

Physics Colloquium
Senior Research
Michigan Technological University
Thursday, April 16, 2009
4:00pm
Room 139 Fisher Hall

Searching for a Photon Bose-Einstein Condensate
Daniel Kestner
Advisor: Dr. Miguel Levy

Abstract: Atomic Bose-Einstein condensates have been realized within the last few decades. We investigate the possibility of a photon condensate.

A Molecular Junction Exhibiting Negative Differential Resistance
Brandon Johnson
Advisor: Dr. Ranjit Pati

Abstract: Circuits using organic molecules have proved to be a promising way to further miniaturize electronic devices. These devices have versatile properties, including the exhibition of negative differential resistance. The first molecule to exhibit this effect was discovered by a research group at Yale in 1999, ten years later though the source of this effect remains unknown. Through theoretical calculations and analysis we have found that the contact structure of the molecular junction is a possible source of this effect.

Analysis of a CDF Data Anomaly
Jamie Bougher
Advisors: Dr. Monica Tecchio and Dr. Myron Campbell
University of Michigan

Abstract: I conduct an analysis of data from the Collider Detector at Fermilab (CDF) project. M. Strassler and K. Zurek predict a possible mass resonance in the 400-500 GeV range in their hidden valley model. Motivated by this theory, using data from the UoM CDF team, and advised by Drs. Monica Tecchio and Myron Campbell, I review various variables and cuts in sets of 20 GeV transverse momentum dimuon data. A statistical analysis of this data yields no conclusive results, but further study with less stringent momentum requirements could be conducted.

Brownian Motion
Paul Rojas and Martin Boluyt
Advisor: Dr. Raymond Shaw

Abstract: One of the greatest achievements in the 20th century was proving the existence of atoms. Brownian motion helped to show this. Brownian motion is the erratic movement of macroscopic particles due to random bombardment of atoms. For the Spring 09 semester's Modern Lab course, we modernized Jean Perrin's Nobel Prize winning experiment and made it accessible to students.