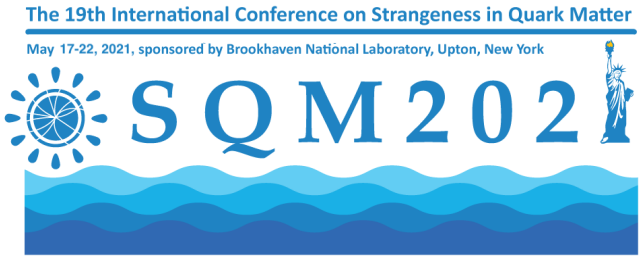

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Extracting freeze-out parameters from cumulant ratios of electric charge and strangeness fluctuations

Thursday, May 20, 2021 9:50 AM (20 minutes)

The determination of freeze-out parameters from experimental data on particle yields and higher order cumulants crucially relies on thermodynamic relations known to be valid in hadron resonance gas models. In particular, the determination of chemical potentials at the time of freeze-out, obtained from ratios of first and second order cumulants, relies on the assumption that particle fluctuations are well described by Skellam distributions. As is known from lattice QCD calculations such an assumption becomes worse with increasing values of the baryon chemical potential.

Using results from our most recent simulation campaign that used improved fermion discretization schemes on fine lattices, we provide new continuum extrapolations for mean, variance, skewness and kurtosis cumulants of electric charge and strangeness fluctuations along the pseudo-critical line, $T_{pc}(\mu_B)$, of the chiral transition. We use ratios of these cumulants to discuss deviations from Skellam distributions of conserved charge fluctuations and determine systematic differences between baryon and strangeness chemical potentials deduced from cumulant ratios when using QCD results on the one hand and relying on Skellam relations on the other hand.

Furthermore, we present first continuum estimates for hyper-skewness and hyper-kurtosis cumulant ratios for electric charge and strangeness fluctuations on the pseudo-critical line.

Collaboration

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