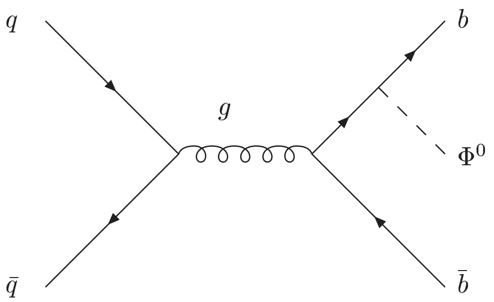
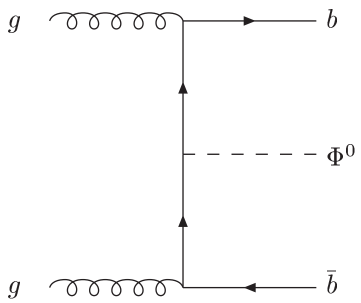
HIGGS BOSON PRODUCTION : APPLICATION OF B PDFS

Michael Spira (PSI)

$\mathcal{BREMSSTRAHLUNG}$: $pp \to b\bar{b} + h/H/A$



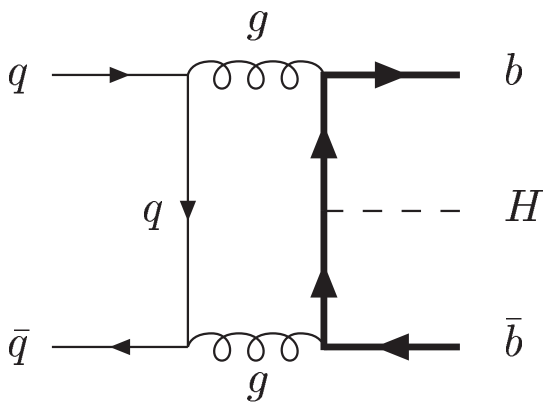


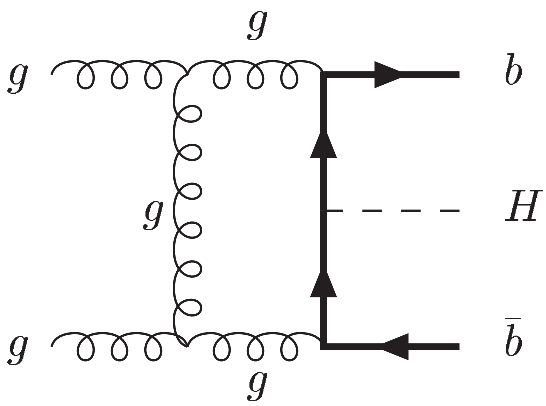
dominant

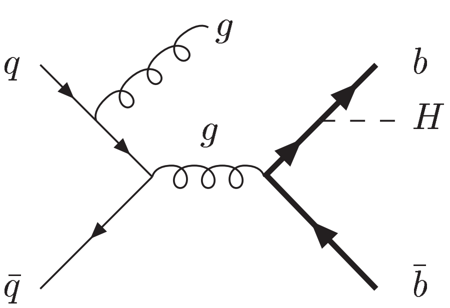
- $b\bar{b} + H/A$ dominant for large tgβ

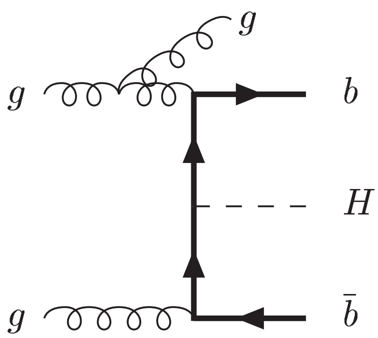
- measurement of tgβ

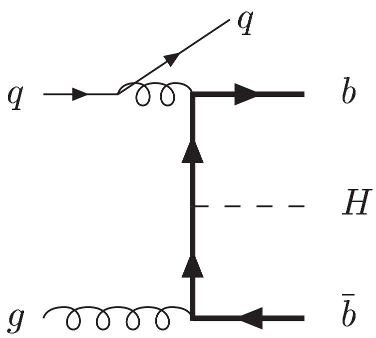
- QCD corrections:

