

Physics Colloquium

Michigan Technological University

Thursday, January 25, 2007

4:00 - 5:00 pm

Room 139, Fisher Hall

Theoretical Studies on Spin-Polarized Electron Transport in Molecular Systems

Haiying He

(Advisor: Professor Ravindra Pandey)

Department of Physics

Michigan Technological University

Houghton, MI 49931

ABSTRACT

There has been a recent interest in organic molecule-mediated spin-polarized electron transport with a potential application in molecular-scale spintronics. By use of organic molecules in a spin valve, the feature size of an electronic device can be drastically reduced. In this talk, I will present our results of theoretical studies on the spin-dependent electron tunneling via such molecular systems. It is found that the magnitude of the tunnel current and the spin polarization of current are strongly influenced by the nature of chemical bonding in the molecular structure and the specific interfacial features between the metallic electrode and the molecule.

Slow Light Based On Photonic Crystals

Ziyou Zhou

(Advisor: Professor Miguel Levy)

Department of Physics

Michigan Technological University

Houghton, MI 49931

ABSTRACT

Photonic crystals have been fabricated and tested in He⁺ ion implanted LiNbO₃ samples. Photonic crystals are artificial periodic nanostructures fabricated in dielectrics to generate band gaps in the transmission spectra. Results will be presented of experiments conducted to optimize the transmittance performance of photonic crystal waveguides in this material. To realize slow light (slow down of the group velocity of the light) with good transmittance asymmetric photonic structures are required. Patterning techniques for realizing these structures have been developed in our group and will be presented. Actual measurements of slow down have not yet been carried out by our group.