

Chez Pierre

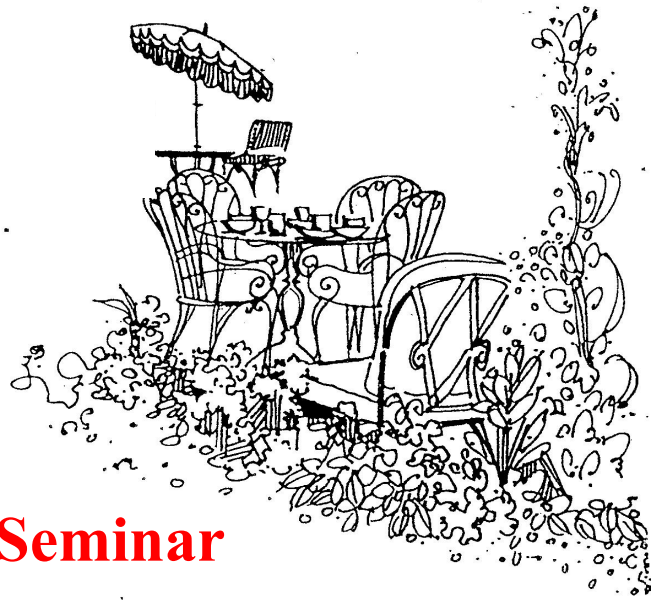
Presents ...

Monday, September 19, 2016

12:00pm Noon

MIT Room 4-331

Chez Pierre Seminar



Wei-Sheng Lee - Stanford University

“X-ray studies on CDW and excitations in high-Tc cuprates”

Charge density wave modulations have now been widely reported in high temperature superconducting cuprates, raising questions about their nature and relationship with superconductivity and the mysterious pseudogap state. In this seminar, I will highlight two of our most recent x-ray scattering studies. First, I will discuss x-ray scattering on $\text{YBa}_2\text{Cu}_3\text{O}_{6+x}$ at high magnetic field (~ 30 T). A three dimensionally ordered CDW is found to emerge at a finite magnetic field in addition to the quasi-2D CDW that already exists at zero fields. At magnetic fields comparable to the upper critical field H_{c2} , this 3D CDW possess a correlation volume on the order of 105 unit cells, significantly larger than that in any other bulk cuprates; thus, it arguably represents the CDW ground state in YBCO [1, 2]. In the second part of my presentation, I will present some of our recent resonant inelastic x-ray scattering (RIXS) results on the bi-layer cuprates, $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+x}$. Using a state-of-the-art instrument, a CDW in the quasi-elastic region can now be resolved along with other elementary excitations, such as phonons. We highlight the influence of this CDW on other degrees of freedom.

[1] S. Gerber et al., Charge Density Wave in $\text{YBa}_2\text{Cu}_3\text{O}_{6.67}$ at High Magnetic Fields, *Science* **350**, 949 (2015).

[2] H. Jang et al., Ideal charge density wave order in the high-field state of superconducting YBCO, arXiv: 1607.05359