PSC PRIORITIES MEETING
AUGUST 3, 2020

STEPHEN STREIFFER
Director, Advanced Photon Source
Associate Laboratory Director, Photon Sciences

AGENDA

- **PSC Update –** Stephen Streiffer
- **XSD** – Jonathan Lang
- **ASD** – John Byrd
- **AES** – John Connolly
- **APS Upgrade** – Bob Hettel

Masks: They're not just for Halloween anymore. Wear yours!

To keep up with the latest APS news & research: www.aps.anl.gov

SAFETY

- All have completed COVID-100 training. **Put the training to use!**
- **Re-acquaint yourself** with the COVID-19 Hazards Assessment and Controls document. Even though this is embedded in the Aware hazard tree, still a great document to review.
- **Remember your PPE**:
  - Requirement for dosimetry, safety shoes, safety glasses, goggles, ear protection, bump caps, etc. remain in place (never changed).
- **Remember your COVID prevention material/techniques**:
  - Face masks available in the APS stockroom
  - Face shields, when required per WCD or document above, are available in the APS stockroom
  - Consult with your ESH Coordinator prior to undertaking close proximity work (< 6 ft for > 10 min cumulative).
  - Ensure your mask fits and is worn correctly
  - No sharing of tools unless they are cleaned thoroughly between uses.

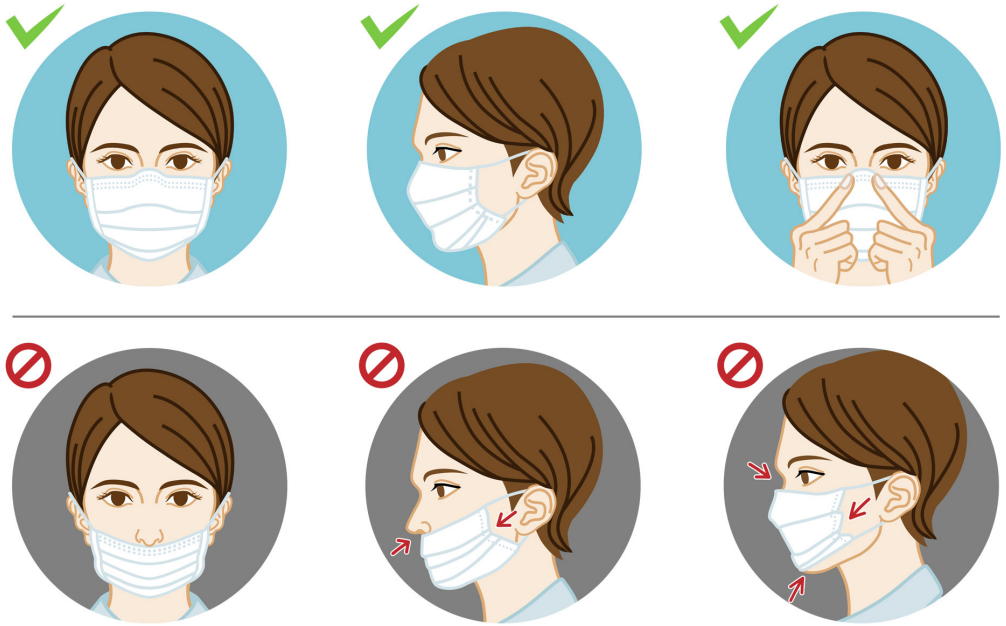


Image courtesy of UT Southwestern Medical Center

SAFETY

- **Maximum social/physical distancing** always applies, wherever possible**.** **Minimize total time onsite** to accomplish task(s) before returning home, based on schedule from supervisor.
- **Frequently wash hands** with soap and water (or alcohol-based sanitizer) for at least 20 seconds
- **Avoid touching your face**, especially with unwashed hands
- **Clean and disinfect** frequently touched or shared objects (tools, coffee pots, refrigerators, etc.) and surfaces prior to and after using them
- **Work Control Documents (WCDs) should have been re-approved and re-authorized** before use, in order to cite COVID hazards and controls.
- **Perform pre-job briefs** either virtually or socially distanced, prior to starting shutdown work scopes.
  - Log completion in the APS Pre-Job Brief system. Post-job lessons learned can be captured in the same record

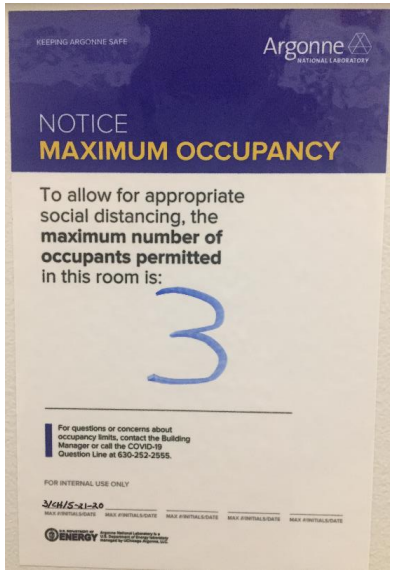
ANL COVID-19 Resources

COVID-19/coronavirus FAQ

Argonne's 24x7 COVID-19 Question Line at 1-630-252-2555.

