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On the high-energy amplitudes for forward Higgs production in the infinite-top-mass limit

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We consider the one-loop effective vertex for the interaction of a gluon with a Reggeized gluon and a Higgs boson in the infinite-top-mass limit. This vertex enters the calculation of differential cross sections for the forward inclusive production of a Higgs boson in high-energy proton-proton collisions, possibly in association with a backward jet or identified hadron, in a framework where next-to-leading logarithms of the energy are resummed to all orders. It is extracted from the high-energy behavior of two-to-two amplitudes for the Higgs production in parton-parton collisions and relies on the validity of the Regge form for these amplitudes. However, the latter assumption if far from obvious in the infinite-top mass limit if the Standard Model gluon-Higgs interaction is described by a 5-dimensional non-renormalizable operator. This issue is carefully discussed. We examine also the applicability of the high-energy calculation technique, based on the separation of rapidity regions, for the extraction of the vertex and the comparison with the calculation based on the Lipatov effective action.

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