



## Poster session 1 - Monday 4 July

### P1.058 Development of the front-end board of a Xenon gas time projection chamber at the AXEL neutrinoless double beta decay search experiment

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*on behalf of AXEL collaboration*

AXEL (A Xe ElectroLuminescence detector) is a high pressure Xenon gas Time Projection Chamber (TPC) to search for neutrinoless double beta decay ( $0\nu\beta\beta$ ). Energy and tracks of two electrons from the  $0\nu\beta\beta$  are reconstructed from the ionisation signals, which is observed by detecting electroluminescence photons with SiPMs. AXEL would have a high sensitivity to  $0\nu\beta\beta$ , because of high energy resolution (aiming 0.5% FWHM at 2.4 MeV) and background rejection from event topology.

About 50,000 SiPMs will be used in the  $0\nu\beta\beta$  search and we are planning to make next prototype detector with a few thousands SiPMs. In order to record the waveform of such amount of channels, we are developing a front-end board (FEB) using an ASIC chip, AFTER, developed for T2K experiment. The AFTER chip has 72 channels of readout circuit, each of which is composed of a charge sensitive amplifier, shaper and switched capacitor array (SCA). The 511 capacitors in the SCA store charges successively, so the waveform is recorded. These 72channel X 511 signals are serially outputted and digitised by one FADC chip in the FEB. The FEB also has the HV adjustable system for SiPMs, Ethernet interface, and a FPGA to control FEB.

To achieve high energy resolution, a large linear dynamic range for long pulse is required because the maximum number of photos detected by a SiPM would reach  $10^5$  and the pulse length varies from  $5\mu\text{s}$  to several hundreds  $\mu\text{s}$ .

We will report the design and expected performances of the FEB.