

Bulletin of the American Physical Society

64th Annual Meeting of the APS Division of Plasma Physics Monday–Friday, October 17–21, 2022; Spokane, Washington

Session BO08: Beam-Plasma Wakefield, High Field Physics, and Diagnostics

9:30 AM–12:18 PM, Monday, October 17, 2022
Room: 402 ABC

Chair: Yong Ma, University of Michigan

Abstract: BO08.00001 : Study of ionization and rotational dynamics of molecules under intense laser fields and spectral broadening via laser filamentation*
9:30 AM–9:42 AM

[Abstract ➡](#)

Presenter:

Dennis Dempsey
(Binghamton University)

Authors:

Dennis Dempsey
(Binghamton University)

Garima C Nagar
(Binghamton University)

Jack W Agnes
(Binghamton University)

Nicole A Batista
(Binghamton University)

Bonggu Shim
(Binghamton University)

We study the ultrafast dynamics such as ionization and rotation of various molecules (e.g., CO_2 and N_2O) under intense femtosecond laser fields in a single shot using Frequency Domain Holography (FDH) [1-2] as well as investigate spectral broadening via filamentation in molecular gases. FDH is a single-shot, time-resolved visualization technique that utilizes chirped reference and probe pulses that interrogate the nonlinear effects caused by an intense ultrashort pump pulse. In particular, single-shot visualization of laser-matter interactions will allow for increased understanding of nonlinear optical phenomena such as Raman-induced extreme spectral broadening [3], filamentation [4], and plasma generation and recombination [2].

[1] S. P. Le Blanc et al., Opt. Lett. 56, 764-766 (2000). [2] D. Dempsey et al. Opt. Lett. 45, 1252-1255 (2020) [3] J. Beetar et al., Science Advances 6, eabb5375 (2020) [4] A. Couairon and A. Mysyrowicz, Phys. Rep. 441, 47 (2007).

*Funded by Air Force Office of Scientific Research (AFOSR)(FA9550-18-1-0223), National Science Foundation (NSF) (PHY- 2010365) and the Integrated Electronics Engineering Center (IEEC) at Binghamton University