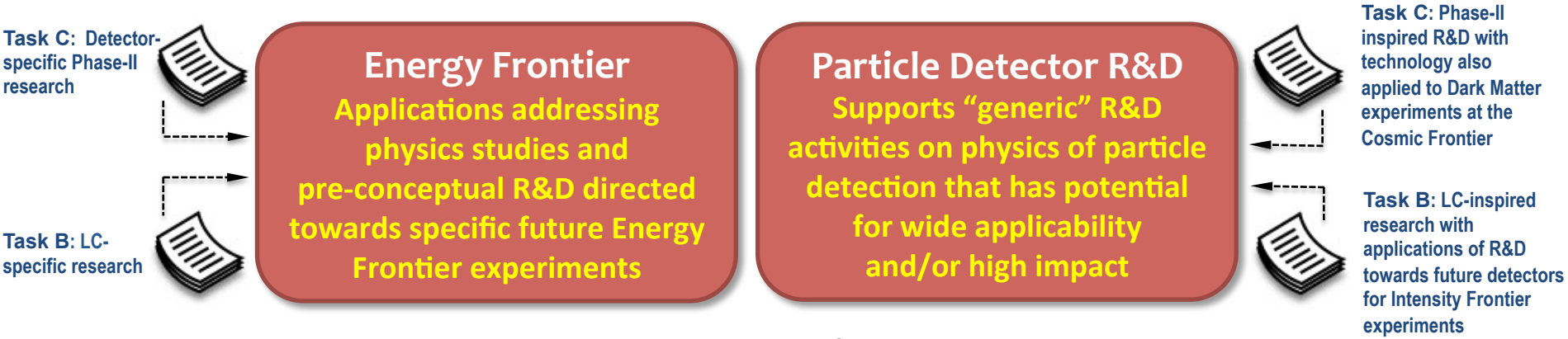
Accelerator Science — Supports R&D at national labs and universities in beam physics, novel acceleration concepts, beam instrumentation and control, high gradient research, particle and RF sources, superconducting magnets and materials, and superconducting RF technology.

The LHC Forecast



Future Lepton Colliders and LHC Phase-II

- **Guidance for proposals on e.g., future lepton colliders (LC) and/or LHC Phase-II detector upgrades**
  - General approach to such R&D proposals, where LC and Phase-II are common examples
  - Proposals in such research areas may be submitted in addition to a group's research activities on one of the LHC experiments (CMS or ATLAS)
  - If so, proposals encouraged to address project narrative separately – one for each research area as part of an "umbrella" proposal on multiple research tasks
    - *for e.g.,* Task A devoted to ATLAS research efforts, Task B on LC, etc…
    - as specified in Section IV of FOA, list all PIs and budget info for *each* area in the 'Cover Page Supplement for Proposals with Multiple Research Areas or Thrusts' material of the proposal
    - proposal must comply with all FOA requirements, including page limits
  - Detector R&D may support some level of engineering/M&S whereas Energy Frontier typically does not
  - Depending on scope of work described in these tasks, DOE Program Managers will assess which Panel (*i.e.,* Energy Frontier or Particle Detector R&D) to solicit reviews



- **Final decisions on support will depend on the scientific merit review process, and other programmatic and budgetary factors**

