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A first application of machine and deep learning for background rejection in the ALPS II TES detector

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Axions and axion-like particles are hypothetical particles predicted in extensions of the standard model and are promising cold dark matter candidates. The Any Light Particle Search (ALPS II) experiment is a light-shining-through-the-wall experiment that aims to produce these particles from a strong light source and magnetic field and subsequently detect them through a reconversion into photons. With an expected rate ~ 1 photon per day, a sensitive detection scheme needs to be employed and characterized. One foreseen detector is based on a transition edge sensor (TES). Here, we investigate machine and deep learning algorithms for the rejection of background events recorded with the TES. We also present a first application of convolutional neural networks to classify time series data measured with the TES.

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