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Measurements of charge, strangeness, and baryon number balance functions in pp and Pb-Pb collisions in ALICE

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Two-particle charge-dependent correlations (balance functions) are sensitive to the production and transport of conserved quantum numbers in the medium created in hadronic collisions. In this contribution, recent ALICE measurements of the balance functions of charge, strangeness, and baryon numbers are presented. Balance functions for all combinations of identified charged-hadron (π,K,p) pairs are calculated in Pb-Pb collisions at $\sqrt{s_{\rm NN}}$ = 2.76 TeV as a function of collision centrality. The balancing in azimuthal angle and rapidity is expected to provide information about quark diffusion and delayed hadronization, respectively. For the latter, a possible two-stage quark-production scenario - early production of strange quarks and late production of light quarks - is discussed. In addition, balance function integrals of (un)identified hadron pairs as a function of collision centralities, which provide the information about different pairing probabilities, are calculated for the first time. To investigate further the strangeness enhancement with multiplicity in small systems, recent measurements of how the production of doubly-strange Ξ baryons is balanced with mesons (strange kaons and non-strange pions) and baryons (Ξ, Λ, and p) in pp collisions at $\sqrt{s}$ = 13 TeV are shown. The balance is studied by triggering on Ξ baryons and subtracting the same quantum number from the opposite quantum number per-trigger yields. In particular, the multiplicity dependence is studied in order to identify if the same strangeness-production mechanism is at work in low- and high-multiplicity pp collisions. The results are compared to predictions from Monte Carlo models with various tunes of PYTHIA 8 (Lund string-based approach) and EPOS LHC (based on core-corona approach).

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