

Gluon mass generation and infrared Abelian dominance in Yang-Mills theory

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Abstract: The dual superconductivity is believed to be a promising mechanism for quark confinement. Indeed, what this picture is true has been confirmed in the maximal Abelian (MA) gauge. However, it is not yet confirmed in any other gauge and the MA gauge explicitly breaks color symmetry. To remedy this defect, we propose to use our compact formulation of a non-linear change of variables corresponding to the Cho-Faddeev-Niemi (CFN) decomposition on a lattice. This formulation has succeeded to extract the magnetic monopole with integer-valued magnetic charge in the gauge-invariant way. In this talk, we present measurements of various correlation functions for the operators constructed from the CFN variables in SU(2) Yang-Mills theory. Some of our results reproduce previous results obtained in MA gauge, e.g., DeGrant-Toussaint monopole, infrared Abelian dominance and off-diagonal gluon mass generation. These studies preserve color symmetry, in sharp contrast to the conventional MA gauge. We argue the gauge fixing independence of these results and the implications to quark confinement.