U.S. DEPARTMENT OF ENERGY | Office of Science

Theory at DOE-HEP

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Introduction

The purpose of this talk is to explain and summarize how the theory program works at DOE, how it is funded, how grant allocations are made, and how the entire process works so that everyone will be on the same page in all future discussions.
(see also: Snowmass talks in 2013, HEPAP talk in March 2014, PI Meeting talk in June 2014)

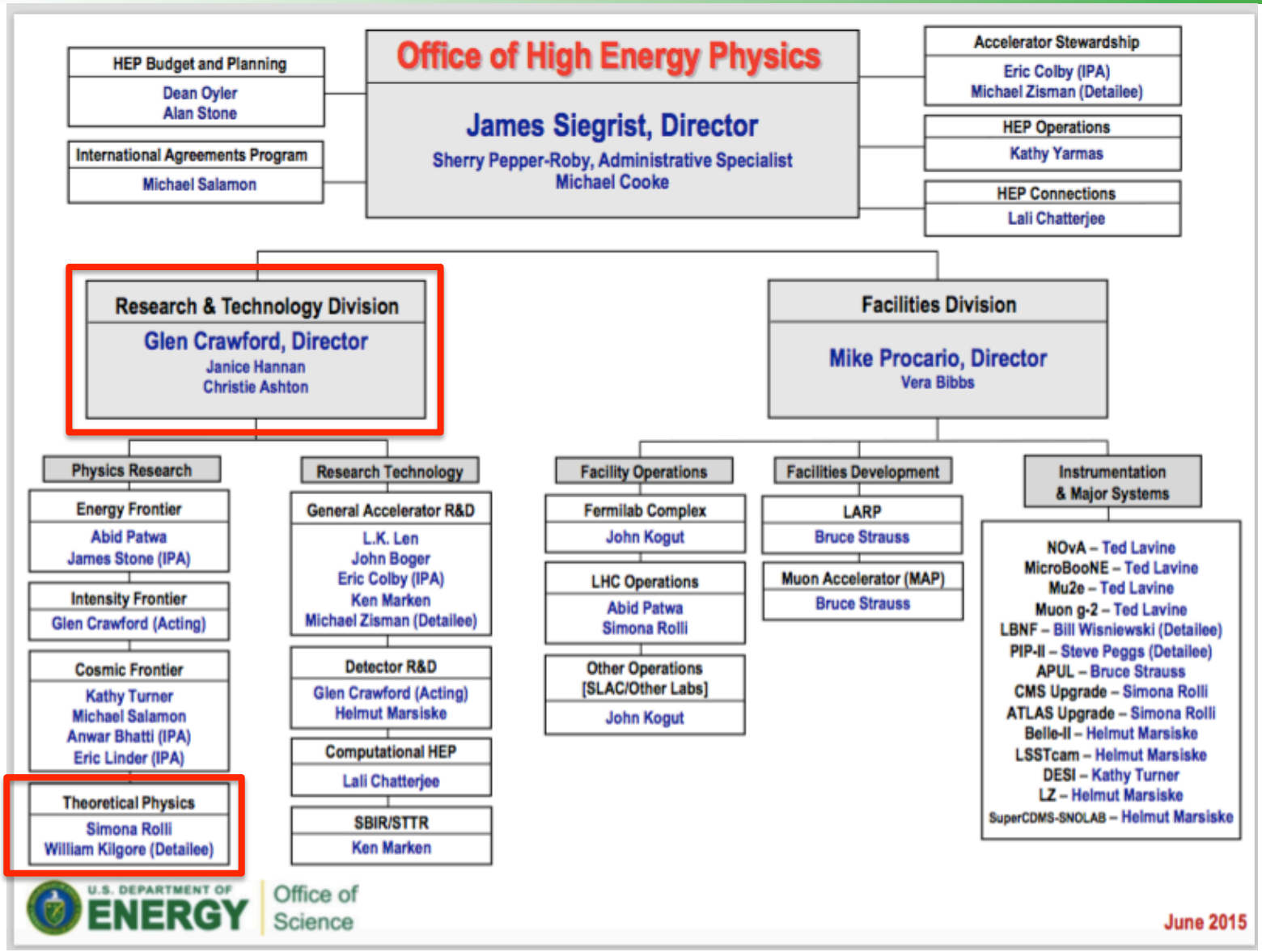
There are two issues that everyone needs to understand:

- How much funding is allocated to the Theory Program *in total*
- How that money is *distributed* across different grant allocations (universities) and across different contracts (laboratory theory groups).

Outline

- The Theory Program at DOE-HEP
- Theory Portfolio and Budget Trends
  - 2009-2015
  - Labs and Universities
- University Comparative Review
  - Review Panels, Funding Allocation & Budget Guidance
- Laboratory Comparative Review
- Early Career Research Program
- Concluding Remarks

The context


HEP Budget and Planning
Dean Oyler
Alan Stone
International Agreements Program
Michael Salamon
Office of High Energy Physics
James Siegrist, Director
Sherry Pepper-Roby, Administrative Specialist
Michael Cooke
Accelerator Stewardship
Eric Colby (IPA)
Michael Zisman (Detailee)
HEP Operations
Kathy Yarmas
HEP Connections
Lali Chatterjee
Research & Technology Division
Glen Crawford, Director
Janice Hannan
Christie Ashton
Facilities Division
Mike Procario, Director
Vera Bibbs
Physics Research
Energy Frontier
Abid Patwa
James Stone (IPA)
Intensity Frontier
Glen Crawford (Acting)
Cosmic Frontier
Kathy Turner
Michael Salamon
Anwar Bhatti (IPA)
Eric Linder (IPA)
Theoretical Physics
Simona Rolli
William Kilgore (Detailee)
Research Technology
General Accelerator R&D
L.K. Len
John Boger
Eric Colby (IPA)
Ken Marken
Michael Zisman (Detailee)
Detector R&D
Glen Crawford (Acting)
Helmut Marsiske
Computational HEP
Lali Chatterjee
SBIR/STTR
Ken Marken
Facility Operations
Fermilab Complex
John Kogut
LHC Operations
Abid Patwa
Simona Rolli
Other Operations
[SLAC/Other Labs]
John Kogut
Facilities Development
LARP
Bruce Strauss
Muon Accelerator (MAP)
Bruce Strauss
Instrumentation & Major Systems
NOvA – Ted Lavine
MicroBooNE – Ted Lavine
Mu2e – Ted Lavine
Muon g-2 – Ted Lavine
LBNF – Bill Wisniewski (Detailee)
PIP-II – Steve Peggs (Detailee)
APUL – Bruce Strauss
CMS Upgrade – Simona Rolli
ATLAS Upgrade – Simona Rolli
Belle-II – Helmut Marsiske
LSSTcam – Helmut Marsiske
DESI – Kathy Turner
LZ – Helmut Marsiske
SuperCDMS-SNOLAB – Helmut Marsiske
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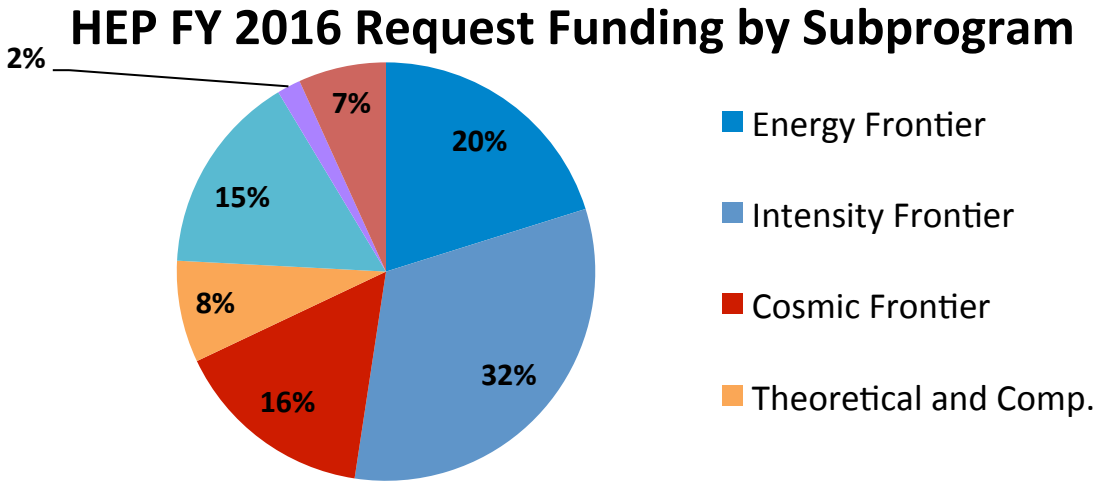
Office of Science
June 2015

