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NEXT GENERATION GAMMA RAY DIAGNOSTICS FOR THE NATIONAL IGNITION FACILITY HANS HERRMANN, Y.H. KIM, A.M. MCEVOY, A.B. ZYLSTRA, C. S. YOUNG, F. E. LOPEZ, J.R. GRIEGO, V. E. FATHERLEY, J. A. OERTEL, H. J. JORGENSON, D. B. BARLOW, Los Alamos National Laboratory, W. STOEFFL, J. A. CHURCH, J.E. HERNANDEZ, A. CARPENTER, Lawrence Livermore National Laboratory, M. S. RUBERY, C. J. HORSFIELD, S. GALES, A. LEATHERLAND, Atomics Weapons Establishment, T. HILSABECK, J.D. KILKENNY, General Atomics, R. M. MALONE, K. MOY, National Security Technologies, J.D. HARES, Kentech Instruments Ltd., J. MILNES, Photek Ltd. — Fusion reaction history and ablator areal density measurements based on gamma ray detection are an essential part of Inertial Confinement Fusion (ICF) experiments on the National Ignition Facility (NIF). Capability improvements are being implemented in sensitivity, temporal and spectral response relative to the existing Gamma Reaction History diagnostic (GRH-6m). The "Super" Gas Cherenkov Detector (GCD) [1] will provide 200x more sensitivity, reduce the effective temporal resolution from 100 to 10 ps, and lower the energy threshold from 2.9 to 1.8 MeV, relative to GRH-6m. The Gamma-to-Electron Magnetic Spectrometer (GEMS) [2] - a Compton spectrometer intended to provide true gamma energy resolution ($\leq$5%) for isolation of specific lines such as t(d,γ), D(n,γ), ^{12}C(n,n'γ) and energetic charged particle nuclear reactions indicative of ablator/fuel mix. [1] H.W. Herrmann, et al., Rev. Sci. Instrum. 85, 11E124 (2014) [2] Y. Kim, et al., Rev. Sci. Instrum. 85, 11E122 (2014)

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