

# The 8th Asian Triangle Heavy-Ion Conference (ATHIC2021)



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## Light nuclei production and QCD critical point

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Light-nuclei production is one of the hot topics in heavy-ion collisions for the high-baryon-density region of the QCD phase diagram. It was found to exhibit a non-monotonic behavior with respect to the colliding energy in experiments and thus was suggested to be a possible signal of the QCD critical point.

This talk introduces a systematic expansion of the light-nuclei production within the framework of the coalescence model to deal with the effects of the non-trivial geometry of the fireball and flow-induced coordinate-momentum correlations of the phase-space density of nucleons. By considering the characteristic function of the phase-space density, we expand the yield of light nuclei in terms of cumulants of the phase-space density. We see that, while the second-order cumulants correspond to the Gaussian shape in phase-space, higher orders characterize various types of non-Gaussianity of the phase-space density. We find that the leading terms of the phase-space cumulants in the yields share a similar structure and can be canceled out in the ratio of light nuclei, whereas the higher-order ones remain in the ratio and play an important role. Thus the non-Gaussianity of the phase-space density of nucleons plays an important role in the interpretation of the behavior of the light-nuclei yield ratio. We also discuss the contribution of the critical correlations to the higher-order phase-space cumulants in this framework.

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