Abstract Submitted
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Design of an Experiment to Observe Laser-Plasma Interactions on NIKE[1] L. PHILLIPS, J. WEAVER, W. MANHEIMER, S. ZALESAK, A. SCHMITT, D. FYFE, NRL, B. AFEYAN, M. CHARBONNEAU-LEFORT, Polymath Research Inc. — Recent proposed designs (Obenschain et al., Phys. Plasmas 13 056320 (2006)) for direct-drive ICF targets for energy applications involve high implosion velocities combined with higher laser irradiances. The use of high irradiances increases the likelihood of deleterious laser plasma instabilities (LPI) that may lead, for example, to the generation of fast electrons. The proposed use of a 248 nm KrF laser to drive these targets is expected to minimize LPI; this is being studied by experiments at NRL's NIKE facility. We used a modification of the FAST code that models laser pulses with arbitrary spatial and temporal profiles to assist in designing these experiments. The goal is to design targets and pulseshapes to create plasma conditions that will produce sufficient growth of LPI to be observable on NIKE. Using, for example, a cryogenic DT target that is heated by a brief pulse and allowed to expand freely before interacting with a second, high-intensity pulse, allows the development of long scalelengths at low electron temperatures and leads to a predicted 20-efold growth in two-plasmon amplitude.

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