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Energy Resolution of the LZ detector to High Energy Electronic Recoils, Guilherme Pereira

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The LUX-ZEPLIN (LZ) detector, currently operating at the SURF laboratory (South Dakota, USA), is a 10-ton liquid xenon dual-phase time projection chamber designed to search for dark matter particles. Due to its large mass and low backgrounds, the LZ scientific program also includes the search for the neutrinoless double beta decay of ^{136}Xe , highlighting the importance of achieving good energy resolution at ^{136}Xe Q value of 2.46 MeV.

In this work, the detector's energy resolution is presented for single scatter interactions, with emphasis on the high energy search region (>2 MeV). The detector demonstrates a linear response to electron recoils in the 160–2700 keV energy range. A novel technique to correct the non-uniformity of the light collection in a scintillation detector, based on the knowledge of the light response functions of individual photosensors, will be described. The use of this technique allows to achieve state-of-the-art energy resolution for the whole fiducial volume at a very early phase of the detector operations. The comparison of the measured energy resolution in the 160–2700 keV energy range with other liquid xenon particle detectors and the predictions of the NEST model will also be presented.

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