

SEMINAR NOTICE

*Department of Physics and Engineering Physics
University of Saskatchewan*

SPEAKER: Ivan Romadanov, PhD Candidate
Department of Physics & Engineering Physics

TOPIC: *Large Scale Oscillations in Hall Plasmas*

DATE: October 3rd, 2017

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

PLACE: Physics 103

ABSTRACT:

Partially-ionized weakly-collisional plasmas with magnetized electrons and weakly-magnetized ions in crossed electric and magnetic fields are common in nature and industrial devices, such as sputtering magnetrons for coating and deposition, MHD generators, electric propulsion (ion/Hall, helicon thrusters) and Penning discharges. Such plasmas are usually in a strongly non-equilibrium state, with a variety of turbulent fluctuations. These fluctuations are responsible for anomalous transport phenomena and large-scale plasma structures. The most known and pervasive examples are rotating spokes and breathing oscillations, which can critically affect the performance of plasma devices. Possible mechanisms for structure formation, experimental diagnostics and results, and control methods will be discussed in this talk.

Ion dynamics play a crucial role in the formation of large-scale plasma modes. Time-resolved laser-induced fluorescence (LIF) was used to measure the ion velocity distribution function (IVDF) at different phases of a discharge, in a cylindrical Hall thruster. I present the results of ion dynamic measurements in a cylindrical Hall thruster and in a Penning discharge.

Large scale structures can be induced by external modulation, e.g. the breathing mode can be excited by driving the anode potential. The effects of these external modulations were also studied. Two types of thruster response were identified: linear and non-linear. In the non-linear mode, there is an increase in beam efficiency, which opens up the possibility to utilize these external modulations.

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