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ID29 SMX - A universal Time-Resolved Crystallography Beamline

Friday 30 August 2024 14:00 (20 minutes)

The European Synchrotron facility –ESRF has recently been upgraded to Extremely Brilliant Source (EBS) [1]. The new storage ring with an extremely low horizontal emittance and > 30 times more brilliant than 3rd generation sources allows to expand the scope of synchrotron radiation for Macromolecular X-ray crystallography (MX). After EBS upgrade, the highly focused and intense X-ray beam bridges the gap between any 3rd generation synchrotron and X-ray free electron lasers (XFELs), enabling data collection from micron-sized biomolecular crystals. This enabled development of a dedicated time-resolved serial crystallography (TR-SSX) beamline. Thus, old ID29, a formerly experimental phasing microfocus MX beamline [3], was entirely re-built to World's first leading beamline towards μ s-time-resolved serial crystallography. The beamline produces 10- μ s pulsed X-ray beam with a continuous flux of ~1015 photons/sec and equipped with multi-layer monochromator resulting in 1% bandwidth. ID29 –TR-SSX beamline enables to explore the uncharted < 100 μ s exposures domain between 3rd generation source and XFEL. Two chopper systems mechanically produce the pulsed X-ray beam synchronized with the reference frequency of the storage ring. ID29 is equipped with KB-mirrors to produce 1 μ m X-ray beam, state-of-the-art MD3up-SSX diffractometer, a nanosecond tunable high-repetition laser, and Jungfrau 4M detector, enabling data acquisition rate of 925 Hz. In the talk, the new ID29 beamline together with developments in sample-delivery, data acquisition system, time-resolved setup will be introduced and opportunities of various SSX data collection at the ID29 will be highlighted.

Reference:

- [1] Raimondi, et al., Nature comm. physics., 2023
- [2] Chapman et al., Nature, 2011
- [3] de Sanctis D., et al., J. Synch. Rad., 2012

I plan to submit also conference proceedings

No

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