PSC PRIORITIES

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Director, Advanced Photon Source
Associate Laboratory Director, Photon Sciences Directorate

October 18, 2017

AGENDA

10:00am	Stephen Streiffer, Introduction
10:10am	Highlights and Future Goals for Divisions Efim Gluskin, Accelerator Systems Division John Connolly, APS Engineering Support Division Jonathan Lang, X-Ray Science Division
10:55am	Jim Kerby, APS Upgrade Update
11:10am	Paul Rossi, Safety

ARGONNE'S 2017 INITIATIVES

Hard x-ray sciences: Transform understanding of materials and chemical systems through 3D x-ray microscopy

Advanced computing: Deploy exascale computer and advance machine learning and quantum and neuromorphic computing

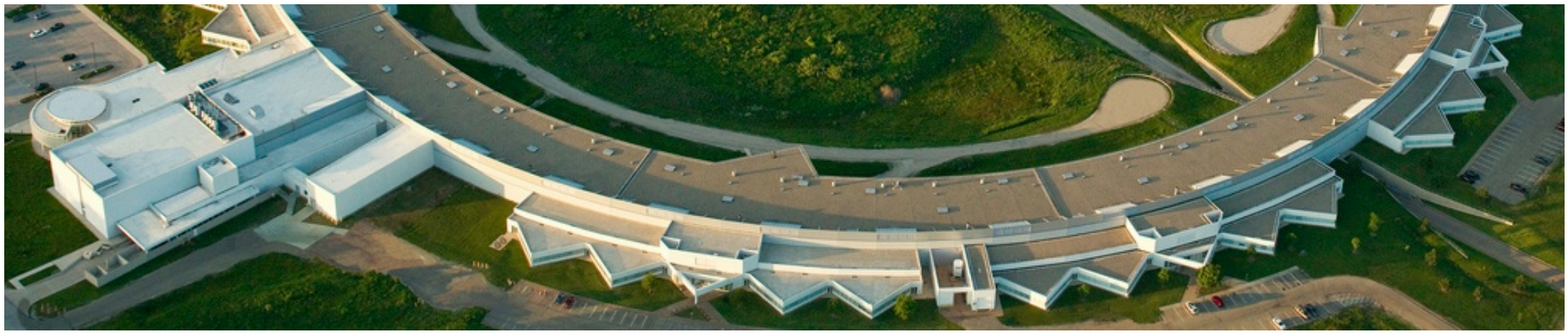
Materials and chemistry: Discover emergent phenomena and synthesize novel materials and chemical systems

The universe as our laboratory: Make leading contributions to physics experiments that explore the early universe and its dynamics

Energy manufacturing science and engineering: Create science-based approaches to speed scaling of manufacturing processes for energy technology

Hard X-Ray Sciences Vision:

Operate and develop hard x-ray user facilities and advance the forefront of x-ray science, transforming exploration of energy, biological and other functional materials, chemistries and systems, to overcome global challenges to sustainable energy, health, and national security.



Our Goals:

- Sustain excellence and improve efficiency in APS operations
  - Maintain the current facility for current and future operations (into the APS-U era)
  - Continue to improve accelerator and beamline capabilities, aligned with APS-U
- APS-U: Upgrade APS to maintain world leadership
- Advance hard x-ray S&T to exploit APS-U x-ray energy, brightness, and coherence
- Leverage leadership computing and math & computer science to meet data science challenges
- Leverage Argonne leadership in hard x-ray science across the Lab
- Develop concepts for future sources and accelerator technologies

