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The Use of Tritium Rich Surrogate Capsules with High Deuterium Concentrations to Diagnose Ignition[1] D.C. WILSON, Los Alamos National Laboratory, B.K. SPEARS, S.P. HATCHETT II, C.J. CERJAN, P.T. SPRINGER, D.S. CLARK, Lawrence Livermore National Laboratory, M.J. EDWARDS, J.D. SALMONSON, S.V. WEBER, B.A. HAMMEL, Lawrence Livermore National Laboratory, G.P. GRIM, H.W. HERRMANN, M.D. WILKE, Los Alamos National Laboratory — The path to ignition at the National Ignition Facility (NIF) relies upon experimentally tuning target conditions. Capsules with mixtures of Tritium, Hydrogen, and Deuterium (THD) can be made hydrodynamically equivalent to 50:50 DT capsules, up to the time when the alpha particle heating becomes significant. Above about 10% deuterium alpha heating, thermal conduction, and electron-ion disequilibria begin to be important. The ion temperature increases and both X-ray and neutron images become larger and more symmetric. As ignition is approached, the fraction of neutrons scattered by the fuel and the burn duration decrease. The high yields from these capsules preclude time resolved X-ray imagers, but allow time resolution of gamma ray emission. The large variation in neutron yield between capsules that would ignite and those that fail improves the ability to predict ignition with 50% deuterium.

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