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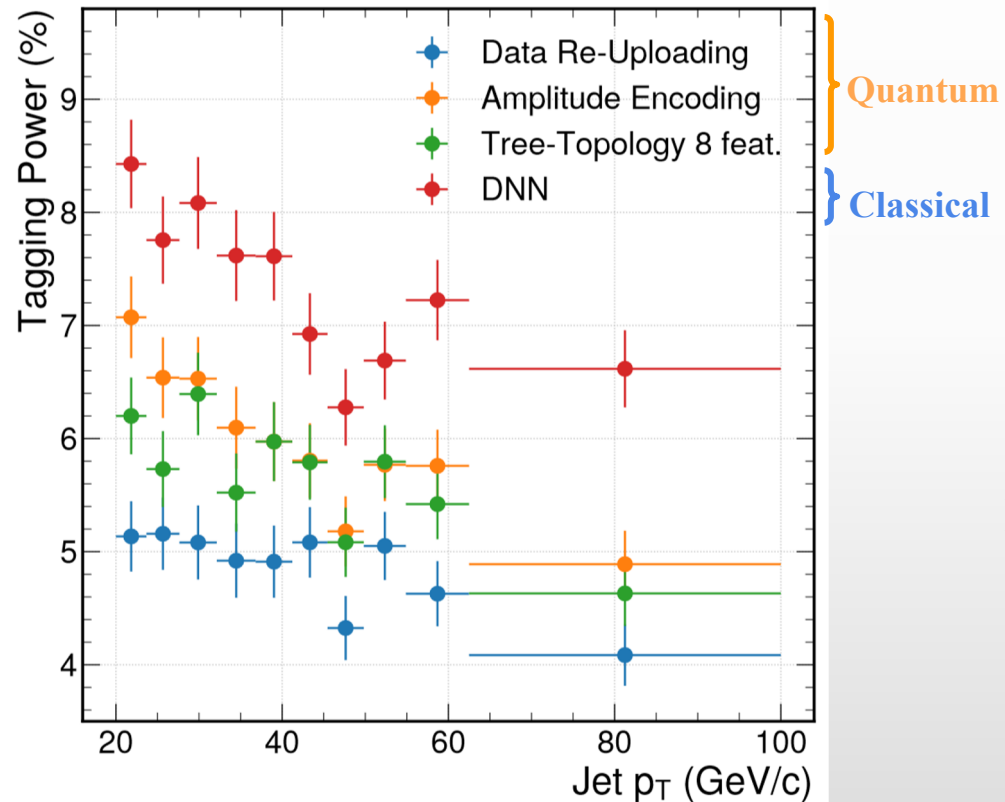


## **Development of Quantum Machine Learning Algorithms to Study Higgs Boson Decays with the LHCb Detector**

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# Quantum Computing Machine Learning for b-jet classification

First study demonstrated how efficiently b-jet can be separated by b-bar jet:



- QML algorithms are trained on 1/50th of events w.r.t. DNN
- testing is performed on the same number of events

For details Davide Nicotra [Snowmass presentation](#)

# Quantum Computing Machine Learning for heavy flavor jet classification

The new project would study how QML can improve the determination of the Higgs boson decay rates to b and c jets by exploiting the different b and c jet sub-structure.

The project could articulate:

- Develop of b and c-jet identification methods by using QML algorithms;
- Run the algorithm on quantum simulators using LHC simulated data without and with noise;
- Run the algorithm on a real quantum computer with LHC data as input to perform the measurement.