U.S. DEPARTMENT OF ENERGY | Office of Science

HEP office of high energy physics

Perspectives from DOE HEP for Funding Junior Scientists

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Office of Science

Outline

- Introduction
- DOE HEP Mission
- Submitting an Effective Proposal
- Review Process
- Funding Opportunities
  - HEP Comparative Review
  - Early Career Research Program
- Summary
- Primer on Grants and Contracts

INTRODUCTION

My Background

- Academic background
  - BU Undergrad
    - Physics & Astronomy (NSF)
  - LSU Grad Student
    - JACEE (NSF), L3 (DOE)
  - LaTech & UIC Post-docs
    - D0 (DOE & NSF)
  - Fermilab PPD
    - CMS (DOE)
- Started position on 4 Jan 2009 as DOE Program Manager
  - Official title is Physicist, GS-15 with the Department of Energy, Office of Science, Office of the Deputy Director for Science Programs, Office of High Energy Physics, Research and Technology Division
  - HEP PM for Intensity Frontier research program
- In my brief period at DOE, I have read >1000 new, renewal and supplemental proposals
  - Applications range from a few $k (e.g. conference) to $10M+ (e.g. large multi-year university group)
    - "High Energy Physics"
    - "Gauge Theories, Branes, and Gravity"
    - "Poultry farm and fruit garden utilized by solar energy and sky water, Gives charity 20,000.00 chicken a year"
- Conducted 100+ university and laboratory site visits
- Organized and participated in dozens of reviews
  - Early Career Research Program
  - Univ. Comparative Research
  - Lab Comparative Research
  - ARRA Infrastructure
  - Theory Graduate Fellowship
  - S&T, Operations, Projects, R&D
- Disclaimer
  - *The views and opinions expressed in this presentation are those of the speaker and do not necessarily reflect the position or policy of the Department of Energy or the United States government*

Alan at Work


LUX Homestake

HPS JLab

Texas A&M


NOvA Ash River


K0TO JPARC

Tokai Japan

PECASE

JPL

Soudan Mine

KEK

T2K


FNAL PAC Aspen

Kimballton Mine

Kamioka Mine

DOE HEP MISSION

Office of

High Energy Physics

Fundamental

to the

Frontiers of

Discovery

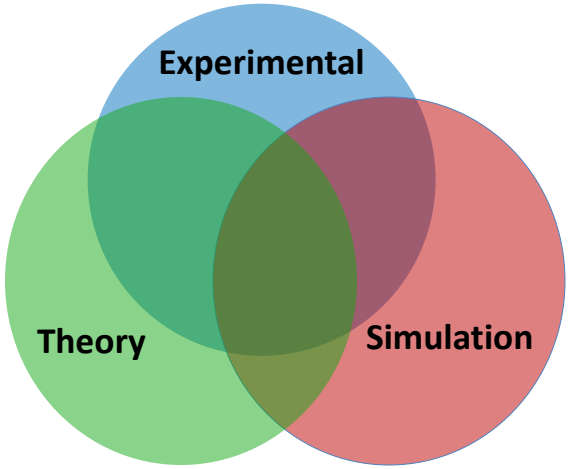
HEP's Mission: To explore the most fundamental questions about the nature of the universe at the Cosmic, Intensity, and Energy Frontiers of scientific discovery, and to develop the tools and instrumentation that expand that research.

HEP seeks answers to Big Questions:

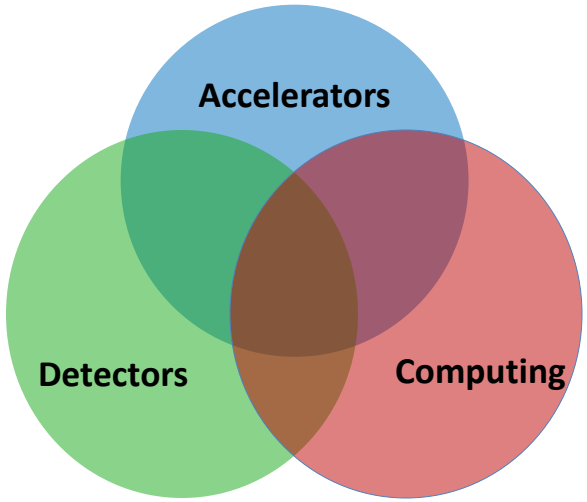
How does mass originate?
Why is the world matter and not anti-matter?
What is dark energy? Dark matter?
Do all the forces become one and on what scale?
What are the origins of the Universe?

HEP offers high-impact research opportunities for small-scale collaborations at the Cosmic and Intensity Frontiers to full-blown international collaborations at the Energy Frontier. More than 20 physicists supported by the Office of High Energy Physics have received the Nobel Prize.

