

# Advanced Photon Source Upgrade Update



George Srajer

APS Users Monthly Meeting  
December 19, 2012

# Outline

- DOE CD-2 Review Outcome
  - Road Ahead
- Updates:
  - Long Lead Procurement for Resonant Inelastic X-ray Scattering (RIXS) Beamline
  - Superconducting Undulator Prototype (SCU0)
  - Revolver Undulators



# DOE CD-2 List of Reviewers

December 4 -6, 2012

Department of Energy/Office of Science (CD-2) Review of the  
Advanced Photon Source-Upgrade (APS-U) Project  
December 4-6, 2012

Daniel R. Lehman, DOE/SC, Chairperson

## SC1 Front Ends, Diagnostics, IDs, and Long Straight Sections

\$53M (WBS 1.05.02,1.03.02, 1.03.04 )

\* Kem Robinson, LBNL  
Lonny Berman, BNL

## SC2 Short Pulse X-Ray Systems and Accelerator Physics

\$51M (WBS 1.02.01, 1.03.03)

\* Sam Krinsky, BNL  
Mark Champion, ORNL  
Sang-Ho Kim, ORNL

## SC3 Ultrafast Beamlines

\$19M (WBS 1.04.02)

\* Bill White, SLAC  
Uwe Bergmann, SLAC

## SC4 Diffractions and Imaging Beamlines

Dif, \$33M (WBS 1.04.02);  
Imag, \$36M (WBS 1.04.02, 1.05.03)

\* Tony Warwick, LBNL  
Don Brown, LANL  
Yong Chu, BNL  
Eric Dooryhee, BNL  
Rich Sheffield, LANL

## SC5 Spectroscopy Beamlines

\$23M (WBS 1.04.02)

\* Mike Toney, SLAC  
Yong Cai, BNL

## SC6 ES&H

\* Steve Hoey, BNL  
Jim Floyd, LBNL

## SC7 Cost and Schedule

\* Richard Boyce, SLAC  
Rick Blaisdell, OAPM  
Brian Huizenga, OAPM  
Hannibal Joma, DOE/SSO  
Ethan Merrill, DOE/SC  
Ray Won, DOE/SC

