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Plasma ramps generation by outflow in gas-filled capillaries

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Plasma confinement inside capillaries has been developed in the past years for plasma-based acceleration to ensure a stable and repeatable plasma density distribution during the interaction with either particles or laser beams. In particular, in gas-filled capillaries, the neutral gas is ionized by a discharge current and confined to let it evolves leading to a stable and almost predictable distribution during the interaction with particles. However, the plasma ejected through the electrodes interacts with the beam outside the capillary, affecting the quality of the beam. We have studied the evolution of the plasma flown at the two ends of the capillary, in particular the longitudinal density distribution and the expansion velocity of the plasma. The study of these properties provides a deeper knowledge of the processes involved in the discharge and allows a better understanding of the beam-plasma interaction for future plasma based experiments.

Primary author: FILIPPI, Francesco (LNF)

Co-authors: MAROCCHINO, Alberto (LNF); BIAGIONI, Angelo (LNF); ZIGLER, Arie (LNF); BRENTEGANI, Emanuele (LNF); CHIADRONI, Enrica (LNF); ANANIA, Maria Pia (LNF); FERRARIO, Massimo (LNF)

Presenter: FILIPPI, Francesco (LNF)

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