Abstract Submitted
for the DPP12 Meeting of
The American Physical Society

Yield degradation by 3D asymmetries during the deceleration phase of ICF capsule implosions on the NIF JEREMY CHITTENDEN, SHAUN TAYLOR, BRIAN APPELBE, NICHOLAS NIASSE, Imperial College — We report on investigations into the effect of asymmetry on thermonuclear yield in ICF implosions on the NIF. Different forms of perturbation are applied to the full 3D volume of the DT fuel during the coast phase in order to stimulate the growth of Rayleigh-Taylor instabilities during the deceleration phase. Synthetic neutron spectra, radiography and soft X-ray images indicate that different forms of perturbation have characteristic diagnostic signatures which can provide clues as to the dominant source of asymmetry in experiments. A combination of high bandwidth multimode perturbations together with macroscopic asymmetries is found to give the best agreement with experiment. Scaling of the neutron yield and burn history with perturbation amplitude is discussed. Asymmetry at stagnation promotes the mixture of cold dense fuel with the hotspot and quenches the burn. 3D high bandwidth perturbations produce a series of narrow spikes of dense fuel which penetrate the hotspot and result in significantly more mix than axi-symmetric perturbations. The effect of non-uniformity in the rho-R of the main fuel upon alpha particle transport is evaluated using a kinetic model of alpha transport and heating.

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Date submitted: 16 Jul 2012 Electronic form version 1.4