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Topological studies of light-flavor hadron production in pp, p-Pb and Pb-Pb collisions with ALICE at the LHC

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Recent results for high multiplicity pp and p-Pb collision systems have revealed that they exhibit collective-like behaviors. These were formerly thought to be achievable only in heavy-ion collisions. To understand the origins of these unexpected phenomena, event shape observables such as transverse sphericity (S_0) and the relative transverse activity classifier (R_T) can be exploited as a powerful tool to disentangle soft and hard particle production.

Results on the production of light flavor hadrons (π , K p, K^{*0} , φ and Ξ) as a function of S_0 and R_T in high multiplicity pp collisions at $\sqrt{s} = 13$ TeV measured with the ALICE detector at the LHC are presented. The evolution of particle ratios and average transverse momentum ($\langle p_T \rangle$) with multiplicity, S_0 and R_T is also discussed in the context of radial flow and flow-like effects. In addition, the system size dependence of charged particle production in pp, p-Pb and Pb-Pb collisions at $\sqrt{s} = 5.02$ TeV will be presented. The evolution of the transverse momentum spectra, integrated yields and $\langle p_T \rangle$ in different topological regions as a function of R_T are presented. These are compared with event generators such as EPOS-LHC and PYTHIA8 (ANGANTYR). Finally, within the same approach, we present a search for jet quenching behavior in small collision systems.

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