

APRIL 27, 2022

PSC ALL-HANDS MEETING

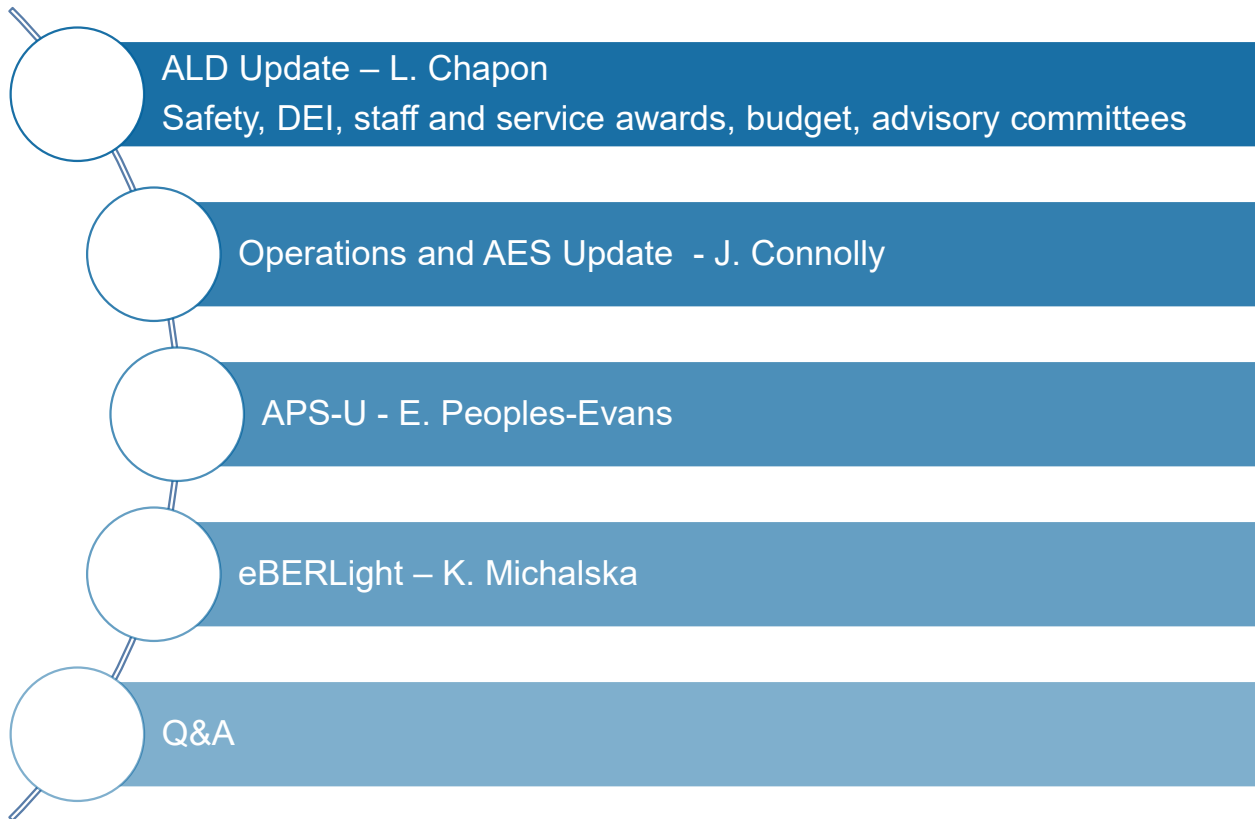
LAURENT C. CHAPON
Associate Laboratory Director for Photon Sciences
APS Director



Argonne National Laboratory is a
U.S. Department of Energy laboratory
managed by UChicago Argonne, LLC.

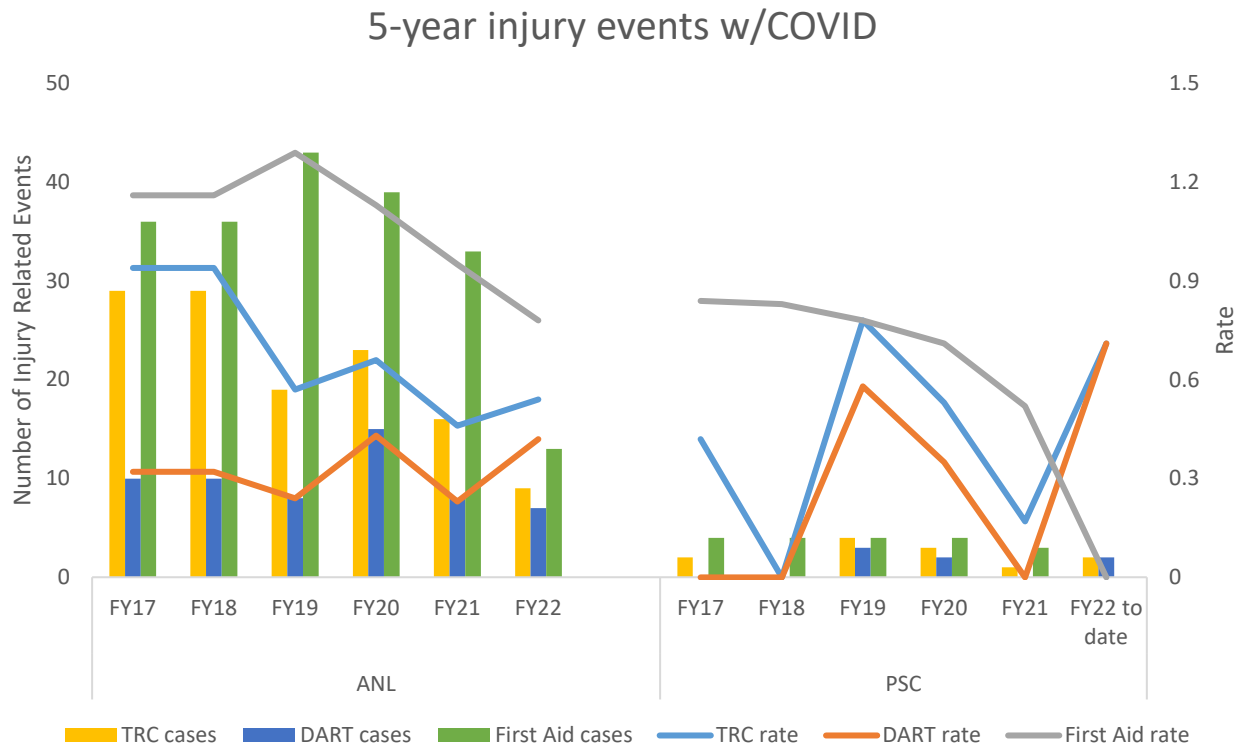


OUTLINE



SAFETY

Photon Sciences safety record is excellent for FY22



SAFETY

- **APS Confined-Fire Event**

- Foam added to catch-tank to muffle sound
- Foam tested at ARL facilities with >100 shots prior to this experiment



- **DOE Assessment of Work Planning and Control**

- Office of Enterprise Assessments concluding WPC Assessment
 - Expecting draft report mid-May

DEI

- Many thanks to Fanny Rodolakis (DEI Council Chair) and Becky Sikes (co-Chair) for their work.
- National GEM (Graduate Education for Minorities) Consortium
 - PSC is doubling the number of GEM students in 2022 (5 have accepted, 1 pending).
- Doing some research on double-blind reviews
- Bringing DEI discussion to the APS/CNM Users Meeting
- Working with APSUO to have a more diverse representation in the user organization and democratize access to newcomers
- DEI initiative across the 5 light sources as part of the 5-way meeting.

