

**Color confinement mechanism and the vacuum type of $SU(2)$
gluodynamics**

Presenter: Tsuneo Suzuki

T. Suzuki, M.N. Chernodub, K. Ishiguro, Y. Mori, Y. Nakamura, M.I. Polikarpov, T. Sekido

Abstract: The vacuum type of $SU(2)$ gluodynamics is studied with the use of Monte-Carlo simulations in Maximally Abelian (MA) gauge and in Landau (LA) gauge. Correlations between Wilson loops and electric fields are observed to measure the penetration length. The coherence length is shown to be fixed in MA gauge from measurements of the monopole density around a static quark-antiquark pair. It is also shown numerically that a dimension 2 gluon operator (A^+A^-) and the monopole density has a strong correlation. The coherence length can be fixed also from the correlations between Wilson loops and (A^+A^-) and $(A_\mu^\alpha)^2$ in MA gauge. Expecting the same physics works in Landau gauge, we determine the coherence length from correlations between Wilson loops and $(A_\mu^\alpha)^2$. Penetration lengths and coherence lengths in two gauges are almost the same. The vacuum types of the confinement phase in both gauges are found to be near the border between the type 1 and the type 2 dual superconductors, although the continuum limit is not studied yet.