

CONDENSED MATTER THEORY SEMINAR

Subject: **Non-Fermi Liquids and Novel Broken Symmetries in Multipolar Quantum Materials**

Speaker: **Prof. Yong-Baek Kim (University of Toronto)**

Date & time: **Friday, November 20th 2020 at 3:15 p.m.**

Venue: **Online Seminar**

The hallmarks of non-Fermi liquids are singular thermodynamic and transport properties that are distinct from those associated with a Fermi liquid. Non-Fermi liquid behaviors are famously seen in cuprates, heavy fermion materials, and metallic quantum critical systems. In this talk, I discuss possible non-Fermi liquids in multipolar quantum materials, where conduction electrons interact with the local moments that do not carry any dipole moment, but possess higher-rank quadrupolar and octupolar moments. This theoretical work is partly motivated by recent experiments on cubic f-electron systems, where the local moments arise from non-Kramers ground states. I present the renormalization group and conformal field theory solutions of a multipolar Kondo problem, where a single multipolar moment is interacting with the orbital and spin degrees of freedom of conduction electrons. I show that an unexpected non-Fermi liquid state arises in this system. I also discuss hidden multipolar orders in the lattice version of the model and how to experimentally detect such subtle broken symmetries.