Abstract Submitted
for the DPP17 Meeting of
The American Physical Society

Flying Focus: Spatiotemporal Control of the Laser Beam Intensity D.H. FROULA, D. TURNBULL, T.J. KESSLER, D. HABERBERGER, S.-W. BAHK, I.A. BEGISHEV, R. BONI, S. BUCHT, A. DAVIES, J. KATZ, A.B. SEFKOW, J.L. SHAW, Laboratory for Laser Energetics, U. of Rochester — A "flying focus" is presented: this advanced focusing scheme provides unprecedented spatiotemporal control over the laser focal volume. A chromatic focusing system combined with chirped laser pulses enabled the speed of a small-diameter laser focus to propagate over nearly 100× its Rayleigh length. Furthermore, the flying focus decouples the speed at which the peak intensity propagates from the group velocity of the laser pulse, allowing the laser focus to co- or counter-propagate along its axis at any velocity. Experiments have demonstrated a nearly constant intensity over 4.5 mm while the velocity of the focus ranged from subluminal ($0.01c$) to superluminal ($15c$). These properties could provide the opportunity to overcome current fundamental limitations in laser-plasma amplifiers, laser-wakefield accelerators, photon accelerators, ion accelerators, and high-order frequency conversion. This material is based upon work supported by the Department of Energy National Nuclear Security Administration under Award Number DE-NA0001944.

D.H. Froula
Laboratory for Laser Energetics, U. of Rochester

Date submitted: 18 Jul 2017 Electronic form version 1.4