Contribution ID: **15** Type: **not specified**

Quantum machine learning for jet classification at LHCb

Tuesday, 15 November 2022 16:55 (20 minutes)

Machine Learning algorithms are playing a fundamental role in solving High Energy Physics tasks. In particular, the classification of hadronic jets at the Large Hadron Collider is suited for such types of algorithms, and despite the great effort that has been put in place to tackle such a classification task, there is room for improvement. In this context, Quantum Machine Learning is a new methodology that takes advantage of the intrinsic properties of quantum computation (e.g. entanglement between qubits) to possibly improve the performance of a classification task. In this contribution, a study of Quantum Machine Learning applied to jet identification is presented. Namely, a Variational Quantum Classifier is trained and evaluated on fully simulated data of the LHCb experiment. The jet identification performance of the quantum classifier is compared with a Deep Neural Network using the same input features. The performance of the algorithm measured on quantum hardware will be also discussed.

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Session Classification: Martedi

Track Classification: Machine Learning