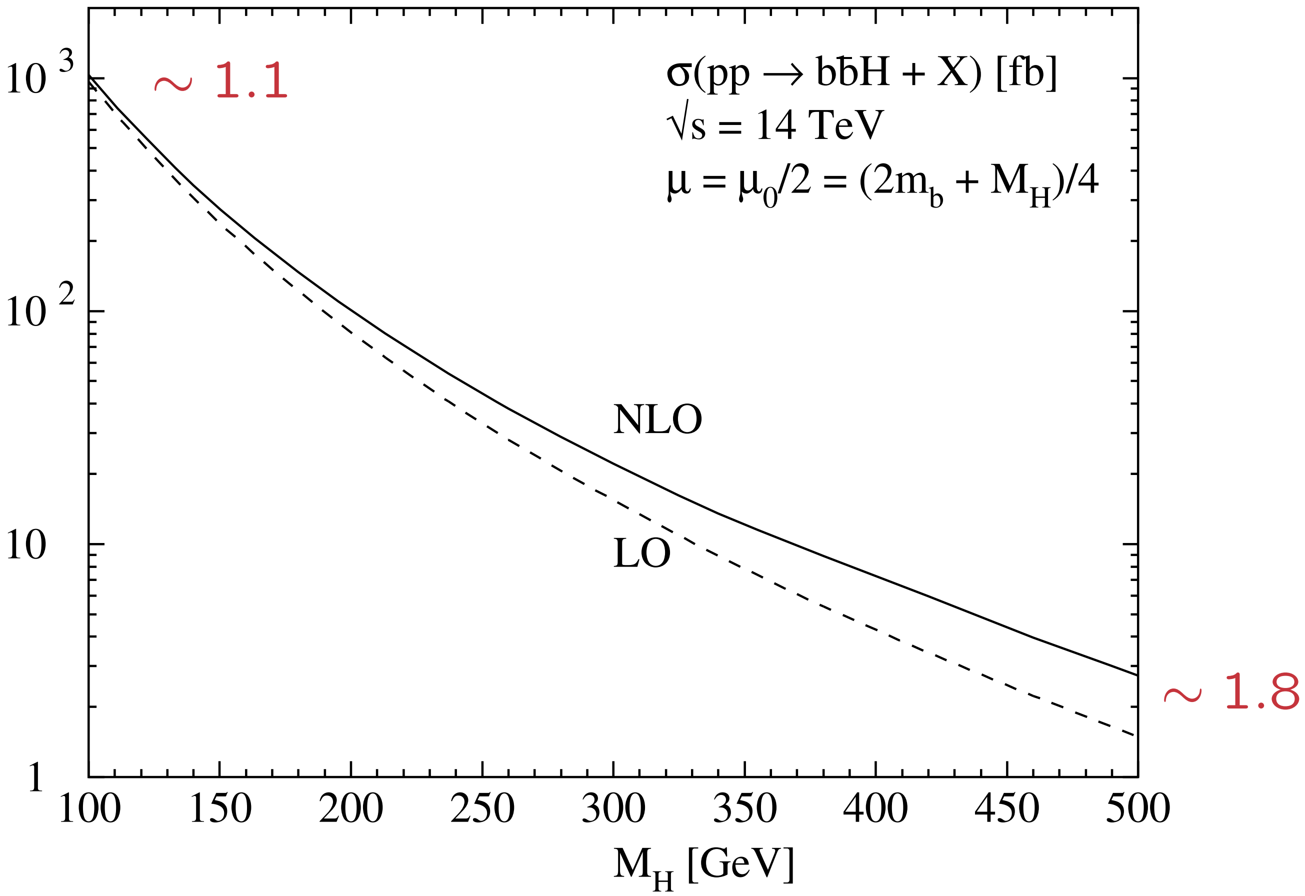


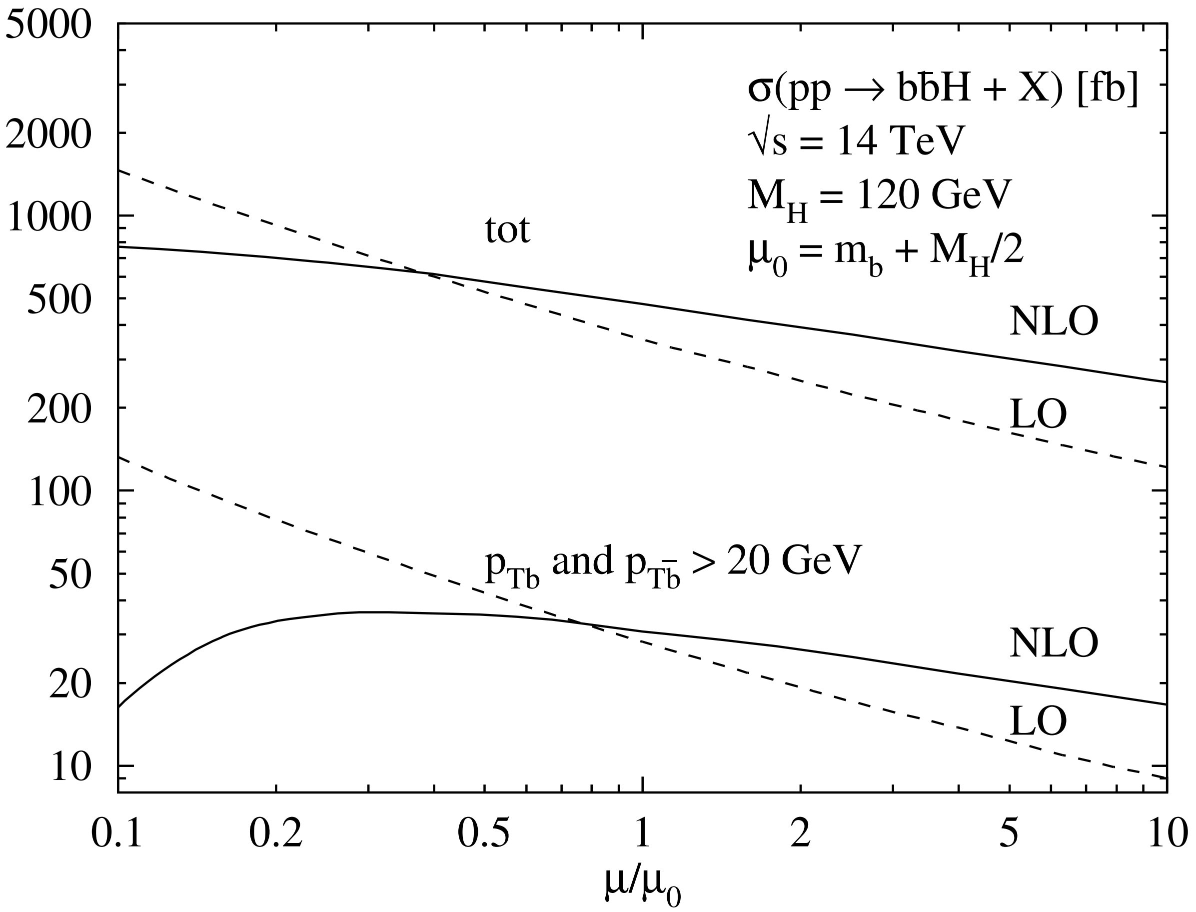






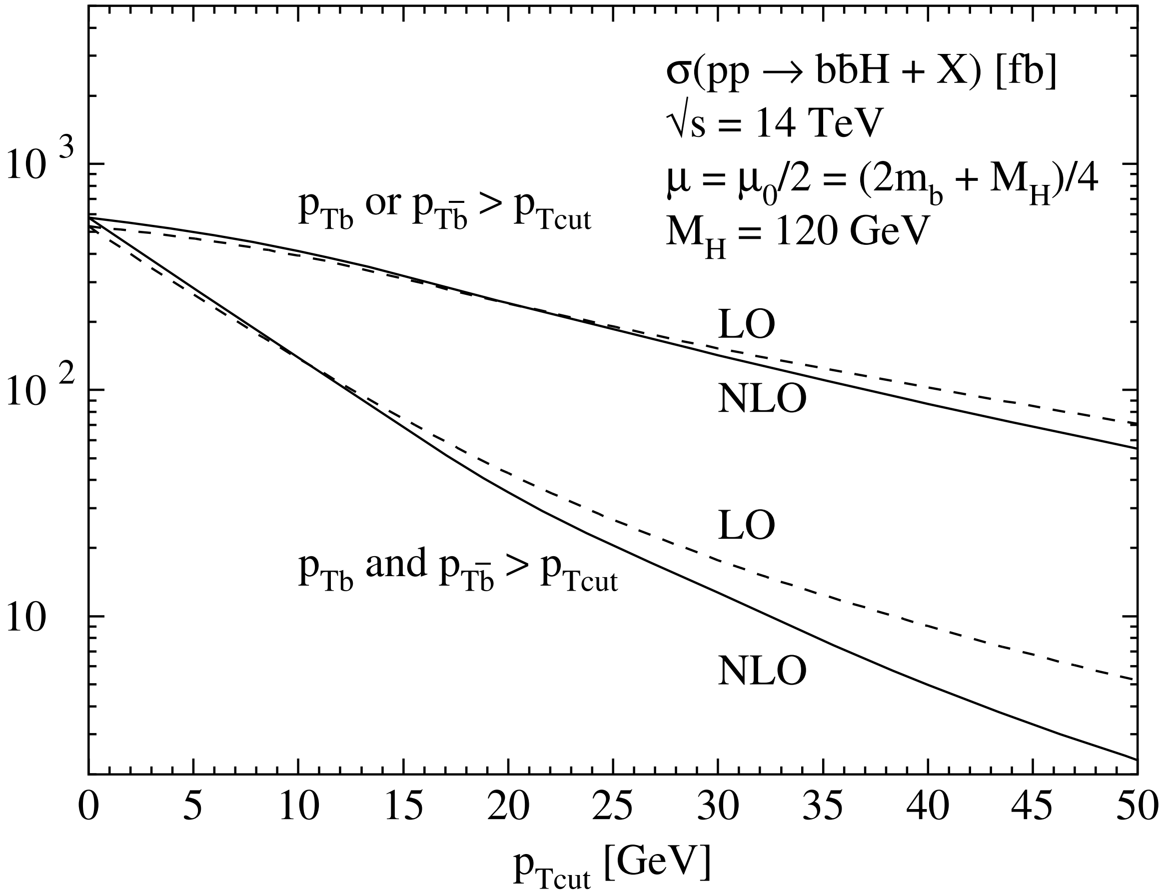






Dittmaier, Krämer, S.

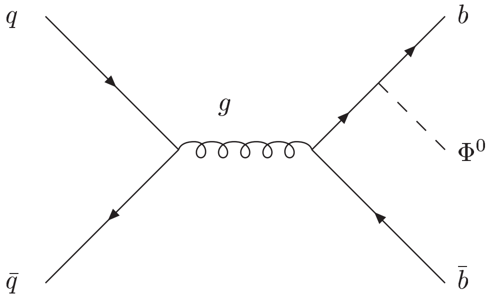
Dawson, Jackson, Reina, Wackeroth

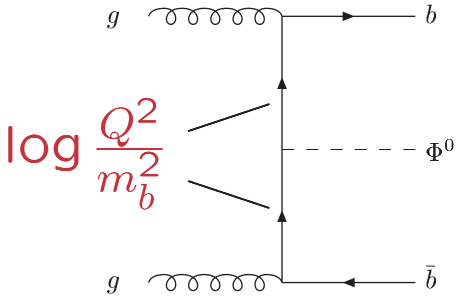


Dittmaier, Krämer, S.

