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Multi-differential studies to explore strangeness enhancement in pp with ALICE at the LHC

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The ALICE experiment studies the physics of strongly interacting matter, focusing on the properties of the Quark-Gluon Plasma (QGP). The relative production of strange hadrons with respect to non-strange hadrons in heavy-ion collisions was historically considered as one of the signatures of QGP formation. Recent results in proton-proton (pp) and proton-lead (p-Pb) collisions have revealed an increasing trend in the yield ratio of strange hadrons to pions with the charged particle multiplicity in the event, smoothly connecting data from different collision systems and energies.

In this talk, new studies will be presented with the aim of better understanding the strangeness enhancement phenomenon in small collision systems. In the first study the very forward energy transported by beam remnants and detected by the Zero Degree Calorimeters (ZDC) is used to classify events. In particular, strangeness production is studied exploiting the concept of the effective energy available for particle production in the event, which is estimated by an anti-correlation with the energy deposited in the calorimeters. The contribution of the effective energy and of the particle multiplicity on strangeness production is studied using a multi-differential approach in order to disentangle initial and final state effects. In the second study the origin of strangeness enhancement with multiplicity in pp has been further investigated by separating the contribution of soft and hard processes, such as jets, to strange hadron production. Techniques involving full-jet reconstruction or two-particle correlations have been exploited.

The results indicate that strangeness production emerges from the growth of the underlying event, being disconnected from initial state properties, and suggest that soft (out-of-jets) processes are the dominant contribution to strange hadron production.

Preferred track

Collectivity & Multiple Scattering

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