



What HEP Told the Committee of Visitors

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Office of High Energy Physics
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Outline

- The Charge to the COV
- Overview
- The Research Division
- The Facilities Division

Highlights of the Charge

The full charge is available on the HEP website

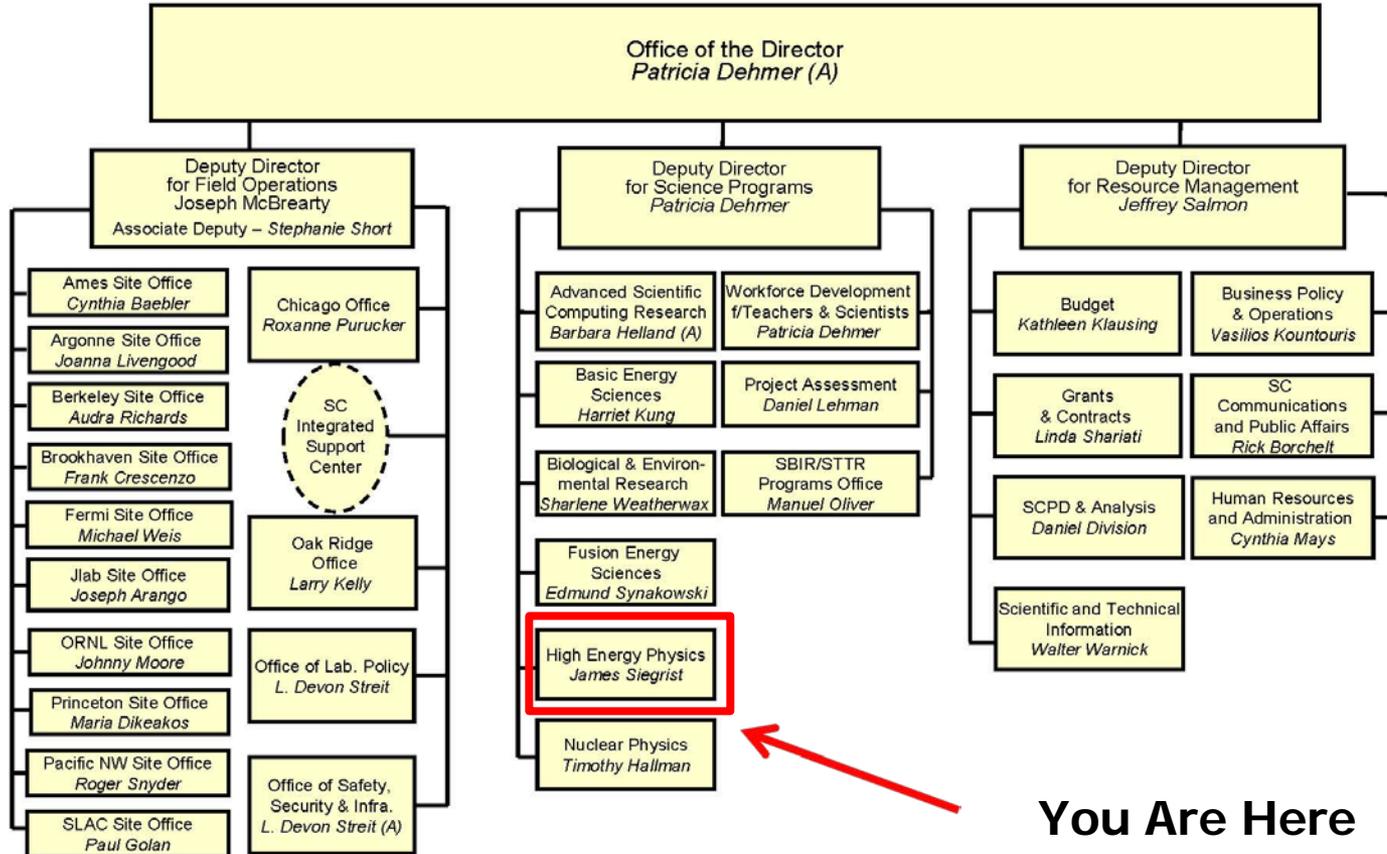
- Assess the *quality of the processes to solicit, review, award, and monitor* proposals.
- Are the *recommendations of P5* and other recent subpanels are being followed?
- Is HEP *maintaining the capabilities* needed for healthy lab and university programs?
- Evaluate the *effectiveness and impact of comparative review process* on the HEP program.
- Evaluate the *impact of HEP organization* along the frontiers of the 2008 P5 report.
- Assess the impact of decreases on the research program. Are reductions being allocated judiciously?
- Have the recommendations of the previous COV been reasonably addressed?
- Identify issues that it is not able to appropriately consider within the time span of its review and that deserve subsequent consideration and/or study.
- In addition to these, any comments on the observed strengths or weaknesses in any component or sub-component of the HEP's portfolio, along with suggestions for improvement as appropriate, would be appreciated.

Covers FY 2010, 2011, and 2012. It is retrospective. How did we do?



OVERVIEW

DOE Office of Science (SC)



Updated 08/26/13

HEP Mission/Strategies/Context

■ Mission:

- *The High Energy Physics (HEP) program mission is to understand how the universe works at its most fundamental level, which is done by discovering the elementary constituents of matter and energy, probing the interactions between them, and exploring the basic nature of space and time.*

■ Strategies:

- Support innovative scientific research that advances our knowledge
- Build and operate the forefront scientific facilities needed to do the research
- Act as a steward of human resources, essential scientific/technology disciplines, institutions, and scientific user facilities.

■ Context:

- HEP is in DOE and SC and must support their missions. DOE is a “mission agency.”
 - *And work within established structures to carry out its own mission*
- Primary Federal builder/operator of forefront scientific facilities for HEP
- National Laboratories are central to carrying out HEP’s mission



Executing the Mission: Strategic Planning

Input (Selected, formal)

- HEPAP Reports (e.g. P5)
- AAAC Reports, NRC Reports (EPP2010, Astro2010), etc
- Community workshops and studies (e.g. Snowmass)
- Facility/Institution Reviews
- Lab Managers Budget Briefings
- HEP Office Retreats
- OMB, DOE, Congressional guidance

Outputs (Not all public)

- DOE/SC Strategic Plans
- DOE Annual Performance Plan
- SC Facilities Plan
- President's Budget Requests and supporting docs
- Internal budget/planning exercises
- MOUs (NSF, NASA, other countries), etc.

Items in Green charged or commissioned by DOE/HEP



Executing the Mission: Funding Decisions

Inputs

- Appropriated Budgets
- Internal HEP budget plans
- International/interagency commitments
- Facility/Institution Reviews
- Program Reviews/Briefings
- Lab Managers Budget Briefings
- Lab Field Work Proposals (FWPs)
- University/other proposals
 - Proposal (peer) reviews

Outputs (not all public)

- Initial financial plan (funding to DOE labs)
- Monthly Financial Plans (updates/increments to the above)
- Financial assistance awards (e.g. grants)

Items in Red prepared in response to Funding Opportunity Announcements (FOAs) and Budget Calls

Where We Were in 2010

Energy Frontier

- LHC research program has been delayed and there is a new plan for LHC
- Tevatron performance continues to be outstanding!

Intensity Frontier

- Significant progress on implementation of a U.S. leadership intensity frontier program
- Established a model for a joint agency DUSEL Physics program
 - This has been articulated in a draft DOE/NSF MOU now in concurrence

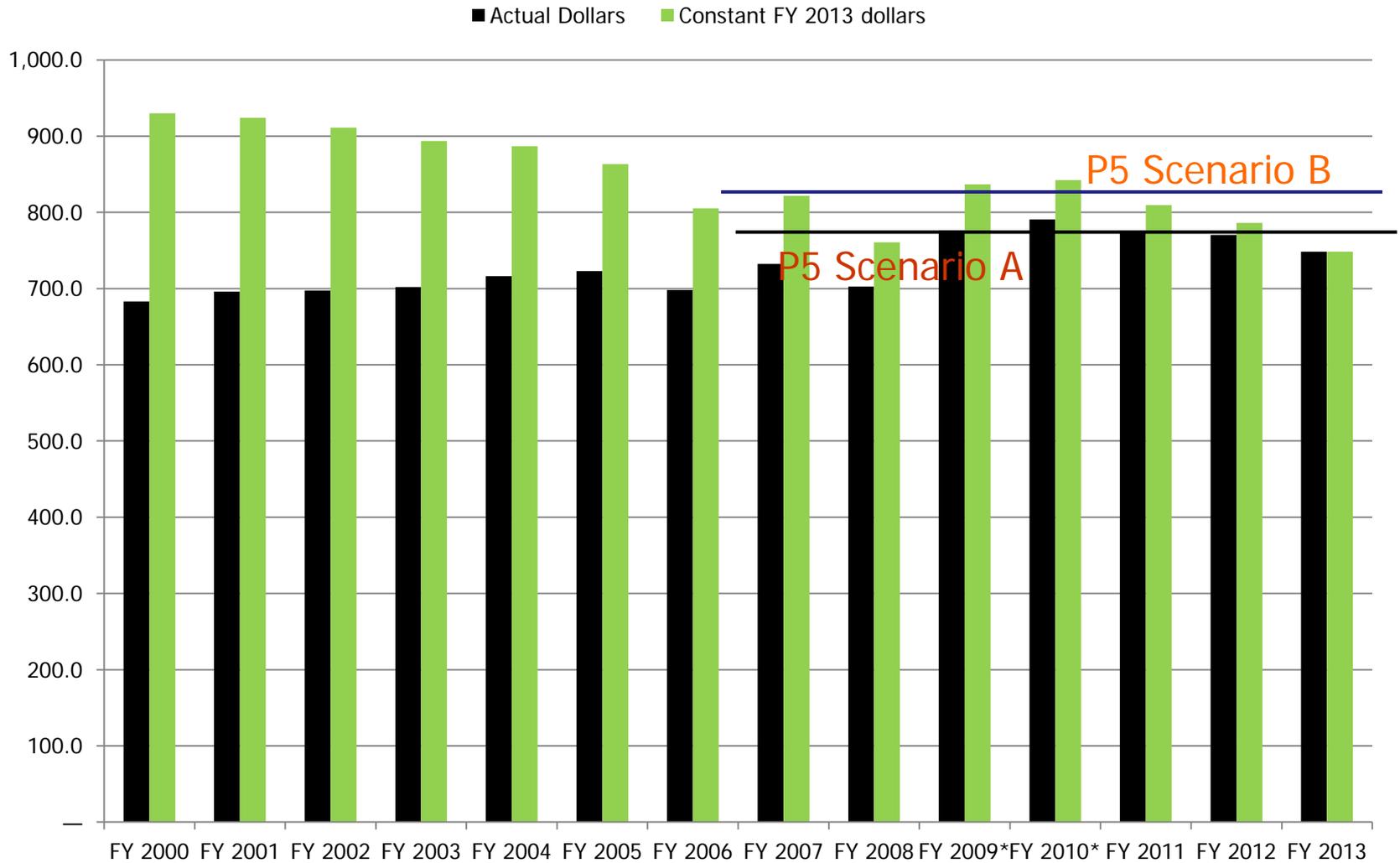
Cosmic Frontier

- Guidance received:
 - PASAG Report: opportunities/priorities for HEP particle astrophysics
 - Astro2010 Report: opportunities/priorities for the U.S. Astronomy/Astrophysics program
 - OSTP worked for a coordinated agency (DOE, NASA and NSF) response

Advanced Technology R&D

- Delay in LHC schedule delayed “decision” on next lepton collider
- Accelerator R&D Workshop Report provided guidance on priorities

Budget History and P5 Guidance



Where We Are in 2013

Energy Frontier:

- LHC research program (7-8 TeV) has been a stunning success.
- CERN has revised midterm plan. Phase I Upgrades has started.