APS UPGRADE PROJECT MANAGEMENT

- **Jim Kerby** has been appointed APS-U project director
- **Elmie Peoples-Evans** has been appointed APS-U project manager



Jim Kerby



Elmie Peoples-Evans

ARGONNE IMPACT AWARD WINNERS

Extraordinary Effort

- Randy Brown, Jessie Morales, Valerie Rivas, Ryan Roberts,
- Grace Lynch, Yiying Ge, Sue Benda, Jade Thomas, Jeff Toeller
- Mike Bracken, Daniel Burke, Debra Curry, John Dench, Robert Furst, Noel Gonzales, Nicholas Kubinski, Brian Poncin, Taino Winfrey
- Zou Finfrock, Steve Heald, Hwang Inhui, Debora Motta Meira, Mike Pape, Aleks Mikhail, Chengjun Sun, Erik Sarnello
- Frank Skrzecz, Stan Wiedmeyer, Jeremy Carvelli, Greg Fystro
- Ibrahim Kesgin
- Bill Guszczko, Joseph Vanis, Thomas Meier, Robert Vargas
- Colleen Trattner
- Ralph Bechtold
- Joe Budz
- Curt Forth, Aleksander Marcetic, Chris Sawatski

25+ YEARS SERVICE AWARDS

25 years: Frederick Carter, Jessica Skwarek

30 years: Joseph Gagliano, Patricia Cameli, David Meyer, Douglas Horan, Anthony Puttkammer, Martin Smith, Gian Trento

35 years: Ralph Bechtold

40 years: Mary Westbrook

AWARDS & RECOGNITIONS

Kamlesh Suthar (AES) was selected for the Strategic Program for Innovation at National Laboratories

Suresh Narayanan (XSD) is the winner of the 2022 APSUO Gopal K. Shenoy Excellence in Beamline Science Award

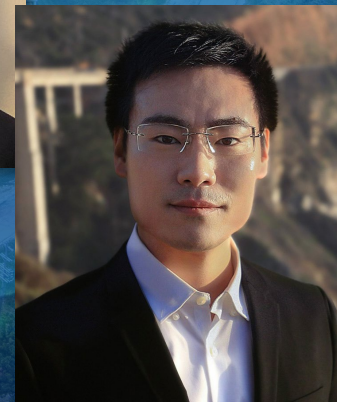
Qilin Guo (University of Wisconsin-Madison) is the 2022 APSUO Rosalind Franklin Young Investigator Award winner



Kamlesh Suthar



Suresh Narayanan



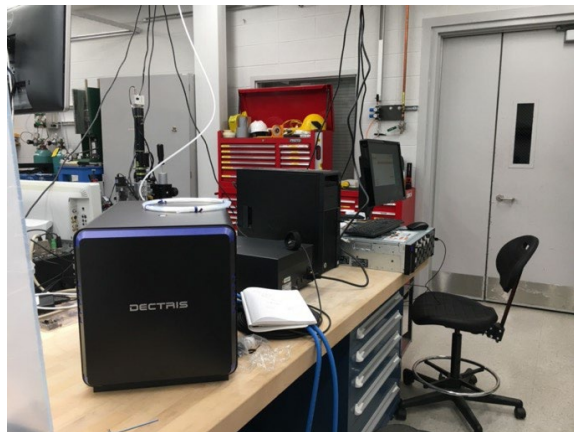
Qilin Guo

XSD & ASD HIGHLIGHTS



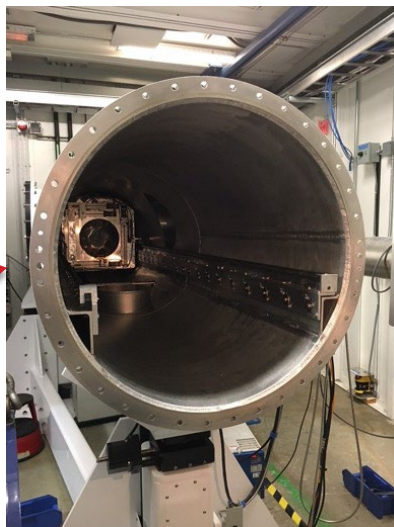
PSC All Hands Meeting
April 27, 2022

XSD: DETECTOR UPGRADE AT @ 12-ID-B

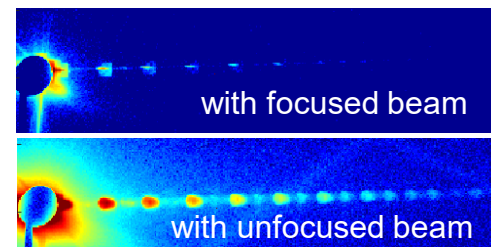


Detector bench test Dec 21

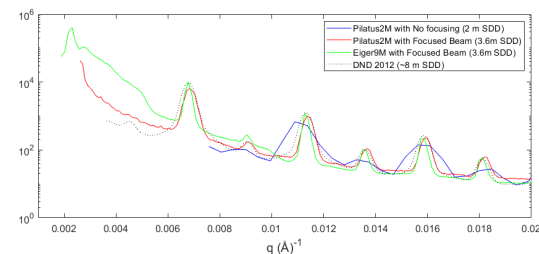
Sensitive area 233 x 245 mm² (75 x 75 μm²)
Dynamic range: 20bits
Frame rate: 40Hz (S version >25% cheaper)
Count rate: 1E7/pixel
QE @12keV: 86%
Operation pressure: <1E-2 mbar



Preparation of SAXS tube for detector installation Jan 22



Comparison of data taken with previous (top) and new detector (bottom)

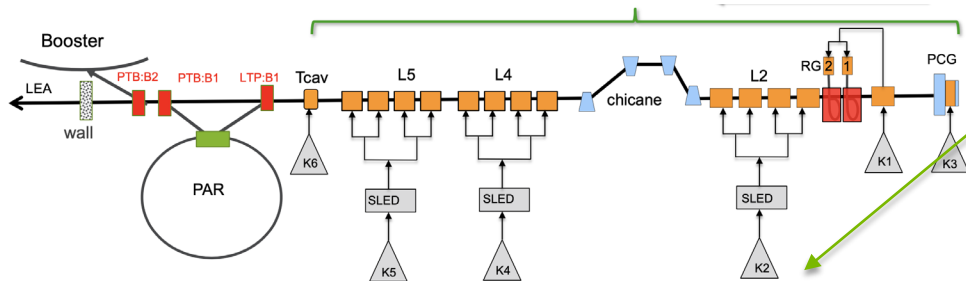


Xiaobing Zuo, Chuck Kurtz, Soenke Seifert, Alexis Quental, Byeongdu Lee, Kevin Peterson, Antonino Micelli

ASD: APS LINAC REFURBISHMENT: FIRST NEW MODULATOR/KLYSTRON BEING INSTALLED IN K2

Address obsolescence issues in the APS linac to support APS-U operation

Perfect fit!



