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Glueball-glueball scattering and the glueballonium

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The scalar glueball G is the lightest particle of the
Yang-Mills sector of QCD, with a lattice predicted mass of about
mG⊠1.7 GeV. It is natural to investigate glueball-glueball
scattering and studying the possible emergence of a bound state,
that we call glueballonium. We perform this study in the context of a
widely used dilaton potential, that depends on a single parameter ΛG. We consider a unitarization prescription that allows us to predict the lowest partial waves in the elastic window. These quantities can be in principle calculated on the
lattice, thus offering possibility for testing the validity of the dilaton
potential and an independent determination of its parameter. Moreover, we
also show that a stable glueballonium exists if ΛG is small enough. In particular, for
ΛG compatible with the expectations from the gluon condensate, the glueballonium has a mass of about 3.4 GeV.

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