Intensity Frontier

- Significant progress on implementation of a intensity frontier program
 - Although not along the path we planned.
 - NOvA will begin running in 2014. BELLE II, g-2, and Mu2e will follow.
 - Coordinating multiple R&D efforts in the neutrino sector leading to LBNE.

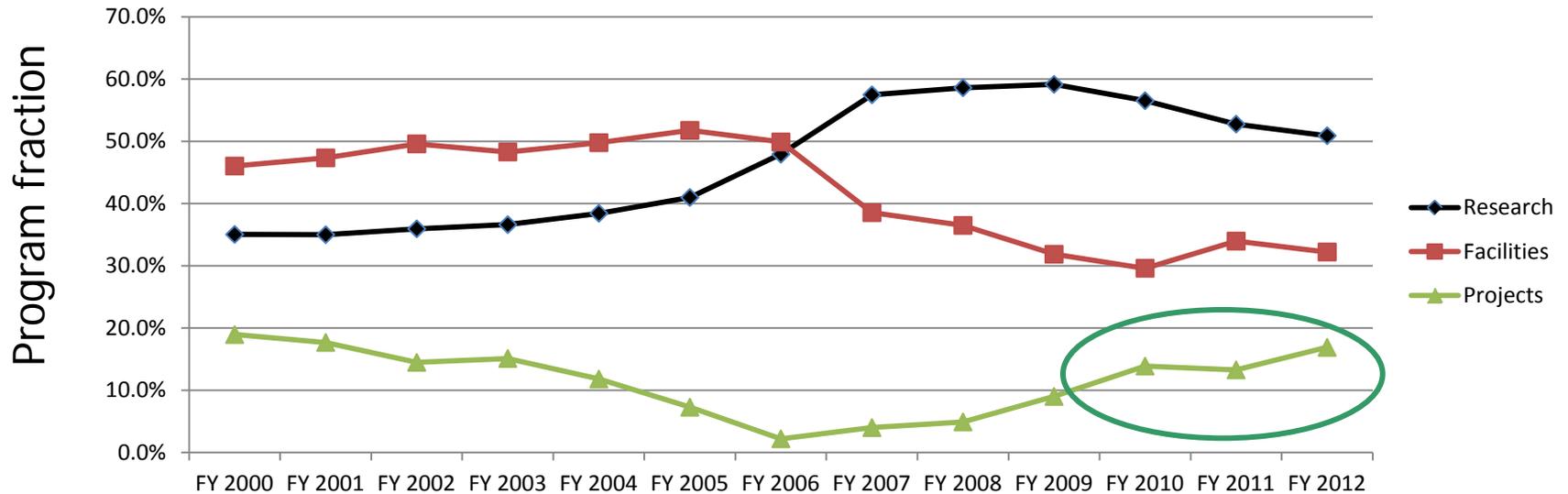
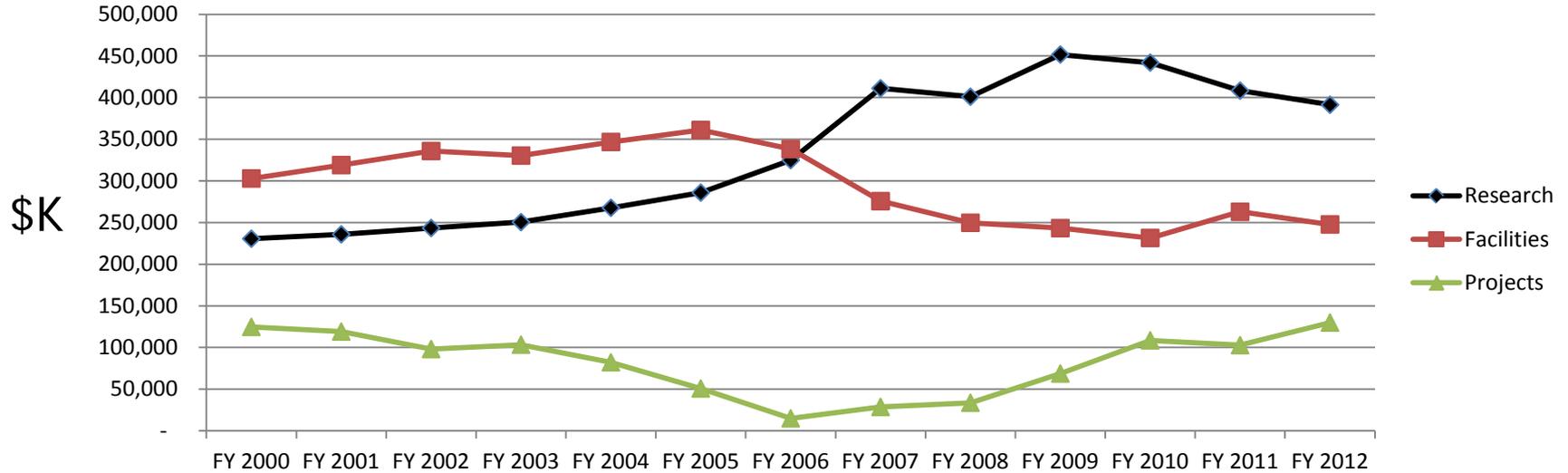
Cosmic Frontier

- Implementing guidance received as best we can. LSST \uparrow WFIRST \downarrow CTA ?
- Dark Energy Survey is operating. G2 dark matter to follow.

Advanced Technology R&D

- US ILC effort in 2012 with the completion of the TDR.
- FACET and BELLA were built and are operating. MAP and LARP were reorganized.
- Accelerator Workshop Report \rightarrow **Accelerator Stewardship**

Research/ Facilities/ Projects





RESEARCH DIVISION

Accelerator Stewardship

- Strategic plan sent to Congress in October 2012
- Incorporated into FY 2014 Budget Request as new subprogram in HEP
 - Note this is an SC program that is managed/coordinated by HEP
 - This is not yet an *approved program*.
 - Beyond the scope of this COV but mentioned here for completeness and to indicate the evolution of the overall Accelerator R&D program
- 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**

Small Business Innovative Research (SBIR)

SBIR and the associated technology transfer program (STTR) are Congressionally mandated programs.

- Congress has increased the SBIR “tax” through FY 2017

	<i>FY11</i>	<i>FY12</i>	<i>FY13</i>	<i>FY14</i>	<i>FY15</i>	<i>FY16</i>	<i>FY17</i>
SBIR	2.5%	2.6%	2.7%	2.8%	2.9%	3.0%	3.2%
STTR	0.30%	0.35%	0.35%	0.40%	0.40%	0.45%	0.45%
combined	2.80%	2.95%	3.05%	3.20%	3.30%	3.45%	3.65%

- HEP provides technical expertise to review and evaluate proposals.
- HEP does not set the rules for this program.
 - Emphasis on commercial applications has been increased.
- Funding for HEP proposals exceeds the amount “taxed” from the HEP program.

HEP Early Career Program

- Early Career is an SC wide program.
 - HEP manages the review and selection of HEP proposals according to SC guidance
- Early Career Research Program is very competitive (~10% success rate)
- HEP Early Career proposals available for COV review

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)



PROGRAM MANAGEMENT

Program Management Philosophy

- Program managers should be responsible and accountable for specific subprograms and/or projects
 - Implemented with HEP reorg in 2008
- Align management responsibilities with Budget
 - This was true at the time of the 2008 reorg (old budget structure)
 - Management model changed to Frontiers basis in 2010
 - Budget substructure was modified to allow tracking in this basis starting FY 2010
 - HEP budget structure was modified to Frontiers basis effective with FY 2013 budget execution (and FY2014 request)
 - Required DOE CFO, OMB, and Congressional approval

Primary Roles and Responsibilities

- Program Managers (PMs)
 - Generic term for HEP professional staff (physicists). Often colloquially used in place of one of the following.
 - *Note most PMs have more than one role.*
- Budget Managers
 - Manages a HEP portfolio and associated budget. Coordinates lab research review(s) and operations review(s) for his/her program. Writes up review report(s). Makes funding recommendations on all proposals.
- Project Managers
 - Oversees HEP project(s) and associated budget(s). Works with SC project assessment [Lehman] to coordinate project review(s) as needed.
- Grant Monitor
 - POC for a given HEP grant. Coordinates funding decisions among budget managers. Works with grant PI to address issues as needed.
- Lab Monitor
 - POC for a given HEP lab program. Coordinates lab S&T and institutional reviews and typically chairs review. Works with lab management to address issues as needed.

Budget Management

Accelerator Stewardship	Colby
AD Reserve	Siegrist
Computational HEP	Chatterjee
Cosmic Frontier	Turner
Detector R&D	Kim/Crawford
EC Reserve	Crawford
Energy Frontier	Patwa
Facilities	Procaro
HEP Directed Accelerator R&D LARP	Strauss
HEP Directed Accelerator R&D Muon	Strauss
HEP General Accelerator R&D	Len
Intensity Frontier	Alan Stone
IT projects	Kogut
LHC Operations	Jim Stone
Projects	Procaro
Theory	Rolli

Internally HEP uses these budget categories.

Budget Managers are given control totals that they have to hit.

The AD has a reserve to solve problems.

