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## **(U\*) Waveform fitting algorithm for LoLX pulse data**

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The light-only liquid xenon (LoLX) experiment is a small-scale liquid xenon (LXe) detector with cutting-edge photo-detection technology. LoLX is designed to characterize the performance of silicon photomultipliers (SiPMs), and to study light emission, transport, and detection in LXe to inform future LXe rare-decay detectors. LoLX consists of 96 Hamamatsu VUV4 SiPMs arranged in a cylindrical geometry and submerged in LXe. This R&D detector is used to investigate the timing structure of light production processes like scintillation and Cherenkov radiation in LXe, and to provide better understanding of SiPM external crosstalk between neighboring SiPMs and its effect on the overall detector performance.

When photons are detected by a SiPM, photodiodes undergo an avalanche process, from which secondary photons can be produced. In a process called SiPM external crosstalk, these photons can reach other SiPMs and produce correlated hits on nearby devices. Characterizing the SiPM pulse shape and correlated noise contributions allows for accurate and reliable reconstruction of photons, which is needed to improve the energy and timing resolution of our response model for photon detection. To reconstruct photon signals, we have developed an improved pulse-fitting algorithm that constructs a functional form of the pulse shape. I will present on the functioning of the fitter, its performance, and compare it to other photon-counting algorithms, in particular, to a traditional pulse-finding algorithm with respect to improving energy resolution.

### **Keyword-1**

Silicon photomultipliers

### **Keyword-2**

Fit algorithm

### **Keyword-3**

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