## SC8 Management

\* John Galayda, SLAC  
Kurt Fisher, DOE/SC  
Steve Hulbert, BNL

Number of reviewers: 26



# DOE CD-2 List of Observers

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Harriet Kung, DOE/SC

Ron Lutha, DOE/ASO

Jim Murphy, DOE/SC

Frank Gines, DOE/ASO

Phil Kraushaar, DOE/SC

Jerry Kao, DOE/ASO

Peter Lee, DOE/SC

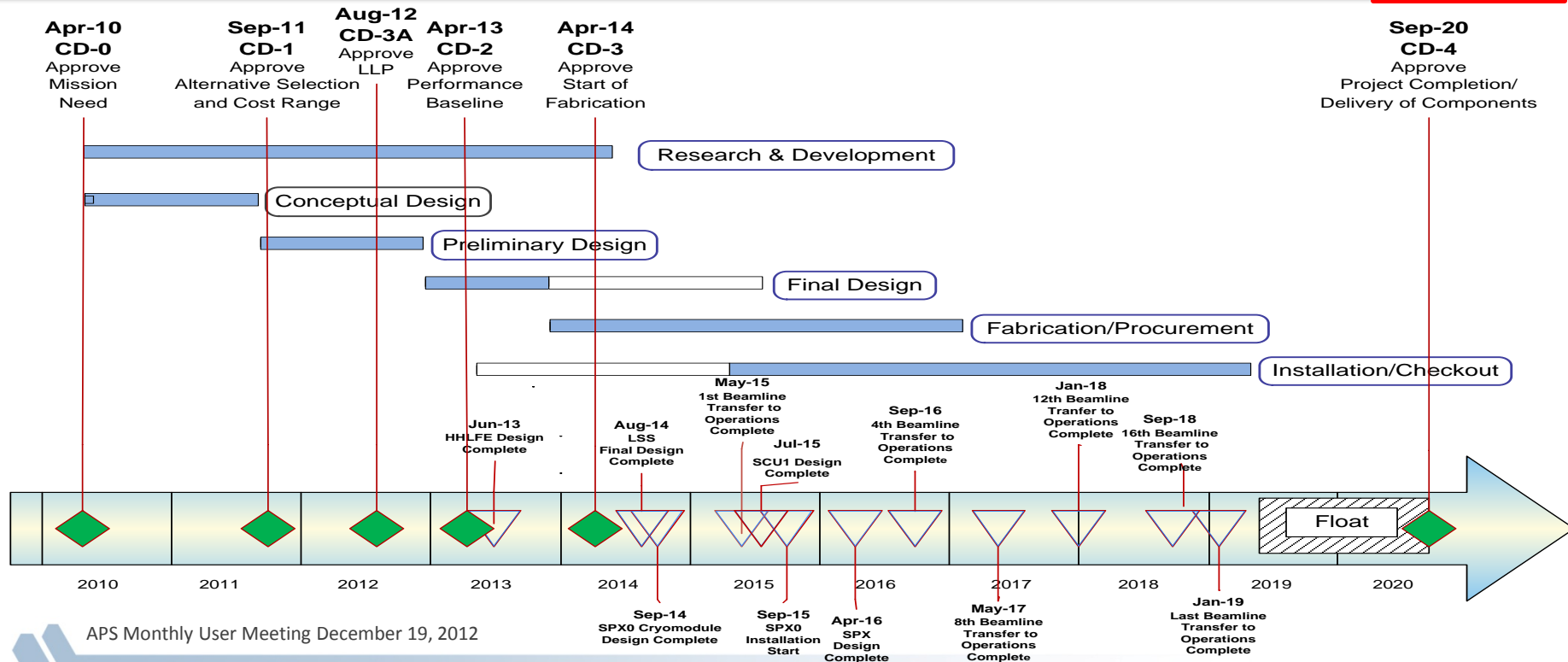
Ted Lavine, DOE/SC

Total count (reviewers + observers): 34



# Proposed Funding Profile and Schedule

	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	F19	FY20	Total
(OPC)	\$1M	\$7.5M										\$8.5M
(MIE)			\$20M	\$20M	\$38M	\$69.5M	\$103M	\$99M	\$33M			\$382.5M
<b>Total Funding Profile</b>	<b>\$1M</b>	<b>\$7.5M</b>	<b>\$20M</b>	<b>\$20M</b>	<b>\$38M</b>	<b>\$69.5M</b>	<b>\$103M</b>	<b>\$99M</b>	<b>\$33M</b>	<b>\$0</b>	<b>\$0</b>	<b>\$391M</b>



# High Level Project Cost Roll-Up

WBS		DIRECT (\$k)		ESCALATION (\$k)	DIV OH + ANL G&A (\$k)	TOTAL (\$k)
		Labor	Non-Labor			
<b>U1</b>	<b>APSU PROJECT</b>					
	01 - PROJECT MANAGEMENT PLANNING & ADMINISTRATION	14,018	16,241	2,833	2,444	35,536
	02 - RESEARCH & DEVELOPMENT (R&D)	7,438	7,909	397	2,043	17,786
	03 - ACCELERATOR SYSTEMS	22,644	38,684	7,679	7,339	76,347
	04 - EXPERIMENTAL FACILITIES	18,359	89,035	13,414	8,119	128,927
	05 - INFRASTRUCTURE & ENABLING TECHNOLOGIES	<u>6,756</u>	<u>19,335</u>	<u>3,134</u>	<u>2,412</u>	<u>31,636</u>
	Sub-total	69,215	171,205	27,457	22,357	290,233
	Available Contingency					100,767
	<b>Total Project Cost</b>					<b>391,000</b>