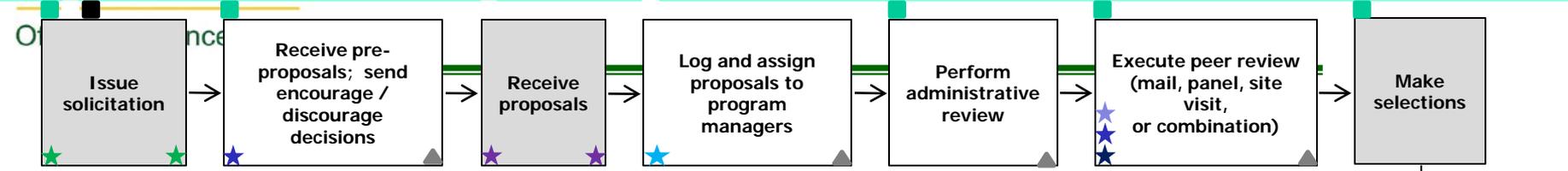
DOE Grant Process

- For DOE as a whole, only about 10% of the total funding goes to grants as compared to contracts
 - Financial infrastructure reflects this and is not optimized for grants
 - However grants are a large fraction of the total number of actions
- Grant awards are a multistep process (see following diagram), multiple people and software products involved
- Therefore, we build in considerable lead time for grants review, action, processing:
 - At least 6 months for new or renewal applications
 - At least 3 months for continuations, supplemental funding
 - This is barely enough time in a normal year
 - Timely and complete grant submissions are very important
- Much of this process is becoming more automated with modern software
 - Existing grants software system is 15+ years old
 - Financial procurement software is 4 years old; rollout of this system was rocky
 - Currently a mixed process with both hardcopy and electronic files

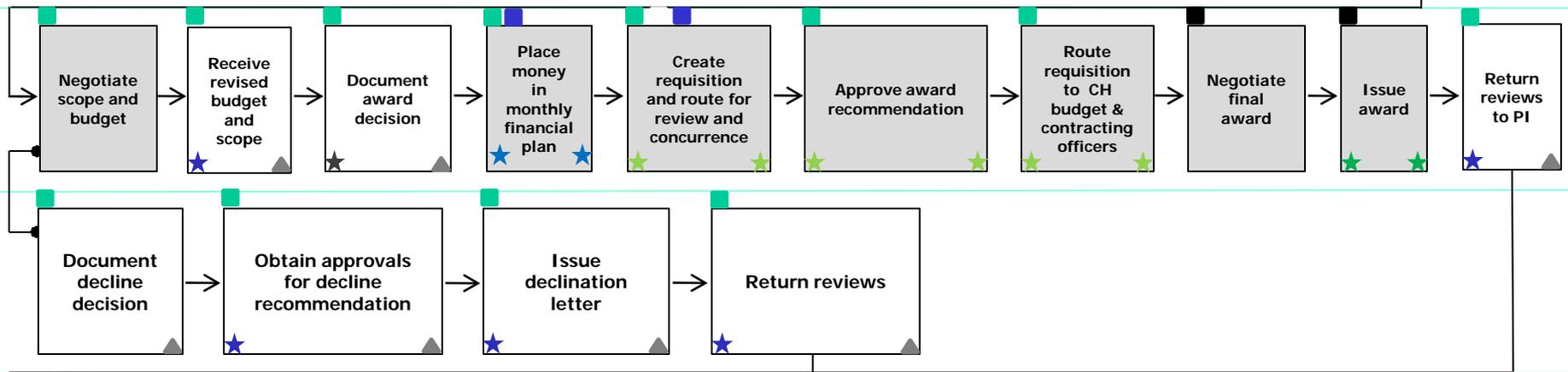
Universities (Financial Assistance)

Future PAMS Contributions

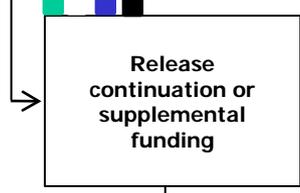
Pre-Award



Award

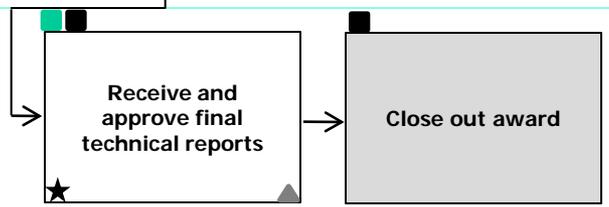


Post-Award



All IT systems listed above are used to release funds during the post-award period (e.g., non-review years).
One program uses RIMS to manage progress reports, continuations, and renewal due dates.

Closeout



- Crosscutting Activities During Above:**
- Document decisions manually in IMSC
 - Send correspondence by paper or email or RIMS

IT SYSTEM - CURRENT		IT SYSTEM - PROPOSED	
		PAMS	▲
Website	★		
Email	★	Email	★
STRIPES	★	STRIPES	★
FedConnect	★	FedConnect	★
IMSC	★		
FMIS/FDS	★	FMIS/FDS	★
PeerNet	★		
Grants.gov	★	Grants.gov	★
Selection Statement Software	★		
E-Link	★		

PARTICIPANTS LEGEND

Program	■
Grants & Contracts	■
Budget	■
Chicago	■
OSTI	■

HEP Grant Review Process

- **Old system (FY10-11) was based on mail-in reviews (occasionally on-site panels)**
 - Nearly every group ranked at least “good”. Hard to differentiate relative impact.
 - Funding done by small perturbations w.r.t. historical levels. Strong new groups hit “ceiling”. Some traditionally strong groups coast.
- **Comparative Review started in FY 12 after several months of preparation**
 - This was a complete break from past and took awhile to think through all the complications and structure the process. Head-to-head panel reviews are key.
 - Decided to “phase-in” review process over three years (FY2012-4) to match 3-year grant cycle.
- **The goal of this effort is to improve the overall quality and efficacy of the HEP research program by identifying the best proposals.**
 - Program Managers feel the need to directly compare groups working in the same area to optimize their programs, particularly in an era of tight research budgets.
 - General concerns about fairness of funding distribution across the program.
- **This change in process was recommended by several DOE advisory committees, including the 2010 HEP Committee of Visitors.**

HEP Lab Review Process

- **HEP implemented a new review process for national labs in 2008**
 - Fermilab Science and Technology (S&T) Review annually
 - this is mostly an Operations review
 - Laboratory research group Reviews (on a rotating basis)
 - FY 2010 Non-accelerator (Cosmic) and Electron-based (Intensity) subprograms
 - FY 2011: Theory
 - FY 2012: Energy frontier and Detector R&D subprograms
 - [FY 2013: Accelerator Science, Cosmic, Intensity Frontier subprograms]
 - Institutional Reviews on rotating basis (Fermilab with S&T review as needed)
 - FY 2009: LBNL / FY 2010: BNL, LANL / FY 2011: ANL / FY 2012: SLAC (+FNAL)
 - HEP Site visits to Labs not undergoing peer-review in that year's other Reviews
- **Outcomes from reviews were incorporated in funding decisions**

FY12 Comparative Review Data by Proposal

	Energy	Intensity	Cosmic	Theory	Tech R&D*	HEP Total
Received	30	20	11	40	25+9	136
Declined ⁺ or Withdrawn	4	2	1	4	3+0	14
Reviewed	27	18	10	36	22+9	122
Funded	21	15	6	22	15+6	85
“Success Rate” (%)	78	83	60	61	68/75	70

*First number is Accel R&D, second is Detector R&D (reviewed separately)

+Proposals declined without review

NOTES:

- **Single proposals with multiple research thrusts are counted multiple times (1 /thrust)**
- “Success Rate” is = # Funded/ # Reviewed.
- Most proposals are not fully funded at requested level.
- About ½ of the proposals reviewed were from research groups that received DOE HEP funding in FY11.

FY12 Comparative Review Summary

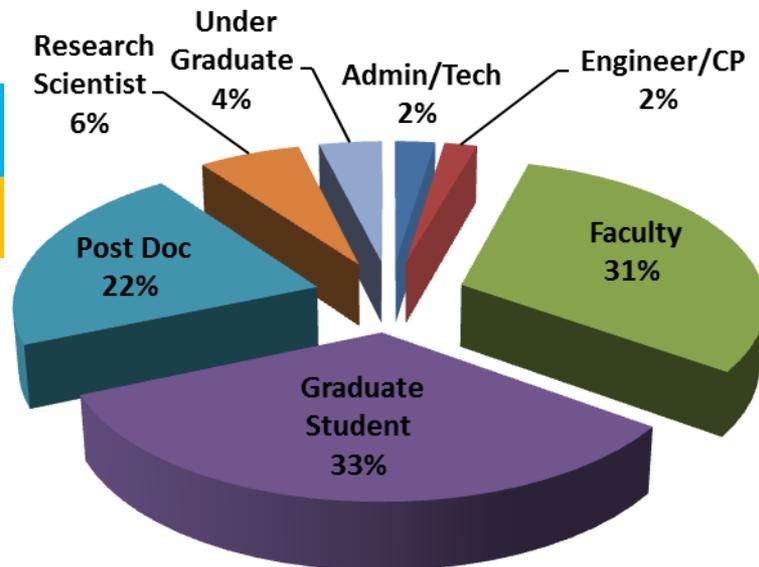
- **DOE/HEP has undertaken Comparative Reviews (Round 1)**
 - New process but ran relatively smoothly from our perspective
 - Goal is better-optimized, more efficient program
 - Time will tell, but we think we have overall better outcomes
 - Large number of new (to DOE) PIs applied and about half are being supported
 - Existing PIs mostly reviewed well but there is some turn-over
 - Total number of PIs ~constant but changing demographics:
 - Several new junior faculty supported
 - Some senior faculty no longer supported
 - Several senior research faculty no longer supported
 - Expect total FTEs supported to be down somewhat
- **FY 2014 comparative reviews were held in November.**

HEP Workforce: FY 2012

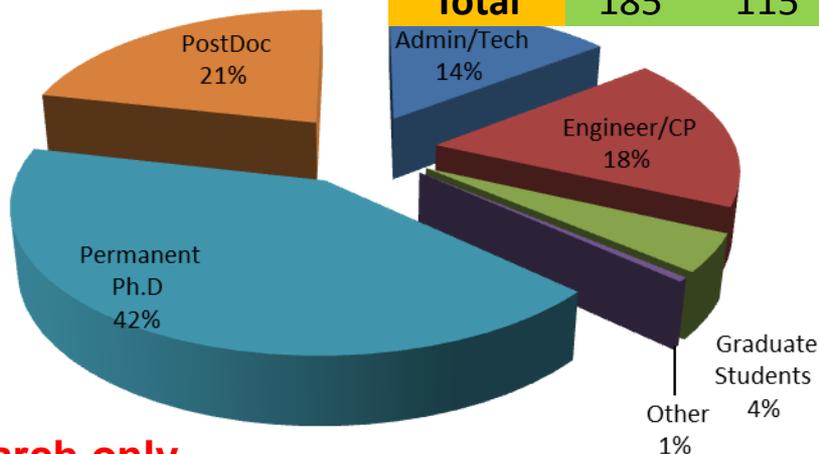
Total university: 1785 FTEs

	Energy	Intensity	Cosmic	Theory/ Comp	Adv Tech	Total
Total	660	295	170	465	175	1765

