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Detection and use of HT and DT gamma rays to diagnose mix in ICF capsules[1] M.J. SCHMITT, Y.H. KIM, H.W. HERRMANN, A.M. MCEVOY, A. ZYLSTRA, LANL, A. LEATHERLAND, S. GALES, AWE — Recent results from Omega capsule implosion experiments containing HT-rich gas mixtures indicate that the 19.8 MeV gamma ray from aneutronic HT fusion can be measured using existing time-resolved gas Cherenkov detectors (GCDs). Additional dedicated experiments to characterize HT-γ emission in ICF experiments already have been planned. The concurrent temporally-resolved measurement of both HT-γs and DT-γs opens the door for in-depth exploration of interface mix in gas-filled ICF capsules. We propose a method to temporally resolve and observe the evolution of shell material into the capsule core as a function of fuel/shell interface temperature (which can be varied by varying the capsule shell thickness). Our proposed method uses a CD-lined plastic capsule filled with 50/50 HT gas and diagnosed using GCDs to temporally resolve both the HT "clean" and DT "mix" gamma ray burn histories. It will be shown that these burn history profiles are sensitive to the depth to which shell material mixes into the gas region. An experiment to observe these differences as a function of capsule shell thickness is proposed to determine if interface mixing is consistent with thermal diffusion ($\lambda_{ion} \propto T_{ion}^2/Z_{ion}^2\rho$) at the gas/shell interface. Since hydrodynamic mixing from shell perturbations, such as the mounting stalk and glue, could complicate these types of capsule-averaged temporal measurements, simulations including their effects also will be shown.

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Mark Schmitt
Los Alamos Natl Lab

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