

**NCD plasma dynamics driven by ultraintense femtosecond laser pulse**

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High-density gas-jet target has superior advantages in laser-driven particle and radiation sources development. The near-critical-density gas is especially attractive for both ion acceleration and high-brilliance Betatron x-ray generation due to highly efficient laser absorption and a variety of nonlinear coherent structures. In this talk, I will present our experimental work on the spatiotemporal evolution of near-critical-density gas-plasma produced by high-contrast relativistically intense femtosecond laser pulses with helium gas jet of peak atom density of  $8 \times 10^{20} \text{ cm}^{-3}$ . The underlying physics will be discussed with the help of 2D and 3D particle-in-cell simulations.

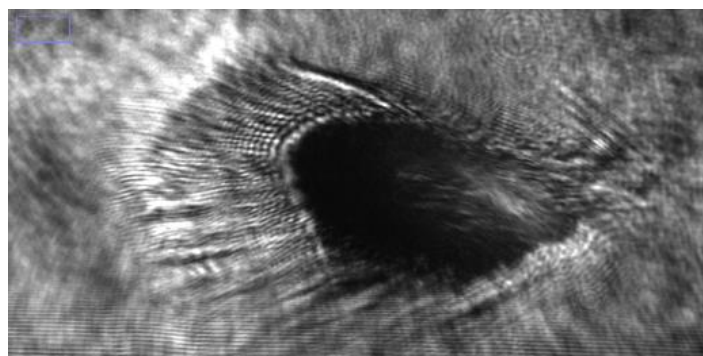


Figure 1 Typical plasma structure detected with second-harmonic optical probe

**References:**

- F. Sylla, *etc.* Short Intense Laser Pulse Collapse in Near-Critical Plasma. *Phys. Rev. Lett.* 110, 085001 (2013)  
F. Sylla, *etc.* Anticorrelation between Ion Acceleration and Nonlinear Coherent Structures from Laser-Underdense Plasma Interaction. *Phys. Rev. Lett.* 108, 115003 (2012)