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Session TO05: Fundamental Plasmas: Laboratory, Nonneutral, and Strongly Coupled Plasmas

9:30 AM–12:18 PM, Thursday, November 2, 2023

Room: Governor's Square 14

Chair: Derek Thuecks, Washington College

Abstract: TO05.00012 : Time-resolved single-shot measurements of electron collision times of plasma in glass ionized by high-intensity femtosecond laser pulses*

11:42 AM–11:54 AM

← Abstract →

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We measure the electron collision time of plasma in thin glass ionized by a high-intensity femtosecond laser pulse using time-resolved single-shot frequency domain holography (FDH) [1, 2]. If a laser pulse has high enough intensity, a material it interacts with will be ionized creating plasma. The existence of plasma will change the material's dielectric constant which is a critical quantity for determining optical properties of the material. Although the electron collision time is an important parameter for determining the dielectric constant particularly for high-density plasma, there are only a few studies that experimentally measure the electron collision time [3-5]. To aid on this front, we study the effects of pump pulse energy and pulse duration on electron collision time of plasma in thin glass and visualize how it evolves on femtosecond time scales in a single shot.

[1] S. P. Le Blanc et al., Opt. Lett. 56, 764-766 (2000). [2] D. Dempsey et al. Opt. Comm. 545, 129669 (2023). [3] G. C. Nagar, D. Dempsey, and B. Shim, Communications Physics 4, 96 (2021). [4] Sun, Q. et al. Opt. Lett. 30, 320 (2005). [5] Papazoglou, D. G. & Tzortzakis Opt. Mater. Express 1, 625 (2011).

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