Condensed Matter Physics Seminar

New quantum phases of matter in strongly correlated and spin-orbit-coupled metals

Monday

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4:00 P.M.

Rm 184 NSH

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Strong interactions between electrons are known to drive metallic systems toward a variety of well-known symmetry-broken phases, including superconducting, electronic liquid crystalline, and charge- and spin-density wave ordered states. In contrast, the electronic instabilities of correlated metals with strong spin-orbit coupling have only recently begun to be explored. In this talk, I will discuss a new class of parity-breaking Fermi liquid instabilities enabled by spin-orbit coupling. These instabilities are distinguished by the spontaneous development of a lattice-locked spin texture on the Fermi surface, generalizing the notion of itinerant ferromagnetism. I will argue that nonlinear optical spectroscopy is an ideal experimental tool to search for these phases in quantum materials, and I will discuss our recent experimental discovery of one such phase--multipolar electronic nematic order--in a strongly spin-orbit-coupled metallic pyrochlore.