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Development of Low-pressure Gas TPC for Stellar Nucleosynthesis Reactions

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We develop an active-target Time Projection Chamber (aTPC) operated in a low-pressure, strong magnetic field. The aTPC comprises a cathode plane, four field-cage planes, a gating GEM (Gas Electron Multipliers) plane, a triple GEM structure, and a pad plane. The pad plane covers $10 \times 10 \text{ cm}^2$ with 1000 $3 \times 3 \text{ mm}^2$ square pads. The construction of the detector is in progress, and the expected performance is verified using Geant4 and Garfield++ simulation. We will primarily focus on the cross-section measurement for oxygen production from the $^{12}\text{C}(\alpha,\gamma)^{16}\text{O}$ reaction and potassium destruction through the reverse $^{37}\text{Cl}(\alpha,n)^{40}\text{K}$ and $^{40}\text{Ar}(p,n)^{40}\text{K}$ reactions. This talk will present the current R&D status.

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Session Classification: Poster session (New facilities, instruments and tools)

Track Classification: Others (new facilities, instruments, tools, etc)