

Virtual Hard X-Ray Collaboration Seminar Series

Date: Thursday 26 October 2023

Title: Pushing SFX user throughput at the SwissFEL Cristallina station

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Abstract:

Serial crystallography has shown itself an essential method in the macromolecular crystallography tool kit, proving unique in the solution of dynamic structural biology information and instrumental in pushing the resolution of small poorly diffracting crystals. However, the X-ray free electron laser (XFEL) remains a niche tool due to its expense and limited user base. The key issue with XFELs which limits their impact is one of scale. There are only five operational hard X-ray XFELs in the world and due to their linear geometry, it is exceptionally challenging to have more than 2-3 experiments running concurrently; a feat easily achieved even by the smallest synchrotrons. Given this difference in active beamlines, there is a dramatic difference in the costs associated with the sources. A generous reading of these data suggests that XFELs are order of magnitude more expensive than their circular cousins. The CristallinaMX project at the SwissFEL Cristallina experimental station was founded to answer these challenge through the application of fixed-target sample delivery methods. Fixed-targets are typically more sample efficient than other delivery systems and also generally have higher hit-rates (crystals-hits:pulses) making better use of the source and the sample. Cristallina will also try to offer users shorter beamtimes (<24 hr) but, if necessary more of them over a beamtime period in order to decrease the overheads on experimenters. Commissioning experiments at Cristallina over the past year have explored these proposals with promising results as we move towards user operation. Ultimately, we aim to increase the user throughput through Cristallina by an order of magnitude to increase the impact of SwissFEL to PSI's MX user community.