Abstract Submitted
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Shaped Plasma Lenses for Optical Beam Control at High Laser Intensities[1] R. F. HUBBARD, J. P. PALASTRO, L. A. JOHNSON, B. HAFIZI, D. F. GORDON, J. R. PENANO, M. H. HELLE, D. KAGANOVICH, Plasma Physics Division, Naval Research Laboratory — A plasma channel is a cylindrical plasma column with an on-axis density minimum. A short plasma channel can focus a laser pulse in much the same manner as a conventional lens or off-axis parabola [R. F. Hubbard, *et al.*, Phys. Plasmas **9**, 1431 (2002)]. If the plasma has an off-axis density maximum ("inverse channel"), it behaves like a negative lens and acts to defocus the pulse. In either case, a shaped plasma lens (SPL) may be placed in the beamline at locations where the laser intensity or fluence is orders of magnitude above the damage threshold for conventional solid optics. When placed after an off-axis parabola, SPLs may provide additional flexibility and spot size control and may also be useful in suppressing laser prepulse. For high power, ultrashort laser pulses, the broad laser bandwidth and extreme intensities produce chromatic and phase aberrations and amplitude distortions that degrade the lens focusing or defocusing performance [J. P. Palastro, *et al.*, Phys. Plasmas **22**, 123101 (2015)]. Although there have been a few experiments that demonstrate laser pulse focusing by a shaped plasma lens, generation and control of the plasma present significant challenges. Potential applications of SPLs to laser-plasma accelerators will be discussed.

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Richard Hubbard
Naval Research Laboratory

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