SEMINAR NOTICE

Department of Physics and Engineering Physics
University of Saskatchewan

SPEAKER: Ashton S. Reimer, PhD Candidate

TOPIC: *Investigating the near-Earth Space Environment: SuperDARN Radar Signal Processing Analysis and Applications*

DATE: Tuesday, February 2nd, 2016

TIME: 3:30-4:30pm.

PLACE: Rm. 103, Physics Building

ABSTRACT:

Abstract: The interaction of the solar wind with the magnetosphere of the Earth is responsible for a variety of physical processes in the near-Earth space environment; the most well-known process being the Aurora Borealis and Aurora Australis. Understanding the processes involved in producing this "space weather" requires a variety of scientific instruments, both in-situ and remote, including Earth-based radar systems. The Super Dual Auroral Radar Network (SuperDARN) is an international research collaboration consisting of more than 30 radar systems that are used to study space weather. Together, the radars provide global-scale convection maps of bulk plasma flow in the ionospheric with minute time resolution. In addition, SuperDARN data is extensively used to provide a global context for other instrument measurements, including numerous satellite missions (ePOP, THEMIS, RBSP, etc.).

Recently, there has been research aimed at improving and expanding SuperDARN data products. For example, Gillies et. al. (2012) demonstrated a technique for obtaining electron density measurements from SuperDARN data on a statistical basis. Recently, Spaleta et. al. (2015) extended this work with new measurement and data analysis techniques to obtain electron density measurements as a routine data product (every 1 to 2 minutes). My thesis project aims to further improve SuperDARN observations techniques and data products. This talk will focus on propagation of measurement errors to the fitted SuperDARN data products. The voltage signals recorded by SuperDARN radars are processed using time-domain auto-covariance techniques to estimate the autocorrelation function (ACF) of the ionospheric plasma. The ACF contains information about the velocity and lifetime of ionospheric plasma irregularities, which is extracted using fitting techniques. Error bars for the ACFs have been derived and verified. I will discuss the effect of these error bars on the SuperDARN data products. The talk will conclude with applications of this new research, including improvements to SuperDARN measurement techniques and the potential of extracting plasma temperature from SuperDARN measurements.

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