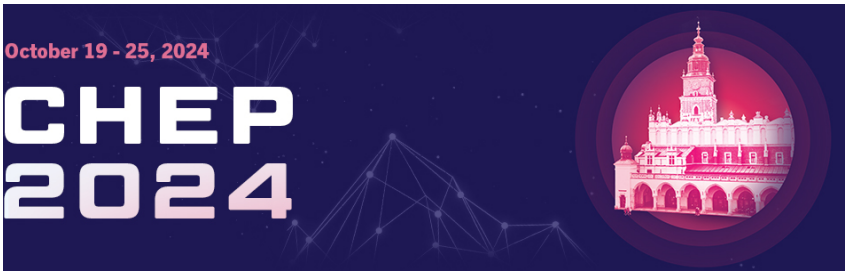

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Unsupervised Learning Techniques for Identification of Anomalous LZ Data

Monday 21 October 2024 16:00 (15 minutes)

LUX-ZEPLIN (LZ) is a dark matter direct detection experiment. Employing a dual-phase xenon time projection chamber, the LZ experiment set a world leading limit for spin-independent scattering at 36 GeV/c2 in 2022, rejecting cross sections above 9.2×10−48 cm2 at the 90% confidence level. Unsupervised machine learning methods are indispensable tools in working with big data, and have been applied at various stages of LZ analysis for data exploration and anomaly detection. In this work, we discuss an unsupervised dimensionality reduction approach applied to a combination of both PMT waveforms and reconstructed features aiming to identify anomalous events. We examine the tradeoffs in this method, and compare our results to known anomalies in the data, as well as conventional data quality cuts.

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