

Abstract Submitted  
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**New possibilities for the efficiency enhancement of the high harmonic generation process in gas mixtures of Ne and H<sub>2</sub>** MUHAMMED SAYRAC, ALEXANDRE A. KOLOMENSKI, SUNILKUMAR ANUMULA, GAMZE KAYA, NECATI KAYA, HANS A. SCHUESSLER, Texas A&M University — We have investigated how mixing of two gases (H<sub>2</sub> and Ne) with significantly different ionization potentials (IPs) modifies the high harmonic generation (HHG). We observed up to a 2.5 fold enhancement of HHG compared to pure H<sub>2</sub> and up to  $3 \times 10^3$  enhancement compared to pure Ne at moderate laser intensities at the gas jet  $\sim 1.5 \times 10^{14}$  W/cm<sup>2</sup> when the backing pressure of H<sub>2</sub> was fixed at 0.7 bar and the Ne pressure increased in steps of  $\sim 0.4$  bar up to  $\sim 2.8$  bar; the optimal Ne pressure was found to be about  $\sim 0.5$  - 1 bar for different harmonics order. Initially, HHG in H<sub>2</sub> gas takes place due to its low IP, inducing excited states and facilitating ionization and HHG in the Ne gas with high IP [1]. For simulation of HHG in mixtures we employed a phenomenological model that took into account also the changes in the matching conditions, affecting the HHG process. Thus, mixing of gases with low and high ionization potentials opens up new possibilities for the efficiency enhancement of the HHG process. This work was supported by the Robert A. Welch Foundation Grant No. A1546 and the Qatar Foundation under the grant NPRP 5 - 994 - 1 - 172.

[1] E. J. Takahashi et al. PRL 99, 053904 (2007).

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