The Context (cont'd)

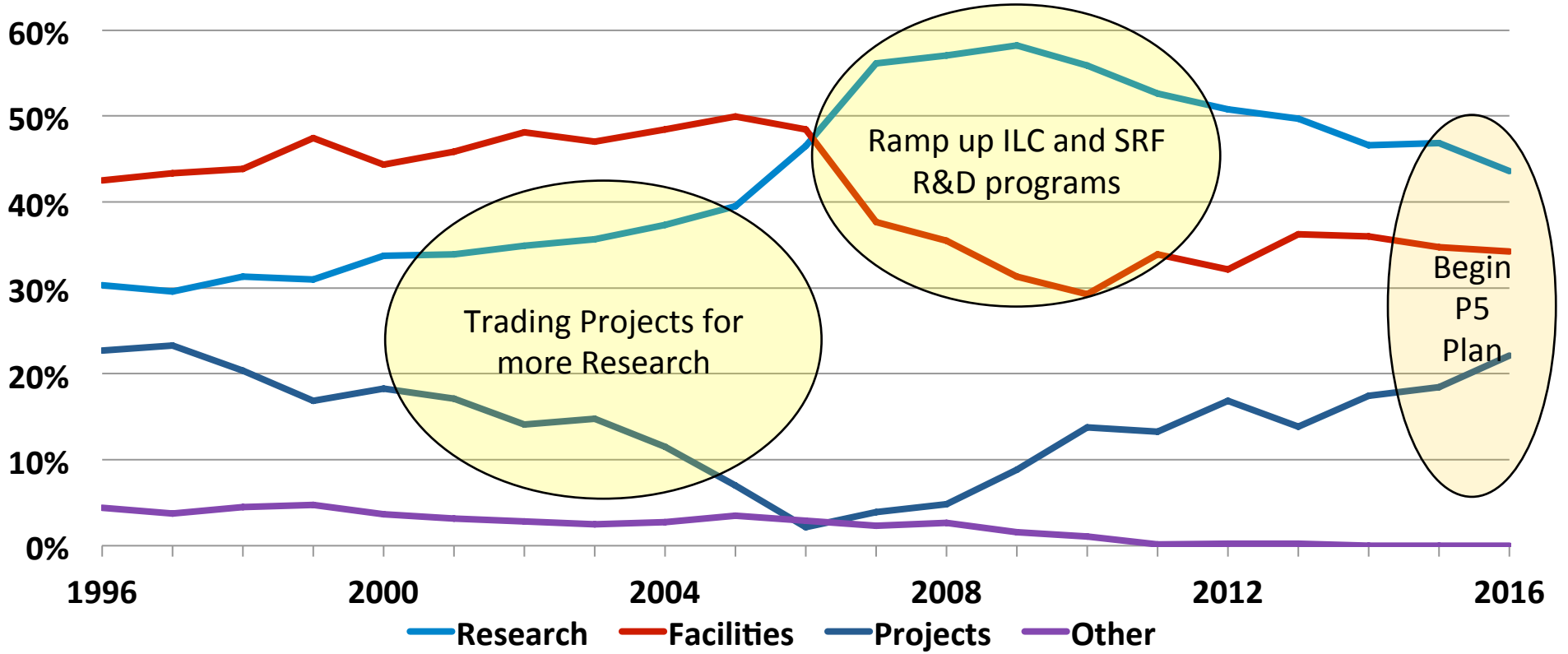


The theory budget in DOE is a small fraction (about 6 -7%) of a much larger budget which sustains the entire HEP infrastructure in the US (Energy, Cosmic and Intensity frontier experiments, Accelerator R&D and detector R&D). **The total theory budget is not determined by any individual Program Manager, but at the level of the entire Office of High-Energy Physics, following a game-plan proposed and endorsed by the high-energy physics community through their representatives on the 2012 P5.**

While we all agree that Theory is important, the reality is that the overall primary HEP budget driver is the experimental program (experimental R&D, facilities, etc.). This is an undeniable reality. However, a healthy, well-rounded Theory program is also essential in order to achieve maximum return from these other investments.

Funding Trends by Fiscal Year

(FY 2016 shows President's Request)



- P5 report recommendation suggests increasing the project budget fraction to 20%–25%
  - "Addressing the [science] Drivers in the coming and subsequent decades requires renewed investment in projects."
- P5 report strategy has informed the HEP request in the FY 2016 DOE budget

HEP Theory Portfolio

- Topics studied in theoretical high energy physics research *include, but are not limited* to: **phenomenological and theoretical studies that support experimental HEP research at the three frontiers**, both in understanding the data and in finding new directions for experimental exploration; **development of analytical and numerical computational techniques for these studies**; and **construction and exploration of theoretical frameworks for understanding fundamental particles and forces** at the deepest level possible.
- The program is centered across several research areas:
  - 1) **Standard Model Phenomenology**, which involves high precision calculations of Standard Model predictions such as Monte Carlo simulation, higher order calculations of particle production rates and distributions, radiative corrections, and extraction of parton distribution functions;
  - 2) **Beyond the Standard Model Phenomenology**, which studies the experimental consequences of extensions of the Standard Model as well as the search for new particles given their signatures in collider and astrophysical sources, and in rare processes;
  - 3) **Cosmology and Astroparticle** theory, which studies the early universe, inflation scenarios, large scale structure formation, particle models for Dark Matter and prospects for its detection, Dark Energy and its theoretical consequences, quantum gravity and black holes;
  - 4) **Lattice Field Theory**, which involves the study and simulation of lattice models of quantum field theory and its phenomenology;
  - 5) **Formal** and mathematical aspects of quantum field theory, including string theory.

