HH production: differential distributions for YR4

Eleni Vryonidou
Université catholique de Louvain

with Benoît Hespel and Marco Zaro

Based on arxiv:1401.7340 and 1408.6542

HH Subgroup
19/11/15

Calculation Setup

MadGraph5_aMC@NLO

PYTHIA8 for the shower

PDF4LHC15 MC sets: 30 replicas set (100 replicas can be used also if needed)

Parameters following the HXSWG recommendations:

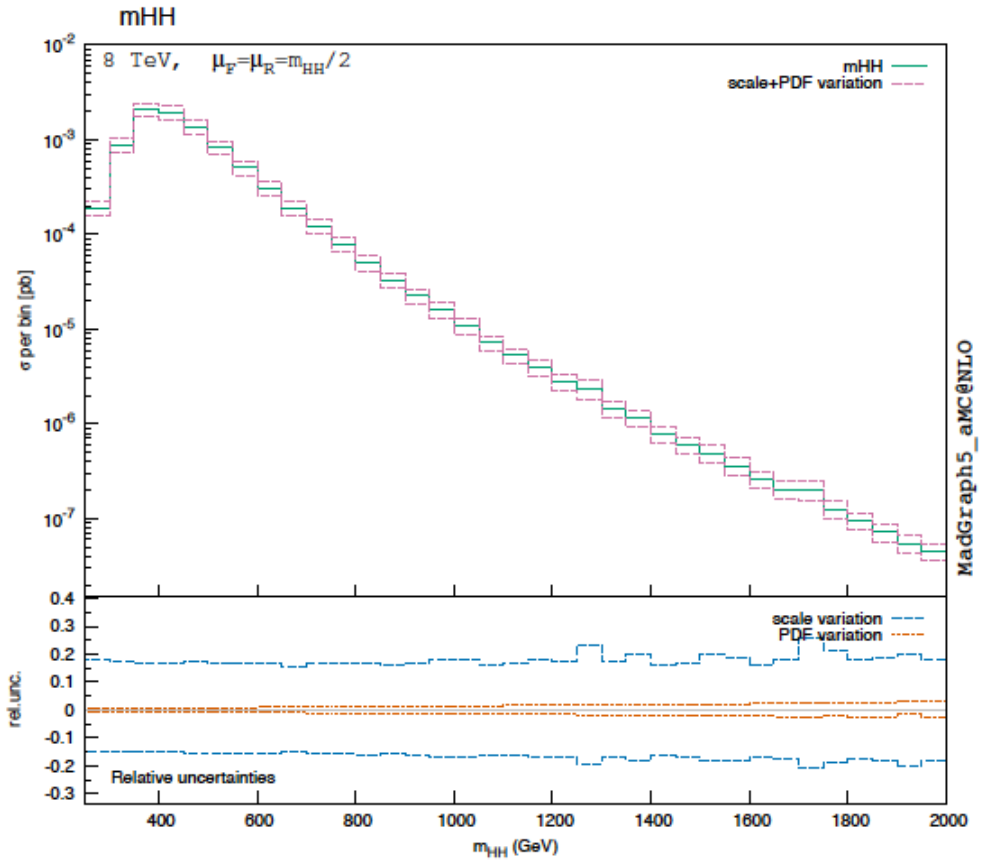
m_H=125GeV
m_t=172.5GeV

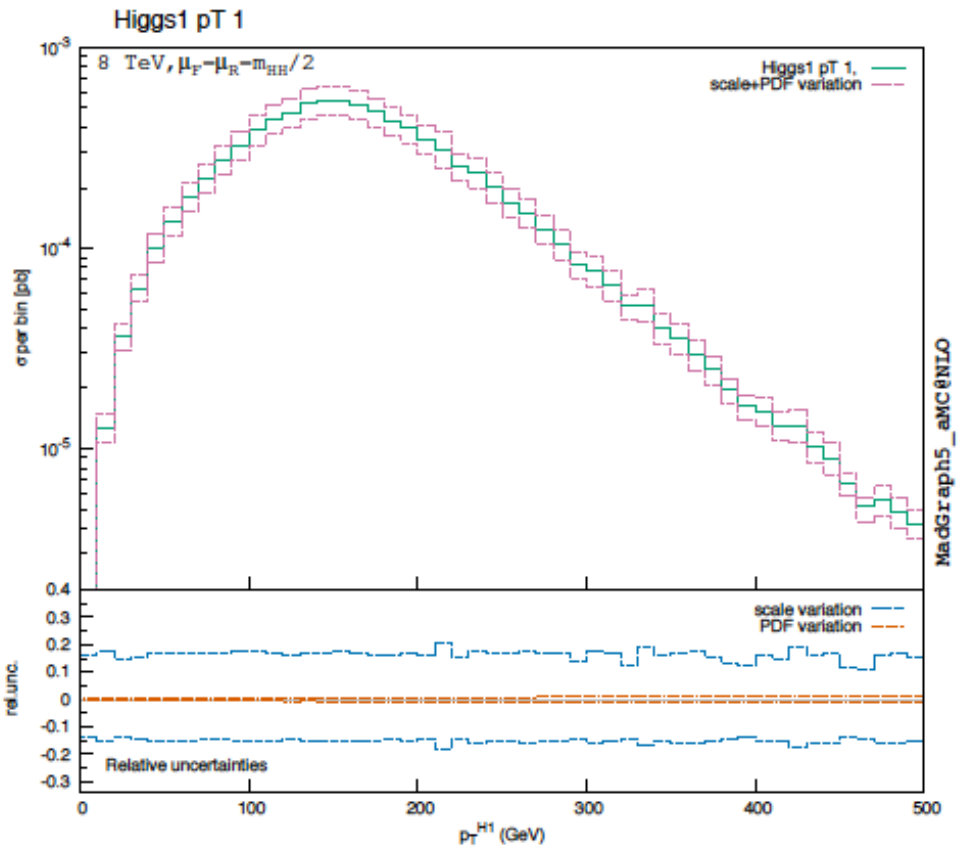
Gluon-fusion results:

NLO-approx: Exact real emission amplitudes
Born-reweighted EFT for the virtual corrections

scale choices: m_{HH} and $m_{HH}/2$

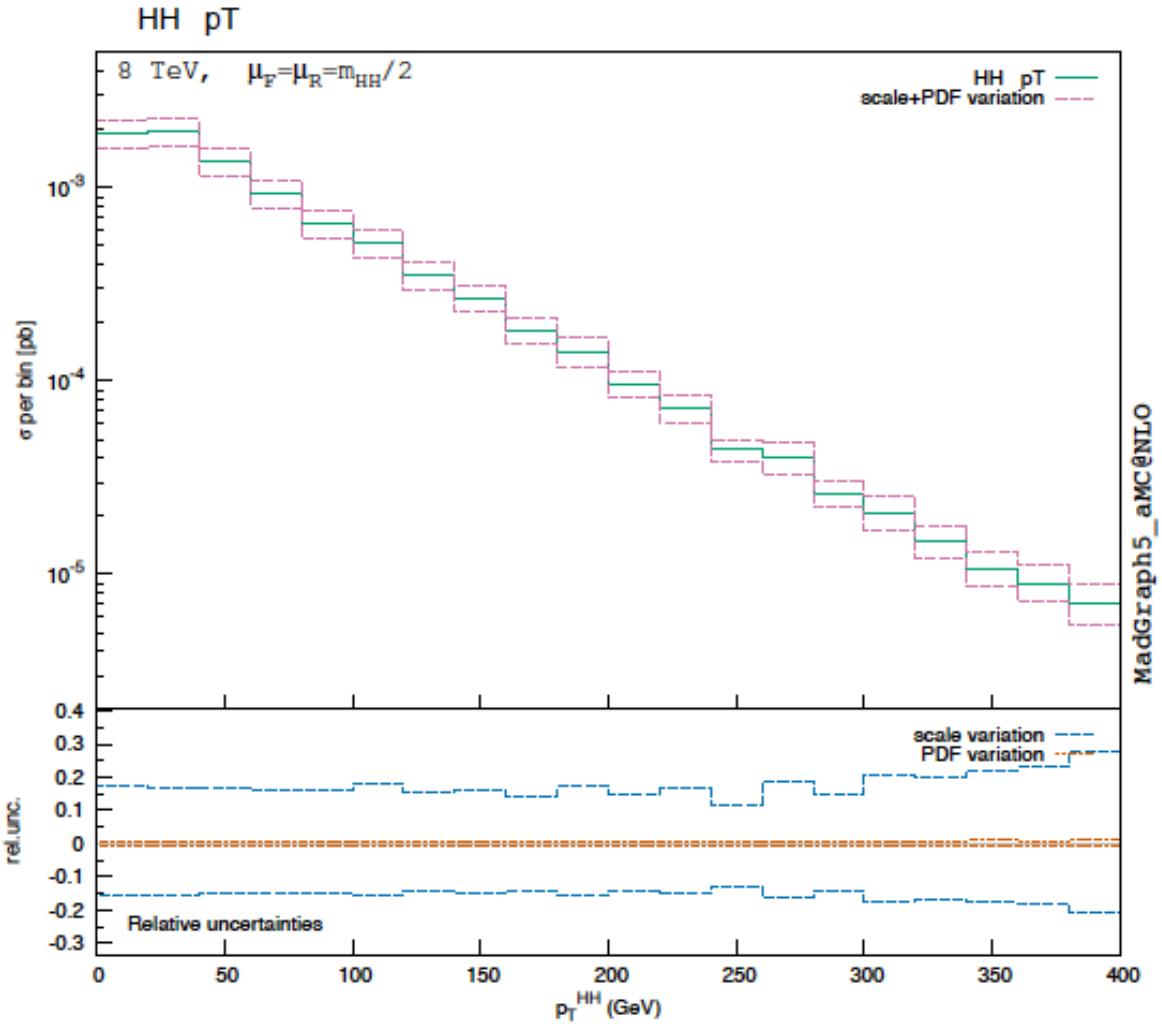
