Western University
Department of Physics and Astronomy

PHYSICS & ASTRONOMY COLLOQUIUM

Date: **Thursday, 13 February 2020**

Time: **1:30 p.m.**

Location: **Physics & Astronomy Seminar Room 100**

Dr. Ben Lansdell

MindCORE (Mind Center for Outreach, Research, and Education)
University of Pennsylvania

"The neuronal credit assignment problem as causal inference"

ABSTRACT

How an individual neuron knows its role in a network's output, and so how it should change to improve performance, is known as the credit assignment problem. Despite significant recent attention, it remains unclear exactly how neurons in the brain solve this problem. In this talk I will show that the credit assignment problem can be framed as one of causal inference: what is a neuron's causal effect on a reward signal? This framing leads to a new learning rule a neuron could use to estimate its causal effect. The rule relies on, rather that smooths out, the spiking mechanism of neurons. In the second half of the talk, I show how a causal effect estimator can be combined with a feedback network to allow for efficient learning. Specifically, I propose a method to train weights of a feedback network to provide meaningful error signals to each neuron in the feedforward network. This setup results in comparable performance to backpropagation, and better performance than using fixed feedback weights (known as feedback alignment), on simple benchmarks. I propose these approaches yield efficient and plausible learning algorithms for the brain.

HOST: O. Trichtchenko

COFFEE + light snacks will be available in the Atrium, 2nd floor, at 1:15 p.m.