The $^3\text{H}(d,\gamma)^5\text{He}$ Reaction at $E_{\text{c.m.}} \leq 300$ keV

C.E. PARKER, C.R. BRUNE, T.N. MASSEY, J.E. O’DONNELL, A.L. RICHARD, D.B. SAYRE, Ohio University — The $^3\text{H}(d,\gamma)^5\text{He}$ reaction has been measured using a 500-keV pulsed deuteron beam incident on a stopping titanium tritide target at the Edwards Accelerator Laboratory. The time-of-flight technique has been used to distinguish the $\gamma$-rays from neutrons in the bismuth germinate (BGO) $\gamma$-ray detector. A stilbene scintillator and an NE-213 scintillator have been used to detect the neutrons from the $^3\text{H}(d,n)^4\text{He}$ reaction using both the pulse-shape discrimination and time-of-flight techniques. A newly designed target holder with a silicon surface barrier detector to simultaneously measure $\alpha$-particles to normalize the number of neutrons, along with a new titanium tritide target, was incorporated for subsequent measurements. The $\gamma$-rays have been measured at laboratory angles of $0^\circ$, $45^\circ$, $90^\circ$, and $135^\circ$. Information about the $\gamma$-ray energy distribution for the unbound ground state and first excited state of $^5\text{He}$ can be obtained experimentally by comparing the BGO data to Monte Carlo simulations. The $^3\text{H}(d,\gamma)/^3\text{H}(d,n)$ branching ratio has also been measured. Data analysis is currently underway for the subsequent measurements.

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