Abstract Submitted
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Direct Measurements of the Dynamics of Self-Guided Femtosecond Laser Filaments in Air[1] DANIEL GORDON, ANTONIO TING, RICHARD FISCHER, ILYA ALEXEEV[2], THEODORE JONES, JOSEPH PENANO, PHILLIP SPRANGLE, Naval Research Laboratory — High power laser pulses propagating in air form self-guided filaments due to a balance between Kerr focusing and ionization induced defocusing. These filaments are difficult to characterize because they are intense enough to damage optics. Measurements were carried out using a novel diagnostic which allows quantitative measurements of filament characteristics despite the high intensity in the filaments [A. Ting et al., Appl. Opt. 44, p. 1474]. The diagnostic apparatus was aligned to a rail so that measurements could be carried out at a large number of axial positions thereby allowing the dynamics of the filament propagation to be studied. It is observed that the energy in a filament remains constant for several meters despite the fact that much of the filament's energy must be expended to create just one meter of plasma. This indicates that the filament energy is constantly replenished by the surrounding radiation. The conductivity of the plasma column created by the optical filament was also measured. Furthermore, the effect of varying the laser pulse length while holding the pulse energy constant was studied.

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