

## Condensed Matter Theory Seminar

Subject: **Sleuthing octupolar hidden order**

Speaker: **Prof. Arun Paramekanti (University of Toronto)**

Date & time: **Friday, 2<sup>nd</sup> of June 2023 at 3:15 p.m.**

Venue: **Room 01.114**

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### Abstract:

Quantum magnets with large spin can naturally host multipole operators and multipolar symmetry breaking beyond conventional spin dipole order. Such ordering has been proposed in f-electron materials (heavy fermion compounds) where the emergence of multipolar orders has been extensively explored. Probing multipolar symmetry breaking is challenging due to the intrinsic complexity of the ordering. In this talk, I will describe a bunch of recent experiments on d-orbital Mott insulators which suggest the emergence of robust octupolar order (arising from orbital loop currents) and competing quadrupolar orders. Our theory including microscopics, Landau theory, and Monte Carlo simulations provides a comprehensive understanding of neutron, muon spin rotation, and impurity NMR experiments, and broadens the class of systems where one can study multipolar orders.