Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Modulation of molecular high harmonic generation by electron de Broglie wave interference JING CHEN, Institute of Applied Physics and Computational Mathematics, P.O. Box 8009, 100088 Beijing, China, JINGYUN FAN, Joint Quantum Institute, National Institute of Standards and Technology, and University of Maryland — In the intense laser field, the amplitude for the n^{th}-order high harmonic generation (HHG) of a two-center molecule using the modified Lewenstein model is written as $S(n) \propto \sum_{l,m} |(e^{i\vec{k}'\cdot\vec{R}/2} - e^{-i\vec{k}'\cdot\vec{R}/2})\Phi_i(\vec{k}')|^2 J_l(-\frac{\vec{k}\cdot\vec{A}_0}{\omega}) J_m(\frac{\vec{k}\cdot\vec{A}_0}{\omega})$, where $m$and $l$are number of photons that the electron absorbs/emits at ionization /recombination and are restricted by the energy conservation, $n = (m \pm 1) + l$. The electron's kinetic energy is related to photon number m and molecular ionization potential I_p as $\vec{k}^2/2 = (m \pm 1)\omega - I_p$. $\vec{k}'$ is parallel to $\vec{k}$with $\vec{k}'^2/2 = \vec{k}^2/2 + I_p$ due to the bound potential acceleration effect in the recapture. $J_l()$ is l^{th} order Bessel function and $\Phi_i(k)$ is the amplitude of electron momentum state (Fourier transformation of the atomic wavefunction φ_i in the LCAO-MO approximation). Clearly MHHG at each order (n^{th}) is contributed by a number of momentum states, being a summation of interferences $(e^{i\vec{k}'\cdot\vec{R}/2} - e^{-i\vec{k}'\cdot\vec{R}/2})$ weighed by state probabilities which is affected by laser parameters. We numerically evaluate the MHHG spectra for different laser intensities and various alignment angles, the results are consistent with recent experimental observations.

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Date submitted: 29 Nov 2008 Electronic form version 1.4