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Diagnosing Mix in Double Shell Implosions[1] D.S. MONTGOMERY, J.P. SAUPPE, R.F. SACKS, A. HAYES-STERBENZ, E.N. LOOMIS, Los Alamos National Laboratory — Implosions using a high-Z metal pusher, such as in a double shell capsule, promise to achieve thermonuclear burn conditions with low hot spot convergence ratio, CR $\sim$ 10. While the implosions are designed to avoid or minimize mix of the high-Z pusher into the D-T fuel, fusion performance degradation due to mix remains a major concern. Here we discuss the use of secondary D-T neutron yields from D-D fusion, using a CD or CD_2 foam as a surrogate fuel, to obtain D-D fusion performance, fuel ion temperature, and high-Z mix in early planned implosions on NIF using chromium, molybdenum, or tungsten pushers. Future double shell implosions with D-T fuel will require radiochemical tracers from charged particle reactions, such as 10B(α, n)13N and 79Br(d, 2n)79Kr, to determine the amount of high-Z mix in the D-T fuel. The reactant products 13N and 79Kr are non-reactive, gaseous, with sufficient half-lives, and can be collected with high efficiency using the Radiochemical Apparatus for Gas Sampling (RAGS) diagnostic on NIF. We will present results from RAGE and HYDRA simulations on mix, and initial results of predicted mix signatures using 1D RAGE results with varying degrees of mix.

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