

# AXEL - high pressure xenon gas TPC for neutrinoless double beta decay search

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Observation of neutrinoless double beta decay ( $0\nu\beta\beta$ ) is of essential importance to reveal the nature of neutrino, such as mass hierarchy, absolute mass and especially its Majorana property. In order to search for  $0\nu\beta\beta$ , we, AXEL project, are developing a time projection chamber filled with high pressure Xenon gas. The detector can potentially achieve high energy resolution, large target mass and strong background rejection power by tracking. By using gaseous xenon, it is possible to realize a high energy resolution of 0.5% at 2.5MeV (Q value), better than several % in case of liquid. The deposited energy is determined by measuring the proportional scintillation lights which are generated by accelerating ionization electrons. We are developing a new readout scheme where light-emitting region is divided to cells and emitted lights are detected by MPPCs cell by cell. In addition to the robust structure, this scheme would have uniform response in wide area because the light-emitting region and MPPC corresponds one-to-one, so this scheme enables to achieve both high energy resolution and large size.

We have produced a prototype chamber filled with 10 bar and 10 L Xe gas and evaluated the performance and obtained 5% (FWHM) energy resolution at 122 keV. This is expected to be further improved by the time of conference with new VUV-sensitive MPPCs. We will report about the studies of this prototype chamber and present future plans and final goals of AXEL.

**Primary author:** NAKAMURA, Kiseki (Kyoto University)

**Co-authors:** Dr MINAMINO, Akihiro (Kyoto University); ICHIKAWA, Atsuko (Kyoto University); SEKIYA, Hiroyuki (University of Tokyo); Dr MIUCHI, Kentaro (Kobe University); Dr UESHIMA, Kota (Tohoku University); Mr HIROSE, Masanori (Kyoto University); Ms YANAGITA, Saori (Kyoto University); Mr BAN, Sei (Kyoto University); Mr TANAKA, Shunsuke (Kyoto University); NAKAYA, Tsuyoshi (Kyoto University)

**Presenter:** NAKAMURA, Kiseki (Kyoto University)

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