Total Theory Budget

ECA = Early Career awards

	Universities	Labs	Total
FY10	**27.25M**	**25.83 M**	**53.09 M**
FY11	**27.42M (incl. 450K for EC)**	**25.63 M**	**53.06 M**
FY12	**27.71 M (incl. 900K for EC)**	**24.72 M**	**52.43 M (-1.17%)**
FY13	**25.44 M (incl. 1.2M for EC)**	**25.75 M (incl. 2 ECA)**	**51.19 M (-2.4%)**
FY14	**24.01 M (incl. 2.0M for EC)**	**24.62 M (incl. 2 ECA)**	**48.63 M (-5.0 %)**
FY15	**24.131M (including 13 ECA – $3.75M)**	**25.189M (incl. 2 ECA)**	**49.320M (+1.4%, mostly due to EC infusion)**

The Theory Budget has steadily declined over the last several years (FY10-FY14 ~-8.5%).

Early Career awards are helping to support the the total University base budget, but are reserved for EC winners. Unlike remainder of budget, EC funds are *immune* from all future budget cuts. Total EC Theory awards since inception in FY10: 18 to universities, 2 to labs.

University & Laboratory Research

- **University research is supported by a competitive, proposal-driven process**
  - **Grants issued after peer review of proposals submitted to Funding Opportunity Announcements (FOAs)**
- **Program alignment is built into proposal review process:**
  - **Relevance to HEP mission is explicit in review criteria**
  - **HEP programmatic priorities inform the peer review process**
  - **Program Managers consider reviewer feedback and program priority when determining awards**

- Laboratory research is mission driven and funded through Field Work Proposals
  - HEP holds comparative reviews of the Laboratory research programs every 3 years
    - *e.g.,* Energy Frontier review last week
- Program guidance to the Laboratories is provided by HEP with input from a variety of sources, including:
  - The Laboratories themselves
    - Local strengths and resources
  - Advisory committees
  - Institutional reviews

Lab vs. University allocations

- **Universities** are funded through *grants* ("financial assistance"). DOE-HEP can offer a grant or not, based on available budgets.
  - Selection is made through University Comparative Review. Grants typically have three-year cycles; review takes place upon renewal (once per three years).
  - University program includes approximately 80 groups funding approximately 220 PI's, 100 postdocs, 120 grads.

- **Laboratories** are DOE facilities. They are managed/funded through *contracts*, and the laboratory management hire/fire research personnel, including theory personnel.
  - In general, the lab budget pays 100% of the salaries of lab personnel. DOE controls the top-level budget lines, but lab management determines its distribution *within* individual budget lines. Thus, DOE's ability to sculpt/shape profiles of individual lab theory groups is more indirect.
  - Assessment is made through Laboratory Comparative Review. All assessments are made simultaneously in a single Comparative Review held every three years (2008, 2011, 2014,2017).
  - Laboratory theory groups with HEP personnel: Argonne, Brookhaven, Fermilab, Lawrence Berkeley Lab, Los Alamos, SLAC. Total: approximately 50 PI's, 25 postdocs.

Funding Allocation

Given an annual Theory budget, the Program Manager (in this case, me) is ultimately responsible for recommending the relative allocations across the entire program.

Decisions of Program Managers are not made in isolation ---

- External reviewers are consulted for each proposal.
- Since FY12, members of a Comparative Review Panel also provide assessments and rankings.
- Program Managers also weigh programmatic needs and Office priorities.
- DOE-HEP line of management subsequently must "concur" with all recommendations of Program Managers.

This procedure is not unique to DOE.

For example, for many years NSF has been following exactly these same procedures, as do many grant-giving federal agencies.

The Annual Budget Process

- The Theory PM receives an allocation from DOE-HEP leadership = total budget for a given fiscal year.
- First, the PM makes payments for second-year continuations on grants made in previous year (~16%) and third-year continuations on grants made two years earlier (~16%).
- Second, the PM pays previous commitments for labs (~50%).
- Residual funds are then available for new grants, renewals, supplements, conferences, summer schools, etc. etc. (~16%)

- *Comparative Review only helps to determine how this remaining piece of the pie is divided.* **Commitments from previous years (for both universities and labs) can greatly affect the size of available funds (for both universities and labs).** Thus, the Program Manager must aim to balance the program fiscally across many years at once, even in the face of uncertain (and even declining) budgets. **A single-year snapshot is not sufficient.**

Comparative Reviews

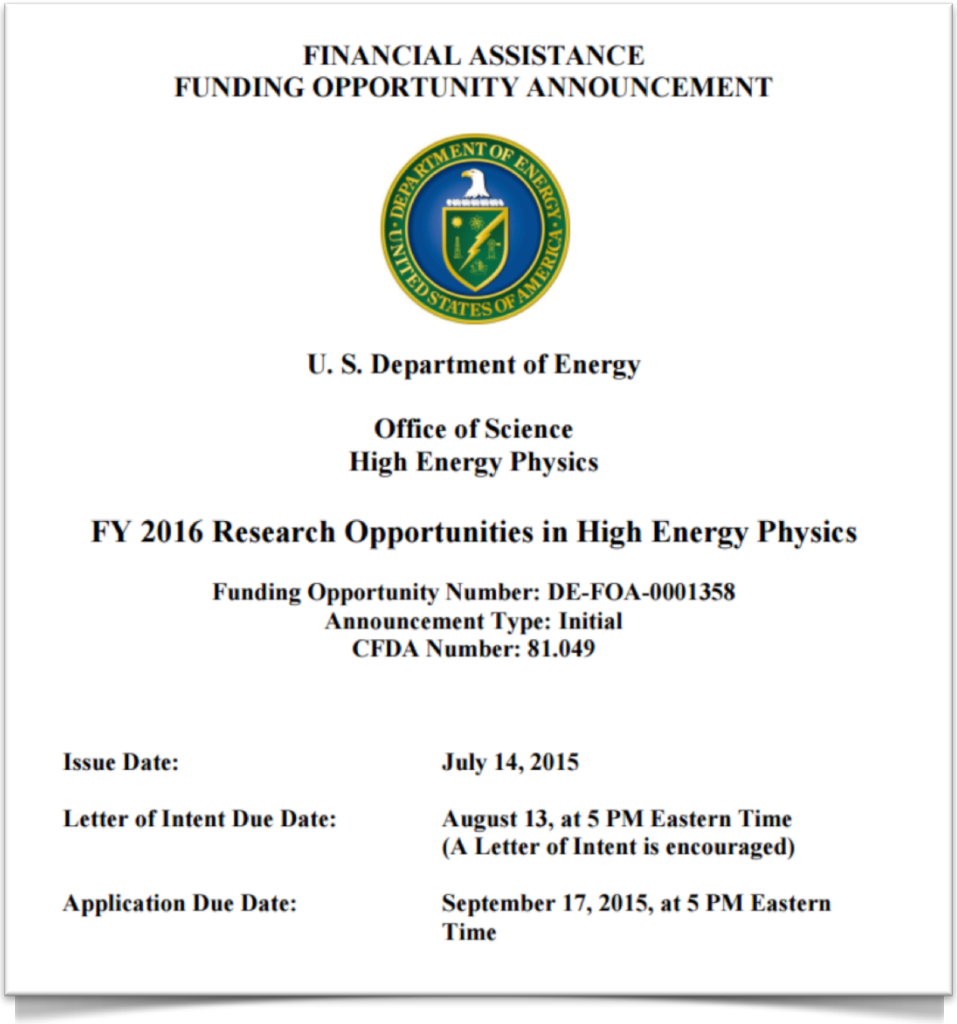
- DOE/HEP started undertaking a round of comparative grant reviews for existing research grants which were scheduled for renewal in FY2012 (+ any new proposals as desired)
  - All current grants now have been awarded based on comparative review
  - FY12-FY14 was the first cycle; FY15-FY17 second cycle is ongoing
  - When a grant renews PIs are re-evaluated based on their new proposal and activity/impact in the past 3-5 years.
- Previously all HEP proposals responding to the general Office of Science (SC) call were individually peer-reviewed by independent experts.

