



Contribution ID: 34

Type: Poster

Why would you put a flashlight in a dark matter detector?

Tuesday, 7 November 2023 19:40 (20 minutes)

Silicon photomultipliers (SiPMs) are an appealing photosensor technology for next generation dark matter detectors, including XLZD and potential upgrades to LZ. The energy threshold of these experiments is driven in part by the ability to distinguish actual few-photon scintillation events from accidental coincidence events caused by photodetector dark counts. The avalanche process inside a SiPM produces excess photons which can escape the originating pixel and be detected by other pixels. If the excess photon is detected by a pixel in a different device, the process is referred to as external optical crosstalk. We have measured the effects of external optical crosstalk in a dual-phase liquid xenon TPC. In contrast to previous work, we find that the effect is significant and problematic. It causes the gain calibration of the scintillator to be strongly dependent on the bias voltage of the SiPMs. It further increases the rate of accidental coincidence. Depending on the photosensitive area, external optical crosstalk coincidences can dominate over dark count accidental coincidences.

Early Career

No

Primary authors: CHEN, Hao (Lawrence Berkeley National Laboratory); SORENSEN, Peter (Lawrence Berkeley National Laboratory); XIA, Qing (LBNL); GIBBONS, Ryan (University of California, Berkeley, Lawrence Berkeley National Laboratory); HASELSCHWARDT, Scott (Lawrence Berkeley National Laboratory)

Presenter: GIBBONS, Ryan (University of California, Berkeley, Lawrence Berkeley National Laboratory)

Session Classification: Poster Session

Track Classification: RDC Parallel Sessions: RDC2: Photodetectors