

HPCAT NEWSLETTER – AUGUST 2024

APS and HPCAT-Upgrade Status

Over the last month, APS has continued with storage ring operations and pushing to higher current – at present, up to ~60mA continuous beam has been achieved and ramping up to target 200mA will be done in the coming months and year.

On July 17, 2024, Argonne National Laboratory held a Dedication Ceremony for the upgraded APS. The event was attended by a number of high-level dignitaries, including IL Governor J.B. Pritzker, Dr. Bill Foster U.S. representative for IL, Geri Richmond DOE Under Secretary of Energy for Science, and many others – picture from ribbon cutting shown below and ceremony video posted on <https://www.youtube.com/watch?v=9z9kqOiM6IE&t=1149s>



As part of the event, **our HPCAT colleague Freda Humble contributed in a very unique way**, by composing and singing a parody song “Killer Beam”, which can be seen in the YouTube video as well. APS doesn’t give out Grammy awards, but APS did honor Freda with an Impact Argonne award and certificate (picture shown below with Freda and APS Director L. Chapon) – please join us in congratulating Freda on her great and innovative contribution to HPCAT and APS.



As APS pushes forward, **HPCAT is also making progress on resumption of work and planning to bring users back.** Here are some key status updates:

- ID-B station (after receiving first beam on July 03) has continued with technical commissioning. This is a critical effort in making sure we can deliver beam to the experimental station safely and continuously. Likewise, during technical commissioning, staff is working on assessing the beam quality and properties, such as beam size/shape, energy tuning, on-sample flux, etc. – this is critical information that we must provide to users prior to their planning and coordination of future experiments. Once technical commissioning is finalized ~September, then ID-B will proceed with scientific commissioning and user access.
- User access to ID-B will start the later part of the 2024-3 cycle (~late November and onwards) via direct coordination between HPCAT and users – more info will be emailed out in the coming weeks.
- Standard access to ID-B will resume in the 2025-1 cycle. General User (GU) proposal call for 2025-1 is expected to be announced in ~September and with due date of October 25th. APS is using a new GU Universal Proposal System <https://ups.servicenowservices.com/ups>, so please plan your proposal submission process with enough time to get familiar with the new GU platform.
- The rest of HPCAT beamlines will resume operation in a staggered, phased approach, with BM branch up next starting technical commissioning in ~Oct. 2024 and planned user resumption in late 2025-2 (GU call for BM branch will be March 2025)

Summary of HPCAT beamline status

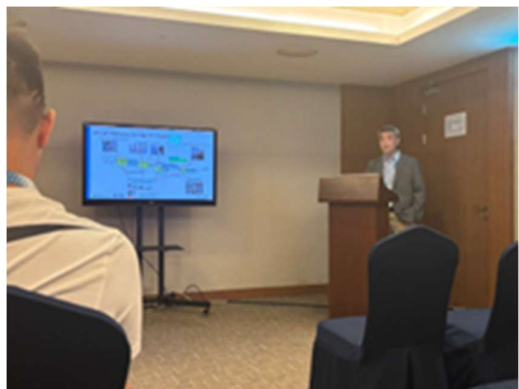
Experimental Station	Current Status	Planned full user resumption
16ID-B	<ul style="list-style-type: none"> • In Technical Commissioning currently • Installing new Branching Double Crystal Monochromator (BDCM1) Sep. 03-09 (during APS scheduled shutdown) • Moving to Scientific commissioning by ~Oct. 	<ul style="list-style-type: none"> • Partial user resumption 2024-3 (~late November) • Full user resumption in 2025-1 via open GU proposal call (GU deadline Oct. 25, 2024)
16BM branch	<ul style="list-style-type: none"> • Full layout infrastructure is being replaced and expected to complete by end of Sept. • Both BM-B and BM-D experimental stations are complete and installed • BM-B will start technical commissioning in Oct. 2024 and then BM-D couple of months after 	<ul style="list-style-type: none"> • Partial user resumption expected in 2025-1 • Full user resumption expected 2025-2 (via GU proposal due March 2025)
16ID-D and E stations	<ul style="list-style-type: none"> • New Double Crystal Monochromator and new Double Multilayer Monochromator expected to arrive and be installed in March 2025 • ID-D planning to start technical commissioning in March 2025 • ID-E is currently starting installation of new experimental equipment and with planned completion expected in late CY2025 and early 2026 	<ul style="list-style-type: none"> • ID-D expected to start user program in 2025-3 • ID-E is currently in construction and planned to open early 2026

News and Highlights

Scientists from **HPCAT, LLNL, LANL, and DESY** join efforts in continuing to push advancements in studies of materials at extreme conditions and performing experiments at Deutsches Elektronen-Synchrotron (DESY) PETRA-III Extreme Conditions Beamline P02.2. This beamtime is part of a long-term project that is being led by LLNL. The goal of this project is to develop new diagnostics for determining melting of metallic systems under high pressure/temperature conditions, as well as developing software for rapid data processing of both X-ray diffraction and X-ray imaging data. Additionally, new dynamic diamond anvil cell (d-DAC) compression techniques are also being actively developed under this project. The joint effort among the various high-pressure groups is vital in continuing to push the strain rates limits with d-DAC and coupling with laser heating and critical x-ray diagnostics probes. Capabilities being developed under this effort will be available in the future at HPCAT, DESY, EuXFEL and broader high-pressure community. *(Photo (L-R) Ross Hrubciak, Emma Ehrenreich-Petersen, Changyong Park, Zsolt Jenei, Earl O'Bannon, Blake Sturtevant)*

