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Spectral function of a fermion coupled with a massive vector particle at finite temperature— analysis on gauge dependence in the Stueckelberg formalism DAISUKE SATOH, YOSHIMASA HIDAKA, TEIJI KUNIHITO, Kyoto University — Effective chiral models of QCD suggest that hadronic collective excitations may exist even in the quark gluon plasma(QGP) phase. In turn, the coupling with such a collective mode can lead to a drastic change in the quark quasi-particle picture. We analyze the spectral function of a fermion coupled with a massive vector collective mode at finite temperature in the one-loop order in the Stueckelberg formalism, which has a gauge invariance and is renormalizable so that the correct high temperature limit can be obtained. It is known that the pole position of the fermion propagator is generically independent of the gauge fixing condition, although the residue of the pole has a gauge dependence. In perturbation theory, however, even the pole can also artificially depend on the gauge fixing condition owing to the truncation of the higher order terms. In fact, the pole as well as the residue of the fermion propagator show a dependence on the gauge in our numerical calculation. In this presentation, we are going to propose a prescription to obtain the pole in a gauge-independent way, and discuss the possible quasi-particle picture of a fermion coupled with a massive vector mode.

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