



Contribution ID: 128

Type: Postar

Beauty production in pp collisions at $\sqrt{s} = 13$ TeV via non-prompt D mesons

The study of hadron production containing charm or beauty quarks in proton-proton (pp) collisions provides essential insights into the predictions of perturbative quantum chromodynamics (pQCD). The ALICE detector allows for precise measurements of non-prompt D-meson production, which serves as an effective tool to explore the production of beauty quarks in pp collisions.

This analysis presents recent results on the transverse momentum (p_T)-differential production cross section for D mesons originating from beauty-hadron decays (referred to as non-prompt D mesons). These findings are compared with those for prompt D mesons produced directly in pp collisions at center-of-mass energies of ($\sqrt{s} = 5.02$) TeV and ($\sqrt{s} = 13$) TeV. Additionally, the (p_T)-differential production yield ratios, such as non-prompt (D^+ / D^0) and ($D_s^+ / (D^0 + D^+)$), are examined, along with measurements of the fragmentation fraction ratio of beauty quarks into strange and non-strange B mesons in pp collisions, to assess their universality across different collision systems. Comparisons with pQCD predictions and other theoretical models are also included. A machine-learning-based multiclass classification algorithm is employed to distinguish D mesons arising from beauty-hadron decays for these measurements.

Field of contribution

Experiment

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Track Classification: Heavy ion and QCD