Loop Tutorial

- Continue tutorial of yesterday

  ➡ Scan on top pair production

- Compare loop-induced process with Higgs Effective Theory:

  ➡ Compare the cross-section for g g > h

    ❑ In "heft" model

    ❑ In sm (g g > h [QCD])

  ➡ Compare the jet transverse momenta for "g g > h g" in both theory

Cross-section

- HEFT:

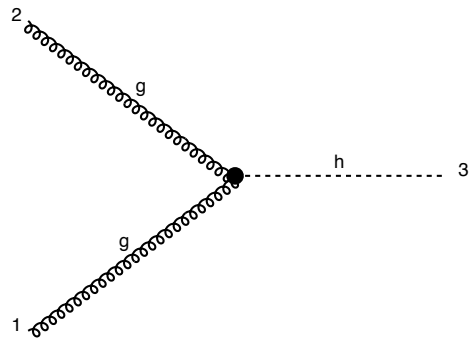   ➡Import model heft; generate g g > h; output; launch

    ➡17.62 pb

- SM:

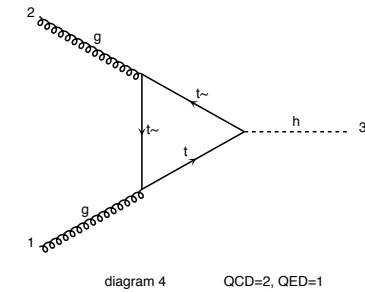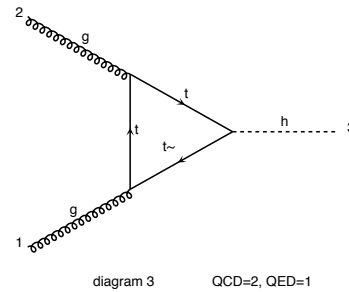   ➡Import model sm; generate g g > h [QCD];output;launch
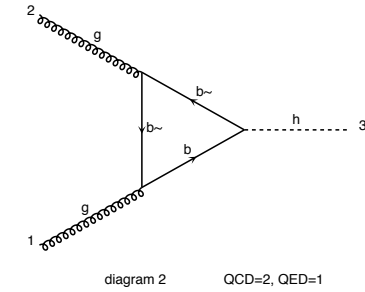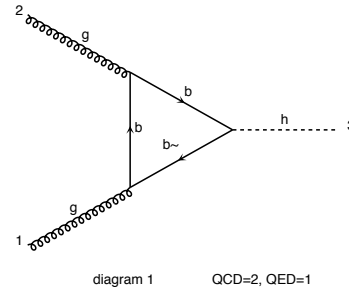
    ➡ 15.69 +- 0.05053 pb

    ➡ Why so different?

Feynman diagram

• HEFT

• SM

- Remove the "b" loop:

 ➡ Import model sm-no_b_mass; generate g g > h [QCD];output;launch

  ➡ 17.59 pb

  ➡ The "b" loop itself is negligeable, the impact here is 100% the interference term.

  ➡ The lighter quark (mainly c) have the same effect (at the level of the percent)

process	EFT	Exact loop-Induced (LI)	Exact loop-Induced $m_b = 0$ (NoB)
$gg \to h$	19.996(4) pb	17.79(6) pb	19.94(4) pb
$pp \to hj$	13.41(2) pb	12.86(4) pb	13.24(4) pb
$pp \to hjj$	6.31(2) pb	6.18(2) pb	6.13(1) pb