Results for 8 TeV
scale: $m_{HH}/2$





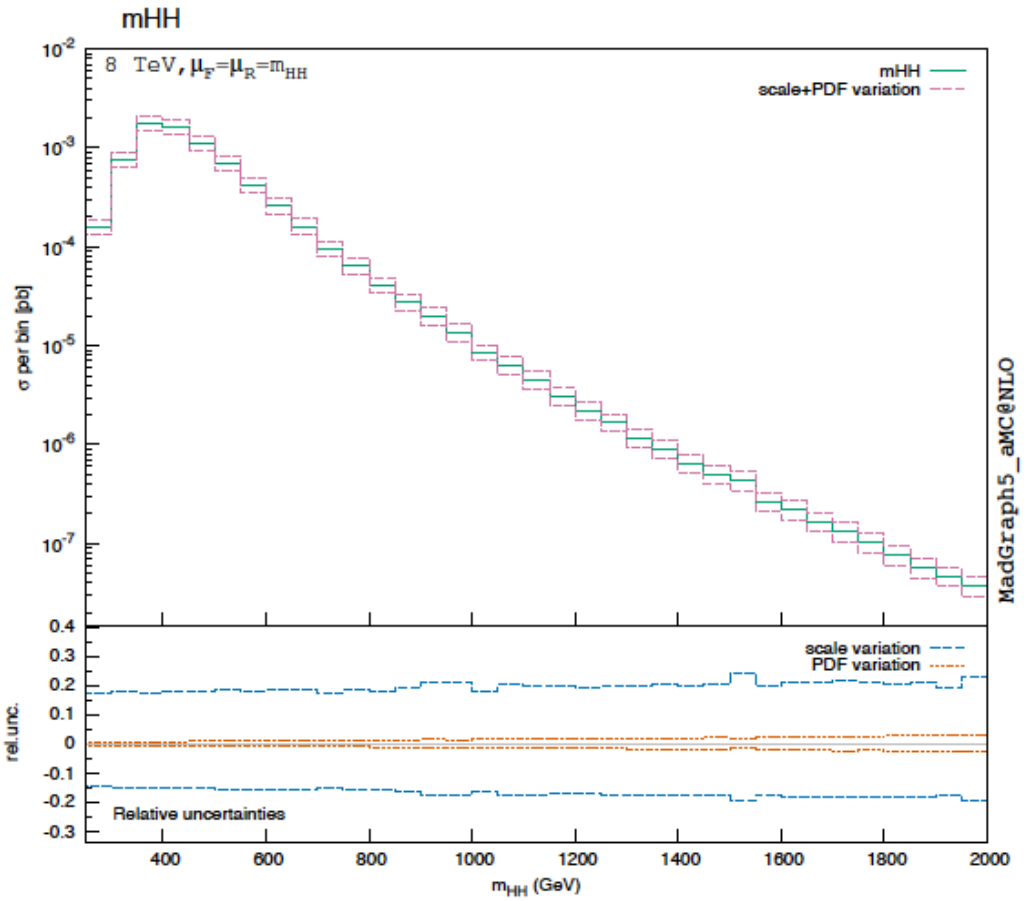
Scale and PDF uncertainties added linearly for upper plots
Shown separately for insets

