Detect New Physics with Deep Learning Trigger at the LHC
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- Traditional searches rely on **hypothesis testing**
- A Model-Agnostic Trigger for anomaly events
- Deployment at Level-1 trigger to avoid bias from upstream

- Use **Autoencoder** (AE) for feature-learning of background data
- Anomaly events differ from background, manifest as large loss value
  \[ \text{Loss} = f(\text{input} - \text{output}) \]

- Simple 8 layer AE trained with CMS Level-1 inputs from background, **showed the separation power in inference**
- Within the resource and latency requirement of hardware

- Simple AE model can be implemented at the Level-1 trigger level as anomaly event trigger at 40MHz
- AE trigger rate can be stabilized to cope with noisy online condition
- Stay tune for the CMS Phase 2 Level-1 Trigger TDR