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Apparent modification of the jet-like yield in high multiplicity proton-proton collisions

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In this work we present the production of charged particles associated with high- p_T trigger particles ($8 < p_T^{\text{trig.}} < 15 \text{ GeV}/c$) at midrapidity in proton-proton collisions at $\sqrt{s} = 5.02, \text{TeV}$ simulated with the PYTHIA 8 Monte Carlo model [1]. The study is performed as a function of the relative transverse activity classifier, R_T , which is the relative charged-particle multiplicity in the transverse region ($|\pi/3 < \phi^{\text{trig.}} - \phi^{\text{assoc.}}| < 2\pi/3$) of the di-hadron correlations, and it is sensitive to the Multi-Parton Interactions. The evolution of the yield of associated particles on both the towards and the away regions ($3 \leq p_T^{\text{assoc.}} < 8 \text{ GeV}/c$) as a function of R_T is investigated. We propose a strategy which allows for the modelling and subtraction of the Underlying Event (UE) contribution from the towards and the away regions in challenging environments like those characterised by large R_T . We found that the signal in the away region becomes broader with increasing R_T . Contrarily, the yield increases with R_T in the towards region. This effect is reminiscent of that seen in heavy-ion collisions, where an enhancement of the yield in the towards region for 0-5% central Pb-Pb collisions at $\sqrt{s_{NN}} = 2.76, \text{TeV}$ was reported. To further understand the role of the UE and additional jet activity, the transverse region is divided into two one-sided sectors, “trans-max” and “trans-min” selected in each event according to which region has larger or smaller charged particle multiplicity. Based on this selection criterium, the observables are studied as a function of R_T^{max} and R_T^{min} , respectively. Results for pp collisions simulated with PYTHIA 8.244 and Herwing 7.2 will be shown.

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