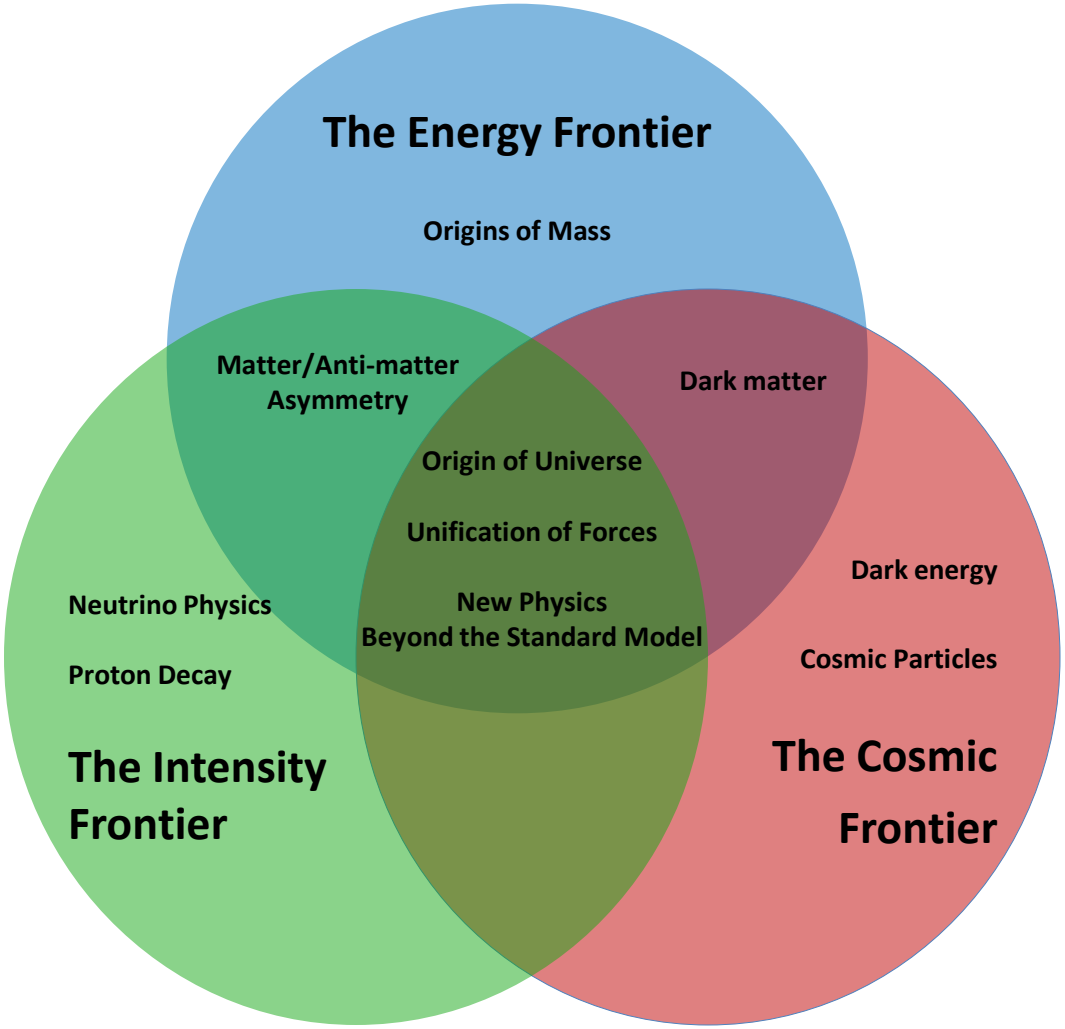
HEP Physics and Technology



Along Three Paths



Enabled by
Advanced Technologies in:



Physics Frontiers

Not Just Organizational Abstractions!

- All proposals for DOE HEP support must be written in the context of the DOE mission!
- All proposals need to fit into at least one of the circles on the previous slide!
- Clichés, but essentially true: **"The DOE supports mission-driven science; the NSF supports proposal-driven science".**
- (But, DOE responds only to proposals, and NSF and DOE work together to support many common missions….)

