

Investigating the isolated S1 backgrounds in the LUX-ZEPLIN (LZ) experiment

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The LUX-ZEPLIN (LZ) experiment features a liquid xenon time projection chamber designed to detect weakly interacting massive particles (WIMPs) with exceptional sensitivity. Among its background signals, scintillation-only events are particularly challenging to study due to their poor spatial reconstruction; yet, they play a significant role by contributing to accidental coincidence backgrounds that can obscure WIMP-like signals. I investigate the origin and nature of these scintillation-only events by analysing photon hit patterns and leveraging the double photon electron effect. Specifically, I will discuss whether the light emitted by these events is in the vacuum ultraviolet (VUV) range, characteristic of xenon scintillation, and explore their possible sources within the detector. This research not only contributes to the broader effort to refine background models, ultimately improving the reliability of the LZ experiment's search for dark matter, but will also be of fundamental importance for the design and optimisation of future detectors, paving the way for the next generation of dark matter experiments.

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