PAY ATTENTION TO POSTINGS

- Additional postings are shown at right, which should remind you to:
  - Limit occupancy
  - Wear a face covering
  - Maintain social/physical distance
  - Wash hands especially if touching high-touch surfaces
- Will see them posted outside of common areas, conference rooms, restrooms, seating areas, and other programmatic areas like Main Control Room and D1109 Computer Room.



Review and adhere to new postings as shown above, which can now be seen around the APS

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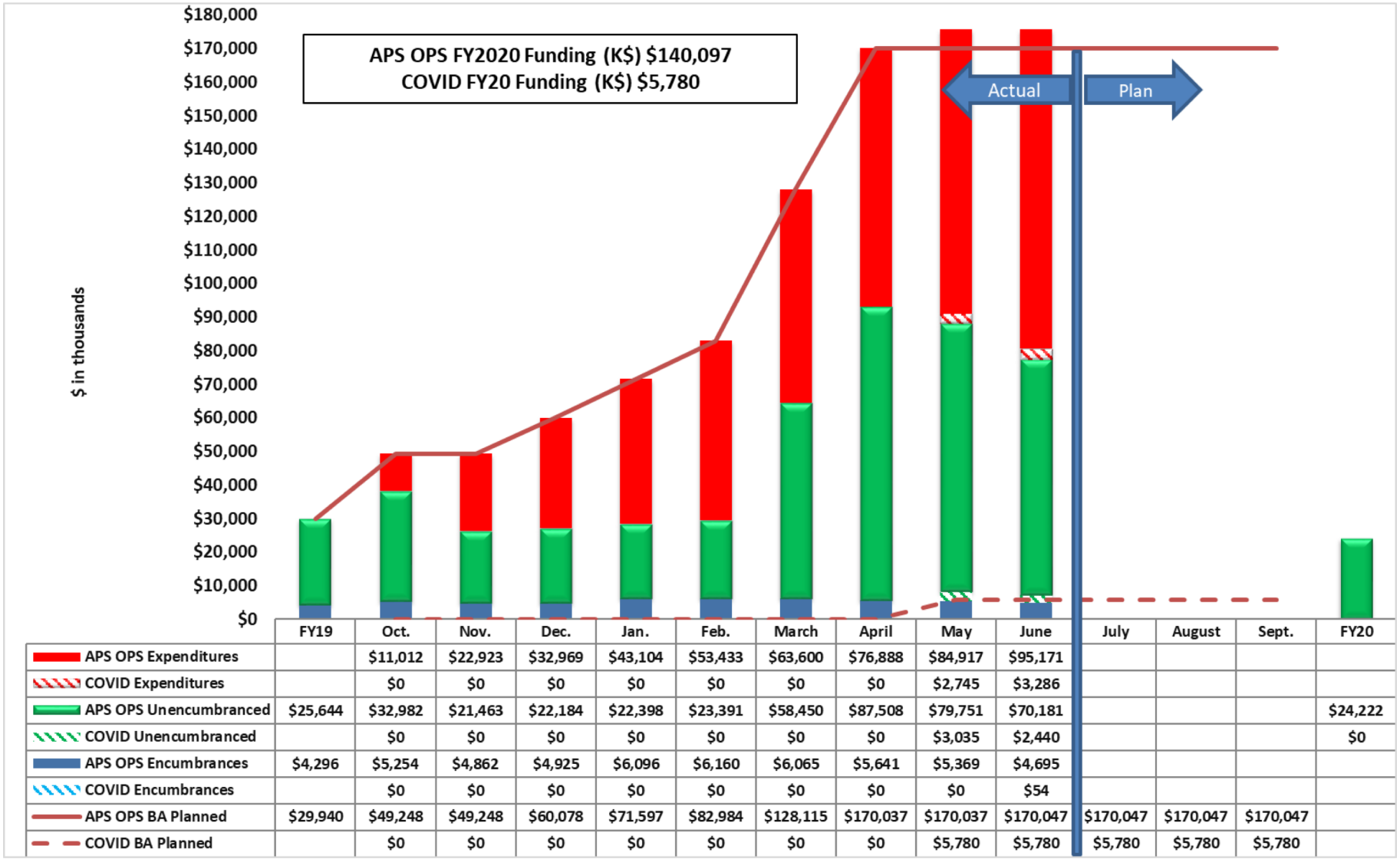
SAFETY

- **Recent uptick in safety incidents seen across the complex as additional work resumes**
  - Ease back into the routine of safe, quality work
  - Reacquaint yourself with the workplace when returning to the site
    - Tidy things up, and make sure your tools and equipment are in good working order
    - Look at the physical facility to see if anything has changed or deteriorated while you were away
  - Review your work control documents, procedures and processes to see that they are up to date and valid
  - Take a moment to reiterate the need to rethink basic safety considerations
  - Go about your work carefully and deliberately

- **Recent increase in wasp activity**
  - Stay alert and be mindful of where you put your hands
  - Railings, cylinder caps, open-ended items like pipes, overhanging surfaces, and infrequently used vehicles are prime nesting areas
  - Don’t swat or make other quick movements, leave the insects alone
  - On cooler mornings insects move slower, but don’t count on them staying slow if you invade their space

