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Spheroidal expansion and freeze-out geometry of heavy-ion collisions in the few-GeV energy regime

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Abstract

The applicability of statistical hadronization-based models to the high baryon density regions of the QCD phase diagram still remains unresolved. In our previous work [1], we have proposed a spherical geometry of the fireball and the corresponding expansion shape into the THERMal heavy IoN generATOR (THERMINATOR) 2 [2], a statistical hadronisation based model implementing a single freeze-out approximation. This approach has yielded a satisfactory reproduction of bulk particle transverse-mass distributions but failed to meet the expectations regarding rapidity distributions. Based on these results, we have proposed a spheroidal symmetry instead, which allowed us to reproduce well the rapidity distributions of the most abundant particles measured by the HADES collaboration in Au+Au 10% central collisions at $\sqrt{s_{NN}} = 2.4$ GeV [3]. We analyse experimentally measured spectra and results from femtoscopic correlation analysis to constrain the parametrisation of the fireball's shape and expansion profile. Moreover, in light of recent publications analysing this topic [4], we extend our study to discuss different formulations of the statistical hadronisation models, aiming to understand better the statistical nature of particle production in heavy-ion collisions. We also pursue implementing a Pok Man Lo distribution [5] for the most common resonances present in few-GeV collisions: Δ^{++} and Δ^{0} for THERMINAOTOR 2.

References

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