Abstract Submitted
for the DNP15 Meeting of
The American Physical Society

Examining the Structure of the Oxygen-16 Nucleus[1] ETHAN SAUER, ANI APRAHAMIAN, WANPENG TAN, ARMEN GYURJINYAN, BRYCE FRENTZ, BENJAMIN GUERIN, University of Notre Dame — The intent of this work is to explore the structure of the nucleus of Oxygen-16 (16O), which consists of four alpha particles, each with two protons and two neutrons. 16O is generated via the fusion of helium and carbon during stellar nucleosynthesis. This reaction is crucial to the existence of life. By measuring the structure of the 16O nucleus, we hope to gain a better understanding of stellar evolution and processes. The theoretical state of most interest is a linear arrangement of the four alpha particles, proposed by Chevallier et al. in their 1967 paper to explain the surprisingly large moment of inertia of the nucleus they measured. [1] The existence of this state can be most accurately observed through an analysis of the energy spectra of the decay products. This method has previously been implemented at Notre Dame by Freer et al. when a similar structure, that of Carbon-12 (12C), was analyzed, and a previously unknown state was observed. [2] The data gathered is analyzed using the method of angular correlation, which makes use of the angles and energies of decay products relative to the center of mass frame to reconstruct possible spins of the initial state. Analysis is currently underway and results will be presented at CEU 2015.

[1] P. Chevallier et al. Physical Review Vol. 160, No. 4 (August 1967), p. 827.
[2] M. Freer et al. Physical Review C 83 (March 2011), p. 034314.

[1]Supported by NSF grant PHY-1419765.

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Date submitted: 31 Jul 2015 Electronic form version 1.4