APS OPERATIONS & COVID-19 – FY20 BUDGET



	FY19	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	August	Sept.	FY20
APS OPS Expenditures		$11,012	$22,923	$32,969	$43,104	$53,433	$63,600	$76,888	$84,917	$95,171				
COVID Expenditures		$0	$0	$0	$0	$0	$0	$0	$2,745	$3,286				
APS OPS Unencumbranced	$25,644	$32,982	$21,463	$22,184	$22,398	$23,391	$58,450	$87,508	$79,751	$70,181				$24,222
COVID Unencumbranced		$0	$0	$0	$0	$0	$0	$0	$3,035	$2,440				$0
APS OPS Encumbrances	$4,296	$5,254	$4,862	$4,925	$6,096	$6,160	$6,065	$5,641	$5,369	$4,695				
COVID Encumbrances		$0	$0	$0	$0	$0	$0	$0	$0	$54				
APS OPS BA Planned	$29,940	$49,248	$49,248	$60,078	$71,597	$82,984	$128,115	$170,037	$170,037	$170,047	$170,047	$170,047	$170,047	
COVID BA Planned		$0	$0	$0	$0	$0	$0	$0	$5,780	$5,780	$5,780	$5,780	$5,780	

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LIMITED OPERATIONS

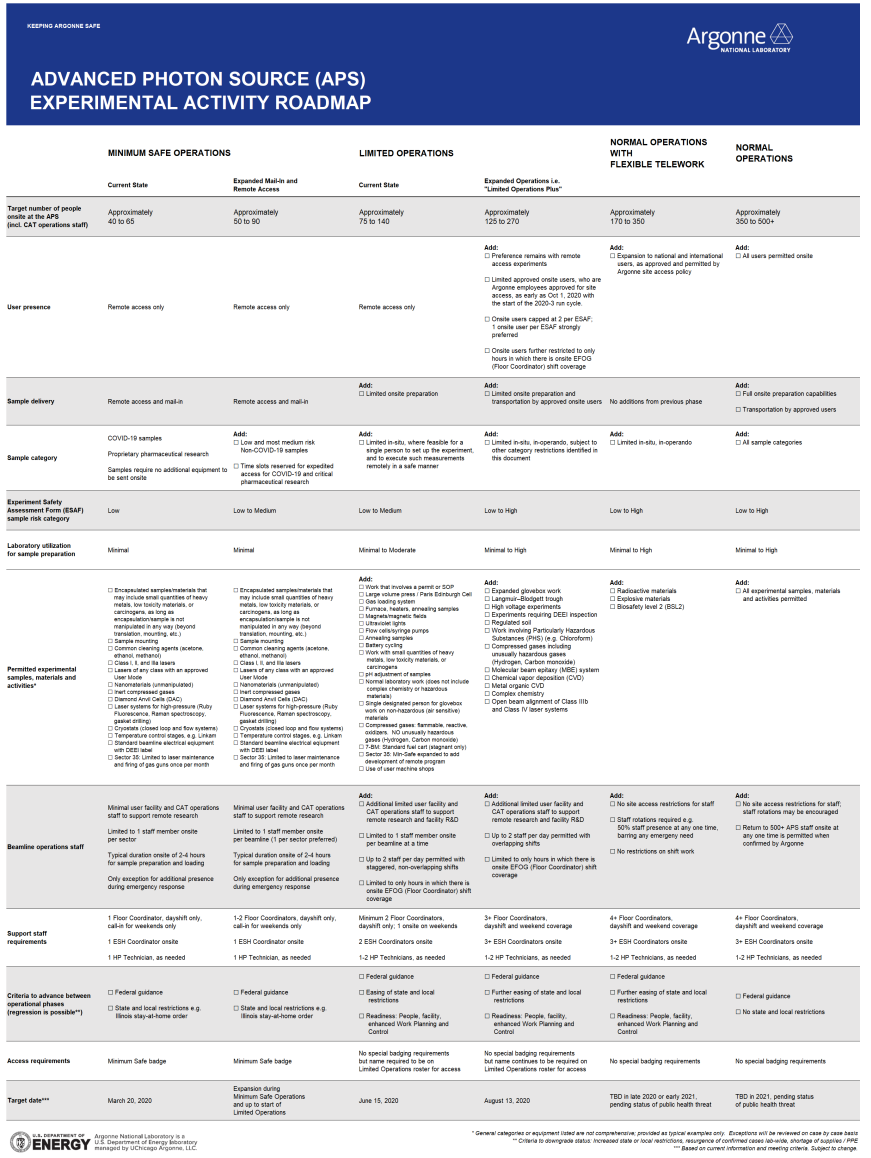
Current Status

- Lab is averaging about 1,100 people/weekday
- PSC (APS and APS-U) is averaging about 160 – 170 people/weekday
- Large fraction of experimental work has been restored – remote access only
  - Peak of 57 end stations enabled
- Sizeable portion of APS-U work accommodated
  - Magnet receipt, testing, measurement (Bldg. 369)
  - Various power supply, undulator, supports, diagnostics scopes in 300- and 400-Area
  - Large infrastructure scope: Bunch Lengthening System cryo in EAA, Bldg 420 prep; 400A mezzanine build; Long Beamling Building preparation (network, control rooms, cage removal for utility tie-in)
- Additional APS Operations work in place, beyond machine response and maintenance:
  - Work on 2-ID, 4-ID, 28-ID, RF Test Stand and numerous shutdown prep activities

