Jet flavor conversions in a quark-gluon plasma

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We have studied the effect of both elastic (gq↔qg) and inelastic (gg↔q qbar) two-body scatterings of quark and gluon jets in a quark-gluon plasma not only on their energy loss but also on the conversions between them [1]. To mimic the effect of radiative energy loss of quark and gluon jets in the quark-gluon plasma, we have multiplied the drag coefficients calculated from two-body scattering by a factor of four. We find that two-body conversion scatterings lead to a small net conversion of the quark jet to the gluon jet, resulting in a slightly larger p/π^+ and $\bar{p}/\pi^-$ ratios compared to the case without conversions between gluon and quark jets, but they are not large enough to bring these ratios in central Au+Au collisions to that in p+p collisions at same energy as shown in Fig. 1. A large conversion enhancement factor K_C of more than four, similar to that needed for the jet drag coefficients to describe the jet energy loss, is needed to explain the experimental observations. Our results thus could be another indication for the strongly coupled QGP that has been produced in central heavy ion collisions at RHIC.

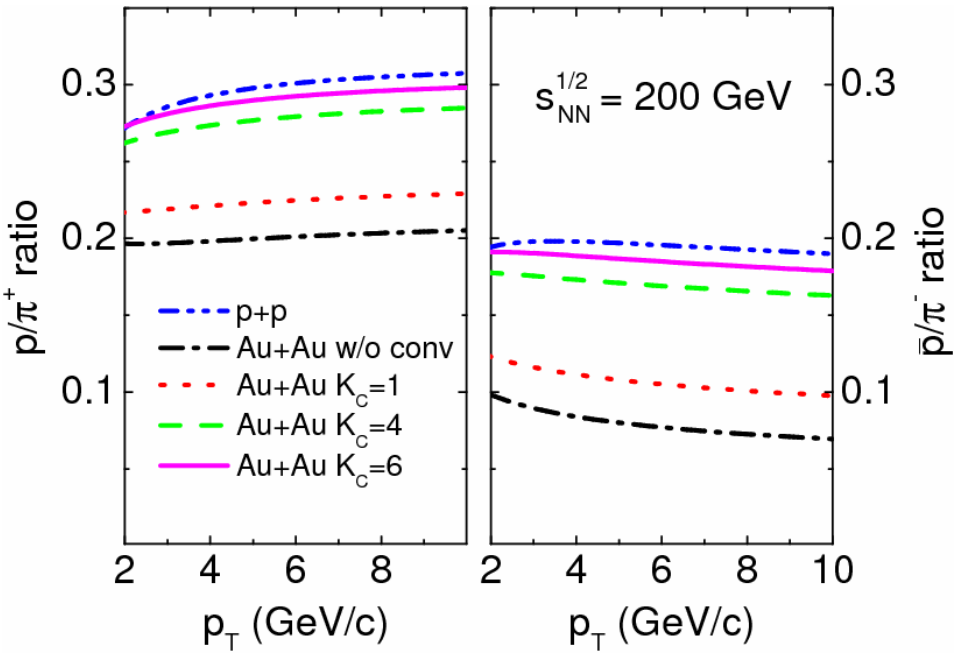

Figure 1. p/π^+ (left panel) and $\bar{p}/\pi$ (right panel) ratios from quark and gluon jet fragmentation in p+p collisions and central Au+Au collisions at $s^{1/2}_{NN}$=200 GeV as functions of momentum without or with different enhancement factor K_C for conversion scattering.

[1] W. Liu, C. M. Ko, and B. W. Zhang, Phys. Rev. C **75**, 051901(R) (2007).