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Bump Hunting in Latent Space

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Unsupervised anomaly detection could be crucial in future analyses searching for rare phenomena in large datasets, as for example collected at the LHC. To this end, we introduce a physics inspired variational autoencoder (VAE) architecture which performs competitively and robustly on the LHC Olympics Machine Learning Challenge datasets. We demonstrate how embedding some physical observables directly into the VAE latent space, while at the same time keeping the classifier manifestly agnostic to them, can help to identify and characterise features in measured spectra as caused by the presence of anomalies in a dataset.

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