



Western University
Department of Physics and Astronomy

PHYSICS & ASTRONOMY COLLOQUIUM

Date: **Thursday, 24 January 2019**
Time: **1:30 p.m.**
Location: **Physics & Astronomy Seminar Room 100**

Dr. Jonathan Bradley

Department of Engineering Physics
McMaster University

“New Light Emitting Materials for Silicon Nanophotonics”

ABSTRACT

The erbium-doped fiber amplifier (EDFA) enables the amplification of high-speed optical signals travelling over continents and across oceans in fiber-optic cables. Its invention in the late 1980's was ultimately a key step towards connecting people worldwide and the information revolution brought about by the Internet. Since the 1990's, like many other optical technologies, researchers have made significant efforts to integrate rare-earth-doped materials and devices on photonic chips, to provide a robust form factor as well as a size and cost advantage. Nevertheless, despite many advances, on-chip rare-earth-doped devices have yet to see widespread application. The primary reason is that fiber-based devices, although bulkier, are very well established, offer good performance and can meet the requirements of larger telecommunications systems. Recently, however, with the rise of silicon nanophotonics and scaling of transceiver technology in data centers, the demand for compact optical amplifier and light emitter solutions is high. In this talk I will discuss recent progress in our lab in silicon-based rare-earth-doped light emitting materials. I will focus on the rare-earth host materials alumina and tellurite glass, which both exhibit high thermal stability, broad emission spectra, reduced rare-earth clustering and higher refractive index than other common glass hosts such as silica, thus enabling ultra-compact devices. We have demonstrated a number of on-chip near-infrared optical amplifiers and lasers based on these materials, including distributed feedback, distributed Bragg reflector and microcavity devices. The talk will cover critical materials and design considerations towards optimizing devices, and explore the limits of device size and performance, from ultra-compact and low threshold microlasers to high output power waveguide amplifiers and lasers.

HOST: L. Goncharova

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