225 active grants
109 universities



	Energy	Intensity	Cosmic	Theory/ Comp	Adv Tech	Proj. & Fac. Ops	Total
Total	185	115	125	120	250	1520	2315*

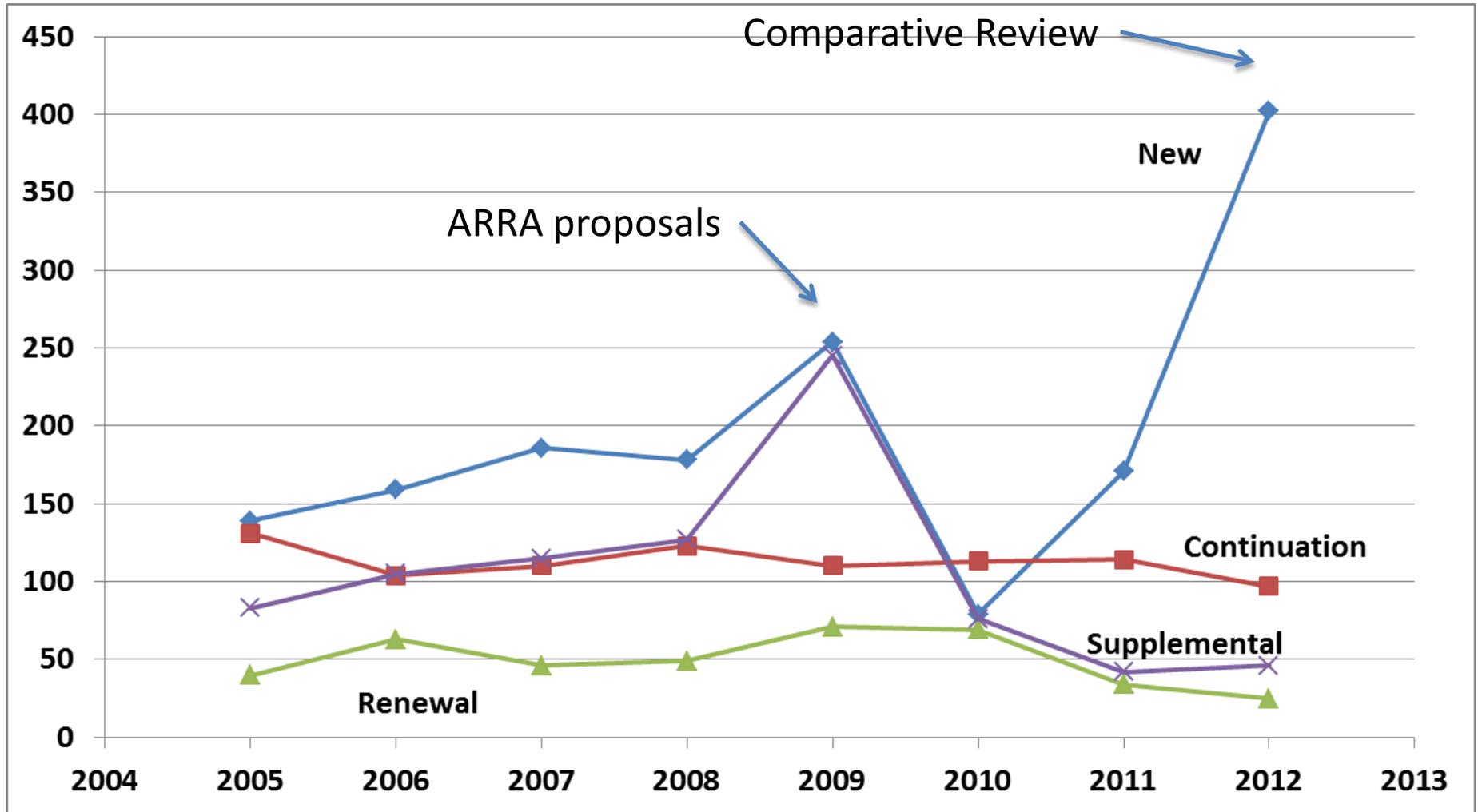


research only

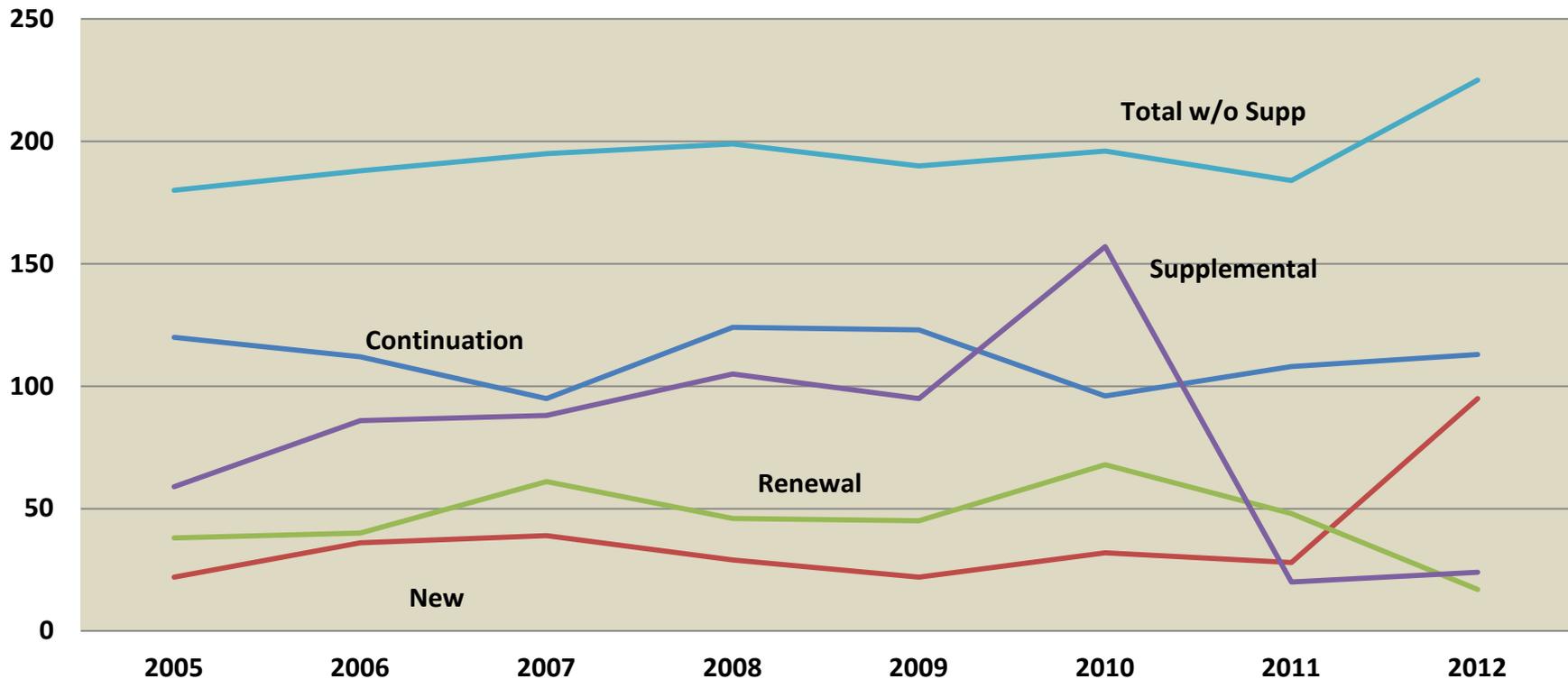
Sum: 4080 FTEs
(Based upon annual HEP demographic survey and budget briefings)

*Numbers are rounded. Binning may be somewhat different than PM reports.

HEP Grants Statistics: Proposals



HEP Grants Statistics: Awards



- Spike in 2010 is ARRA awards (supplemental)
- Increase in New awards in 2012 (+decrease of Renewals) is Comparative Review.
- Data prior to 2012 indicate three-year cycle of ongoing awards: new and renewal awards are at a max when continuations are at a minimum.



FACILITIES DIVISION

FD Responsibilities

- Projects that fall under DOE O413.3b. TPC > \$5 million.
 - Smaller projects are managed out the Research Division.
- User Facilities and large operations programs
 - Fermilab Accelerator Complex
 - LHC Operations Program
 - Facility for Accelerator Experimental Test (FACET)
 - Small operations programs such as DES, Daya Bay, EXO are managed out of the Research Division
- HEP Directed Accelerator R&D
 - LHC Accelerator Research Program (LARP) and Muon Accelerator Program (MAP)
 - Have management structures more like projects with real deliverables and milestones.
 - Will be mostly covered by the Accelerator subcommittee.

User Facilities

- **The B-factory shutdown in FY 2008.**
- **The Tevatron shutdown at the end of FY 2011.**
- **HEP currently supports two official user facilities.**
 - Fermilab Accelerator Complex
 - FACET
- **There are three efforts that we are considering naming user facilities.**
 - CMS Center at Fermilab
 - LHC Physics Center; Remote Control Room; Tier 1 Center and CAF.
 - ATLAS Center
 - Less well defined. Only at BNL or a virtual center involving other labs?
 - Accelerator Test Facility at BNL
 - Has functioned as a true user facility for decades.
 - Should we formally recognize it as such?

Operations Goals

- **The goal for user facilities and other operations programs is support research effectively and efficiently.**
- **Metrics vary depending on the program**
 - Tevatron and B-factory: maximize integrated luminosity
 - Neutrino beams: protons on target
 - LHC Ops
 - Computer uptime, jobs run, detector uptime, minimal deadtime
 - FACET/ATF
 - Number of users, time needed to collect data
- **Correlate metrics with science**
 - Peer review of the science
 - Are high impact results coming out of the facilities?
 - Paper published/talks given
- **Efficiency of operations**

Performance Metrics

	Tevatron Integrated luminosity		Fermi Accelerator Uptime		NuMI protons on target		Cost weighted CPI and SPI	
	Target	Achieved	Target	Achieved	Target	Achieved	Target	Achieved
FY 2010	1.7 fb-1	2.5 fb-1	80%	87%	2.70E+20	3.20E+20	0.9	Met
FY 2011	2.0 fb-1	2.5 fb-1	80%	81%	2.20E+20	2.20E+20	0.9	Met
FY 2012	N/A	N/A	80%	83%	1.20E+20	2.20E+20	0.9	Met

Facility and project performance metrics for FY 2010 through FY 2012 were all met.

