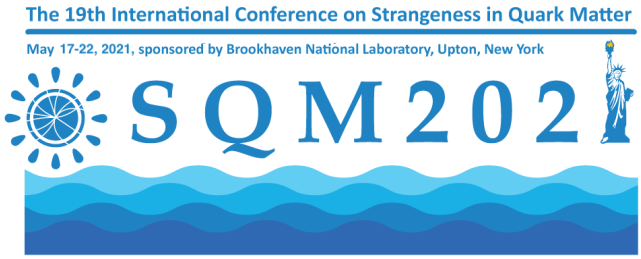

Contribution ID: **96** Type: **Theory talk**

Conserved charge fluctuations at vanishing net-baryon density from Lattice QCD

Tuesday, May 18, 2021 11:50 AM (20 minutes)

Cumulants of net charge fluctuations and their correlations at vanishing values of the conserved charge chemical potentials ($\mu_{B,Q,S} = 0$) provide the basis for Taylor expansions of various thermodynamic observables at non-zero values of the chemical potentials. At $\mu_{B,Q,S} = 0$ continuum extrapolated results for these cumulants can directly be compared with charge fluctuations and correlations currently being measured by the ALICE collaboration at the LHC.

We present here continuum extrapolated results for all second order cumulants of net baryon-number, strangeness and electric charge fluctuations as well as their cross-correlations using the most resent results obtained by the HotQCD collaboration in (2+1)-flavor QCD. From this we obtain their temperature derivatives and determine inflection points which are absent in hadron resonance gas (HRG) model calculations using a spectrum of point-like, non-interacting resonances. We present a detailed comparisons of our results with such HRG models based on different sets of hadron spectra as well as with S-matrix based model calculations. We update results on model parameters for three body and higher order S-matrix contributions to the correlation of net baryon-number and electric charge fluctuations that have been used to explain the so-called proton anomaly observed by ALICE at the LHC.

We furthermore compare our lattice QCD results for second order cumulants with models that parametrize repulsive interactions among baryons and anti-baryons in a hadron resonance gas through a single excluded volume parameter (EVHRG). We point out that such an approach is not sufficient to describe all second order cumulants simultaneously. At least independent excluded volume parameter for strange and non-strange baryons would be needed already for the description of second order cumulants.

Collaboration

HotQCD

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