Comparative Review

- This change in process had been recommended by several DOE advisory committees, including 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.
  - Endorsed by the 2013 COV
  - Routinely used at other agencies (NSF)

FY 2016 HEP Comparative Review FOA

- DE-FOA-0001358
  - Issued July 14, 2015
  - http://science.energy.gov/hep/funding-opportunities/
- Six HEP research subprograms
  - Energy, Intensity, and Cosmic Frontiers
  - HEP Theory
  - Accelerator Science and Technology R&D
  - Detector R&D
- Letter of Intent (LOI) due August 13, 2015, 5 PM Eastern Time
  - Strongly encouraged
- Final application due September 17, 2015, 5 PM Eastern Time



FINANCIAL ASSISTANCE
FUNDING OPPORTUNITY ANNOUNCEMENT

U. S. Department of Energy

Office of Science
High Energy Physics

FY 2016 Research Opportunities in High Energy Physics

Funding Opportunity Number: DE-FOA-0001358
Announcement Type: Initial
CFDA Number: 81.049

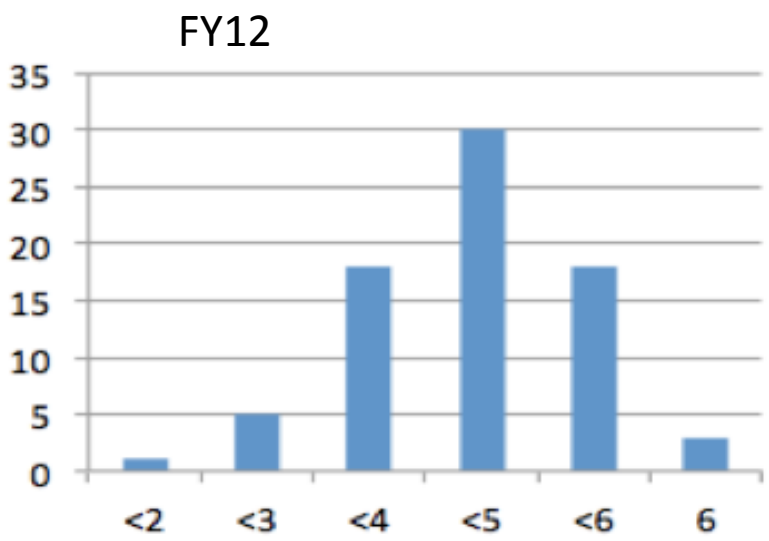
Issue Date:	**July 14, 2015**
Letter of Intent Due Date:	**August 13, at 5 PM Eastern Time (A Letter of Intent is encouraged)**
Application Due Date:	**September 17, 2015, at 5 PM Eastern Time**

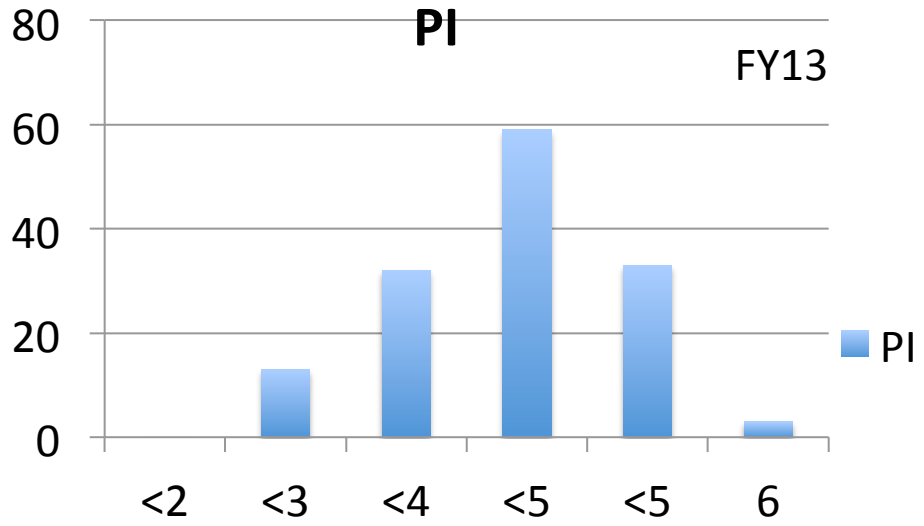
See Section I of FOA for the appropriate point of contact for questions regarding a specific research program area

