Abstract Submitted
for the DPP12 Meeting of
The American Physical Society

Density characterization of tapered super-sonic gas jet targets for laser wakefield acceleration GREGORY GOLOVIN, EMILY GRACE, SUDEEP BANERJEE, CHAD PETERSEN, KEVIN BROWN, JARED MILLS, SHOUYUAN CHEN, CHENG LIU, DONALD UMSTADTER, University of Nebraska-Lincoln — Phase slippage between plasma wave and electron bunch limits maximum energy gain in laser-wakefield acceleration. Plasma-density spatial tailoring has been proposed as a way to overcome this dephasing problem [1]. In practice, such tailoring can be achieved in super-sonic gas jets by use of a nozzle with a tapered orifice. We have developed a 3-D temporally-resolved interferometric tomography technique to characterize dynamical density distribution of such gas jets. The SIRT (Simultaneous Iterative Reconstructive Technique) algorithm [2] was implemented. We also present preliminarily results on laser wakefield acceleration in the tailored gradient density profiles resulting from use of the characterized jets as targets.

[1] W. Rittershofer, C. B. Schroeder, E. Esarey, F. J. Grüner, and W. P. Leemans, "Tapered plasma channels to phase-lock accelerating and focusing forces in laser-plasma accelerators," *Physics of Plasmas* **17**, 063104, (2010).
[2] P. Gilbert, "Iterative methods for the three-dimensional reconstruction of an object from projections," *Journal of Theoretical Biology* **36**, 105 (1972).

Gregory Golovin
University of Nebraska-Lincoln

Date submitted: 19 Jul 2012 Electronic form version 1.4