HEP Research Activities Supported

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

- **What Research does DOE HEP support?**
  - Research efforts (mainly scientists) on R&D, experiment design, fabrication, data-taking, analysis activities
  - Theory, simulations, phenomenology, computational studies
  - Consider funding other efforts that are in direct support of our experiments

- **Faculty support - Typically if we provide 2 months summer salary for the person and support for his/her group (post-docs, students – even if they are shared), we are assuming you are spending your TOTAL research time on it during the year. Therefore, you should describe what fraction of your TOTAL research time you're spending on this effort.**
  - It may be 50% time during the school year and 100% time during the summer
  - If you are working on 2 different projects, you may be spending 25% time on each during the school year and 50% time on each during the summer
- **It is important to describe your other current or pending sources of support, as well as activities in multiple subprograms in the proposal**
  - If you have other federal support (another DOE grant, or NSF or NASA, etc.) or are involved in several activities or subprograms on the HEP grant, you need to be clear what fraction of time you are spending on the different efforts
  - If you have several grants covering similar efforts (e.g. same experiment) you should be explaining how the work is different on each grant. We assume you are taking the corresponding amount of your support from the funds that support each effort, either in subprograms within the HEP grant or on the different grants.

HEP Intensity Frontier Portfolio

- **Over 20 Research Thrusts**
  - **Neutrinos: MINOS(+), MINERvA, MiniBooNE, NOvA, MicroBooNE, LBNE at FNAL; T2K at J-PARC; SuperK at Kamioka; Daya Bay Reactor in China; Double Chooz Reactor in France**
  - **Rare Decays: K0TO at J-PARC; Mu2e, Muon g-2 at FNAL; MEG at PSI; EXO-200 at WIPP**
  - **Electrons: BaBar at SLAC; Belle/Belle-II at KEK; BES-III at IHEP**
  - **R&D Activities: ORKA, LAr1AT at FNAL; CAPTAIN at LANL; NA61/SHINE at CERN; HPS, DarkLight at JLAB; nEXO; nuSTORM; Short Baseline Reactor**
- **FY 2012 Summary**
  - **Supported research at 56 Universities, 9 DOE Labs**
  - **Approximately 435 FTEs**
    - **35% of research activities are off-shore**

SUBMITTING AN EFFECTIVE PROPOSAL

Starting Notes

- A faculty position does not guarantee anyone a DOE grant
- All proposals are subject to peer-review
- Review process is comparative and competitive
- A grant is financial assistance funded by taxpayer dollars

Proposal Content

- **Scientific and/or Technical Merit Should Be Compelling**
  - 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?
- **Proposed Method(s) Needs Appropriate Milestones & Deliverables**
  - 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?
- **Competency of Research Team and Adequacy of Available Resources**
  - 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?
- **Budget Justification**
  - Are the proposed resources and staffing levels adequate to carry out the proposed research?
  - Is the budget reasonable and appropriate for the scope?

Grants: What To Do

- Do follow instructions
  - Read the FOA thoroughly, as well as any supporting materials, e.g. FAQ
  - SC rules & procedures and HEP program requirements are regularly updated
- Do seek out advice and support from trusted colleagues and mentors
  - Your institution has invested a lot of time and money hiring you. They want you to succeed. Let them help you.
  - Request a review of the proposal
- Do learn the rules, regulations, and costs of your institution
  - Grants are awarded to the institution
- Do follow through on reviewer feedback
  - Give weight to the critical reviews
- Do follow proper English grammar and composition
  - Careless editing will annoy or confuse reviewers
  - Hire someone to proof-read your proposal
- Do ask for what you reasonably need
  - Standard research requests
    - Summer salary and travel
    - Other Personnel
    - Equipment, M&S, etc.
  - Realistic funding expectations for non-tenured faculty
    - Early Career Research ~$150/yr
    - Other awards <$100k/yr

"There's room for bulls, there's room for bears, but there's no room for pigs."

Grants: What Not To Do

- **Do Not** submit a proposal late
  - Applications received after the deadline will not be reviewed or considered for award
  - Unacceptable justifications include the following
    - Failure to begin submission process early enough
    - Failure to provide sufficient time to complete process
    - Failure to understand the submission process
    - Failure to understand the deadlines for submissions
    - Failure to satisfy prerequisite registrations
    - Unavailability of administrative personnel
- **Do Not** brag or exaggerate
  - Be professional and objective
  - List your accomplishments in the bio
  - Accurately and reasonably describe research plan
- **Do Not** preach to the choir
  - The narrative should be accessible to a review panel with a wide range of expertise
  - Avoid jargon when possible
  - Describe in clear and concise language. Tell a story.
- **Do Not** submit a sloppy budget
  - The budget sheets and justification should be prepared with the same care as the narrative
  - Reviewers will call out any:
    - Excessive or inappropriate requests
    - Arithmetic errors
    - Non-competitive indirect costs
- **Do Not** be discouraged
  - Competition is strong. Some very good proposals are declined due to limited resources.