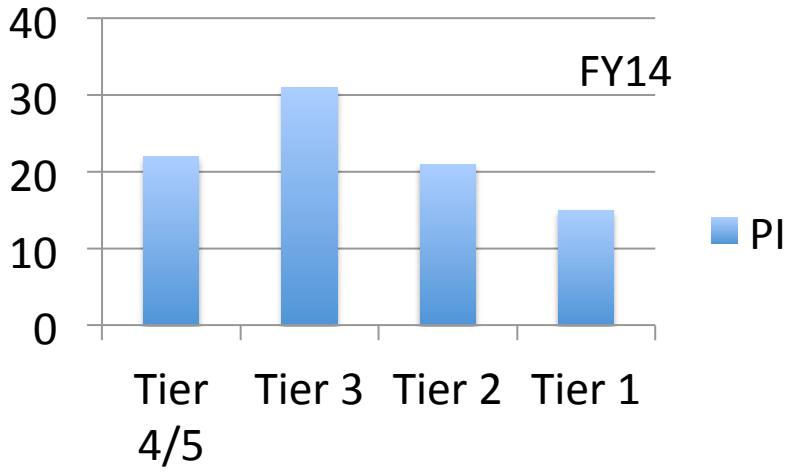
Statistics

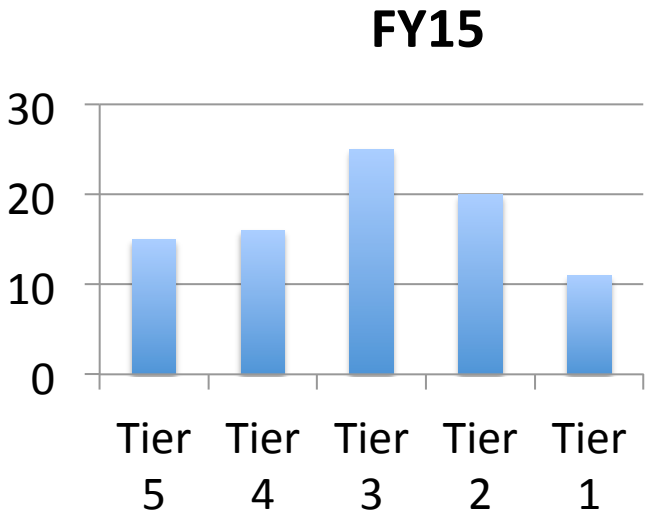
Proposals Reviewed	Proposals Funded	Proposals Declined	Young PI Funded	Young PI not funded	PI Not previously funded
FY12					
37 (66 PI)	22	15	3	5	8
FY13					
53 (146 PI)	35	18	13	2	11
FY14					
33 (89 PI)	16	17	2	2	1
FY15					
43 (87 PI)	26	17	3	2	4

PI ranking


FY12
35
30
25
20
15
10
5
0
<2
<3
<4
<5
<6
6


PI
FY13
80
60
40
20
0
<2
<3
<4
<5
<5
6
PI


40
30
20
10
0
FY14
Tier 4/5
Tier 3
Tier 2
Tier 1
PI


FY15
30
20
10
0
Tier 5
Tier 4
Tier 3
Tier 2
Tier 1

Funding Allocation & Comparative Review

- Comparative Review Panels are now the standard procedure for funding grants in DOE-HEP.
- ***The funding method, which mirrors that employed at NSF, determines grant sizes according to the ranking of the individual PI's involved, regardless of the PI's previous history.***
  - There are generally **5 tiers** corresponding to:
    - Outstanding: no more than 10-15% of applicants
    - Very good: ~20-30%
    - Good: ~20%-30%
    - Fair: ~15%
    - Poor ~15%
- Theorists who are ranked higher are given more funds, per PI, than theorists who are ranked lower.
- For multi-PI grants, the group total funding is the sum of the individual PIs funding
  - Individual ranking is available on demand

Budget Guidance

- The *budget guidance* gives the PI wide latitude on how to use his/her budget: support for junior researchers (postdocs and students), Summer salary and travel.
- "Applicants to this Funding Opportunity Announcement are advised that HEP places primary importance on maximizing the number of research personnel supported by its financial assistance awards. In particular, budgets should be prepared with an effort towards supporting the greatest number of junior scientific personnel consistent with the proposed research scope. During HEP's decision-making process, such support for junior personnel will be considered a high priority relative to other areas of support."

Not being funded

- *Theorists whose rankings are below a certain cutoff are defunded completely, as recommended by the Panel, in order to provide more funding at the top.*
  - Typically, because of budget the first three tiers have been funded, while the bottom two have not.
- Having lost funding in the recent past is not a criteria by which we evaluate. However it is indicative that the research might not be competitive with what is being funded both at DOE and similar agencies.
- Since budgets are declining, applying for a grant is not like buying a lottery ticket every year and hope to win... Scrutiny is very serious and lots of people that in the past were funded cannot be funded anymore b/c of lack of resources…
- **Having been defunded should be taken as a serious warning about making sure that a new proposal is really competitive, the PI has serious impact in the community '(as evidenced by citation etc) and his/her research has the potential to provide breakthroughs...**

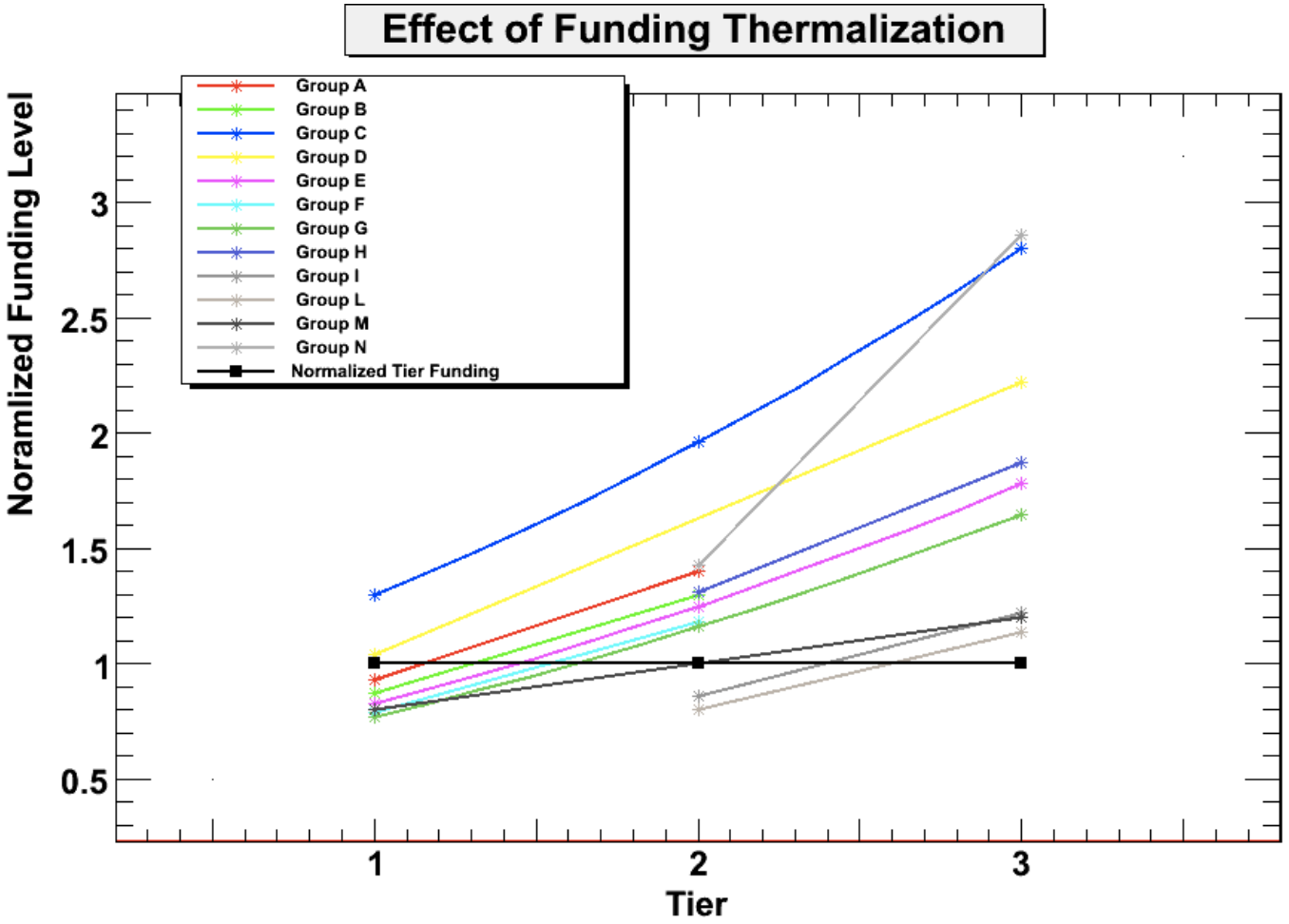
Funding Allocation & Comparative Review

- **Note that previous funding levels are irrelevant in Comparative Review. Everyone "recompetes" from zero in each new competition, based on current merit and current budget baselines**.
  - Thus, the program remains flexible and dynamic.
  - Allowances have been made in (very rare!) cases of large fluctuations, where grads or postdocs might otherwise be stranded, **but this is only to soften a strong derivative.**

