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AXEL: high pressure xenon gas time projection chamber for neutrinoless double beta decay search

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The AXEL (A Xenon ELectroluminescence) experiment aims to search for neutrinoless double beta ($0\nu\beta\beta$) decay of ^{136}Xe using xenon gas time projection chamber. Electroluminescence (EL) mode is used to readout the ionization signal in order to achieve high energy resolution. We have developed a new modularized cellular readout method called "Electroluminescence Light Collection Cell (ELCC)". Ionization electrons are drifted and pulled into the cells by the electric field and generate EL lights, then EL photons are detected by VUV-sensitive SiPMs attached to that cell. Its rigid structure is an advantage to enlarge the detector.

The performance of the AXEL detector was demonstrated with the 180 L prototype detector: The energy resolution and track patterns were measured at up to 2.6 MeV.

Towards the construction of a detector with 1000 L, R&D has been performed : HV generation inside the chamber, resistive electrode with diamond-like carbon coating and large-area SiPM and higher-density readout electronics board.

Status and prospect of the 180L-protototype evaluation and 1000L-detector construction will be reported in this talk.

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