TRANSITIONING TO THE NEXT PHASE

Looking Ahead

- We will be in Limited Operations mode for a while longer
- Planning for a modest expansion of Limited Operations, known as “Limited Operations Plus”:
  - Work planning and control process returns to directorate oversight (with continued use of the COVID controls)
  - Increased onsite population across Argonne, including coverage for Aug.-Sept. shutdown
  - Limited number of users allowed onsite, subject to Argonne access protocol
    - First, Argonne employees, followed by cautious addition of external users



KEEPING ARGONNE SAFE

Argonne NATIONAL LABORATORY

ADVANCED PHOTON SOURCE (APS)
EXPERIMENTAL ACTIVITY ROADMAP

	MINIMUM SAFE OPERATIONS		LIMITED OPERATIONS		NORMAL OPERATIONS WITH FLEXIBLE TELEWORK	NORMAL OPERATIONS
	Current State	Expanded Mail-in and Remote Access	Current State	Expanded Operations i.e. “Limited Operations Plus”		
Target number of people onsite at the APS (incl. CAT operations staff)	Approximately 40 to 65	Approximately 50 to 90	Approximately 75 to 140	Approximately 125 to 270	Approximately 170 to 350	Approximately 350 to 500+
User presence	Remote access only	Remote access only	Remote access only	**Add:** ☐ Preference remains with remote access experiments ☐ Limited approved onsite users, who are Argonne employees approved for site access, as early as Oct 1, 2020 with the start of the 2020-3 run cycle. ☐ Onsite users capped at 2 per ESAF; 1 onsite user per ESAF strongly preferred ☐ Onsite users further restricted to only hours in which there is onsite EFOG (Floor Coordinator) shift coverage	**Add:** ☐ Expansion to national and international users, as approved and permitted by Argonne site access policy	**Add:** ☐ All users permitted onsite
Sample delivery	Remote access and mail-in	Remote access and mail-in	**Add:** ☐ Limited onsite preparation	**Add:** ☐ Limited onsite preparation and transportation by approved onsite users	No additions from previous phase	**Add:** ☐ Full onsite preparation capabilities ☐ Transportation by approved users
Sample category	COVID-19 samples Proprietary pharmaceutical research Samples require no additional equipment to be sent onsite	**Add:** ☐ Low and most medium risk Non-COVID-19 samples ☐ Time slots reserved for expedited access for COVID-19 and critical pharmaceutical research	**Add:** ☐ Limited in-situ, where feasible for a single person to set up the experiment, and to execute such measurements remotely in a safe manner	**Add:** ☐ Limited in-situ, in-operando, subject to other category restrictions identified in this document	**Add:** ☐ Limited in-situ, in-operando	**Add:** ☐ All sample categories
Experiment Safety Assessment Form (ESAF) sample risk category	Low	Low to Medium	Low to Medium	Low to High	Low to High	Low to High
Laboratory utilization for sample preparation	Minimal	Minimal	Minimal to Moderate	Minimal to High	Minimal to High	Minimal to High
Permitted experimental samples, materials and activities*	☐ Encapsulated samples/materials that may include small quantities of heavy metals, low toxicity materials, or carcinogens, as long as encapsulation/sample is not manipulated in any way (beyond translation, mounting, etc.) ☐ Sample mounting ☐ Common cleaning agents (acetone, ethanol, methanol) ☐ Class I, II, and IIa lasers ☐ Lasers of any class with an approved User Mode ☐ Nanomaterials (unmanipulated) ☐ Inert compressed gases ☐ Diamond Anvil Cells (DAC) ☐ Laser systems for high-pressure (Ruby Fluorescence, Raman spectroscopy, gasket drilling) ☐ Cryostats (closed loop and flow systems) ☐ Temperature control stages, e.g. Linkam ☐ Standard beamline electrical equipment with DEEI label ☐ Sector 35: Limited to laser maintenance and firing of gas guns once per month	☐ Encapsulated samples/materials that may include small quantities of heavy metals, low toxicity materials, or carcinogens, as long as encapsulation/sample is not manipulated in any way (beyond translation, mounting, etc.) ☐ Sample mounting ☐ Common cleaning agents (acetone, ethanol, methanol) ☐ Class I, II, and IIa lasers ☐ Lasers of any class with an approved User Mode ☐ Nanomaterials (unmanipulated) ☐ Inert compressed gases ☐ Diamond Anvil Cells (DAC) ☐ Laser systems for high-pressure (Ruby Fluorescence, Raman spectroscopy, gasket drilling) ☐ Cryostats (closed loop and flow systems) ☐ Temperature control stages, e.g. Linkam ☐ Standard beamline electrical equipment with DEEI label ☐ Sector 35: Limited to laser maintenance and firing of gas guns once per month	**Add:** ☐ Work that involves a permit or SOP ☐ Large volume press / Paris Edinburgh Cell ☐ Gas loading system ☐ Furnace, heaters, annealing samples ☐ Magnets/magnetic fields ☐ Ultraviolet lights ☐ Flow cells/syringe pumps ☐ Annealing samples ☐ Battery cycling ☐ Work with small quantities of heavy metals, low toxicity materials, or carcinogens ☐ pH adjustment of samples ☐ Normal laboratory work (does not include complex chemistry or hazardous materials) ☐ Single designated person for glovebox work on non-hazardous (air sensitive) materials ☐ Compressed gases: flammable, reactive, oxidizers. NO unusually hazardous gases (Hydrogen, Carbon monoxide) ☐ 7-BM: Standard fuel cart (stagnant only) ☐ Sector 35: MIn-Safe expanded to add development of remote program ☐ Use of user machine shops	**Add:** ☐ Expanded glovebox work ☐ Langmuir–Blodgett trough ☐ High voltage experiments ☐ Experiments requiring DEEI inspection ☐ Regulated soil ☐ Work involving Particularly Hazardous Substances (PHS) (e.g. Chloroform) ☐ Compressed gases including unusually hazardous gases (Hydrogen, Carbon monoxide) ☐ Molecular beam epitaxy (MBE) system ☐ Chemical vapor deposition (CVD) ☐ Metal organic CVD ☐ Complex chemistry ☐ Open beam alignment of Class IIIb and Class IV laser systems	**Add:** ☐ Radioactive materials ☐ Explosive materials ☐ Biosafety level 2 (BSL2)	**Add:** ☐ All experimental samples, materials and activities permitted
Beamline operations staff	Minimal user facility and CAT operations staff to support remote research Limited to 1 staff member onsite per sector Typical duration onsite of 2-4 hours for sample preparation and loading Only exception for additional presence during emergency response	Minimal user facility and CAT operations staff to support remote research Limited to 1 staff member onsite per beamline (1 per sector preferred) Typical duration onsite of 2-4 hours for sample preparation and loading Only exception for additional presence during emergency response	**Add:** ☐ Additional limited user facility and CAT operations staff to support remote research and facility R&D ☐ Limited to 1 staff member onsite per beamline at a time ☐ Up to 2 staff per day permitted with staggered, non-overlapping shifts ☐ Limited to only hours in which there is onsite EFOG (Floor Coordinator) shift coverage	**Add:** ☐ Additional limited user facility and CAT operations staff to support remote research and facility R&D ☐ Up to 2 staff per day permitted with overlapping shifts ☐ Limited to only hours in which there is onsite EFOG (Floor Coordinator) shift coverage	**Add:** ☐ No site access restrictions for staff ☐ Staff rotations required e.g. 50% staff presence at any one time, barring any emergency need ☐ No restrictions on shift work	**Add:** ☐ No site access restrictions for staff; staff rotations may be encouraged ☐ Return to 500+ APS staff onsite at any one time is permitted when confirmed by Argonne
Support staff requirements	1 Floor Coordinator, day/shift only, call-in for weekends only 1 ESH Coordinator onsite 1 HP Technician, as needed	1-2 Floor Coordinators, day/shift only, call-in for weekends only 1 ESH Coordinator onsite 1 HP Technician, as needed	Minimum 2 Floor Coordinators, day/shift only; 1 onsite on weekends 2 ESH Coordinators onsite 1-2 HP Technicians, as needed	3+ Floor Coordinators, day/shift and weekend coverage 3+ ESH Coordinators onsite 1-2 HP Technicians, as needed	4+ Floor Coordinators, day/shift and weekend coverage 3+ ESH Coordinators onsite 1-2 HP Technicians, as needed	4+ Floor Coordinators, day/shift and weekend coverage 3+ ESH Coordinators onsite 1-2 HP Technicians, as needed
Criteria to advance between operational phases (regression is possible†)**	☐ Federal guidance ☐ State and local restrictions e.g. Illinois stay-at-home order	☐ Federal guidance ☐ State and local restrictions e.g. Illinois stay-at-home order	☐ Federal guidance ☐ Easing of state and local restrictions ☐ Readiness: People, facility, enhanced Work Planning and Control	☐ Federal guidance ☐ Further easing of state and local restrictions ☐ Readiness: People, facility, enhanced Work Planning and Control	☐ Federal guidance ☐ Further easing of state and local restrictions ☐ Readiness: People, facility, enhanced Work Planning and Control	☐ Federal guidance ☐ No state and local restrictions
Access requirements	Minimum Safe badge	Minimum Safe badge	No special badging requirements but name required to be on Limited Operations roster for access	No special badging requirements but name continues to be required on Limited Operations roster for access	No special badging requirements	No special badging requirements
Target date†††**	March 20, 2020	Expansion during Minimum Safe Operations and up to start of Limited Operations	June 15, 2020	August 13, 2020	TBD in late 2020 or early 2021, pending status of public health threat	TBD in 2021, pending status of public health threat

