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A New Way to Compute the Pseudoscalar Screening Mass at Finite Chemical Potential

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We present a new way of computing the pion screening mass at finite isoscalar chemical potential μ_ℓ, starting from the Taylor expansion of the screening correlator in μ_ℓ. The method derives from the known exact expression for the free theory pion screening correlator at finite μ_ℓ. As a first check of the formalism, we compare the lattice results for the free theory screening correlator and its derivatives, obtained on an $80^3 \times 8$ lattice with HISQ/tree fermions, with the corresponding theoretical expressions. We find good agreement, thus verifying our approach. We then apply our formalism to calculate the $\mathcal{O}(\mu_\ell^2)$ correction to the pion screening mass for two temperatures in the range $2\,\mathrm{GeV} < T < 3\,\mathrm{GeV}$, using $N_f = 2 + 1$ flavors of HISQ/tree fermions on $64^3 \times 8$ lattices. We conclude with some general remarks concerning the scope of the present study and its relation to other approaches.

Topical area

QCD at Non-zero Density

Primary authors: Dr HEGDE, Prasad (Indian Institute of Science, Bengaluru.); Dr THAKKAR, Rishabh (Central China Normal University, Wuhan)

Presenter: Dr HEGDE, Prasad (Indian Institute of Science, Bengaluru.)

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