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## An Upcoming Novel Coherent Diffractive Imaging Beamline at National Synchrotron Light Source II

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The application of techniques designed to capitalize on the high source brightness at current generation storage ring facilities continues to produce unique insights into the structure and dynamics of materials. At NSLS-II, we are nearing the completion of a new beamline designed to provide tunable x-ray illumination in both size and coherence fraction—sample environments, and experimental geometries. The design considerations, beamline optical system simulations, end-station provisions, and progress toward its completion in 2025 will be presented here.

The CDI beamline's source will be provided by an 18-mm-period in-vacuum undulator and the 3 GeV electrons from NSLS-II. The undulator will feature a variable taper, delivering an increased x-ray bandwidth of at least 5% RMS at 10 keV. The optical system will use two bendable x-ray mirrors in conjunction with two fixed-figure mirrors to provide a sample illumination that allows variable coherence properties in a "zoomable"x-ray focal spot of about 1 to 10 microns in lateral size. Thus, the optical design provides a unique opportunity to tailor beam properties to the needs of each experiment. All aspects of the design were modelled and informed by simulations with the Synchrotron Radiation Workshop tool.

The final optics will provide a very long working distance of approx. 1.5 m and the sample-to-detector distance will be variable from 0.5 m to 10 m. Two area detectors will be independently positionable, allowing for simultaneous measurements in either or both of the forward-scattering and a Bragg-reflection geometry. The angular coverage of the detector system varies from approx.  $70(V) \ge 120(H)$  to  $11(V) \ge 120(H)$  degrees as a function of sample-to-detector distance.

The CDI beamline will present an exciting capability for routine, high-stability coherent imaging measurements and a uniquely-capable test-bed for the development and refinement of future imaging methods. We are currently on-track to commission this beamline in Summer 2025.

## I plan to submit also conference proceedings

No

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