HIGH FOOT IMPLOSIONS IN LARGER HOHLRAUMS FILLED WITH AN INTERMEDIATE GAS FILL DENSITY*

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Recent High Foot implosions at the National Ignition Facility (NIF), where the laser power is high early in time, i.e., during the "foot", have resulted in record neutron yields [1]. To obtain near-spherical, low-mode implosion symmetry, these targets have relied on cross-beam energy transfer (CBET), where outer beam power is transferred to the inner beams [2]. CBET has a temporal dependence, as large amounts of transfer occur early in the laser pulse, when the electron temperature is low, and at peak power, when the laser intensity is at its highest. Furthermore, there is also spatial non-uniformity across laser spots after transfer.

To obtain good inner beam propagation without the use of CBET, we propose a High Foot implosion in a hohlraum that is 1.17 times larger than typically used. This hohlraum is filled with an intermediate gas fill density (0.6 mg/cc) rather than with the nominal 1.6 mg/cc gas fill . This larger hohlraum with intermediate fill density has performed well for the shorter pulse lengths driving implosions with high density carbon (HDC) ablators [3]. In these experiments, there is growing evidence of correlation between predictability and low levels of laser backscatter, hot electrons, and CBET. The challenge here is to maintain the predictability shown by simulation at the longer pulse lengths necessary for plastic ablators.

Two upcoming shots provide the first tests of drive symmetry in these larger hohlraums with an intermediate gas fill density using the longer High Foot pulse. The first is a shock timing shot, in late May. This shot will also provide a information about drive deficit and laser backscatter on the rise to and early in peak power. The next shot, a 2D converging ablator shot, will provide backlit images of the implosion in-flight as well as the final stagnated hot spot shape from self emission. Analysis and results of both the design and these two shots will be presented.

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[2] P. Michel *et al.,* Phys. Plasmas **17** , 056305 (2010).
[3] P. A. Amendt, D. D. Ho, O. S. Jones, *et al*., submitted to Phys. Rev. E, 2015.