center for nanophysics and advanced materials

Condensed Matter Colloquium

Thursday, February 3, 2011

2 pm, Room 1201

Dr. Ni Ni

Princeton University

Physical properties of the $Ba(Fe_{1-x}TM_x)_2As_2$ series and related layered antiferromagnetic oxyselenides $R_2O_3T_2Se_2$

The phase diagrams of single crystalline $Ba(Fe_{1-x}TM_x)_2As_2$ (TM = Co, Ni, Cu, Cu/Co, Rh, Pd) series will be discussed in this talk. Hall, Seebeck coefficient and recent ARPES measurements suggests the application of the rigid band approximation in these series. Quantitative analysis of the detailed temperature-dopant concentration (T-x) and temperature-extra electrons (T-e) phase diagrams of these series shows that there exists a limited range of the number of extra electrons added, inside which the superconductivity can be stabilized if the structural and magnetic phase transitions are suppressed enough. Moreover, I will compare the temperature-doping with temperature-pressure phase diagram. This comparison further reinforces the conclusion that the T_c in the underdoped side is related to the suppression of the structural / magnetic phase transition, but for the overdoped side Tmax-C is determined by e. I will also talk about a structurally and chemically related series, $R_2O_3T_2Se_2$ (R=La-Sm, T=Mn and Fe), which shows two dimensional to three dimensional antiferromagnetic ordering of the transition mental sublattice. A close relationship between the ordering of the T sublattice and the T-Se distance is observed. Neutron scattering of $La_2O_3T_2Se_2$ will be discussed.

Refreshments at 1:30 pm in Room 1305F

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