

Waveform simulations for the LUX-ZEPLIN experiment

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The LUX-ZEPLIN (LZ) experiment is a dual-phase time projection chamber with the primary aim of detecting WIMPs through direct detection methods. Light from scintillation within the detector is collected with arrays of PMTs and is recorded as waveforms in our data. LZ fundamentally relies on our understanding of all the information encoded in these waveforms. It is therefore paramount that we have an in-depth understanding of how these waveforms are produced from the initial interaction right up to the start of the analysis chain. Simulations of these processes can help to verify our understanding of our detector and furthermore predict the outcome of various effects we may observe; anything from validating our own analysis chain to training machine learning algorithms to producing potential WIMP signals. All this and more can be done with accurate waveform simulations. In this talk, I will present the waveform simulation methods for the LUX-ZEPLIN experiment and their capability to advance the experiment's discovery potential for all searches.

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