APS linac

IMPACT, BUDGET, AND ADVISORY COMMITTEES

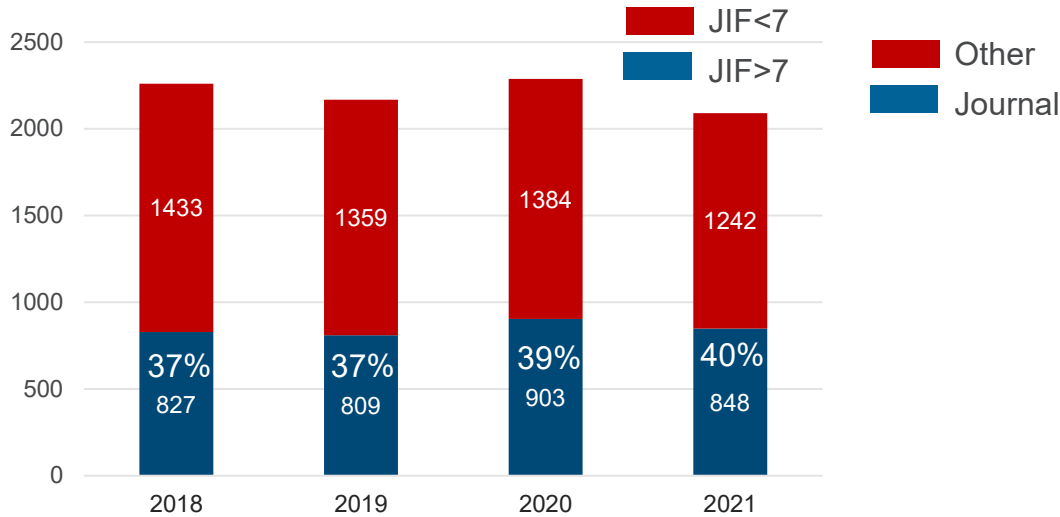


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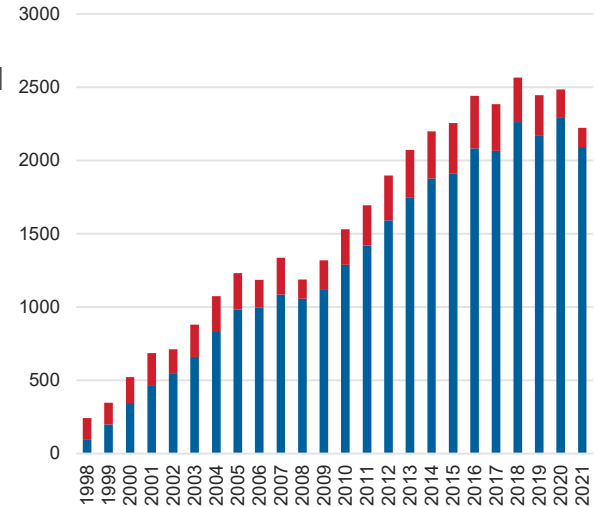
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APS PUBLICATIONS DATA



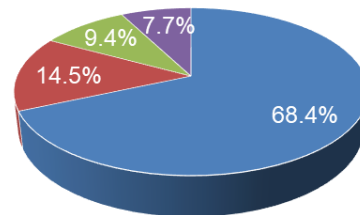
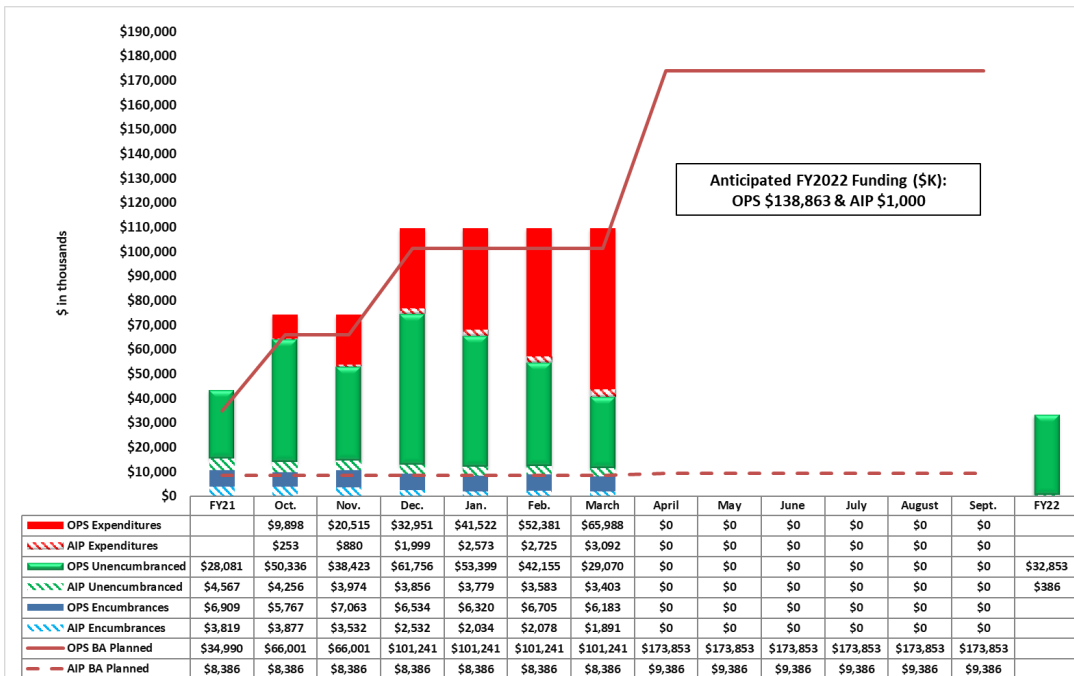
Peer-reviewed APS journal articles JIF>7, JIF<7, CY2018-CY2021

All APS publications, CY1998-CY2021



APS OPERATIONS – FY22 BUDGET

- Funding some 2.5% above FY21 budget (across light sources)
- OPS will spend ~\$150M in FY22
- Effort spending on track – use correct WBS, confirm project with CAM for APS OPS projects
- If possible, submit purchase requisitions for materials and supplies so funds can be spent in FY22

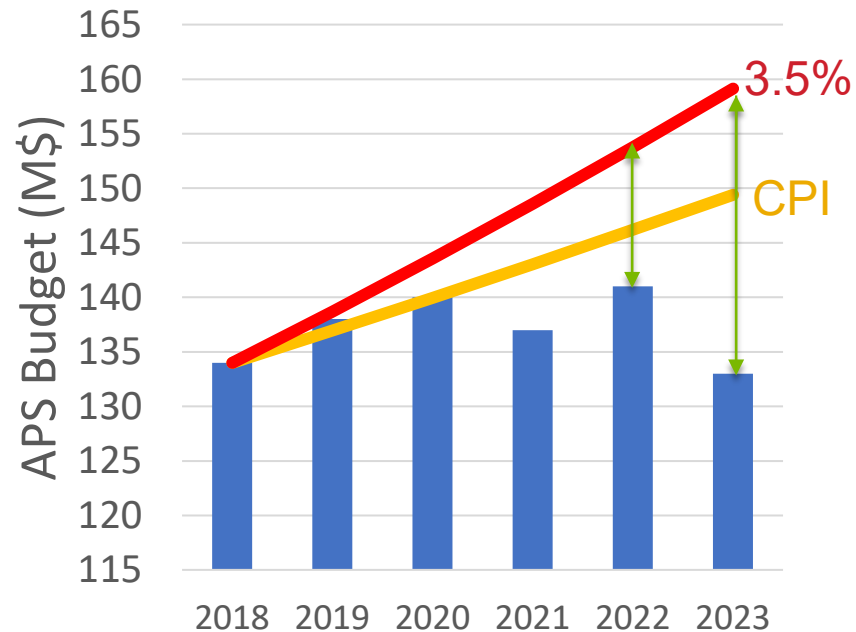


- Effort
- Space & Power
- Recurring Materials & Supplies
- Projects and Non-Recurring

BUDGET UPDATE

- U.S. light sources budget (PBR) down by 5.3% in FY23
- Opportunities to revise before appropriations
- Discussing impact and strategy across light sources and national laboratories

Year	APS budget	DOE light Sources budget
FY18	\$134 M	\$489 M
FY19	\$138 M	\$505 M
FY20	\$140 M	\$519 M
FY21	\$137 M	\$525 M
FY22	\$141 M	\$538 M
FY23	\$133 M	\$509 M (PBR)



ADVISORY COMMITTEE SAC/MAC

SAC held on April 6-7.

- Discussed the staffing level on beamlines, support for operation of XSD beamlines critically low on many instruments.
- Threat to user service, but also innovation and development of a talented workforce.
- Sustained low level will have longstanding impacts.
- Discussed selection of first experiments at APS-U and guidance on commissioning plan.

