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The measurement of cold fuel adiabat from neutron images of ICF experiments at NIF FRANK MERRILL, BAOLIAN CHENG, CHRISTOPHER DANLY, NEVZAT GULER, CARL WILDE, PETR VOLEGOV, Los Alamos National Laboratory, DAVID FITTINGHOFF, Lawrence Livermore National Laboratory — Dozens of laser driven inertially confined fusion (ICF) experiments have been performed at NIF over the past several years to investigate the potential for ignition in indirect ablative compression of plastic (CH) capsules containing DT ice layers, initially filled with DT gas. In these experiments, the gas inside of the DT ice layer is compressed and heated by the convergent implosion to reach temperatures of $\sim$ 5 keV. This hot-spot is surrounded by the colder fuel that was initially in the DT ice layer. Fusion in the hot spot generates 10^{14}-10^{15} 14 MeV neutrons and $\sim$ 5% of these are scattered in the surrounding cold fuel to energies of 6-12 MeV. Images are formed with 14 MeV neutrons and 6-12 MeV neutrons, providing a measure of the hot-spot and cold fuel size and shape, respectively. One dimensional analytic models of these implosions [2] show that the ratio of the hotspot diameter to the cold fuel diameter provides a measure of the adiabat on which the cold fuel is compressed. The most recent neutron imaging data, which has been analyzed to extract this information, will be presented to show relative changes of the fuel compression adiabat from ICF experiments performed at NIF.

[1] F. E. Merrill, et al., Rev. Sci. Instrum. **83**, 10D317
[2] B. Cheng, et al., Phys. Rev. E **88**, 041101

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