Validation plots for H4l ggF 0,1,2 jets production

Katharina Ecker

Max-Planck-Institut für Physik

11.11.2015

Max-Planck-Institut für Physik
(Werner-Heisenberg-Institut)

Introduction

- Goal: ggF $H \to ZZ \to 4\ell$ production with inclusive number of jets
- For inclusive sample majority are 0-jet events and we have roughly 25% 1-jet, 5% 2-jet events
- Idea: In order to increase statistics split inclusive ggF sample in three ggF samples with N additional partons ($N = 0, 1, 2$)

Overview of samples, cross checks and objects

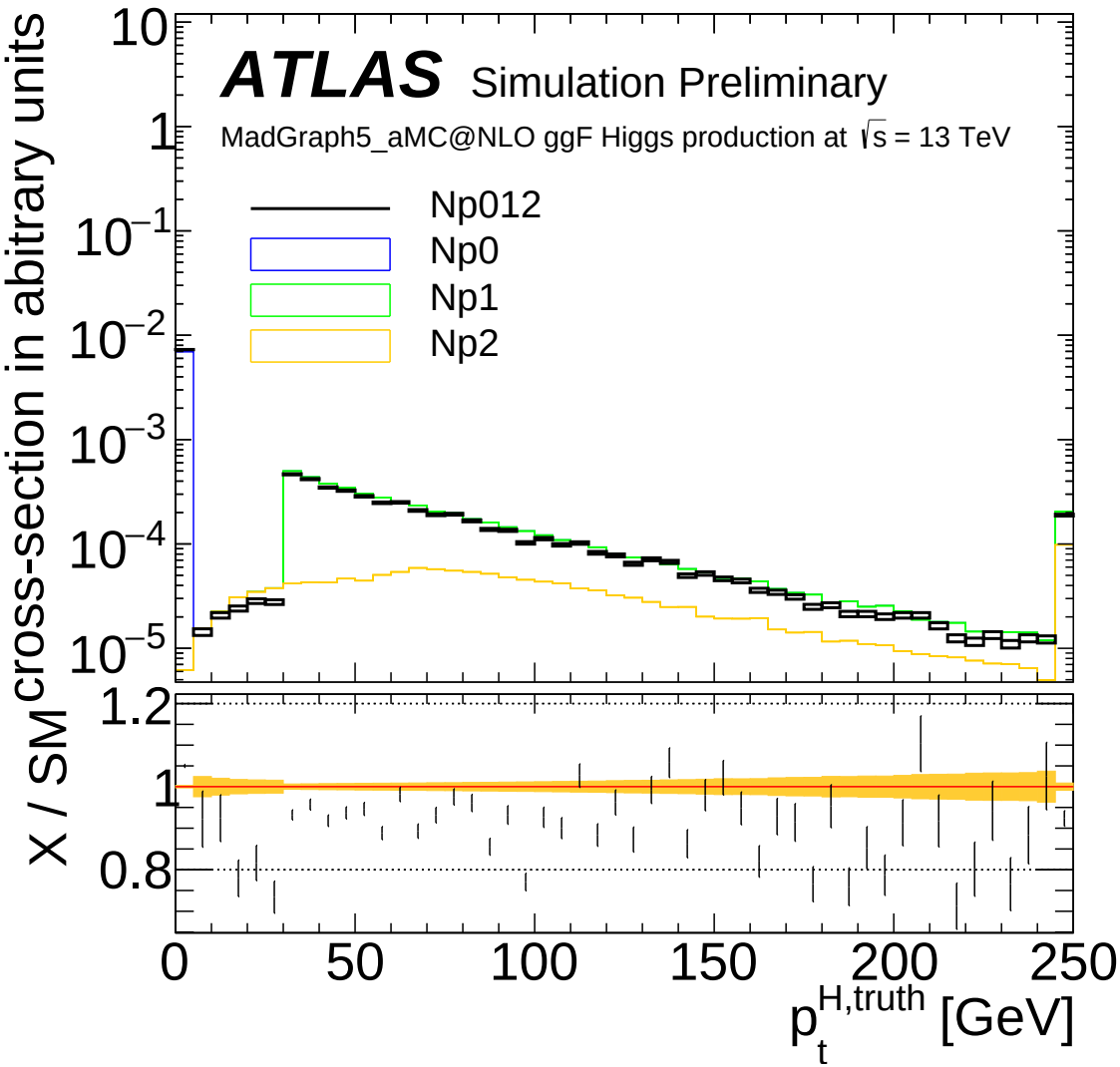
- ggF samples, that we want to request:
  - Np0: pp >x0, x0 > l+l-l+l- & jet matching in pythia
  - Np1: pp >x0 j , x0 > l+l-l+l- & jet matching in pythia
  - Np2: pp >x0 jj, x0 > l+l-l+l- & jet matching in pythia

