The Advanced Photon Source

State-of-the-Art MX Detectors at the APS

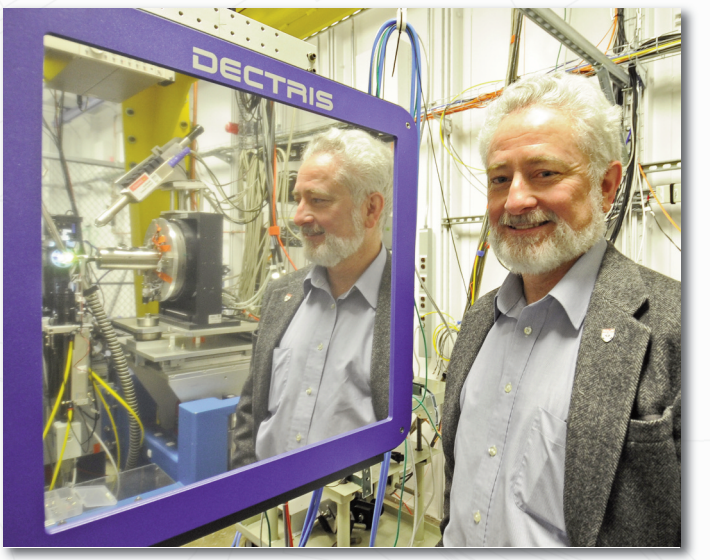
Three macromolecular crystallography (MX) beamlines at the Argonne National Laboratory Advanced Photon Source (APS) have recently implemented new state-of-the art detectors.

At the National Institute of General Medical Sciences and National Cancer Institute Structural Biology Facility (GM/CA) beamline 23-ID-D, a Pilatus3 6M with a high-efficiency, 1000-µm-thick sensor (DECTRIS Ltd., Baden, Switzerland) was installed in January 2014. The Southeast Regional Collaborative Access Team (SER-CAT) received an MX300-HS charge-coupled device (CCD) detector (Rayonix, L.L.C.; Evanston, IL) and are in the process of commissioning the detector on their 22-BM-D bending magnet beamline. BioCARS will receive an MX340-HS CCD detector (Rayonix, L.L.C.; Evanston, IL) at the end of February 2014; it will be installed on their 14-ID-B beamline. Two other beamlines at the APS already have Pilatus detectors: The Industrial Macromolecular Crystallography Association Collaborative Access Team has a Pilatus 6M on their 17-ID-B beamline; and the Northeastern Collaborative Access Team has a Pilatus-F 6M on their 24-ID-E beamline. The newest detectors employ advanced technologies providing even higher frame rates, count rates (Pilatus 3) and dynamic range. The specifications are available on the manufacture's Web sites (see links below).

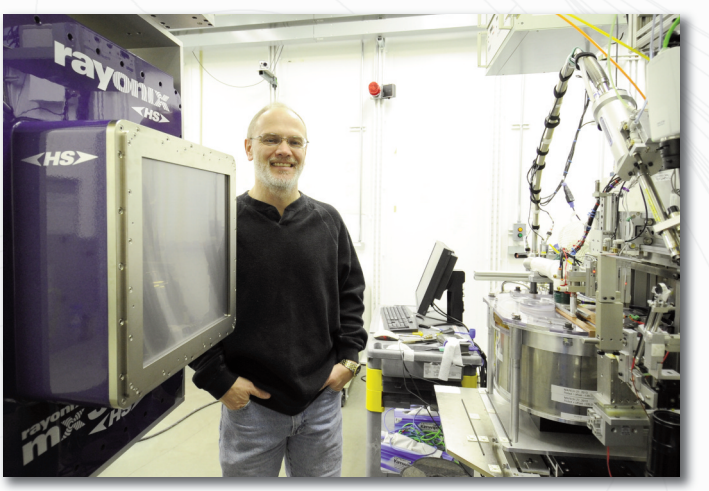
These high-frame-rate detectors will increase throughput and enable several new capabilities including shutterless data collection, rastering (grid search), and collection along a vector (helical). Many users now bring sample mounting loops to the beamlines that contain one or more microcrystals crystals grown in the lipidic cubic phase (LCP), which are difficult to visualize due to the high opacity of the LCP medium. Shutterless rastering will significantly reduce the time—from several minutes to a few seconds—needed to screen the sample mount, locate microcrystals, and ascertain their quality. The low electronic read-out noise and high dynamic range are ideal for studying the structure of membrane proteins and protein complexes, which tend to form small, weakly scattering crystals. The short read-out time allows for efficient employment of fine phi slicing to improve data quality by reducing the amount of background in a frame relative to the Bragg diffraction intensity. The combination of a high degree of automation and high-intensity, micron-sized beams allows users to rapidly screen many samples.

DECTRIS Pilatus detector specifications: https://www.dectris.com/pilatus3_overview.html#main_head_navigation)

Rayonix MX series detector specifications: http://rayonix.com/ products/ mx-hs-series/



Robert Fischetti, Associate Division Director and Group Leader, GM/CA, in the 23-ID-D research station with the Pilatus3 6M detector.



John Chrzas, Sector Manager, SER-CAT, with the Rayonix MX300-HS detector in the 22-BM-D research station. The detector is being commissioned on the bending magnet beamline before being moved to the insertion device line.

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 2014-3 are due by Friday, July 11, 2014.

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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