

# Colloquium Announcement

**Electron Tunneling: From Quantum Weirdness to Your Hard Disk**  
**Dr. Patrick R. LeClair**  
**University of Alabama**

The quantum mechanical tunneling effect is one of the oldest quantum phenomena, already recognized in the early 1930's by Sommerfeld and Bethe. Despite a long history and extensive experimental work, the electron tunneling phenomena continues to be actively studied in many areas of physics, and is only recently entering the realm of mainstream application. Electron tunneling between two magnetic metals is now the basis for current-generation magnetic field sensors in hard disks, as well as prototype non-volatile Magnetic Random Access Memories (MRAMs). However, despite a long history and intense commercial interest, much of the fundamental physics behind tunneling devices is only beginning to be properly understood.

The first portion of the talk will outline some of the basic features and utilities of tunneling -- beginning with what tunneling is in the first place -- and how it may be applied to the study of magnetism and superconductivity in particular. This introductory portion of the talk will focus on historical and conceptual developments, such as superconductive tunneling, the Josephson effects, spin polarized tunneling, and tunneling magnetoresistance. Following this, I will discuss the experimental realities, including device fabrication, measurement techniques, and the hardware required. The latter portion of the talk will include some specific examples from recent experiments, some remarks on the technological aspects of tunneling phenomena, and what may lie ahead.

***Sponsored by UAB Department of Physics***

Thursday, November 2, 2006

12:30 p.m. – 1:45 p.m.

Campbell Hall 274

*Refreshments served at 12:00 p.m. in CH 361*

1300 University Boulevard

For further information please contact the