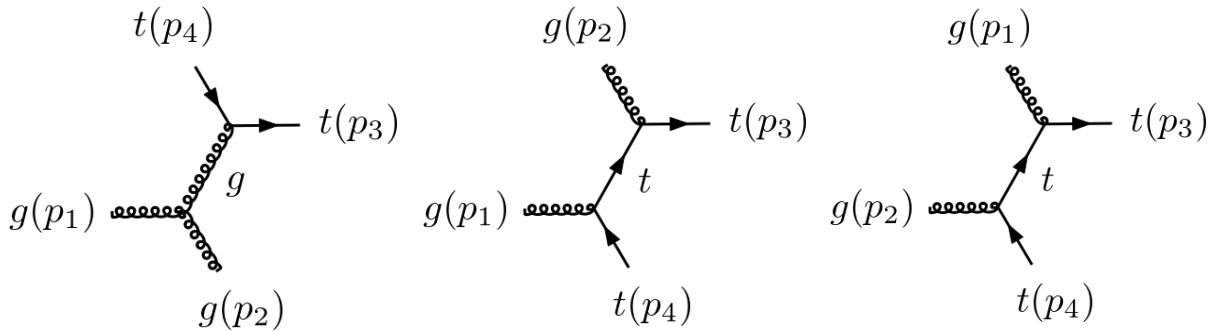


Tutorial summary

Objective : Calculate the partonic cross-section for the $gg \rightarrow tt$ process at the tree level. It has been chosen for this tutorial because it is relevant for LHC phenomenology, and that it relies on many different features to obtain an exact result (γ -matrices algebra, $SU(N)$ algebra, ghosts and gauge invariance...).



We thus think that this example is a good demonstration of what MARTY can do and how it could be used for BSM phenomenology.

The tutorial will be divided in 4 parts :

- **Presentation** of MARTY and the calculation (*~15 min*).
- **Minimal model building** : $SU(3)$ symmetry with one fermion field for the top quark, done in the MARTY program (*~10 min*).
- **Symbolic calculation** at the tree level of the partonic differential cross-section $d\sigma(gg \rightarrow tt)$ with MARTY (*~10 min*).
- **Numerical analysis** of the cross-section, integrating it over the polar angle and plotting the results against values from the PDG (2020 edition). This part will be a mix between C++ using the C++ library generated automatically by MARTY for the cross-section numerical evaluation, and python for plotting (*~25 min in total*).

Installation instructions

The tutorial will be demonstrative, but one is free to download MARTY and follow it by testing the program step by step. In that case I can answer questions one might have by trying to do the tutorial at home or at work (compilation, execution...) in the limit of the time slot we have.

One should download the 1.21 version of MARTY on the website a bit before the tutorial to have time to properly build and install it: <https://marty.in2p3.fr/download.html>

Installation instructions are given on the same page. It is also perfectly possible to follow the tutorial without trying the code at home !

See you on Wednesday !