

Chez Pierre

Presents ...

Tuesday, October 9, 2018

12:30pm

MIT Room 4-331

Special Chez Pierre Seminar

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“Vestigial orders in electronic correlated systems: nematicity and beyond”

A hallmark of the phase diagrams of correlated electronic systems is the existence of multiple electronic ordered states. In many cases, they cannot be simply described as independent competing phases, but instead display a complex intertwinement. A prime example of intertwined states is the case of primary and vestigial phases. While the former is characterized by a multi-component order parameter, the fluctuation-driven vestigial state is characterized by a composite order parameter formed by higher-order, symmetry-breaking combinations of the primary order parameter. This concept has been widely employed to elucidate nematicity in both iron-based and cuprate superconductors. In this talk, I will present a group-theoretical framework, supplemented by microscopic calculations, that extends this notion to a variety of phases, providing a general classification of vestigial orders of unconventional superconductors and density-waves. Electronic states with scalar and vector chiral order, spin-nematic order, Ising-nematic order, time-reversal symmetry-breaking order, and algebraic vestigial order emerge from this simple underlying principle. I will present a rich variety of possible phase diagrams involving the primary and vestigial orders, and discuss possible realizations of these exotic composite orders in different materials.