- Cross check samples:
  - incl: pp > x0 , x0 > l+l-l+l- & showering in pythia
  - Np012: pp >x0, x0 > l+l-l+l- , add process pp >x0 j , x0 > l+l-l+l- , add process pp >x0 j j , x0 > l+l-l+l- & jet matching in pythia

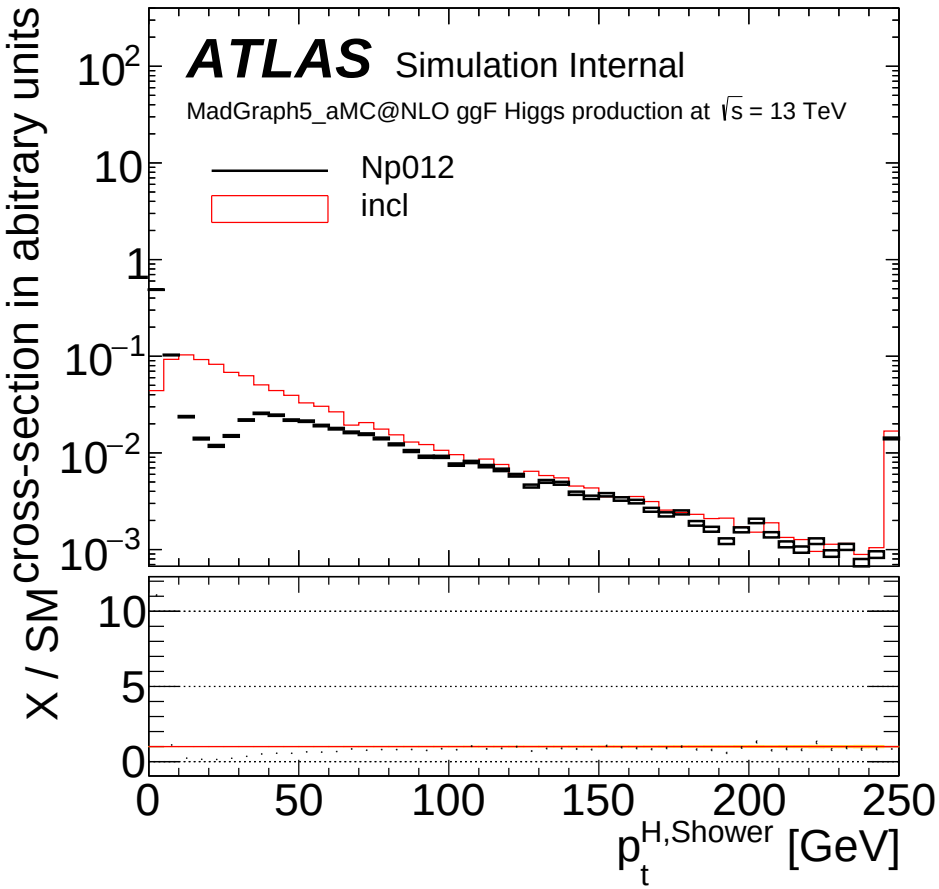
- Cross checks:
  1. Np012 vs. Np0 + Np1 + Np2 stacked $\rightarrow$ ok
  2. Np012 vs. incl $\rightarrow$ see differences

