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Optimization of Supersonic Gas Jet Density Profiles for Laser-Plasma Target Production[1] OCEAN ZHOU, University of California, Berkeley (UCB); Lawrence Berkeley National Lab (LBNL), HAI-EN TSAI, TOBIAS OSTERMAYR, LBNL, LIONA FAN-CHIANG, UCB; LBNL, ANTHONY GONSALVES, ALEXANDER LAUT, LBNL, ROBERT JACOB, UCB; LBNL, CAMERON GEDDES, LBNL, CARL SCHROEDER, UCB; LBNL, ERIC ESAREY, LBNL — Gas jet profiles are essential in fields involving laser-plasma interaction, especially in the creation of high gradient, compact laser-plasma accelerators. In many such experiments, a gas jet is the medium that the intense laser propagates into in order to create the plasma. For laser-plasma interactions, in many cases, a uniform density profile with sharp transitions at the profile edges, often labeled as a "flat-top" profile, is desired at the laser-plasma interaction line. Supersonic gas jets, which are used to create such density profiles, are produced from gas flowing through converging-diverging (CD) nozzles. In this presentation, preliminary density profile results towards meeting accelerator needs, extracted from computational fluid dynamics (CFD) simulations of various CD nozzle geometries, are presented. The nozzle geometry parameters including the throat size, the exit half-angle, and the curvature of the section between the throat and nozzle exit, were investigated for further tailoring of the desired density profiles.

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