

New Opportunities for Structural Biology Research at SSRL

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The Structural Molecular Biology (SMB) program at the Stanford Synchrotron Radiation Lightsource (SSRL) provides an integrated suite of macromolecular crystallography (MC) and small angle X-ray scattering (SAXS) beam lines enabling studies on the most challenging problems in structural biology. SSRL 12-1, a new next-generation microfocus beam line is in commissioning. BL12-1 is outfitted with a broad bandpass capability to provide exceptional brightness, smaller microbeams and a high number of reflections when rastering on the fly or using crystal injectors. It is equipped with a high frame rate EIGER detector and a high-speed goniometer, enabling new approaches for data collection and phasing.

Similarities in instrumentation and software environments will form the foundation of a synergistic relationship between the SSRL BL12-1 and the new Macromolecular Femtosecond crystallography instrument (MFX) at LCLS, through a Gateway approach. The standard sample environment available at MFX is a highly automated goniometer setup for diffraction experiments, developed and supported by the SMB group. The experimental front-end is based on developments at SSRL and LCLS XPP to provide an efficient framework to carry out goniometer-based experiments using automated strategies tailored to handle a variety of sample requirements, crystal sizes and experimental goals. These developments coupled with improvements in data processing algorithms make it possible to derive high-resolution crystal structures using only 100 to 1000 still diffraction images.