

Physics Colloquium

Michigan Technological University

Thursday, March 7, 2013

at 4:00 pm

in Room 139 Fisher

Detection of Long-lived Weakly Interacting Particles in the Cosmic Ray Shower Experiment

Niraj Dhital

Advisor: Dr. Brian Fick

Abstract: Ultrahigh energy cosmic ray particles have energies much higher than that of particles accelerated in the particle-accelerators. These cosmic ray particles interact with the air nuclei as they propagate in the Earth atmosphere, and create a cascade of a very large number of secondary particles, many of which make their way to the ground. These highly energetic cosmic ray particles provide us an opportunity to explore the possibility of the production of new exotic particles, in the high energy regime. In this talk, I will present the search for long-lived weakly interacting particle candidates produced in such interactions using the information of timing and positions of the secondary particles reaching at the ground.

Functionalized Boron Nitride Nanotubes for Switching Devices

Boyi Hao

Advisor: Dr. Yoke Khin Yap

Abstract: Boron nitride nanotubes (BNNTs) are wide band gap nanomaterials with extraordinary mechanical and chemical stability. Unlike carbon nanotubes (CNTs), the band gap of BNNTs is merely uniform, not sensitive to the change of chirality, diameter, and number of nanotubular walls. Furthermore, BNNTs are of advantageous to nanowires as they are ideally free of dangling bonds at their surfaces. Thus BNNTs are promising nanostructures for nanoscale electronic and photonic devices. Theoretical calculations show wide band gap of BNNTs is tunable by various methods, such as giant stark effect, doping and etc. However, there is no experimental evidence showing that BNNTs can be used for electronic and photonic devices. Here we show two novel approaches for the functionalization of BNNTs with quantum dots (QDs) and CNTs, which enable the applications of BNNTs in tunneling electronic and plasmonic devices.