The relative size of the "cut" for any given group (relative to their previous history) reflects three things:

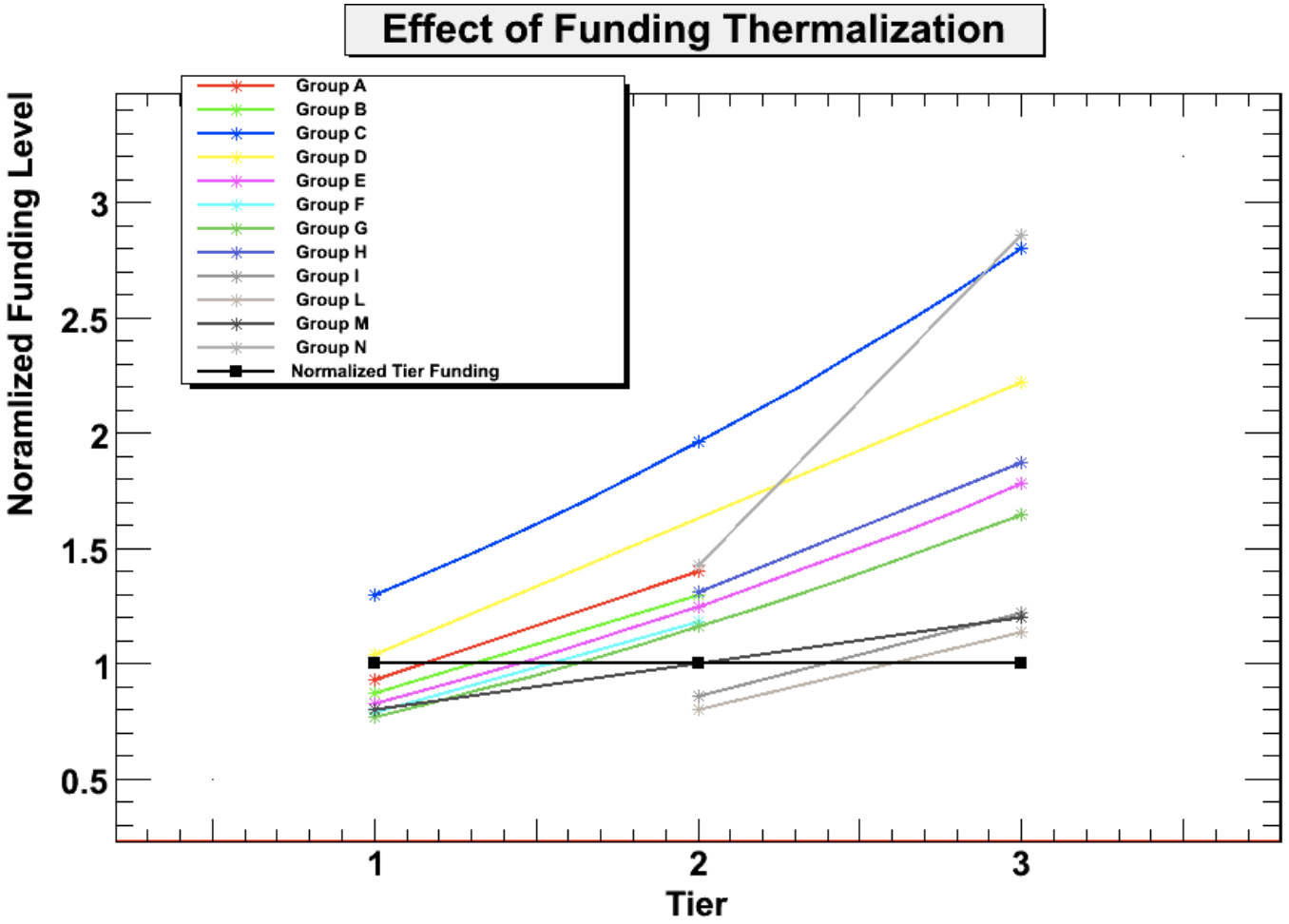
- The size of the cut experienced by the total Theory program (including bridge funding during this first round).
- The perceived *current* scientific merit of the group, as evaluated *today*.
- The degree to which the group's historical funding profile might have been out of synch with the rest of the program … a situation which is no longer sustainable in today's budget climate.

Funding levels are now "thermalized" to merit



- Each PI is ranked in a "Tier" with similarly ranked PI's, and allocated a funding level associated with that Tier (normalized to 1) = black line.
- For each tier, we also show (color) the spread of *previous* normalized funding levels for the PI's in that tier.
- This spread in funding levels is historical, has no basis in current comparative merit within a given tier, and has now been eliminated.
- Lines are connected across different tiers to indicate different groups.

Funding levels are now "thermalized" to merit



Comments:

- In top tier (Tier 1), "thermalization" has brought the majority of PI's up, but a few down.
- In lower tiers (2 and 3), thermalization has tended to reduce funding levels for most PI's.
- Not shown are Tiers 4 and 5, which were defunded completely.
- Reductions of funding levels in lower tiers reflects the cut in the total funding level for the entire Theory program.
- As evident, effort was made to shield the top-ranked PI's from these cuts.

Laboratory Comparative Review

- **All Laboratory Research Groups** (experimental frontiers, Theory, and Detector R&D) have been undergoing Comparative Review **since 2008**.
- In particular, **Theory groups** at Labs were evaluated in **2008**, **2011** and **2014**. Their next review is scheduled for **Summer 2017**.
- Panels evaluate all laboratory theory groups at once and make recommendations on how to best allocate resources to labs, indicating areas of weakness and strength.

"The High Energy Theory (HET) activity across the laboratories is generally an asset to the DOE-HEP mission and should be protected and developed as much as possible, within the current difficult budgetary constraints. Overall, the high energy physics theory groups at the labs are strong, and are playing a fruitful role both in their host laboratories, as well as for the national HEP program. There are specific places that require attention, but the net message of this review is one of a very positive evaluation."
(Laboratory Groups Theory Review 2014 --- Final Report)

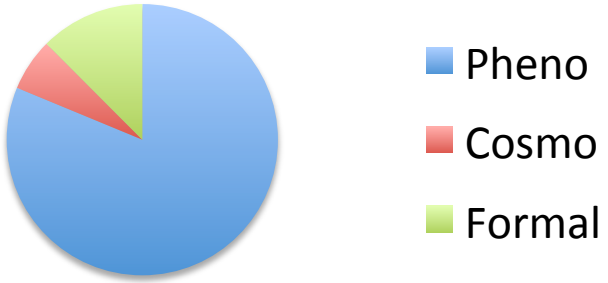
- The recommendations of the Lab Comparative Review Panel are forwarded to lab management for implementation, and the DOE-HEP budget line is adjusted accordingly.

