



Contribution ID: 171

Type: **not specified**

Reformulations of the Yang-Mills theory toward quark confinement and mass gap

Monday 8 September 2014 16:30 (30 minutes)

We propose a reformulation of the $SU(N)$ Yang-Mills theory toward quark confinement and mass gap. In fact, we have given a number of new reformulations for the $SU(N)$ Yang-Mills theory using new field variables, other than the framework given by Cho, Faddeev and Niemi, which is included in our reformulations as a special case called the maximal option. The advantage of the reformulations is that the original non-Abelian gauge field variables can be changed into the new field variables such that one of them called the restricted field gives the dominant contribution to quark confinement in the gauge-independent way. The reformulation is suggested from the $SU(N)$ extension of the Diakonov-Petrov version of the non-Abelian Stokes theorem for the Wilson loop operator. Especially, in the minimal option, the restricted field is non-Abelian $U(N-1)$ and involves the non-Abelian magnetic monopole. This suggests the non-Abelian dual superconductivity picture for quark confinement. This should be compared with the maximal option: the restricted field is Abelian $U(1) \times U(1)$ and involves only the Abelian magnetic monopole, just like the Abelian projection. We give some applications of this reformulation, e.g., large N treatment for deriving the dimensional transmutation and understanding the mass gap, stability for the homogeneous chromomagnetic condensation of the Savvidy type, numerical simulations (given by Dr. Shibata), etc.

Author: Prof. KONDO, Kei-Ichi (Chiba University, Japan)

Co-authors: Dr SHIBATA, Akihiro (KEK, Japan); Dr KATO, Seikou (Fukui National College of Technology, Japan); Dr SHINOHARA, Toru (Chiba University, Japan)

Presenter: Prof. KONDO, Kei-Ichi (Chiba University, Japan)

Session Classification: Parallel I: A2 Vacuum structure and confinement

Track Classification: Section A: Vacuum Structure and Confinement