

T_cSUH Bi-Weekly Brown Bag Seminar

Texas Center for Superconductivity
University of Houston



Prof. John H. Miller, Jr.

Department of Physics and T_cSUH
University of Houston

“Condensed Matter Physics Phenomena in Biological Systems”

Thursday, April 21, 2005

Room 102, University of Houston Science Center

12:00 Noon – 1:00 p.m.

Abstract

This talk will give a brief overview of condensed matter physics phenomena in biological systems, including diamagnetism, quantum tunneling in electron transfer reactions, excitons, charge density waves, and (albeit speculative) proposals of biological superconductivity. I will then, time permitting, discuss some of our own research, such as the production of nonlinear harmonics by enzyme complexes and motor proteins in the plasma membrane and the inner membranes of mitochondria. At low frequencies, we use a high-T_c SQUID to directly probe the current response, which greatly reduces electrode polarization effects. We have been studying, *in vivo*, budding yeast (*Saccharomyces cerevisiae*) and, *in vitro*, cytochrome c, a mitochondrial membrane protein in the respiratory chain. Also of interest are the electric and magnetic properties of tubulin, which self-assembles to form microtubules in the cytoskeleton.

Brief Bio

Prof. Miller received his Ph.D. at the University of Illinois in 1985, where he studied the dynamics of charge density waves under the direction of John Tucker and two-time Nobel laureate John Bardeen. He was a faculty member in the Department of Physics and Astronomy at the University of North Carolina - Chapel Hill from 1986-1989, receiving the prestigious Alfred P. Sloan Research Fellowship in 1987. In 1989, he joined the University of Houston as a faculty member in the Department of Physics and the Texas Center for Superconductivity. Prof. Miller's research has included experiments probing the pairing state symmetry of high-T_c superconductors, applications of superconducting quantum interference devices, and noninvasive biosensors and their use to probe the electromagnetic properties of live cells and complex biological macromolecules.

Persons with disabilities who require special accommodations in attending this lecture should call (713) 743-8210 as soon as possible.



TEXAS CENTER FOR
SUPERCONDUCTIVITY