REVIEW PROCESS

HEP Comparative Review Process

- **This 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. This process by definition means that some of the proposals and investigators will be ranked at the top, middle & 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, many 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 doesn't 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 didn't 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.**

- **Though multiple proposals are sent to most of the mail-in reviewers, it is really the subprogram review panels that see all the proposals and will make recommendations and ranking relative to each other. In some cases, the individual mail-in reviews may give a positive assessment of the proposal and person's work, but when the panel is faced with comparing efforts, impacts and a limited budget, rather than rank the whole proposal low, they may make recommendations regarding details of the proposals**
  - **e.g. Person X should not be funded; do not add an additional post-doc on this effort; travel request is excessive**

Review Panels

- Panelists and ad-hoc reviewers are experts representing the HEP community: labs and universities from the US and abroad.
- The single most important factor in a funding decision is the reviewers' recommendations. Merit review rules.
- High quality reviewers are essential for successful science. We seek people who are informed, engaged, and conscientious; and who are willing to give their honest opinion. We avoid people who mainly want to tweak HEP policy.
- Our panelists almost universally take their jobs very seriously and contribute enormously to the field.
- After you are awarded your first grant, expect invitations to be a reviewer to start coming in. Accept these invitations! The best way to really learn about the funding process is to become a panel member.

FUNDING OPPORTUNITIES

Funding Opportunities for Junior Faculty I

- **Q: I will be a new assistant professor, starting my first faculty position on September 1, 2013. Can I apply to the HEP comparative review FOA?**
  - **A: While you may apply, be advised that evidence of research productivity while holding your faculty position is considered highly desirable. Proposals from first year junior faculty lacking such evidence will likely be assigned a lower funding priority.**
- **Q: I am a new tenure-track faculty member at my institution, which is submitting a new proposal to the HEP comparative review FOA this year, and I am also applying to the Office of Science Early Career Research program. Should I include a copy of my Early Career proposal as part of my institution's new proposal for FY2014?**
  - **A: You cannot submit the *same* proposal to two different Office of Science solicitations at the same time. If you submit the same proposal as part of your institution's comparative review proposal, that part of the overall proposal will be administratively declined and not considered further. If you choose to submit a proposal with your institution it must have different research scope than your Early Career proposal. The DOE manager for your grant will make the determination whether two concurrent proposals from the same (co)PI have sufficient differences to be separately considered for review.**

Funding Opportunities for Junior Faculty II

- **Q: I am a new tenure-track faculty member at my institution, which is submitting a continuation progress report this year, and I am also applying to the Office of Science Early Career Research program. Should I submit a copy of my Early Career proposal as a stand-alone new proposal to the comparative review FOA?**
  - **A: You cannot submit the *same* proposal to two different Office of Science solicitations at the same time. If you wish to submit a second proposal in addition to the Early Career, it should be for different research scope. You are strongly encouraged to submit a (non-Early Career) proposal to the comparative review FOA. New or renewal proposals submitted to the general solicitation will be reviewed following standard merit review criteria; however, funding available to respond to proposals submitted to the general solicitation will be extremely limited.**
- **Q: I applied to a previous call for HEP comparative review proposals but my proposal was declined. Can I apply again to [Insert new] funding opportunity?**
  - **A: Yes.**

Funding Opportunities for Junior Faculty III

- **In addition to the standard DOE HEP grant process, also keep in mind the following:**
  - **NSF CAREER**
  - **Sloan Fellowship**
  - **Graduate Student Funding**
    - **GAANN, NSF, DOE**
  - **URA Visiting Scholars Program**
  - **Lab Program Funding: CMS/ATLAS Fellow, Intensity Frontier Fellow**
  - **University resources or matching**
  - **ADR and Detector R&D funding**
  - **SciDAC and NERSC through DOE ASCR**
  - **NASA, NSF, NNSA, DHS, etc.**
- **For areas of research which are synergistic, costs may be burdened by more than one agency**
  - **Scope of work and costs still need to be delineated**

Additional resources

- Office of High Energy Physics Funding Opportunities: http://science.energy.gov/hep/funding-opportunities/
- HEPAP March 2013 Meeting: http://science.energy.gov/hep/hepap/meetings/20130311/

HEP COMPARATIVE REVIEW PROCESS

FY13 Submitted Proposals

- **For the FY 2013 cycle, 185 proposals requesting support totaling $335.782M in one or more of the six sub-programs were received by the September 10, 2012 deadline in response to the Funding Opportunity Announcement (FOA) *"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 NOT 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 proposals were reviewed, evaluated and discussed by several panels of experts who met in 6 panels over 2 weeks:**
  - **HEP Intensity Frontier sub-program: 31 submitted proposals;**
  - **HEP Theory sub-program: 53 submitted proposals;**
  - **HEP Particle Detector R&D sub-program : 22 submitted proposals;**
  - **HEP Energy Frontier sub-program: 45 submitted proposals;**
  - **HEP Advanced Science and Technology R&D sub-program: 40 submitted proposals; and**
  - **HEP Cosmic Frontier sub-program: 28 submitted proposals.**