Restarting the MAC (Bob Hettel)

- Assess whether the APS accelerator program is on a trajectory that will allow success during each phases and the ultimate return to reliable operation at the conclusion of the APS-U project
- It will also assist the APS in making decisions for the refurbishment of key accelerator components and future plans for the facility

APS OPERATIONS & AES HIGHLIGHTS



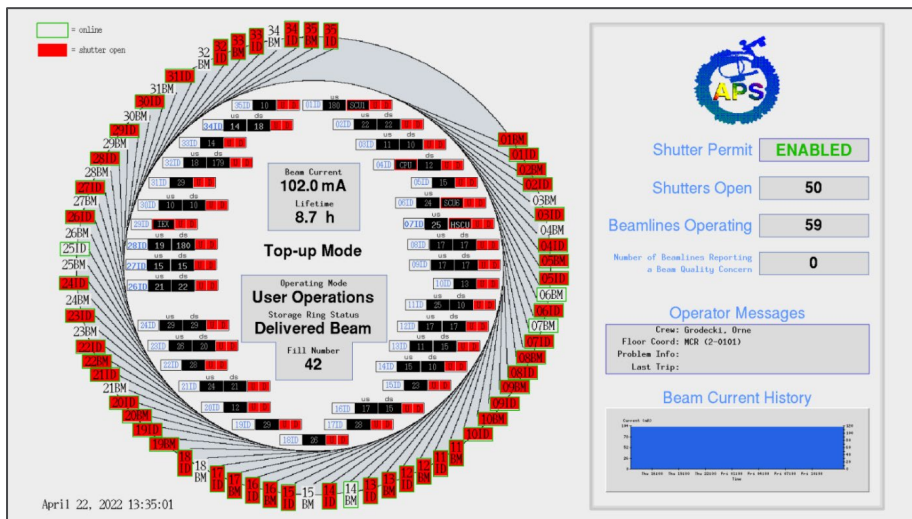
JOHN CONNOLLY
Deputy ALD for Operations
Photon Sciences Directorate

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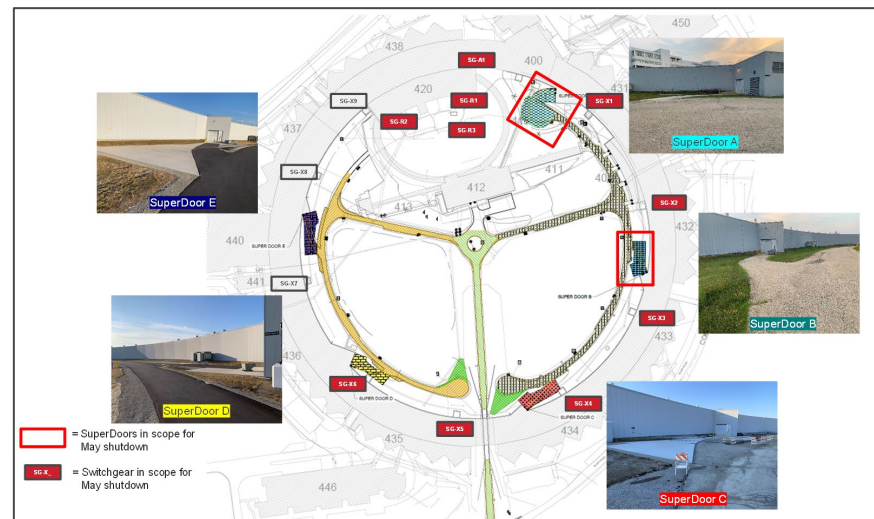
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APS OPERATIONS UPDATE



APS Operations dashboard on April 22, 2022

- APS accelerator complex: 96.96% uptime, MTBF ~54 hrs
- 11 faults >2 hours
- No faults appear to be systemic other than RF4 trips
- Hosting ~180 users onsite/week
- **DuPage County CDC Comm. Level moved to “Medium” Apr 21**



APS Power Shutdown Scope for early May 2022

- Maintenance outage starts Apr 28; user run turnover May 31
- Power shutdown (13.2 kV) for SuperDoor A & B concrete Power off on May 3, power restored on May 6
- Completion of last 2 FEEPS upgrades
- Replacement of L2 water skid

GAP WORKSHOP (APS OPS / APS-U)

- Numerous sessions held previously across six topical discussion areas to identify gaps
- Update in mid February 2022 regarding output consolidation and chartered efforts to close gaps
- Ten focused charters developed with supporting teams to address as one PSC organization
- Current status of projects provided below; many draft or final responses to date
- Next steps will be finalization of responses, review and formalizing implementation actions

Charge Title	Lead Division / Assignee	Project Lead(s)	Status	Deliverable Date	Implementation
Injector Readiness	ASD (Byrd)	Borland	In Progress	May 31, 2022	Before dark time
Control System Software Readiness	ASD (Byrd)	Shen	Draft Report	April 29, 2022	Before SR commissioning
RF Readiness	ASD (Byrd)	Nassiri, Horan	Draft Report	April 29, 2022	Before SR commissioning
Water System Continuity	AES (Edelen)	Swetin	Final Report	March 15, 2022	Before dark time
Component Harvesting and Configuration	APS-U (Kerby, Peoples-Evans)	Erdmann	Draft Report	April 29, 2022	Before dark time
Integration Structure	APS-U (Kerby, Peoples Evans)	Cease, Pile	In Progress	April 29, 2022	Before dark time
Experiment Hall Temperature, Vibration, Acoustic	XSD (Lang)	Preissner, Collins	In Progress	May 31, 2022	Before first experiments
Optical Component Testing	XSD (Lang)	Shi	In Progress	April 29, 2022	Before first experiments
Power and Load Adequacy	PSC (Connolly)	Doktorczyk	Draft Report	April 29, 2022	Before dark time
Preventative Maintenance and Spares Program	PSC (Connolly)	Toeller	In Progress	April 29, 2022	Before first experiments

HELIUM SUPPLY – LIQUID AND GASEOUS



▪ Liquid Helium (LHe):

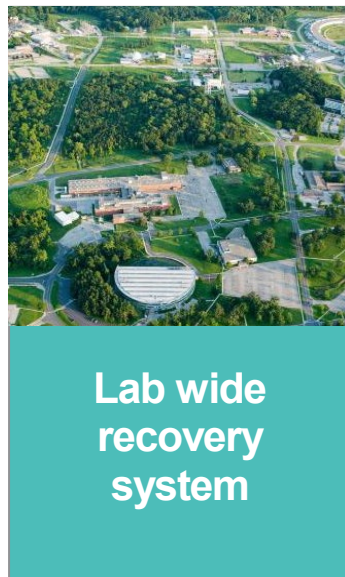
- Price increase from \$7.48 to \$13.50/L effective May 1
- Monthly allocation for Lab: 3600 L; PSC allocated 1700 L/month
- LHe provided on prioritized basis by project
- PSC opted no supplemental LHe (\$65/liter); PSE concurred
- Focus on sitewide LHe recovery system: 400-area operational by Aug 2022

▪ Gaseous Helium

- Monthly allocation for Lab: 98 cylinders; PSC allocated 82 cylinders and weekly quota
- Gaseous helium provided on prorated basis using historical consumption levels
- Pursuing certification that could increase vendor supply