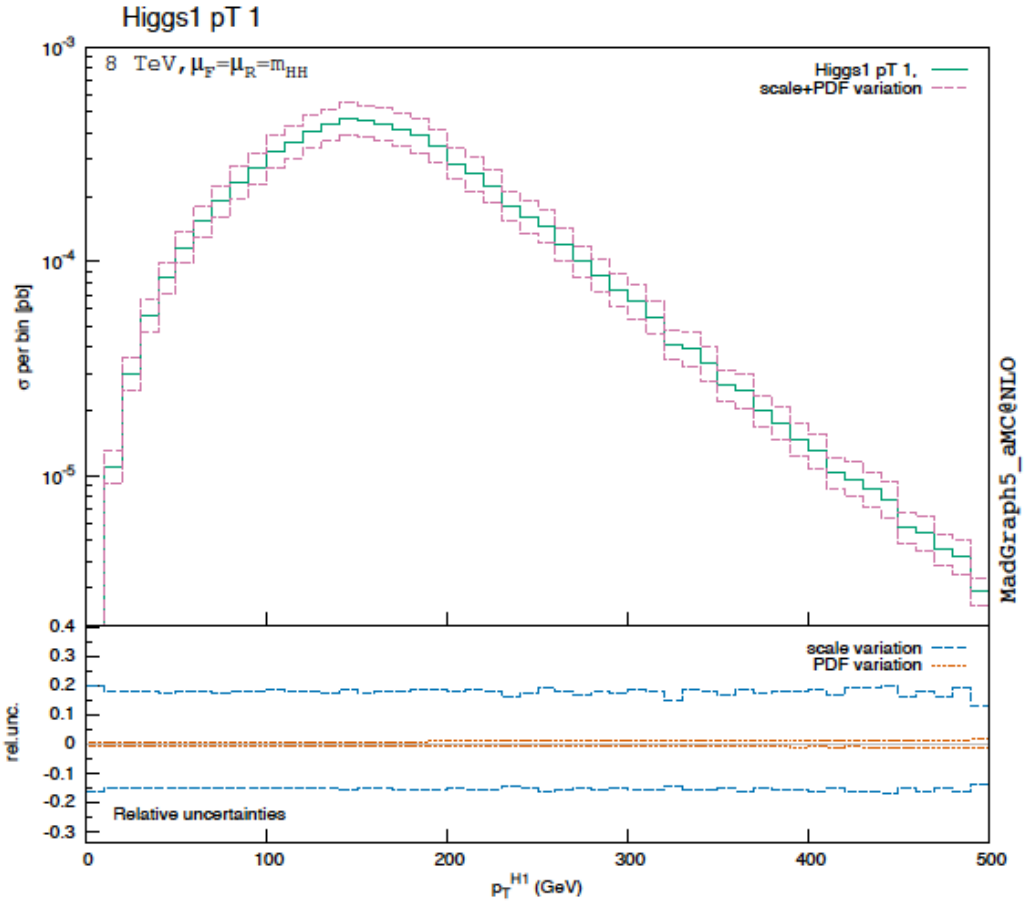
Results for 8 TeV
scale: $m_{HH}/2$



Scale and PDF uncertainties added linearly for upper plots
Shown separately for insets
Other distributions can be produced if needed

Results for 8 TeV
scale: m_{HH}





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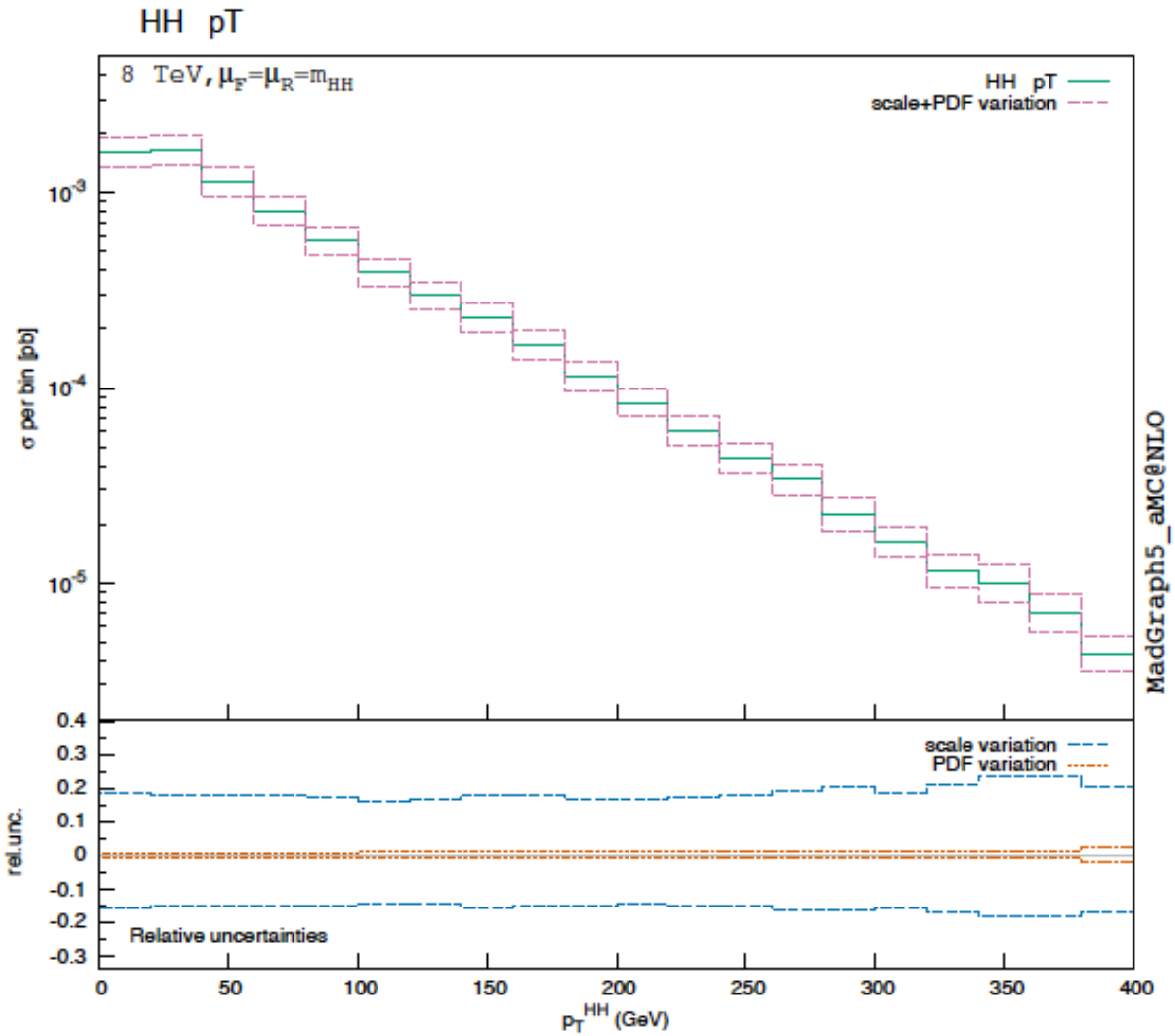
scale: m_{HH}