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

* General categories or equipment listed are not comprehensive; provided as typical examples only. Exceptions will be reviewed on case by case basis
** Criteria to downgrade status: Increased state or local restrictions, resurgence of confirmed cases lab-wide, shortage of supplies / PPE
*** Based on current information and meeting criteria. Subject to change

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UPDATES FROM THE USER OFFICE

- Enhanced communications with CAT staff and Users
  - Thrice weekly CAT Q&A sessions; moving to weekly
  - The Beamline Info Broadcast is a new communication tool to keep resident, administrative, and management staff in the know about items that affect them
- Workshops planned as part of the 2020 Annual Meeting will be held virtually in August and September https://www.aps.anl.gov/Users-Information/User-Community/Users-Meetings/Virtual-Workshops-from-the-2020-APS-CNM-Users-Meeting
- Modifying the usual Beamtime Allocation process for 2020-3 due to restricted site access for users
- Changes in user badging:
  - REAL-ID requirements will probably be postponed due to COVID
  - It is anticipated that user badges will be limited to six-months to comply with DOE Orders.
  - Exemption for six-month requirement is under review by DOE Area Office
- Coming Soon from the User Program Office
  - ORCiD IDs being added to user registrations forms
  - Determination of a new proposal platform for APS (and potentially other light sources)
    - RFPs have been received and evaluations provided to Light Source Directors

