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Session U02: Imaging Ultrafast Molecule Dynamics

2:00 PM–4:00 PM, Thursday, June 3, 2021

Chair: Thomas Weinacht, Stony Brook University

Abstract: U02.00008 : Single-shot visualization of the optical Kerr effect, ionization, and rotational Raman effect during laser matter interactions via frequency-domain holography*

3:24 PM–3:36 PM Live

← Abstract →

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We visualize the ultrafast dynamics caused by intense femtosecond laser pulses in both thin flexible glass as well as gaseous atoms and molecules using single-shot Frequency Domain Holography (FDH) [1-3]. FDH is a robust, single-shot, time-resolved visualization technique that employs chirped pulses. Femtosecond laser micromachining of glass materials relies critically on the Kerr effect and ionization, thus direct observation of their dynamics can help produce optical devices such as waveguides. For gases, single-shot visualization of laser-matter interactions will allow for a better understanding of nonlinear optical phenomena such as filamentation [4] and Raman-induced extreme spectral broadening [5]. Using FDH, we have previously observed the ionization dynamics of thin, flexible glass and measured its nonlinear index [3], and are currently investigating the ultrafast dynamics of gases under intense laser fields. [1] S. P. Le Blanc et al., Opt. Lett. 56, 764-766 (2000). [2] K. Y. Kim et al., APL, 88 4124-4126 (2002). [3] S. Huang et. al., OFC 1-3 (2014). [4] A. Couairon et al., Phys. Rep. 441, 47 (2007). [5] D. Dempsey et al. Opt. Lett. 45, 1252-1255 (2020).

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