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Baryon spectra and antiparticle/particle ratios from the improved AMPT model

The string melting version of a Multi-Phase Transport (AMPT) model can reasonably describe the dN/dy yields, p_T spectra and anistropic flows of pions and kaons at low p_T in heavy ion collisions at RHIC and LHC energies [1,2].
However, it failed to reproduce the dN/dy and p_T spectra of baryons [2,3]. For example, it overestimates the proton yield at mid-rapidity but underestimates the slope of the proton p_T spectra. In addition, antiparticle/particle ratios from the current AMPT model are unexpectedly above unity for strange baryons.

In this work we improve the quark coalescence model in AMPT.
In particular, we have removed the previous constraint that forced the total numbers of mesons, baryons, and anti-baryons in an event to be separately conserved through quark coalescence. Instead, a quark or anti-quark now has the freedom to form either a baryon or a meson, depending on the distance to its coalescence partner(s). We have also changed the order in quark coalescence: previously coalescence partners of all mesons are searched first (ahead of baryons), while now the sequence of meson and baryon formations is dynamically determined.
In this talk we will show that this improved AMPT model can describe baryons much better. In particular, the p_T spectra of protons and and Λ-baryons roughly agree with the heavy ion data at RHIC and LHC, and antiparticle/particle ratios for strange baryons also reasonably agree with the data.

[1]Z. W. Lin, Phys. Rev. C 90, 014904 (2014).

[2]G. L. Ma and Z. W. Lin, Phys. Rev. C 93, 054911(2016).

[3]Z. W. Lin, C. M. Ko, B. A. Li, B. Zhang and S. Pal, Phys. Rev. C 72, 064901 (2005).

Preferred Track

New Theoretical Developments

Collaboration

Not applicable

Author: HE, Yuncun (Central China Normal University, Wuhan)

Presenter: HE, Yuncun (Central China Normal University, Wuhan)

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