

# Physics Colloquium

Michigan Technological University

Thursday, April 3, 2014

at 4:00 pm

Room 139 Fisher Hall

## Search for Long-lived Weakly Interacting Particles with the Pierre Auger Observatory

Niraj Dhital

Advisor: 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 through the earth's 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 extensive air shower data from the Pierre Auger Observatory.

## Simulation of Scanning Tunneling Microscopy and Spectroscopy Under the Lang Approximation.

Douglas Banyai

Advisor: John Jaszczak

**Abstract:** Scanning tunneling microscopy (STM) and the closely related scanning tunneling spectroscopy (STS) are a family of powerful experimental techniques that allow for the probing and imaging of surfaces and molecules at atomic resolution. However, interpretation of the results often requires comparison with theoretical and computational models. We will describe a new method for calculating STM topographs and STS spectra. This method offers a unique balance between the sophistication and accuracy of the model on the one hand, and the resource requirements and ease of use on the other.