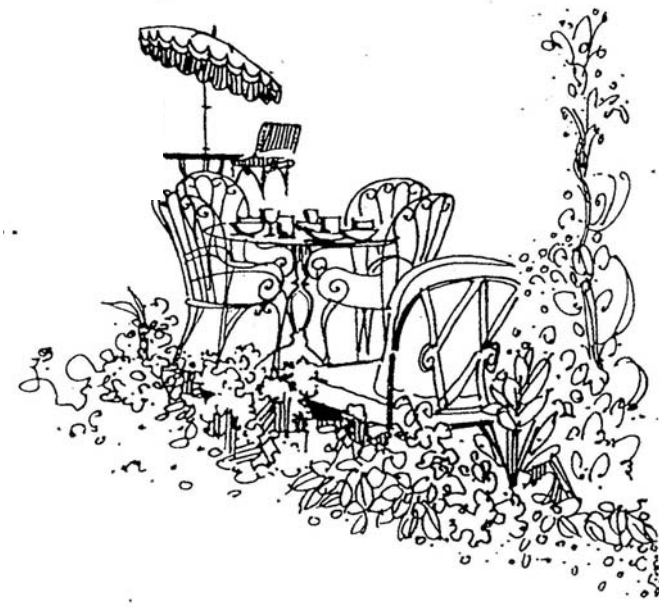
Chez Pierre

Presents ...

Monday, October 27, 2008
12:00pm
MIT Room 4-331



Tony Heinz

Columbia University

"Probing Carbon Nanotubes and Graphene by Optical Spectroscopy"

Carbon nanotubes and graphene respresent the one- and two-dimensional forms of sp2-hybridized carbon in which every atom is at the surface. Both materials have unusual mechanical properties associated with the strong bonding of light atoms. Perhaps even more distinctive are the electronic excitations and charge transport properties of these materials. In this talk, we will review the current understanding of optical excitations in carbon nanotubes and graphene. Recent experimental advances have permitted direct characteriation of electronic tranistions in both individual nontubes and well-defined graphene monolayers. We will discuss how the electronic properties depend on the physical structure for nanotrubes of different chiral correlations will be coniderred and shown experimentally to be of great importance in the 1-D nanotube systems. We also demonstrate how the external environment can modify the electrical states in these monolayer-thick materials: through the application of strain, through modification of the surrounding dielectric environment, and through electrosctatic doping. Finally, we discuss how measurements of ultrafast relexation dynamics by femtosecond pump-probe techniques can yield important insight into the coupling of fundamental excitations in these systems.