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# A High-Pressure Gaseous-Argon TPC R&D Effort for Neutrinos and Rare Events: Simulation Studies

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High pressure gaseous argon time projection chambers (HPgTPCs) are crucial for many applications, including neutrino oscillation analyses, rare event searches such as coherent elastic neutrino-nucleus scattering (CEvNS), and low-energy nuclear recoil detection. Current R&D efforts are focused on testing gas electron multipliers (GEMs) in high-pressure environments, which is critical for optimizing the performance and reliability of HPgTPC systems. Results may be particularly applicable for DUNE Phase II, where the HPgTPC's low detection threshold will be used in the near detector complex to address one of the significant sources of uncertainty in neutrino oscillation analysis: nuclear effects in argon at the neutrino interaction vertex. This talk will provide an overview of the GEM simulation studies using Garfield++, which aim to benchmark and guide experimental optimizations.

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