

Heavy flavour hadronization in ultra-relativistic heavy ion collisions: from AA to pp

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One of the present challenges for the theoretical understanding of heavy-quark hadronization is represented by the description of the measurements of heavy baryon production in pp , pA and AA collisions. The Λ_c/D^0 ratio observed in AA collisions has a value of the order of the unity, and experimental measurements in pp collisions at both $\sqrt{s} = 5.02$ TeV and $\sqrt{s} = 13$ TeV have shown ratios for charm baryons Λ_c , Ξ_c^0 and Ω_c^0 respect to D^0 meson larger than that measured and expected in e^+e^- , ep collisions.

Using the relativistic Boltzmann transport approach coupled to an hadronization mechanism based on the coalescence and fragmentation processes we show the results obtained in AA collisions for D^0 , D_s , Λ_c spectra and the related baryon to meson ratios at RHIC and LHC. where we have found a large Λ_c production resulting in a baryon over meson ratio of order $O(1)$.

Extending this approach to study the production of hadrons containing multiple charm quark, i.e. Ξ_{cc} , Ω_{cc} and Ω_{ccc} and we present here new predictions of these productions in different collision systems (PbPb, KrKr, ArAr).

Furthermore, we present results obtained in pp collisions at top LHC energies assuming the formation of an hot QCD matter at finite temperature for these systems and we show the results for the heavy baryon/meson ratio and the p_T spectra of charmed hadrons with and without strangeness content: D^0 , D_s , Λ_c^+ , Σ_c and the recently measured Ξ_c baryon, finding an enhancement in comparison with the ratio observed for e^+e^- , ep collisions; with this approach we also predict a significant production of Ω_c respect to D^0 such that $\Omega_c/D^0 \sim 0.15$.

[1] V. Minissale, S. Plumari and V. Greco, Physics Letters B 821 (2021) 136622.

[2] S. Plumari, V. Minissale, S.K. Das, G. Coci and V. Greco, Eur.Phys.J. C 78 (2018) no.4, 348

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