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Title of Talk:
GM/CA Canted Undulator Beamlines for Macromolecular Crystallography:
Design and Performance

Abstract:
GM/CA has built two insertion device beamlines and a bending magnet beamline for macromolecular crystallography. The two ID-lines are based on the APS dual canted-undulator geometry, which incorporates two independent, hard X-ray devices in one straight section. The novel design of the beamlines uses a pair of horizontally deflecting mirrors to provide a 500-mm separation between the beams. The combination of a highly stable cryogenically cooled, double crystal monochromator, and a pair of "bimorph" adaptive optic mirrors oriented in a Kirkpatrick-Baez geometry provide apochromatic focusing allowing users to easily change the energy for data collection. The endstation hardware includes an air bearing goniometer with a submicron sphere of confusion and a high magnification, on-axis optical viewing system. Beamline controls based on EPICS and Blu-Ice provide a user friendly interface for data collection at a rate of up to 20 frames per minute for 1 second exposures. Automated beamline setup, and robotic sample mounting and centering are currently under development. Data demonstrating the performance of the beamlines and crystallographic diffraction data from both small crystals and crystals with large unit cells will be presented. The National Institute of General Medical Sciences (GM) and the National Cancer Institute (CA) of the US National Institutes of Health sponsor the GM/CA CAT project.