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Annual Lab Plan:
Advanced Photon Source Upgrade (APS-U) project

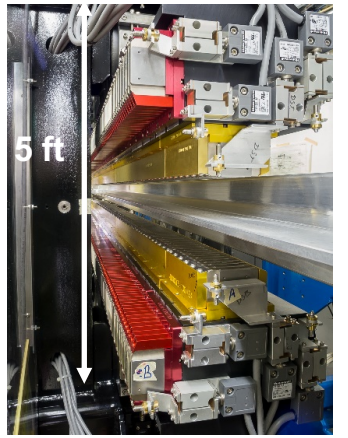
Delivering a world-leading hard x-ray microscope

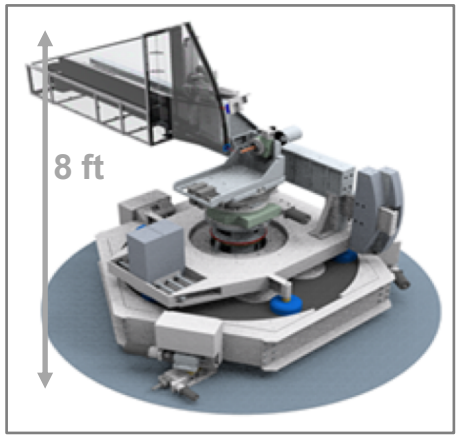
Project status

- $815 million project is 50% complete by costs + obligations
- 32% of the 1,321 storage-ring magnets accepted
- Long Beamline Building groundbreaking

COVID-19 impact

- Internally, component acceptance tests have continued on site and other key tasks have proceeded by telework
- Working with vendors on effects on supply chains and schedules





Top: Sextupole magnets
Lower right: RIXS-II spectrometer designed by BNL
Lower left: Planar undulator

Annual Lab Plan: Hard x-ray sciences

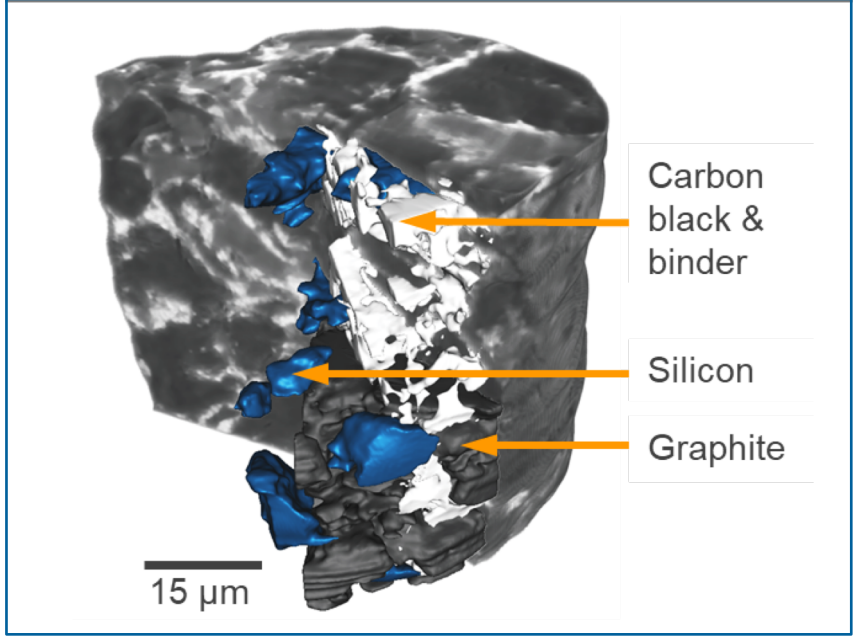
Revolutionizing use of hard x-rays to explore physical, chemical, and biological systems in multiple dimensions, from the atomic to the macroscopic scale

Maximize the impact of science at the upgraded APS

- Prepare our user community for new capabilities
- Develop new experimental methods
- Couple x-ray delivery and detection to automated experiment control and analysis
- Manage the data stream

Frame a vision to transform technology for next-generation light sources

APS transmission x-ray imaging of a battery electrode sample



APS-U experimental methods will include AI systems driving data collection to areas of interest as a sample changes in a dynamic process like battery cycling. A silicon-graphite anode is shown here.

