



Contribution ID: 2

Type: **not specified**

Model Investigation of QCD thermodynamics and phase diagram

Tuesday 8 May 2012 09:30 (30 minutes)

We consider the $(2 + 1)$ flavor Polyakov Quark Meson Model (PQM) and study the effect of including fermion vacuum fluctuations on the thermodynamics and phase diagram. The variation of the thermodynamic quantities across the phase transition region becomes smoother.

This results in better agreement with the lattice QCD (LQCD) data. The critical end point is pushed into higher values of the chemical potential. We then go on to study the fluctuations (correlations) of conserved charges in PQM upto sixth (fourth) order. Comparison is made with LQCD wherever available and overall good qualitative agreement is found, more so for the case of the normalised susceptibilities. Our study provides a solid basis for the use of PQM as an effective model to understand the topology of the QCD phase diagram.

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