Scale and PDF uncertainties added linearly for upper plots
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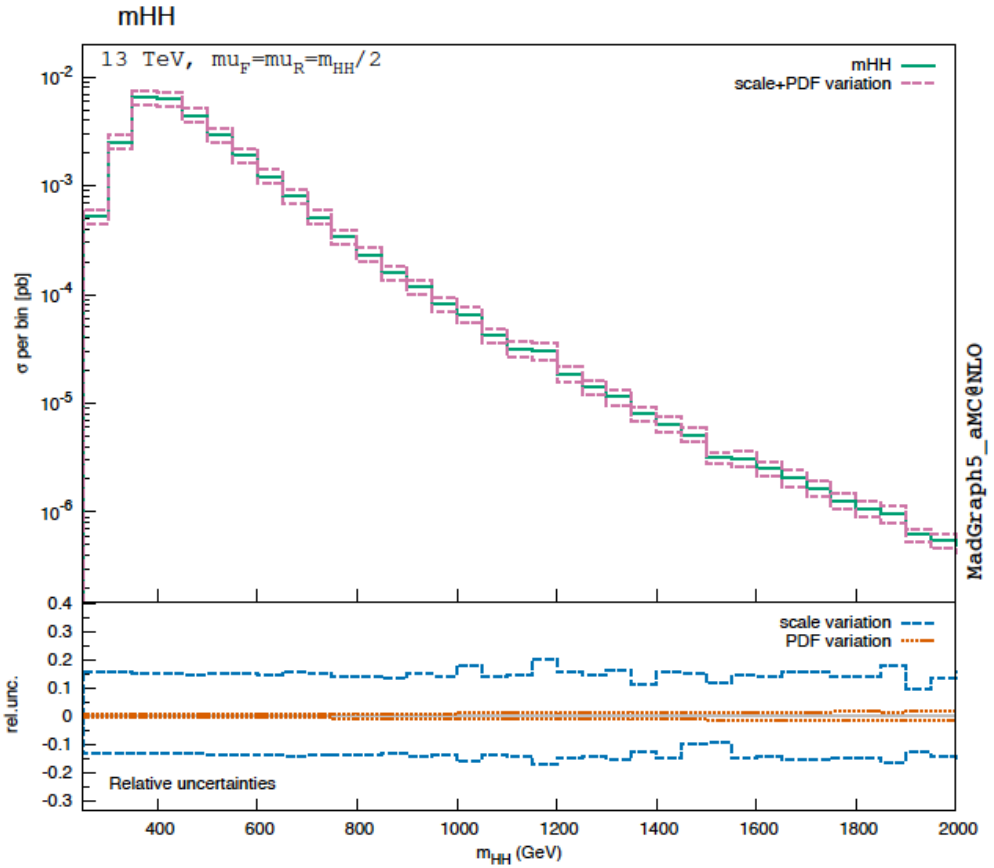
