Abstract Submitted
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ICF Gamma-Ray measurements on the NIF[1] HANS HERRMANN, Y. KIM, N.M. HOFFMAN, S.H. BATHA, LANL, W. STOEFFL, J.A. CHURCH, D.B. SAYRE, J.A. LIEBMAN, C.J. CERJAN, A.C. CARPENTER, E.M. GRAFIL, H.Y. KHATER, LLNL, C.J. HORSFIELD, M. RUBERY, AWE — The primary objective of the NIF Gamma Reaction History (GRH) diagnostic is to provide bang time and burn width information in order to constrain implosion simulation parameters such as shell velocity and confinement time. This is accomplished by measuring DT fusion gamma-rays with energy-thresholded Gas Cherenkov detectors that convert MeV gamma-rays into UV/visible photons for high-bandwidth optical detection. Burn-weighted CH ablator areal density is also inferred based on measurement of the 12C(n,n') gammas emitted at 4.44 MeV from DT neutrons inelastically scattering off carbon nuclei as they pass through the plastic ablator. This requires that the four independent GRH gas cells be set to differing Cherenkov thresholds (e.g., 2.9, 4.5, 8 & 10 MeV) in order to be able to unfold the primary spectral components predicted to be in the gamma ray energy spectrum (i.e., DTγ; ^{27}Al & ^{28}Si (n,n') γ from the thermo-mechanical package (TMP); and ^{12}C(n,n') γ from the ablator). The GRH response to ^{12}C(n,n') γ is calibrated in-situ by placing a known areal density of carbon in the form of a puck placed ~6 cm from a DT exploding pusher implosion. Comparisons between inferred gamma fluences and simulations based on the nuclear cross sections databases will be presented.

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