HEP Intensity Frontier Experiments

Experiment	Location	Status	Description	#US Inst.	#US Coll.
Belle II	KEK, Tsukuba, Japan	Physics run 2016	Heavy flavor physics, CP asymmetries, new matter states	10 Univ., 1 Lab	55
CAPTAIN	Los Alamos, NM, USA	R&D; Neutron run 2015	Cryogenic apparatus for precision tests of argon interactions with neutrinos	5 Univ., 1 Lab	20
Daya Bay	Dapeng Penisula, China	Running	Precise determination of θ_{13}	13 Univ., 2 Lab	76
Heavy Photon Search	Jefferson Lab, Newport News, VA, USA	Physics run 2015	Search for massive vector gauge bosons which may be evidence of dark matter or explain g-2 anomaly	8 Univ., 2 Lab	47
K0TO	J-PARC, Tokai , Japan	Running	Discover and measure $K_L \rightarrow \pi^0 \nu\nu$ to search for CP violation	3 Univ.	12
LArIAT	Fermilab, Batavia, IL	R&D; Phase I 2013	LArTPC in a testbeam; develop particle ID & reconstruction	11 Univ., 3 Lab	38
LBNE	Fermilab, Batavia, IL & Homestake Mine, SD, USA	CD1 Dec 2012; First data 2023	Discover and characterize CP violation in the neutrino sector; comprehensive program to measure neutrino oscillations	48 Univ., 6 Lab	336
MicroBooNE	Fermilab, Batavia, IL, USA	Physics run 2014	Address MiniBooNE low energy excess; measure neutrino cross sections in LArTPC	15 Univ., 2 Lab	101
MINERνA	Fermilab, Batavia, IL, USA	Med. Energy Run 2013	Precise measurements of neutrino-nuclear effects and cross sections at 2-20 GeV	13 Univ., 1 Lab	48
MINOS+	Fermilab, Batavia, IL & Soudan Mine, MN, USA	NuMI start-up 2013	Search for sterile neutrinos, non-standard interactions and exotic phenomena	15 Univ., 3 Lab	53
Mu2e	Fermilab, Batavia, IL, USA	First data 2019	Charged lepton flavor violation search for $\mu N \rightarrow eN$	15 Univ., 4 Lab	106
Muon g-2	Fermilab, Batavia, IL, USA	First data 2016	Definitively measure muon anomalous magnetic moment	13 Univ., 3 Lab, 1 SBIR	75
NOνA	Fermilab, Batavia, IL & Ash River, MN, USA	Physics run 2014	Measure ν_μ-ν_e and ν_μ-ν_μ oscillations; resolve the neutrino mass hierarchy; first information about value of δ_{cp} (with T2K)	18 Univ., 2 Lab	114
ORKA	Fermilab, Batavia, IL, USA	R&D; CD0 2017+	Precision measurement of $K^+ \rightarrow \pi^+ \nu\nu$ to search for new physics	6 Univ., 2 Lab	26
Super-K	Mozumi Mine, Gifu, Japan	Running	Long-baseline neutrino oscillation with T2K, nucleon decay, supernova neutrinos, atmospheric neutrinos	7 Univ.	29
T2K	J-PARC, Tokai & Mozumi Mine, Gifu, Japan	Running; Linac upgrade 2014	Measure ν_μ-ν_e and ν_μ-ν_μ oscillations; resolve the neutrino mass hierarchy; first information about value of δ_{cp} (with NOνA)	10 Univ.	70
US-NA61	CERN, Geneva, Switzerland	Target runs 2014-15	Measure hadron production cross sections crucial for neutrino beam flux estimations needed for NOνA, LBNE	4 Univ., 1 Lab	15
US Short-Baseline Reactor	Site(s) TBD	R&D; First data 2016	Short-baseline sterile neutrino oscillation search	6 Univ., 5 Lab	28

BROADER IMPACTS OF HEP

The Accelerator R&D Stewardship Program

- The mission of the HEP long-term accelerator R&D stewardship program is to support fundamental accelerator science and technology development of relevance to many fields and to disseminate accelerator knowledge and training to the broad community of accelerator users and providers.

- Strategies:
  - Improve access to national laboratory accelerator facilities and resources for industrial and for other U.S. government agency users and developers of accelerators and related technology;
  - Work with accelerator user communities and industrial accelerator providers to develop innovative solutions to critical problems, to the mutual benefit of our customers and the DOE discovery science community;
  - Serve as a catalyst to broaden and strengthen the community of accelerator users and providers
- Strategic plan sent to Congress in October 2012
- Incorporated into FY2014 Budget Request as new subprogram in HEP

