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Multi-particle azimuthal correlations with subevent cumulants method in p+Pb collisions in a multiphase transport model

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Recent observations of long-range correlations in small systems, such as p+p or p+A, challenge our understanding of the collectivity in the strongly coupling syetems. It has been shown that a multiphase transport (AMPT) model can naturally reproduce the long-range two-particle correlation in p+Pb collisions and in a good agreement with the experimental data [1]. A new subevent cumulant method is recently developed, which can significantly reduce the non-flow effects in long-range correlations for small systems [2]. In this study, we use subevent cumulant method to study multi-particle correlations in p+Pb collisions within the AMPT model. The 2nd and 4th order of multi-particle cumulants and multi-particle azimuthal correlations between different flow harmonics, SC(2,3) and SC(2,4), are numerically calculated. Our results show that $v_2\{2\}$ is consistent with the experimental data, while $v_2\{4\}$ is systematically smaller than the experimental data, which may indicate the collectivity is underestimated by the AMPT model. The SC(2,3) from the traditional cumulant method is negative at high multiplicity, while it is positive at low multiplicity. However, the SC(2,3) from the subevent cumulant methods is negative for all range of multiplicity. The SC(2,4) from the traditional cumulant method is larger than that from subevent cumulant methods. We will discuss the implication of these results, which help us to understand the origin of collectivity in small systems [3].

[1] A. Bzdak and G.-L. Ma, Phys. Rev. Lett. 113, 252301 (2014).

[2] J. Jia, M. Zhou, and A. Trzupek, Phys. Rev. C 96, 034906 (2017).

[3] M.-W. Nie and G.-L. Ma, in preparation.

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