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Light-flavor particle production as a function of transverse sphericity in high-multiplicity pp collisions

Measurements of high-multiplicity proton-proton (pp) and proton-lead (p-Pb) collisions at the LHC have revealed that small collision systems show the onset of phenomena typical of heavy-ion collisions. Some of these signatures, such as strangeness enhancement and collective flow, suggest that light-flavor hadron production arises from complex mechanisms whose relative contributions evolve smoothly from low to high multiplicity collisions. In this context, pp collisions cannot only be seen as a simple incoherent sum of parton-parton scatterings, contrary to the modelization in most Monte Carlo event generators, such as PYTHIA. Moreover, these signatures have historically been attributed to the strongly interacting medium formed in heavy-ion collisions. However, creating a medium in smaller collision systems challenges the current theoretical frameworks.

Studies on multi-differential strange particle production in small systems can be utilized to disentangle the various final state effects at play and represent an essential baseline for heavy-ion studies. This poster presents new results from ALICE on light-flavor particle production and exotic resonances as a function of the transverse sphericity in pp collisions measured at center-of-mass energies of 13 TeV. Events that are either “isotropic” (dominated by multiple soft processes) or “jet-like” (dominated by one or few hard scatterings) can be selected utilizing narrow selections in multiplicity and sphericity. The experimental results are compared with predictions from various state-of-the-art Monte Carlo generators.

Category

Experiment

Collaboration (if applicable)

Given on behalf of ALICE

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