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A Novel Approach to Study of Neutron Producing Reactions for Nuclear Astrophysics MICHAEL FEBBRARO, FREDERICK BECCHETTI, BRUCE PIERSON, CHRIS LAWRENCE, RAMON TORRES-ISEA, University of Michigan, Ann Arbor, DAN ROBERTSON, ED STECH, JAMES KOLATA, University of Notre Dame, WILLIAM PETERS, University of Tennessee, Knoxville — Neutron producing reactions such as ^{13}C(α,n)^{16}O which serve as dominate neutron sources for the s-process, incur experimental challenges due to the difficulties in detection of neutrons. Measurements of such reactions at low energies usually involve the use of 3He counters or n/γ-convertors but these methods do not provide neutron spectroscopy. Neutron Time-of-Flight (n-ToF) provides spectroscopy but requires ether beam pulsing or a fast recoil trigger. The University of Michigan Deuterated Scintillator Array appears to be well suited for such measurements either above or below ground. The array has been shown to provide n/γ discrimination, low background, and can yield neutron spectroscopic information without the use of n-ToF relying instead on matrix inversion techniques for spectrum unfolding. Methods such as MLEM, CGRN, and Artificial Neural Networks permit extraction of discrete neutron energy groups imposed on a continuous background. Preliminary measurements of the ^{13}C(α,n)^{16}Oreaction conducted at the 10 MV FN tandem and the new 5U high intensity accelerator at the University of Notre Dame will be shown. This work is supported by NSF grants PHY 0969456.

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