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JOHANNES GUTENBERG
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Physikalisches Kolloquium

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None

Zheng-Tian Lu
University of Science and Technology of China

Laser-based ultrasensitive trace analysis methods

The long-lived noble-gas isotope ^{81}Kr is the ideal tracer for water and ice with ages of 10⁵ - 10⁶ years, a range beyond the reach of ^{14}C . ^{81}Kr -dating, a concept pursued over the past five decades, 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, in which individual atoms of the desired isotope are captured and detected. 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 10⁻¹⁷ 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. We are also dating old ice from the deep ice cores of Antarctica, Greenland, and the Tibetan Plateau. For an update on this worldwide effort, please google "ATTA Primer".

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