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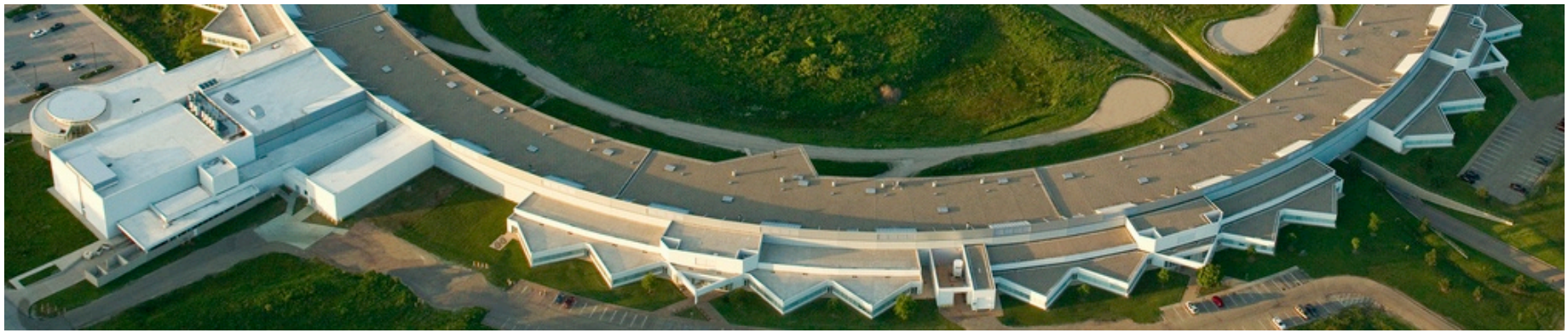
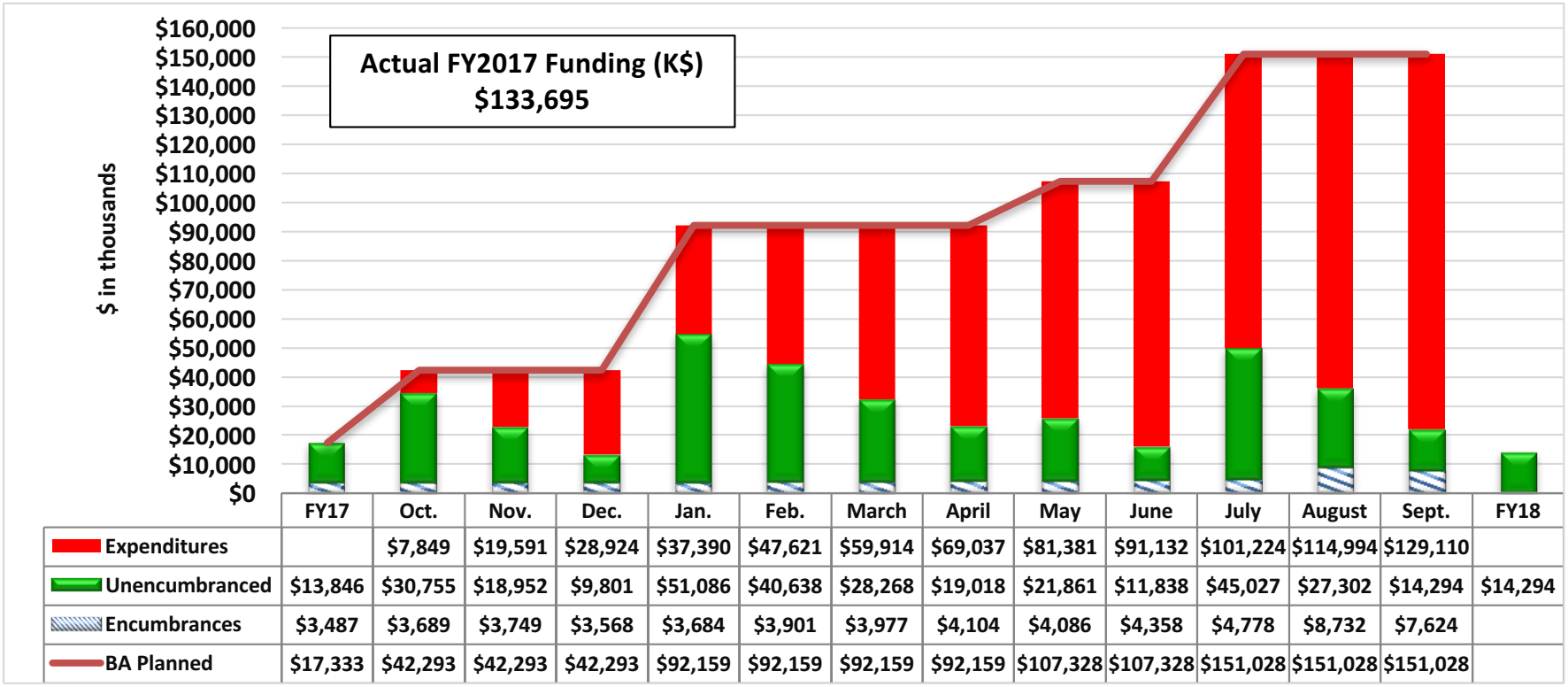


