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b-jet tagging in pp collisions using graph neural network with the ALICE experiment

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Beauty-jets (b-jets) refer to sprays of collimated particles produced from the fragmentation of beauty quarks generated in hard scatterings at collider experiments. Compared to jets produced by the fragmentation of light quarks and gluons, b-jets are characterised by the presence of displaced secondary vertices, due to the decay of beauty hadrons which have a relatively long lifetime ($c\tau \sim 500$ μm). Therefore, they can be tagged by exploiting the decay topology using traditional methods based on the impact-parameter (IP) of their constituents or the reconstruction of secondary vertices (SV). These methods however have a limited performance. Graph Neural Network (GNN) is a deep learning method capable of considering the relationship between the constituent tracks, and extracting features of jets by treating them as graphs consisting of tracks. Hence, GNN is expected to demonstrate outstanding b-jet tagging performance. On this poster, we will introduce the structure and training process of GNN, and present the b-jet tagging performance of the GNN which is trained using ALICE Monte Carlo data.

Category

Experiment

Collaboration

ALICE

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