Dawson, Jackson, Reina, Wackeroth

b densities

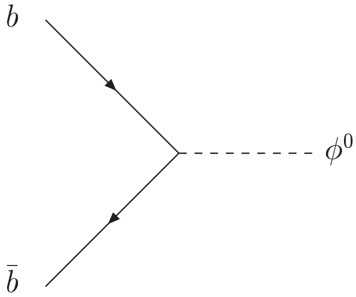




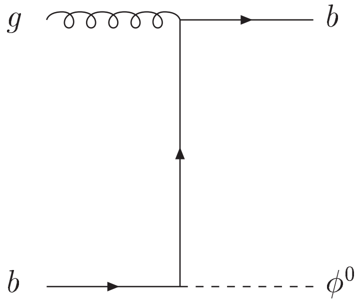
dominant

large logs from phase space integration
$\longrightarrow$ absorbed in bottom PDF
resummation $\equiv$ DGLAP evolution

- new processes:



NNLO



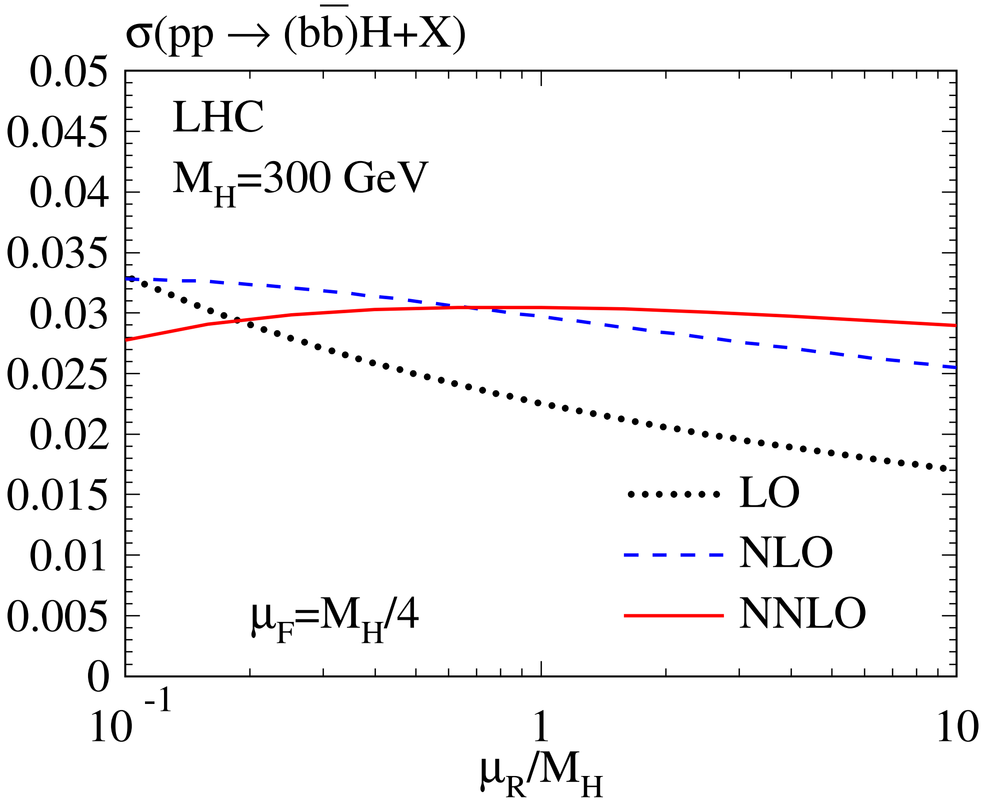
NLO

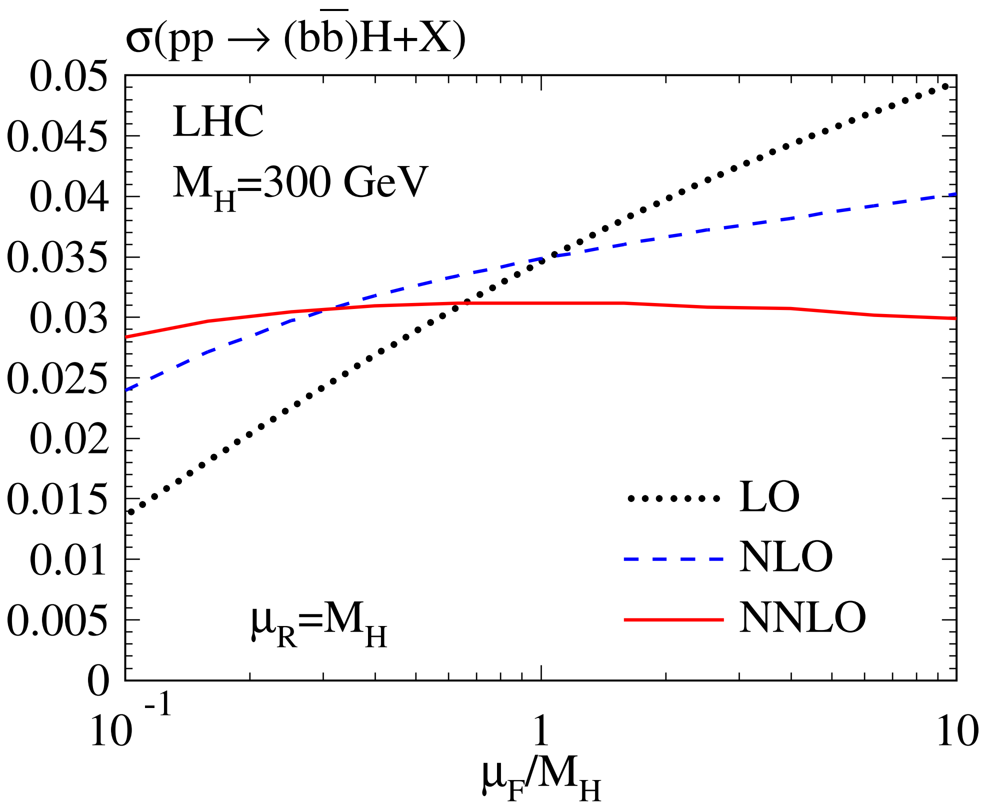
Dicus,Willenbrock
Stelzer, . . .
Balazs,. . .
Campbell,. . .

Harlander, Kilgore

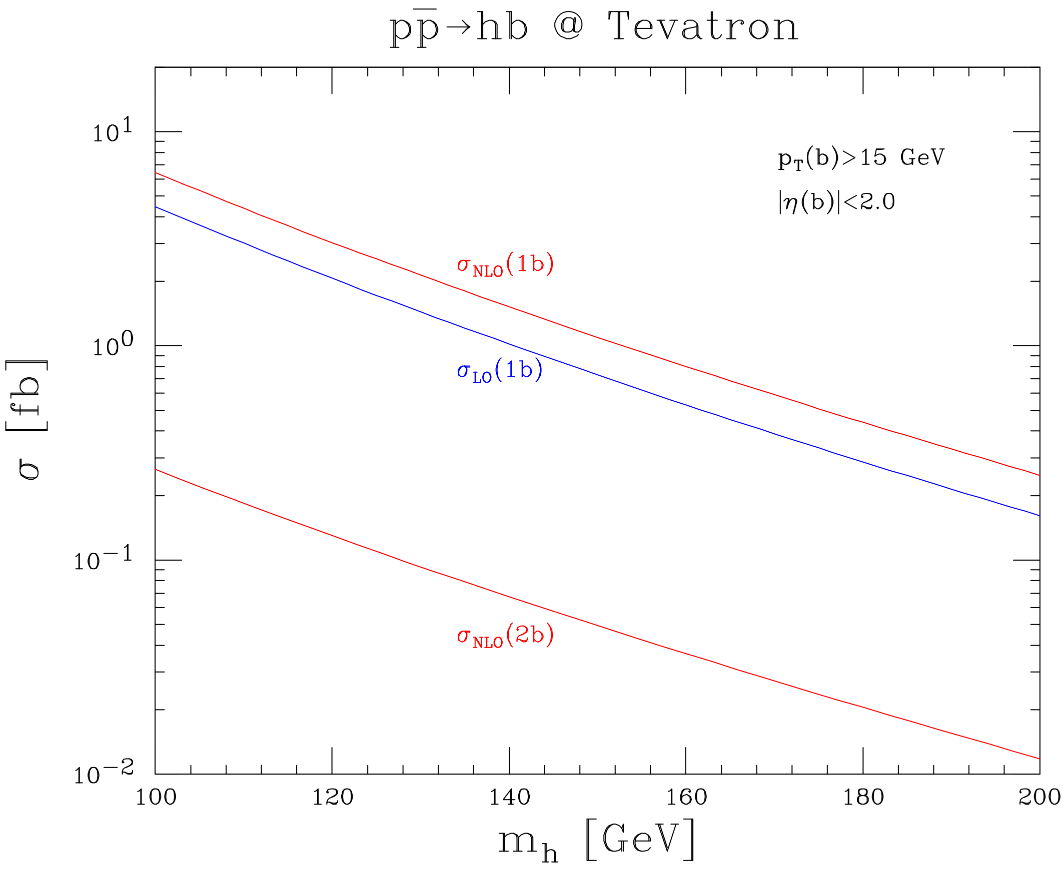
$$b(x,\mu^2) \longrightarrow b(x,\mu^2) - \frac{\alpha_s}{2\pi} P_{qg} \otimes g(x,\mu^2) \log \frac{\mu^2}{m_b^2}$$

