

T_cSAM Bi-Weekly Brown Bag Seminar

Texas Center for Superconductivity and Advanced Materials



Prof. John H. Miller, Jr.

Department of Physics and T_cSAM
University of Houston

“Dielectric Properties of Biological Cell and Protein Suspensions”

Friday, October 31, 2003

Room 102, University of Houston

Houston Science Center

12:00 p.m. – 1:00 p.m.

Abstract

The charges in live cells can be polarized by an electric field, creating a dipole moment for each cell. As a result, a suspension of live cells in water has an enormous dielectric response at low frequencies, and this response decreases rapidly with increasing frequency. The magnitude of the low-frequency dielectric response has been shown theoretically to correlate with the cell's membrane potential. Recently, we have been exploring new applications, such as sensors designed to detect biological warfare agents inside sealed containers. Another ongoing study is the dielectric response of tubulin dimers, in an attempt to determine their intrinsic dipole moment. Tubulin is the protein that comprises microtubules -- remarkable structures that form much of the cellular cytoskeleton. In addition, due to their high concentration in neuronal axons, microtubules have been proposed to play a role in information processing. We are investigating several approaches to performing linear and nonlinear dielectric spectroscopy, ranging from simple direct electrode methods to techniques that employ SQUIDs.

Brief Bio

Prof. Miller received his Ph.D. at the University of Illinois at Urbana-Champaign in 1985. There he studied the dynamics of charge density waves under the direction of John Tucker and two-time Nobel laureate John Bardeen. After continuing as a postdoctoral fellow at Illinois for another year, he joined the faculty in the Department of Physics and Astronomy at the University of North Carolina in Chapel Hill in 1986. In 1989, he became a faculty member in the Department of Physics here at the University of Houston and also became affiliated with the recently created Texas Center for Superconductivity at the University of Houston. Since that time, his research interests have included high temperature superconductivity, HTS device applications, charge density waves, and, most recently, biosensors and their applications.

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

T_cSAM

TEXAS CENTER for SUPERCONDUCTIVITY
and ADVANCED MATERIALS