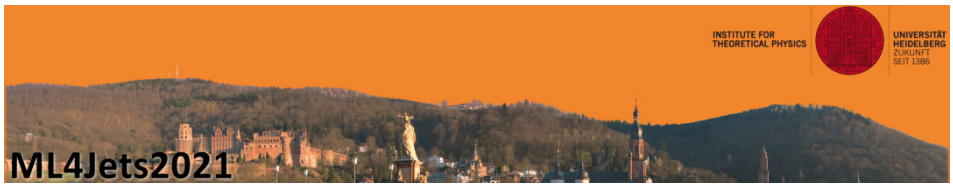

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OnlineFlow: Trigger Free Analysis Using Online Learned Generative Models

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The high collision rates at the Large Hadron Collider (LHC) make it impossible to store every single observed interaction. For this reason, only a small subset that passes so-called triggers —which select potentially interesting events —are saved while the remainder is discarded. This makes it difficult to perform searches in regions that are usually ignored by trigger setups, for example at low energies. However a sufficiently efficient data compression method could help these searches by storing information about more events than can be saved offline.
We investigate the use of a generative machine learning model (specifically a normalizing flow) for the purpose of this compression. The model is trained online on the collision data, essentially encoding the underlying data structure in the network weights. The data generated by the trained model can then be analysed and for example probed for anomalies offline.
We demonstrate this method for a simple bump hunt, showing that we can detect resonances that would have been missed under regular trigger setups.

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Session Classification: Regression, Calibration, and Fast Inference