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Geant4 supplied parameters for gamma reaction history at NIF MICHAEL RUBERY, COLIN HORSFIELD, AWE, HANS HERRMANN, YONGHO KIM, JOE MACK, CARL YOUNG, SCOTT EVANS, TOM SEDILLO, LANL, KIRK MILLER, NSTech, WOLFGANG STOEFFL, ELLIOT GRAFIL, LLNL — The GRH diagnostics at NIF and Omega report ICF burn parameters through detection of multi-MeV γ emissions. Of particular interest is 'γ bang-time' (GBT), defined as the temporal separation between light impacting the capsule and peak in the nuclear reaction history; GBT can constrain shock and compression parameters, and indicate fuel/ablator mix. Early NIF commissioning experiments have identified contributions to GRH signals from n,n'γ reactions with remaining capsule ablator, hohlraum and thermo-mechanical package, outside the fuel hotspot region. Such contributions are mitigated by increasing the Cherenkov threshold above the energy of these emissions. The pressure adjustment modifies parameters important to GBT, such as cell time-of-flight and detector FWHM; corrections simulated using Geant4 are presented using models experimentally validated at Duke University. Beyond GBT, studies suggest GRH may be capable of recording ablator ρR, unfolding the DT γ spectrum, and inferring the DT_γ /DT_n branching ratio. All calculations rely on the energy-resolved intensity response as a function of gas pressure. Geant4 response simulations, together with calculations by LANL using the experimentally validated ACCEPT code, are also presented.

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