Outcome:

- The world's leading 3D hard x-ray microscope – our upgraded Advanced Photon Source (APS) – will illuminate the structure, chemistry, electronic configuration, topology, and dynamics of materials. chemical systems, and biological systems in unprecedented detail

- Coupled with advances in computing, the upgraded APS will drive breakthroughs in an extraordinarily broad spectrum of science and engineering

APS OPERATIONS – FY17 BUDGET



	FY17	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	August	Sept.	FY18
Expenditures		$7,849	$19,591	$28,924	$37,390	$47,621	$59,914	$69,037	$81,381	$91,132	$101,224	$114,994	$129,110	
Unencumbranced	$13,846	$30,755	$18,952	$9,801	$51,086	$40,638	$28,268	$19,018	$21,861	$11,838	$45,027	$27,302	$14,294	$14,294
Encumbrances	$3,487	$3,689	$3,749	$3,568	$3,684	$3,901	$3,977	$4,104	$4,086	$4,358	$4,778	$8,732	$7,624	
BA Planned	$17,333	$42,293	$42,293	$42,293	$92,159	$92,159	$92,159	$92,159	$107,328	$107,328	$151,028	$151,028	$151,028	

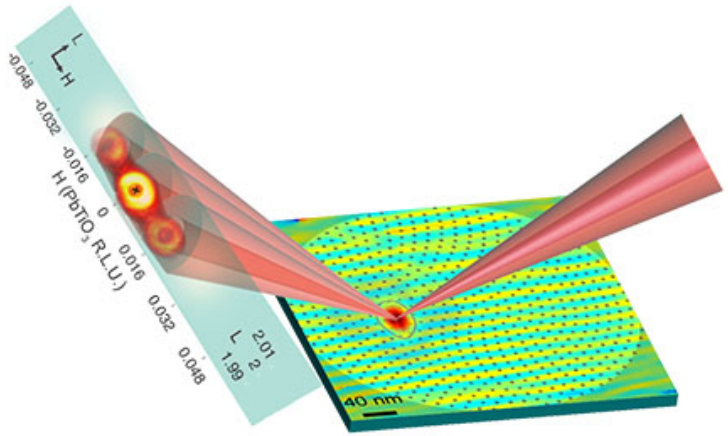
FY18: Continuing Resolution in place through December 8th
House and Senate marks flat to FY17

APS-U PROJECT DIRECTOR SEARCH CONCLUDED

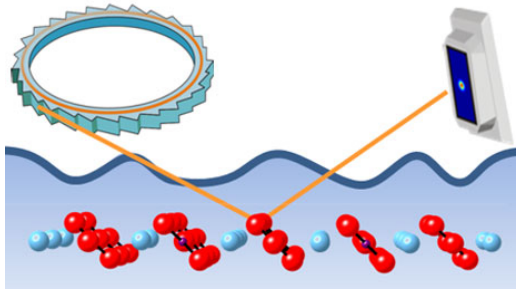
- Bob Hettel named APS Upgrade Director
  - Acting Head of the Accelerator Research Division at SLAC
- Tentative start date: November 27, 2017

ARGONNE'S PROGRAMMATIC DIVISIONS HAVE STRONG PROGRAMS UTILIZING APS

- MSD
  - Synchrotron Studies of Materials
  - Neutron and X-Ray Scattering
  - Emerging Materials