- **30 of the proposals requested research support from two or more of the six sub-programs, e.g. umbrella proposals, in which case 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 which satisfied the requirements of the solicitation was sent out for review by at least three experts.**
  - **130 reviewers participated in the review process. In cases where there were proposals on similar topics, reviewers were sent multiple proposals**
  - **834 reviews were completed with an average 5.2 reviews per proposal**

FY13 Declined Proposals

- **Based on the reviewers' assessments, the 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, the potential impact of the proposed work, the proposals' responsiveness to the FY13 HEP Comparative Review FOA, and the budgetary constraints, 61 proposals were recommended for declination.**
  - **12 proposals were seeking new scope of research support (currently funded by DOE HEP)**
  - **12 proposals were requesting support to extend currently funded research (aka "renewal")**
  - **37 proposals were 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**

FY13 Proposals vs. FY12 Status

	New Proposals		Efforts funded in FY12				
	Fund	Decline	Up	Flat	Down	No-Fund	Total
Accelerator R&D	3	17	2	4	8	6	40
Cosmic Frontier	4	10	7	1	6	0	28
Detector R&D	6	8	2	2	2	2	22
Energy Frontier	0	4	10	2	28[a]	1	45
Intensity Frontier	3	2	8	6	7	5	31
Theory	4	7	2	7	22	11	53
HEP Total	**20**	**38**	**20**	**14**	**48**	**22**	**162**

- **Single proposals with multiple research thrusts are counted multiple times (1 /thrust)**
- **New/Fund = HEP research effort was not funded at this institution in FY12 but is funded in FY13**
- **New/Decline = HEP research effort was not funded at this institution in FY12 and is not funded in FY13**
- **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.**

[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.

Additional resources

- Office of High Energy Physics Funding Opportunities: http://science.energy.gov/hep/funding-opportunities/
- HEPAP March 2013 Meeting: http://science.energy.gov/hep/hepap/meetings/20130311/ (Glen Crawford's talk)

FY13 Comparative 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)

FY13 Proposals vs. FY12 Status

- FY13 had many more total proposals and PIs
  - Due to historical renewal pattern & break-up of umbrellas
  - Review logistics more complicated
  - Average proposal success rate somewhat lower
  - Average funding requests were similar in most subprograms
- Overall funding down a few percent on average
  - Significantly lower in Theory and Energy Frontier
- Success rate was generally better for recurring PIs & somewhat worse for new to DOE PIs
  - Most new PIs in Cosmic Frontier and Technology R&D
- Success rate for new Jr. faculty about the same (~60%)
- Success rate for Sr. Research Scientists somewhat better

FY14 Comparative Review Timeline

All dates are preliminary

- **6/10/2013:** ***FY 2014 Research Opportunities in High Energy Physics***
  - **DE-FOA-0000XYZ – FOA should hit the street by mid-June 2013.**
- **7/15/2013: Letter of Intent (Monday 17:00 PM ET)**
- **9/9/2013: Proposal Deadline (Monday 23:59 PM ET)**
- **10/14/2013: Proposals sent to External Reviewers**
- **11/12–11/22/2013: Subprogram Panels Convene**
- **12/2–12/20/2013: HEP discusses panel outcome, budgets, programmatic priorities, etc.**
- **1/7/2014: Final funding recommendations. PIs will be notified.**
  - **Negotiate final budgets, carryover, no-fund extension, etc.**
  - **Paperwork will be needed no later than 2/3/2014 for new grants starting on 5/1/2014.**
  - **Important to coordinate with Sponsored Research Office**
    - **Fall semester ends, Holiday season & vacations, etc.**

