Abstract Submitted
for the DPP17 Meeting of
The American Physical Society

Plasma Channel Lenses and Plasma Tornadoes for Optical Beam Focusing and Transport[1] R. F. HUBBARD, D. KAGANOVICH, L. A. JOHNSON, D. F. GORDON, J. R. PENANO, B. HAFIZI, M. H. HELLE, Plasma Physics Division, Naval Research Laboratory, A. A. MAMONAU, Research Support Instruments, Inc. — Shaped plasmas offer the possibility of manipulating laser pulses at intensities far above the damage limits for conventional optics. An example is the plasma channel, which is a cylindrical plasma column with an on-axis density minimum. Long plasma channels have been widely used to guide intense laser pulses, particularly in laser wakefield accelerators. A new concept, the "plasma tornado", offers the possibility of creating long plasma channels with no nearby structures and at densities lower than can be achieved by capillary discharges. A short plasma channel can focus a laser pulse in much the same manner as a conventional lens or off-axis parabola. When placed in front of the focal point of an intense laser pulse, a plasma channel lens (PCL) can reduce the effective f-number of conventional focusing optics. When placed beyond the focal point, it can act as a collimator. We will present experimental and modeling results for a new plasma tornado design, review experimental methods for generating short PCLs, and discuss potential applications.

[1]Supported by the Naval Research Laboratory Base Program

Richard Hubbard
Plasma Physics Division, Naval Research Laboratory

Date submitted: 14 Jul 2017 Electronic form version 1.4