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Discrimination between prompt and long-lived particles using convolutional neural network

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Sophisticated machine learning techniques, like computer vision, are state of the art in modern day research. These technologically advanced algorithms have promising potential in search for physics beyond Standard Model in Large Hadron Collider (LHC). Most of the computer vision tasks are surrounded around convolutional neural networks (CNN), which can provide powerful tools for differentiating between patterns of calorimeter energy deposits by prompt particles of Standard Model and long-lived particles predicted in various models beyond the Standard Model. We demonstrate the usefulness of CNN by using a couple of physics examples from well motivated BSM scenarios predicting long-lived particles giving rise to displaced jets. Our work suggests that modern machine-learning techniques have potential to discriminate between energy deposition patterns of prompt and long-lived particles, and thus, they can be useful tools in such searches.

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