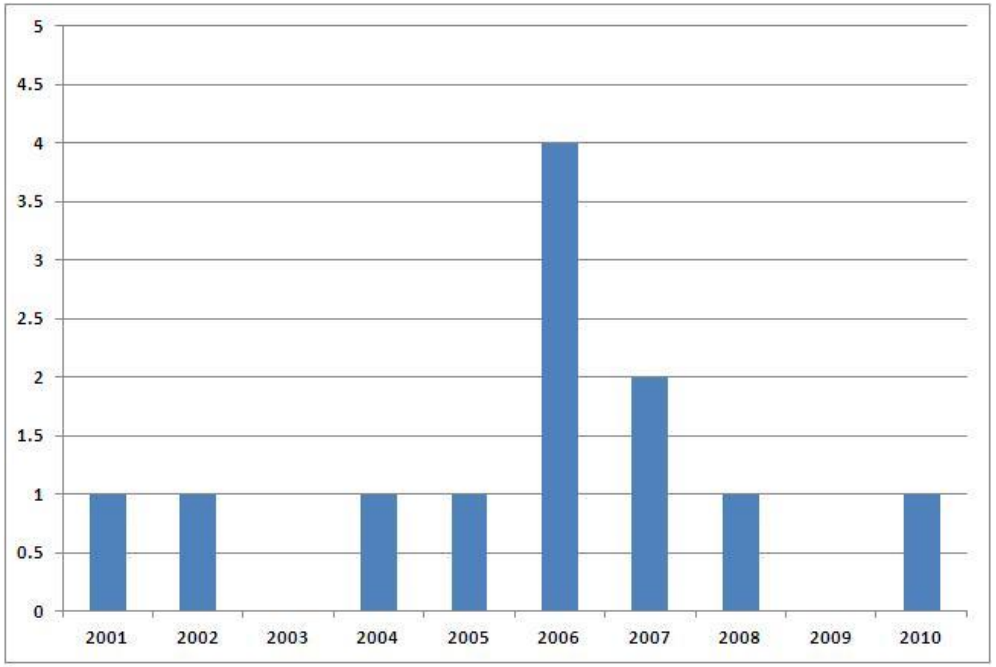
EARLY CAREER RESEARCH PROGRAM

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**
  - **Should be somewhat speculative but not too risky**
  - **Provide unique capabilities. What does not get done?**
- **Many LHC experimental proposals**
  - **Looking for balanced program: strong physics effort and hardware project attached to the upgrade or shutdown.**
- **Many lab and some university proposals suffered from "isn't the lab/project going to do that anyway?"**
  - **Some proposals were clear efforts to fund 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**
- **Because different reviewers weigh the criteria differently (or have their own physics biases) there is a larger spread in panel rankings**

FY12 HEP Early Career Statistics & Demographics

- 3 theory awards (23 proposals)
  - Spanning research frontiers
- 7 experiment awards (63 proposals)
  - 1 Energy Frontier; 3 Intensity Frontier; 3 Cosmic Frontier
- 2 accelerator R&D awards (10 proposals)
- 3 women; 9 men
- 4 lab awards, 8 university awards
  - 3 awards to FNAL, 2 to Stanford
- 3 East ; 5 Midwest; 3 West; 1 South



- Ph.D.s distribution peaks around 2006
  - Only one HEP EC proposal from very recent Ph.D. because majority complete 1-2 post-docs prior to taking a tenure-track position

HEP Early Career FY10-12 Demographics

Program	FY10 (M/F)	FY11 (M/F)	FY12 (M/F)	Total (M/F)
Energy	3 (2/1)	3 (2/1)	1 (1/0)	7 (5/2)
Intensity	2 (1/1)	1 (1/0)	3 (1/2)	6 (3/3)
Cosmic	2 (2/0)	3 (3/0)	3 (2/1)	8 (7/1)
Theory	6 (6/0)	4 (3/1)	3 (3/0)	13 (12/1)
Accelerator	1 (0/1)	2 (2/0)	2 (2/0)	5 (4/1)
Proposals	154 (132/22)	128 (109/19)	87 (73/14)	369 (314/55)
Awards	**14 (11/3)**	**13 (11/2)**	**12 (9/3)**	**39 (31/8)**

- **Early Career Research Program is very competitive (~10% success rate)**
- **FY13 awards will be announced in early- to mid-May**

Early Career: Next Round in FY14

- FY14 FOA will be posted sometime in July 2013. Watch the Early Career web site:
  - http://science.energy.gov/early-career/
- Read the FY13 FAQ which addresses most of the common Q&A collected over the last four years
- Features of FY14
  - Entering fifth year. Some population of candidates will no longer be eligible due to the "three strikes rule".
  - Mandatory pre-application requirement. Two pages. Deadline last year was September 6 2012 at midnight.
    - Candidates will have nearly three months to develop a plan, write a narrative, and submit an application.
- Presidential Early Career Awards for Scientists and Engineers (PECASE)
  - The PECASE-eligible candidates are selected from the pool of Early Career awardees
  - http://science.energy.gov/about/honors-and-awards/pecase/

CONCLUSION

Closing Remarks

- **Propose research that will contribute to the HEP mission, science goals and programmatic priorities**
- **Read and follow all directions in the FOA**
- **Prepare and submit a well-organized proposal**
  - **Integrated and easy to comprehend sections**
  - **Well-researched and documented statement of the problem**
  - **Creative or innovative strategies for addressing the problem**
  - **Feasible goals and objectives with timeline**
  - **Budget and justification to accomplish goals**
- **Respond promptly to any and all communication from the program office**
- **Discover new physics!**

"Personally, I liked working for the university! They gave us money and facilities. We didn't have to produce anything. You've never been out of college. You don't know what it's like out there! I've worked in the private sector… they expect results!"

