

Measuring Light and Charge Yields in LKr

- Why these measurements are important?
- Both the light and charge signals provide valuable information needed for events reconstruction in TPC
- The total deposited energy is shared to produce UV scintillation photons and electron-ion pairs – correlated signals
- In LXe TPCs, e. g., in nEXO, the light and charge signals are added together to overcome fluctuations of the electron-ion recombination to improve energy resolution

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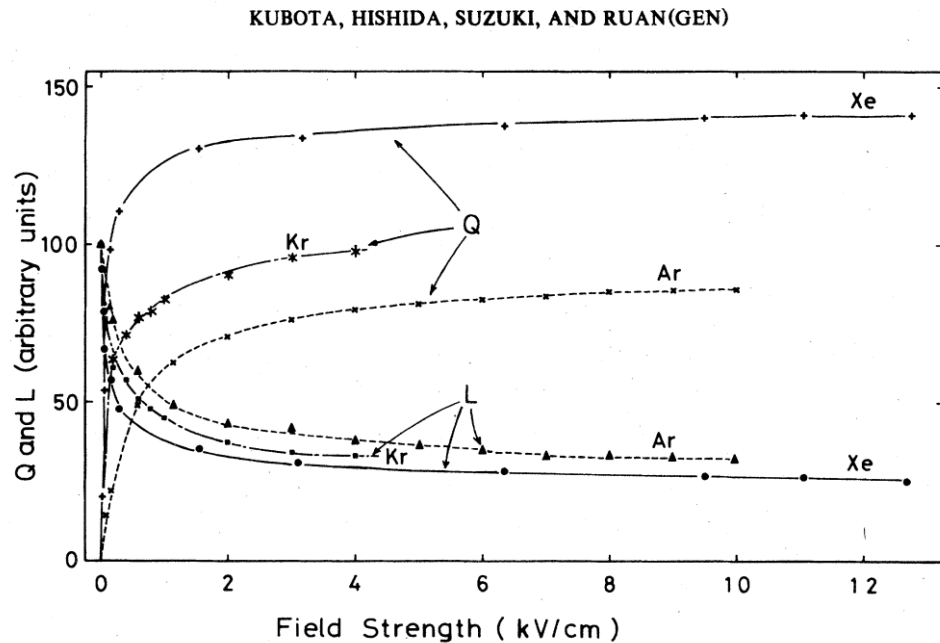


FIG. 2. Variation of relative luminescence intensity L and collected charge Q in liquid argon, krypton, and xenon vs electric-field strength for 0.976- and 1.05-MeV electrons.

- Early measurements using Bi-207 **internal-conversion electrons** by Kubota et al., “Dynamical behavior of free electrons in the recombination process in liquid argon, krypton, and xenon”, Phys. Rev. v. 20, 1979.
- It is important to repeat these measurements with electron and also use alpha-particles
- One possibility is to collaborate with Columbia University team (Prof. Elena Aprile)
- Elena’s team took such measurements in LXe before and is very interested in taking similar measurements in LKr

Measurements in LXe done by Columbia group using electrons and alpha-particle

Apparatus used by Columbia team

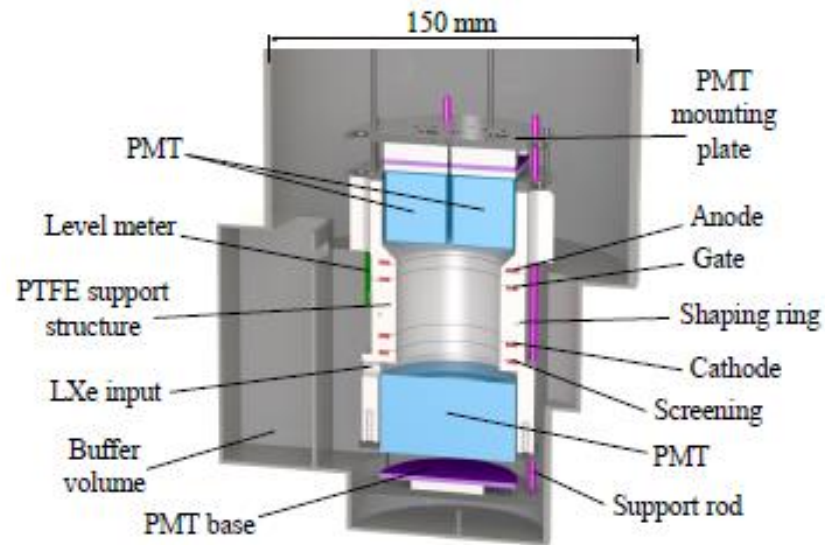


FIG. 1. Schematic drawing of neriX TPC. Plot from [18].

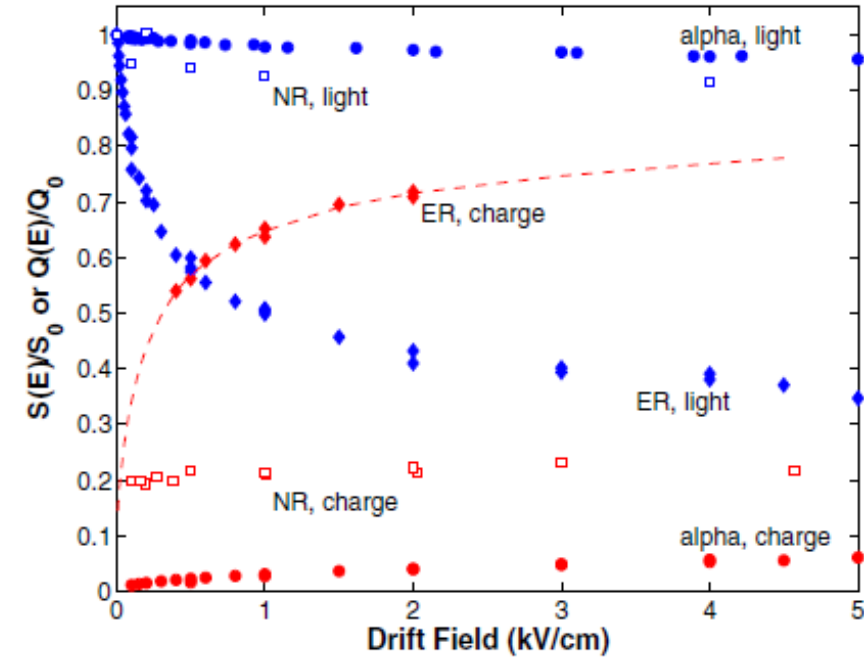


FIG. 3 (color online). Field dependence of scintillation and ionization yield in LXe for 122 keV electron recoils (ER), 56.5 keVr nuclear recoils (NR) and alphas.

LKr at BNL

Kr storage at Physis

