



**Western University**  
**Department of Physics and Astronomy**

## **PHYSICS & ASTRONOMY COLLOQUIUM**

**Date:** **Thursday, 14<sup>th</sup> September 2017**  
**Time:** **1:30 p.m.**  
**Location:** **Physics & Astronomy Seminar Room 100**

### **Dr. Julio Martinez-Trujillo**

Department of Physiology & Pharmacology  
Brain and Mind Institute  
Robarts Research Institute  
University of Western Ontario

### ***“Complex behaviour and the Cerebral Cortex, a fertile ground for quantitative scientists”***

#### **ABSTRACT**

The cerebral cortex is the part of the brain that has evolved the most in humans and other primates, the most intelligent creatures in the planet. The cerebral cortex is composed of trillions of small units called neurons that fire electrical pulses to communicate with one another. From this symphony of digital pulses (the neural code) and an exquisite connectivity blueprint between neurons, complex thoughts, memories and behaviours arise. Is it possible to reverse engineer the brain? Can we measure neural activity and build dynamic models of the brain? In this presentation, I will show examples of how to conduct electrophysiological measurements of the activity of single neurons and neuronal ensembles during complex behaviors aimed at cracking the neural code. I will elaborate on a theory of how visual information can travel through different cortical areas, is decomposed into tractable features via neural computations, and is reassembled again by integrator neurons to be stored as memories. I will discuss current developments and challenges in the field of neuroscience that are of interests to physicists, mathematicians and other quantitative disciplines.

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