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Investigating strangeness production in pp collisions using multi-differential analyses with ALICE at the LHC

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The ratio of strange to non-strange hadron yields increases from low- multiplicity to high-multiplicity hadronic interactions, reaching values observed in heavy-ion collisions. The ALICE experiment investigates the microscopic origin of this striking phenomenon by performing dedicated multi-differential analyses in pp collisions at $\sqrt{s}$ = 13 TeV.

To separate strange hadrons produced in jets from those produced in soft processes, the angular correlation between high-charged particles and strange hadrons is exploited. The near-side jet and out-of-jet yield of K^0_S and $\Xi^{\pm}$ are studied as a function of the charged particle multiplicity, up to values comparable to those reached in peripheral Pb–Pb collisions.

In order to disentangle initial and final state effects, a new analysis exploits the concept of the effective energy available for particle production, which is anti-correlated with the forward energy deposited in the Zero Degree Calorimeters (ZDC). (Multi-)strange hadron production is studied as a function of the charged particle multiplicity measured at midrapidity and of the forward energy detected by the ZDC.

The results suggest that soft (i.e., out-of-jet) processes are the dominant contribution to strange particle production and provide new insights on the role of initial state effects on strangeness enhancement in pp collisions.

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