

Massachusetts Institute of Technology
Department of Physics

INFORMAL CONDENSED MATTER SEMINAR

**“Realization of Spin Orbit Coupling
and Majorana Fermions in a 2D Optical Lattice”**

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Abstract: Majorana zero bound mode exists in the vortex core of a chiral p+ip superconductor or superfluid, which can be driven from an s-wave pairing state by two-dimensional (2D) spin-orbit (SO) coupling. However, a 2D Rashba-type SO interaction is not experimentally realistic in cold atom gases. We propose here a novel scheme based on realistic cold atom platforms to study exotic topological phases with (pseudo)spin-1/2 cold fermions trapped in a blue-detuned square optical lattice and coupled to two periodic Raman fields, and predict both the quantum anomalous Hall effect and chiral topological superfluid phase in the experimentally accessible parameter regimes. The remarkable advantage of our model in the realization is that the square lattice and Raman fields, used to induce 2D SO interactions, are generated simultaneously by the same laser fields, which greatly simplifies the setup for experimental studies.

3:30 PM
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Room 4-331