

Abstract Submitted
for the TSF15 Meeting of
The American Physical Society

Generation of enhanced even and odd harmonics in a two-color laser field¹ M. SAYRAC, A. A. KOLOMENSKII, Y. BORAN, Texas AM University, J. STROHABER, Florida AM University, H. A. SCHUESSLER, Texas AM University — We present results on an enhanced production of high harmonics (HHs) with a two-color laser field ($\omega_0 + 2\omega_0$) in argon (Ar), nitrogen (N₂) and carbon dioxide (CO₂) gases having close ionization potentials, $I_p = 15.6eV$, $I_p = 15.7eV$, and $I_p = 13.77eV$ respectively. The fundamental radiation at ω_0 corresponds to 50fs pulses from a Ti:sapphire chirped-pulse amplifier laser system at 800nm. Odd $(2n + 1)\omega_0$ ($n = 2 - 10$) and even $2(2m + 1)\omega_0$ ($m = 1 - 3$) harmonics, were observed in the $\omega_0 + 2\omega_0$ driving field. High harmonics were measured for parallel and perpendicular relative polarizations orientations of the ω_0 and $2\omega_0$ -fields, and intensity of ω_0 beam was $\sim 1.5 \times 10^{14} W/cm^2$, and $2\omega_0$ beam was in the range $\sim 3 \times 10^{12} - 3 \times 10^{13} W/cm^2$. An increased conversion efficiency into HHs, notably of the $2(2n + 1)$ orders was found for the latter case. With the combined $(\omega_0 + 2\omega_0)$ field, which was obtained by inserting a doubling crystal into the fundamental (ω_0) beam, more than an order of magnitude enhancement of the HHs signal was observed compared to the ω_0 -field or its second harmonic ($2\omega_0$) alone. We also discuss similarities and differences of the HH generation in the three gas media with a single and two-color beams.

¹This work was supported by the Robert A. Welch Foundation Grant No. A1546, the Qatar Foundation under the grant NPRP 5-994-1-172, and the Ministry of National Education of the Republic of Turkey.

Muhammed Sayrac
Texas A
M University

Date submitted: 09 Oct 2015

Electronic form version 1.4