Color confinement and the Faddeev-Popov ghosts in Coulomb gauge QCD

Presenter: Yoshiyuki Nakagawa — Research Center for Nuclear Physics, Osaka
Y. Nakagawa, A. Nakamura, T. Saito, and H. Toki

To understand the mechanism of color confinement in quantum chromodynamics is a key issue in particle and nuclear physics. In the Gribov-Zwanziger scenario the Faddeev-Popov ghosts play a significant role in the infrared dynamics. In Coulomb gauge, the importance of the ghosts in the infrared region is transparent. Recent lattice QCD simulations showed that the instantaneous interaction energy between quarks rises linearly at large quark separations and is stronger than the static potential. Because the kernel of the instantaneous interaction contains the inverse of the Faddeev-Popov operator twice, the strong confining feature of the instantaneous interaction originates from the infrared singular behavior of the ghost propagator. In this talk we discuss the infrared behavior of the ghost propagator in Coulomb gauge QCD.