Abstract Submitted
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Simulation of free-space optical guiding structure based on colliding gas flows DMITRI KAGANOVICH, JOHN PALASTRO, Naval Research Laboratory, YU-HSIN CHEN, Research Support Instruments, DANIEL GORDON, MICHAEL HELLE, ANTONIO TING, Naval Research Laboratory — Preformed plasma channels with parabolic radial density profiles enable the extended and stable optical guiding of high intensity laser pulses. High voltage discharge capillaries, commonly used for channel formation, have limited guiding length and opaque walls, complicating diagnosis of the plasma within. We propose a unique free-space gas channel produced by the collision of several gas flows. The collision of the gas flows forms an on-axis density depression surrounded by higher density walls. By offsetting the flows, we demonstrate the creation of a novel vortex structure exhibiting a long-lived parabolic density profile. Once ionized, the resulting plasma density profile has a near-parabolic dependence appropriated for guiding. Detailed 2-D fluid dynamics simulations are performed to examine the properties and stability of the guiding structure. Simple physical model and experimental perspectives will be presented.

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