

# Asymptotic expansions and causal representations through the loop-tree duality

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Precision calculations needed to disentangle SM predictions from BSM effects involve the calculation of higher-order quantum corrections which pose technical challenges. An alternative to the traditional method has been proposed in the form of the loop-tree duality theorem. We present a newly found purely causal representation of the dual integrands and the definitions of several classes of multiloop topologies as well as their loop-tree duality representations. While the effectiveness of employing the loop-tree duality for obtaining asymptotic expansions has been shown previously in the large-mass limit for Higgs production through gluon fusion, we derive a more general method for asymptotic expansion of scattering amplitudes within the loop-tree duality formalism. We apply and analyse this method for the scalar two- and three-point functions at one-loop order and apply it to highly boosted Higgs boson production.

## Abstract

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