

The SSRL Structural Molecular Biology group operates five beamlines, BL7-1, 9-2, 11-1, 12-2 and 14-1 for local or remotely controlled experiments. BL12-2, an in-vacuum undulator station, has a SSRL-designed microdiffractometer, an in-line camera, and a Pilatus 6M PAD detector operating in a shutterless fine-phi-slicing data collection mode, optimized for high throughput & stable microbeam studies. BL9-2 has recently been upgraded with a microdiffractometer and Pilatus 6M PAD detector for fine-sliced data collection. Data collection strategies taking into account spot overlaps and radiation damage can be requested for native, SAD, or MAD data via the web-based program, Web-Ice.

Recent developments have focused on enabling data collection from microcrystals and on probing larger crystals using the microbeam. The low-dose diffraction-based grid search is now much faster, both for finding the positions of microcrystals on a micromesh and for finding the highest quality spots or the most strongly diffracting areas of larger crystals. As an alternative to mounting on a micromesh, crystals may be grown or mounted in pre-defined openings in SSRL-designed grids for efficient data collection. For rod-shaped crystals, helical data collection is offered as a method to minimize radiation damage.

These advances have gone hand-in-hand with development of goniometer-based data collection protocols for end-stations at the LCLS, taking advantage of the short pulse length of the XFEL source (diffraction before destruction). These data sets may be assembled from still images collected via rastering of crystals in loops, micromeshes, or grids, as well as via a helical collection strategy for larger crystals. For samples that survive an X-ray pulse, additional pseudo-oscillation data may be collected with attenuated X-ray pulses to aid in refinement of the still image parameters and scaling of the data.

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