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# A covariant variational approach to Yang-Mills theory

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We investigate the low-order Green's functions of *SU(N)* Yang-Mills theory in Landau gauge, using a covariant variational principle based on the effective action formalism. Employing an approximation to the Faddeev-Popov determinant established previously in the Hamiltonian approach in Coulomb gauge leads to a closed and renormalizable set of integral equations for the ghost and gluon propagator. We perform a full infrared analysis of this system, solve it numerically and compare our results to findings from lattice gauge theory and other functional approaches. We also discuss formal aspects such as the lack of full BRST symmetry and its implications on confinement in our approach. Furthermore, we demonstrate how the system can be extended to finite temperatures and search the renormalized numerical solution for signals of a phase transition in the shape of the propagators and, in particular, in the infrared exponents. Finally, we discuss briefly the inclusion of fermions and how the method could be extended to non-zero chemical potential.

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