- **Laboratory groups have been affected by budget cuts in ways similar to University groups.** *For example at one prominent lab: 30% reduction in Postdocs between FY12 and FY14; 9.5% reduction in permanent personnel; 20% reduction in student support.*

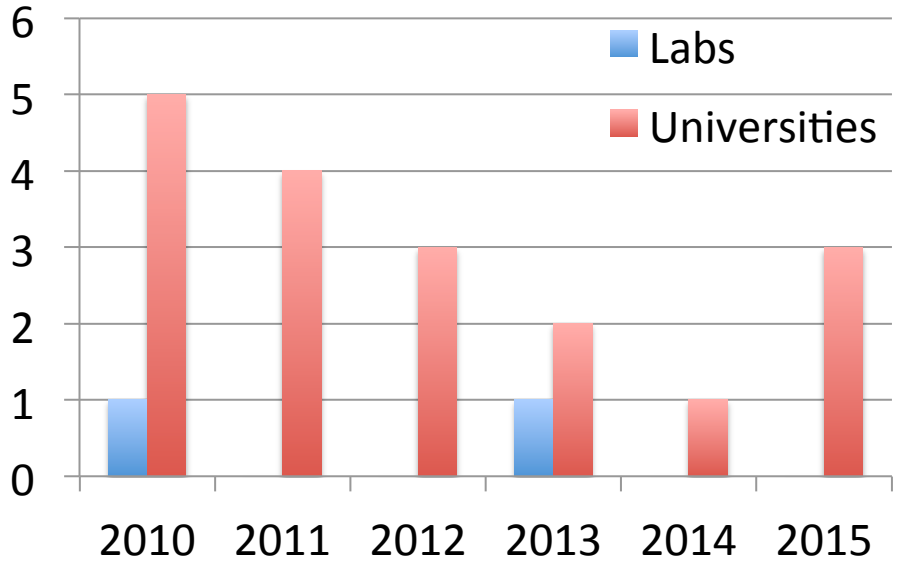
Early Career Research Program

- 2010: 6 awards (out of 43)
  - 5 Universities (first 4 years from ARRA 5th year to be taken from theory budget
  - 1 Lab (fully forward funded for 5 years - ARRA) 500k
  - Pheno 6
- 2011 : 4 awards (out of 45)
  - 4 Universities 600k
    - Pheno 2
    - Cosmo 1
    - Formal 1
- 2012 : 3 awards (out of 23)
  - 3 Universities 450k
    - Formal 1
    - Pheno 2
- 2013: 3 awards (out of 20)
  - 1 Lab 500k
  - 2 Universities 300k
  - 2 Pheno, 1 Cosmo
- 2014: 1 award (out of 22)
- 2015: 3 awards (out of 22)

PI



The most successful research area in the HEP Office!



Early Career vs Comp Review

- Young Assistant Professor can now submit the same proposal to the Early Career Research Program (if within 10 years from PhD) and the HEP Comparative Review (not possible until 2014).
- **There is a difference between the 2 programs:**
  - ECRP seeks the invest in outstanding young investigator with a potential to become leaders in the field
  - HEP Grants support PIs with proven research record while in teaching positions at Research Universities
- Consequently, first year tenure track assistant professors tend not to be funded in the Comp HEP review process, given their unproven research record in such a position (as opposed to a postdoc research record).
- TT Assistant professor should probably consider applying for a regular grant once startup funds end, generally after at least 2 years from the beginning of their appointment, and when their research record in their new position has been tested

Demographics Universities

Sum of FTE Count	Column Labels	
Row Labels	2012	2013
Cosmology and Particle Astrophysics	**77.21**	**68.57**
Faculty (Univ)	35.34	33.62
Post Doc	15.96	14.17
Graduate Student	25.91	20.78
Formal Field Theory and String/Gravity Theory	**151.4**	**140.32**
Faculty (Univ)	77.42	73.25
Post Doc	31.98	29.85
Graduate Student	42	37.22
Lattice Gauge Theory	**39.86**	**41.72**
Faculty (Univ)	21.85	23
Post Doc	7.5	7.33
Graduate Student	10.51	11.39
Lattice QCD	**0**	
Faculty (Univ)	0	
Post Doc	0	
Graduate Student	0	
Phenomenology and Model Building	**176.34**	**156.15**
Faculty (Univ)	81.69	77.58
Post Doc	45.95	40.72
Graduate Student	48.7	37.85

Faculty: 232 FTE in 2012 → 207 in 2013 → **-10.7%**
PD: 101 FTE in 2012 (0.43/PI) → 92 FTE in 2013 (0.44/PI) → **- 8.9%**
Students 127.5 in 2012 →107.30 → **-15.8%**

Demographics Labs

Sum of FTE Count / Row Labels	2012	2013	2014
Cosmology and Particle Astrophysics	**18.89**	**15.97**	**12.31**
Graduate Student	2.62	1.49	3.38
Permanent Ph.D (lab)	8.92	9.16	5.92
Post Doc	7.35	5.32	3.01
Formal Field Theory and String/Gravity Theory	**7.22**	**4.08**	**3.57**
Graduate Student	2.3	1.58	1.7
Permanent Ph.D (lab)	2.29	1.17	1.12
Post Doc	2.63	1.33	0.75
Lattice Gauge Theory	**6.4**	**8.11**	**6.89**
Graduate Student	0	0	0
Permanent Ph.D (lab)	4.48	6.37	6.58
Post Doc	1.92	1.74	0.31
Phenomenology and Model Building	**59.86**	**56.06**	**54.5**
Graduate Student	6.38	4.26	3.42
Permanent Ph.D (lab)	31.15	30.35	30.38
Post Doc	22.33	21.45	20.7

Faculty: 46.84 in 2012→47.05 in 2013 →44.0 in 2014 → **-6%**
PD: 34.23 2012 (.74/PI) → 29.84 2013 (0.63/PI)→24.14 2014 (0.54/PI) → **- 30% (12.8%)**
GS: 11.3 2012 → 7.33 2013 → 8.5 →**25% (-35%)**

Fiscal-Year Timeline & Postdoc Hiring

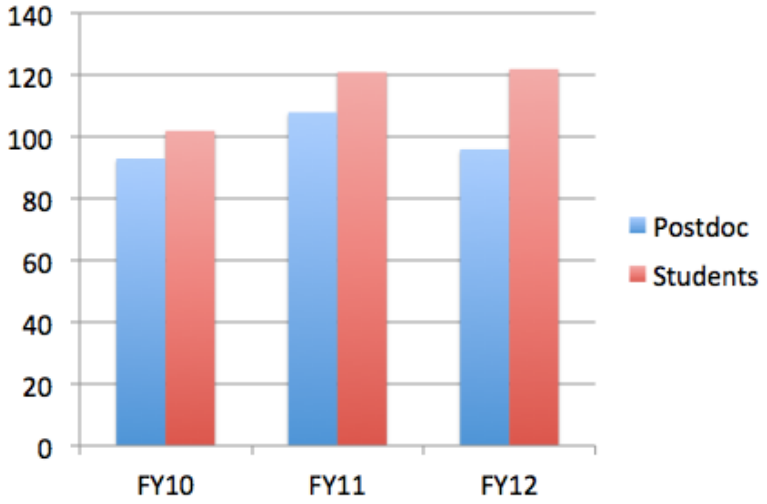
HEP budget operates according to a given **Fiscal Year**:

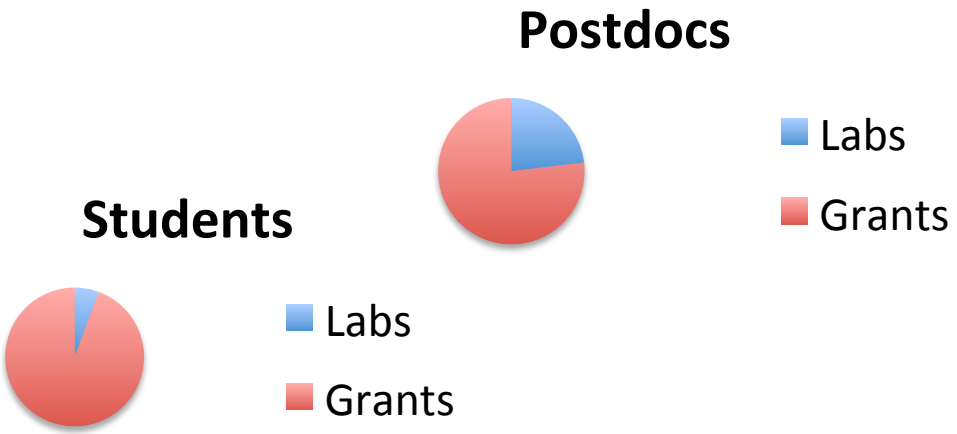
- **FY12:** Proposals submitted 11/2011, Panel 1/2012, decisions announced 3/2012. Given postdoc hiring season scheduling in Theory, postdocs hired from this money started *Fall 2013*.
- **FY13**: Proposals submitted 9/2012, Panel 11/2012, decisions announced 2/2013. Postdocs start *Fall 2014*.
- **FY14**: Proposals submitted 9/2013, Panel 11/2013, decisions announced 1/2014. Postdocs to start *2015*.
- **FY15**: Proposals submitted 9/2014, Panel 11/2014, decisions announced 1/2015. Postdocs to start 2016

Comments

- **The 2012 hiring season is the result of FY11 budgets.**
- Postdoc and student market was steady through FY12, reflecting the steady total budget that existed through FY11.
- **The 2013 hiring season is the result of the <u>FY12 budgets and comparative review</u>**
  - -9% in PD; -11% in PI

- The continued decline in total Theory budget and comparative review pruning of ineffective PIs had effects in 2013 (-10%) and 2014 hiring seasons. Final data on 2014 does not exist yet, but strong anecdotal evidence suggests a decline which indeed matches the decline in the total Theory budget and Comparative Review pruning of unproductive PIs





Comments

- **From 2012 (PD being hired as result of 2011 funding) to 2013 (PD being hired as the result of 2012 1st comp review) the number of PI declined ~11% and correspondingly the number of postdocs declined ~9%,**

- Assuming that a similar decline happened in the following years (2014 for which we do not have enough data yet and 2015, for which there is not data in) this would amount to a total -30% PD (but also a reduction in PIs, many of which have been weeded out of the program due to low productivity). **So the claim that the number of PD declined significantly really reflects a decline in PIs supported.**
- In the first cycle of comp review (2012-2013-2014), PIs were really reduced mostly due to low productivity.
- In Comp Review FY15, due to budget pressure we started cutting people who could have been funded in the past, but did not raise to the level of good, very good or outstanding...

- The labs by contrast saw a decline from 2012 to 2013 in the number of PD of ~13%, with the number of FTE remaining constant. This reflects the 2011 comparative review (formal people reduction, redistribution in other areas due to retirements etc) but a generally better quality of labs PI. Their budget cuts impacted obviously mostly postdocs and students.

Concluding Remarks

- The Theory program at DOE-HEP is an integral part of a much larger portfolio sustaining the entire HEP infrastructure in the U.S.;
- The Research Budget has been declining in the last several years, due to priority shifting of resources to projects;
- The Theory budget has been cut, together with the budget for research in all other experimental frontiers.

Do Research Program % cuts have disproportionate impact on Theory?

It is plausible though not proven that many Theory groups were operating "close to the edge" (budget-wise) prior to budget cuts to the Research Program. Traditional HEP funding per PI in Theory is less than Experimental HEP by 30-40%, and previously supported on average PI + 1/2 postdoc + 1 grad student. Inflation has eroded this purchasing power over the years and PIs have been forced to rely more heavily on TAs and other sources of funding.

Experimental HEP groups (particularly Energy Frontier) have taken similar cuts in FY12-15 but have on average managed better, likely a combination of having more "cushion" and PI's discretion on how to allocate resources.

Backup Slides

"Bridge" funding

To make matters worse, another (independent) effect entered the scene at roughly the same time: ***the need to synchronize grants to the same start date (April 1) across the entire program***. This affected all programs within DOE-HEP, not just Theory. ***This was done in order to provide long-term stability to the HEP program***, given that final Congressional budget appropriations are not always available prior to this date.

This had a significant effect in FY12, FY13 and FY14, since extra months of funding had to be provided to "bridge" each group to the new start date. This extra bridge funding had to come out of the **same FY allocation** as all other grant actions, further reducing the effective size of the total Theory budget.

- *Example:* Imagine a grant with previous start date of October 1. Upon renewal, their first-year allocation must provide 18 months of funding, not just the usual 12. **This comes out of the single total Theory budget for that fiscal year**. If all grants in the program started October 1, this would represent an effective cut of 33% across the program.
- In reality, different groups had different starting dates. Overall, the net effective cut due to bridge funding turned out to be approx. 15-20% across the program each year (bridge/(new+renewal+bridge)). (Effects were slightly mitigated in FY12 due to one-time lab/university transfer and were worse in FY14 due to other budget constraints.)
- ***This is temporary***, and will no longer be an issue starting next year. All grants are now successfully synchronized.

"Full-Funding"

- Starting in FY14, Congressional language mandates that all grants with overall size below $1M be funded out of the appropriated funds for the Fiscal Year in which the award is made
  - *"The Department is directed to transition to a model in which it fully funds multi-year awards with appropriated funds"*
- This has an impact on single-PI, small groups theory grants, generally not affecting umbrella grants.
  - 2 grants in FY14 (2 years)
  - 11 grants in FY15 (2 years)
  - ? In FY16 (2 or 3 years)
- Transition will be completed in 2-3 years
  - Mixed portfolio, due to the presence of large umbrella grants with theory tasks