Abstract Submitted
for the HAW09 Meeting of
The American Physical Society

Diagnosing Implosion Velocity and Ablator Dynamics at NIF
GARY GRIM, ANNA HAYES, JERRY JUNGMAN, Los Alamos National Laboratory, DOUG WILSON, JERRY WILHELMY, PAUL BRADLEY, BOB RUNDBERG, CHARLIE CERJAN, Lawrence Livermore National Laboratory — An enhanced understanding of the environment in a burning NIF capsule is of interest to both astrophysics and thermonuclear ignition. In this talk we introduce a new diagnostic idea, designed to measure dynamic aspects of the capsule implosion that are not currently accessible. During the burn,the NIF capsule ablator is moving relative to the 14.1 MeV dt neutrons that are traversing the capsule. The resulting neutron-ablator Doppler shift causes a few unique nuclear reactions to become sensitive detectors of the ablator velocity at peak burn time. The "point-design" capsule at the NIF will be based on a ^{9}Be ablator, and the ^{9}Be(n,p)^{9}Li reaction has an energy threshold of 14.2 MeV, making it the ideal probe. As discussed in detail below, differences in the ablator velocity lead to significant differences in the rate of ^{9}Li production. We present techniques for measuring this ^{9}Li implosion velocity diagnostic at the NIF. The same experimental techniques, measuring neutron reactions on the ablator material, will allow us to determine other important dynamical quantities, such as the areal density and approximate thickness of the ablator at peak burn.

Anna Hayes
Los Alamos National Laboratory

Date submitted: 12 Aug 2009 Electronic form version 1.4