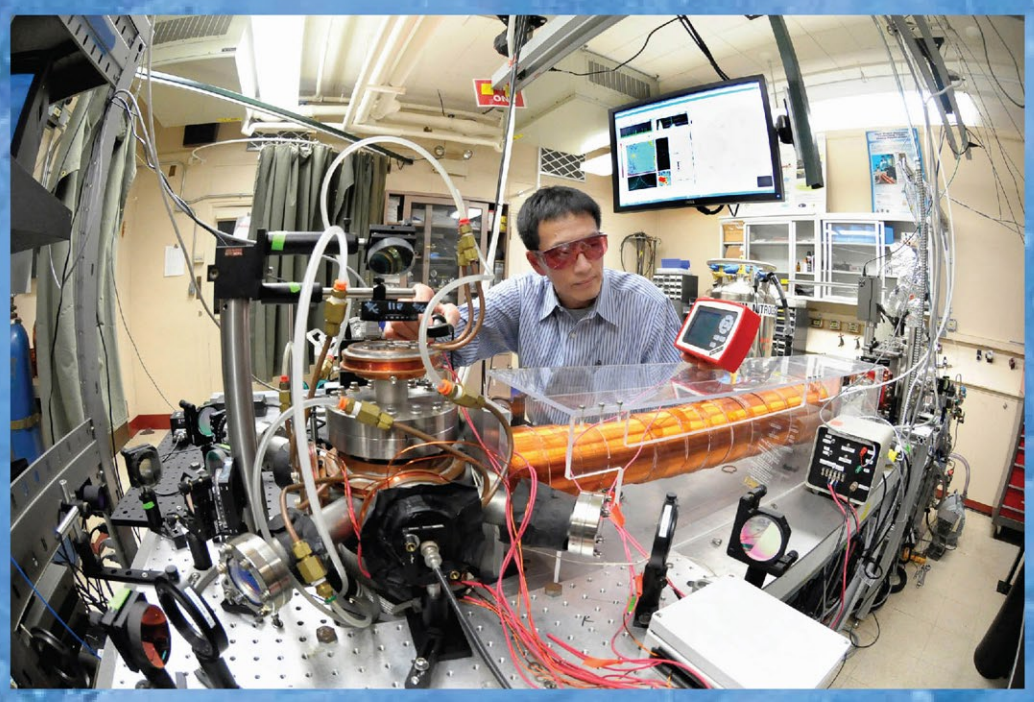
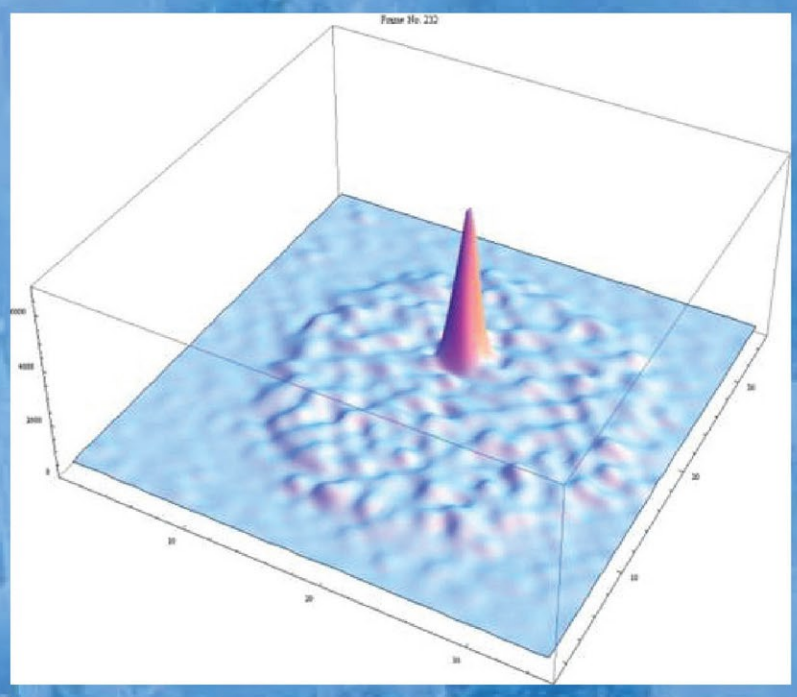
Zheng-Tian Lu

Atom Trap, Krypton-81, and Global Groundwater

Argonne NATIONAL LABORATORY





The long-lived noble-gas isotope ^{81}Kr is the ideal tracer for water and ice with ages of 10^5–10^6 years, a range beyond the reach of ^{14}C. ^{81}Kr-dating, a concept pursued over the past five decades by numerous laboratories employing a variety of techniques, is finally available to the earth-science community at large. This is made possible by the development of the Atom Trap Trace Analysis (ATTA) method, which captures and detects individual ^{81}Kr atoms, whose isotopic abundances are in the range of 10^{-14} to 10^{-12}. In collaboration with earth scientists, we are dating groundwater and mapping its flow in major aquifers around the world. We have also demonstrated for the first time ^{81}Kr-dating of old ice.

Zheng-Tian Lu is a Senior Scientist in the Physics Division of Argonne and a Professor (part-time) in the Physics Department of The University of Chicago. He did Ph.D. research at Argonne from 1988 to 1991, and returned in 1997 to join the Physics Division staff. Throughout his career, Lu has been developing techniques for laser manipulation and laser spectroscopy of atoms, and applying these techniques to ultrasensitive trace analysis, studying nuclear structure, and testing fundamental symmetries. He received a U.S. Presidential Early Career Award in 2000, was elected a Fellow of the American Physical Society in 2006, and received the Society's Francis M. Pipkin Award in 2009.

Background: www.virtualantarctica.com

Wednesday, May 6, 2015 | 3:00 p.m.

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