Chez Pierre

Presents ...

Monday, March 5, 2012

4:00pm

MIT Room 4-331

SPECIAL CHEZ PIERRE SEMINAR

James Analytis
Stanford University

"Coupled order parameters and quantum criticality in iron-based superconductors"

Condensed matter systems are a playground for exploring new states of quantum matter. The nature of ordered states and their associated critical fluctuations connects many problems in condensed matter physics, particularly unconventional superconductivity in the cuprate, organo-metallic and heavy-fermion materials. The recently discovered iron-based superconductors could provide a simpler route into understanding this broad problem because of their simple (and relatively uncontroversial) phase structure. As these materials are doped or the temperature is lowered, the different thermodynamic phases that are stabilized include magnetism and superconductivity. Recent measurements have also suggested that nematic order plays an important role by coupling to magneto-elastic or superconducting-elastic degrees of freedom. I will present evidence from transport measurements of underdoped (orthorhombic) and overdoped (tetragonal) compounds that magneto-structural fluctuations are closely linked with quantum critical fluctuations at optimal doping, suggesting a strong connection to superconductivity.