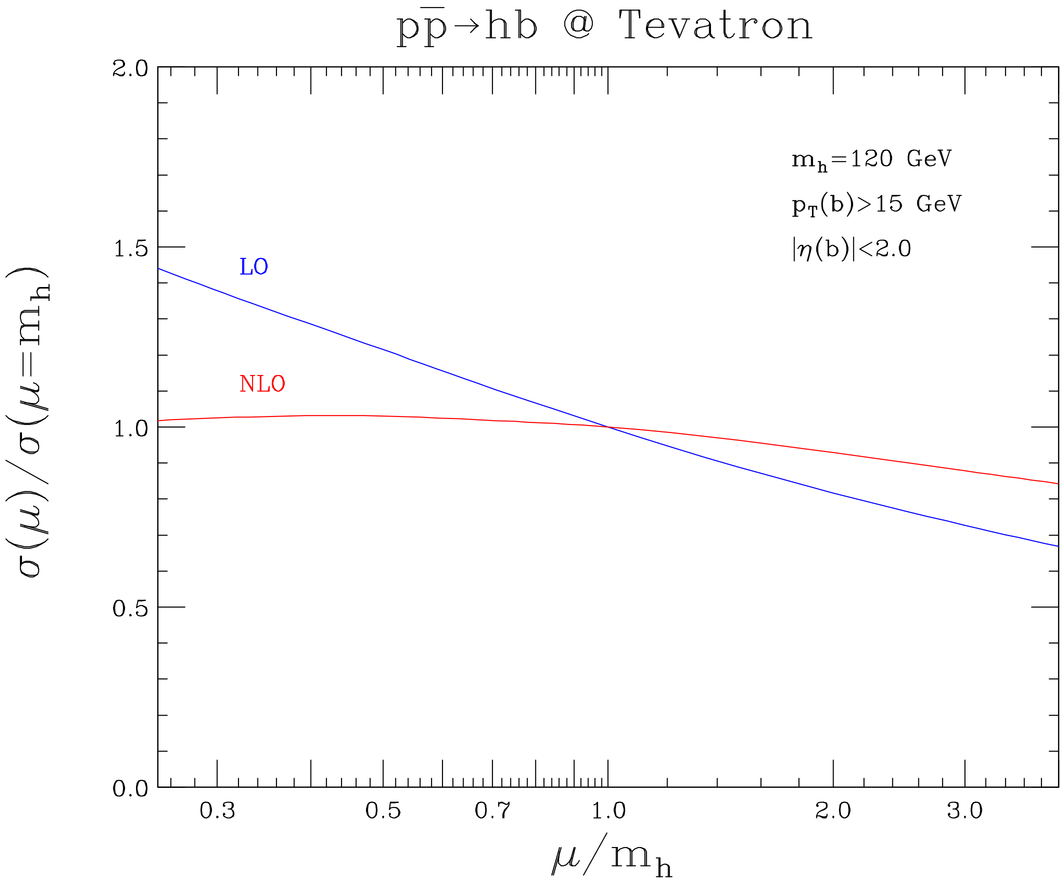
$$\mu \sim Q \sim M_\phi/4 \Rightarrow \sigma_{tot}$$





Harlander, Kilgore





Campbell, Ellis, Maltoni, Willenbrock

• factorization in high-energy limit: $[M_{Tb} = \sqrt{p_{Tb}^2 + m_b^2}]$

$$\frac{d\sigma^{(2\to3)}}{dM_{Tb}^2} = \frac{1}{M_{Tb}^2}\left\{\frac{\alpha_s}{2\pi}\Delta_{qg} \otimes g \otimes g \otimes \hat{\sigma}_{\bar{b}g}\right\}_{M_{Tb}=m_b\to0} + \cdots$$

$$\Delta_{qg}(x) = P_{qg}(x) + \frac{m_b^2}{M_{Tb}^2}x(1-x)$$

[analogous to WWA]

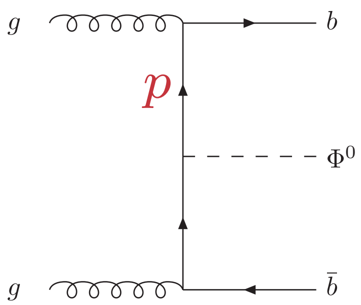
• total cross section:

$$\sigma = \underbrace{\int_{m_b^2}^{Q^2}\frac{dM_{Tb}^2}{M_{Tb}^2}}_{\log\frac{\mu_F^2}{m_b^2}}\left\{\frac{\alpha_s}{2\pi}P_{qg} \otimes g \otimes g \otimes \hat{\sigma}_{\bar{b}g}\right\}_{M_{Tb}=m_b\to0} + \cdots$$

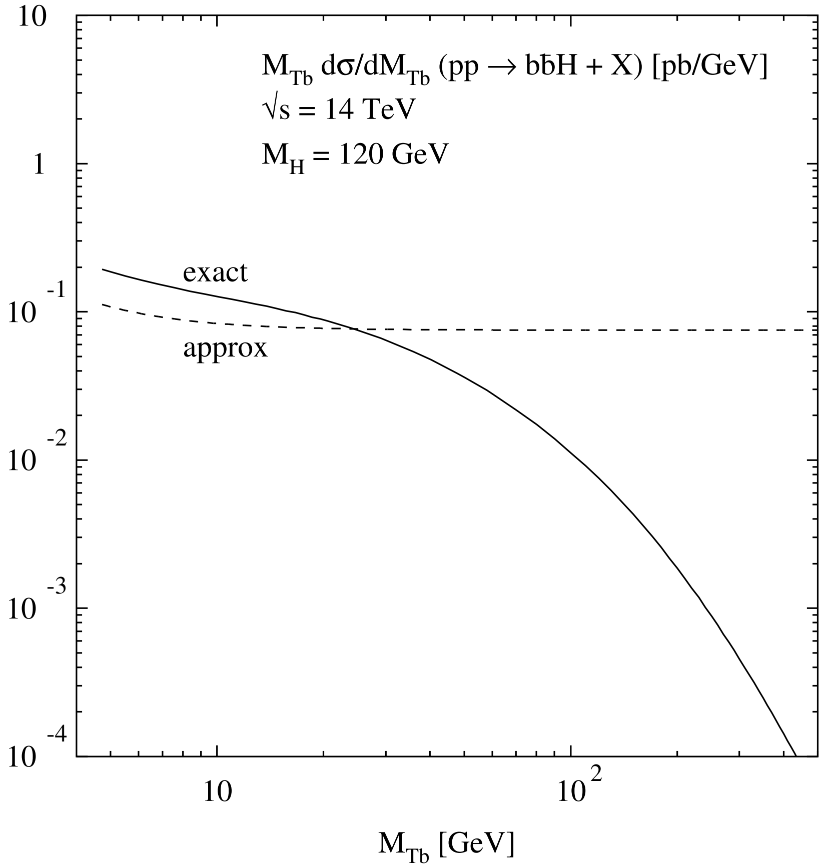
$\Rightarrow$ crucial condition:

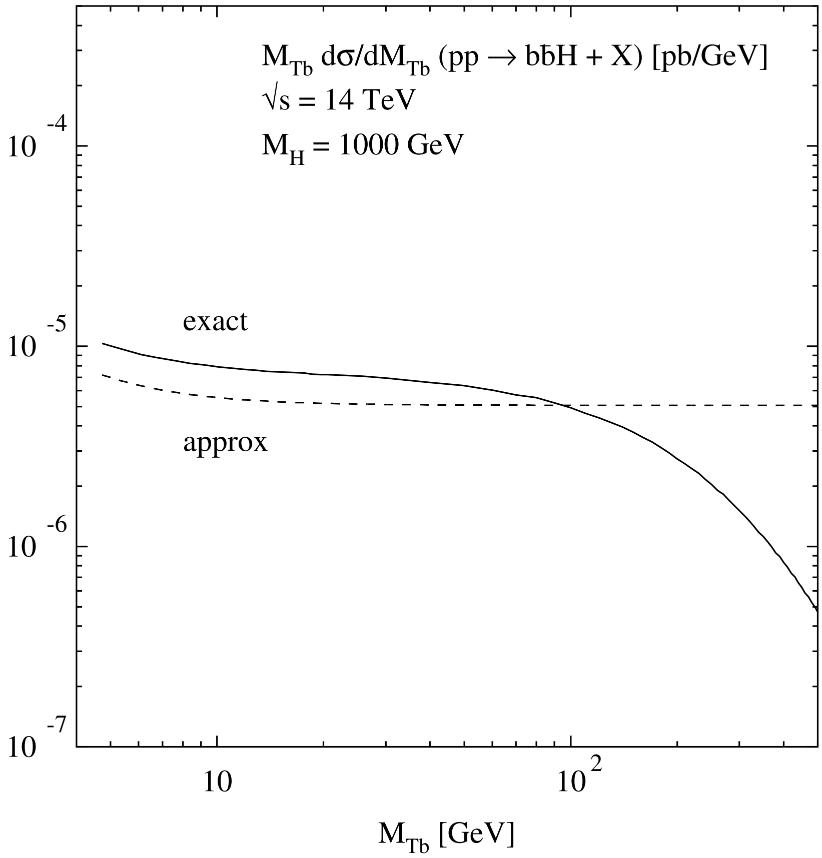
$$\frac{d\sigma^{(2\to3)}}{dM_{Tb}} \propto \frac{1}{M_{Tb}} \qquad \text{up to } M_{Tb} \sim Q$$

