

Abstract Submitted  
for the SES08 Meeting of  
The American Physical Society

**Study of Stellar Helium Burning with O-TPC at TUNL/HI $\gamma$ S**

P.-N. SEO, UConn/TUNL, A.H. YOUNG, W.R. ZIMMERMAN, M. GAI, UConn, M.W. AHMED, E.R. CLINTON, S.S. HENSHAW, C.R. HOWELL, B.A. PERDUE, S.C. STAVE, C. SUN, H.R. WELLER, Y. WU, TUNL/Duke, P.P. MARTEL, UMass, B. BROMBERGER, V. DANGENDROF, K. TITTERMEIER, PTB, Braunschweig, A. BRESKIN, Weizmann — The Optical-readout Timing Projection Chamber (O-TPC), operating with a CO<sub>2</sub>(80%)+N<sub>2</sub>(20%) gas mixture at 150 Torr, has been successfully commissioned at TUNL/HI $\gamma$ S with alpha-particles from a <sup>148</sup>Gd standard source. The O-TPC will be used to study the <sup>16</sup>O( $\gamma,\alpha$ )<sup>12</sup>C reaction, the time-reversed reaction of the oxygen formation in stellar helium burning. This reaction is considered to be of major importance since it determines the C/O ratio that in turn determines the final state of a supernova (black hole or neutron star). While we studied this reaction at 9.55 MeV, on the 1<sup>-</sup> resonance of <sup>16</sup>O, we also took an advantage of the powerful detection system to investigate the <sup>16</sup>O( $\gamma,3\alpha$ ) reaction at 10.53, 10.84, and 11.16 MeV gamma energy from HI $\gamma$ S, spanning the 1<sup>-</sup> resonance of <sup>12</sup>C located at 10.84 MeV which may or may not contribute to carbon formation during stellar helium burning. We will describe these two recent experiment and preliminary results from our data analysis that is in progress both at Yale and TUNL/Duke University.

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Date submitted: 14 Aug 2008

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