

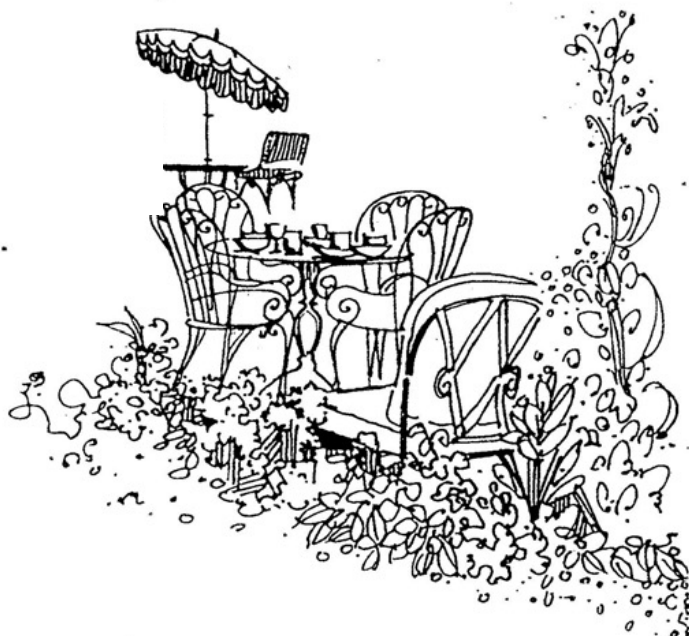
Chez Pierre

Presents ...

Monday, October 5th, 2026

12:00pm – 1:00pm

Duboc room - 4-331



Chez Pierre Seminar

Peter Hirschfeld, U. Florida

“Disorder and time reversal symmetry breaking in unconventional superconductors”

Time-reversal symmetry breaking (TRSB) has emerged as one of the most important and actively debated topics in the study of unconventional superconductivity, with profound implications for pairing symmetry, topological phenomena, and the microscopic mechanisms responsible for superconductivity itself. Many experiments over decades, particularly polar Kerr effect and mSR, have pointed to signatures of TRSB appearing in the superconducting state of a wide variety of materials. A central question in the field is whether TRSB is a fundamental property of the superconducting state or an emergent consequence of defects or competing orders. I first review various ways disorder can create local magnetic order that can mimic global homogeneous TRSB in unconventional superconductors generally. Next, I present simulations of disordered d-wave superconductors that can reproduce many of the effects seen in STM on overdoped cuprates, and predict a glassy TRSB phase driven entirely by disorder. I focus in particular on a new STM technique capable of imaging small local currents and present recent experimental results on BSCCO that have imaged these currents.

“Spontaneous time-reversal symmetry breaking” by disorder in superconductors”, B.M. Andersen, P.J. Hirschfeld, and A. Kreisel, *Frontiers in Physics* 12, 1353425(2024).

“Supercurrents and spontaneous time-reversal symmetry breaking by nonmagnetic disorder in unconventional superconductors”, C. N. Brei{\o}, P. J. Hirschfeld, and B. M. Andersen, *Phys. Rev. B* 105, 014504 (2022).”