GM/CA Canted Undulator Beamlines for Protein Crystallography

Robert F. Fischetti[a], S. Stepanov[a], S. Xu[a], O. Makarov[a], A. Urakhchin[a], R. Sanishvili[a], W.W. Smith[a], D. Yoder[a], R. Benn[a], S. Corcoran[a], S. Devarapalli[a], W. Diete[b], M. Schwoerer-Boehing[b], R. Signorato[b], L.E. Berman[c], J.L. Smith[ad], [a]*Argonne National Lab., USA.* [b]*ACCEL GmbH, Germany.* [c]*Brookhaven National Lab., USA.* [d]*University of Michigan, USA.* E-mail: rfischetti@anl.gov

GMCA CAT has been established to build and operate a macromolecular crystallography facility at the Advanced Photon Source (APS). The facility will consist of three beamlines; two insertion device (ID) beamlines based on the APS dual-canted-undulator geometry and one bending magnet beamline. The independently tunable ID beamlines are presently being commissioned, and crystallographic experiments have begun. The beamlines are rapidly tunable (MAD capable), encompassing an energy range from 3.5 keV to 35 keV (wavelength 3.5 Å to 0.35 Å).

The scientific and technical goals of the CAT emphasize automation for a variety of sample types, sizes and qualities, including weakly diffracting samples as small as 10 μm, and unit cells as large as 2000 Å. Several novel features implemented to achieve these goals include "bimorph" mirrors with positional feedback, air-bearing goniometry, miniature piezo translation stages, and high resolution on-axis sample viewing. The control system has been designed to provide capabilities for fast automation. It includes a light weight version of SSRL's BluIce that has been converted into a client of the EPICS distributed control environment. Fast scans have been implemented for all beamline components at the hardware level based on novel motion controllers utilizing fiber links.

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