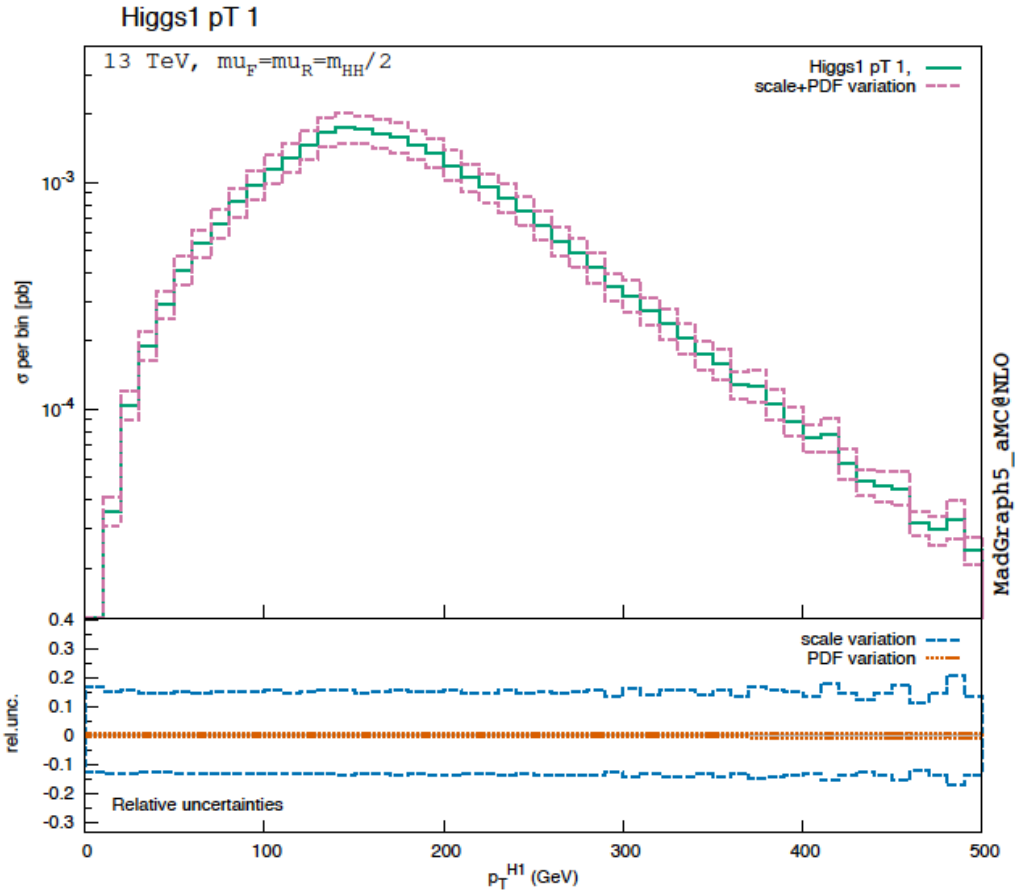
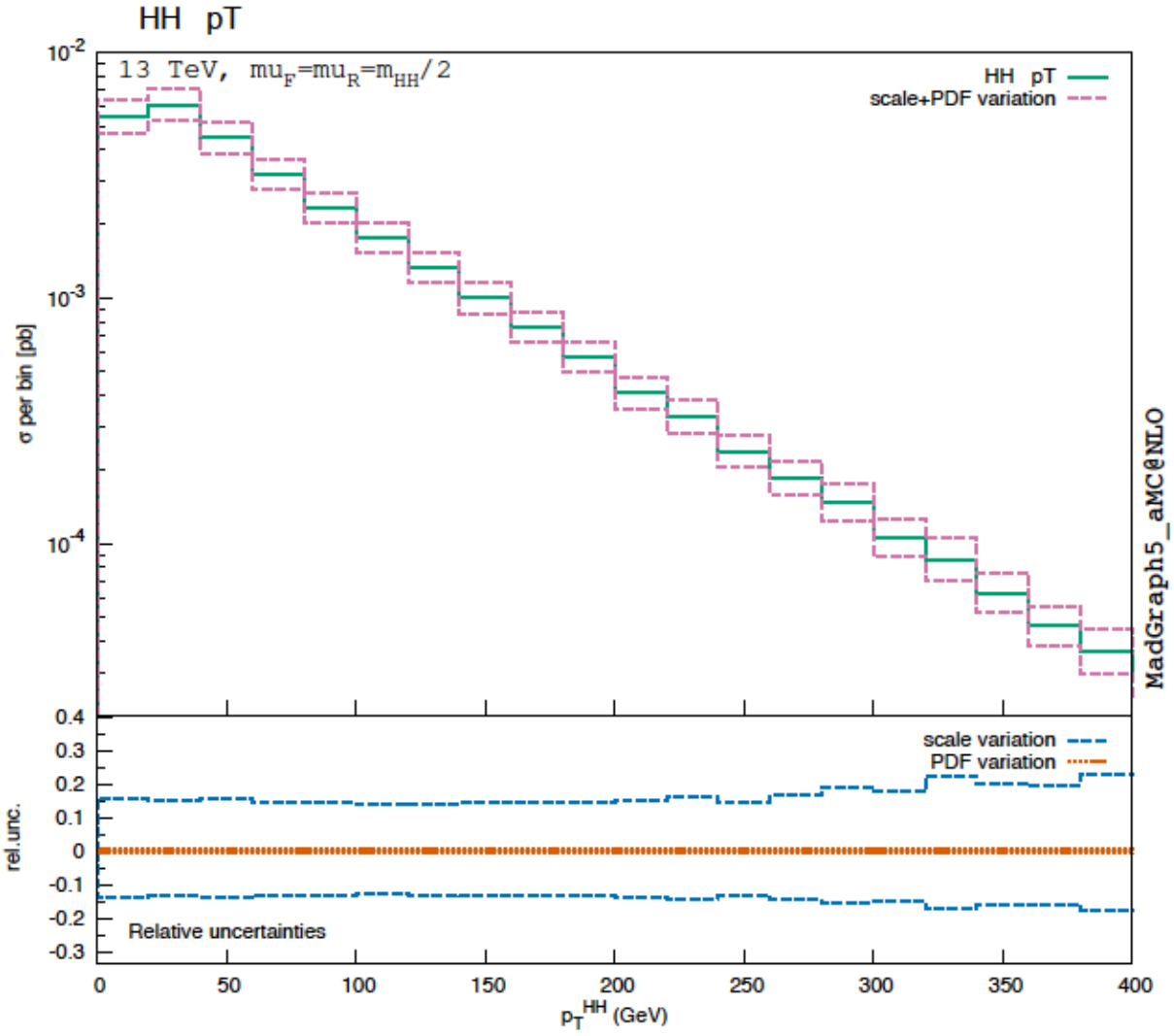
Results for 13 TeV
scale: $m_{HH}/2$