**Contingency = 34.7%**



# APS Upgrade Scope

## WBS 1.02.01/1.03: Accelerator Systems and Associated R&D

- Short Pulse X-rays (SPX) by transverse rf deflection
- Increased beam stability and 150 mA operation
- 2 Superconducting undulators
- 5 Revolver undulators
- 3 Planar undulators
- 3 Polarizing undulators
- 3 Long straight sections (~7.7 m)

## WBS 1.02.02/1.04: Experimental Facilities and Associated R&D

- 8 New beamlines; 6 Beamline upgrades; 6 Beamline relocations
- Nanofocusing optics development
- High speed detector development
- Resonant inelastic x-ray scattering optics
- High heat load upgrades to beamline optics and components

## WBS 1.05: Infrastructure and Enabling Technologies

- 15 New front ends
- 7 Renovated front ends
- Physical infrastructure for Wide Field Imaging beamline
- Next generation beam position monitors



# Charge to the Review Committee

1. Project Scope: Is the project's scope and specifications sufficiently defined to support the established cost and schedule performance baseline? Is the preliminary design sound and likely to meet the technical performance requirements in the Mission Need Statement?
2. Cost and Schedule: Are the cost and schedule estimates, including life cycle costs, credible for this stage of the project to establish the project performance baseline; and do they include adequate scope, cost and schedule contingency?
3. ES&H/QA: Are the Environment, Safety & Health, and Quality Assurance requirements being properly addressed given the project's current stage of development?
4. Management: Is the project being properly managed at this stage? Does the project organization possess the leadership and staff with sufficient technical expertise and experience to successfully execute the proposed baseline?
5. Prerequisites: Have all of the prerequisite activities and documents necessary to support CD-2 approval been completed? Is the project ready for CD-2?
6. Recommendations: Have the Recommendations from past reviews been appropriately addressed?





# DOE CD-2 Review Outcome

- Lehman Committee recommended to proceed with CD-2
- Next step(s)
  - Respond to CD-2 recommendations and comments
  - Complete the Hazard Analysis Report
  - Finalize the Project Execution Plan
  - Reconcile with the Independent Cost Estimate review recommendations



# DOE CD-2 Review Recommendations and Comments

## Three major categories

- Review labor estimates in Experimental Facilities area
- Define a path forward for SPX
- Define the process of transfer of systems from Project to operation



