Abstract Submitted
for the DPP16 Meeting of
The American Physical Society

Gamma Ray Imaging of Inertial Confinement Fusion Experiments CARL WILDE, PETR VOLEGOV, VERENA GEPPERT-KLEINRATH, CHRISTOPHER DANLY, FRANK MERRILL, RASPBERRY SIMPSON, Los Alamos National Laboratory, DAVID FITTINGHOFF, GARY GRIM, Lawrence Livermore National Laboratory, NIF NUCLEAR DIAGNOSTIC TEAM TEAM, ADVANCED IMAGING TEAM TEAM — Experiments consisting of an ablatively driven plastic (CH) shell surrounding a deuterium tritium (DT) fuel region are routinely performed at the National Ignition Facility (NIF). Neutrons produced in the burning fuel in-elastically scatter with carbon atoms in the plastic shell producing 4.4 MeV gamma rays. Providing a spatially resolved distribution of the origin of these gammas can inform models of ablator physics and also provide a bounding volume for the cold fuel (un-burned DT fuel) region. Using the NIF neutron imaging system hardware, initial studies have been performed of the feasibility of imaging these gamma rays. A model of the system has been developed to inform under which experimental conditions this measurement can be made. Presented here is an analysis of the prospects for this diagnostic probe and a proposed set of modifications to the NIF neutron imaging line-of-site to efficiently enable this measurement.

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Date submitted: 20 Jul 2016 Electronic form version 1.4