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Looking for Cherenkov light in liquid Xenon with LoLX

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The Light-only Liquid Xenon (LoLX) experiment is designed to study the properties of light emission and transport in liquid xenon (LXe) using silicon photomultipliers (SiPMs). In addition, we also plan to perform long-term stability studies of the SiPMs in LXe. Another important goal of the LoLX experiment is to characterize and utilize the differences in the timing of Cherenkov and scintillation light production to develop a background discriminator for low-background LXe experiments such as, neutrino-less double beta decay searches. The first phase of LoLX is operational and consists of an octagonal 3D-printed structure housing 24 Hamamatsu VUV4 SiPM modules, for a total of 96 individual SiPM channels. The LoLX structure is placed in a cryostat that allows for the liquefaction of Xe along with a Sr-90 beta-emitter placed at the center of the LoLX detector volume. The beta decay electrons on interaction with LXe produce Cherenkov and scintillation light to be studied using LoLX. This talk will cover the current status of the LoLX experiment and present the results obtained from the first runs of the experiment. This data-taking campaign focused on validating the optical transport simulations of LoLX done in GEANT4 by the collaboration. In addition, the effect of external cross-talk (eXT) between the SiPMs was also explored. The DAQ system has been recently upgraded with a GSPS ADC, allowing for improved timing resolution of the light signals.

Collaboration

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