

THE ADVANCED PHOTON SOURCE

CANTED IDS AT THE ADVANCED PHOTON SOURCE

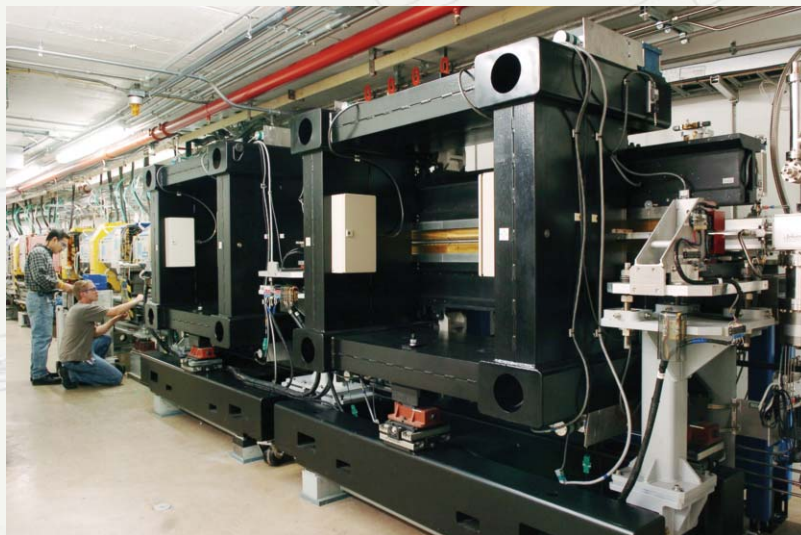
Synchrotron x-ray beamlines and beam time seem to always be at a premium. Time-based solutions (schedule more user-beam hours) or space-based solutions (expand the facility) are often impractical, if not impossible, so ingenuity has become a necessity.

The canted undulator (CU) storage ring straight section configuration creates two insertion device (ID) beams per sector where once there was one by adding a second ID to the lattice, thus doubling the capacity of that beamline. A chicane is created with a trio of dipole magnets, with an undulator in each leg. This creates an angular separation between the x-ray beams that can be exploited downstream to create two independent beamlines from a single straight section. The total CU system consists of two slightly shortened undulators, a special ID vacuum chamber, the dipoles, a corrector magnet for the chicane, and a specialized front end [1].

At the Advanced Photon Source (APS), canted IDs have for some time been in operation at sectors 4 and 12 (managed by the Argonne X-ray Science Division, or XSD), Sector 21 (Life Sciences Collaborative Access Team, or CAT), Sector 23 (General Medicine and Cancer Institutes CAT), and Sector 24 (Northeastern CAT). These are now joined by new canted configurations at Sector 16 (the High Pressure CAT, or HP-CAT) and Sector 34, also managed by XSD. Next up for canted IDs will be Sector 13, the GeoSoilEnviro Center for Advanced Radiation Sources (GSECARS) CAT.

16-ID-B and 16-ID-D

Funding for the HP-CAT canted front end (like the other two new front ends) was provided by monies the APS received from the American Recovery and Reinvestment Act (ARRA) of 2009. The canted front end allows two stations (16-ID-B and 16-ID-D) to be run simultaneously and independently (rather than parasitically). The 16-ID-B beamline is dedicated to high-pressure micro-x-ray diffraction, while the 16-ID-D beamline is dedicated to x-ray scattering and spectroscopy research of materials under



The canted undulators at APS Sector 23.

high pressure. Installation of the canted front end was carried out in September 2011 and HP-CAT plans to accept general users on the new independent beamlines in FY2012.

34-ID-C and 34-ID-E

The canted front end for Sector 34 was also supported by ARRA funding. It will allow two stations (34-ID-C and 34-ID-E) to be run simultaneously and independently (rather than in an

either/or mode, or occasionally in a parasitic mode). The 34-ID-C beamline is dedicated to coherent x-ray scattering techniques. 34-ID-E is dedicated for Laue microdiffraction techniques utilized to examine the structure of materials with sub-micron spatial resolution in all three dimensions. Installation of the canted front end occurred during the May 2011 maintenance period and the two new independent beamlines are accepting general users.

13-ID-C, 13-ID-D, and 13-ID-E

GSECARS-CAT operates the third sector at the APS to receive ARRA funding support for its canted undulator upgrade. This upgrade will allow two stations (13-ID-C or D and 13-ID-E) to be run simultaneously and independently in FY2012. The X-ray microprobe will run in 13-ID-E with a new ID (U36). The second new ID (U30) will supply interface diffraction and spectroscopy in 13-ID-C or high-pressure studies in 13-ID-D. Installation of the vacuum chamber and the U30 undulator was carried out during the scheduled maintenance period in December 2011; the front end and U36 undulator will be installed during the April-May 2012 shutdown. Associated beamline upgrades are being supported by DOE, NSF and NASA.

Reference

[1] Patric K. Den Hartog et al., Proceedings of the 2003 Particle Accelerator Conference (2003, IEEE), pg. 833.

CALL FOR APS GENERAL-USER PROPOSALS

The Advanced Photon Source is open to experimenters who can benefit from the facility's high-brightness hard x-ray beams.

General-user proposals for beam time during Run 2012-3 are due by Friday, July 13, 2012.

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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