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Functional approaches to infrared Yang-Mills theory in the Coulomb gauge

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Abstract content

Over the last years, valuable insight into the deep infrared region of SU(N) Yang-Mills theory in the Coulomb gauge has been obtained with the help of functional methods. I describe how a Gaussian ansatz for the vacuum wave functional leads, via the variational principle, to equations of the Dyson-Schwinger type for the equal-time gluon and ghost propagators. I will present the numerical and analytical (infrared) solutions of these equations and comment on the corresponding results of lattice calculations. I will also mention the problems that arise in this approach when calculating the color-Coulomb potential between static color sources (heavy quarks). Finally, I present a similar approach which uses an adaptation of the functional (Wilsonian) renormalization group to the Hamiltonian formulation of Yang-Mills theory and leads to a nearly linearly rising color-Coulomb potential.

Summary

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