

PHYSICS COLLOQUIUM

Seminars

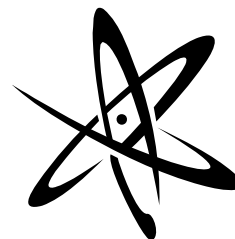
Zheng-Tian Lu

Argonne National Laboratory

“Atom Traps, Krypton-81 and Saharan Water”

Monday, May 12, 2008

4:00 PM, Ronald Geballe Auditorium, Rm. A-102



May 12-16, 2008

Abstract: Since radiocarbon dating was first demonstrated in 1949, the field of trace analyses of long-lived cosmogenic isotopes has seen steady growth in both analytical methods and applicable isotopes. The impact of such analyses has reached a wide range of scientific and technological areas. A new method, named Atom Trap Trace Analysis (ATTA), was developed by our group and used to analyze ^{81}Kr ($t_{1/2} = 2.3 \times 10^5$ years, isotopic abundance $\sim 1 \times 10^{-12}$) in environmental samples. In this method, individual ^{81}Kr atoms are selectively captured and detected with a laser-based atom trap. ^{81}Kr is produced by cosmic rays in the upper atmosphere. It is the ideal tracer for dating ice and groundwater in the age range of 104–106 years. As the first real-world application of ATTA, we have determined the mean residence time of the old groundwater in the Nubian Aquifer located underneath the Sahara Desert. Moreover, this method of capturing and probing atoms of rare isotopes is also applied to experiments that study exotic nuclear structure and test fundamental symmetries.

Tuesday, May 13

Condensed Matter Seminar

4:00 PM, Rm. C-421, PAT

Hsin-Ying Chiu, CalTech Physics

“Carbon Nanotube Nanomechanical Mass Sensor”

Wednesday, May 14

Special Colloquium

4:00PM, Rm. A-102, PAB

Tom Shutt, Case Western University

“LUX, and the race to detect WIMP dark matter”

Thursday, May 15

Astronomy Colloquium

4:00 PM, Rm. A-102, PAA

Mate Adamkovics, University of California, Berkeley

“Condensed-phase methane and tropospheric meteorology on Titan”