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Strangeness freezeout- role of system size and missing resonances

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The conventional approach to treat strangeness freezeout has been to consider a unified freezeout scheme where strangeness freezes out along with the non-strange hadrons (1CFO), with or without an additional parameter accounting for out of equilibrium
strangeness production (γ_S). Several alternate scenarios have been formulated lately- i. to consider a hadronic afterburner post hadronisation that allows for a microscopic and dynamic description of freezeout, ii. to consider out of equilibrium production of strange as well as non-strange hadrons, iii. to introduce flavor dependent hadron mass - eigenvolume relationship within a Van der Waal's excluded volume approach, and iv. allowing for early freezeout of strangeness within a complete thermal and chemical
equilibrium approach (2CFO).
In this talk, we will focus on this last approach, 2CFO in comparison to 1CFO and its variants with respect to the roles played by the system size and missing resonances predicted by different theoretical approaches but yet to be seen in experiments.
We have compared the performance of different freezeout scenarios like 1CFO, 1CFO+γ_S and 2CFO across all available centralities for Pb+Pb, p+Pb and p+p at $\sqrt{s_{NN}}$ = 2.76, 5.02 and 7 TeV respectively- in doing so we are able to analyse the freezeout properties over three orders of magnitude in terms of the mid-rapidity charged multiplicity as well as the extracted freezeout volume parameter. We find that the performance of 1CFO with/without γ_S is insensitive to system size. However, 2CFO exhibits a clear system size dependence- while for Pb+Pb the χ^2/NDF is around 0-2, for smaller system size in p+Pb
and p+p, the $\chi^2/NDF > 5$. This clearly shows a system size dependence of the preference for the freezeout scheme- while 2CFO is preferred in Pb+Pb, 1CFO+γ_S is preferred in
p+Pb and p+p. We have further investigated the role of the missing resonances on strangeness freezeout across SPS to LHC beam energies. We study several decay schemes for these missing resonances and estimate their influence on the strange chemical potential, performance of the different freezeout schemes as well as on the choice of the extracted freezeout parameters.

List of tracks

Freeze-out, hadronisation and statistical models

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