Optimizing the SER-CAT Beamlines for Routine Soft X-ray Data Collection

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The SER-CAT beamlines were designed and optimized for collecting multiwavelength anomalous dispersion (MAD) data on crystals of seleno-methionyl derivatized protein at the selenium X-ray absorption edge ($\sim$12 keV). However, single-wavelength anomalous scattering (SAS) methods have opened up the possibility of structure determination from native crystals based on the weak sulfur anomalous scattering signal enhanced by data collection using soft (6-8 keV) X-rays.

Over the past two years, SER-CAT has embarked on a program of soft X-ray beamline optimization focused on identifying and correcting instabilities in the system at low energies which can significantly contribute to noise level in the SAS data produced. This is important to the success of sulfur-SAS structure determination since although the SAS signal is enhanced at longer wavelengths the strength of the signal at $\sim$6 keV is still only about one-third of that produced by selenium at its absorption edge.

Progress on the optimization of both the SER-CAT undulator and bending magnet beamlines for routine, high quality soft X-ray data collection will be presented.