These metrics are approved and tracked by SC-2. The ones in yellow are SC-wide. The ones in purple are developed by HEP and the lab.

Operations Reviews

- **Fermilab S&T Review**
 - Accelerator performance, quality of the science, planning for the future. Held annually.
 - Dedicated operations reviews have been held in the past.
- **LHC Operations Review**
 - Conducted jointly with NSF each year.
 - Looks at Tier1 and Tier 2 computing center performance.
 - Support of the users
 - Evaluates detector maintenance and operations performance.
 - Reviews the impact of the program on researchers
 - Do U.S. researchers have a significant impact on the LHC research program?
- **ILC, LARP and MAP Reviews**
 - Conducted every 12-18 months.
 - Last ILC review was held in FY 2010.

Operations Reviews II

- **ILC, LARP and MAP Reviews**
 - Conducted every 12-18 months.
 - Last ILC review was held in FY 2010.

	FY 2010	FY 2011	FY 2012
FNAL S&T	X	X	X
LHC operations	X	X	X
LARP	X	X	X
MAP	X		X
ILC	X		

OHEP Project Management Strategy

- **Aligned with Office of Science Project Management Strategy**
 - SC has its own project management procedures modeled on O413.3B
- **Management goals**
 - Develop high quality cost estimates then build to cost.
 - Develop realistic funding profiles and then stick to them.
 - Still trying to frontload the funding more.
 - Successful at maintaining profiles we establish.
 - Hold the contractor accountable for management of the project.
 - Problems should be identified by the contractor.
 - Solutions should be proposed by the contractor.
 - Strong communications at multiple levels.
 - HEP AD – Lab ALD
 - HEP Program manager – Lab project manager
 - Horizontal and vertical communication.
 - The goal is no surprises.

Project Communications

- Integrated Project Team meets every 1-2 weeks, typically by teleconference
- Laboratory Oversight
 - At Fermilab, the Project Oversight Group (POG) meets monthly.
 - For Daya Bay, the Lab Oversight Group (IHEP, LBNL & BNL) meets monthly.
 - SLAC provides central oversight of all its projects through the Project Management Oversight Group.
- Program Office Oversight
 - Program Manager attends IPT & PMG meetings plus informal calls and/or site visits as needed. Receives status report from Contractor PM Office monthly.
 - HEP Director holds biweekly project-focused teleconference with the Labs.
 - Energy Systems Acquisition Advisory Board (ESAAB) is convened for Critical Decisions.
 - Independent Project Review by Office of Project Assessment,
 - SC Project Watch-list Meeting w/ Dehmer & Lehman hears projects' issues monthly.

Project Portfolio FY 10-12

Project	Laboratory	Type	TPC (\$M)	Next Step	Actual or Forecast	Manager
BELLA	LBNL	MIE	27.22	Completed	1/17/2013	Borcherding
FACET	SLAC	MIE	14.5	Completed	1/31/2012	Borcherding
Daya Bay RND	LBNL-BNL	MIE	35.50	Completed	8/20/2012	Lavine
DES	Fermilab	MIE	35.15	Completed	6/4/2012	Turner
APUL	BNL	MIE	13	CD-4	4/30/2014	Strauss
MicroBooNE	Fermilab	MIE	19.9	CD-4	9/30/2015	Lavine
NOvA	Fermilab-UMinn.	MIE	278	CD-4	11/31/2014	Lavine
Belle-II	PNNL	MIE	13-15	CD-2/3b	FY 2014	Marsiske
LBNE	Fermilab	LIC	805-1,110	CD-2	FY 2016	Procaro
LSST	SLAC	MIE	120-175	CD-3a	FY 2014	Marsiske
Mu2e	Fermilab	LIC	200-310	CD-3a	Q2 FY 2014	Lavine
Muon g-2	Fermilab	MIE	30-60	CD-1	Q1 FY 2014	Lavine
LHC ATLAS Upgrade	BNL	MIE	22-34	CD-2	Q4 FY 2014	Rolli
LHC CMS Upgrade	FNAL	MIE	22-34	CD-2	Q4 FY 2014	Rolli
DM Generation-2	TBD	MIE	20-38	CD-1	FY 2014	Marsiske
DE Spectroscopic Inst.	LBNL	MIE	25-42	CD-1	FY 2014	Turner

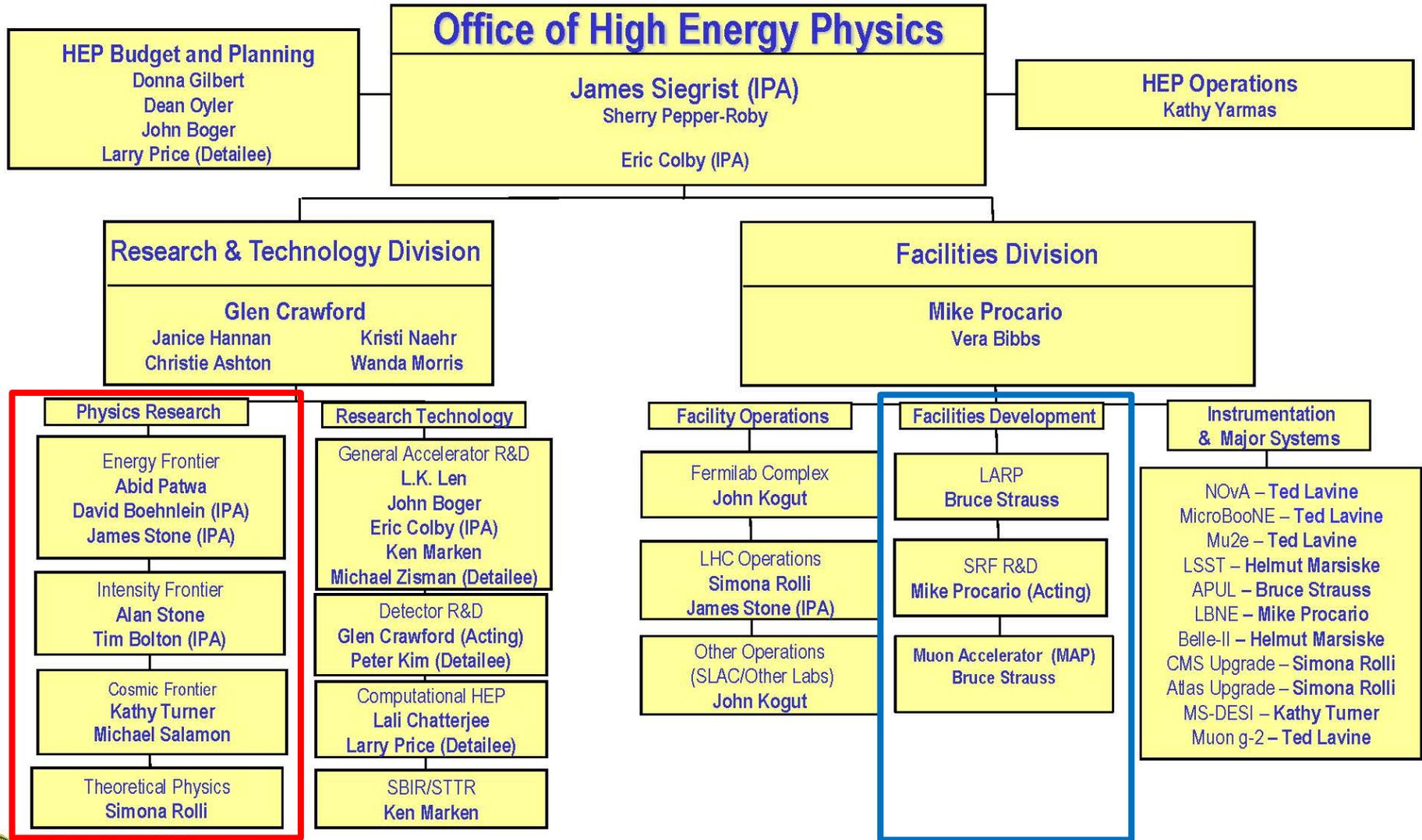
Independent Project Reviews

- Constructive assessment of performance, readiness, strength & robustness of a project's management organization at all levels
 - For each Critical Decision and 1-2 times per year depending on size.
 - Full-scope review or targeted mini-review, depending on the issues
- Program Office writes situation-specific charge for the review
- Office of Project Assessment organizes the review committee
- Pre-Review by the Lead Laboratory (“Director’s Review”)
- Review Committee meets with the Project at the Lab
 - Plenary, break-out, and executive sessions
 - Close-out with findings, comments & recommendations
- Follow-up (Add tailoring of reviews)
 - Two-page summary paper & briefing by OPA for DOE management
 - Full written report within 60 days for Program Office, Project, Lab & Agencies
 - Timely response by project addresses the review’s recommendations.