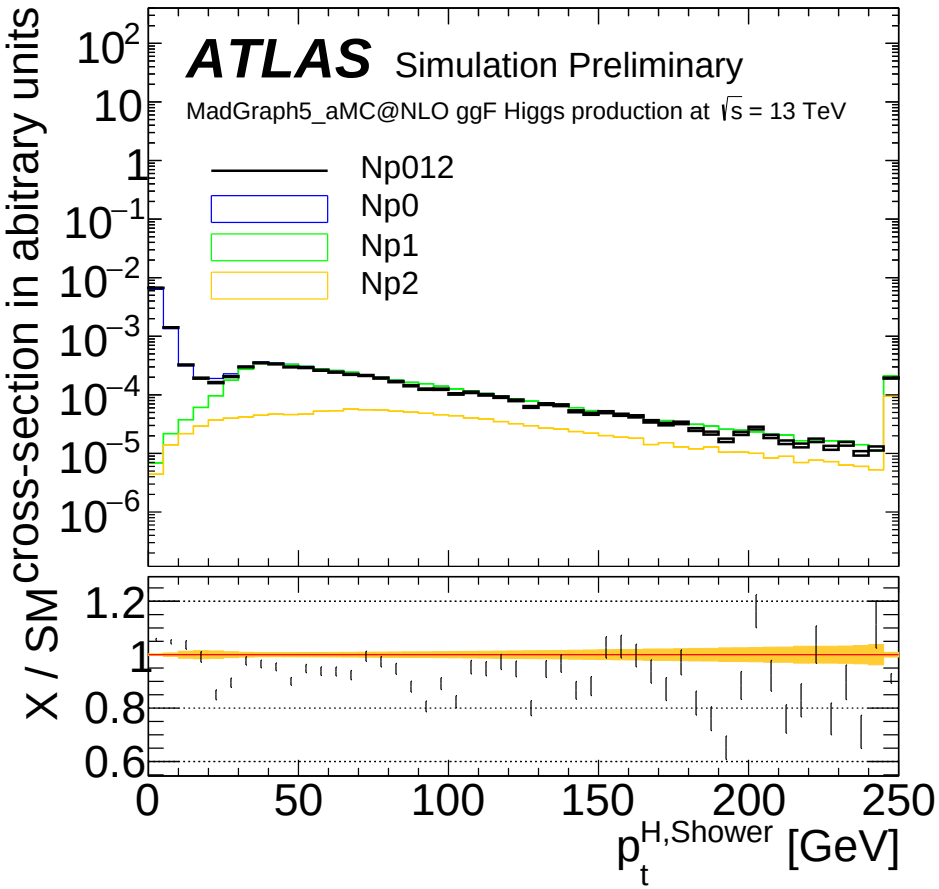
- Objects:
  - Higgs before showering: status 22
  - Higgs after showering: status 62
  - truth Z: status 22
  - Jets: Output container of antikt algorithm with R=0.4 AntiKt4TruthJets ('contaminated' by electrons/photons)

Higgs before showering ($p_{T,H} > 1$ MeV)

