



# PHYSICS & ASTRONOMY WEEKLY CALENDAR

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## WEEKLY CALENDAR

January 19, 2009

### DEPARTMENT COLLOQUIUM

**"A Bump from the ATIC - Observations of High Energy Cosmic Ray Electrons"**

3:40 PM, January 22, 2009  
109 Nicholson Hall

**T. Gregory Guzik**  
LSU

**Host: Juhan Frank**

• *Refreshments served at 3:15 PM in 201 Nicholson Hall* •

A recent publication in Nature about 300 to 800 GeV cosmic ray electrons observed by the Advanced Thin Ionization Calorimeter (ATIC) balloon experiment during several high altitude flights over the continent of Antarctica made international news. The excitement was due to the reported observation of a feature or "bump" in the otherwise smoothly decreasing electron energy spectrum. The severe energy losses that occur as these high energy particles traverse the galaxy render the cosmic ray electron spectrum sensitive to local (a few kiloparsecs) sources and, consequently, very interesting. The ATIC results are the first time that such a cosmic ray spectrum anomaly has been observed at high energy. Potential sources of this electron excess include pulsars, micro-quasars, supernovae remnants as well as the annihilation of exotic dark matter candidate particles. During this talk I will discuss the ATIC experiment, the reported electron observations, examine the merits of the various source models and compare the ATIC observations with other recent measurements.

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## SPECIAL SEMINAR

**"The Double Chooz Experiment and Beyond"**

3:40 PM, **Tuesday, January 27, 2009**  
109 Nicholson Hall

**Mark Dierckxsens**  
University of Chicago

**Host: William Metcalf**

• *Refreshments served at 3:15 PM in 201 Nicholson Hall* •

The Double Chooz experiment is designed to search for the last unknown neutrino mixing angle  $\theta_{13}$  using reactor neutrinos. By comparing the event rates in two identical detectors at different distances from the reactor cores, a significant improvement is obtained over the previous experiments. The design, physics potential and status of the experiment which is currently under construction will be discussed. An observation of a non-zero value of  $\theta_{13}$  opens the path to an ambitious program to study CP violation in the lepton sector and the mass hierarchy of the neutrinos. One of the proposals wants to send a wide band neutrino beam from Fermilab to a large detector at the Homestake mine in South Dakota. The concept behind such an experiment as well as the expected sensitivities will be reviewed.