different time. Our current approach does not take such a space-time picture but just provide an averaged effect which is more simple and transparent than a real hydrodynamic simulation. If combination is treated locally one can still compute the entropies before and after hadronization for each space-time cell using Eq. (2) or Eqs. (5-6). The total entropy is a sum over all cells and the result is similar to the ideal case in our paper. This implies that the entropy can be described in a global and effective way as in our current model. In other words the entropy is a global quantity which should be insensitive to the local fine structure. As we have emphasized in the beginning that we do not address in our QCM the entropy issue in the context of phase transition. We just made a few comments about it. If local equilirium is reached for a closed system the entropy would not change during the transition from the quark to hadronic phase, it is the *entropy density* that changes (decreases) during the transition acompanied by the volume expansion. If the system is not in local equilibrium the phase transition is not well defined (it is indeed a crossover) but still one can obtain the total entropy which should increase. Such a study in the QCM is independent of whether the entropy increases or decreases beyond the combination process.

In summary, we have investigated the issue of the entropy in the framework of the quark combination-like model. As an example for such types of models we used the one developed by Shandong group whose exclusive nature makes a transparent calculation feasible. We used two available methods to calculate the entropies for the quark and hadronic phases, one from the Duhem-Gibbs relation, another from the entropy formula in terms of particle phase space distributions. We found that the total entropy from the Duhem-Gibbs relation always increases in hadronization if the average temperature of the hadronic phase is lower than that of the quark phase. The increase of the entropy during hadronization can also be confirmed from the entropy formula if the volume of the hadronic phase is larger than 2.5-3.0 times that of the quark phase. This implies that the expansion of the fireball takes place during hadronization and it takes finite time for the quark phase to hadronize. So whether the entropy increases or decreases during combination depends on the temperature before and after combination and on how much expansion the system undergoes during combination. The current study provides an example to shed light on the entropy issue in the quark combination model.

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