Structural Biology at the Photon Factory

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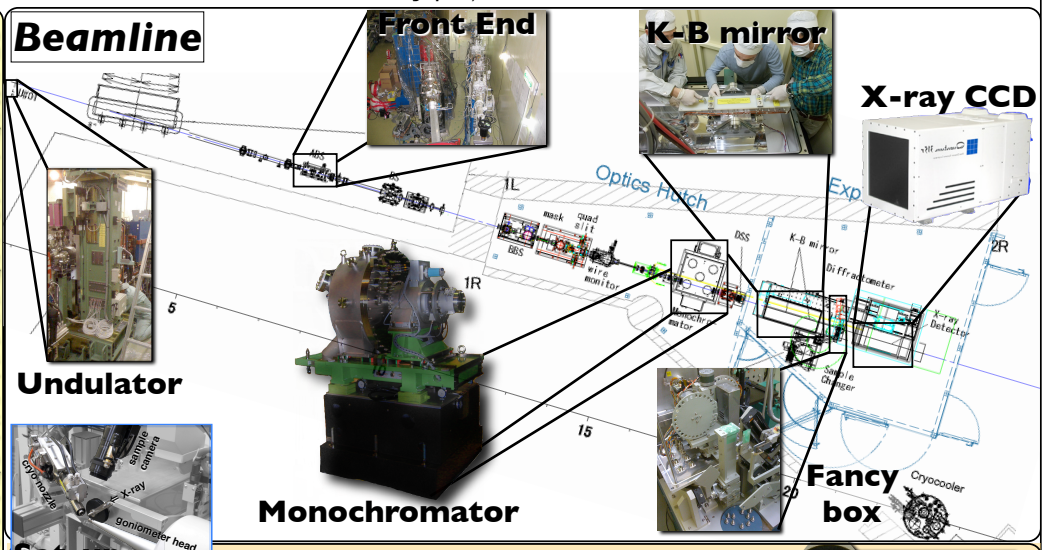
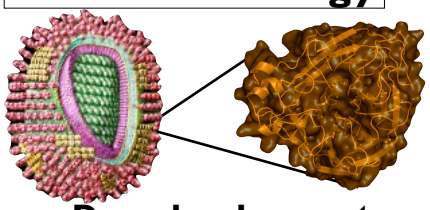
At the Photon Factory (PF), the Structural Biology Research Center (SBRC) currently operates five beamlines dedicated to protein crystallography, including four insertion device (BL-5A, BL-17A, AR NW12A, AR NE3A) and one bending magnet beamlines (BL-6A). The optic for three of the beamlines was designed 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 x 10^{11} to 8.0 x 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 microfocus 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.

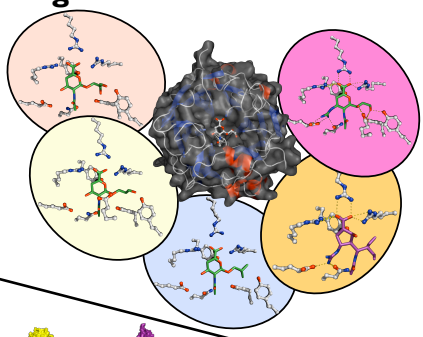
Beamline

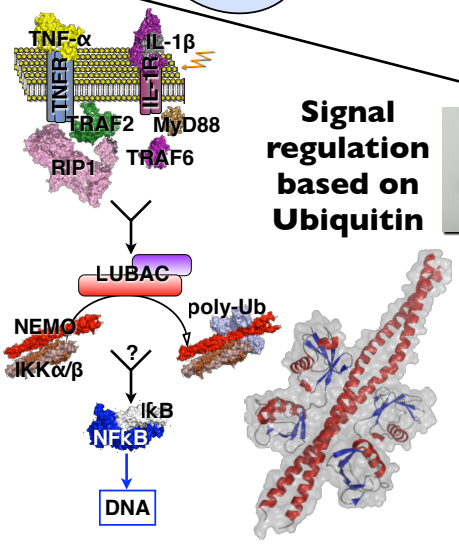


Structural biology



Drug development against influenza virus





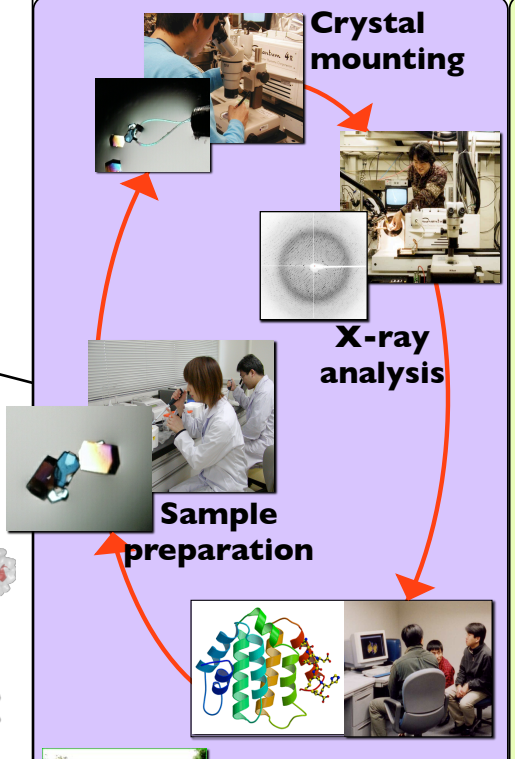
Signal regulation based on Ubiquitin

Robot

Crystallization robot PXS

Observation system

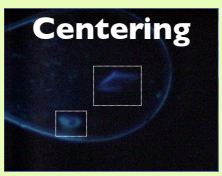
Mounting robot PAM

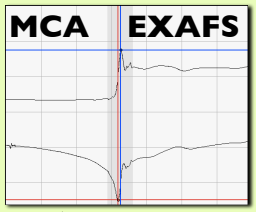


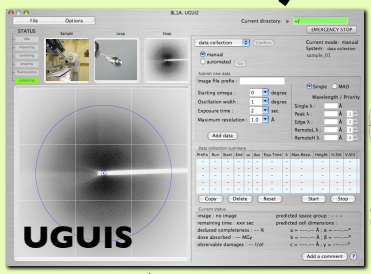
SBRC

Life cycle of structural biology

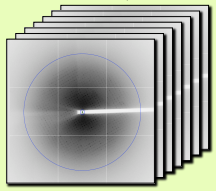
Software



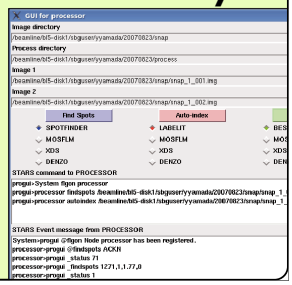




Strategy



CCD ADSC



Data analysis

For further readings:

Structure 18, 138–147 (2010)
J Mol Biol (2009)
Cell 136, 1098-109 (2009) ...