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The infrared dynamics of the three-gluon vertex

The infrared behavior of the three gluon vertex is one of the most prominent subjects of study in current non perturbative QCD, playing a central role in dynamical gluon mass generation through the Schwinger mechanism and being an essential ingredient in the Bethe-Salpeter equation which governs glueballs. However, the analysis of this vertex through Schwinger-Dyson equations (SDEs) is difficult, due to its rich tensor structure and the complexity of the SDE that it satisfies. Instead, in this preliminary study we aim to determine the non-transverse part of the three gluon vertex by solving the Slavnov-Taylor identity (STI) that relates it to the ghost-gluon scattering kernel. The later is computed by solving a truncated SDE that is much simpler than that of the three gluon vertex. When the ghost-gluon scattering kernel is then used as input for the STI of the three gluon vertex, we obtain for its non transverse form factors results that are in qualitative agreement with those found in lattice simulations and, in particular, display a zero-crossing, a feature that has been widely discussed in recent literature.

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