PT distribution
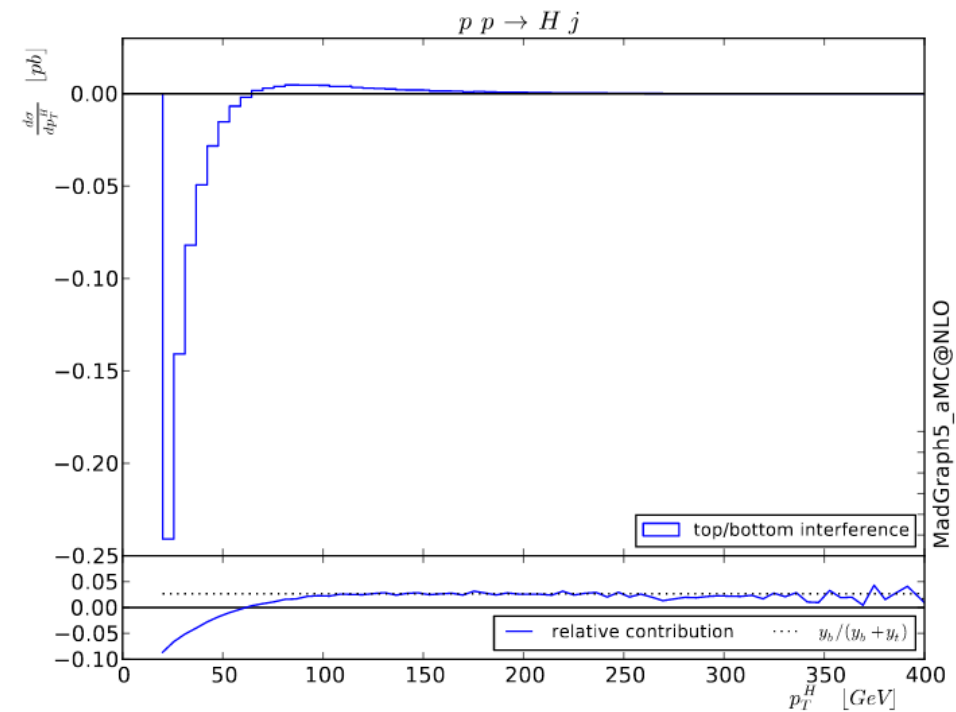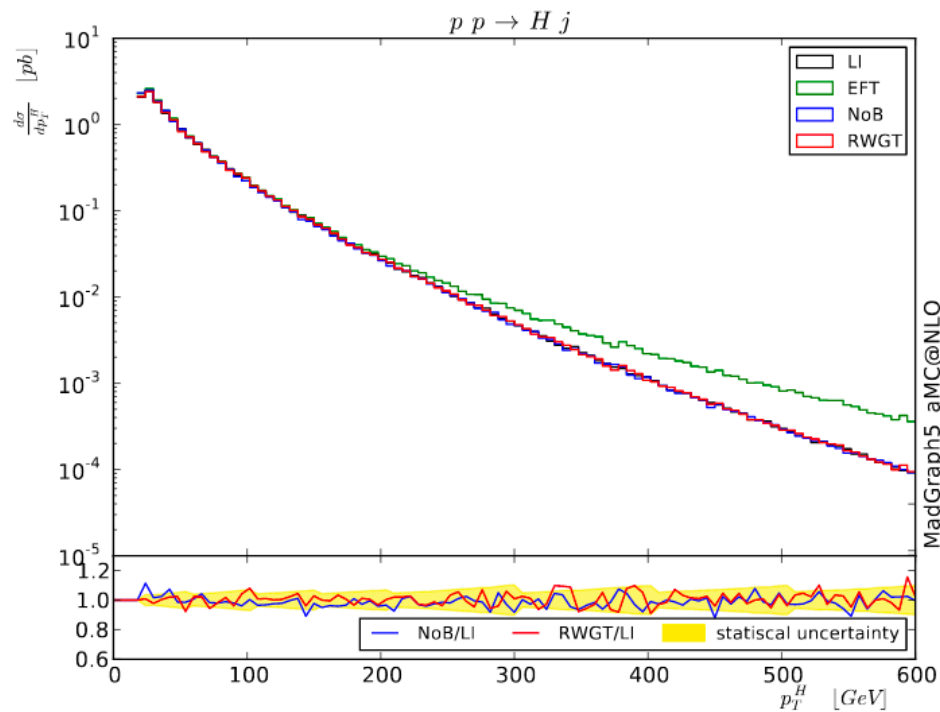
- HEFT is working fine at low energy (as expected)

- At low pt, the b diagram decrease the cross-section