

NoAmpTPC, a direct read-out of primary ionization electrons for high pressure gaseous TPC

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Time projection chambers read by gaseous detectors are widely used but the gaseous amplification has several drawbacks: constraints on the gas mixture, energy resolution degradation, ion backflow in the drift volume. The present project proposes to detect directly the primary ionization electrons, with several applications: hydrogen TPC as proton active target, search for neutrinoless double-beta decays in Xenon, very low ion backflow TPC,... Primary electrons will be read by very low-noise (around 100 e⁻) IDeF-X read-out chips developed at CEA Saclay, connected to a read-out plane with an optimized electron collection.

Different geometries were optimized with Garfield++ simulations. A small-scale prototype TPC is under production as well as new IDeF-X front-end cards, and will be tested with radioactive sources and different gas mixtures. The performance in terms of electron collection efficiency, noise level, signal to noise ratios, and energy resolutions will be presented.

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