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Developments for spherical single phase LXe TPCs

Until today, the most established detector which uses noble liquid gases is the two phase TPC, however, at the early stages of the study, several groups had been testing of both direct (S1) and proportional (S2) scintillation in liquid xenon. Recently, considering to make much larger detectors for dark matter, supernova neutrino, and $0\nu\nu\bar{\nu}$, the single phase TPC has been revived.

As a LXe spherical scintillator, XMASS is existing with us and GXe spherical TPCs also exist and are successfully operated, we are aiming to convert XMASS to spherical LXe TPC. For the first step we focus on getting S2 signal in a small LXe setup. We tested 10 μ m tungsten wire in LXe and successfully observed stable S2 signal in keV range and confirmed the threshold of the electric field for S2 signal. Accordingly, we are designing a spherical electrode which makes enough high electric field over the threshold for the spherical detector.

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