



# CNAM Condensed Matter Colloquium

**2 p.m., Thursday, September 23, 2010**

**Room PHYS1201**

Refreshments will be served at 1:30 p.m. in Room 1305F – behind the IT Help Desk.

*Measurement and Control of Individual Electron Spins in Few-Electron  
Silicon Quantum Dots*

**HongWen Jiang,**

**Department of Physics and Astronomy, University of  
California at Los Angeles**

Abstract:

It is becoming increasingly apparent that mesoscopic Si devices have considerable potential for applications in spintronics and in quantum information processing. We, at UCLA, have developed electrostatically-confined quantum dots on Si metal-oxide-semiconductor based materials. A sequence of electrical characterizations shows that the quantum dots have unprecedented device stability and controllability. In this talk, I present results from transport and excited states spectroscopy measurements in the few electron regime. Unusual spin filling configurations due to strong spin exchange coupling, along with non-linear transport features associated with high-spin states will be reported. An integrated charge sensing channel adjacent to the quantum dot has been used to study the individual electron tunneling events and energy relaxation dynamics. The electron spin-lattice relaxation time of the individual spins is measured by the charge sensor with a pump-and-probe technique. I will discuss mechanisms leading to spin relaxation in this type of Si device. Finally, I will describe an ongoing experiment to detect ESR of single electrons in a double quantum dot.

**Host: Ian Appelbaum**