

Chez Pierre

Presents ...

Monday, May 14, 2018

12:00pm Noon

MIT Room 4-331

Chez Pierre Seminar

Kyle Shen – Cornell University

“Shedding Light on Artificial Quantum Materials”

Quantum materials host a vast array of emergent electronic phenomena, including high-temperature superconductivity, colossal magnetoresistance, and nanoscale charge / spin ordering. One of the challenges is to be able to precisely and deterministically manipulate the properties of quantum materials. To achieve this control, we employ molecular beam epitaxy (MBE) to synthesize artificial quantum materials with atomic layer precision, combined with angle-resolved photoemission spectroscopy (ARPES) which provides direct insights into the electronic structure. In particular, I will focus on some very recent developments where we have used interfacial engineering and thin film epitaxy to manipulate and control exotic superconductivity. The first example is the odd-parity superconductor Sr_2RuO_4 , where we have used epitaxial strain and stabilization to drive a Lifshitz transition in the Fermi surface topology and investigate how epitaxial strain affects the superconducting transition temperature. The second is monolayer FeSe grown on SrTiO_3 , where the superconducting transition temperature can be enhanced from 8 K in bulk FeSe to approximately 60 K in monolayer thin films grown on SrTiO_3 via interfacial engineering.

