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Confinement/deconfinement phase transition in the $SU(3)$ Yang-Mills theory: center symmetry and Meissner effect

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 The dual superconductivity is a promising mechanism for quark confinement. We have presented a new formulation of the Yang-Mills theory on the lattice, and pointed out that the $SU(3)$ Yang-Mills theory has a new way of reformulation using new field variables (minimal option), in addition to the conventional option adopted by Cho, Faddeev and Niemi (maximal option). In the preceding works, we have accumulated the numerical evidences that support the non-Abelian dual superconductivity using the minimal option for the SU(3) Yang-Mills theory.

 In this talk, we focus on the confinement/deconfinement phase transition from the viewpoint of the dual superconductivity. The confinement/deconfinement phase transition is conventionally detected by using center symmetry unbroken/spontaneous breaking. In view of the dual superconductivity, the confinemenet/deconfinement phase transition must be described by the phase transition dual Meissner effect at finite temperature. For this purpose, we measure the distribution of the chromoelectric flux connecting a quark and an antiquark and the induced magnetic-monopole current around the flux tube which is the candidate of the order parameter for the confinement/deconfinement phase transition. Finally, we will discuss the relation between center symmetry and the dual Meissner effect. </P>

Primary author: SHIBATA, Akihiro (Computing Research Center, KEK)

Co-authors: KONDO, Kei.-Ichi (Chiba University); KATO, Seikou (National Institute of Technology,Oyama College)

Presenter: SHIBATA, Akihiro (Computing Research Center, KEK)

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