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Quark-gluon string tension fluctuations and the effect on strange particle yields

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In various microscopic string models (see, e.g., [1–8]), the Schwinger mechanism [9, 10]—which features a characteristic Gaussian exponential—is used to describe particle transverse-momentum spectra. On the other hand, experimental data on inclusive hadron production spectra exhibit pronounced thermal behavior. A. Bialas [11] proposed resolving this contradiction by accounting for fluctuations in the string tension k , modeled by a Gaussian distribution. However, the probability distribution proposed in [11] peaked at $k = 0$, which seems physically incorrect in the context of QCD confinement: a string possesses finite average energy density, so the probability of zero tension should vanish. In the present work, we modify the Bialas approach by assessing the local string tension fluctuations around its mean value. We demonstrate that not only the mean value of the string tension but also its fluctuations influence the strangeness production, and the treatment of these fluctuations allows for a better description of strange particle yields.

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