Contribution ID: **559** Contribution code: **contribution ID 559** Type: **Oral**

A factorisation-aware Matrix element emulator

Monday 29 November 2021 17:40 (20 minutes)

In this talk we present a neural network based model to emulate matrix elements. This model improves on existing methods by taking advantage of the known factorisation properties of matrix elements to separate out the divergent regions.
In doing so the neural network learns about the factorisation property in singular limits, meaning we can control the behaviour of simulated matrix elements when extrapolating into more singular regions than the ones used for training the neural network. We apply our model to the case of leading-order jet production in e^+e^- collisions with up to five jets.

Our results show that this model can reproduce the matrix elements with errors below the one-percent level on the phase-space covered during fitting and testing, and a robust extrapolation to the parts of the phase-space where the matrix elements are more singular than seen at the fitting stage. We also demonstrate that the uncertainties associated with the neural network predictions are negligible compared to the statistical Monte Carlo errors.

Talk based on [2107.06625] with code to reproduce the method at https://www.github.com/htruong0/fame

Significance

We significantly improve per-point accuracy of emulated matrix elements compared to existing methods.

The method described is a general strategy that can be applied to a variety of processes where factorisation occurs at the matrix element level.

References

https://arxiv.org/abs/2107.06625

Speaker time zone

Compatible with Europe

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Session Classification: Track 3: Computations in Theoretical Physics: Techniques and Methods

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