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Role of Hydrogen Fractionation in ICF Ignition Target Designs P.W. MCKENTY, M.D. WITTMAN, Laboratory for Laser Energetics, U. of Rochester — The need of cryogenic hydrogenic fuels in inertial confinement fusion (ICF) ignition targets has long been established. Efficient implosion of such targets has mandated keeping the adiabat of the main fuel layer at low levels to ensure drive energies are kept at reasonable minima. In fact, it has been shown by many authors that the minimum drive energy of an ICF implosion scales roughly as the square of the fuel adiabat. The use of cryogenic fuels helps meet this requirement nicely and has therefore become the standard in most ICF ignition designs. To date, most theoretical ICF ignition target designs have assumed a homogenous layer of deuterium–tritium (DT) fuel kept roughly at or just below the triple point. Such assumptions have lead to several promising ICF target designs that have numerically demonstrated ignition and burn under a variety of illumination schemes. However, recent work done at the Laboratory for Laser Energetics has indicated the possibility that, as cryogenic fuel layers are formed inside an ICF capsule, isotopic dissociation of the tritium (T), deuterium (D), and DT can take place leading to a "fractionation" of the final ice layer. This paper will numerically investigate the effect that various scenarios of fractionation have on hot-spot formation, ignition, and burn of ICF ignition target designs. This work was supported by the U.S. Department of Energy Office of Inertial Confinement Fusion under the Cooperative Agreement No. DE-FC52-92SF19460.

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