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Formation of laser plasma channels in a stationary gas ALEXANDER DUNAIEVSKY, Dept. of Astrophysical Sciences, Princeton University, ALEXANDER GOLTSOV, Kurchatov Institute, TRINITI, JOEL GREENBERG, SZYMON SUCKEWER, Department of MAE, Princeton University, ERNIE VALEO, NATHANIEL FISCH, Princeton Plasma Physics Laboratory — Plasma channels with a density of $\sim 10^{19} \text{ cm}^{-3}$ and nonuniformity of about $\pm 3.5\%$ can be formed in a non-flowing gas, contained in a cylindrical chamber. Channels with radius of 15 μm and length about 2.5 mm were formed in He, N₂, Ar, and Xe by a 0.3 J, 100 ps laser pulses. Laser beam passed through the chamber along its axis via pinholes in the chamber walls. Ablative plasma on the pinholes, created by the wings of radial profile of the laser beam, plays an important role in the plasma channel formation and its uniformity. Uniform channel forms only at proper time delay and in optimal pressure range, which depend on the sort of gas. Interaction of the laser beam with the gas stream from of the front pinhole was found insignificant. Uniformity of the plasma channel may be improved slightly by low current glow discharge initiated in the. High current arc discharge, oppositely, leads to refraction of the laser beam near the front pinhole because of the formation of overdense plasma.

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