PRIMER ON GRANTS & CONTRACTS

Grants and Contracts

- A grant is a form of financial assistance to a designated class of recipients authorized by statute to meet recognized needs, while a contract involves the purchase of a product or service for federal use or, as stated in the Federal Grant and Cooperative Agreements Act, for the direct benefit of the government.
- The chief distinction between grants and contracts is in the nature of the "deliverable" under the funding instrument. Grantees agree to provide a good or carry out a service *on behalf of* or *in the stead of* the federal government, whereas contractors agree to provide a good *to* or carry out a service *for* the federal government.
- Contracts are subject to the Federal Acquisition Regulation at Title 48 of the Code of Federal Regulations. Grants are governed by "common rules" in the OMB Circulars as incorporated into grantor agency regulations.

GRANTS	CONTRACTS
• A flexible instrument designed to provide money to support a public purpose.	• A binding agreement between a buyer and a seller to provide goods or services in return for consideration (usually monetary).
• Governed by the terms of the grant agreement	• Governed by Federal Acquisition Regulations
• Flexible as to scope of work, budget, and other changes	• Relatively inflexible as to scope of work, budget, and other changes
• Diligent efforts are used in completing research and the delivery of results	• Significant emphasis placed on delivery of results, product, or performance
• Payment awarded in annual lump sum	• Payment based on deliverables and milestones
• Annual reporting requirements	• Frequent reporting requirements
• Principal Investigator has more freedom to adapt the project and less responsibility to produce results	• High level of responsibility to the sponsor for the conduct of the project and production of results

Glossary

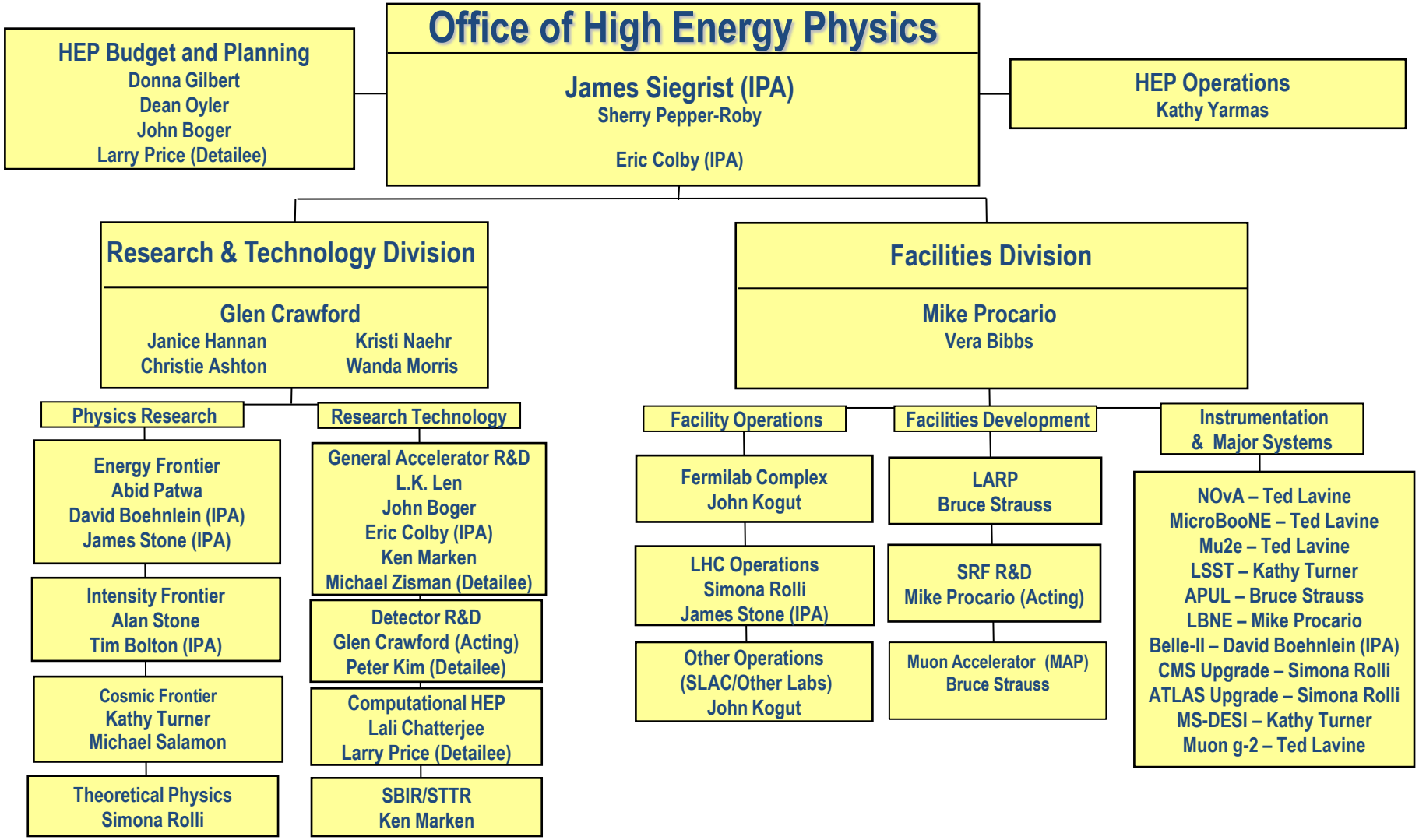
- A funding opportunity announcement (FOA) is a notice in Grants.gov of a federal grant funding opportunity
  - DE-FOA-0000768. "*FY 2013 Continuation of Solicitation for the Office of Science Financial Assistance Program*"
- Grants.gov was established as a governmental resource named the E-Grants Initiative, part of the President's 2002 Fiscal Year Management Agenda to improve government services to the public
  - The Office of Science requires the submission of all financial assistance applications through Grants.gov
  - Grants.gov is the single access point for over 1000 grant programs offered by the 26 Federal grant-making agencies
- Portfolio Analysis and Management System (PAMS)
- Sponsored Research Office (SRO)
- Outstanding Junior Investigator (OJI)
  - Prior to the Early Career Research Program, HEP had supported researchers early in their careers through the OJI program from 1978 through 2009 (final year)
  - Later awards were typically $60-90k/year
- Federally Funded Research and Development Centers (FFRDCs) conduct research for the United States Government
  - There are 39 recognized FFRDCs that are sponsored by the U.S. government. 16 are DOE National Laboratories.
- Laboratories submit Field Work Proposals (FWPs) in response to the following:
  - Annual DOE Field Budget Call
  - FOAs
  - Other Office of Science Program requests
- Laboratory Directed Research and Development (LDRD) programs are sources of internally directed funding at most DOE labs (except FNAL)
  - Each year LDRD invests from a few to several percent of the total lab budget in scientific research that is either too new or high-risk to be funded by existing programs.
  - The ability to invest in the future by funding challenging research enables each laboratory to attract and retain top researchers, and foster collaborations with other institutions and industry that promotes technology transfer to the private sector.