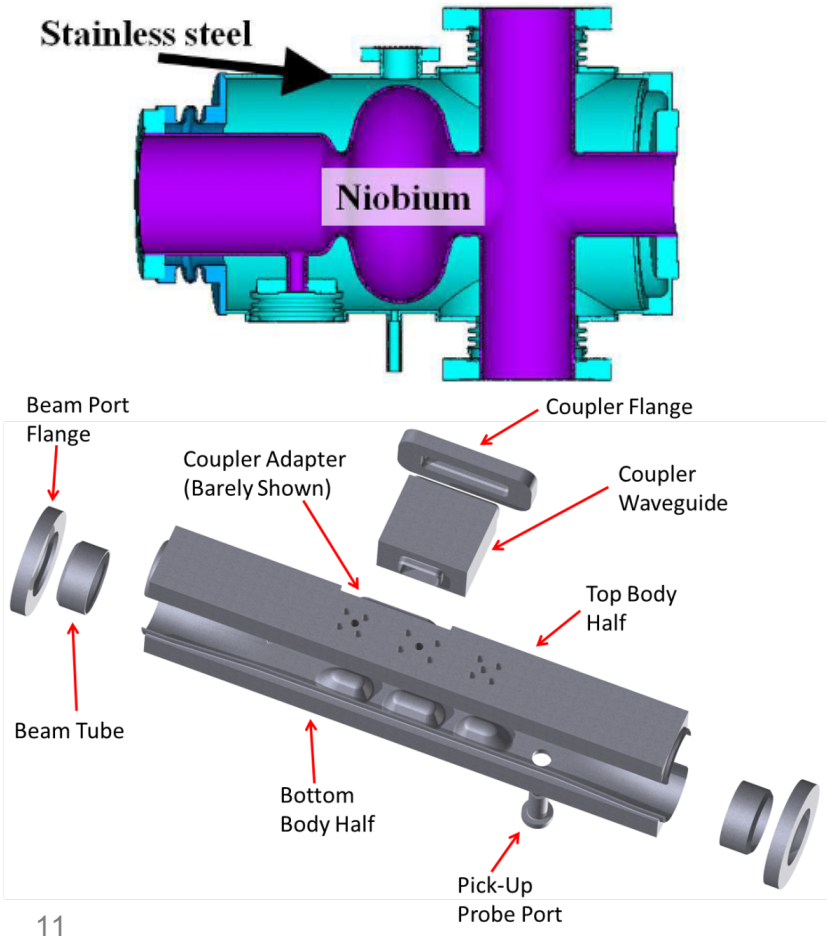
- CSE
  - Catalysis
  - Neutron and X-Ray Scattering
  - Atomic, Molecular, and Optical Physics
  - Electrochemical Energy Storage
  - Heavy Elements and Separation Sciences
  - Interfacial Processes
  - Solar Energy Conversion



COLLABORATIVE WORK WITH PHYSICS DIVISION

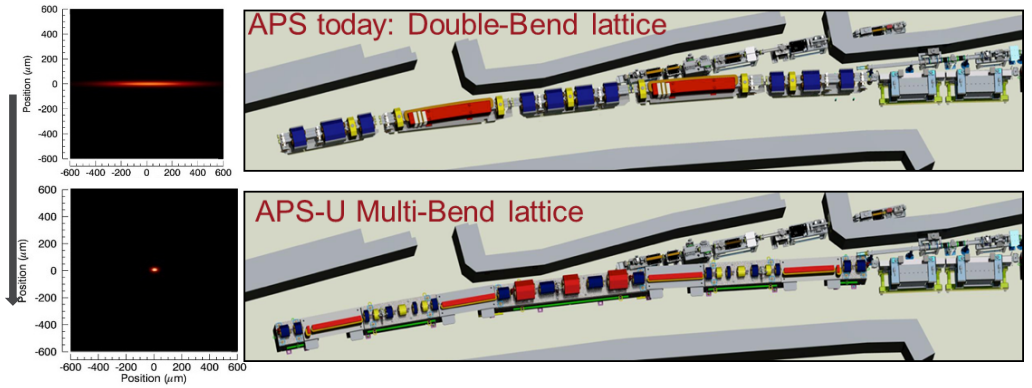
Development of superconducting harmonic cavity for APS-U

QMiR: Quasi Waveguide Multi Cell Resonator – conceived and developed together with PHYS for SPX and now could be potentially used at SPEAR



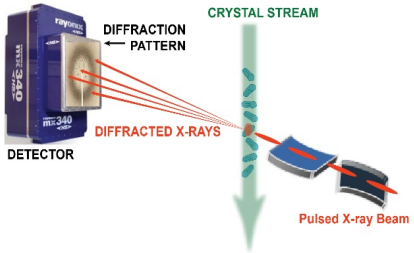
THE APS UPGRADE:
BUILDING A WORLD LEADING HARD X-RAY FACILITY

- Design optimized to provide orders of magnitude improvements in brightness, coherent flux, and nano-focused flux
- MBA lattice optimized with reverse bends, reduces emittance from 67 pm to 42 pm
- Beamline selection and roadmap complete
- Technical prototypes well along; Preliminary Design Report draft complete; a few procurements starting



