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Investigation of the DT Fusion Gamma Spectrum with an Energy Thresholding Gas Cherenkov Detector COLIN HORSFIELD, MICHAEL RUBERY, Atomic Weapons Establishment, YONG HO KIM, HANS HERRMANN, JOSEPH MACK, CARLTON YOUNG, JAMIE LANGENBRUNNER, SCOTT EVANS, THOMAS SEDILLO, AARON MCEVOY, MICHAEL HUFF, GERRY HALE, Los Alamos National Laboratory, WOLFGANG STOEFLL, Lawrence Livermore National Laboratory, ELLIOT GRAFIL, Colerado School of Mines, AWE COLLABORATION, LANL COLLABORATION, LLNL COLLABORATION, CSM COLLABORATION — In addition to alphas and neutrons, the DT fusion reaction produces gamma rays from the intermediate ^{5}He nucleus with a small branching ratio (BR) of several e-5 γ/n. The excited ^{5}He can decay to the ground state emitting a 16.75 MeV γ (width $\sim$0.5 MeV) or to the broad first excited state emitting a $\sim$12 MeV γ (width $\sim$5 MeV). Knowledge of the BR between these two states is important to making absolutely calibrated measurements of the overall gamma-ray spectrum on the NIF. We have carried out an energy thresholding experiment for DT ICF implosions on the Omega laser using a Gas Cherenkov Detector, and have compared the relative intensities at various thresholds with possible theoretical gamma spectra folded with detector response as calculated by ACCEPT and GEANT4 codes. We present the results of this experiment, our estimate of the precision of the DT fusion gamma spectrum and the implications for the future determination of the DT γ/n BR.

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