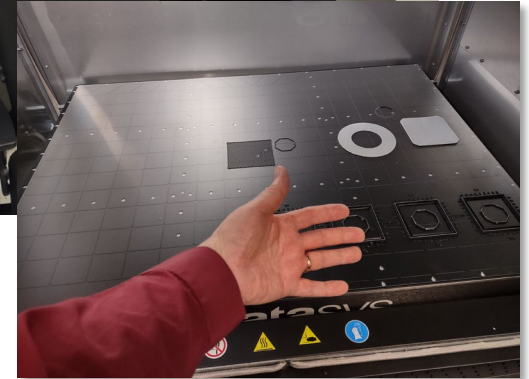
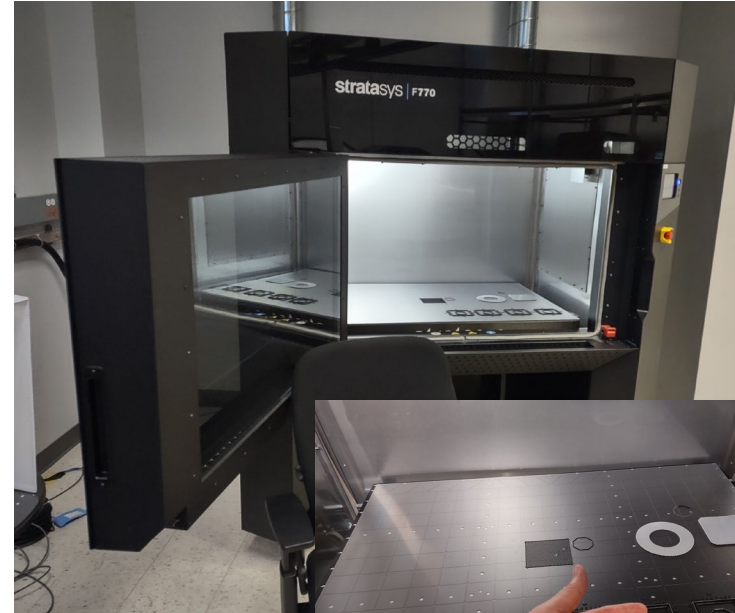
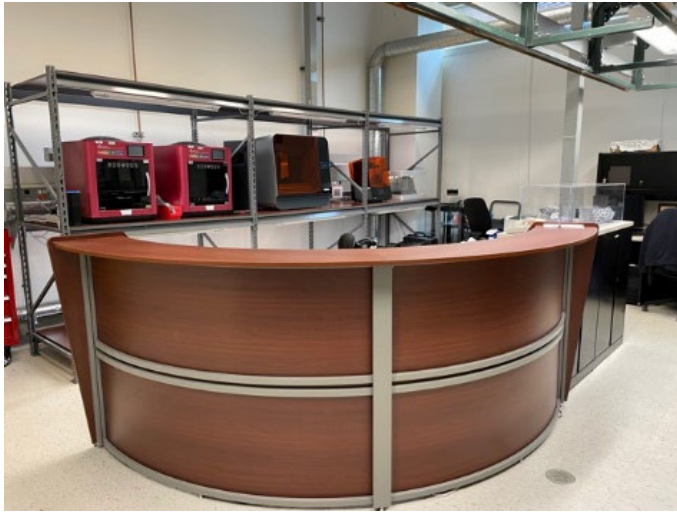
HELIUM CRISIS

- Helium shortage (liquid, gas)
- Threat to operations
- PSC- ANL coordinating strategies



DESIGN AND DRAFTING GROUP – ADDITIVE MANUFACTURING FACILITY

- Produced >3000 parts in last year
 - 75% for beamlines
- Stratasys F770 – extra large format FDM to print items up to 1 meter long



INFORMATION TECHNOLOGY

- Fiber infrastructure upgrade
- Sector 16 network updates



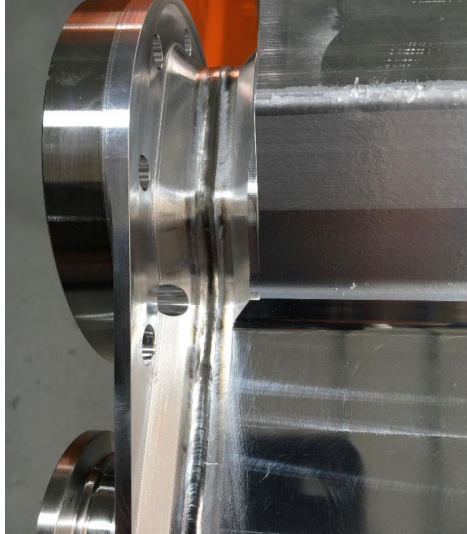
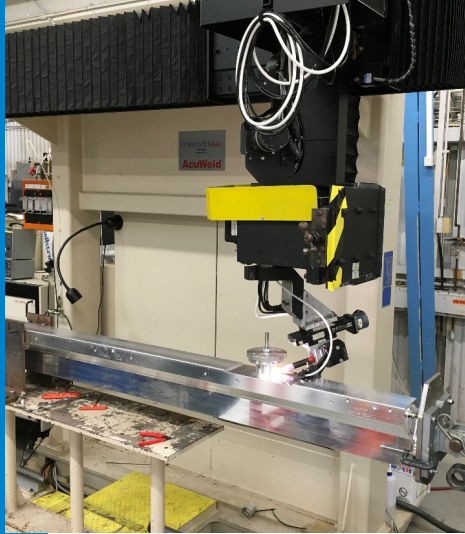
Fiber shelves in APS datacenter for accelerator, beamlines, LOMs



Accelerator Cluster disk storage – two HPE nimble storage chassis



S16 network isolation boxes

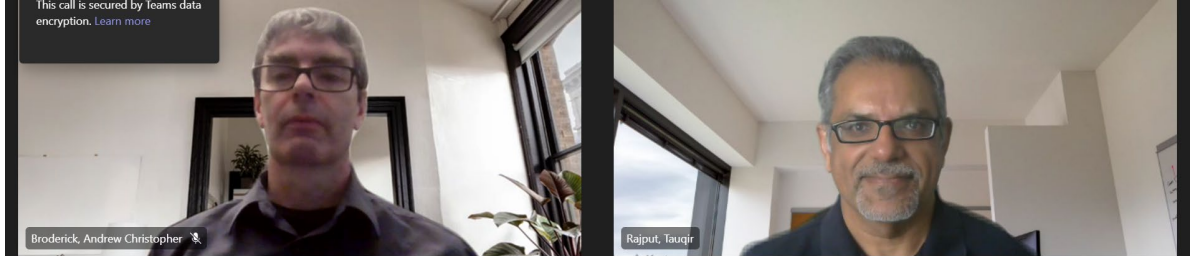


L-BEND VACUUM CHAMBER PRODUCTION FOR APS-U

- 5 different styles of vacuum chamber, total of 180
- Production includes assembly, welding, cleaning, bakeout, vacuum certification
- 4 chambers completed
- 19 chambers welded; undergoing processing

INFORMATION SOLUTIONS

- New initiatives include:
 - ORCID integration
 - Beamline scheduling system deployed
 - Argonne Single Sign ON for Business Objects
 - Upgrade ICMS repository
 - Universal Proposal Management System collaboration w/BNL, SLAC



APS-U PROJECT UPDATE



Elmie Peoples-Evans
APS Upgrade Project Manager
PSC All Hands Meeting
April 27, 2022