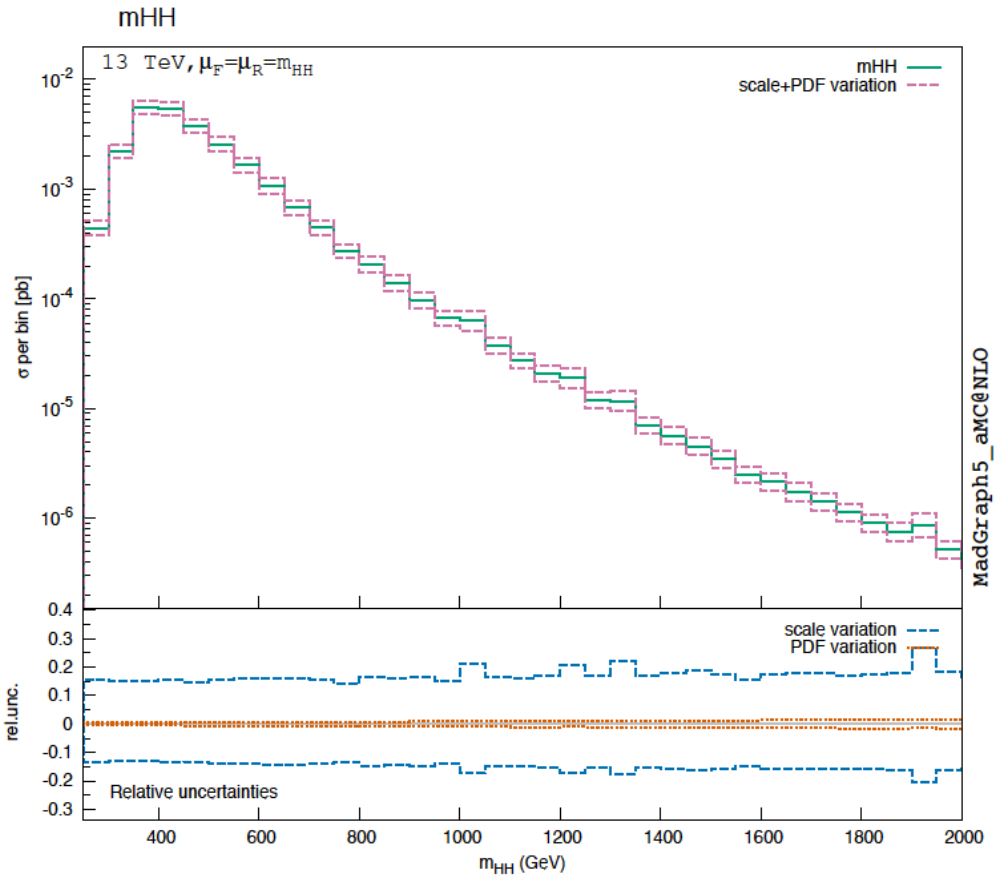


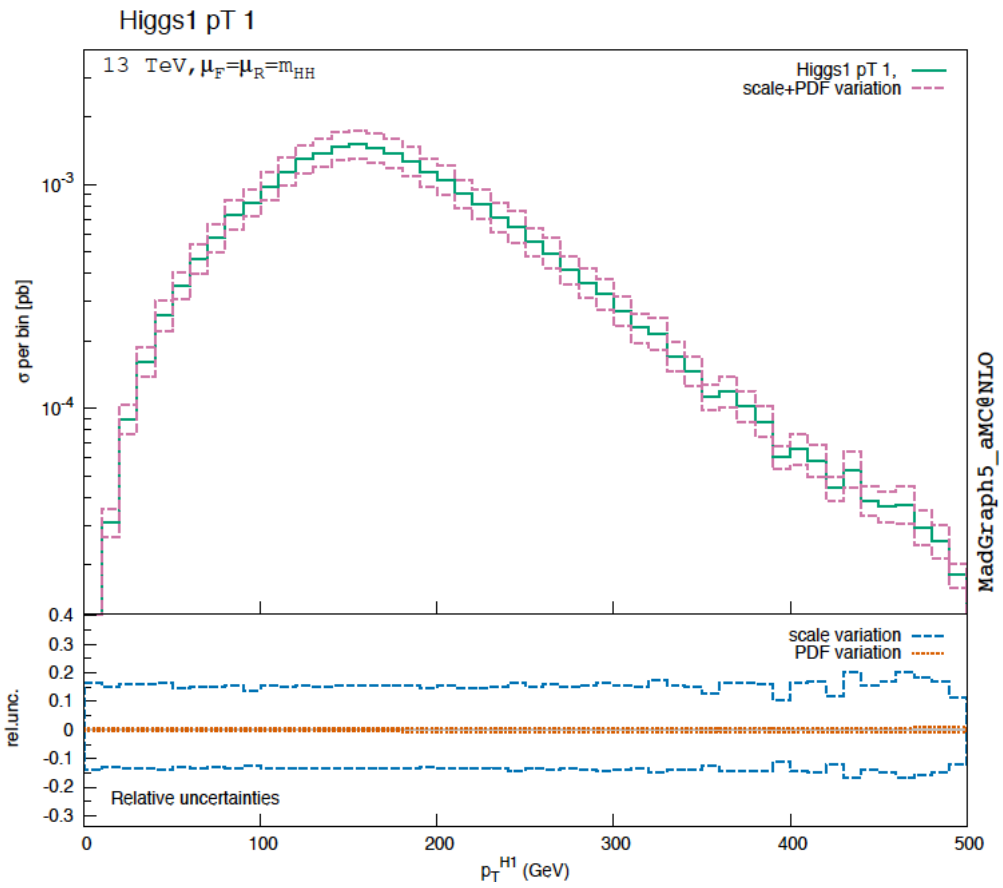


Results for 13 TeV
scale: $m_{HH}/2$

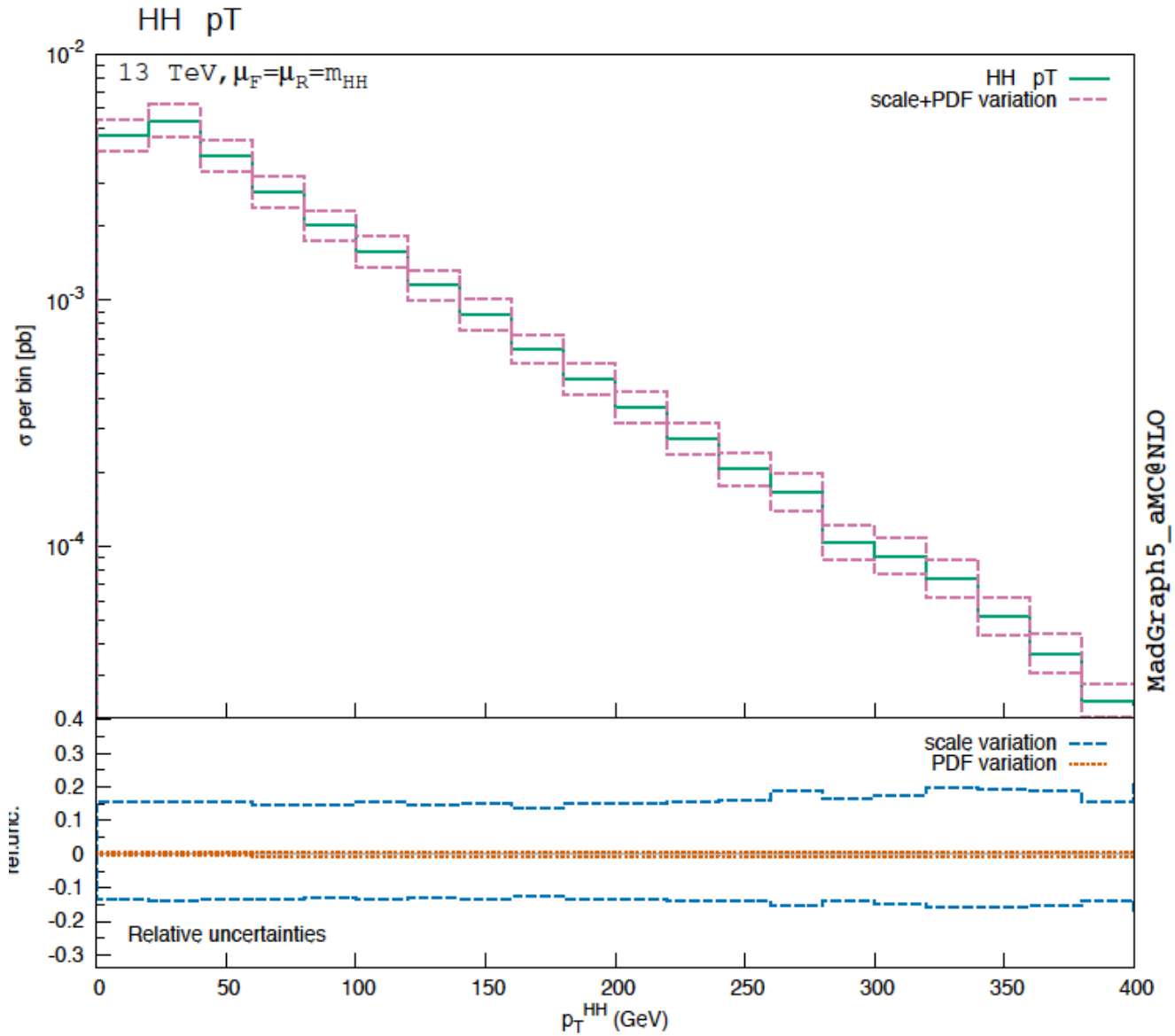


Results for 13 TeV
scale: m_{HH}





Results for 13 TeV
scale: m_{HH}



Results for other channels

NLO results for other channels at 8 and 13 TeV
PDF4LHC15 PDFs
MadGraph5_aMC@NLO

	$\sqrt{s} = 8\,\text{TeV}$ NLO	$\sqrt{s} = 13\,\text{TeV}$ NLO
HH (NLO_approx)	$7.28^{+18\%}_{-15\%} \pm 0.7\%$	$24.9+15\%_{-13\%} \pm 0.5\%$
$HHjj$ (VBF)	$0.438^{+2.0\%}_{-1.3\%} \pm 0.4\%$	$1.551^{+1.6\%}_{-0.6\%} \pm 0.3\%$
$t\bar{t}HH$	$0.165^{+1.2\%}_{-5.6\%} \pm 0.7\%$	$0.792^{+2.8+2.4\%}_{-10-2.9\%}$
W^+HH	$0.144^{+2.0\%}_{-1.8\%} \pm 0.5\%$	$0.324^{+1.7\%}_{-1.1\%} \pm 0.4\%$
W^-HH	$0.0682^{+2.0\%}_{-1.8\%} \pm 0.6\%$	$0.173^{+1.6\%}_{-1.1\%} \pm 0.4\%$
ZHH	$0.129^{+1.9\%}_{-1.8\%} \pm 0.5\%$	$0.313^{+1.8\%}_{-1.2\%} \pm 0.3\%$
$tjHH(\cdot 10^{-3})$	$5.307^{+4.4\%}_{-2.9\%} \pm 1.1\%$	$28.44^{+5.5\%}_{-3.6\%} \pm 0.9\%$

Conclusions - TODO list

- Provide 7,14,100 TeV results
- Comparison plots with Born-improved approach (not including exact reals)
- Other observables?