Additional resources

- Office of Science Grants & Contracts: http://www.science.doe.gov/grants/
- Grant Application Guide: http://science.doe.gov/grants/guide.asp

BACK-UP

HEP Organizational Chart



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
MINERvA	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 & Soudain 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
NOvA	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 NOvA)	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 NOvA, 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

Award Search

- In 2011, the Office of Science deployed on its website an award search that provides access to active award information. The award search is found under "Funding Opportunities" dropdown on the main website, and from the programmatic sites.
  - http://science.energy.gov/hep/funding-opportunities/award-search/
- Phase II of the award search was deployed in 2012, and implements an advanced keyword search, has new sorting features, and adds a few data fields to the Excel export.
- Features:
  - New awards will NOT show up in the search until they are issued and signed by the Contract Officer (CO) in DOE Chicago.
  - Renewals which have been issued but not awarded will reflect the prior funding period/amount until the newest renewal is issued and signed by the CO.
  - Awards under no-cost extensions will show up with dollar values of zero.
  - Awards or award modifications are entered into the database by the grants analysts about once a week.

FOA: Intensity Frontier Research Program

From the HEP FY13 Funding Opportunity Announcement

- **This subprogram seeks to support precision studies that are sensitive to new physics at very high energy scales, beyond what can be directly probed with energy frontier colliders. Often these studies involve observing rare processes that require intense particle beams. In addition, recent advances in neutrino physics have opened the first window beyond the Standard Model of particle physics, perhaps signaling significant new properties of neutrinos that will have wide ranging impact in particle physics and cosmology.**
- **This subprogram includes studies of high intensity electron-positron collisions; studies of the properties of neutrinos produced by accelerators, nuclear reactors, and certain rare nuclear decays; and studies of rare processes using high intensity beams on fixed targets. In addition, this subprogram includes searches for proton decay.**
- **This subprogram also provides graduate and postdoctoral research training for the next generation of scientists, and equipment and computational support for physics research activities.**