

Abstract Submitted  
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**Atomic tunneling ionization in a photon picture**<sup>1</sup> YUJUN WANG, B.D. ESRY, J. R. Macdonald Laboratory, Department of Physics, Kansas State University — Above-threshold ionization (ATI) and high-harmonic generation (HHG) are studied by the photon-phase formalism [1] in the tunneling regime. Different from the commonly used three-step model for understanding such strong-field phenomena, we show that each order of the ATI or HHG peaks is strongly associated with a single “photon channel” in the photon-phase picture. This simplicity allows an identification of pathways for each of the orders. This picture not only provides a convenient means to understand the electron dynamics in the strong field, but also gives insights that may help engineer laser pulses to manipulate the output of the ATI or HHG. We apply this method to quantify the strong-field-induced ionization threshold shift and study the carrier-envelope phase dependence of the HHG.

[1] V. Roudnev and B. D. Esry, Phys. Rev. Lett. 99, 220406 (2007); J. J. Hua and B. D. Esry, J. Phys. B 42, 085601 (2009).

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