BACKUPS

HEP Organization Chart (2013)



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
<ul style="list-style-type: none"> • A flexible instrument designed to provide money to support a public purpose. 	<ul style="list-style-type: none"> • A binding agreement between a buyer and a seller to provide goods or services in return for consideration (usually monetary).
<ul style="list-style-type: none"> • Governed by the terms of the grant agreement 	<ul style="list-style-type: none"> • Governed by Federal Acquisition Regulations
<ul style="list-style-type: none"> • Flexible as to scope of work, budget, and other changes 	<ul style="list-style-type: none"> • Relatively inflexible as to scope of work, budget, and other changes
<ul style="list-style-type: none"> • Diligent efforts are used in completing research and the delivery of results 	<ul style="list-style-type: none"> • Significant emphasis placed on delivery of results, product, or performance
<ul style="list-style-type: none"> • Payment awarded in annual lump sum 	<ul style="list-style-type: none"> • Payment based on deliverables and milestones
<ul style="list-style-type: none"> • Annual reporting requirements 	<ul style="list-style-type: none"> • Frequent reporting requirements
<ul style="list-style-type: none"> • Principal Investigator has more freedom to adapt the project and less responsibility to produce results 	<ul style="list-style-type: none"> • 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>

ACTIVE PROJECTS

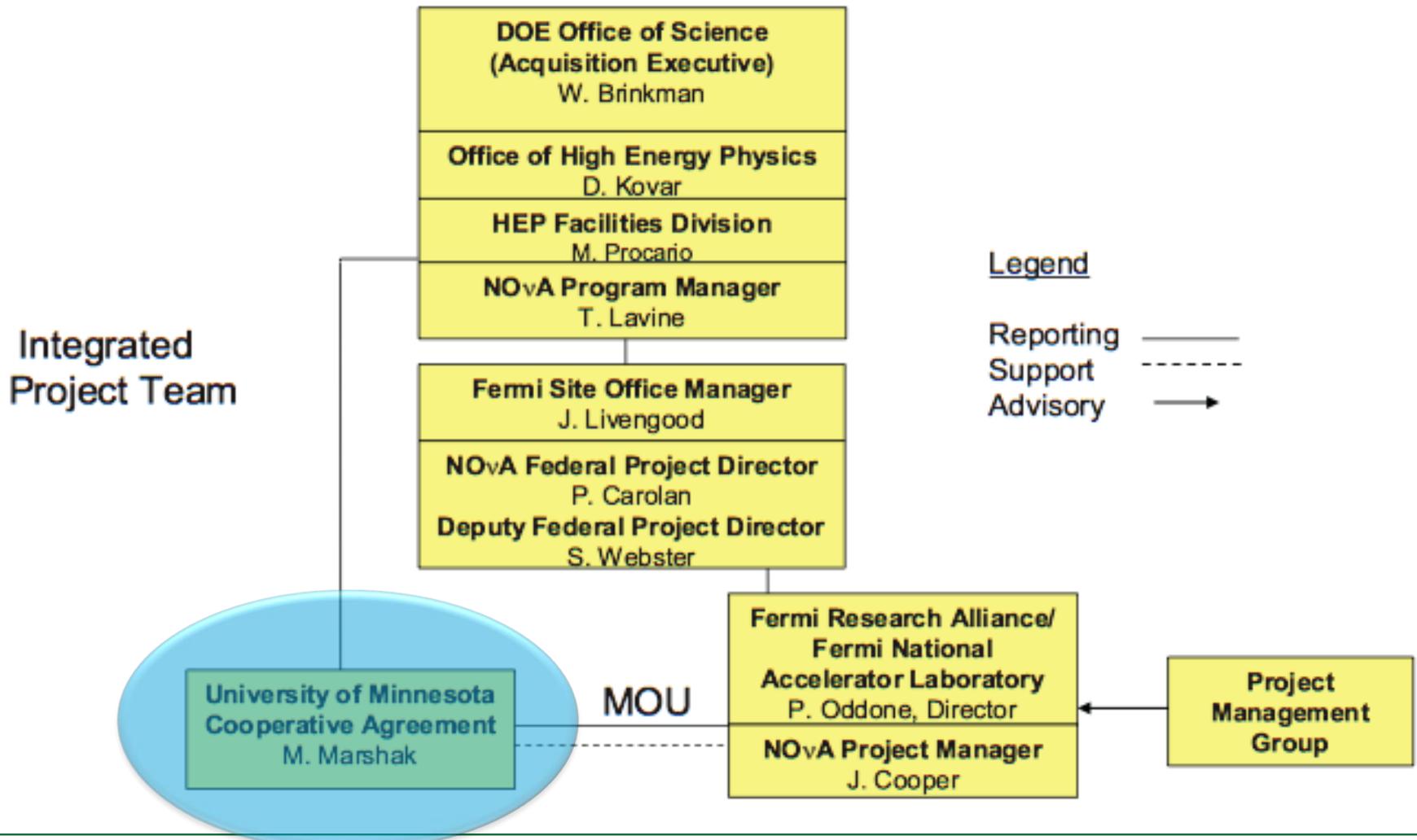


NOvA Project

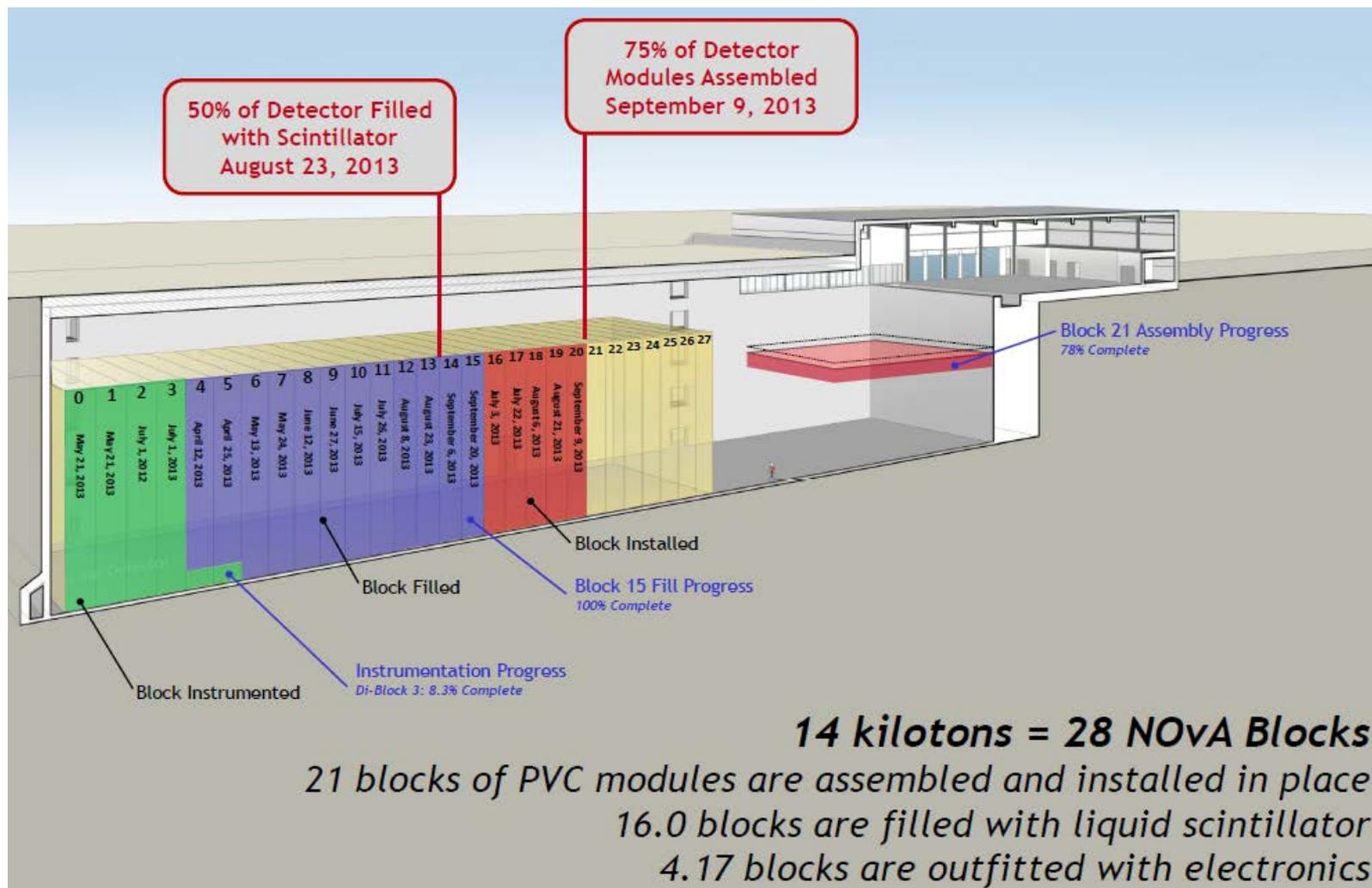
- **NuMI Off-axis Electron Neutrino Appearance Experiment, \$278M**
 - **Project involves multiple Fermilab Divisions and Cooperative Agreement w/ UM for the Far Detector Housing in Minnesota**
 - Managed as a single project
 - Coop. Agreement partner participates in all project reviews
 - **Phased CD-3a, -3b, and Minnesota construction start**
 - **Suffered from funding interruption and demobilization in 2008**
 - ARRA funds in 2009 advanced the project and reduced risk
 - Competition for staff resources at Fermilab required corrective action.
 - **Near-exhaustion of contingency funds by early FY 2013**
 - Available contingency not well understood by project or the lab.
 - Descoped liquid scintillator to water in alternating planes of the back end
 - Currently restoring scope using earned contingency
-



NOvA Project Management Organization



NOvA Technical Status



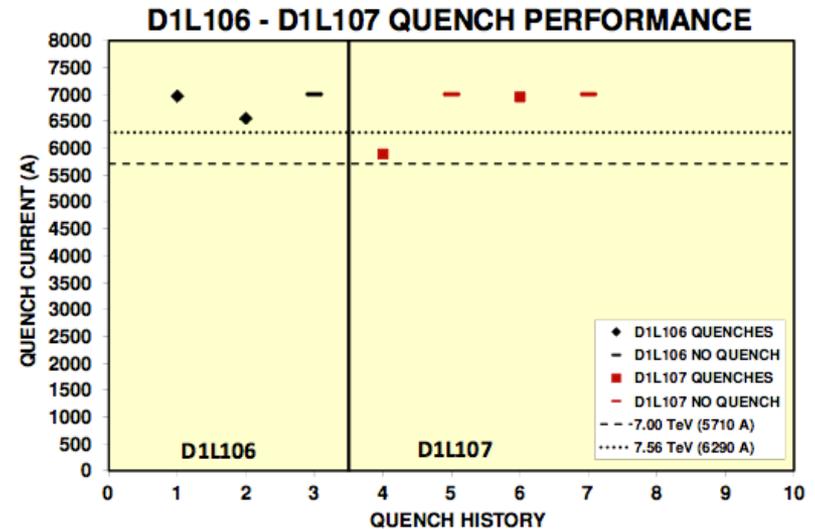
MicroBooNE Project

- **Micro Booster Neutrino Experiment, TPC \$19.9M**
- **Aiming for CD-4 in FY 2014.**
- **Partnering with NSF, in-kind contributions from research & MRI grants**
 - TPC by Yale U.
 - TPC electronics by Columbia U.
 - Phototubes by MIT
- CD-4 is based on readiness for liquid argon.
- Liquid argon filling techniques are part of the research program.



