

# Spectrum of very excited flux tubes in SU(3) gauge theory

*Friday 24 September 2021 09:15 (5 minutes)*

As gluons, the force carriers of strong interactions, have color charge; the gluonic field is squeezed in space-time due to the self interaction and forms a flux tube in the vacuum; this is in contrast to the electromagnetic field spreading out in space. The dominant behavior of the flux tube is string-like, hence, it can be modeled with a thin relativistic string. The quantization of the string leads to a tower of levels. The simplest model of a quantum string is known as the Nambu-Goto string model. We study the spectrum of the flux tubes between quark and antiquark for pure SU(3) gauge using lattice QCD in 3+1 dimension. We could get a significant number of excitations for different symmetries of the flux tube. To accomplish this goal, we used a large set of appropriate operators, different lattice QCD actions besides smearing techniques and solving generalized eigenvalue. Moreover, we compare our results with the Nambu-Goto string model to see the deviation from it, which could be a signal for novel phenomena beyond the model.

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**Session Classification:** Quantum Materials and Quantum Technologies (Posters)

**Track Classification:** Quantum Materials and Quantum Technologies