SEMINAR NOTICE

Department of Physics and Engineering Physics
University of Saskatchewan

SPEAKER: Oleksandr Koshkarov, PhD Candidate
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TOPIC*:* ***Analytical and Numerical study of nonlinear phenomena in plasma physics***

DATE: September 26, 2017

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

PLACE: Physics 103

ABSTRACT:

Plasmas consist of a quasi-neutral gas of charged particles, where the interactions are dominantly collective. Nearly all (99%) of the visible universe is in a plasma state, and there are numerous important applications of plasma physics in astrophysics, space physics, fusion, ion propulsion, gas lasers, plasma etching, etc. Therefore, the study of plasma behavior is a very important branch of modern physics with numerous unanswered questions.

Plasmas support a large variety of wave phenomena, and some may argue that plasma physics is dominantly the physics of plasma waves. When wave amplitudes are small , linear wave theory can be used. Linear theory has been widely exploited by numerous researchers and it has significantly increased the understanding of plasma dynamics. Nevertheless, the majority of plasmas in space, as well as in the laboratory are in a highly non-linear or turbulent state, where process such as wave-wave or wave-particle interactions can not be neglected.

In this presentation, I will overview how one can approach the study of nonlinear plasma dynamics using select numerical and analytical techniques, along with example projects which were conducted during my PhD program.

In the first example, I use a novel numerical method to solve the kinetic equation based on a combination of spectral and PIC methods. In the next example, I will discuss the application of modulational instability theory to highly magnetized plasmas. Finally, the investigation of nonlinear dynamics in Hall plasmas with combination of linear theory and nonlinear simulations will be explored.

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