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Quark-hadron phase transition in the PNJL model with mesonic and baryonic excitations

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We study the QCD phase transition by a Nambu-Jona-Lasinio model extended with the Polyakov loop. This model was proposed by combining the Nambu-Jona-Lasinio model which describes the chiral transition and the Polyakov loop which works as an order parameter of de-confinement transition. The aim of this work is to describe the change of degrees of freedom from hadrons to quarks through the transition region. For this purpose, we calculated an equation of state by an approach beyond the mean field approximation to take thermal excitations of hadrons into account. We will present an equation of state concerning mesonic excitations at zero quark chemical potential in the PNJL model for interacting quarks. In addition, we have thought the way to introduce baryonic correlation as the three body system of quarks at finite chemical potential. We will also discuss about that.

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