



Tsinghua University
Department of Physics

Physics Seminar

2012

Fall

Atom Trap, Krypton-81, and Global Groundwater 原子陷阱及其应用

Abstract

The long-lived noble-gas isotope ^{81}Kr is the ideal tracer for old water and ice in the age range of 10^5 - 10^6 years, a range beyond the reach of ^{14}C . ^{81}Kr -dating, a concept pursued over the past four decades by numerous laboratories employing a variety of techniques, is now available for the first time to the earth science community at large. This is made possible by the development of an atom counter based on the Atom Trap Trace Analysis (ATTA) method, 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 thus far used to analyze the environmental radioactive 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. In collaboration with earth scientists, we are dating groundwater and mapping its flow in major aquifers around the world.

Speaker

Zheng-Tian Lu received his B.S. in University of Science and Technology of China in 1987, and M.S. in University of Chicago in 1991. He got his Ph.D. in University of California at Berkeley in 1994. He worked in JILA, University of Colorado as a research associate from 1994 to 1997. In 1997, he joined in the Argonne National Laboratory and became Senior Physicist in 2007. He is also a professor (part-time) in University of Chicago since 2004.



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