Winter 2018

Physics 250 Special Topics: Spectroscopies of Quantum Materials

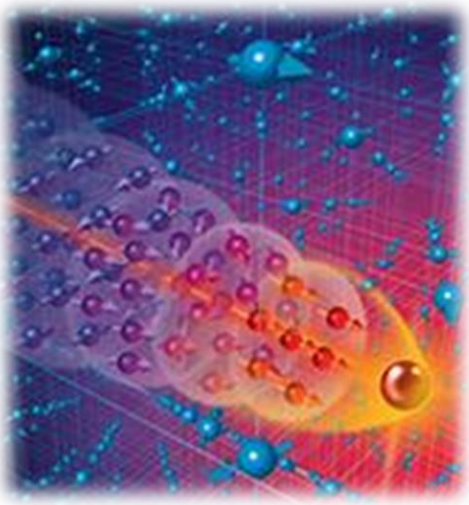

Image Source: https://yazdanilab.princeton.edu/highlights

Course description: Quantum materials encompass some of the most fascinating phenomena in condensed matter physics, including high temperature superconductivity, topologically protected surface states, and new excitations not found in conventional materials. Investigating emergent phenomena in quantum materials simultaneously pushes the boundaries of basic physics and promises solutions to technological challenges. In this course, we will highlight how a variety of novel spectroscopic tools can be used to elucidate quantum materials of contemporary interest, with a focus on experimental efforts and opportunities in the UC Davis physics department. The goal of this course is to expose students to key questions in this field, and have them become comfortable with critically evaluating experimental research papers on the topics covered.

Coordinates: Tu/Th 2:10-3:30 PM, Physics Building 414

Topics: High-temperature cuprate superconductors, high-temperature iron-based superconductors, topological insulators, Dirac and Weyl semimetals, heavy fermion compounds, transition metal dichalcogenides, majorana fermions, strongly correlated electron systems, angle-resolved photoemission spectroscopy, scanning tunneling spectroscopy, resonant (inelastic) x-ray scattering, ultrafast spectroscopies.

Instructors: da Silva Neto/Vishik

Prerequisite: undergraduate solid state physics

Suggested for: graduate students and advanced undergraduates in physics, chemistry, and materials science

Assignments: Several homeworks primarily focused on critical reading of research papers and one or more journal club presentations. No final.

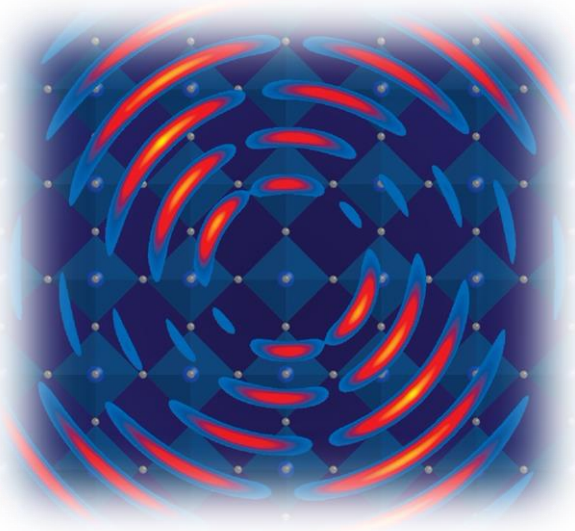

Image Source: front cover of insight on quantum materials, Nature Physics/Nature Materials (2017)