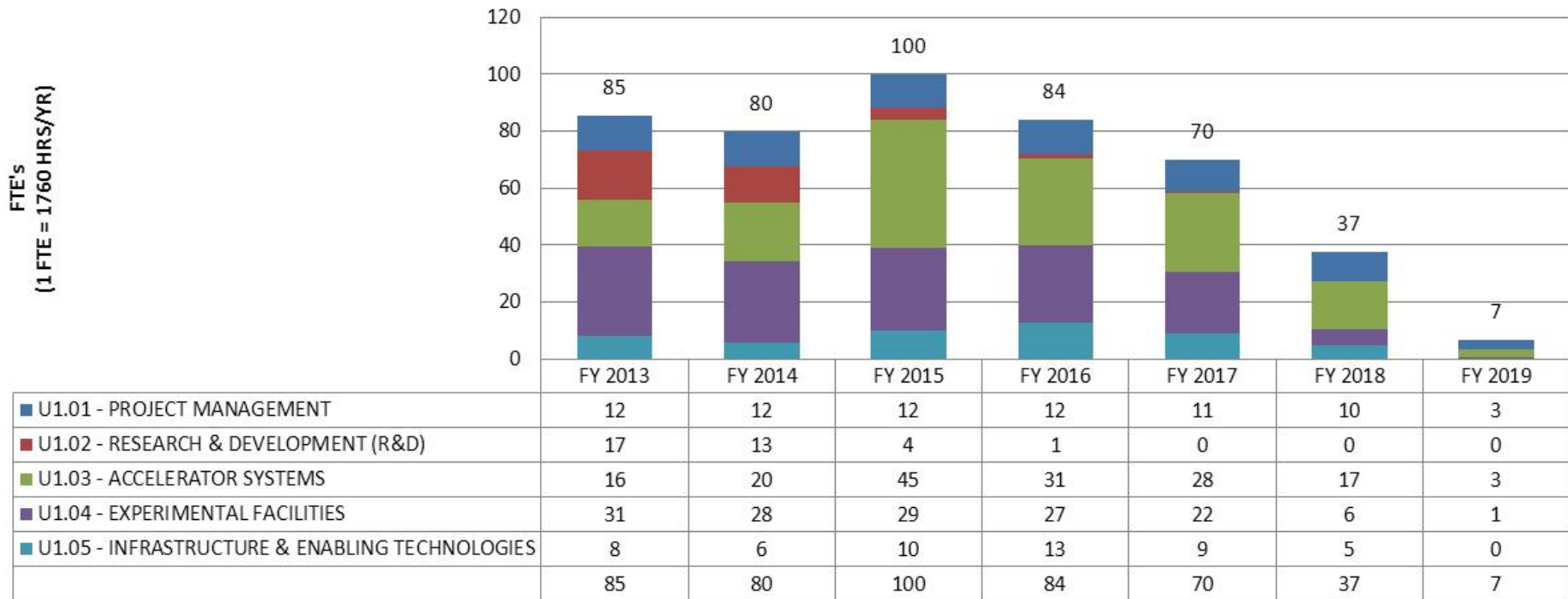
# Other Items

- Hazard Analysis Report is being revised, expected completion by end of December (T. Barkalow)
- Project Execution Plan draft now in Lehman's office for review
- Reconciliation with Independent Cost Estimate complete



# APS Upgrade Staffing Profile by Level 2

APS-U LABOR FTE's by WBS



- Ability to move 5 FTEs (largely driven by moving RIXS beamline forward) in a short time is an advantage of a matrixed system
- Labor is matrixed from the 550 personnel in Photon Sciences, and augmented by contractors, agreements with other ANL Directorates, and MOUs with other National Laboratories



# Next Step in Hiring

- In the process of augmenting staff with critical full-time hires:
  - Deputy Associate Project Manager for Experimental Facilities
  - Short Pulse X-ray Technical Lead
  - Accelerator Physicist
  - Integration Engineer
  - ESH/QA Coordinator



