Contribution ID: **263** Type: **Invited**

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

Thursday, June 8, 2023 4:30 PM (30 minutes)

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 $\sqrt{s} = 5.02\,\mathrm{TeV}$ and $\sqrt{s} = 13\,\mathrm{TeV}$ 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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Session Classification: Hadrons in hot and nuclear environment

Track Classification: Hadrons in hot and nuclear environment