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Measurements of the beauty-jet cross section in pp collisions with a variety of techniques using the ALICE detector

Due to the large mass of beauty-quarks, their production is well described by perturbative QCD (pQCD) calculations. As such, beauty jets are a powerful tool for constraining these pQCD calculations and for understanding the fragmentation of coloured massive partons. One of the main challenges in measurements of beauty jets is their accurate identification from the sample of inclusively measured jets. Using the significant upgrades to the tracking and data acquisition rate of the ALICE detector in Run3, we present high precision measurements of the beauty-jet cross section at low transverse momentum in pp collisions, using a variety of tagging methods. These methods include the impact parameter method, which utilises the displacement of tracks from the primary vertex; the secondary-vertex method, which identifies long-lived beauty hadrons by reconstructing the secondary vertex of their decay; and a machine learning approach that integrates features from both the impact parameter and secondary vertex methods to enhance tagging efficiency.

Category

Experiment

Collaboration (if applicable)

ALICE

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