Physics Colloquium
Graduate Posters
Michigan Technological University
Thursday, April 16, 2009
2:00 – 4:00 pm
Aftermath Atrium in Fisher Hall

Quantum Confinement and Phase Transition in PbS nanowire:
A First Principles Study.
Subhasish Mandal
Advisor: Dr. Ranjit Pati

Abstract: One dimensional nanowires have become leading candidates in building nano sensor, nano transistor, optoelectronic devices and logic circuit. In last several years, PbS nanowire has drawn considerable interest for their potential applications in optical switch and solar cell. Controlled synthesis of PbS nanowire with diameter ranging from 1.2 nm to 20 nm have been reported with the photo luminescence study revealing wide band gap behavior for the nanowire. This offers exciting opportunities to study theoretically quantum confinement effect in PbS Nanowire. Here we report first principles density functional calculations of the electronic properties of PbS nanowire as a function of diameter. Our calculation shows, by varying the diameter of the nanowire from ~ 1.17 nm to ~3.64 nm, the energy band gap is found to change from 1.55 eV to 0.93 eV, substantially higher than the band gap observed for the PbS bulk - confirming the role of quantum confinement.

Second Harmonic Generation in Bi-substituted Magnetic Garnet Thin Films
Pradeep Kumar
Advisor: Dr Miguel Levy

Abstract: Our study focus on enlarging the nonlinear performance of ferrite garnet films by stress generation and compositional gradients in the sputter-deposition growth of these films and by controlling the surface contribution to harmonic generation in the presence of photon trapping. The choice of ferrite garnets is based on the ability to control the room-temperature ferrimagnetism in these materials through substitution doping, their transparency in the near infrared range and their large Verdet constants.

Adsorption of nucleobases on BNNT
Saikat Mukhopadhyay
Advisor: Dr. R. Pandey

Abstract: Even though it is not known that how the nucleobases interact with the inactive surface with dissimilar atoms unlike CNT, the self assembly of the nucleobases onto the surface of boron nitride nanotube (BNNT), has not been explored till date. In this Poster session, we will present the results of first principles study focusing on the adsorption of the nucleobases on the surface of BNNT.

Low Temperature Growth of Single Wall Carbon Nanotubes by Al/Ni/Mo catalysts.
Abhay Pratap Singh
Advisor: Dr. Yoke Khin Yap

Abstract: Single-walled carbon nanotubes are molecular wires. Remarkable electronic properties which allow a single-walled carbon nano-tube one atom thickness, a few tens of atoms in circumference and many microns in length to be either semiconducting or metallic, depending on its diameter and chirality. Synthesis of SWCNT is crucial for their application to electronic devices. We report the synthesis of single wall carbon nanotubes in thermal chemical vapor deposition system using trilateral catalyst at low temperature.

Continuous monitoring of Comet Holmes from before the 2007 outburst
Ehab E. El-Houssieny
Advisor: Professor Robert Nemiroff

Abstract: The outburst evolution of Comet Holmes has been observed by the All Sky Monitor fisheye camera, currently supporting the Multiple Mirror Telescope near Tucson, Arizona, USA. The comet was picked up at the limiting visual magnitude of 5.5 on October 24 and tracked by the night video camera with continuous 10-second exposures until the early months of 2008.