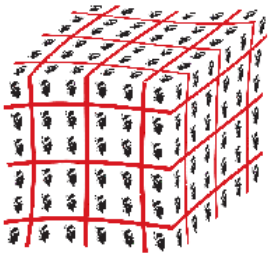

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Gauge-independent "Abelian" dominance and magnetic monopole dominance in SU(3) Yang-Mills theory

Friday, 18 June 2010 17:20 (20 minutes)

Recently we have proposed a new reformulation of Yang-Mills (YM) theory based on new variables on a lattice by extending the Cho-Faddeev-Niemi-Shabanov decomposition. Our reformulation allows options discriminated by the stability group $\tilde{H}$ of the gauge group G. When $\tilde{H}$ agrees with the maximal torus group H, it reduces to a manifestly gauge-independent reformulation of the conventional Abelian projection in the maximal Abelian gauge. Within this framework, a non-Abelian Stokes theorem enables us to express the Wilson loop operator in the fundamental representation by the "Abelian" variable extracted in association with the stability group in the minimal option, and to rewrite the Wilson loop operator using a non-Abelian magnetic monopole defined in a manifestly gauge-independent way.

For $G = SU(3)$, two options are possible: minimal one with $\tilde{H} = U(2)$ and maximal one with $\tilde{H} = H = U(1) \times U(1)$. In this talk we summarize the results of Monte Carlo simulations for $SU(3)$ in the minimal option. Especially, we compare three Wilson loop averages defined by the Abelian" variable, the monopole part and the original YM field. We confirm that the quark–antiquark confining potential is reproduced by theAbelian" variable ("Abelian" dominance), and that the string tension is reproduced by the non-Abelian magnetic monopole (magnetic monopole dominance).
Moreover, we mention the behaviors of correlation functions for new variables.

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talk

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