• alternatively:

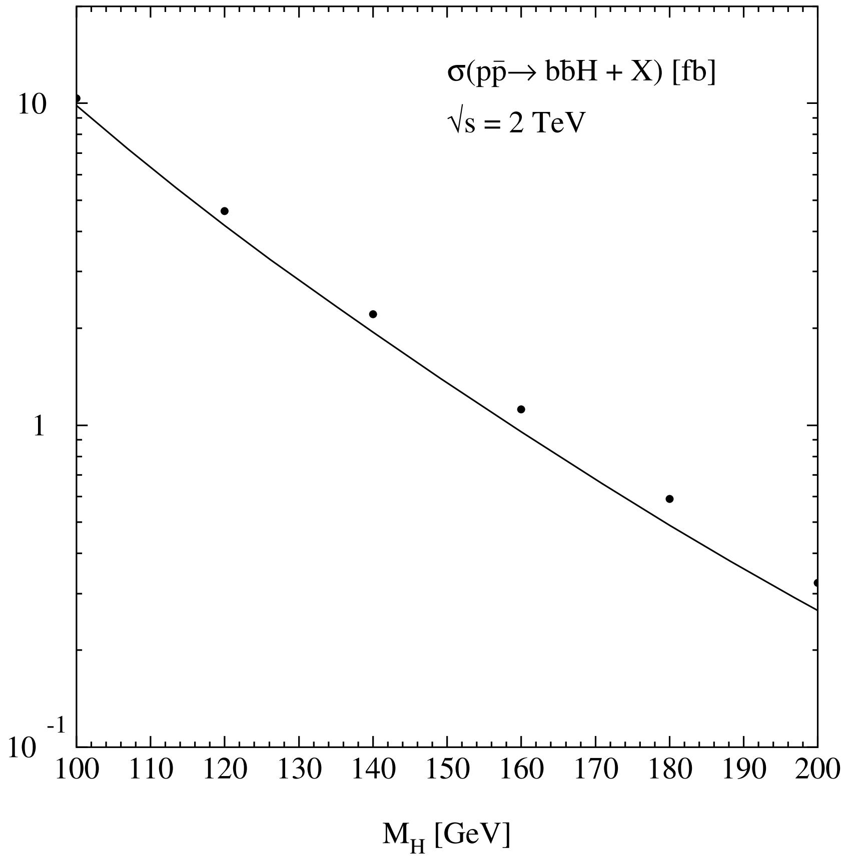


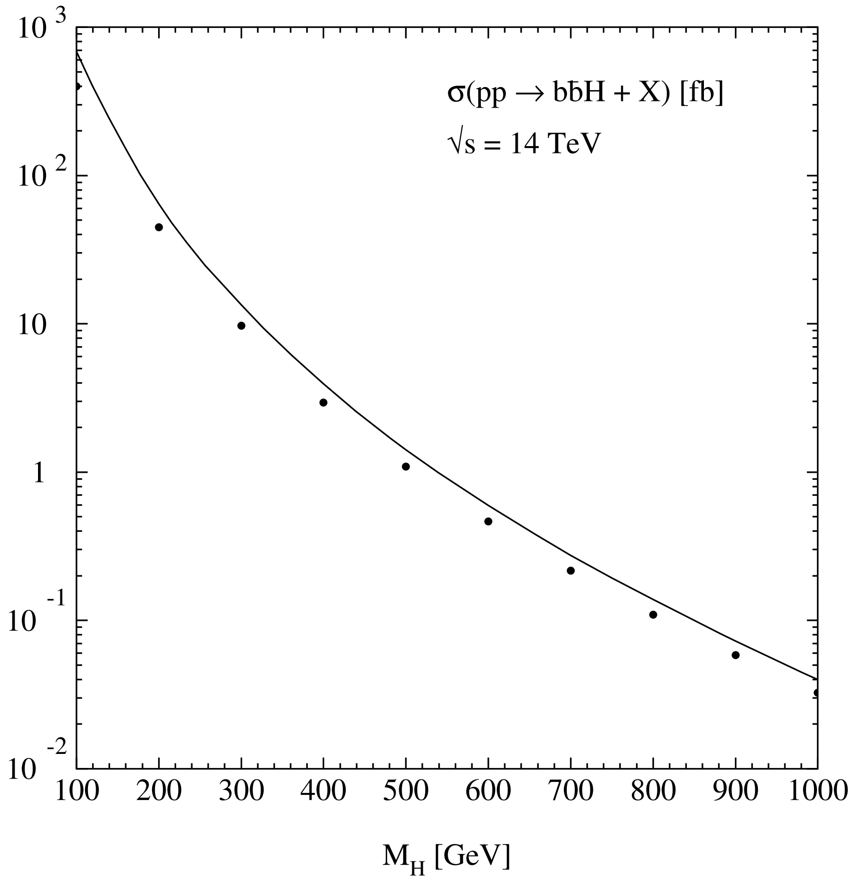
$$\frac{d\sigma^{(2\to3)}}{dp^2} \propto \frac{1}{p^2} \qquad \text{up to } -p^2 \sim Q^2$$