APUL Project

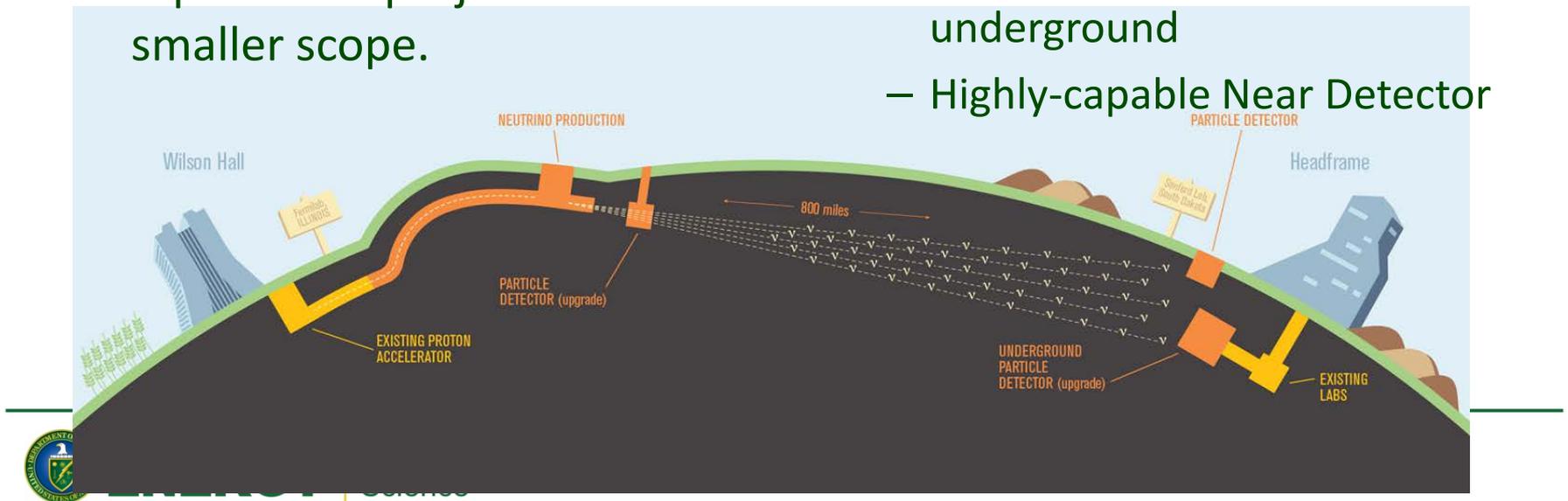
- Accelerator Project to Upgrade the LHC
- Scope is interaction region dipoles
- CD-0 approved in 2008 with cost range of \$18-27M
- CD-1 approved after a delay to react to changing CERN schedule
 - Cost range of \$9-11M
- CD-2/3 approved in 2011 for two magnets and TPC of \$11.4M
- Work is managed and



LBNE Project

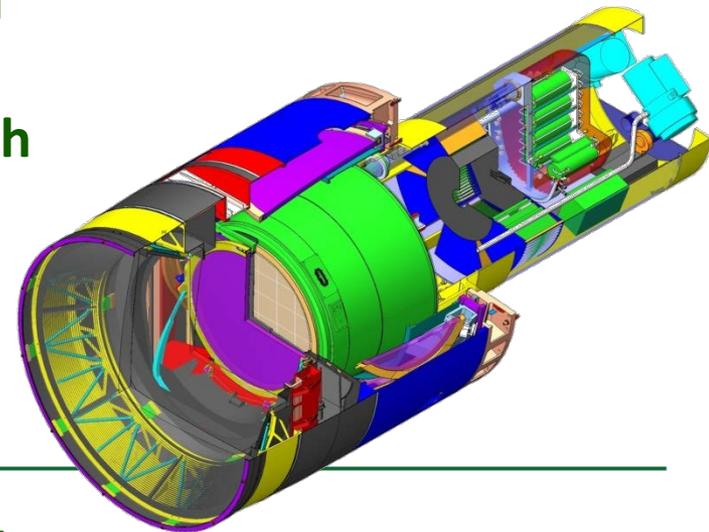
- **CD-0 in February 2010 (Range of \$660-940 M)**
 - Assumed that NSF would host the detector at DUSEL.
 - The National Science Board then killed DUSEL.
- **CD-1 in December 2012 (Range of \$805-1,110 M)**
 - A pure DOE project with a smaller scope.

- FNAL (DOE) to SURF (SDSTA)
- Neutrinos from 700 kW Proton Beam, upgradable to 2,300 kW
- 10 kton L-Ar TPC on surface
- Currently seeking international collaboration for enhancement of scientific capability
 - More massive far detector(s) underground
 - Highly-capable Near Detector



LSST-Camera Project

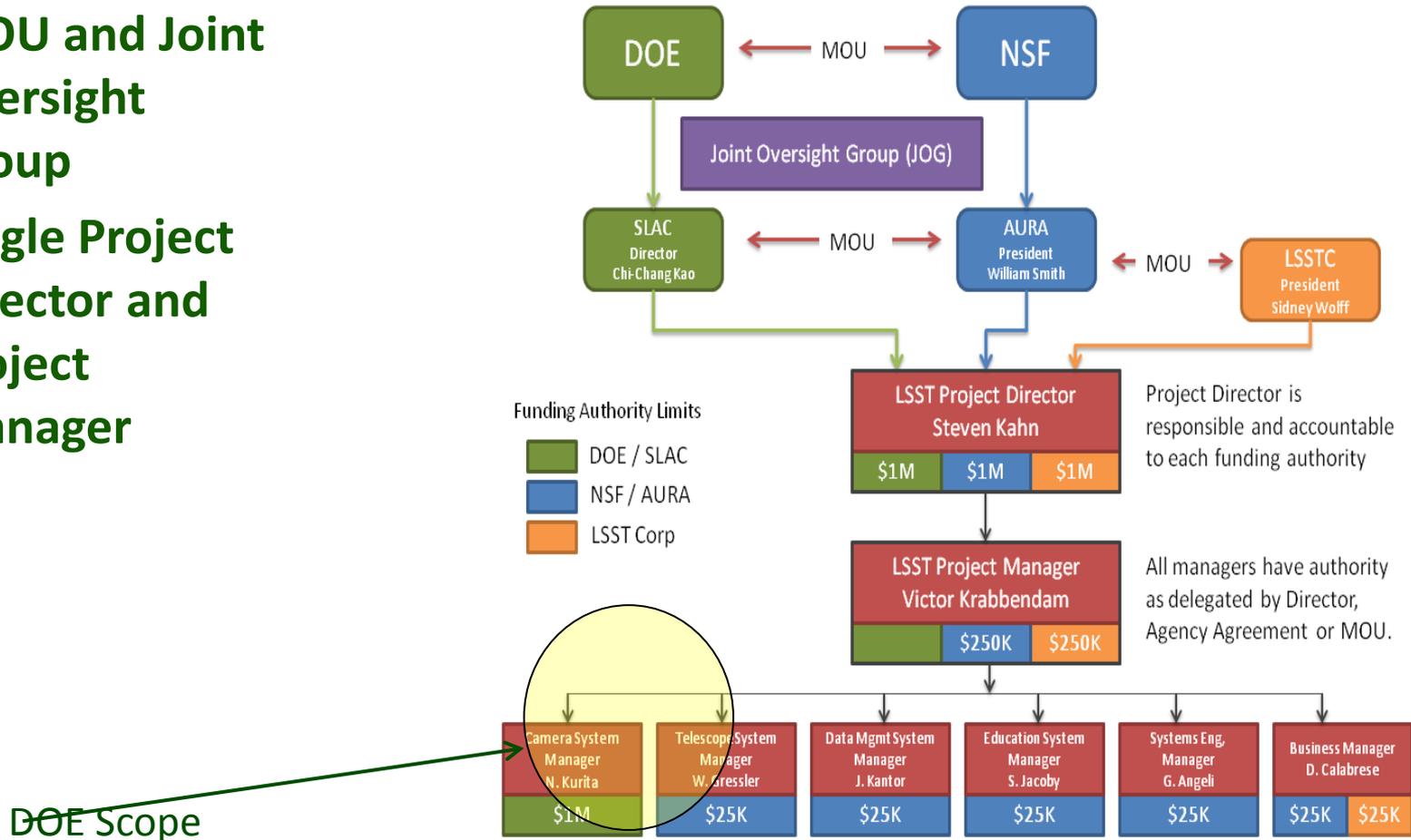
- **LSST observatory on Cerro Pachón in Chile**
 - joint initiative with NSF-AST (lead agency) and the non-profit LSST Corporation with private and foreign contributions
 - DOE science goal is precision study of dark energy
- **NSF-AST responsible for site preparation, construction of telescope facility, and data management system**
 - Funded as MREFC project; preparing for NSF Final Design Review in October 2013
- **DOE scope is 3-billion pixel CCD camera with associated optics (\$120M-\$175M)**
 - LSSTcam MIE project managed through SLAC
 - CD-1 approval in February 2012;
 - No new start in FY 2013 due to CR



– requesting MIE start in FY14; preparing for CD-3a
(CCD sensor long-lead procurement) in early 2014

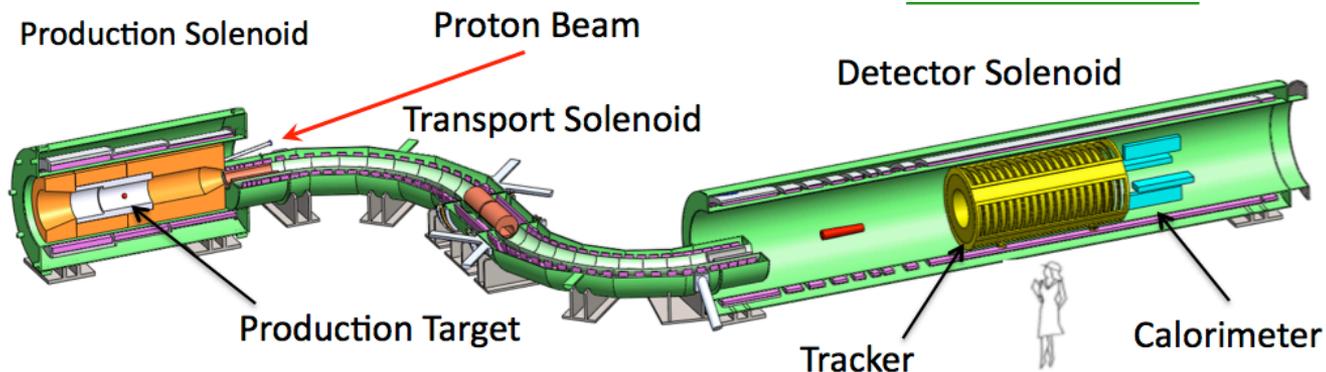
LSST Management Structure and Relationship to Agencies

- Inter-agency MOU and Joint Oversight Group
- Single Project Director and Project Manager