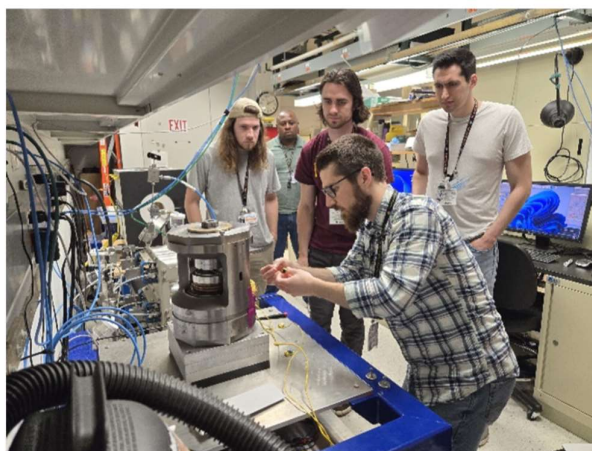


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HPCAT staff scientist Changyong Park visited several institutions in South Korea in June. Changyong gave an invited talk at the Asia Oceania Geosciences Society (AOGS) 2024 annual meeting in Pyeongchang, Gangwon-do, South Korea, and used the opportunity to also visit a number of high-pressure research groups and facilities in an effort to help share the status of HPCAT's upgrade, progress, and resumption status. **The visit was productive and critical to maintaining a strong international user base**, many of whom have been very productive users of HPCAT platforms for many years.

HPCAT recently hosted workshops for two groups of graduate students attending the 2024 National School on Neutron and X-ray Scattering (NXS). The workshops were led by assistant physicist Innocent Ezenwa and postdoctoral appointee Tyler Eastmond. Innocent and Tyler taught the students about fundamental principles, applications, and techniques of high-pressure research, with a particular focus on the Paris-Edinburgh (PE) press program at 16-BM-B. The workshop activities were designed to be hands-on, allowing the students to appreciate the precision and care required to successfully conduct challenging high-pressure experiments. In addition to classroom tutorials, the



students practiced assembling PE sample capsules and then set up and ran experiments in the PE press, in which they investigated pressure-induced phase transitions in bismuth. As beam is not yet available in BM-B due to the ongoing upgrade, the high-pressure behavior of bismuth was observed through electrical resistance measurements, a technique new to BM-B that was recently developed to probe phase transitions with high accuracy and sensitivity. The workshop was well received by the students, who enjoyed the interactive nature of the experiments.

Offline user experiments at HPCAT

- During the ongoing upgrade shutdown HPCAT is available for limited offline user support. Some of the available offline capabilities include:
 - Sample lab
 - Paris-Edinburgh (PE) press experiments
 - Raman measurements
- Please reach out to Zulu zulu@anl.gov and Freda fhumble@anl.gov for additional information and requests for onsite visits during the shutdown.

Job postings and various opportunities

- **The Department of Geology and Geophysics at the University of Utah** invites applications for an open-rank faculty position (Assistant/Associate/Full Professor) in the area geomechanics, with emphasis on rock and fracture mechanics, fracture networks, and/or fracture characterization and modeling. We seek applicants whose research complements and grows departmental strengths in areas such as Tectonic Processes, Earth Resources and Energy Transitions, Petrology and Volcanology, Experimental Mineral Physics, Seismology and Geodesy, Geological Engineering, Earth Surface Processes, and Geologic Hazards. Research approaches might include field data generation or exploration of field analogs, numerical modeling, computational methods such as machine learning and AI, and/or laboratory experiments.
The new faculty member will be expected to develop a high impact, externally-supported research program, effectively support the department's teaching mission at the undergraduate and graduate levels, and contribute to a thriving intellectual community that welcomes people of all backgrounds and viewpoints. We can accommodate start dates as early as July 1, 2025. The University of Utah is located in Salt Lake City, a vibrant urban region at the foothills of the Wasatch Mountains with world-class cultural and recreational opportunities. <https://utah.peopleadmin.com/postings/168605>
- **Post-doctoral position at Iowa State University** is available in [Dr. Valery Levitas' group](#) starting in the Fall of 2024 to perform experimental research on coupled plastic flow, phase transformations, and microstructure evolution under high-pressure and torsion of a sample in static and dynamic rotational diamond anvil cells. Experience with *in situ* high-pressure experimentation and/or x-ray characterization of stresses and structural changes in materials at the micron scale is desired. Close collaboration with theoretical/computational collaborators and Argonne National Laboratory of DoE is expected. Please email your application to Prof. Valery Levitas vlevitas@iastate.edu.
- **Ludo Frevel Crystallography Scholarship** (Samantha Clark 2018, Rebecca Fischer 2013) <https://www.icdd.com/ludo-frevel-scholarship/#apply> Deadline: October 10, 2024

Upcoming events

Sept 8-13	13th International Conference on Inelastic X-ray Scattering, IXS2024 , in Himeji, Japan
Sept 20-21	9th North American Mössbauer International Symposium (NAMIS9) at ORNL
Sept 21-23	81st Pittsburgh Diffraction Conference at Cornell University in Ithaca, NY
Oct 23	APS PUC/User meeting
Oct 29	HPCAT EC quarterly
Dec. 9-13	AGU Fall meeting in Washington DC
Jan 14-15, 2025	FORCE facility WORKSHOP on Recent Advances in High Pressure Research – VIRTUAL
Jan 22, 2025	APS PUC/User meeting
Feb 10-12, 2025	ESRF User meeting
Mar 23-27, 2025	TMS Annual Meeting in Las Vegas, NV https://www.tms.org/TMS2025 NOTE: There is session organized by HPCAT/APS long time user Richard Sandberg and additional folks from APS “Characterization of Materials through High Resolution Coherent Imaging” https://www.programmaster.org/PM/PM.nsf/UpcomingSymposia/D6B7CB06ED39D35B85258AB5000D0E8F?OpenDocument&ParentUNID=268FE297891FF1D785258687004BB316