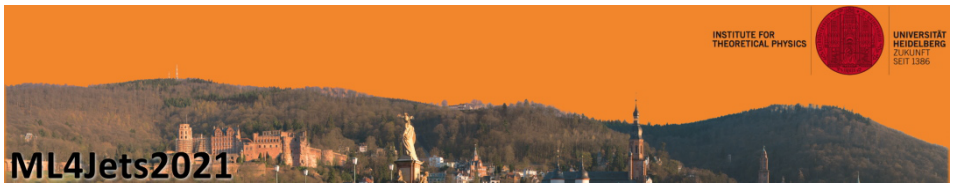

Contribution ID: **2** Type: **not specified**

Spectral Clustering for Jet Formation

Thursday, July 8, 2021 5:20 PM (20 minutes)

Machine learning (ML) is pushing through boundaries in computational physics.
Jet physics, with it's large and detailed dataset, is particularly well suited.
In this talk I will discuss the application of an unusual ML technique, Spectral Clustering, to jet formation.

Spectral clustering differers from much of ML as it has no "black-box" elements.
Instead, it is based on a simple, elegant algebraic manipulation.
This allows us to inspect the way the algorithm is interpreting the data, and apply physical intuition.

Infrared-collinear (IRC) safety is of critical importance to jet physics.
IRC safety requires that jets formed are insensitive to collinear splitting and soft emissions.
Spectral clustering is shown to be possible to apply in an IRC safe way, and the conditions for this are noted.

Finally, the capacity of spectral clustering to handle different datasets is shown.
Its excellent performance, both in terms of multiplicity and mass peaks is demonstrated.
In particular we show great performance on two datasets from the extended Higgs sector, alongside the semileptonic top.
The reasons for its flexibility are discussed, and potential developments offered.

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