

# APPLIED MATHEMATICS COLLOQUIUM

Date: Wednesday January 25, 2016

Time: 2:30 – 3:30 pm

Location: MC Room 204

## **Consistent chiral kinetic theory in Weyl materials: chiral magnetic plasmons and helicons**

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**Abstract:** Weyl materials, whose low-energy quasiparticle excitations are described by the Weyl equations, became an active and vibrant area of research in condensed matter physics. We argue that the correct definition of the electric current in the chiral kinetic theory for these materials should necessarily include the topological Chern-Simons contribution that makes the theory consistent with the local conservation of the electric charge in electromagnetic and strain-induced pseudoelectromagnetic fields. By making use of such a kinetic theory, we study the frequencies of collective modes in Weyl materials in constant magnetic and pseudomagnetic fields taking into account the effects of dynamical electromagnetism. We show that the collective modes are chiral plasmons. We also predict the existence of pseudomagnetic helicons for strained Weyl materials. The corresponding collective modes are similar to the usual gapless low energy helicons in metals in strong magnetic fields but can exist even without a magnetic field due to a strain-induced background pseudomagnetic field.