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Clocking the particle production and tracking quantum numbers balance and radial flow effects at top LHC energy with ALICE

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Balance functions have been used extensively to elucidate the time evolution of quark production in heavy-ion collisions. Early models predicted two stages of quark production, one for light quarks and one for the heavier strange quark, separated by a period of isentropic expansion. This led to the notion of clocking particle production and tracking radial flow effects, which drive the expansion of the system.

In this talk, balance functions of identified particles in different multiplicity classes of pp collisions at $\sqrt{s} = 13.6$ TeV recorded by ALICE in Run 3 are reported. The results are compared with different models as well as with previously published results on pp and Pb-Pb collisions at different energies. The results enable tracking the balancing of electric charge and strangeness by measuring how the widths and integrals of the charge and strangeness balance functions evolve across multiplicity classes.

Auteur principal: GONZALEZ, Victor (Wayne State University)

Orateur: GONZALEZ, Victor (Wayne State University)