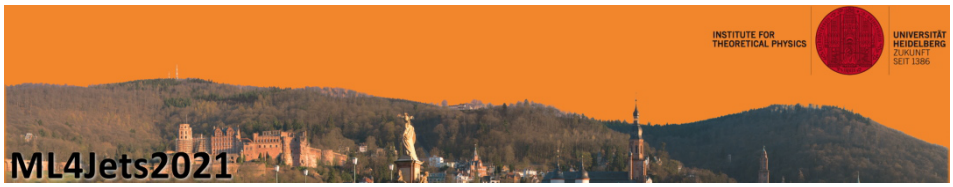

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CATHODE part 1: introducing a new model-agnostic search strategy for resonant new physics at the LHC

Tuesday 6 July 2021 14:20 (20 minutes)

We propose Classifier-based Anomaly detection THrough Outer Density Estimation (CATHODE), a new approach to search for resonant new physics at the LHC in a model-agnostic way. In CATHODE, we train a conditional density estimator on additional features in the sideband region, interpolate it into the signal region, and sample from it. This produces in a data-driven way events that follow the SM background model without any reliance on simulation. Then we train a classifier to distinguish background events and data events in the signal region to find anomalies. Using the LHCO R&D dataset, we show that CATHODE can discover new physics that would otherwise be hiding in the data, improving the nominal statistical significance in a specific example from ˜1 σ to as much as ˜15 σ.

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