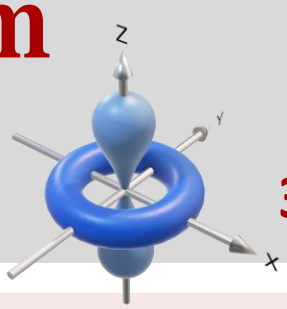
Department of Physics Colloquium

April 11, 2022 **3:00 PM**



New topological states in synthetic magnets

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The recent progress in synthesizing and discovering states and phenomena beyond the Landau symmetry-breaking paradigm in the quantum matter has been quite extraordinary. These new findings confront our views of fermions and bosons' possible behavior in solids, and in bulk may remain concealed from the experimental probes. For instance, in crystals of cubic symmetry, Weyl fermions are hidden in the magneto-transport due to the perfect cancellation of monopole charges.

To exacerbate, though topological phases are well-known for non-correlated compounds, they are scarcely found in correlated electron systems. In my talk, I will discuss the fresh ways to address two challenges by (1) creating new synthetic templates with rich many-body behavior derived from the class of rare-earth pyrochlore iridates and (2) discovering interesting states and phenomena entwined with spin correlations and non-trivial band topology arising from breaking time-reversal or inversion symmetry including Weyl semimetal, and potentially gaped Dirac and surface axionic states. Specifically, I will focus on the feasibility of experimental validation of those states within the oriented films of synthetic frustrated Kagome-triangular materials with entangled fermions and large spin-orbit interaction.

References:

1. Xiaoran Liu *et al.*, *Appl. Phys. Lett.* **117**, 041903 (2020).
2. JC *et al.*, *Appl. Phys. Lett. Mater.* **8**, 050904 (2020).
3. Xiaoran Liu *et al.*, *Phys. Rev. Lett.* 127, 277204 (2021).

This colloquium will be held in-person, at SERC 116 unless announced otherwise.