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(G*) POS-C10 – Vertical phase space measurement at Canadian Light Source

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A key feature of third-generation light sources is their small vertical opening angle, which is difficult to measure experimentally. To reconstruct the vertical phase space, one can scan the beam's position using X-ray synchrotron radiation (XSR) and a pinhole camera. The XSR diagnostic beamline, operational in the wavelength region of λ= 0.05 - 0.15 nm, in Canadian Light Source (CLS) is qualified to measure the beam position with X-ray radiation. Using the corrector magnets in CLS lattice made of 12 identical double-bend achromats (DBA) cells, vertical iterations of 100 μm can be executed parallel to the beam's original orbit. The outcomes of this experiment are: 1) the vertical beam positions that are monitored by BPMs on both sides of the X-ray's source point, 2) the X-ray image of the beam that is projected through the pinhole and converted to visible light to be captured on the CCD camera. The bumps were simulated using Matlab Middle Layer (MML) for Accelerator control systems to get an insight of the source point's position in the XSR's bending magnet. The simulation shows the position of the source point depends on which corrector sets are chosen. To make a truly parallel bump in the DBA sector and to be able to calculate the source point's actual position, critical in reconstructing the vertical phase space, a particular set of correctors should be chosen.

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