

CONDENSED MATTER THEORY SEMINAR

Subject: **Tunneling Probe of 2D and Moiré Magnetism**

Speaker: **Associate Professor Adam Wei Tsen (Department of Chemistry, University of Waterloo, Ontario/Canada)**

Date & time: **Friday, 3rd of May 2024 at 3:15 p.m.**

Venue: **Room 01.114**

Abstract:

The discoveries of ferromagnetism in single atomic layers have opened a new avenue for two-dimensional (2D) materials research. Not only do they raise fundamental questions regarding the requirements for long-range magnetic order in low-dimensional systems, but they also provide a new platform for the development of spintronic devices. In this talk, I will present a series of studies on the layered ferromagnetic insulator, CrI₃, both in the atomically thin limit and in twisted homostructures. By incorporating natural 2D CrI₃ as tunnel barriers between graphene electrodes, we are able to achieve extremely large tunnel magnetoresistance and directly observe its spin wave, or magnon, excitation spectrum, from which we can then obtain a simple microscopic Hamiltonian for the monolayer spin system. For twisted CrI₃, we observe evidence for two types of moiré magnetic textures that give rise to nonvolatile tunneling magnetoresistance states switchable by magnetic field.