



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

## **PHYSICS & ASTRONOMY COLLOQUIUM**

**Date:** THURSDAY, 8<sup>th</sup> February 2018  
**Time:** 1:30 p.m.  
**Location:** Physics & Astronomy Seminar Room 100

### **Dr. Mark Gorski**

Department of Physics & Astronomy  
The University of Western Ontario

### ***“Molecular Tracers of Star Formation Feedback in Nearby Galaxies”***

#### **ABSTRACT**

The energy and momentum injected into the ISM from stars has a drastic effect on the star formation history of a galaxy. This feedback is responsible for the inefficient collapse of the ISM into stars. By using molecular tracers of feedback, we provide insights into the star forming ecosystem of the galaxies NGC 253, IC 342, NGC 6946, and NGC 2146. We have selected the metastable NH<sub>3</sub> lines as a temperature tracer of the dense molecular ISM, the 22 GHz H<sub>2</sub>O maser as an indicator of star formation, and the 36 GHz CH<sub>3</sub>OH maser which was previously unexplored in the extragalactic context. We uncover evidence for a uniform two-temperature component distribution of the molecular gas across the central kiloparsec of NGC 253 and IC 342. The temperature does not appear to correlate with feedback effects such as supernovae, PDRs, or shocks. We identify several new water masers associated with star formation across all four galaxies. We also show that extragalactic 36 GHz CH<sub>3</sub>OH masers are likely related to large scale weak shocks in the dense molecular ISM. In NGC 253 specifically we test models of galactic outflows driven by a nuclear starburst with sub-arcsecond observations of NH<sub>3</sub>(3,3) masers, H<sub>2</sub>O masers and CH<sub>3</sub>OH masers. We uncover evidence for star formation and entrainment of molecular material in the outflow of NGC 253.

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