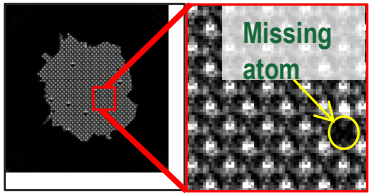
Small-Beam Scattering & Spectroscopy

Nanometer imaging with chemical and structural contrast; few-atom sensitivity
Room-temperature, serial, single-pulse pink beam macromolecular crystallography



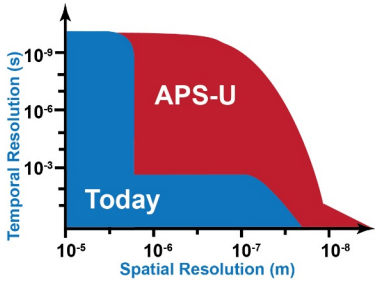
Coherent Scattering & Imaging

Highest possible spatial resolution: 3D visualization; imaging of defects, disordered heterogeneous materials
XPCS to probe continuous processes from nsec onward, opening up 5 orders of magnitude in time inaccessible today,



Resolution @ Speed

Mapping all of the critical atoms in a cubic millimeter
Detecting and following rare events
Multiscale imaging: enormous fields of view with high resolution



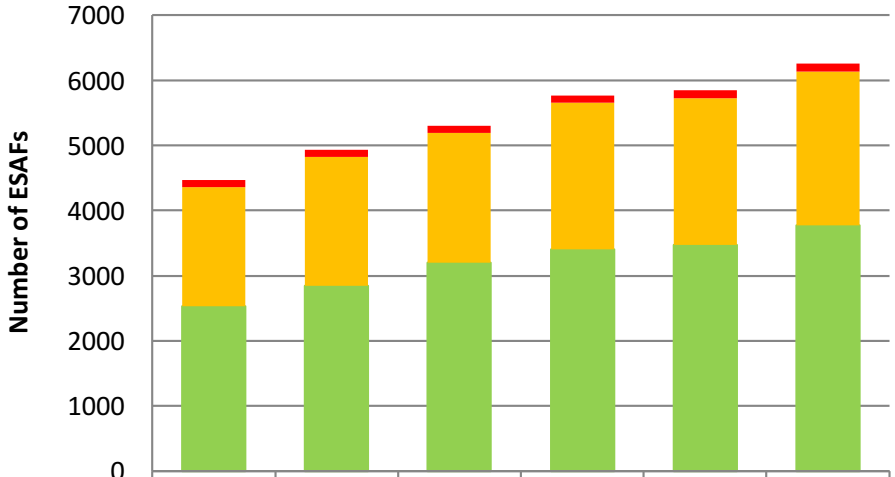
Argonne NATIONAL LABORATORY

SAFETY

- APS has integrated Work Planning and Control, ESH, and Rad Protection programs, that allow efficient and safe operation for a very large number of users, and for operations

- Focus areas for safety – we strive to do better!
  - Management accountability
  - Individual implementation at the point of work
  - “Listening down, talking up”
  - Learning and improving

ESAFs increased 40% from 2011 to 2016



	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016
High	114	111	120	110	111	118
Medium	1834	1982	1990	2253	2259	2372
Low	2526	2840	3196	3397	3469	3766
Totals*	**4474**	**4933**	**5306**	**5760**	**5839**	**6256**

*Includes experiments which don’t use x-rays.

PSC IS COMMITTED TO A DIVERSE AND INCLUSIVE CULTURE

REMINDER: Complete the Next Step Survey, closing Friday!
https://www.surveymonkey.com/r/Argonne2017NextStep

DIVERSITY
Any difference that makes a difference

INCLUSION
Getting people fully engaged

Working Group Co-chairs: R. Bradford, P. Fernandez (stepping down), S. Vogt (coming on)

Vision – An inclusive work environment, committed to diversity, where everyone feels valued and is empowered to be able to develop their talents, providing the greatest opportunities for the individual, and the greatest benefit to the facility.

Mission –To work with PSC management to develop action plans, and to identify metrics for determining the efficacy of the actions.

Current areas of emphasis:

1. Exclusionary Behavior
2. Leadership Development
3. Commitment to D&I Principles

Thank you!