Abstract Submitted
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TPC Detector for Studies in Nuclear Astrophysics, II: The HIγS *Measurement*[1] SARAH R. STERN, DERAN K. SCHWEITZER, MOSHE GAI, University of Connecticut, ROBIN SMITH, Sheffield Hallam University, MOHAMMAD W. AHMED, TUNL and NC Central University — The UConn-TUNL Optical Readout Time Projection Chamber (O-TPC) detector operating with CO_2 gas, discussed in the previous abstract was used to study the $^{16}O(\gamma,\alpha)^{12}C$ reaction, the time reverse of the $^{12}C(\alpha,\gamma)^{16}O$ reaction that occurs during stellar helium burning. The cross-section of this reaction was measured at nominal gamma beam energies of: 9.08 MeV, 9.38 MeV, 9.58 MeV, 9.78 MeV, 10.1 MeV, and 10.4 MeV. The actual beam energies were measured using attenuated gamma beam implanted into the HPGe detector and the effective beam energies were calculated. Anode (total energy) and PMT (time projection) signals, together with CCD camera images of the tracks were measured. The line shape of the measured signals were used to distinguish between ^{12}C and ^{16}O dissociation events. For each event the total energy and the scattering angle of the track were measured and complete angular distributions were measured at 0-180. The angular distributions were analyzed using partial wave decomposition with the three fit parameter: E1, E2 and the E1-E2 mixing phase angle (φ_{12}). For the first time, the extracted φ_{12} fit values agree with the prediction based on unitary: $\varphi_{12} = \delta_2$-δ_1-atan($\eta/2$).

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Sarah Stern
University of Connecticut

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