

SEMINAR NOTICE

*Department of Physics and Engineering Physics
University of Saskatchewan*

SPEAKER: Dr. Dean Chapman, Adjunct with Dept of Physics
Anatomy, Physiology & Pharmacology, USask

TOPIC: *X-Ray Crystal Optics R&D at the Canadian Light Source*

DATE: Tuesday October 1st, 2019

TIME: 3:30-4:30 p.m.

PLACE: Physics 103

ABSTRACT:

The synchrotron provides an ideal environment to develop new approaches to developing crystal optics. At the Canadian Light Source (CLS) there are a number of activities on the Biomedical Imaging and Therapy (BMIT) beamlines directed to advancing the x-ray diffractive optics used for wide-field imaging and other applications. These optics have been used to improve existing methods as well as provide new capabilities not possible before.

Optics have been developed to improve and extend K-Edge Subtraction, a form of function imaging with tracer elements. An extension of this system optimized for energy dispersion has been used to CT image selenium compounds of different oxidation state (speciation) and successfully independently determined the concentration of those compounds (selenite, selenate, and seleno-methionine).

The drive to improve and expand the amount of information extracted from various imaging modalities has led to the use of multiple x-ray photon energies in computed tomography clinical systems. A MEI system, which prepares a focused polychromatic x-ray, has been developed. An extension of this system makes use of the wide energy range fan beam to do wide energy range computed tomography. New approaches to CT reconstruction are required and present interesting challenges.

The small vertical beam size of a synchrotron limits its usability in some applications. A beam expander was developed that makes the source appear to originate at distance much farther away. This was accomplished using a double crystal bent Laue monochromator in a non-dispersive divergent geometry. Studies are underway to ensure that the phase and coherence properties of the output beam are preserved.

Finally, a project that derived from some of the K-Edge Subtraction work has shown that the synchrotron beam position and angle can be determined at a single location in a synchrotron beamline. New work has shown that the source size and angular distribution (emittance) can also be found and has the sensitivity to measure the properties of the new high brightness (MBA lattice) synchrotrons.

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