

SEMINAR NOTICE

*Department of Physics and Engineering Physics
University of Saskatchewan*

SPEAKER: Mercedes Martinson, PhD Candidate,
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TOPIC: *Phase-preserving Beam Expander for Biomedical Imaging*

DATE: Tuesday, November 24th, 2015

TIME: 3:30-4:30pm.

PLACE: Rm. 103, Physics Building

ABSTRACT:

At the Canadian Light Source, the BioMedical Imaging and Therapy (BMIT) bend magnet and insertion device beamlines have been very successful in their mission to image biological tissue and conduct live animal imaging studies. However, since their inception, they've been restricted by a small vertical beam size. This poses limitations for imaging modalities such as micro-computed tomography and dynamic phase imaging, techniques which are necessary to remain at the cutting edge of biomedical imaging research.

We previously reported results of a vertical beam expansion up to 7.7x using a bent Laue double crystal monochromator. However, these attempts resulted in significant degradation of the beam's phase characteristics in the vertical direction (corresponding to horizontal edges in the object). In order to observe edge-enhancement refraction effects, the source must be angularly small. When an X-ray beam is diffracted through a bent crystal, the apparent angular source size can be adversely affected if there is a mismatch between different types of foci. In order to preserve the transverse coherence of the synchrotron X-ray beam, the single-ray focus must coincide with the dominant geometric focus in what is referred as the "magic condition." To achieve this condition, we derived a better approximation for the single-ray focal length and carefully merged it with the well-established geometric focus. On the Engineering side, we developed a bending frame that more carefully controls the bend radius of the crystal. The result of this effort is a great improvement in the transverse coherence of the expanded beam, restoring its ability to perform techniques such as dynamic phase imaging of relatively large samples.

Coffee and Cookies will be served in the Physics lounge at 3:00 pm. for those attending the seminar.