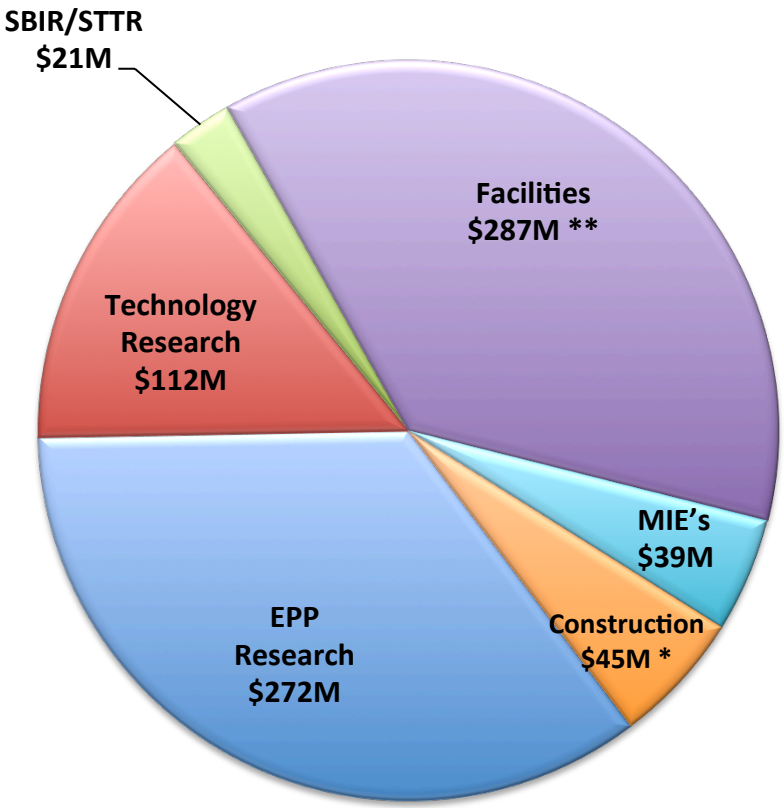
Connecting Accelerator R&D to Science and to End-User Needs

Science Goal "Push"					Application "Pull"				
Particle Beam Quality	Photon Beam Quality	Beam Intensity	Compact or High Energy	DOE R&D Program Thrust	Industry	Medicine	Energy and Environment	Defense and Security	Discovery Science
●	●	●	●	Superconducting RF	●		●	●	●
●	●	●	●	Accelerator, Beam, Computation		●	●	●	●
●	●	●	●	Particle Sources	●		●	●	●
		●	●	RF Sources	●		●	●	●
●	●	●	●	Beam Inst. & Controls		●	●	●	●
●	●		●	NC High-gradient Accel. Structures	●	●		●	●
			●	New Accelerator Concepts		●		●	●
●	●	●	●	Superconducting Magnets	●	●			●

BUDGET
REFERENCE SLIDES

FY 2014 Request Crosscuts

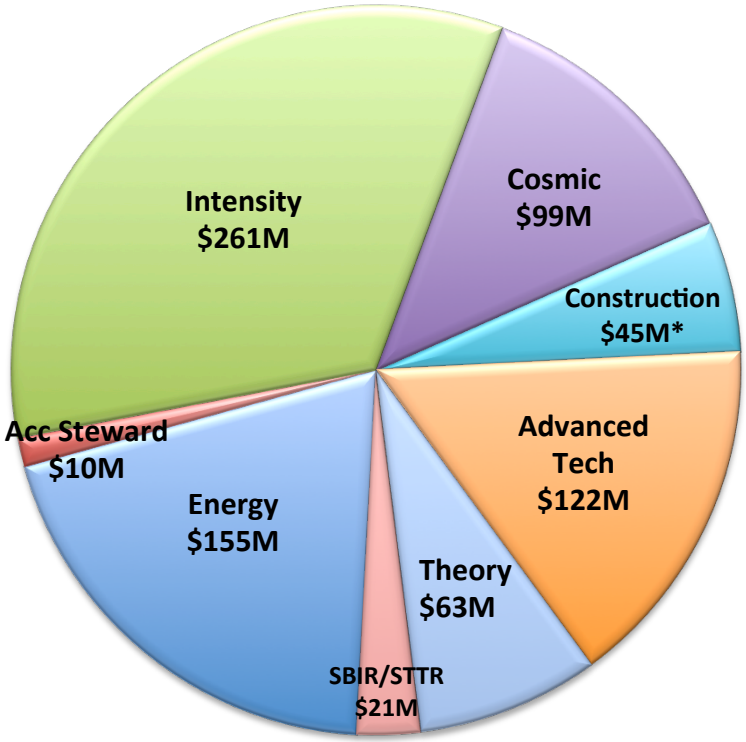
By Function



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

**Includes $15.9M Other Facility Support

By Frontier



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

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 Research 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 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.

