Physics AT QUEENS COLLEGE

# Colloquium Notice


## Jiufeng Tu

**City College of CUNY**


## *Shining a Light on Low-dimensional Systems*


Whether a material is an insulator or a metal (maybe a superconductor) is one of the most fundamental questions in physics. While this question can be easily addressed in three dimensions, the situation in lower dimensions is much more complicated. For example, no metallic phase was predicted theoretically in two-dimension (2D) for many years. Experiments on quasi-two dimensional electron systems have continued to reveal some of the most unexpected and theoretically challenging behavior in condensed matter physics. These phenomena include the pseudogap behavior in underdoped high-$T_c$ cuprates and an apparent metal-insulator transition in dilute 2D electron gases. Such anomalous behavior is widely believed to be rooted in the proximity of these systems to quantum phase transitions. Ultra-thin films have served as model quasi-2D systems for many years. In this talk, I will discuss our recent optical studies of these systems in the frequency domain. Our preliminary THz study has identified a percolation transition at sheet resistance (R) ~ 3 kΩ (in addition to the superconductor-to-insulator transition near $R = h/4e^2$ or 6.44 kΩ), possibly associated with a metal-to-insulator transition. We have proposed a new phase diagram for these ultra-thin films that is similar to the phase diagram of high-$T_c$ cuprates.


Monday
**November 6, 2006**
Starts at 12:15 PM
Coffee at 12:00 PM
Physics Conference Room, SB B326