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Contrasting freezeout schemes in large versus small systems

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Freezeout in relativistic collisions occurs as a result of competition between interaction of the fireball constituents and fireball expansion. The magnitude of interaction of the fireball constituents is expected to go down as we go from nucleus-nucleus (A-A) to proton-nucleus (p-A) to proton-proton (pp) collisions which should show up in the thermal model fits of the hadron yields. However, on the contrary, it has been found that within the unified freezeout scheme (1CFO), the fits to hadron yields are insensitive to system size. In this talk we extend the 1CFO scheme to multiple freezeout with early freezeout of strangeness (2CFO) and analyse the system size dependence of the freezeout scheme. We find unlike 1CFO that is blind to system size, 2CFO fits clearly distinguish between large and small system sizes.

We discuss the freezeout conditions in pp, p-Pb and Pb-Pb collisions at the LHC energies by analysing the data on hadron yields and transverse momentum spectra. We have studied three different schemes of freezeout, i) 1CFO, ii) strange hadrons freeze out along with non-strange with an additional strangeness undersaturation factor γ_S which accounts for the non-equilibrium production of strangeness (1CFO+γ_S), and iii) 2CFO. A comparison of the fit to data suggests that different freezeout schemes are preferred for different collision systems. For small systems (pp and p–Pb) and peripheral Pb–Pb, data prefer 1CFO+γ_S where γ_S starts from ˜0.8 for pp and reaches close to unity for central p-Pb and peripheral Pb-Pb. For Pb-Pb, 2CFO describes data better than 1CFO and 1CFO+γ_S.

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