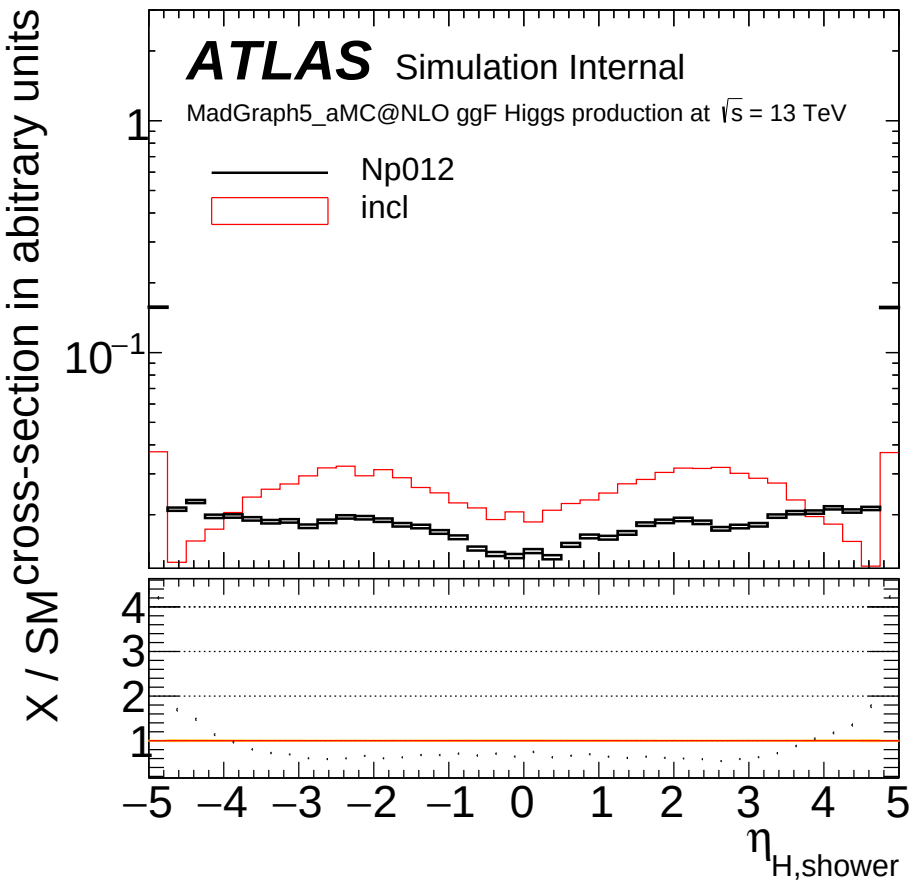


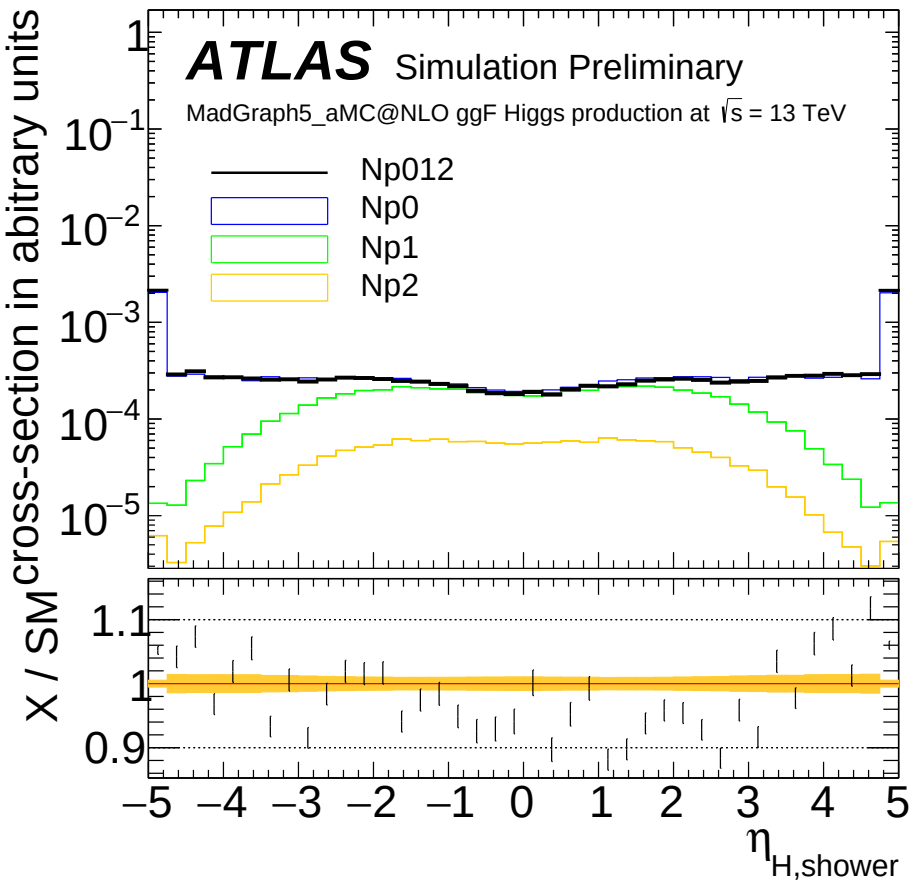
Higgs after showering ($p_{T,H} > 1$ MeV)



