Chez Pierre

Presents …

Monday, September 23, 2024
12:00pm - !:00 pm
Duboc Room – 4-331

Chez Pierre Seminar

Zachariah Addison, Wellesley College

"Unified Theory of Anomalous and Topological Hall Effects with Phase-Space Berry Curvatures: Electric, Thermal, and Thermoelectric Transport in Chiral Magnet Materials".

We develop a theory for the electrical and thermal transverse linear response functions such as the Hall, Nernst and thermal Hall effects in magnetic materials that harbor topological spin textures like skyrmions. In addition to the ordinary transverse response that arises from the Lorentz force due to the external magnetic field, there is an anomalous and a topological response. The intrinsic anomalous response derives from the momentum space Berry curvature arising from the spin-orbit coupling (SOC) in a system with a nonzero magnetization, while the topological response arises from real space Berry curvature related to the the topological charge density of the spin texture. We show within a controlled, semiclassical approach for large scale magnetic textures that all conductivities -- electrical, thermoelectric, and thermal Hall -- can be written as the sum of three contributions: ordinary, anomalous and topological.