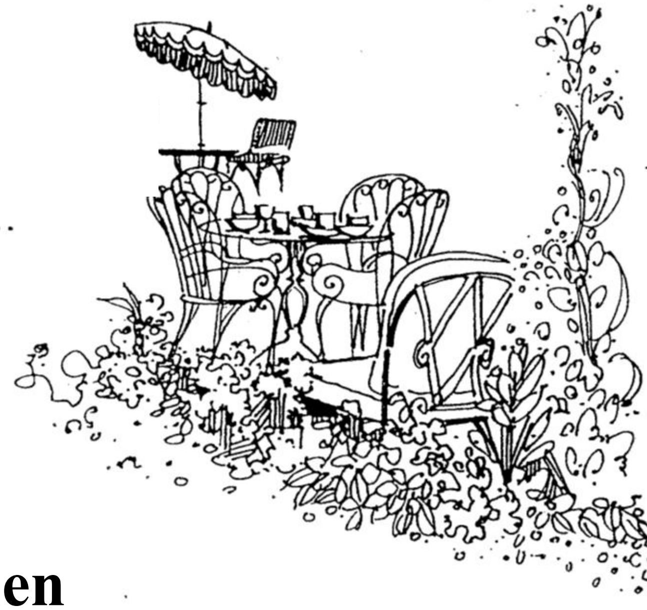
Chez Pierre

Presents ...

Monday, April 1, 2013
12:00pm
MIT Room 4-331



Kyle Shen
Cornell University

"Watching Correlated Electrons Move in Artificial Quantum Materials and Interfaces"

Our ability to control electronic properties at the interfaces between materials has had enormous scientific and technological implications. Extending this idea beyond the familiar semiconductors, we can now use materials which possess inherently strong quantum many-body interactions as our building blocks to create artificial heterostructures and interfaces. For example, metallic, magnetic and even superconducting states have been realized at the interface between two insulators. I will describe some of our recent work in creating and exploring emergent electronic and magnetic phases which arise in these new "artificial quantum materials" using a combination of oxide molecular beam epitaxy and angle-resolved photoemission spectroscopy (ARPES).

As one example, I will describe our work on digital manganite superlattices ([LaMnO3]2n / [SrMnO3]n), comprised of alternating LaMnO3 and SrMnO3 blocks. Our ARPES measurements reveal that by controlling the separation between the LaMnO3-SrMnO3 interfaces, we can tune the effects of the quasiparticle interactions, driving the interfacial states from a 3D ferromagnetic metal, to a 2D polaron liquid, and finally to a pseudogapped ferromagnetic insulator.