

Abstract Submitted
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Gamma-based Measurement of “Dark Mix” in ICF Capsules

KEVIN MEANEY, H HERRMANN, YH KIM, AB ZYLSTRA, H GEPPERT-KLEINRATH, NM HOFFMAN, AS YI, Los Alamos National Laboratory — Mix of capsule ablator material into the fusion fuel is a source of yield degradation in inertial confinement fusion. Jetting or chunk mix, such as the elusive “meteors” that have been observed at NIF, can be difficult to diagnose because the chunks may not get hot enough to excite dopant x-rays, nor atomized enough for separated-reactants to fuse. Using the gamma reaction history (GRH-6m) diagnostic, (n,n') gammas from strategically placed carbon layer within a beryllium capsule gives a measure of the time-resolved areal density of this carbon during the burn and hence an indication of the compression and spatial distribution of this layer. As the carbon moves further from the fuel, the areal density nominally decreases as $1/r^2$ for unablated material. However, mix of this carbon into the cold dense fuel layer or hot spot will have a significant effect on the carbon gamma signal. Different types of mix (e.g., jetting, Rayleigh-Taylor fingers, diffusive, ...) as well as features that can seed this mix (eg., tents, fill,...) will be discussed along with their expected effect on the carbon signal. The design for upcoming OMEGA shots, which will demonstrate this technique, and the potential for use on the NIF will be presented.

Kevin Meaney
Los Alamos National Laboratory

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