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Preliminary results of a Beam Expander for Biomedical Imaging

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X-ray phase based imaging is becoming increasingly important due to the high contrast that can be obtained from soft tissues. A number of synchrotron facilities use phase contrast routinely for imaging of biomedical systems. One of the simplest and most used phase contrast method is in-line or propagation based phase contrast. Due to the small beam size available from synchrotron sources there are significant limitations on the physical size of objects that can be imaged without scanning the object through the beam. This severely limits the applicability of synchrotron sources for imaging systems in real time.

We present results of a bent Laue beam expanding double crystal monochromator for use at the Biomedical Imaging and Therapy (BMIT) beamlines at the Canadian Light Source. This system will enable live animal dynamic imaging not previously possible at this facility, as well as drastically reduce image acquisition and processing time for work already being done. Previous experiments led us to an expansion of 7.7x the incident beam height, however the loss of beam coherence seriously limited its usability for phase-dependent imaging techniques. Recent improvements to the system have increased this expansion to 12x while maintaining phase coherence. Implementation of this expander in the insertion device (wiggler) beamline at BMIT has the potential to bring this facility to the forefront of biomedical synchrotron imaging facilities worldwide.

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