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Mathematical aspects of the scattering amplitude for $H \rightarrow gg$ within the loop-tree duality

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The phenomenological application of the Higgs boson production via gluon fusion has been extensively studied in the full theory of the standard model and in the effective field theory approach where the Higgs boson couples directly to gluons. The latter is straightforwardly obtained by considering the heavy top mass limit. In this talk, following the ideas of universal dual amplitudes in the loop-tree duality formalism [Eur.Phys.J. C78 (2018) no.3, 231], we analyse the one-loop amplitude $H \rightarrow gg$ in the large top mass limit. In fact, we show that independently of the particles running in the loop (scalar, quarks, vector bosons and gluons), we recover the same functional structure. We present the decay width of $H \rightarrow gg$, in which local UV renormalisation and local IR cancellation are done by means of the four-dimensional-unsubtraction method.

Authors: TORRES BOBADILLA, William Javier (IFIC CSIC-UV);   RODRIGO, German (IFIC CSIC-UV)

Presenter: TORRES BOBADILLA, William Javier (IFIC CSIC-UV)

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