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Gluon mass through massless bound states excitations.

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Recent large-volume lattice simulations have established that, in the Landau gauge, the gluon propagator is infrared-finite.
The most natural way to explain this observed finiteness is the generation of a nonperturbative, momentum-dependent gluon mass.
Such a mass may be generated without compromising the gauge-invariance of the fundamental QCD Lagrangian
by employing the famous Schwinger mechanism in d=4. The main assumption underlying this mechanism is that the interaction vertices of the theory contain masslesss poles, originating from the dynamical formation of
massless bound-state excitations. In this work we demonstrate that this key assumption is indeed realized by the QCD dynamics. Specifically, the corresponding Bethe-Salpeter equation describing the aforementioned massless excitations is solved under certain approximations,
and non-trivial solutions are obtained.

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