Abstract Submitted
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X-ray probe of Alignment by Strong-field Ionization[1] C. HÖHR, E. PETERSON, D.A. ARMS, E.M. DUFRESNE, R.W. DUNFORD, D.L. EDERER, E.P. KANTER, B. KRÄSSIG, E.C. LANDAHL, J. RUDATI, R. SANTRA, S.H. SOUTHWORTH, L. YOUNG, Argonne National Labratory, Argonne, IL 60439, USA — The study of atoms in strong laser fields has led to several discoveries with fundamental and technological interest. While experiments so far have focused on the detection of ejected particles from the focal region of the laser beam, we present results of an experiment on Kr atoms probing within the strong-field volume (4×10^{14} W/cm^2) using micro-focused, tunable x-ray radiation from the APS (14.3 keV). The polarization of the x rays enables determination of magnetic sublevel alignment in the residual krypton ion after tunneling ionization in the laser field. We detect the x-ray fluorescence following K-shell excitation as a function of target pressure, time, laser intensity and polarization, and external magnetic fields. We demonstrate methods both to destroy and preserve the alignment created in the tunnel ionization process. This experiment develops methodology for future studies using x-ray free electron lasers, where intensities of up to 10^{20} W/cm^2 are expected.

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