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Features of the QCD phase diagram from small, noisy, fluctuating systems

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Statistical moments of particle multiplicities in heavy-ion collision experiments are an important probe in the exploration of the phase diagram of strongly-interacting matter and, particularly, in the search for the QCD critical endpoint. In order to appropriately interpret experimental measures of these moments, however, it is necessary to understand the role of experimental limitations, as well as background contributions, providing expectations on how critical behavior should be affected by them. We present a framework for calculating moments of particle multiplicities in the presence of correlations of both critical and spurious origins. We also include effects from resonance decay and a limited acceptance window, as well as detector efficiency. Although we focus on second-order moments, for simplicity, an extension to higher-order moments is straightforward.

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