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Definition of Ignition in Inertial Confinement Fusion A.R. CHRISTOPHERSON, R. BETTI, Laboratory for Laser Energetics, U. of Rochester — Defining ignition in inertial confinement fusion (ICF) is an unresolved problem. In ICF, a distinction must be made between the ignition of the hot spot and the propagation of the burn wave in the surrounding dense fuel. Burn propagation requires that the hot spot is robustly ignited and the dense shell exhibits enough areal density. Since most of the energy gain comes from burning the dense shell, in a scale of increasing yields, hot-spot ignition comes before high gains. Identifying this transition from hot-spot ignition to burn-wave propagation is key to defining ignition in general terms applicable to all fusion approaches that use solid DT fuel. *Ad hoc* definitions such as gain = 1 or doubling the temperature are not generally valid. In this work, we show that it is possible to identify the onset of ignition through a unique value of the yield amplification defined as the ratio of the fusion yield including alpha-particle deposition to the fusion yield without alphas. Since the yield amplification is a function of the fractional alpha energy $f_\alpha = E_\alpha/2E_{\mathrm{hs}}$ (a measurable quantity), it appears possible not only to define ignition but also to measure the onset of ignition by the experimental inference of the fractional alpha energy and yield amplification. This material is based upon work supported by the Department of Energy Office of Fusion Energy Services under Award Number DE-FC02-04ER54789 and National Nuclear Security Administration under Award Number DE-NA0001944.

R. Betti
Laboratory for Laser Energetics, U. of Rochester

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