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# Higgs Boson Production via Quark mediated Gluon Fusion at High Energy at Next-to-Next-to-Leading Power in Quark Mass

*Friday, 17 February 2023 11:45 (15 minutes)*

In perturbative QCD, processes involving quark scattering provide the simplest way of studying non-Abelian scattering amplitudes. To that end, in this talk I will discuss our calculation for the Form Factor of the Higgs boson production via light quark mediated Gluon Fusion process in the high energy/small quark mass limit, where the leading contribution comes in the form of large double logarithms for each power of the strong coupling constant ($\alpha$_s). We reproduced the leading coefficient (Next-to-Leading order in quark mass ($m$_q)) for the asymptotic expansion of the form factor in the high energy approximation; and extended the analysis to next coefficient which is at Next-to-Next-to-Leading order ($O(m\_q^3)$). Three distinct sources of diagrams contribute to this coefficient at this order; the complete analytic result for which is presented at three loops. We also present all order analysis in the large-N_c limit of QCD as well as for the opposite Abelian limit. Our results provide a universal estimate of the light quark effects at the higher orders for both the Higgs boson production and decay processes.

## Supervisor

Alexander Penin

## Funding Agency

University of Alberta

## Supervisor Email

penin@ualberta.ca

## Your Email

smodi@ualberta.ca

**Primary author:**   MODI, Sneh (University of Alberta)

**Co-author:**   Prof. PENIN, Alexander

**Presenter:**   MODI, Sneh (University of Alberta)

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