HEP Intensity Frontier

Funding (in $K)	FY 2012 Actual	FY 2013 July Plan	FY 2014 Request	Comment
Research	**53,261**	**52,108**	**53,562**	Ramp-down of B-factory research offset by increased support for new initiatives
Facilities	**143,844**	**172,318**	**180,481**	
Expt Ops	6,615	7,354	7,245	Offshore and Offsite Ops
Fermi Ops	119,544	143,128	156,438	Accelerator and Infrastructure improvements
B-factory Ops	10,031	5,654	4,600	Completion of BaBar D&D
*Homestake**	5,478	14,000	10,000	
Other	2,176	2,182	2,198	GPE and Waste Mgmt
Projects	**86,750**	**62,794**	**37,000**	
Current	73,770	52,794	27,000	NOνA + MicroBooNE ramp-down
Future R&D	12,880	10,000	10,000	
TOTAL, Intensity Frontier	**283,675**	**287,220**	**271,043**	

***Per interagency MOU, HEP provided LHC Detector Ops funding during FY12 CR to offset NSF contributions to Homestake dewatering activities.**

HEP Cosmic Frontier

Funding (in $K)	FY 2012 Actual	FY 2013 July Plan	FY 2014 Request	Comment
Research	**47,840**	**48,836**	**62,364**	R&D for G2 Dark Matter
Facilities	**11,207**	**10,948**	**12,022**	Offshore and offsite Ops
Projects	**12,893**	**19,159**	**24,694**	
Current	9,153	9,500	23,200	LSSTcam fabrication begins
Future R&D	3,380	9,659	1,484	Dark energy and dark matter projects move to conceptual design
TOTAL, Cosmic Frontier	**71,940**	**78,943**	**99,080**	

HEP Theory and Computation

Funding (in $K)	FY 2012 Actual	FY 2013 July Plan	FY 2014 Request	Comment
Research	**64,465**	**63,198**	**59,670**	
HEP Theory	55,929	54,621	51,196	Follows programmatic reductions in Research
Computational HEP	8,536	8,577	8,474	
Projects	**2,500**	**3,200**	**3,200**	Lattice QCD hardware
TOTAL, Theory and Comp.	**66,965**	**66,398**	**62,870**	

HEP Advanced Technology R&D

Funding (in $K)	FY 2012 Actual	FY 2013 July Plan	FY 2014 Request	Comment
Research	**134,006**	**111,888**	**105,303**	
General Accel. R&D	59,280	61,791	57,856	Selected long-term R&D moves to Accelerator Stewardship
Directed Accel. R&D	46,587	22,692	23,500	Completion of ILC R&D
Detector R&D	28,139	27,405	23,947	Funding for liquid argon R&D is reduced
Facility Operations	**23,100**	**19,997**	**17,150**	Completing SRF infrastructure at Fermilab
TOTAL, Advanced Technology R&D	**157,106**	**131,885**	**122,453**	

Accelerator Stewardship

Funding (in $K)	FY 2012 Actual	FY 2013 July Plan	FY 2014 Request	Comment
Research	0	82	6,581	Recast of Accelerator R&D activities relevant to broader impacts
Facility Operations	2,850	3,050	3,350	Incremental FACET ops for stewardship research
TOTAL, Accel. Stewardship	2,850	3,132	9,931	

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]

Current LBNE Strategy

- **We are trying to follow the reconfiguration [phased] plan for LBNE, though it has hit some snags**
  - **Out-year budgets are challenging**
  - **Some members of the community objected that the phased LBNE was not what the previous P5 [or they] had in mind**
- **The plan, as it currently stands:**
  - **Use time before baselining to recruit partners (international and domestic) that expand scope and science reach**
- **We also take note of the House language on LBNE:**

"The Committee recognizes the importance of this project to maintaining American leadership in the intensity frontier and to basic science discovery of neutrino and standard model physics. However, the Committee also recognizes that LBNE construction must be affordable under a flat budget scenario. As such, the Committee supports the Office of Science's challenge to the High Energy Physics community to identify an LBNE construction approach that avoids large out-year funding spikes or to identify viable alternatives with similar scientific benefits at significantly lower cost."

FY13 COMPARATIVE REVIEW STATS

FY13 Declined Proposals

- Based on: reviewers' assessments, comparison and ranking of the proposals by the panel(s) within the subprogram(s), evaluations of the needs of the HEP research program by the respective Program Managers, potential impact of the proposed work, proposals' responsiveness to the FY13 HEP Comparative Review FOA, budgetary constraints
  - 61 proposals were recommended for declination
    - 12 proposals seeking new scope of research support (currently funded by OHEP)
    - 12 proposals requested support to extend currently funded research ("renewal")
    - 37 proposals from senior investigators not supported by a DOE HEP grant in FY12
      - including 7 proposals from Small Business applicants
      - 15 proposals came from senior investigators who were not successful in the FY12 Comparative Review