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Quark-hadron phase transition in a three flavor PNJL model

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We extend our previous study of the quark-hadron phase transition at finite temperatures with zero net baryon density by two flavor Nambu-Jona-Lasinio model with Polyakov loop [1] to the three flavor case. At low temperatures, only mesonic correlations, mainly due to mesonic collective excitations, dominate the pressure while thermal excitations of quarks are suppressed by the Polyakov loop. As temperature increases, mesonic collective modes melt into the continuum of quark and anti-quark so that hadronic phase changes continuously to the quark phase where quark excitations dominate pressure. We add the gluon pressure in a phenomenological way through the effective potential for the Polyakov loop. Since we introduce mesons as not elementary fields but auxiliary fields made from quarks, we can describe the phase transition between hadronic phase and quark phase in a unified fashion.

[1] Kanako Yamazaki and T.Matsui, arXiv:1212.6165 [hep-ph].

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