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Measuring the ^{134}Te(d, pγ)^{135}Te Reaction with GODDESS to Probe the Single-Particle Structure of ^{135}Te[1] C.C. UMMEL, J.A. CIZEWSKI, Rutgers University, S.D. PAIN, Oak Ridge National Laboratory, K.L. JONES, University of Tennessee, Knoxville, A. RATKIEWICZ, Lawrence Livermore National Laboratory, G.L. WILSON, Louisiana State University, GODDESS COLLABORATION — The single-particle energy spectra of nuclei near shell closures provide important inputs for the nuclear shell model. ^{135}Te ($Z = 52$, $N = 83$) is of particular interest due to its proximity to the $Z = 50$ and $N = 82$ closed shells. Additionally, neutron capture on ^{134}Te has been identified as a key reaction in attempts to explain an overabundance of ^{134,136}Xe observed in some pre-solar grains. The ^{134}Te$(n, \gamma)^{135}$Te direct capture cross section can be constrained via the measurement of excitation energies, spin-parities, and spectroscopic factors of single-neutron states in ^{135}Te using neutron transfer reactions such as (d, p). The ^{135}Te level scheme is highly fragmented, with many closely-spaced levels that are difficult to separate by charged particle measurement alone. However, enhanced resolution can be achieved by coincident measurement of gamma rays emitted by excited ^{135}Te states. The ^{134}Te$(d, p\gamma)^{135}$Te reaction was accordingly measured with GODDESS (GRETINA-ORRUBA: Dual Detectors for Experimental Structure Studies) at ATLAS with a 9 MeV/u ^{134}Te beam provided by CARIBU with 60% purity and an approximate intensity of 1200 pps incident upon a CD_2 target. Preliminary results will be presented.

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