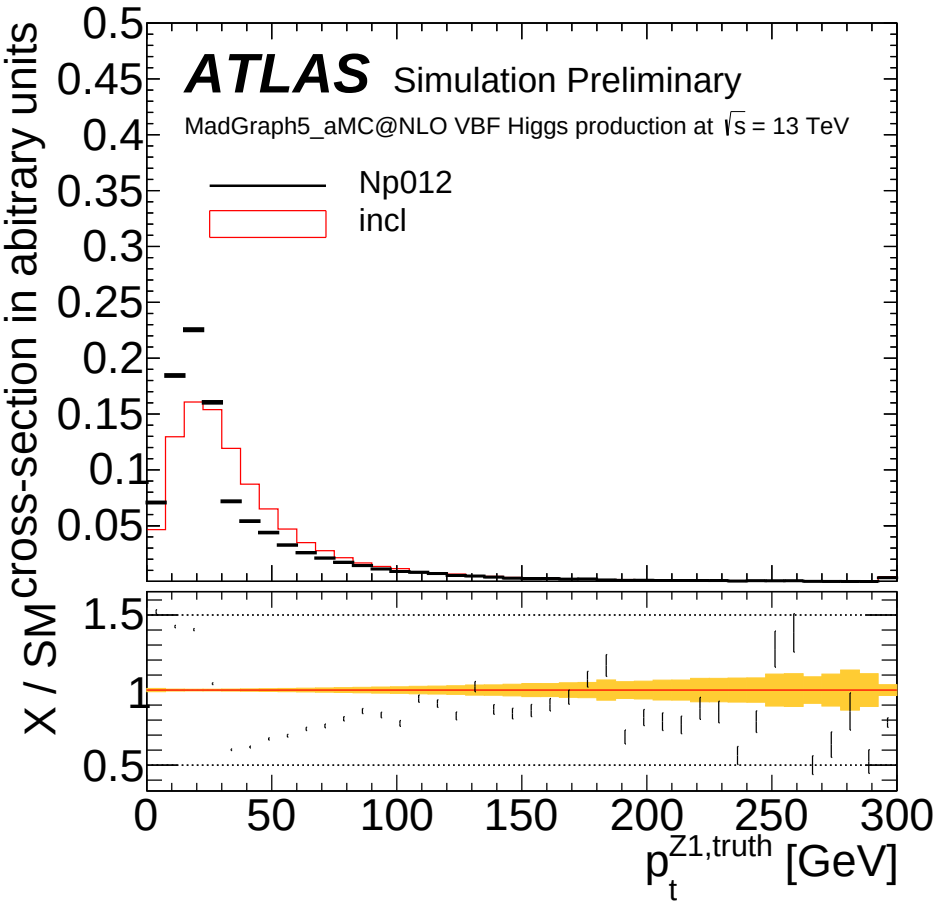


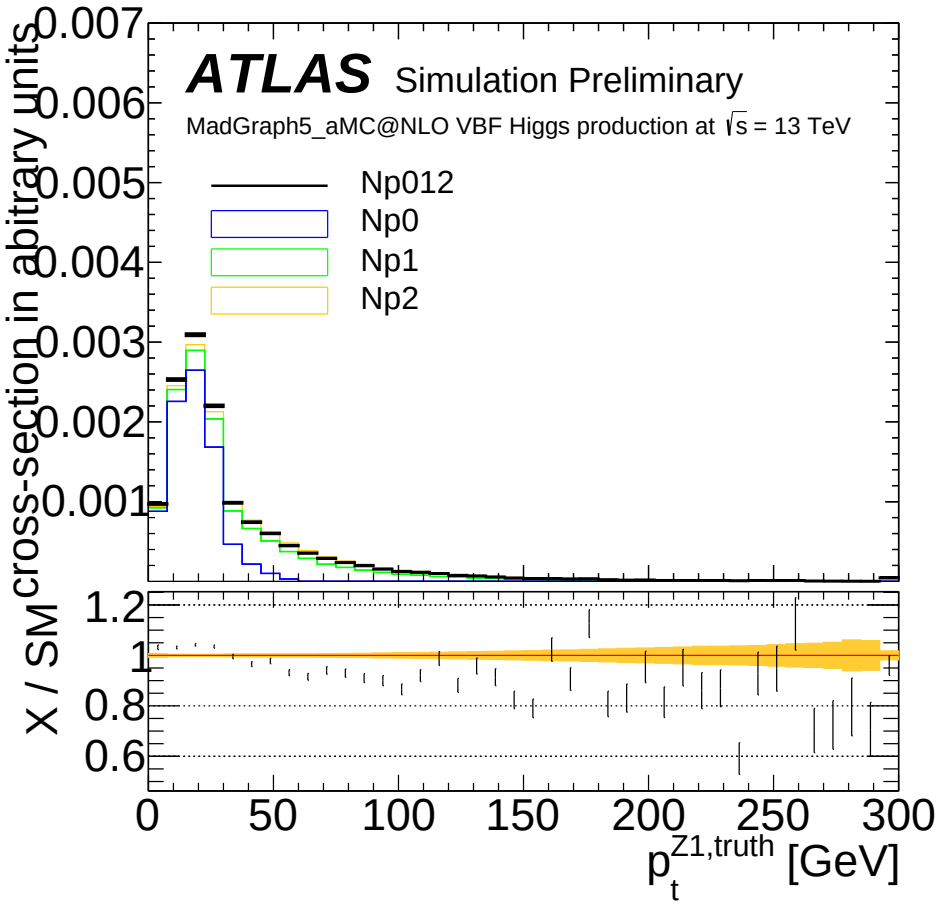
Higgs after showering ($p_{T,H} > 1$ MeV)



