Abstract Submitted
for the DPP13 Meeting of
The American Physical Society

Modeling Ignition Experiments and the Role of Mix on the National Ignition Facility DANIEL CLARK, DENISE HINKEL, DAVID EDER, OGDEN JONES, STEVEN HAAN, BRUCE HAMMEL, MICHAEL MARINAK, JOSE MILOVICH, HARRY ROBEY, JAY SALMONSON, RICHARD TOWN, Lawrence Livermore National Laboratory — The National Ignition Campaign on the National Ignition Facility (NIF) was completed in September of 2012 with nearly three dozen cryogenic ignition experiments fired. While ignition was not achieved in these experiments, substantial progress was made towards that goal by achieving ignition relevant implosion velocities, high compressions, and high stagnation pressures. At present, larger than anticipated long-wavelength spatial asymmetries and possibly larger than expected instability growth are believed to have been responsible for preventing ignition. Furthermore, detailed 2-D simulations of ignition experiments showed significant discrepancies with measured implosion performance, especially in thermonuclear yield. This talk describes current efforts at improving our understanding of NIF implosion performance and the role mix and instabilities have played in determining that performance. The results of past 2-D simulations will be surveyed and efforts to improve their fidelity and agreement with experimental data will be described. Additionally, the results of 3-D simulations with resolution adequate to model the dominant unstable modes will be presented. While these large-scale simulations show closer agreement with experimental results, discrepancies nonetheless remain. In all cases, the importance of hydrodynamic instabilities and mix is evident and the need to control their growth to achieve ignition will be emphasized.

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Date submitted: 12 Jul 2013 Electronic form version 1.4