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The Advanced Photon Source

LS-CAT: A New Life Sciences Facility at the APS

LS-CAT Operations Manager Keith Brister (Northwestern Univ.) at the MD2 diffractometer in the 21-ID-D enclosure.

The Life Sciences Collaborative Access Team (LS-CAT) on Advanced Photon Source (APS) Sector 21 is the latest macromolecular crystallography sector providing state-of-the-art x-ray diffraction facilities at the APS. LS-CAT is open to general user (GU) proposals through the APS GU proposal system as well as to researchers from member institutions. LS-CAT facilities include four experiment stations (21-ID-C, -D, -E, and -G) taking beam from two insertion devices (IDs). The main beamline (21-ID-D) uses a shortened APS Undulator A and a double-crystal monochromator in a layout very similar to the X-ray Operations and Research ID beamline on APS Sector 4, and the Northeastern CAT ID beamline on Sector 24. The other three LS-CAT experiment stations share a 3.0-cm undulator.

The 21-ID-F and 21-ID-G stations use diamond Laue monochromators, along with beryllium lenses to deliver focused beam to the stations. This arrangement, which is very similar to the ID14 beamline at the European Synchrotron Radiation Facility, allows macromolecular crystallography experiments to be done at the selenium edge (12.668 keV). The fourth station, 21-ID-E, is scheduled to come on line in 2009 using a large offset monochromator.

Each of the four stations is equipped with a MAATEL MD2 Microdiffractometer for high-throughput crystallography. The MD2 provides a beam-axis video view of the sample without parallax error.

LS-CAT manages user data using the Lustre file system, originally developed for supercomputer centers. This system allows for very fast access for data analysis.

The APS Experiment Safety Review System (ESAF) has been integrated into the data collection process. ESAF approval generates the user accounts required to use the LS-CAT systems elevating the ESAF into an engineered control that enhances user safety.

To automate sample manipulation, four Cryogenic Automated Transfer Systems (CATS), one for each experimental enclosure, are being installed. Each of the robots is equipped for both SPINE and Cryotong grippers to provide the greatest flexibility for users.

LS-CAT was formalized in 2003 with seed money from the State of Michigan through the Michigan Core Technology Alliance. Northwestern University was selected as the managing partner for the collaboration. Current LS-CAT members are Michigan State University, University of Michigan, Wayne State University, Van Andel Research Institute, Northwestern University, University Wisconsin-Madison, Vanderbilt University, and University of Illinois at Urbana-Champaign.

The interior of the 21-ID-G enclosure.

Call for APS General-User Proposals

General-user proposals for beam time during Run 2009-2 are due by Friday, March 6, 2009
Information on access to beam time at the APS is at http://www.aps.anl.gov/Users/apply_for_beamtime.html
or contact Dr. Dennis Mills, DMM@aps.anl.gov, 630.252.5680

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