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Mapping critical region in the on-shell renormalized 2+1 flavor Polyakov quark meson model

The critical region around the critical end point (CEP) has been mapped in the 2+1 flavor renormalized Polyakov quark meson (RPQM) model. The consistent treatment of the quark one-loop vacuum fluctuations, gives the improved chiral effective potential of the renormalized quark meson (RQM) model, where the parameters are fixed by relating the counterterms in the on-shell (OS) scheme to those in the minimal subtraction $\overline{\text{MS}}$ scheme. The $U_A(1)$ anomaly strength gets significantly stronger and the light (strange) explicit chiral symmetry breaking strength becomes weaker by a small (relatively large) amount after renormalization in the RQM model. The effect of the above novel features, on the extent of critical fluctuations around the critical end point, has been quantified by drawing the contours of enhanced quark number susceptibility in the presence as well as the absence of the Polyakov loop potential. The results thus obtained, have been compared with the existing studies where the quark one-loop vacuum fluctuations are included but the model parameters get fixed by using the curvature masses of the mesons.

Field of contribution

Phenomenology

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