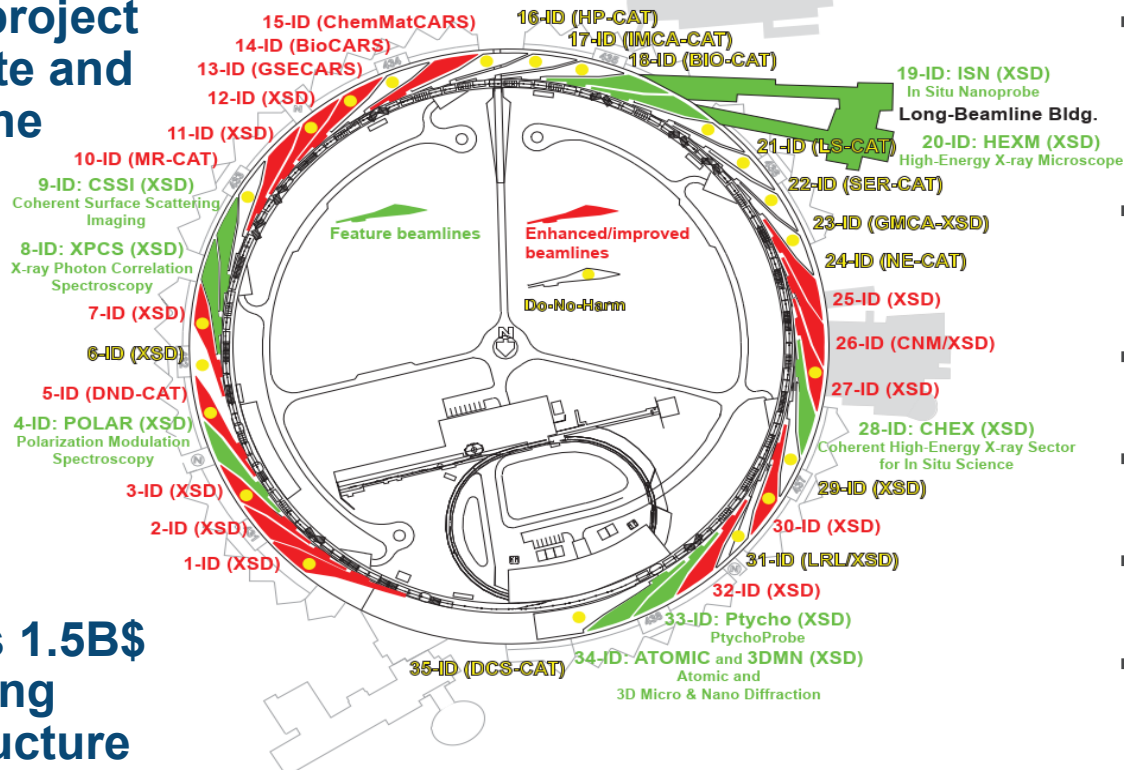
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January 26, 2022, PSC All Hands Meeting

APS-U PROJECT SCOPE

815M\$ project to update and renew the facility

Re-uses 1.5B\$ in existing infrastructure



- New storage ring: 42-pm emittance @ 6 GeV, 200 mA
- New and updated insertion devices, including superconducting undulators (SCUs)
- Combined result in brightness increases of up to 500x
- 9 new feature beamlines + Long Beamline Bldg.
- 15 enhanced and improved beamlines
- “Do no harm” beamlines; realign 17 bend magnet lines
- Exploit high-performance computing, AI



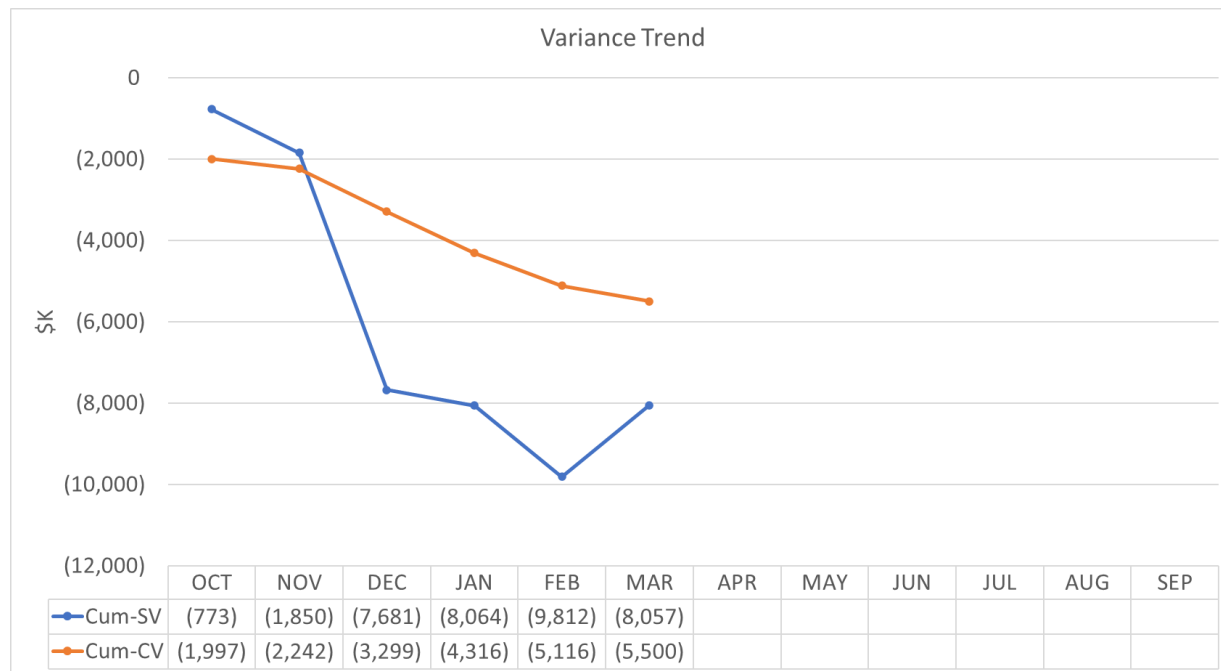
RECENT SUCCESSES

- Acceptance and testing of components in full swing across the project
- L-Bend vacuum chamber welding ramping up in 382
- Polar beamline 2T magnet tested and commissioned
- Vendors continue to make progress in production efforts



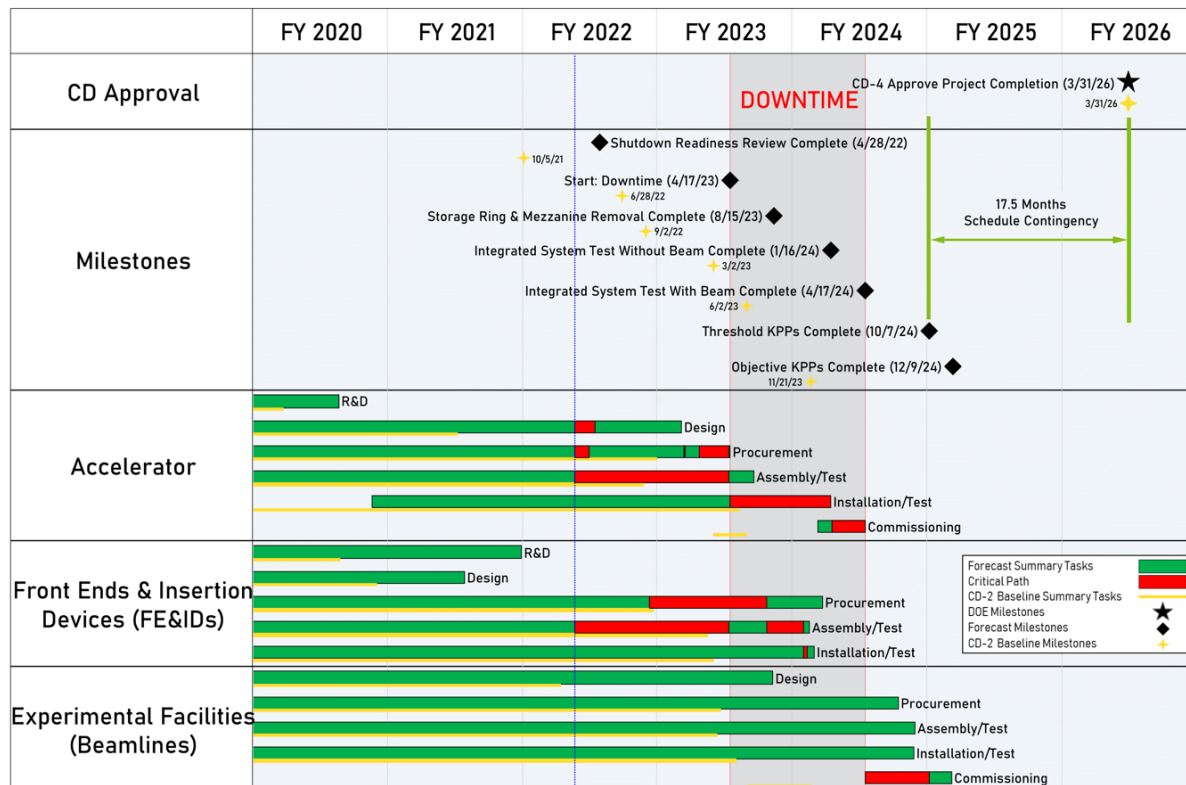
NEWS AND UPDATES

- COVID and supply chain effects continue to impact the cost and schedule contingency of the project
- \$63M available cost contingency is 23.6% on work to go, 30% recommended @ this stage of the project, ~\$17M gap
- Large uncertainties remain in this volatile market; thus, some scope has been deferred while we manage the situation
- Technical and procurement teams working hard to minimize vendor delays, including visiting vendors
- Great job team receipting and accepting items in March



