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Session YO4: AB: Intense Short Pulse Laser-Plasma Interactions

9:30 AM–12:18 PM, Friday, October 25, 2019

Room: Grand A

Chair: Grigory Golovin, UNL

Abstract: YO4.00009 : Experimental and theoretical study of wavelength dependence of plasma dynamics in laser filamentation in solids.*

11:06 AM–11:18 AM

[Preview Abstract](#)

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We experimentally and theoretically investigate plasma dynamics in laser filamentation in fused silica by varying the driver wavelength from 1.2 to 2.3 μm covering the near-zero to the anomalous group-velocity dispersion regimes. First, we perform femtosecond time-resolved interferometry to measure plasma densities in filaments, which unexpectedly reveals that plasma densities are not monotonically decreasing with increasing wavelength. This result is in sharp contrast to recent theoretical work in filamentation in air/gases [1,2] as well as our own numerical simulations in fused silica in which the electron collision time is assumed to be constant for all the wavelengths. Therefore, to investigate further, we also perform time-resolved shadowgraphy which, combined with interferometry, enables us to determine the electron collision time in plasma [3]. We find out that the electron collision time is not a constant for different wavelengths, which can change the plasma dynamics in filamentation significantly.[1]L. Bergl et al., Phys. Rev. A 88, 023816 (2013).[2]Y. E. Geints et al., Appl. Opt. 56, 1397–1404 (2017).[3]A. Couaeron et al., Eur. Phys. J-Spec. Top. 199, 76 (2011).[4]Q. Sun et al., Opt. Lett. 30, 3 (2005).

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