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Single-particle structure of ^{133}Sn explored through the ^{132}Sn(d,p) reaction in inverse kinematics[1] K.L. JONES, Univ. of TN, R.L. KOZUB, TN Tech., S.D. PAIN, ORNL, A.S. ADEKOLA, OH Univ., D.W. BARDAYAN, J.C. BLACKMON, ORNL, K.Y. CHAE, Univ. of TN, K.A. CHIPPS, CSoM, J.A. CIZEWSKI, Rutgers Univ., L. ERIKSON, CSoM, C. HARLIN, Univ. of Surrey, R. HATARIK, Rutgers Univ., R. KAPLER, Univ. of TN, J.F. LIANG, ORNL, R.J. LIVESAY, CSoM, Z. MA, B.H. MOAZEN, Univ. of TN, C.D. NESARAJA, ORNL, N.P. PATTERSON, Univ. of Surrey, D. SHAPIRA, ORNL, J.F. SHRINER JR, TN Tech., M.S. SMITH, ORNL, T.P. SWAN, Rutgers Univ., J.S. THOMAS, Univ. of Surrey, ORRUBA TEAM — Many changes have been observed in nuclei as we move away from the valley of stability and it is important, both to nuclear structure physics and to understanding the synthesis of heavy nuclei in the cosmos, to understand how these changes affect single-particle states, especially around doubly-magic nuclei. A (d,p) reaction was performed in inverse kinematics at the HRIBF using a beam of the exotic doubly-magic nucleus ^{132}Sn. Emergent protons were detected in a large array of silicon detectors, including an early implementation of ORRUBA. A state in ^{133}Sn at approximately 1400 keV, possibly the missing $p_{1/2}$ single-particle state, has been observed for the first time. Newly extracted angular distributions will be presented in comparison to those from DWBA calculations.

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Kate Jones
University of TN

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