Contribution ID: **541** Type: **Parallel**

Strangeness enhancement with effective energy in pp collisions at the LHC with ALICE

The enhanced production of strange hadrons in heavy-ion collisions relative to that in pp collisions is historically considered one of the signatures of the formation of the quark-gluon plasma. At the LHC, the ALICE experiment observed that the yield ratios of strange to non-strange hadrons increase with the charged-particle multiplicity at midrapidity, evolving smoothly across all systems over more than three orders of magnitude in multiplicity. The understanding of the origin of this effect in small systems remains unsolved.
This contribution will present the measurement of (multi-)strange hadron yields in proton–proton collisions at $\sqrt{s} = 13$ TeV as a function of the local charged-particle multiplicity in the pseudorapidity interval $|\eta|$<0.5 and of the very-forward energy measured with the ALICE Zero-Degree Calorimeters. The latter provides information on the effective energy, i.e. the energy effectively available for particle production in the collision once the energy carried by the leading particles is subtracted from the centre-of-mass energy. The yields of strange and multi-strange per charged particle are measured by exploiting a multi-differential approach to decouple the dependence on the local multiplicity and effective energy. These results provide new insights into the interplay between global properties of the collision, such as the initial available energy in the event, and the locally produced final hadronic state connected to the charged-particle multiplicity at midrapidity. A strong increase of strange baryon production with effective energy is observed for fixed charged-particle multiplicity at midrapidity. These results are discussed within the context of existing phenomenological models of hadronisation implemented in different tunes of the PYTHIA 8 event generator.

Secondary track

T05 - QCD and Hadronic Physics

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Session Classification: T04

Track Classification: T04 - Ultra-relativistic Nuclear Collisions