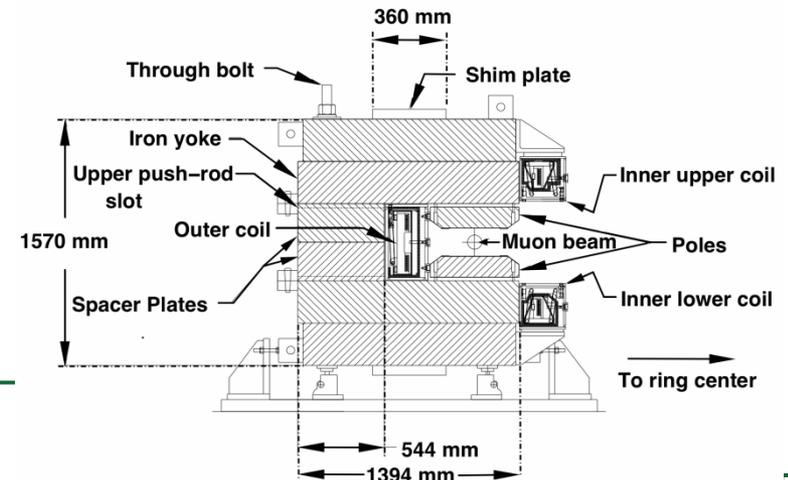
Mu2e Project

- **Muon to Electron Conversion Experiment (Mu2e)**
 - Highly rated by P5.
- **Critical Decision Evolution**
 - CD-0 in Sept 2009 (Range of \$145-205M)
 - CD-1 in July 2012 (Range of \$200-310M)
 - CD-3a in FY 2014 for long-lead procurement of SC solenoids
 - CD-2/3b later in FY 2014
 - CD-4 in FY 2021



Muon g-2 Project

- Project is moving the BNL E-821 muon storage ring to FNAL for upgrade and re-use with more muons.
- **Work Breakdown**
 - Equipment Transport
 - Storage Ring
 - Instrumentation
 - Muon Beam Delivery
 - Project Management
- **Critical Decisions**
 - CD-0 in Sept 2012
 - Cost range of \$30-60M
 - CD-1 later this year
 - CD-4 in FY 2016

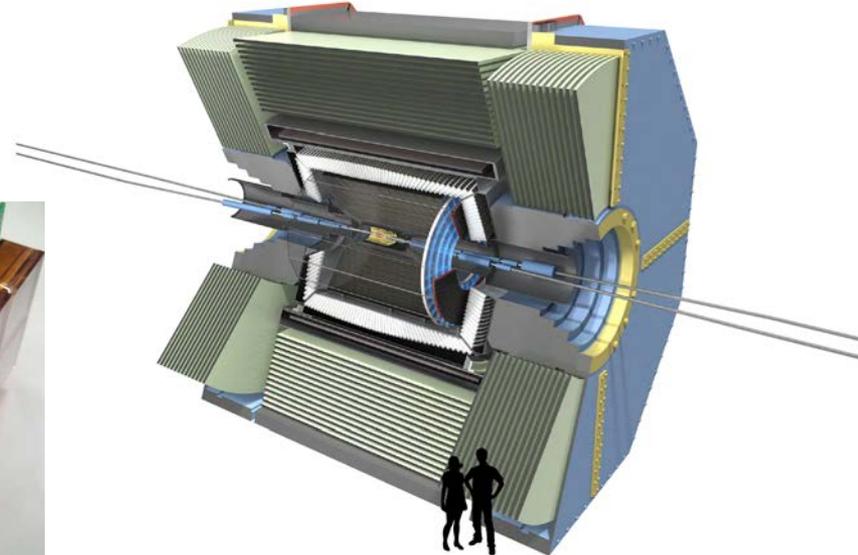
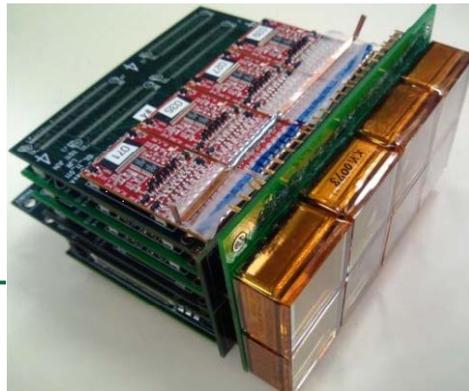
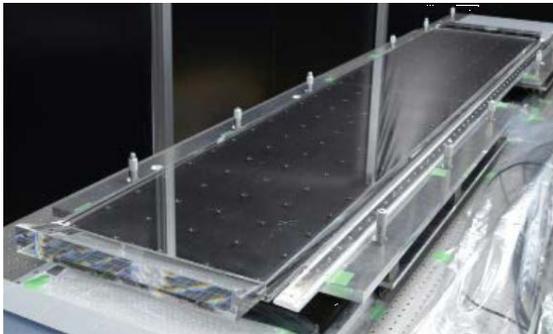


Muon g-2 Equipment Transport



Belle II Project

- **U.S. contribution to the Belle II detector upgrade at KEK (\$12M-\$16M)**
 - Scope consists of KLM modules, iTOP optics, electronics associated with both systems, and components of a commissioning detector
- **Funded as MIE; managed through PNNL**
 - Need to coordinate with the international schedule.
 - CD-1 and CD-3a approval in September and November 2012, respectively;
 - Did not get an MIE start in FY 2013
 - requesting MIE start in FY14; preparing for CD-2/3b in early 2014

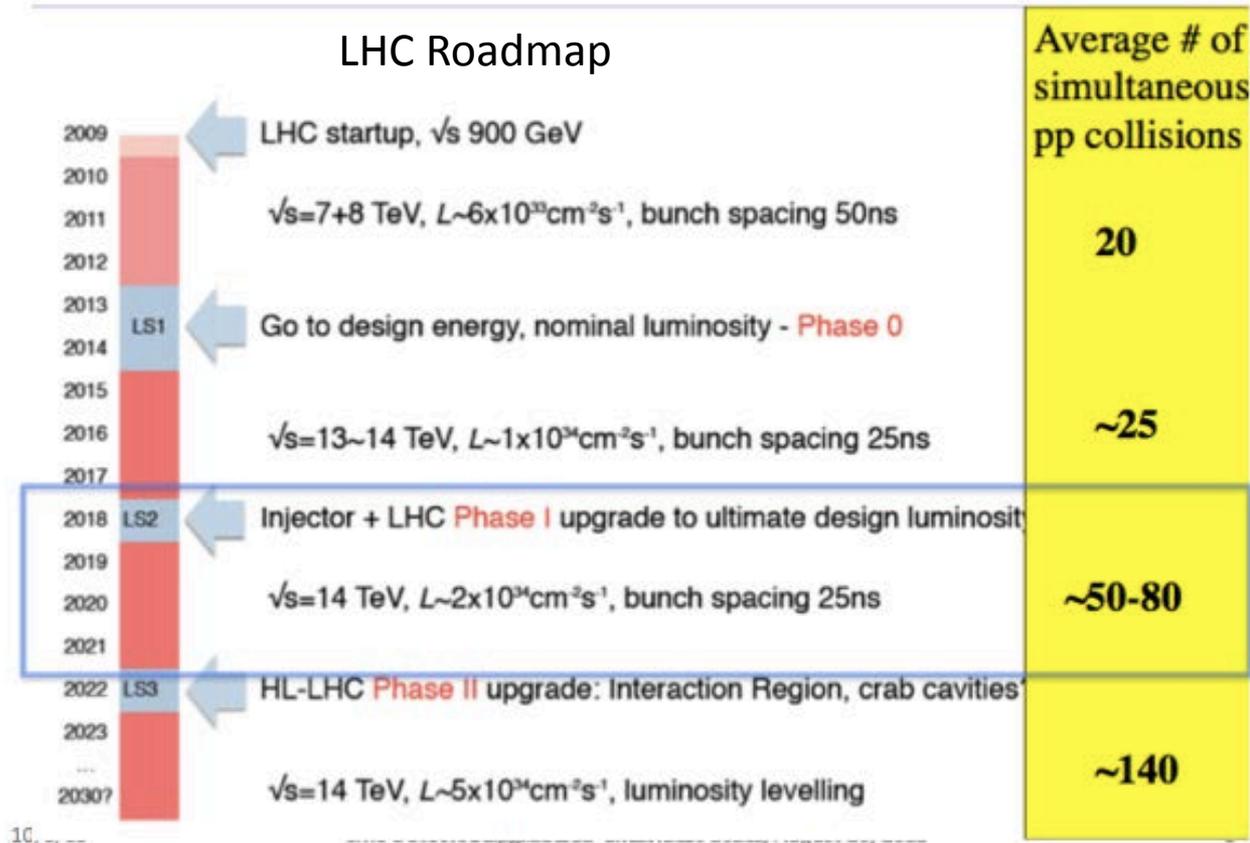


Coordinated Second-generation Dark Matter Experiments

- **Mission Need and CD-0 for suite of second-generation experiments for direct detection of dark matter approved September 2012**
- **Following panel review in September 2012, five experiments supported for one-year R&D effort (\$7M) to reduce scientific, technical and cost risks of proposed experiment design**
 - ADMX, COUPP, DarkSide, LZ, and SuperCDMS
- **Planning down-select in January 2014, joint with NSF, of highest-merit experiments within available funds to continue into project phase and start fabrication**
 - Planning for CD-1 during FY14

LHC Detectors Upgrade Projects

LHC Roadmap



- The ATLAS and CMS detectors will need to be upgraded to be able to cope with higher luminosity, e.g.
 - Improve trigger capabilities
 - better discriminate the desired signal events from background as early as possible in trigger decision

- Upgrade and/or replace detectors as they e.g.
 - Cannot handle higher rate due to bandwidth limitations
 - Suffer from radiation damage making them less efficient

ATLAS and CMS Upgrade Roadmaps

CMS

- **Phase-0**
 - Complete muon coverage
 - Colder tracker
 - Photodetectors in HCAL
 - New beampipe and infrastructure updates
- **Phase-I**
 - New Si pixel tracker
 - L1 trigger upgrade
 - HCAL electronics
- **Phase-II**
 - New pixel and strip tracker
 - Calorimeter
 - Muon system
 - Trigger system
 - Computing
 - ...

ATLAS

- **Phase-0**
 - 4th Si Pixel layer (IBL)
 - Complete muon coverage
 - Repairs (TRT, LAr and Tile)
 - New beampipe and infrastructure updates
- **Phase-I**
 - Fast Track Trigger (FTK)
 - Muon New Small Wheel (NSW)
 - LAr cal. electronics
- **Phase-II**
 - New pixel and strip tracker
 - Calorimeter
 - Muon system
 - Trigger system
 - Computing
 - ...