APS-U PROJECT STATUS

- Project is 65% complete; cumulative CPI 0.97, SPI 0.95 (March)
- Start of the shutdown driven by accelerator and front-end assembly work; project completion driven by beamline completion
- Project team working hard to hold the April 2022 downtime start date
- 1st shutdown readiness review to help prepare for the start of the downtime, and the 12-month execution plan, planned for June 2022
- Getting procurements out for bid is the main priority at this time



SUMMARY

- APS-U Project team is focused on
 - Receipt, assembly, and testing
 - Completing procurement packages and issuing bids
 - Mitigating COVID and associated supply chain ripples
- Contingency situation remains marginal; project, Laboratory, and Program working together to mitigate effects
- Upcoming Reviews
 - Dry Run Shutdown Preparedness Review: June 6-8, 2022
 - Shutdown Preparedness Review: August 2022
 - Machine Advisory Committee (MAC): September 2022
 - Experimental Systems Advisory Committee (ESAC): September 2022
 - Accelerator Readiness Review Status Update: September 2022
 - Director's Review: September/October 2022
 - DOE Status Review: November 2022
- Thanks for your continued efforts, we're looking forward to bringing the upgraded APS to life!

COMMUNICATIONS

Bookmark for the latest news and information

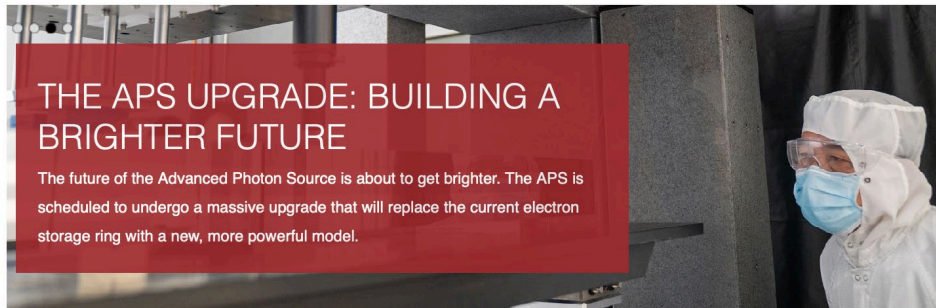
REDESIGNED APS Upgrade web page on the APS website

- <https://www.aps.anl.gov/APS-Upgrade>

APS Upgrade web page on the Argonne website

- <https://www.anl.gov/aps-upgrade>

The **Advanced Photon Source**
a U.S. Department of Energy Office of Science User Facility



[APS Upgrade Home](#)

[About the APS Upgrade](#)

[FAQ](#)

[New Storage Ring](#)

[Feature Beamlines](#)

[Videos](#)

[People of the APS Upgrade](#)

INSTALLATION PERIOD CURRENTLY SCHEDULED TO BEGIN APRIL 17, 2023

The APS Upgrade storage ring installation period, during which the APS will pause operations for one year, is currently scheduled to begin on April 17, 2023. The APS will operate throughout 2022 and will schedule an operations run early in 2023, though the exact schedule has not been determined. The upgraded APS will return to operations after the 12-month installation and commissioning period, though initial operations will be at reduced current and availability as the machine is tuned up. Regular updates will be provided on this website.

27 APRIL 2022

eBERlight – a Virtual CAT for the Biological and Environmental Research Community

KAROLINA MICHALSKA

Structural Biologist

SBC-XSD

Photon Sciences Directorate



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STRUCTURAL BIOLOGY CENTER TRANSITIONING TO eBERlight

Current status

- SBC is funded by DOE Biological and Environmental Research
- Operates 2 MX beamlines (19-ID, 19-BM) for the general user community

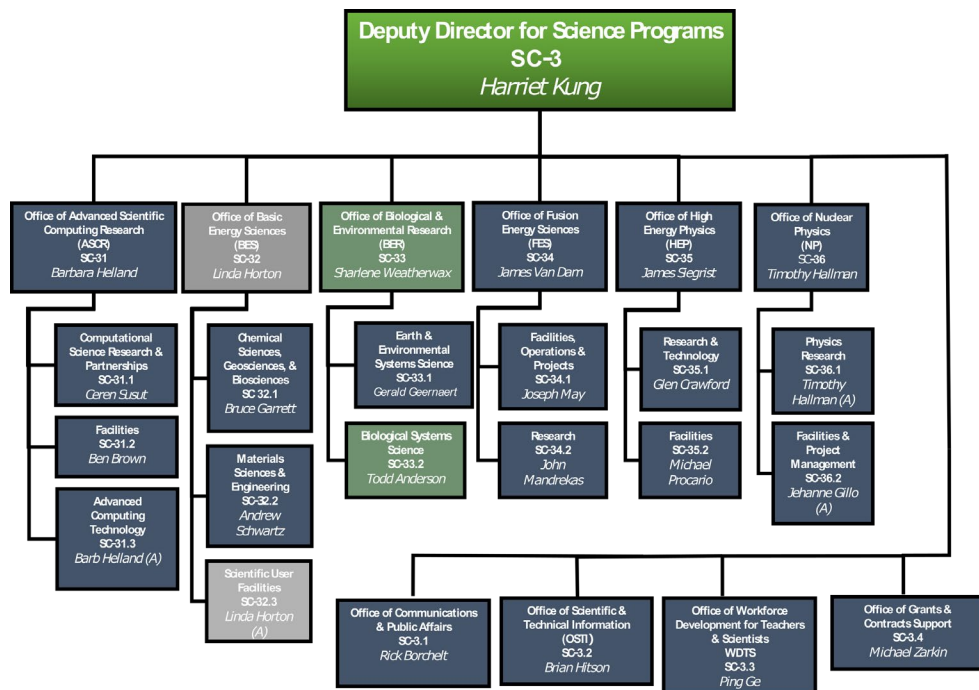
Need for change

- BER community needs access to other techniques
- APS-U brings new opportunities
- 19-ID will host In Situ Nanoprobe

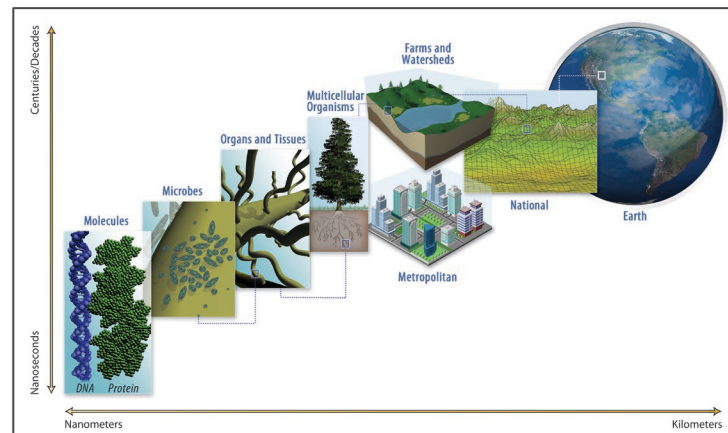
Future program

- eBERlight will serve as a liaison between BER researchers and the APS
- Leverage additional ANL resources
- Integrate with other DOE/BER facilities

DOE BIOLOGICAL AND ENVIRONMENTAL RESEARCH



“Biological and Environmental Research (BER) program supports transformative science and scientific user facilities to achieve a predictive understanding of complex biological, earth, and environmental systems for energy and infrastructure security, independence, and prosperity.”



