

## Poster Presentation

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### *High Brightness Beam for Microcrystallography at GM/CA@APS*

R. Fischetti<sup>1</sup>, S. Xu<sup>1</sup>, O. Makarov<sup>1</sup>, S. Stepanov<sup>1</sup>, C. Ogata<sup>1</sup>, R. Sanisivili<sup>1</sup>, N. Venugopalan<sup>1</sup>, M. Becker<sup>1</sup>, J. Smith<sup>2</sup>

<sup>1</sup>GM/CA@APS, X-ray Science Division, Argonne National Laboratory, Argonne, USA, <sup>2</sup>Life Sciences Institute, University of Michigan, Ann Arbor, USA

GM/CA is a world leader in the development of microcrystallography capabilities for biological macromolecules. The combination of the GM/CA-developed quad-mini-beam collimator and advanced rastering and vector collect software tools have revolutionized microcrystallography. Recently, beamline 23ID-B was reconfigured by shifting the focusing optics 3.8 m downstream. This significantly increased the source demagnification and led to a 4-fold increase in the 5- and 10-micron beam intensity. Beamline 23ID-D is also being upgraded. A Pilatus3-6M with a 1.0 mm thick X-ray sensor was commissioned in January 2014 allowing shutterless data collection with high S/N. The detector specifications include 100 Hz frame rate, 10 MHz/pixel count rate, and high X-ray efficiency. The beamline optics and endstation are also being upgraded to provide a high intensity beam whose size can be variable rapidly in the range of 1 - 20 micron, a new air bearing goniometer with a sphere-of-confusion (SOC) of ~100 nm, a miniature sample XYZ stage that allows centering and scanning of a micron-sized crystal, and a new on-axis-visualization system that provides high resolution optical images of sample crystals. Plans are being developed to upgrade the Advance Photon Source storage ring with a Multi-Bend Achromat lattice. The source properties will be dramatically improved primarily by reducing the horizontal source size to be comparable to the vertical source size, resulting in a 2-3 orders of magnitude increase in source brightness. Both beamlines will be significantly improved by the source upgrade. Moreover the new microfocusing optics for 23ID-D will fully exploit the new source and could deliver a 500 nm (FWHM) beam with >2e13 photons/sec. This unprecedented flux density will provide new opportunities and challenges, and allow the study some of the most important problems in biology. Details of these developments will be presented.

**Keywords:** microcrystallography, detector, optics