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QCD phase diagram using PNJL model with eight-quark interactions

Content :

We reformulate the 2+1 flavour PNJL model in two aspects. One modification is in NJL sector which we will discuss here, where we have incorporated eight-quark interaction to obtain a bound vacuum structure. The other modification is in Polyakov loop sector of PNJL model, where we have incorporated the effect of unitarity of the traced Polyakov loop through the Van der Monde determinant. In our work we have studied the phase diagram of PNJL model with unbounded and bounded potential. We have shown that the critical end point (CEP) shifts to the lower chemical potential and higher temperature for the bounded effective potential, which is more closer to the lattice data. Fluctuations of any conserved charges are very important aspects since they give the physical picture of matter formed at heavy ion colliders. In our work we have computed the correlation between the conserved charges- baryon number, electric charge and strangeness and compare our results with the available lattice data. The comparison shows that the PNJL model results are reasonably close to the lattice data. We have also studied the specific heat and the speed of sound for the PNJL model. The specific heat shows a peak at the transition point and it converges very well to the conformal limit at high temperature.

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