Abstract Submitted
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Determination of the neon double core hole lifetime using high-intensity x-rays from the LCLS[1] B. KRÄSSIG, E.P. KANTER, G. DOUMY, A.M. MARCH, S.H. SOUTHWORTH, L. YOUNG, Argonne National Laboratory, J.D. BOZEK, C. BOSTEDT, M. MESSERSCHMIDT, SLAC National Accelerator Laboratory — The concentration of x-ray photons in a focussed radiation pulse at the SLAC Linac Coherent Light Source (LCLS) exposes atoms to multiple sequential photoabsorption processes [1]. For ∼keV x rays the absorption in neon targets primarily the 1s shell and hollow neon atoms are readily created when the rate of photoabsorption exceeds that of inner-shell decay. With typical LCLS parameters and a ∼1 micron focus, we observed double core-hole states in neon for up to ∼20% of 1s ionization events. For comparison, electron-electron correlations lead to double-to-single core-hole ratios of just 0.3% under single photon absorption conditions [2]. Using the high-resolution electron time-of-flight spectrometers of the LCLS AMO Physics end station, we measured the Ne *KK-KLL* Auger hypersatellite spectrum and determined the lifetime of the $Ne^{2+}(1s^{-2})$ doubly core-excited state. The results are compared to theoretical predictions.

[1] L. Young *et al.*, Nature **466**, 56 (2010).
[2] S. H. Southworth, *et al.* Phys. Rev. A **67**, 062712 (2003).

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