Abstract Submitted for the DNP16 Meeting of The American Physical Society

The $13C(\alpha,n)160$ reaction: A background source for underground astrophysics measurements and geo-neutrino measurements.¹ MICHAEL FEBBRARO, Oak Ridge Nat'l Lab., REBECCA TOOMEY, Rutgers Univ., JAMES DEBOER, Univ., of Notre Dame, STEVEN PAIN, Oak Ridge Nat'l Lab., WILLIAM PETERS, KARL SMITH, Univ., of Tennessee, FRED BEC-CHETTI, Univ., of Michigan, MICHAEL WIESCHER, Univ., of Notre Dame — In this study, we present results for a neutron spectroscopic study of the $13C(\alpha,n)16O$ = 3.5 and 7.5 MeV performed at the University of Notre reaction between $\mathbf{E}\alpha$ Dame Nuclear Science Laboratory. The neutron spectroscopy measurement was performed with deuterated liquid scintillator detectors capable of extracting neutron energy spectra without neutron time-of-flight measurement using spectral unfolding technique [2]. This permitted extraction of the ground state contribution as well as excited state contributions to the total reaction cross section. The usefulness of this technique for the measurement of beam-induced neutron background sources in deep underground nuclear astrophysics measurements will be shown. Results showing the contributions of excited state components to the total cross section will be given and their implication to geo-neutrino measurements will be discussed. [1] S. Harissopulos, et al. Phys. Rev. C. (2005) [2] M. Febbraro, et al., NIM A784 (2015)

¹This material is based upon work supported by the U.S. Department of Energy, Office of Science, Office of Nuclear Physics, NSF grant PHY0969456, PHY1401343, and Defense Nuclear Nonproliferation RD (NA-22).

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Date submitted: 06 Jul 2016

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