

Abstract Submitted
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ATTA-3: The Next-Generation Instrument for ^{81}Kr -Dating Y. DING, Z.-T. LU, Phys Div, Argonne National Lab (ANL) & Enrico Fermi Institute (EFI), Univ of Chicago (UofC), K. BAILEY, P. MUELLER, T.P. O'CONNOR, Phys Div, ANL, R.W. DUNFORD, L. YOUNG, Chem Div, ANL, A.M. DAVIS, EFI & Dept of Geophys. Sci., UofC, N.C. STURCHIO, Dept of Earth & Environ Sci, Univ of Illinois at Chicago, S.-M. HU, Hefei National Lab & Dept of Chemical physics, Univ of Sci & Tech of China — Atom Trap Trace Analysis (ATTA) has been used to analyze two rare isotopes: ^{81}Kr (isotopic abundance $\sim 10^{-12}$) and ^{85}Kr ($\sim 10^{-11}$), in environmental samples. Radiokrypton dating enabled by the ATTA method can now be used to determine the ages of old groundwater in the range of 50,000–1,000,000 years. The present apparatus (ATTA-2) has an overall counting efficiency of 0.01% and, for ^{81}Kr dating, requires a water sample of at least 1,000 liters. We are developing a new apparatus (ATTA-3) to trap and count ^{81}Kr atoms with the goal of reaching a counting efficiency of 1%. If successful, the required sample size would be reduced down to 10 liters of water or ice, and a wider range of applications in the earth sciences can be realized. This work is supported by DOE, Nuclear Phys Div, under contract W-31-109-ENG-38, and by a UofC-ANL collaborative seed grant.

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