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Detection of D-^{3}He Fusion γ-Rays using Gas Cherenkov Detectors Y. KIM, H.W. HERRMANN, J.M. MACK, C. S. YOUNG, G.M. HALE, S.C. EVANS, T.J. SEDILLO, A. CAHILL, Los Alamos National Laboratory, C.J. HORSFIELD, M.S. RUBERY, Atomic Weapons Establishment, E. GRAFIL, W. STOEFFL, Lawrence Livermore National Laboratory, C. WAUGH, H.G. RINDERKNECHT, J.A. FRENJE, R.D. PETRASSO, Massachusetts Institute of Technology, E. KIRK MILLER, National Security Technologies — The high-energy γ-ray from ^{3}He(d,γ)^{5}Li reactions has drawn the attention of the nuclear physics and fusion community as a diagnostic signature to study the ^{5}Li nuclear structure and the D-^{3}He fusion reaction. In the past, the D-^{3}He γ-rays have been measured via accelerator-based beam-target experiments and recently in tokamak-based fusion reactors. In this work, we report the detection of D-^{3}He fusion γ-rays generated from inertial confinement fusion (ICF) implosions at the OMEGA laser facility. The γ-ray signal observed using Gas Cherenkov Detectors (GCD) is proportional to the independently measured 14.7-MeV fusion proton yield and provides a high-bandwidth alternative to fusion protons for D-^{3}He burn-history measurements. By comparing γ-rays from D-^{3}He and D-T implosions, we were able to examine (1) similarities in the γ-ray spectra of D-^{3}He and D-T and (2) disparities in the γ-to-particle branching ratios of D-^{3}He and D-T. This experimental work motivates further theoretical investigation of the multichannel ^{5}Li- and ^{5}He-system.

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