

WEEKLY CALENDAR

September 14, 2009

Departmental Colloquium

" Direct Probe of the Key Building Block of the Fe-based
Superconductors with Scanning Tunneling Microscopy/Spectroscopy "

3:40 PM, September 17, 2009
109 Nicholson Hall

Shuheng Pan
University of Houston

Host: Rongying Jin

• *Refreshments served at 3:15 PM in 232 (Library) Nicholson Hall* •

The recently discovered superconductivity in iron (Fe)-based compounds is another exciting advancement in condensed matter physics since the discovery of high- T_c superconductivity in cuprates. Using a UHV Low Temperature Scanning Tunneling Microscope, we have been studying the structural and electronic properties of the parent and Co-doped $BaFe_2As_2$ compound. We find that, by low temperature in situ cleaving, we are able to expose the key building block – the Fe-As layer of this compound, where superconductivity is believed to occur. With STM/S, we directly probe this key building block with spatial resolution down to atomic scale. STM is a surface sensitive technique. Keeping this in mind, I will demonstrate how we use this high real-space resolution and surface sensitive technique to learn the structural and electronic properties within the bulk. I will show some of our results on the structural and the density-of-states (DOS) evolution with doping, the scaling of the superconducting energy gap, and some electronic local effects. I will also discuss their implications of the interplay of magnetism and superconductivity, and of the pairing symmetry for superconductivity in the Fe-based superconductors.

Publications:

- "The Montevideo interpretation of quantum mechanics: frequently asked questions," Rodolfo Gambini and **Jorge Pullin**, Journal of Physics: Conference Series 174 (2009) 012003.