

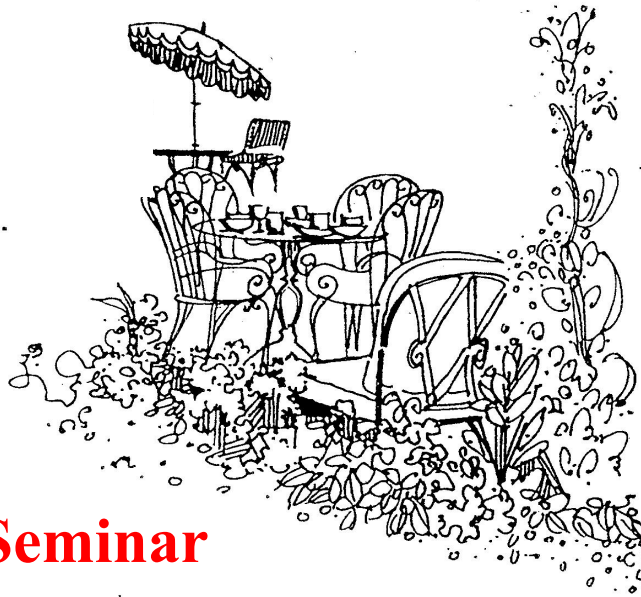
# Chez Pierre

Presents ...

Monday, September 21, 2015

12:00pm

MIT Room 4-331



## Chez Pierre Seminar

Gregory S. Boebinger

Director, National High Magnetic Field Laboratory

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### **“The Phase Diagram of the Cuprate Superconductors: A Survey of Magnetotransport and Specific Heat Measurements”**

More than a quarter century after the discovery of high temperature superconductivity in the cuprates, researchers continue to uncover new complexity in the underdoped region of the phase diagram. For example, in YBCO and LSCO, there is evidence for regimes characterized by spin and/or charge order. After surveying the phase diagram from the perspective of magnetotransport in LSCO, Bi-2201, and YBCO at high magnetic fields, we report on our low temperature electronic specific heat measurements of YBCO. The first goal is to discuss the severe constraints they impose on the complexity of the Fermi surface in the underdoped regime of the high-temperature superconductors [1,2]. The second goal is to elucidate the nature of a phase transition discovered *within the superconducting phase* that characterized by a transition from a regime in which the electronic specific heat increases as  $H^{1/2}$ , behavior expected of a d-wave superconductor, to a regime in which it increases linearly in  $H$ , which is just plain weird behavior. [3]

[1] Scott C. Riggs, O. Vafek, J.B. Kemper, J.B. Betts, A. Migliori, F.F. Balakirev, W.N. Hardy, Ruixing Liang, D.A. Bonn, G.S. Boebinger, *Nature Physics* 7, 332 (2011) “Heat capacity through the magnetic-field-induced resistive transition in an underdoped high-temperature superconductor”.

[2] Similar cast of characters, *unpublished*.

[3] J.B. Kemper, O. Vafek, J.B. Betts, F.F. Balakirev, W.N. Hardy, Ruixing Liang, D.A. Bonn, G.S. Boebinger. arXiv:1403.3702v2 “Thermodynamic signature of a magnetic-field-driven phase transition within the superconducting state of an underdoped high-temperature superconductor.”