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Accession number:20123615400751
Title:Low yield of near-zero-momentum electrons and partial atomic stabilization in strong-field tunneling ionization
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Source title:Physical Review Letters
Abbreviated source title:Phys Rev Lett
Volume:109
Issue:9
Issue date:August 27, 2012
Publication year:2012
Article number:093001
Language:English
ISSN:00319007
E-ISSN:10797114
CODEN:PRLTAO
Document type:Journal article (JA)
Publisher:American Physical Society, One Physics Ellipse, College Park, MD 20740-3844, United States
Abstract:We measure photoelectron angular distributions of single ionization of krypton and xenon atoms by laser pulses at 1320nm, 0.2-1.0×1014W/cm2, and observe that the yield of near-zero-momentum electrons in the strong-field tunneling ionization regime is significantly suppressed. Semiclassical simulations indicate that this local ionization suppression effect can be attributed to a fraction of the tunneled electrons that are released in a certain window of the initial field phase and transverse velocity are ejected into Rydberg elliptical orbits with a frequency much smaller than that of the laser; i.e., the corresponding atoms are stabilized. These electrons with high-lying atomic orbits are thus prevented from ionization, resulting in the substantially reduced near-zero-momentum electron yield. The refined transition between the Rydberg states of the stabilized atoms has implication on the THz radiation from gas targets in strong laser fields. © 2012 American Physical Society.
Number of references:48
Main heading:Atoms
Controlled terms:Electrons - Impact ionization - Ionization of gases - Krypton - Xenon
Uncontrolled terms:Electron yield - Elliptical orbits - Gas targets - Local ionization - Low-yield - Photoelectron angular distributions - Rydberg - Semiclassical simulation - Single ionization -

Strong laser field - Suppression effects - THz radiation - Transverse velocity - Tunneling ionization - Xenon atoms
Classification code:701.1 Electricity: Basic Concepts and Phenomena - 804 Chemical Products Generally - 931.2 Physical Properties of Gases, Liquids and Solids - 931.3 Atomic and Molecular Physics
DOI:10.1103/PhysRevLett.109.093001
Database:Compendex