

## Soft-QCD studies in ALICE: focus on forward particle multiplicities and the underlying event

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It is well-established that high-multiplicity pp and p-Pb collisions exhibit a collective-like behaviour and signatures, like the strangeness enhancement and the ridge behaviors, that were commonly attributed to the formation of the Quark-Gluon Plasma. These processes, which are typically described by phenomenological models and soft QCD measurements, provide important constraints on the model parameters. Thus, the study of system size dependence of particle production and characterisation of underlying events is crucial.

We present measurements of charged and neutral particle production in the forward rapidity range ( $-3.4 < \eta < 5.0$  and  $2.3 < \eta < 3.9$ ) exploiting the full coverage of the ALICE detector at forward rapidities. The evolution of the width of the pseudorapidity density distribution with centrality is shown and a lower bound on the Bjorken energy density for different collision systems is extracted. We also present results obtained using Underlying Event (UE) techniques, allowing the measurement of the average number density in the Toward, Transverse, and Away regions with respect to the leading trigger particle. For the first time at the LHC, an analysis, based on UE measurements, is applied also to p-Pb collisions at  $\sqrt{s_{NN}} = 5.02$  TeV to test the similarities between pp and p-Pb collisions. The charged particle multiplicity in the Transverse UE-dominated region,  $N_{TS}$ , is used as a multiplicity estimator to study particle production mechanisms in pp, p-Pb and Pb-Pb collisions at the same center-of-mass energy. Finally, the UE studies are used to search for jet-like modification by subtracting the UE contributions measured in the Transverse region from the Toward and the Away regions. The results are compared with predictions from QCD-inspired Monte Carlo event generators with different particle-production mechanisms and initial conditions.

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