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Laser enabled Auger decay in argon atoms and dimers PREDRAG RANITOVIC, Colorado University - JILA, XIAO-MIN TONG, University of Tsukuba - Center for Computational Sciences, CRAIG W. HOGLE, Colorado University - JILA, N. TOSHIMA, University of Tsukuba - Center for Computational Sciences, M.M. MURNANE, H.C. KAPTEYN, Colorado University - JILA
— In rare-gas atoms, Auger decay in which an inner-valence shell ns hole is filled is normally not energetically allowed. However, in the presence of a strong laser field, a new laser-enabled Auger decay channel can open up to increase the double-ionization yield. This process is efficient at high laser intensities, and an ns hole can be filled within a few femtoseconds of its creation. This novel laser-enabled Auger decay (LEAD) process is of fundamental importance for controlling electron dynamics in atoms, molecules, and materials. We then use LEAD to investigate charge transfer in a Coulomb exploding Ar dimer. We can selectively double-ionize either the Ar dimer (threshold $\sim$ 36 eV) or Ar atoms (threshold $\sim$ 43.5 eV) using combined laser (1.5 eV) and XUV photons (36 eV) in a time-resolved fashion, and then comparing the kinetic energy releases. The Ar dimer can be double ionized when the 3s hole is filled by a 3p electron from either one of the two Ar atoms through LEAD. Theoretical calculation will support data taken using COLTRIMS and HHG.

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