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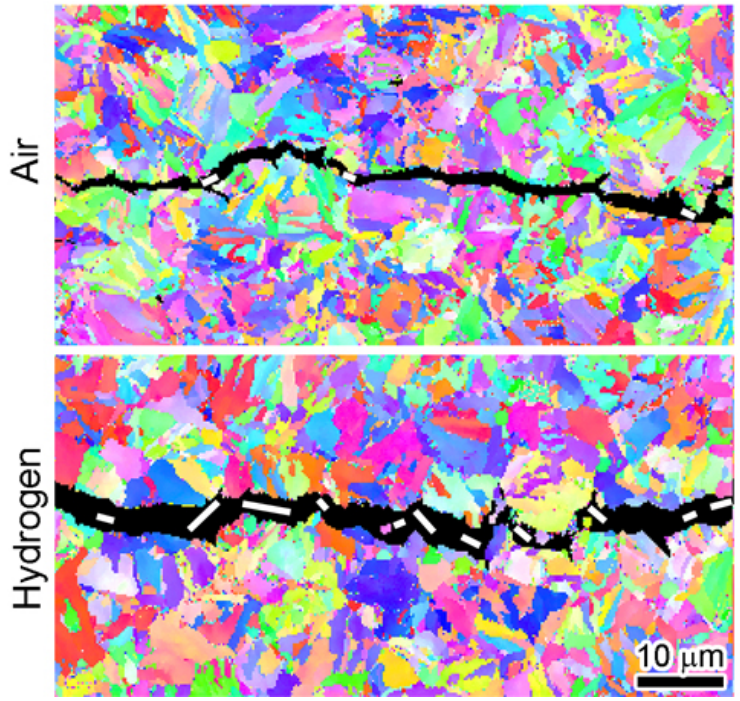
PHOTON SCIENCES STRATEGY

- Maintain and enhance the accelerator complex and conventional facilities, synchronized with APS-U plans, and ensure longevity of parts that will not be replaced by APS-U
- Develop beamline portfolio in the context of the APS-U and beamline roadmap (beamline operations and development)
- Advance the forefront on hard x-ray science and techniques, insertion devices, optics, detectors, and data sciences
- Leverage leadership computing and math & computer science to meet data science challenges
- Leverage Argonne leadership in hard x-ray science across the Lab
- Plan for APS-U dark time
- Enhance business and user processes for better efficiency
- **Build and sustain a culture based on diversity, equity, and inclusion**



Comparison of fatigue cracks in steel exposed to air (upper panel) and to hydrogen (lower panel). The larger crack appearing in the lower panel is indicative of the accelerated growth caused by H_2 exposure. Individual grains in the steel are identified by color. The small white bars highlight the locations where the crack formed between different grains, technically referred to as intergranular fracturing. From M. Connolly et al., Acta Mater. **180**, 272 (2019). Copyright ©2019 Elsevier B.V. or its licensors or contributors.

M. Connolly, M. Martin, P. Bradley, D. Lauria, A. Slifka, R. Amaro, C. Looney, J.-S. Park, "*In situ* high energy X-ray diffraction measurement of strain and dislocation density ahead of crack tips grown in hydrogen," Acta Mater. **180**, 272 (2019). DOI: 10.1016/j.actamat.2019.09.020

Contact: matthew.connolly@nist.gov

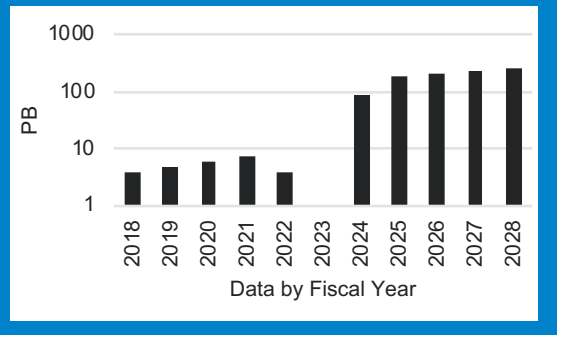
Data & Computing for the APS Upgrade Era

Advanced data analysis and management is critical to meeting APS computing needs

APS-U Era Computing Challenges

Driven by coherence, imaging, and high-energy techniques

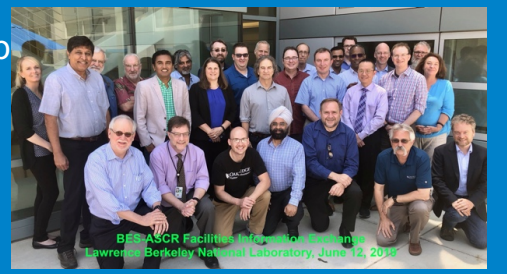
- Over the next decade, the APS will generate multiple orders-of-magnitude more data per year
- The APS will require 50 - 100 PFLOPS of on-demand computing resources



US Collaborative Efforts

Collaborations among US facilities critical to APS data strategy

- *Light Source Data and Computing Steering Committee* formed to develop a computing strategy across the 5 US light sources and computing facilities
- The *DOE BES Data Solution Task Force Pilot Project* is a joint project across the US light sources to begin deploying common software solutions



Data Processing & Analysis

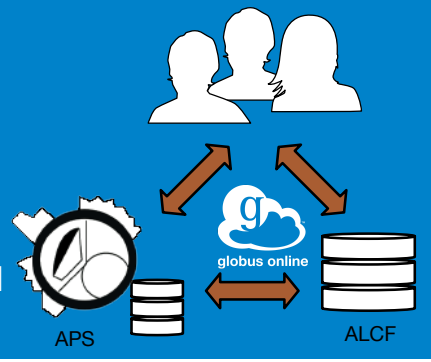
Utilizing current and next generation supercomputers and AI/ML

- Developing HPC software for coherence, imaging, and high-energy techniques to process data at scale
- Argonne Leadership Computing Facility will provide on-demand compute resources
- Pursuing AI/ML on edge devices for autonomous experiment steering

