Abstract Submitted
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TPC Detectors for Studies in Nuclear Astrophysics I: The Detector[1] DERAN K SCHWEITZER, MOSHE GAI, SARAH R STERN, University of Connecticut, ROBIN SMITH, Sheffield Hallam University, WOJCIECH DOMINIK, MIKOLAJ CWIOK, ZENON JANAS, CHIARA MAZZOCCHI, University of Warsaw — Carbon and oxygen are formed during stellar helium burning; however, the carbon-to-oxygen ratio is still not well determined, due to the ill-understood $^{12}C(\alpha,\gamma)^{16}O$ reaction. In this work, we present a new approach for measuring the $^{12}C(\alpha,\gamma)^{16}O$ reaction, by measuring the inverse $^{16}O(\gamma, \alpha)^{12}C$ reaction using a quasi-monoenergetic gamma beam from the HIγS facility, and a time-projection chamber (TPC) detector operating with CO_2 gas. In the optical readout TPC (O-TPC), anode (total energy) and PMT (time projection) signals, together with CCD camera images of the tracks, were measured. Extensive Monte Carlo simulations of the O-TPC detector and the Warsaw electronic readout TPC (eTPC), which will be used at the HIGS facility [M. Gai *et al*, NIMA **954**, 161779 (2020)], were performed. We discuss the Monte Carlo simulation of the UConn-TUNL O-TPC and the electric field simulation of the Warsaw eTPC. Simulations of the electric field using ANSYS EDT (MAXWELL) of the Warsaw eTPC, along with Monte Carlo simulations of the efficiency of the UConn-TUNL O-TPC, were performed, and will be presented.

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