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Phase diagram structure and kaon-to-pion ratios in the entanglement SU(3) PNJL model in Breit-Wigner and Beth-Uhlenbeck approaches

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Within the three-flavor PNJL and EPNJL chiral quark models we have obtained pseudoscalar meson properties in quark matter at finite temperature T and baryochemical potential μ_B.
We compare the meson pole (Breit-Wigner) approximation with the Beth-Uhlenbeck (BU) approach that takes into account the continuum of quark-antiquark
scattering states when determining the partial densities of pions and kaons.
We evaluate the kaon-to-pion ratios along the (pseudo-)critical line in the $T - \mu_B$ plane as a proxy for the chemical freezeout line, whereby the variable
$x = T/\mu_B$ is introduced that corresponds to the conserved entropy per baryon as initial condition for the heavy-ion collision experiments.
We present a comparison with the experimental pattern of kaon-to-pion ratios within the BU approach and using x-dependent pion and strange quark potentials.
A sharp "horn" effect in the energy dependence K^+/π^+ ratio is explained by the enhanced pion production at energies above $\sqrt{s_{NN}} = 8$ GeV, when
the system enters the regime of meson dominance.
This effect is in line with the enhancement of low-momentum pion spectra that is discussed as a precursor of the pion Bose condensation and entails the
occurrence of a nonequilibrium pion chemical potential of the order of the pion mass.
We elucidate that the horn effect is not related to the existence of a critical endpoint in the QCD phase diagram.
in the QCD phase diagram.

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