

SEMINAR NOTICE

*Department of Physics and Engineering Physics
University of Saskatchewan*

SPEAKER: Dr. Jean-Pierre St-Maurice
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Department of Physics & Engineering Physics

TOPIC: *The generation and evolution of unstable plasma structures in the lower Ionosphere.*

DATE: October 11, 2016

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

PLACE: Physics 103

ABSTRACT:

Plasma irregularities that are strongly aligned with the earth's magnetic field permeate the ionosphere. Radio waves moving through these turbulent structures undergo Bragg scattering. This causes the signals transmitted by ionospheric radars to be partially reflected back toward the transmitters in back-scattering systems. In this presentation I will only deal with radar echoes received from the lower ionosphere, near 100 km altitude. For radars operating at 10 MHz or greater, this means that the gradient scales of the scattering structures must be of the order of 10 m or less. The best way to generate growing amplitude structure of this size in the lower ionosphere is through an instability produced by the strong Hall currents that can often flow there. This requires the ambient electric field to make the electrons move at a speed greater than the ion acoustic speed. I will describe on physical grounds how these meter-size structures are amplified through a positive feedback mechanism. This stated, the real challenge to researchers is not with the generation mechanism, but with what happens when the amplitude of the structures becomes large. A few of the relevant properties revealed by the observations are that the velocity of the structures decreases as they grow in amplitude, that the maximum amplitudes are reached at a point where the structures should not be growing, and that energy spills out into structures that are measurably less magnetic-field-aligned than expected. I will describe how these and other observations can be explained theoretically and understood physically.

Coffee and Cookies will be served in Physics 103 at 3:00 p.m. for those attending the seminar.