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Low-frequency noise classification using Machine Learning for the SuperCDMS experiment

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The SuperCDMS experiment uses semiconductor crystal detectors operated at cryogenic temperatures to search for low-mass dark matter. Vibrations observed during the SuperCDMS Soudan experiment generated broadband low-frequency (LF) noise, which due to its similarity in the pulse shape to the low-energy signal events are difficult to remove at low-energies. In the final low ionization threshold analysis, a strong event selection criterion was applied to remove LF noise events which raised the analysis threshold and thus reduced the sensitivity of the experiment to low-mass dark matter. An LF noise selection criterion using machine learning is currently being studied. Under investigation is a convolutional neural network that yields better signal purity while also retaining signal efficiency. This talk discusses the preliminary results of the machine learning-based classification of LF noise.

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