Grand Challenges for Biological and Environmental Research: Progress and Future Vision, 2017

MULTIMODAL APPROACH TO BER SCIENCE AT APS-U

APS-U Techniques

Complementary

*Solution
SAXS*

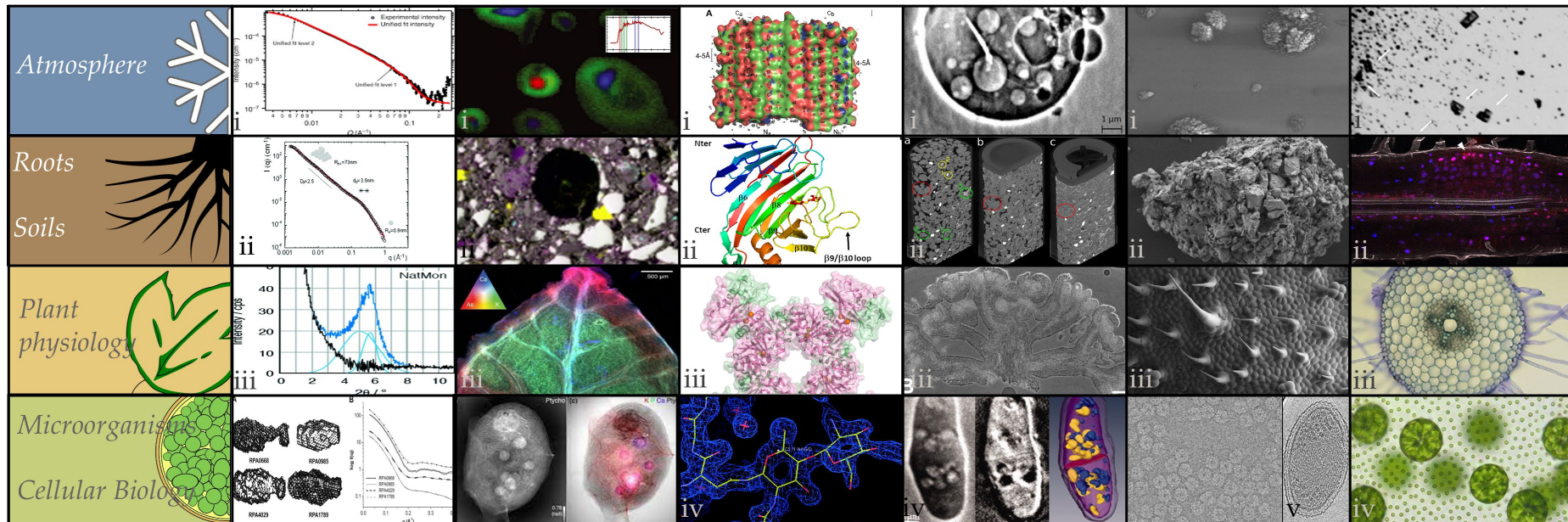
*Point Probe
XFM / XAS*

*Crystallographic
MX*

*Full-field Imaging
XMIC*

*Electron Microscopy
EM*

*Non-Destructive
Optical MIC*



nm - μ m

nm - mm

atomic

nm - mm

<nm - mm

μ m - mm

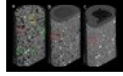
eBERlight CAPABILITIES FOR BIOLOGICAL & ENVIRONMENTAL SCIENCE

Crystallography
21-ID (LS-CAT)



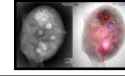
Full-field imaging

2-BM
32-ID



X-ray microscopy

2-ID-D
2-ID-E
(ISN,
25-ID-D,E)



Molecular biology

Advanced Protein
Characterization
Facility



Microfluidics

Advanced Protein
Characterization
Facility



Sample preparation

Cryolab at APS
Lab infrastructure
in bld. 203



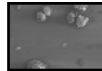
Computing

Argonne Leadership
Computing
Facility



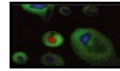
Electron microscopy

Center for Nanoscale
Materials
Picoprobe



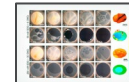
**X-ray absorption
spectroscopy**

9-BM
20-BM
25-ID-D,E
10-ID, BM



**Small-angle X-ray
scattering**

9-ID
12-ID
12-BM



eBERlight INTEGRATION WITH OTHER DOE/BER RESOURCES



Environmental Molecular Sciences Laboratory (EMSL)
Pacific Northwest National Laboratory
• Cryo-EM
Contact: James Evans

Advanced Light Source (ALS)
Lawrence Berkeley National Laboratory
• Berkeley Synchrotron Infrared Structural Biology (BSISB) – Fourier transform infrared (FTIR) spectromicroscopy
Contact: Hoi-Ying Holman
• National Center for X-Ray Tomography (NCXT) – Soft X-ray tomography
Contact: Carolyn Larabell
• Structurally Integrated Biology for the Life Sciences (SIBYLS) – Macromolecular crystallography, small-angle X-ray scattering
Contact: Greg Hura

Advanced Photon Source (APS)
Argonne National Laboratory
• Structural Biology Center (SBC) – Macromolecular crystallography
Contact: Andrzej Joachimiak

Stanford Synchrotron Radiation Lightsource (SSRL)
SLAC National Accelerator Laboratory
Stanford University
• Structural Molecular Biology (SMB) – Macromolecular crystallography, X-ray spectroscopy, small-angle X-ray scattering, microXAS imaging
Contact: Keith Hodgson
• Cryo-EM and Tomography
Contact: Wah Chiu

National Synchrotron Light Source (NSLS-II)
Brookhaven National Laboratory
• Center for BioMolecular Structure (CBMS) – Macromolecular crystallography, small-angle X-ray scattering/diffraction
Contact: Sean McSweeney
• Cryo-EM
Contact: Liguang Wang

Spallation Neutron Source (SNS) and High Flux Isotope Reactor (HFIR)
Oak Ridge National Laboratory
• Center for Structural Molecular Biology (CSMB) – Small-angle neutron scattering, biodeuteration
Contact: Hugh O'Neill

★ DOE Office of Basic Energy Sciences light and neutron facilities
● Cryogenic electron microscopy (Cryo-EM) facilities

February 2020

berstructuralbioportal.org

eBERlight ORGANIZATION

Comprehensive program for BER community starting FY24

Virtual Collaborative Access Team (CAT) managed by X-ray Science Division

Guaranteed beamtime across several beamlines (max. 2 beamlines equivalent)

Effort distribution:

- 25% crystallography (LS-CAT)

- 65% microscopy & imaging (XSD)

- 10% X-ray absorption spectroscopy & SAXS (XSD)

50% of the eBERlight guaranteed beamtime to support CAT members (BER researchers), 50% to support General User Program

ACKNOWLEDGEMENTS

*Chase Akins
Spencer Anderson
Olga Antipova
Gyorgy Babnigg
Joe Brunzelle
Changsoo Chang
Ryan Chard
Si Chen
Francesco De Carlo
Mike Endres
Zou Finfrock
Ian Foster
Christopher Fry*

*Steve Heald
Qiaoling Jin
Andrzej Joachimiak
Jessica Johnson
Shelly Kelly
Ken Kemner
Youngchang Kim
Barry Lai
Jonathan Lang
Alex Lavens
Krzysztof Lazarski
Byeongdu Lee*

*Lu Xi Li
Natalia Maltseva
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Q&A:

Will CMS-CS funding be increased to allow replacement of outdated critical equipment, and provide improved capabilities and efficiency?

The current funding structure for CMS-CS does not provide for replacement of equipment that is no longer supported by OEMs, is well beyond expected service life, or limits the capabilities and efficiency of CMS-CS.

— Paul Amann

Please do not hesitate to reach out
Always welcoming feedback !
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