Data Management System

The APS continues to deploy facility-wide data management

- Assists with data lifecycle management - movement, tracking, analysis workflows, and distribution
- Currently in use at 36 beamlines
- Leverages Argonne Leadership Computing Facility for tape storage, and Globus transfer services



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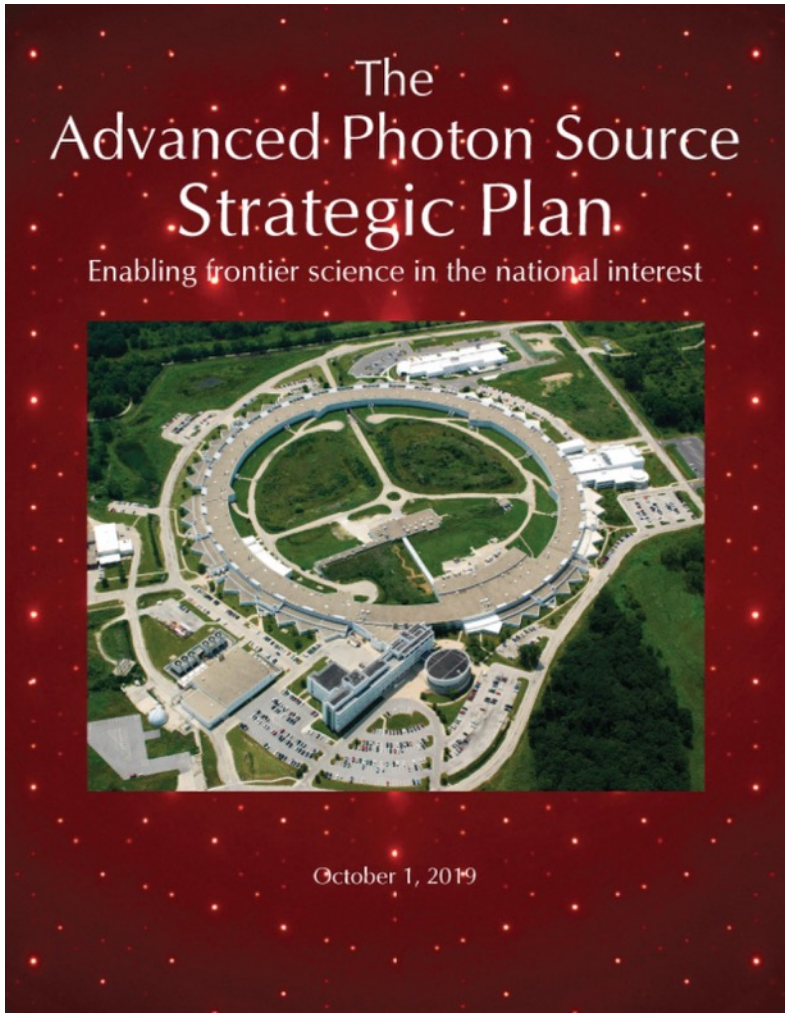
2020 APS STRATEGIC PLAN IS FORTHCOMING

- This is a 5 year plan aligned with APS Upgrade objectives
- Plan is supported by more detailed divisional plans
- Updated annually
- Will be posted on October 1, 2020



2019 APS Strategic Plan

25+ YEARS SERVICE AWARDS

25 years

Richard Diviero
Alexander Cours

30 years

Thomas Barsz
Jeffrey Collins
Albert Macrander
Glenn Decker
Steven Hanuska
Barry Lai
William Berg
Thomas Grabinski
Michael McDowell
Leonard Morrison

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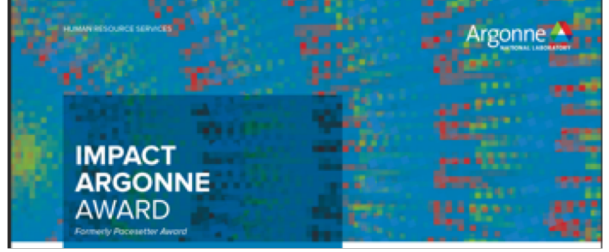
IMPACT ARGONNE AWARDS



- *For tracking and reporting COVID-19 research. The team developing queries to search the APS Experiments database for keywords to identify COVID-19 related research for reporting to DOE. A "COVID-19 Experiment" flag was added to the proposal and ESAF system to identify future proposals. A new procedure was developed to accurately track COVID beamtime usage*

  Laurie Ambrose, Bob Fischetti, Yu Huang, Bev Knott, Nena Moonier, Constance Vanni, Susan White DePace, and Qinqping Xu

- *For working to coordinate with the PSC administrative staff while they teleworked, including check-ins on well-being, work scope, and coordinating the workshare program for the directorate administrative staff*

  Tracy Thomas

- *For providing x-ray capabilities for COVD-19 research*

  DND-CAT, IMCA-CAT, BioCAT, LS-CAT, SER-CAT, NE-CAT, and LRL-CAT

- *For planning, support, and execution of the Lab's COVID-19 operational response*

  John Connolly

Impact Argonne framework and core values guide our strategy

Everyone has put in enormous effort to handle the COVID situation. Thanks to all for your dedication, patience, creativity, and attention to safety and communication!!!

I want to give a special shout-out to those with caregiving responsibilities!!!