

**TRENT UNIVERSITY
PHYSICS & CHEMISTRY SEMINAR PROGRAM**

WEDNESDAY, SEPTEMBER 17, 2014

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<https://uwaterloo.ca/physics-astronomy/people-profiles/david-hawthorn>

**Charge Density Wave Order in Cuprate
Superconductors**

ABSTRACT

The discovery of superconductivity in cuprate high temperature superconductors in 1986 set off a massive worldwide research effort aimed at developing superconductors for practical applications – perfect conductors, levitating trains, quantum electronics – and resolving the physics responsible for the superconductivity. However, despite over 25 years of intensive research the “problem” of cuprate high temperature superconductors remains unsolved. One aspect that makes understanding the cuprates difficult is that the superconducting phase competes with other phases of matter, in particular a charge density wave (CDW) state – a spontaneous, spatial modulation of the charge density. It is now clear that understanding the CDW state is of central importance to understanding many aspects of the cuprates. Recently breakthroughs in the investigation of CDW order and superconductivity in the cuprates have occurred using a novel experimental technique, resonant soft x-ray scattering. I will discuss the development of this technique at the Canadian Light Source synchrotron and how it has illuminated many aspects of the CDW in the cuprates including its microscopic character. Finally, I will discuss the competition between CDW order and superconductivity and how the resonant scattering measurements provide an indication that CDW and superconducting orders are intertwined in a multi-dimensional order parameter.

SCIENCE COMPLEX ROOM 115

11:00 AM

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