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## **AXEL: High-pressure Xe Gas Time Projection Chamber for neutrinoless double beta decay search**

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A Xenon ElectroLuminescence (AXEL) experiment aims to search for neutrinoless double beta decay ( $0\nu\beta\beta$ ) using a xenon gas time projection chamber. We have developed a special readout plane for ionization electrons called Electroluminescence Light Collection Cell (ELCC), which enables to achieve high energy resolution, background rejection with track patterns and collecting large mass of  $0\nu\beta\beta$  candidate at the same time. Performance of the detector has been demonstrated using a 180L-size prototype. A Cockcroft-Walton high voltage generator is placed inside the chamber and has successfully applied up to  $-34.3$  kV in 7 bar Xe gas. We obtained an energy spectrum with a lot of sharp peaks and have achieved  $(0.79\pm 0.12)$  % FWHM energy resolution at 2615 keV. Performance of the background rejection using machine learning is evaluated with obtained electron tracks. Reconstruction method with the Richardson-Lucy deconvolution is under development to obtain sharper tracks. A 1000L-size detector is under construction to demonstrate the  $0\nu\beta\beta$  search. High voltage generation up to  $-76$  kV with the Cockcroft-Walton circuit, discharge resistive structure of ELCC, large-area SiPM with low RI contamination package, higher-density readout digitizer and scintillation light detection plate for higher efficiency of  $t_0$  reconstruction have been developed.

### **Primary experiment**

AXEL (A Xenon ElectroLuminescence) experiment

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**Session Classification:** Gas detectors

**Track Classification:** Gaseous Detectors