SEMINAR NOTICE

Department of Physics and Engineering Physics
University of Saskatchewan

SPEAKER: Farangis Foroughi, PhD Candidate, Physics & Engineering Physics

TOPIC*:* *Multiple-Image Radiography: Principles, Methods, and Applications in Microstructural Imaging.*

DATE: Tuesday November 3rd, 2026

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

PLACE: ***Physics 103***

Investigating the microstructure of materials is important in many fields, from materials science to biomedical research. A variety of microscopy and X-ray techniques are available for this purpose, each with its own capabilities and limitations. X-ray techniques provide different types of information depending on how X-rays interact with matter. In biological imaging, particularly when studying living systems, the choice of technique also requires careful consideration of radiation dose.

This seminar explores multiple-image radiography (MIR), an analyzer-based X-ray imaging technique investigated for dose-limited imaging of living subjects at synchrotron facilities. By exploiting the angular sensitivity of crystal diffraction, MIR goes beyond conventional attenuation contrast to measure subtle changes in X-ray beam direction and angular distribution. These measurements provide three complementary signals: absorption, refraction, and ultra-small-angle X-ray scattering (USAXS), offering different perspectives on the internal structure of a sample.

The seminar will then present MIR2, an alternative analysis method developed to improve contrast retrieval and reduce image artifacts, along with MIR2-Toolkit, a Python-based application with a graphical user interface designed to make the method and its underlying diffraction calculations more accessible to researchers. Finally, applications from this research, including in vivo X-ray imaging of mouse lungs and investigations of paper microstructures, will demonstrate how MIR can be used to study complex porous materials.