Abstract Submitted
for the DPP05 Meeting of
The American Physical Society

Simulations of Omega Fill Tube Experiments STEVEN H. LANGER, STEVEN W. HAAN, NOBUHIKO IZUMI, JEFF KOCH, HOWARD A. SCOTT, MICHAEL JOHN EDWARDS, LLNL — Current plans are to use fill tubes to inject liquid DT into the interior of inertial confinement fusion (ICF) capsules in future experiments on the National Ignition Facility (NIF) laser. The fill tube is a perturbation on the surface of the capsule and hydrodynamic instabilities will cause this perturbation to grow during an implosion. Simulations show that the fill tube leads to a jet of shell material that might push far enough into the fuel to significantly reduce the yield of a NIF implosion. Experiments to investigate the growth of perturbations due to fill tubes (and due to bumps with a mass similar to a fill tube) have been carried out on the Omega laser. The goal of these experiments is to validate simulations at Omega energy scales and thus increase confidence in the use of simulations in planning for NIF experiments. The capsules used in these experiments have a small amount of titanium placed in the inner layers of the plastic shell to diagnose the growth of the jet. This paper presents the results of 2D simulations of x-ray emission from Omega capsule implosions with a bump or a fill tube. The emission from the jet can be seen crossing the capsule in roughly 300 ps in both the experiments and the simulations. The dependence of the x-ray images (experimental and simulated) on the initial bump size will be discussed. This work was performed under the auspices of the U.S. Department of Energy by the University of California Lawrence Livermore National Laboratory under contract No. W-7405-Eng-48.

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Date submitted: 15 Jul 2005 Electronic form version 1.4