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Nanoprobe diffraction and scattering method - BCDI, ptychography, robotics

Tuesday 23 September 2025 16:00 (30 minutes)

A new Nanoprobe beamline is under construction at the ANSTO Australian Synchrotron. The 100 m-long beamline aims to achieve 60 nm-resolution X-ray fluorescence microscopy and correlated 10 nm-ptychography. In addition, the Nanoprobe will implement nanobeam diffraction and scattering methods, including Bragg coherent diffractive imaging (BCDI) and ptychography. To record the diffraction from the sample, over an approximate quarter-hemisphere relative to the incident beam, and at sample-to-detector distances from 0.1 –6.0 m, several detector gantry options were available. ANSTO has engineered a cost-effective solution utilizing a 6-axis industrial robot with 3 m reach and 20 kg payload capacity (KUKA KR20 R3100) travelling on a 6m linear track (Güdel TMF-6) to support and position a diffraction detector (Dectris EIGER2 X 1M). The robot system is required to position the detector sequentially around a chosen (r,θ,ϕ), where cylindrical coordinates define the sample-to-detector-center distance, r, and azimuthal θ and vertical ϕ take-off angles. For certain experiments, the detector will be positioned in a defined (X,Y) plane perpendicular to the incident X-ray beam to capture a full diffraction pattern at a distance away from the sample. The design considerations, and operational configurations for the robot detector positioning system will be discussed in this talk/poster.

Footnotes

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