Abstract Submitted
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"Super" Gas Cherenkov Detector for Gamma Ray Measurements at the National Ignition Facility HANS W. HERRMANN, Y.H. KIM, A.M. MCEVOY, A.B. ZYLSTRA, F.E. LOPEZ, J.R. GRIEGO, V.E. FATHERLEY, J.A. OERTEL, S.H. BATHA, LANL, W. STOEFFL, J.A. CHURCH, A. CARPENTER, LLNL, M.S. RUBERY, C.J. HORSFIELD, S. GALES, A. LEATHERLAND, AWE, T. HILSABECK, J.D. KILKENNY, GA, R.M. MALONE, NSTec, W.T. SHMAYDA, LLE — New requirements to improve reaction history and ablator areal density measurements at the NIF necessitate improvements in sensitivity, temporal and spectral response relative to the existing Gamma Reaction History diagnostic (GRH-6m) located 6 meters from target chamber center (TCC). A new DIM-based "Super" Gas Cherenkov Detector (GCD) will ultimately provide $\sim$ 200x more sensitivity to DT fusion gamma rays, reduce the effective temporal resolution from $\sim$ 100 to $\sim$ 10 ps and lower the energy threshold from 2.9 to 1.8 MeV, relative to GRH-6m. The first phase is to insert the existing coaxial GCD-3 detector [1] into a reentrant well on the NIF chamber which will put it within 4 meters of TCC. This diagnostic platform will allow assessment of the x-ray radiation background environment within the well which will be fed into the shielding design for the follow-on "Super" GCD. It will also enable use of a pulse-dilation PMT which has the potential to improve the effective measurement bandwidth by $\sim$ 10x relative to current PMT technology. GCD-3 has been thoroughly tested at the OMEGA Laser Facility and characterized at the High Intensity Gamma Ray Source (HIgS).

[1] H.W. Herrmann, et al., Rev. Sci. Instrum. 85, 11E124 (2014)

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