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Structural Biology at the Photon Factory

At the Photon Factory (PF), the Structural Biology Research Center (SBRC) currently operates five beamlines dedicated to protein crystallography, including four insertion device (BL-5A, BL-17A, AR NW12A, AR NE3A) and one bending magnet beamlines (BL-6A). The optic for three of the beamlines was designed to provide monochromatic beam of energies from 6 to 17 keV, in an environment ideal for high-throughput crystal screening, data collection and analysis. These beamlines, BL-5A, AR NW12A and the newly built AR NE3A, deliver a measured flux ranging from 1.5×10^{11} to 8.0×10^{11} photons/sec of 12 keV photons on the sample. Together with improvements in the automation of the beamline control, notably through the implementation of sample exchange systems and automatic sample centering, a fully automated data collection and processing system was optimized to allow data acquisition of more than 150 data sets per day in a routinely manner. To complement BL-17A as an additional micro-beam beamline, the short-gap undulator beamline BL-1A is now under construction and will be opened for users in April 2010. BL-1A will deliver brilliant lower energy beam at around 4-5 keV, ideally optimized for sulphur single-wavelength anomalous dispersion (S-SAD) experiments. In this poster, I will present a brief summary of the beamline designs and the challenges facing the new developments, some innovation highlights, and I will try to emphasize through case studies the impact that have such state-of-the art beamlines on the biological studies at SBRC.

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