Abstract Submitted
for the DPP09 Meeting of
The American Physical Society

Updated LPI Thresholds for the Nike Laser* J.L. WEAVER, Laser Plasma Branch, Plasma Physics Division, NRL, J. OH, Research Support Instruments (RSI), B. AFEYAN, Polymath Research Inc., L. PHILLIPS, J. SEELY, D. KEHNE, C. BROWN, S.P. OBENSCHAIN, V. SERLIN, A.J. SCHMITT, NRL, U. FELDMAN, ARTEP, G. HOLLAND, NIST, C. MANKA, R.H. LEHMBERG, E. MCLEAN, RSI — Advanced implosion designs for direct drive inertial confinement fusion use high laser intensities (10^{15}-10^{16} W/cm^2) to achieve gain (g>100) with a reduction in total laser energy (E<1 MJ). Krypton-fluoride lasers such as the Nike laser at NRL are an attractive choice due to their combination of short wavelength (248 nm), large bandwidth (1-2 THz), and beam smoothing by induced spatial incoherence but the potential threat from laser-plasma instabilities (LPI) needs to be assessed. The 2008 LPI campaign at Nike yielded threshold intensities above 10^{15} W/cm^{2}for the two-plasmon instability, a value higher than reported for 351 nm glass lasers. The experiments used a planar geometry, solid polystyrene targets, and a subset of beams (E<200 J) with a reduced focal spot (d<125 μm). The 2009 campaign extended the shot parameters to higher laser energies (E<1 kJ) and larger spot sizes (d<300 μm). Spectrally-resolved and time-resolved measurements of x-rays and emission near $^1/_2\omega_o$ and $^3/_2\omega_o$ harmonics of the laser wavelength show threshold intensities consistent with the 2008 results. *Work supported by DoE/NNSA

James Weaver
Naval Research Laboratory

Date submitted: 24 Jul 2009 Electronic form version 1.4