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Study of the soft and hard production as a function of the event multiplicity and the Relative Transverse Activity Classifier

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The study of charged-particle production in small systems as a function of event multiplicity has exhibited many of the features of collective behaviour found in heavy-ion collisions. Event multiplicity dependent studies may be subject to significant autocorrelation bias due to jet production. In order to avoid these effects, a new multiplicity estimator has been proposed which is based on the self-normalised multiplicity density of the Underlying Event (UE) as measured in the transverse region with respect to the leading jet direction: $R_T = N_{ch}^{transv} / \langle N_{ch}^{transv} \rangle$. The study of charged particle production at high- R_T gives us the opportunity to test the presence of non-trivial soft-QCD dynamics, such as colour reconnections or other collective phenomena. We present a study of unidentified charged-particle production in the leading jet and in the UE for pp collisions at 13 TeV, using both conventional multiplicity estimators and R_T . All the results are compared with those obtained from QCD-inspired Monte-Carlo event generators.

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