SEMINAR NOTICE

Department of Physics and Engineering Physics
University of Saskatchewan

SPEAKER: Nishka Sheth, PhD Candidate, Physics & Engineering Physics

TOPIC*:* *Magnetohydrodynamic modeling of Plasma flow and acceleration in the magnetic nozzle.*

DATE: Tuesday October 14th, 2025

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

PLACE: ***Physics 103***

Abstract:

Different fusion experiment concepts, ranging from toroidal systems like Tokamaks and Stellarators to cylindrical linear devices like theta-pinch, Z-pinch, and open mirror configurations, are being implemented by various scientific groups to achieve controlled nuclear fusion. Recently, linear configurations have gained increased attention as potential compact and lower-cost fusion devices. In these devices, axial plasma flow is fundamental and results from the Lorentz force generated by the radial electric current and the self-generated azimuthal magnetic field. Although the differences in geometry induce different effects in these devices, the underlying principles remain consistent. The investigation of such flows is crucial for the development of controlled nuclear fusion devices because the compression, heating, and injection of hot plasma into magnetic traps are fundamental aspects of achieving controlled nuclear fusion.

The linear systems with axial magnetic field, like axisymmetric open mirrors are of particular interest in this talk. The function of the magnetic mirror (nozzle) is to convert the thermal plasma energy rotation and magnetic energy into the energy of the directed axial motion. Magnetic nozzles are utilized in plasma propulsion systems to generate thrust for space travel and in fusion devices to improve plasma confinement. This talk focuses on the numerical investigation of two-dimensional magnetohydrodynamic (MHD) flows in axisymmetric linear devices, with an emphasis on acceleration mechanisms, as well as the effects of currents and rotation on plasma dynamics in magnetic nozzle configuration.