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The atomic response to 10^{18} W/cm^2 x-rays from the LCLS[1] B. KRÄSSIG, E.P. KANTER, A.M. MARCH, Y. LI, S.T. PRATT, R. SANTRA, S.H. SOUTHWORTH, L. YOUNG, Argonne National Laboratory, N. ROHRINGER, Lawrence Livermore National Laboratory, N. BERRAH, L. FANG, M. HÖNER, Western Michigan University, L. DIMAURO, G. DOUMY, C.A. ROEDIG, Ohio State University, P.H. BUCKSBAUM, J.P. CRYAN, S. GHIMIRE, J.M. GLOWNIA, D.A. REIS, PULSE Stanford, M. MESSERSCHMIDT, C. BOSTEDT, J.D. BOZEK, SLAC — The goal of this experiment was to characterize the response of a prototypical atom, neon, to the unprecedented flux of microfocussed x-rays produced at the Linac Coherent Light Source (LCLS) at the SLAC Linear Accelerator Laboratory. In agreement with results from theoretical modeling, we find atoms inside the focal volume to undergo multiple successive ionization events, leading to fully stripped Ne^{10+} at 2-keV x-ray energies, and charge states up to Ne^{8+} below the K-ionization threshold. We also observe photoproduction of hollow neon ions through successive K-shell ionization on timescales shorter than Auger decay. We demonstrate intensity-induced x-ray transparency as a consequence of ever slower vacancy decay clocks limiting an ion's consecutive K absorption within a single 200-fs x-ray pulse.

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Bertold Krässig
Argonne National Laboratory

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