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Refined Gribov-Zwanziger theory coupled to scalar fields in the Landau gauge

The Refined Gribov-Zwanziger (RGZ) action in the Landau gauge accounts for the existence of infinitesimal Gribov copies as well as the dynamical formation of condensates in the infrared of Euclidean Yang-Mills theories. We couple scalar fields to the RGZ action and compute the one-loop scalar propagator in the adjoint representation of the gauge group. We compare our findings with existing lattice data and also comment on a previous proposal for a non-minimal coupling between matter and the RGZ action. We find good agreement with the lattice data of the scalar propagator for the values of the mass parameters that fit the RGZ gluon propagator to the lattice. This suggests that the non-perturbative information carried by the gluon propagator in the RGZ framework provides a suitable mechanism to reproduce the behavior of correlation functions of colored matter fields in the infrared.

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