XXV International Baldin Seminar on High Energy Physics Problems
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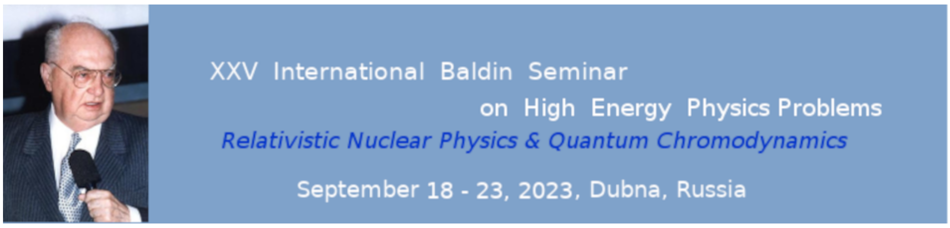

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Temperature Dependence of Gluon Propagators within a Rainbow Truncation of Dyson-Schwinger Equations

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We investigate the finite-temperature structure of ghost and gluon propagators within an approach based on the rainbow truncated Dyson-Schwinger equations in the Landau gauge. The method early used for modeling quark, ghost and gluon propagators in vacuum is extended to finite temperatures. In Euclidean space, within the Matsubara imaginary-time formalism, it is necessary to distinguish between the transversal and longitudinal, with respect to the heat bath, gluon dressing functions for which the Dyson-Schwinger equation splits into the corresponding system of coupled equations. This system is considered within the rainbow approximation generalized to finite temperatures and solved numerically. The solutions to the ghost and gluon propagators are obtained as functions of temperature T, Matsubara frequency Ω_n and three-momentum squared $\mathbf{k}^2$. The effective parameters of the approach are taken from our previous fit of the corresponding Dyson-Schwinger solution to the lattice QCD data at zero temperature. In solving the coupled system of the Dyson-Schwinger equations at finite temperatures, the model parameters are treated as constants independent of temperature. It is found that for zero Matsubara frequency, the dependence of the ghost and gluon dressing functions on $\mathbf{k}^2$ are not sensitive to the temperature T, while at $\mathbf{k}^2 = 0$ their dependence on T is quite strong. The dependence on the Matsubara frequency Ω_n is investigated as well. The performed numerical analysis of the solution to the Dyson-Schwinger equations shows that at a certain value of the temperature $T_0 \sim 150$ MeV the iteration procedure no longer converges. In the vicinity of T_0, the longitudinal gluon propagator increases quite fastly, whereas the transversal propagator does not exhibit any irregularity. This is in qualitative agreement with the results obtained within the QCD lattice calculations in this temperature interval.

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