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Intermittency analysis of proton numbers in relativistic heavy-ion collisions

Local density fluctuation near the QCD critical point has been suggested to exhibit a power-law behavior which can be probed by an intermittency analysis on scaled factorial moment (SFM) in relativistic heavy-ion collisions.

In this talk, I will firstly review recent heavy-ion experimental results on the intermittency measurement from STAR, NA49 and NA61 collaborations. These results are compared with several theoretical and phenomenological model predictions[1-3]. The collision energy and centrality dependence of the second-order SFMs are systematically investigated in Au + Au collisions at $\sqrt{s_{NN}}$ = 7.7, 11.5, 19.6, 27, 39, 62.4, 200 GeV within the UrQMD model. We estimate the non-critical background in the measurement of intermittency and suggest a cumulative variable method to effectively remove the contributions from background. We further study the effect of particle detection efficiency by implementing UrQMD events in the RHIC/STAR experimental tracking efficiencies. A cell-by-cell method is proposed for experimental application of efficiency corrections on SFM. This work can provide a guidance of background subtraction and efficiency correction for experimental measurement of intermittency in the search of QCD critical point in heavy-ion collisions.

[1]Jin Wu, Yufu Lin, Yuanfang Wu and Zhiming Li, Phys. Lett. B 801, 135186 (2020).

[2]Pengcheng Li, et al., Phys. Lett. B 818, 136393 (2021).

[3]Jin Wu, Yufu Lin, Zhiming Li, Xiaofeng Luo, and Yuanfang Wu, arXiv: 2104.11524 (2021).

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