

SEMINAR NOTICE

*Department of Physics and Engineering Physics
University of Saskatchewan*

SPEAKER: Jeffrey Zielinski, PhD Candidate
Physics & Engineering Physics

TOPIC: *Micro/Macro-scale Instabilities in Tokamak Plasmas*

DATE: Tuesday November 19th, 2019

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

PLACE: Physics 103

ABSTRACT:

Tokamaks are toroidal confinement devices designed to heat plasma up to 10 keV (100,000,000K) with the goal of harnessing fusion energy on earth. Although along straight, constant magnetic field lines, particle trapping would be ideal, a number of drifts, flows, and instabilities arise when one considers macroscopic plasma effects (density gradients, field geometry, etc.). Of particular interest for this talk are small-scale instabilities that arise from temperature and density gradients in the plasma, which like the Rayleigh-Benard instability, attempt to form plumes/vortices which pass hot plasma in the tokamak core outwards, thus degrading the energy confinement. This talk will begin by outlining the basics of tokamak equilibria and magnetic geometry, and offer a basic description of turbulent transport, along with the transport barriers which can be used to interrupt transport phenomena. We will then consider the phenomenology of Ion Temperature Gradient (ITG) mode instabilities, developing a fluid-based mathematical model as we proceed. This will allow us to investigate linear and nonlinear simulation results which characterize the ITG instability in several magnetic configurations, including their global self-interaction over the macroscopic domain. Results will focus on analyzing the development of several distinct eigenmode structures, along with investigations of the turbulent states which form in the nonlinear regime.

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