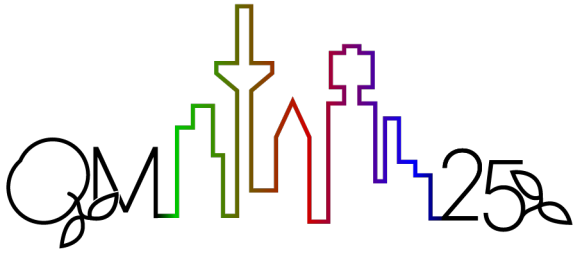

Contribution ID: **255** Type: **Poster**

How far can we see back in time in high-energy collisions using charm hadrons?

We use open charm production to estimate how far we can see back in time in high-energy hadron-hadron collisions. We analyze the transverse momentum distributions of the identified D mesons from pp, p–-Pb and A–-A collisions at the ALICE and STAR experiments covering the energy range from $\sqrt{s_{\rm NN}}$ = 200 GeV up to 7 TeV. While the low-momentum part of the spectra can be associated with particles stemming from a thermal equilibrium, the high-momentum regime follows a power-law-like distribution, resulting from perturbative QCD hadron production. Recent non-extensive thermodynamical models, however, are able to successfully describe the spectra within a unified framework [1]. We discuss the consistency of the resulting Tsallis temperature and non-extensivity parameter, and compare them to the ones of light-flavour hadrons. These results allow us to estimate the production time of D mesons in relation to the light-flavour hadrons [2]. We also explore the species-dependent timescales of formation of particle spectra, as well as provide constrains to the heat capacity of investigated systems [3].

[1] G. Bíró, G. G. Barnaföldi, T. S. Bíró, J.Phys.G 47 (2020) 10, 105002
[2] L. Gyulai, G. Bíró, R. Vértesi, G. G. Barnaföldi, J.Phys.G 51 (2024) 085103
[3] L. Gyulai, G. Bíró, R. Vértesi, G. G. Barnaföldi, preprint: arXiv:2409.01085 [hep-ph]

Category

Experiment

Collaboration (if applicable)

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Session Classification: Poster session 2

Track Classification: Heavy flavor & quarkonia