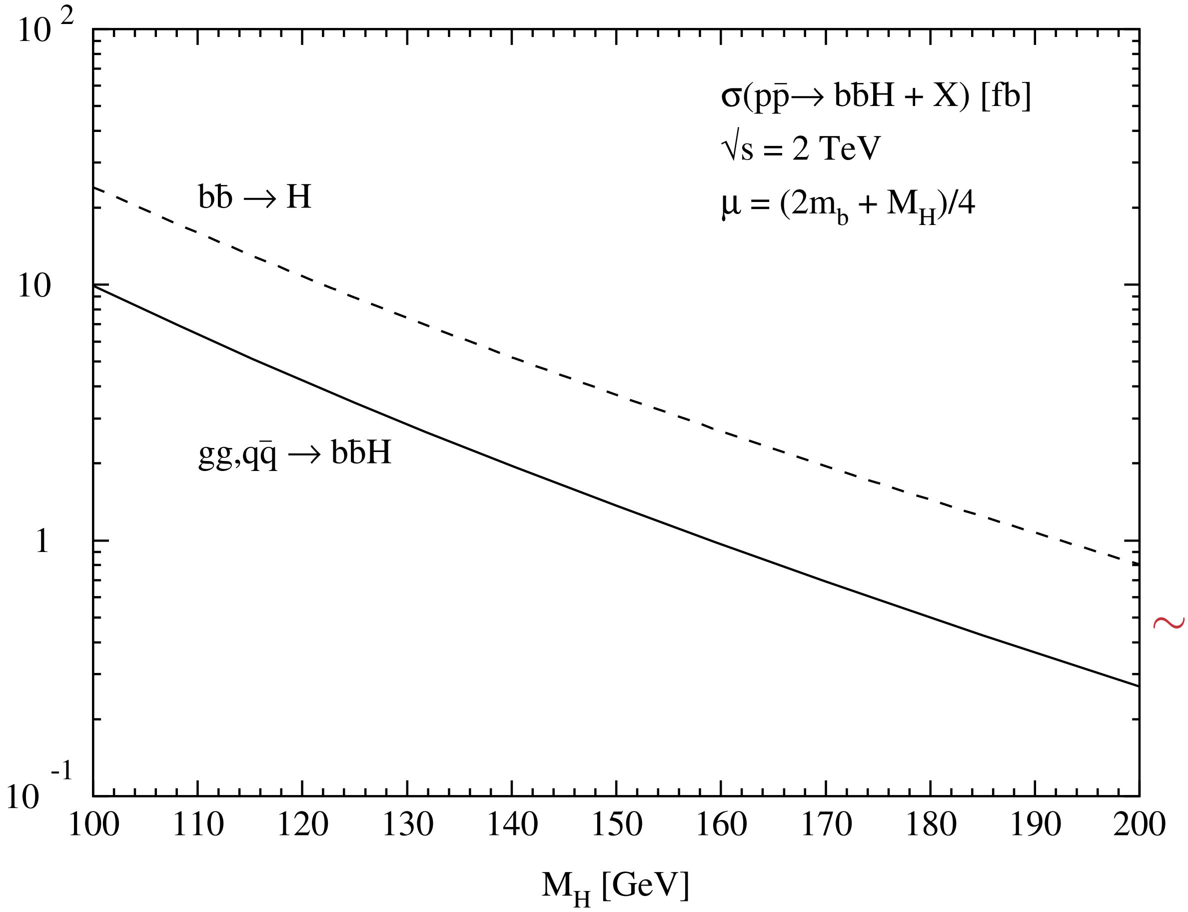




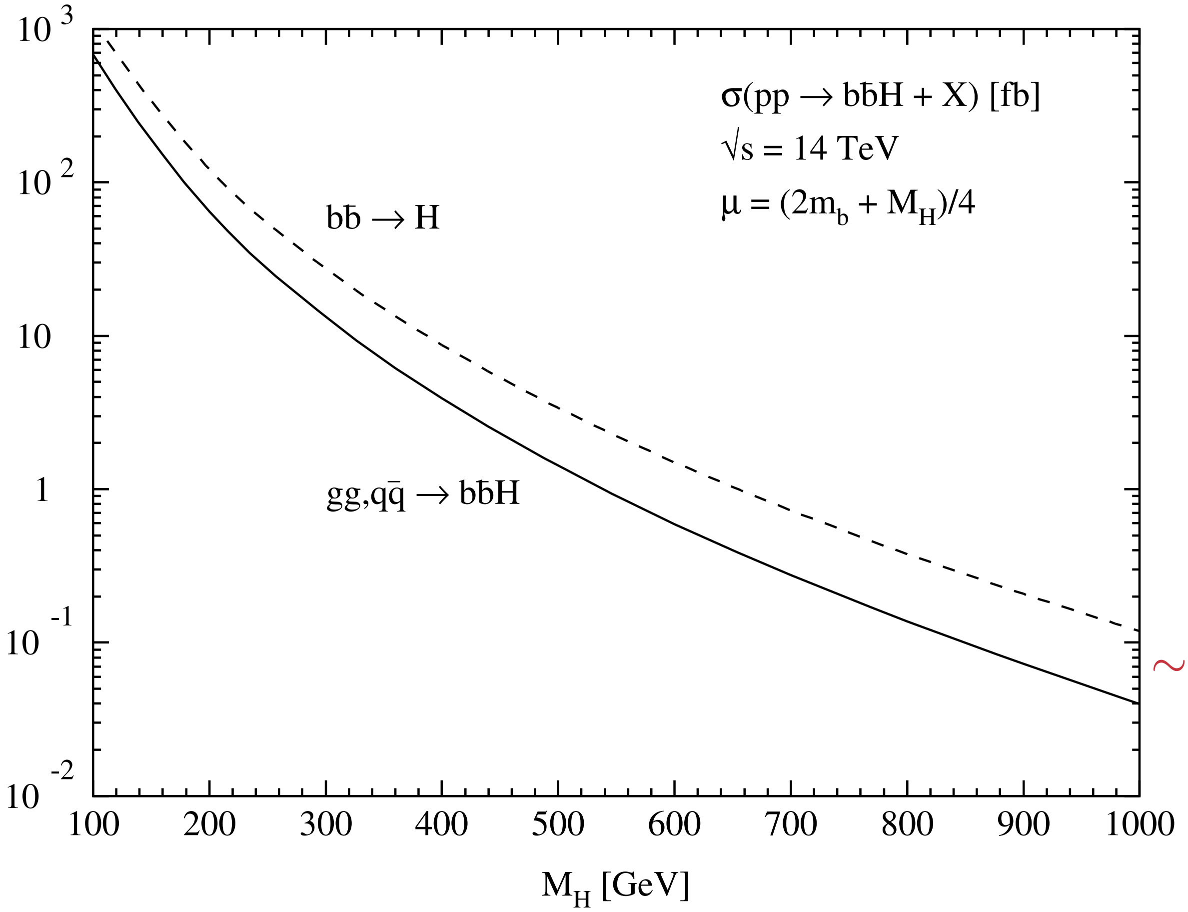
Rainwater, S., Zeppenfeld


σ(pp̄→ bb̄H + X) [fb]
√s = 2 TeV
10
1
10 -1
100
110
120
130
140
150
160
170
180
190
200
M_H [GeV]

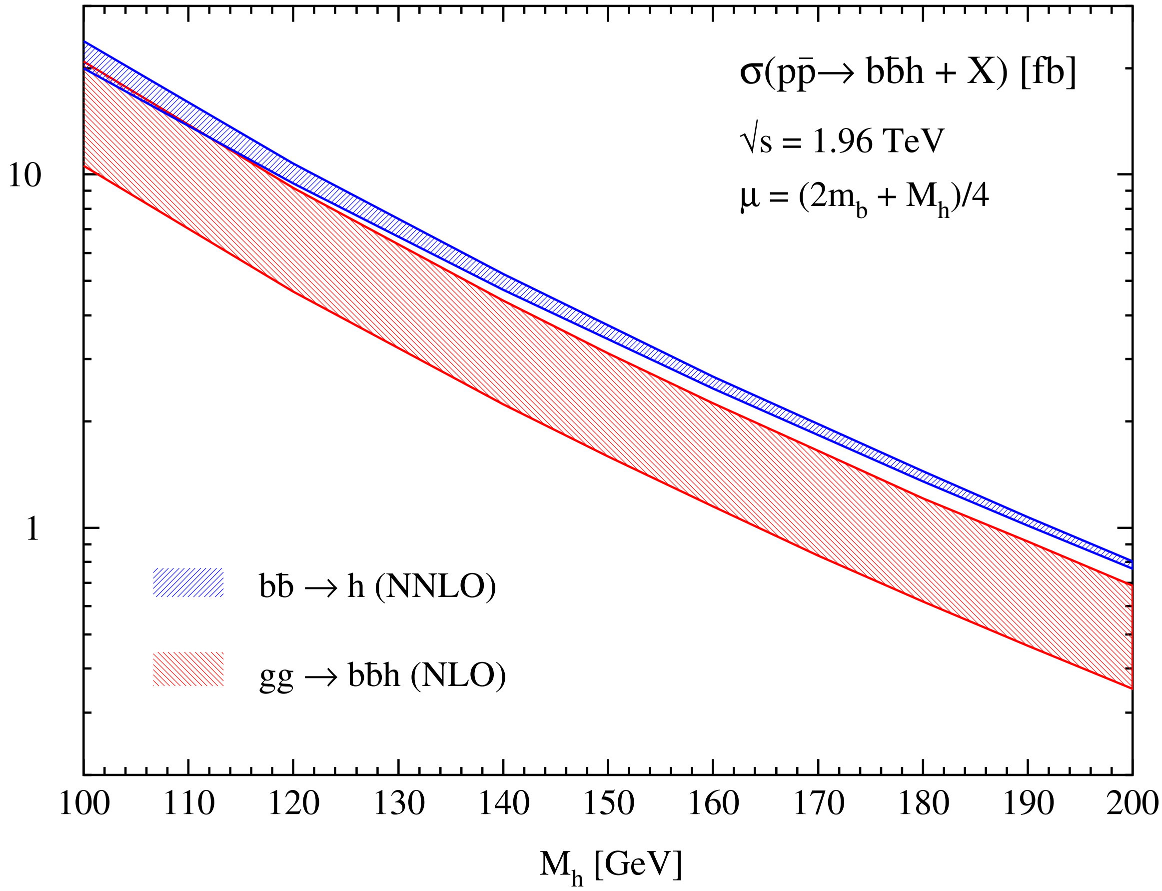

σ(pp → bb̄H + X) [fb]
√s = 14 TeV
10 3
10 2
10
1
10 -1
10 -2
100
200
300
400
500
600
700
800
900
1000
M_H [GeV]

