

Abstract Submitted
for the DAMOP05 Meeting of
The American Physical Society

Sorting Category: 2.4 (E)

The effects of molecular vibration on the yield of high-order harmonic generation. JIANGFAN XIA, MAHENDRA SHAKYA, SHAMBHU GHIMIRE, CHRIS NAKAMURA, ZENGHU CHANG, Phys. Dept. KSU — It is well-accepted that the high-order harmonic spectrum is the results of interference between many attosecond pulses. Each of the attosecond pulse is produced by a three-step process taking place within one laser cycle. For light molecules such as H_2 , the first step is the ionization of one electron. When the freed electron returns to the H_2^+ , the internuclear distance is changed. This may cause the electron to miss the ion during its revisit, thus reducing its probability to recombine with the parent ion. As a result, the high harmonic generation yield is lower for H_2 than D_2 , since D_2 has a longer vibration period (~ 21 fs) than that of H_2 (~ 15 fs). Here we report, to the best of our knowledge, the first experimental observation of the effects of vibration on the yield of HHG in molecules. We compared the high-order harmonic spectra of H_2 , HD and D_2 . The shortest pulses were ~ 8 fs, which is almost the same as one half of the vibration period of H_2 . Using such short pulses assures that the internuclear distances of all three types of molecules are in the increasing phase of a cycle when the harmonics are generated. From the HHG spectra it is evident that the yield of D_2 is a factor of two higher than that of H_2 , while that of HD is in between. This is consistent with the theoretical predictions.

Prefer Oral Session
 Prefer Poster Session

Jiangfan Xia
xia@phys.ksu.edu

Date submitted: 01 Apr 2005

Electronic form version 1.4