THE UNIVERSITY OF DENVER

Department of Physics & Astronomy

Presents

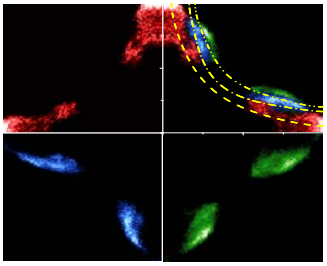
The low down dirty physics of correlated materials

Wednesday, February 15, 2012
4:00 PM
F.W. Olin Hall Room 105
2190 E. Iliff Avenue

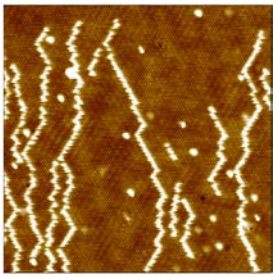
Presented by

Kyle McElroy
CU Boulder

The momentum space character of the electronic states in most conventional materials is protected by the large Fermi energy which dominates their physics. On the other side of Heisenberg's uncertainty relationship, electrons in a strongly correlated material can be dominated by their real space interactions. At the same time, such materials often realize complex phase diagrams where many different electronic phases compete and coexist as control parameters are changed. In many of these materials the phase diagrams may reflect the atomic scale disorder that governs the electronic structure at short length scales. I will describe an ideal technique to investigate the atomic-scale electronic structure: spectroscopic imaging scanning tunneling microscopy (STM). This technique allows us to map out the electronic structure of strongly correlated materials at the atomic scale. I will show how, with this technique, we can map out the various electronic correlations in different materials and illuminate how their interactions with both intrinsic disorder and impurities can teach us about the underlying organization and competition of these correlations.



The Momentum space states of four different high temperature superconductors as reconstructed using real space interactions with impurities



Individual copper atoms being dragged across the surface of TaS_2 a material with both charge density wave and superconductivity coexisting.

HOST: Dr. Barry Zink, (303) 871-3025, Barry.Zink@du.edu
Join us for refreshments & follow-up discussions in Physics Building Room 116, 5:00-6:00 PM