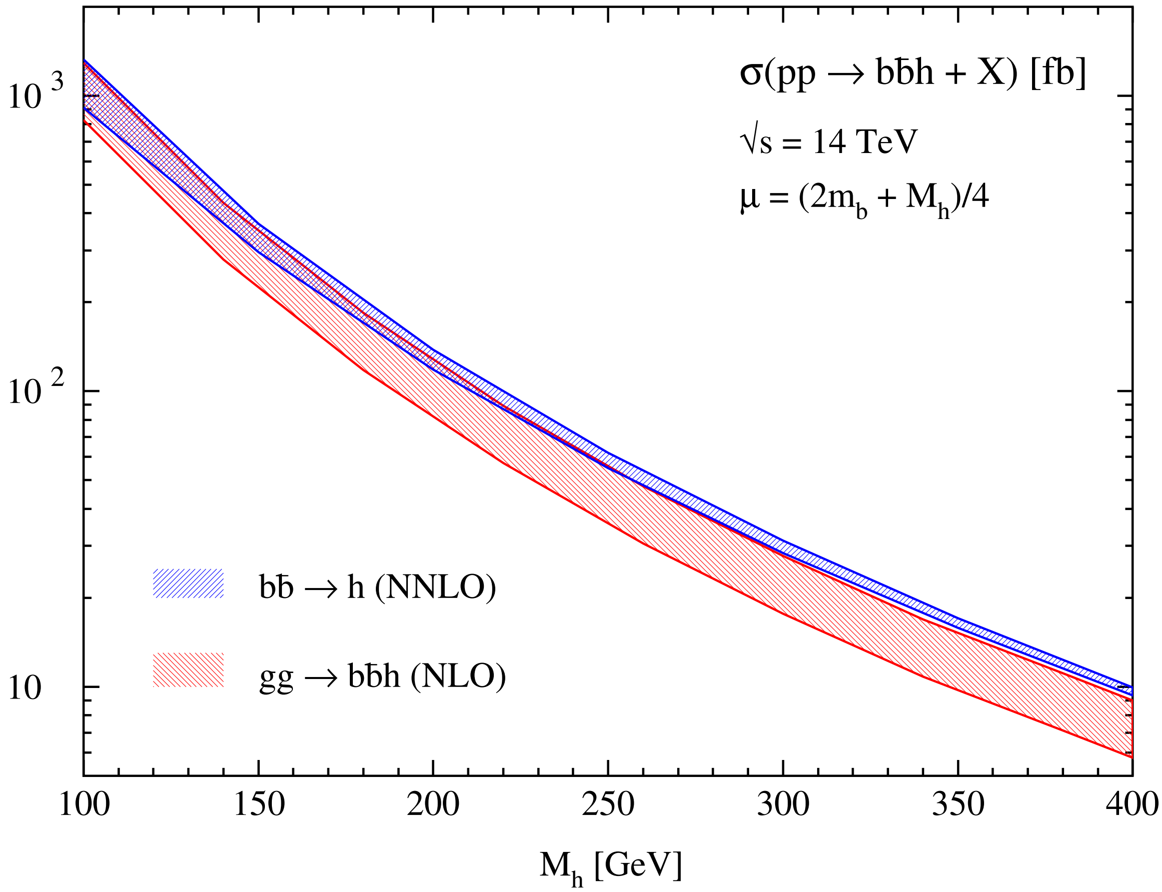


$\sim$ factor 3

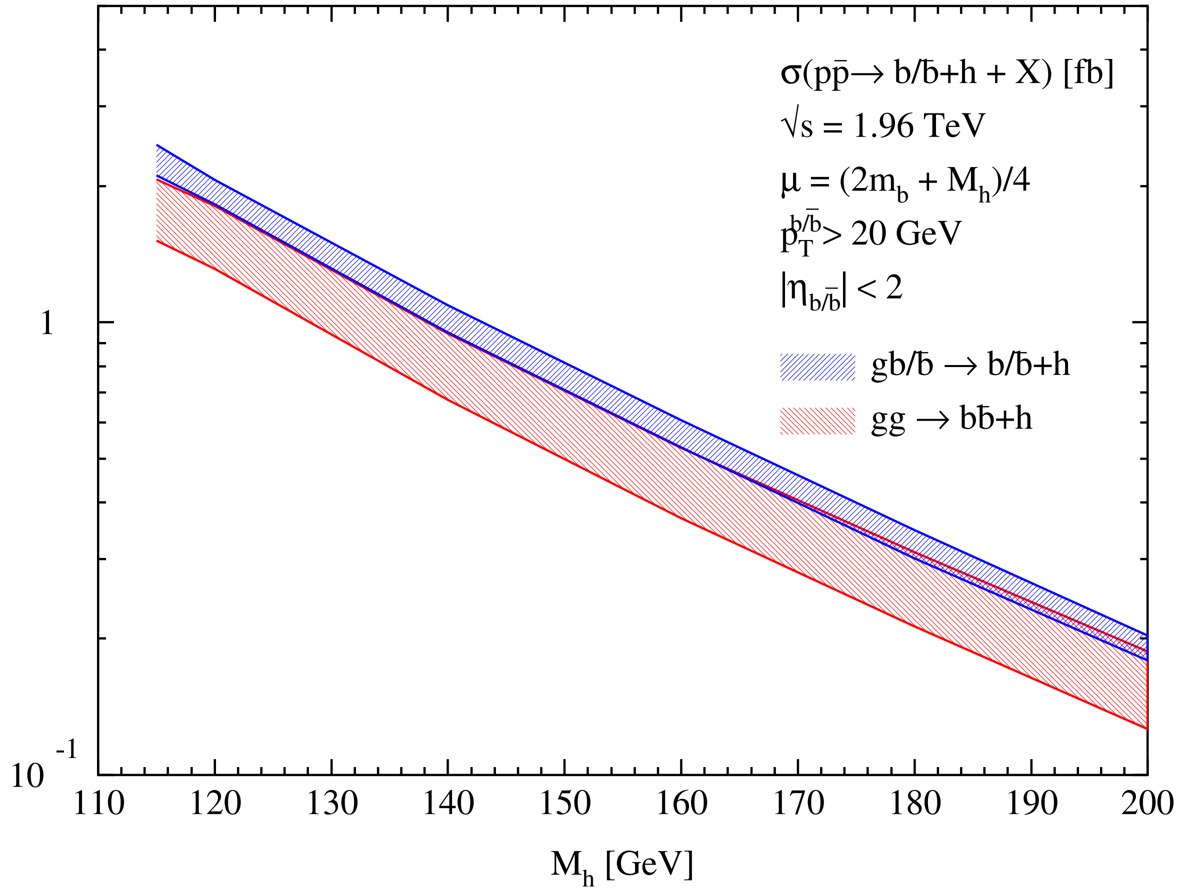


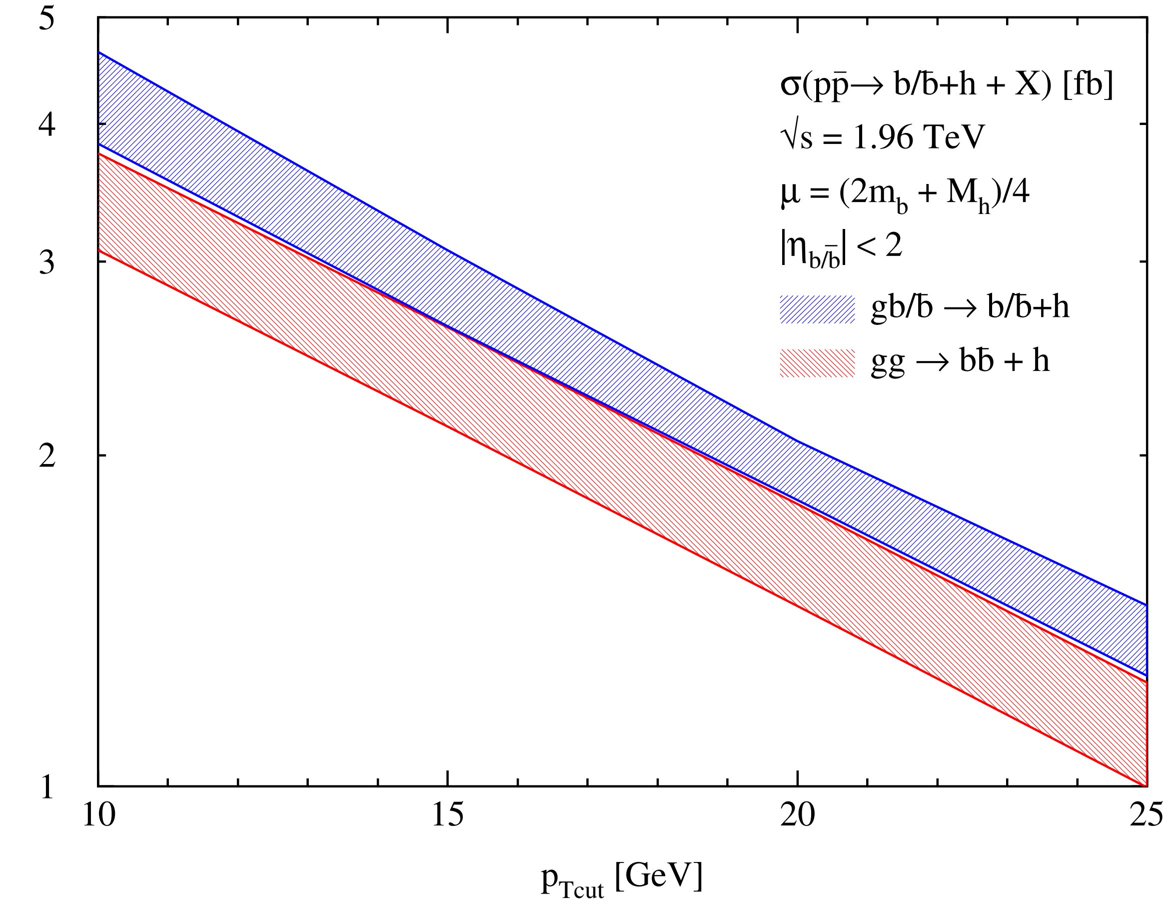
$\sim$ factor 3



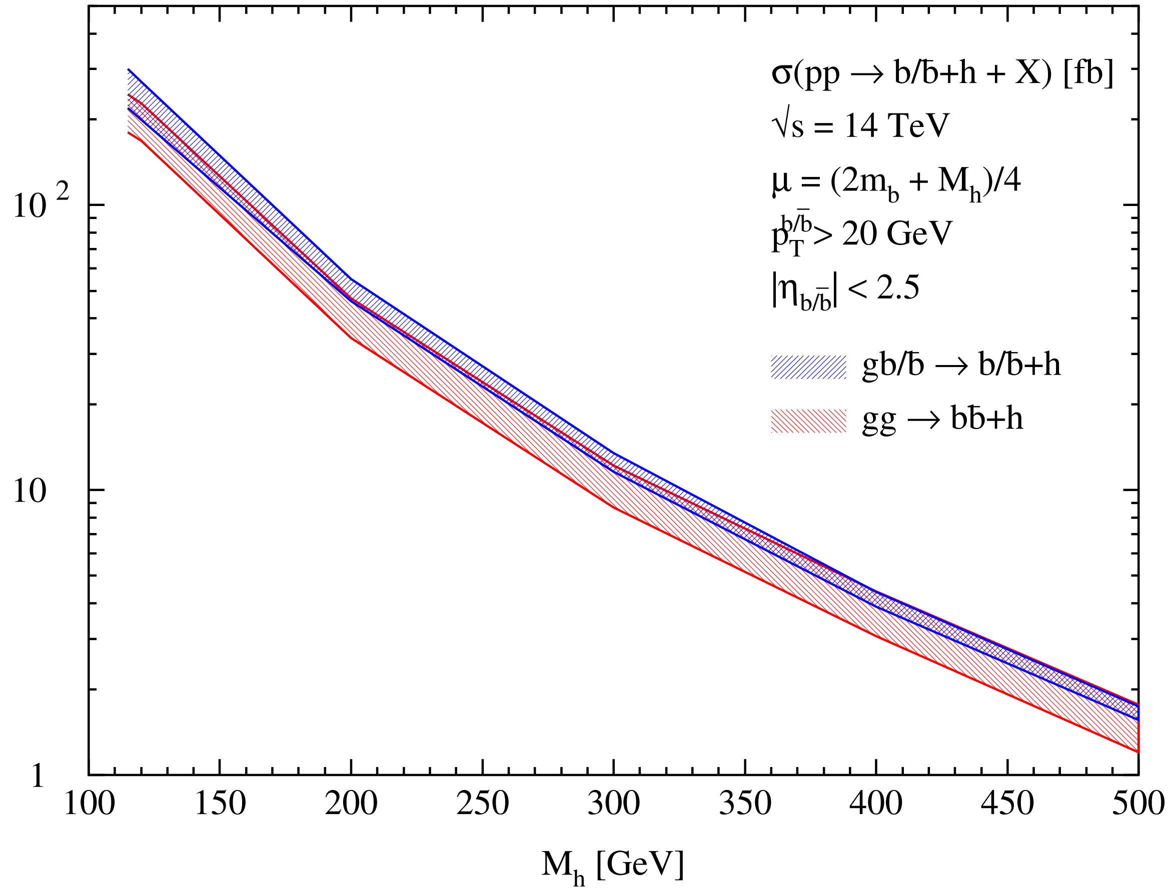


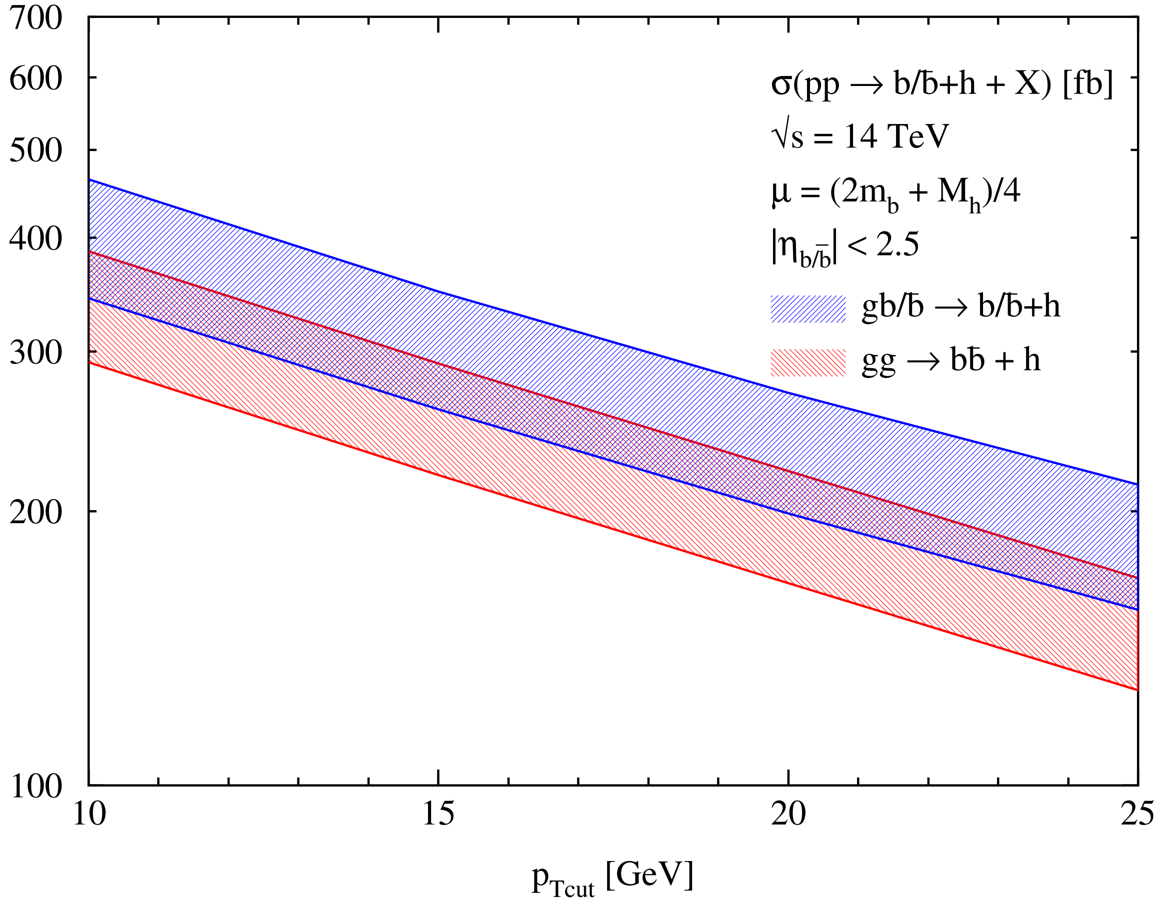
Dittmaier, Krämer, S.
Harlander, Kilgore





Campbell, Dawson, Dittmaier, Jackson, Krämer, Maltoni, Reina, S., Wackeroth, Willenbrock





Campbell, Dawson, Dittmaier, Jackson, Krämer, Maltoni, Reina, S., Wackeroth, Willenbrock