

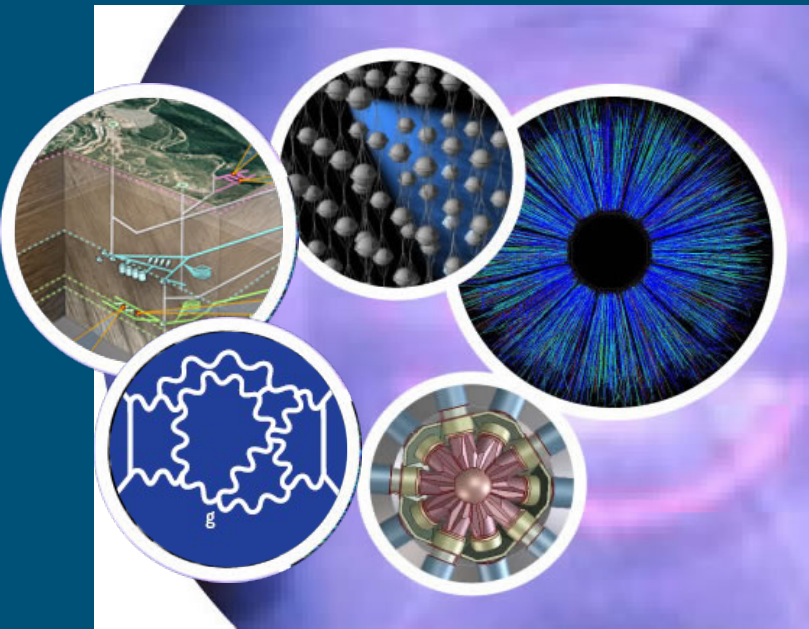
Nuclear Science Division Colloquium

Atom Trap Trace Analysis

Dr. Zheng-Tian Lu
Argonne

Wednesday
October 19, 2011
11:00 am

Bldg. 50-Auditorium



Abstract: Since the invention of radiocarbon dating in 1949, trace analyses of long-lived cosmogenic isotopes have contributed to a wide range of scientific and technological areas. We have developed an analytical method called Atom Trap Trace Analysis (ATTA), in which individual atoms of the desired isotope are selectively captured and detected with a laser-based atom trap. ATTA possesses superior selectivity, and is used to analyze environmental radio-isotopes: ^{81}Kr , ^{85}Kr , and ^{39}Ar . These three isotopes have extremely low isotopic abundances in the range of 10^{-16} to 10^{-11} , and cover a wide range of ages and applications. 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.



BERKELEY LAB

LAWRENCE BERKELEY NATIONAL LABORATORY



U.S. DEPARTMENT OF
ENERGY