Gluon propagators in linear covariant gauge: a lattice study

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In the so-called Gribov-Zwanziger confinement scenario for Landau gauge [1, 2] the gluon propagator $D(p^2)$ is predicted to be infrared suppressed at small momenta. In particular, one should have $D(0) = 0$, implying that reflection positivity is maximally violated. This violation of reflection positivity may be viewed as an indication of gluon confinement [3]. On the other hand, recent lattice results [4] seems to indicate that $D(0)$ is finite and nonzero in three and in four space-time dimensions.

At the same time, little is known about possible extensions of the Gribov-Zwanziger confinement scenario to the linear covariant gauge, which is a generalization of Landau gauge. Here, we present preliminary results for the transverse and longitudinal gluon propagators in linear covariant gauge, using Monte Carlo numerical simulations in lattice gauge theory. We also discuss details of the numerical procedures introduced by us for fixing the linear covariant gauge on the lattice.