



center for nanophysics
and advanced materials

Condensed Matter Colloquium

Thursday, April 26, 2012

2 pm, Room 1201

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*Imaging the impact of single dopants
on high- T_c superconductors*

High- T_c cuprate superconductors display startling nanoscale inhomogeneity in essential properties such as pseudogap energy scale, Fermi surface, and even superconducting critical temperature. The direct cause of this inhomogeneity has remained mysterious; theoretical explanations have ranged from chemical disorder to spontaneous electronic phase separation. We have doubled the energy range of scanning tunneling spectroscopy, allowing the first complete mapping of all three types of oxygen dopants in $\text{Bi}_{2+y}\text{Sr}_{2-y}\text{CaCu}_2\text{O}_{8+x}$ with maximum superconducting $T_c \sim 90\text{K}$. I will explain how the spatial variations in competing electronic orders, such as the pseudogap and the charge density wave, are governed by the disorder in the dopant concentrations, particularly vacancies in the apical oxygen site. I will also discuss work in progress on imaging single dopants the iron-based high- T_c superconductor $\text{Pr}_x\text{Ca}_{1-x}\text{Fe}_2\text{As}_2$.

Refreshments at 1:30 pm in **Room 1305F**

