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Generation of high-density, thin gas jets for high repetition-rate experiments[1] YUAN TAY, LUKE HAHN, YONG-SING YOU, HOWARD MILCHBERG, KI-YONG KIM, University of Maryland, College Park — We have investigated the production of thin (50 - 500 microns), high-density (10^{19} - 10^{21} cm^{-3}) gas jets at high backing pressure (1000 psi) and cryogenic temperature (100 K). Capillary tubes with various diameters are used to produce thin and dense gas jets in continuous flow. The gas density profiles are characterized by optical interferometry. Rayleigh/Mie scattering is also monitored to check the presence of argon clusters. Our result shows a peak gas density of 10^{21} cm^{-3} near the nozzle orifice, approaching the critical plasma density at 800 nm laser wavelength when the gas target is singly ionized. This high-density gas jet, achieved by high backing pressure and cryogenic cooling, can allow studies of laser interaction with overdense plasmas in gas targets, without generating unwanted debris as in solid targets.

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