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Thermodynamic quark susceptibilities in the PNJL model

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The Monte-Carlo method is applied to the Polyakov-loop extended Nambu–Jona-Lasinio (PNJL) model. This allows to go beyond the saddle-point approximation in a mean-field calculation and introduces fluctuations around the mean fields. We study the impact of fluctuations on the thermodynamics of the model, in the two quark flavors case. We calculate the second order Taylor expansion coefficients of the thermodynamic grand canonical partition function with respect to quark chemical potential and present a comparison with extrapolations from lattice QCD. We show that fluctuations are necessary in order to reproduce lattice data for the flavor non-diagonal expansion coefficients. Of particular importance are pion fields, the contribution of which is found to be highly volume dependent. This opens the question of what would be the behavior of such quantities on the lattice, in the infinite volume limit.

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talk

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