

XVth Quark Confinement and the Hadron Spectrum



Contribution ID: 163

Type: Oral

Color-magnetic correlation in SU(3) lattice QCD

Tuesday 20 August 2024 16:00 (20 minutes)

Motivated by color-magnetic instability in QCD [1,2], we investigate spatial color-magnetic correlation in SU(2) and SU(3) lattice QCD. In the Landau gauge, we numerically obtain the spatial color-magnetic correlation $\langle H_z^a(\mathbf{x})H_z^a(\mathbf{x} + \mathbf{r}) \rangle$. Curiously, the correlation is found to be always *negative* for \mathbf{r} on xy -plane, apart from the same-point correlation. This behavior seems fairly different from the Savvidy/Copenhagen vacuum [1,2]. From an analytical expression of the gluon propagator $\langle A_\mu^a(x)A_\mu^a(x) \rangle \propto \frac{e^{-mr}}{r}$ [3] in the Landau gauge, we obtain an analytic form of the magnetic correlation, which agrees with the lattice QCD data.

[1] G.K. Savvidy, Phys. Lett. B71 (1977) 133.

[2] H.B. Nielsen and P. Olesen, Nucl. Phys. B160 (1979) 380.

[3] T. Iritani, H. Suganuma and H. Iida, Phys. Rev. D80 (2009) 114505.

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Session Classification: Vacuum Structure and Confinement

Track Classification: A: Vacuum Structure and Confinement