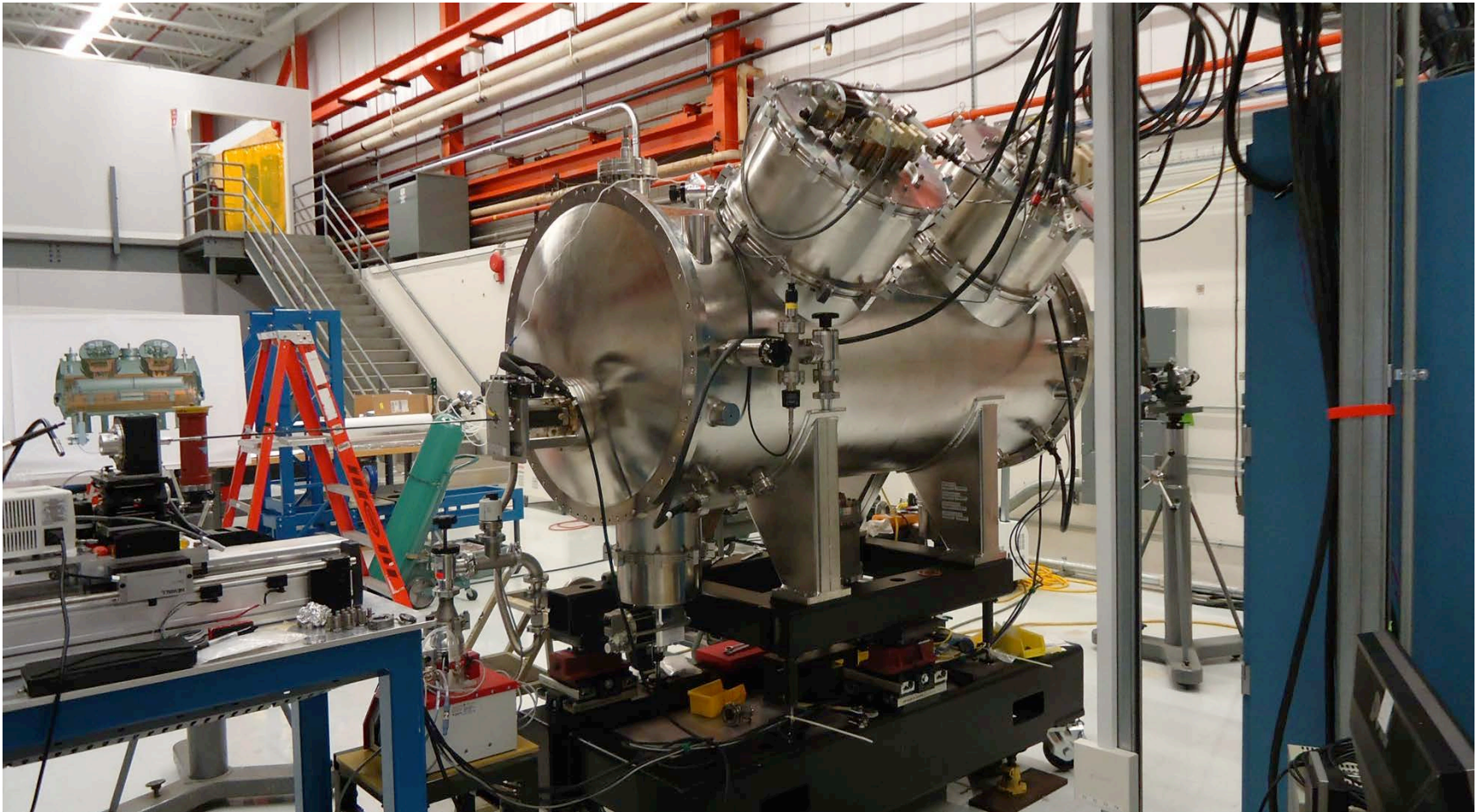
# Update on Long Lead Procurement

- Enclosures for RIXS (\$854.4K) and DCS (\$2.792M)
  - Contract to be awarded by *December 19 (today)*
  - Construction will begin in May (DCS) and continue in September 2013 (RIXS)
- Monochromator for RIXS (\$562K)
  - In procurement
- Front End Components and Grid XBPM (\$200K)
  - Procurement package in preparation



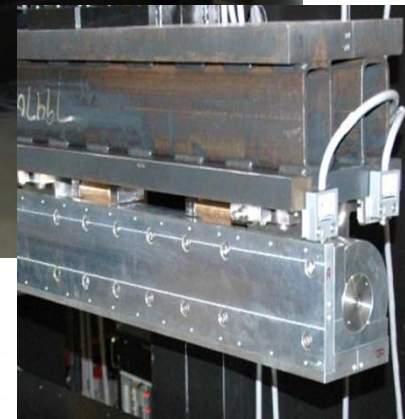
# Assembled SCU0 at the Magnet Measurement Bench

In building 314: ready to be moved to APS



# Revolver Undulators

Two engineering prototypes being tested





# Summary

- APS Upgrade had a successful CD-2 review
- We need to respond to recommendations and comments
- Proceed aggressively with hiring
- Move on to prepare for CD-3 review (anticipate December 2013)
  - Status review (~ Early summer 2013)
  - Final design technical reviews (Summer and Fall 2013)
  - Director's review (Fall 2013)