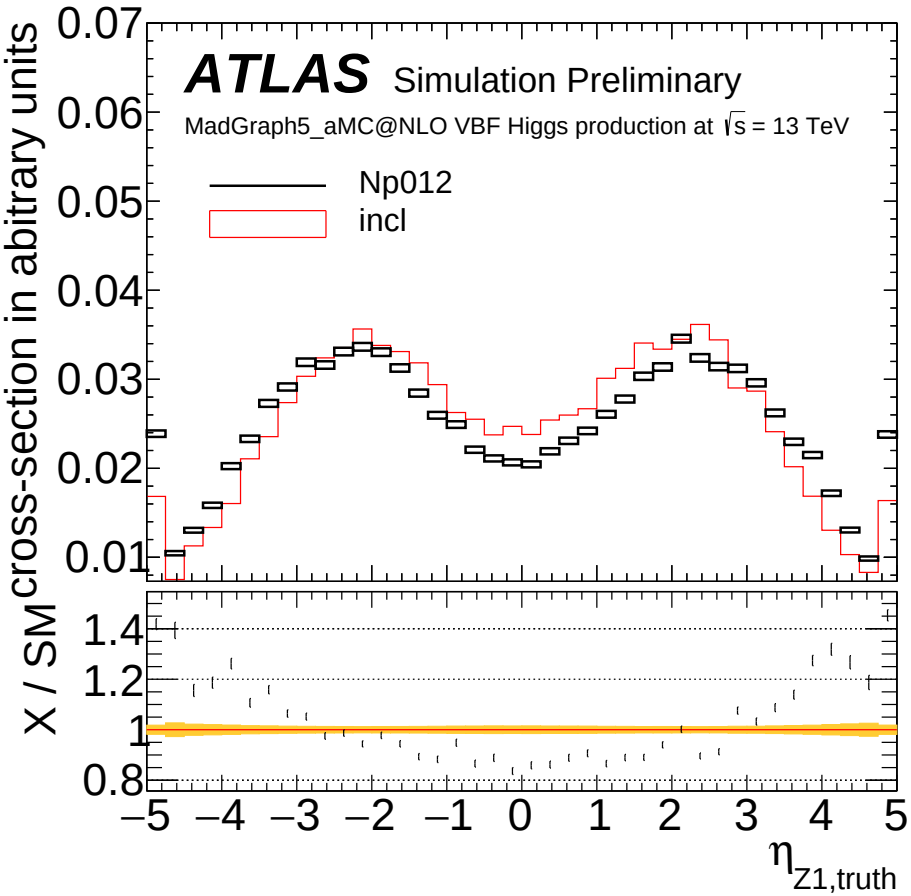


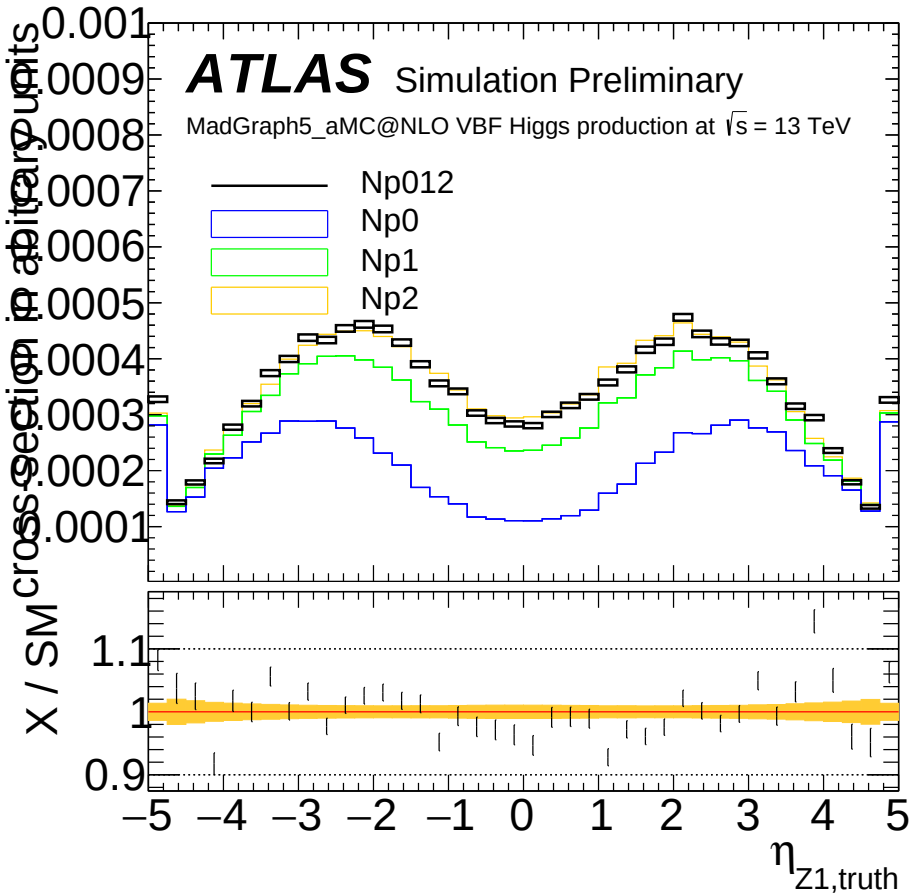
Z_1 truth


ATLAS Simulation Preliminary
MadGraph5_aMC@NLO VBF Higgs production at √s = 13 TeV
Np012
incl
cross-section in abitrary units
X / SM
$p_t^{Z1,truth}$ [GeV]

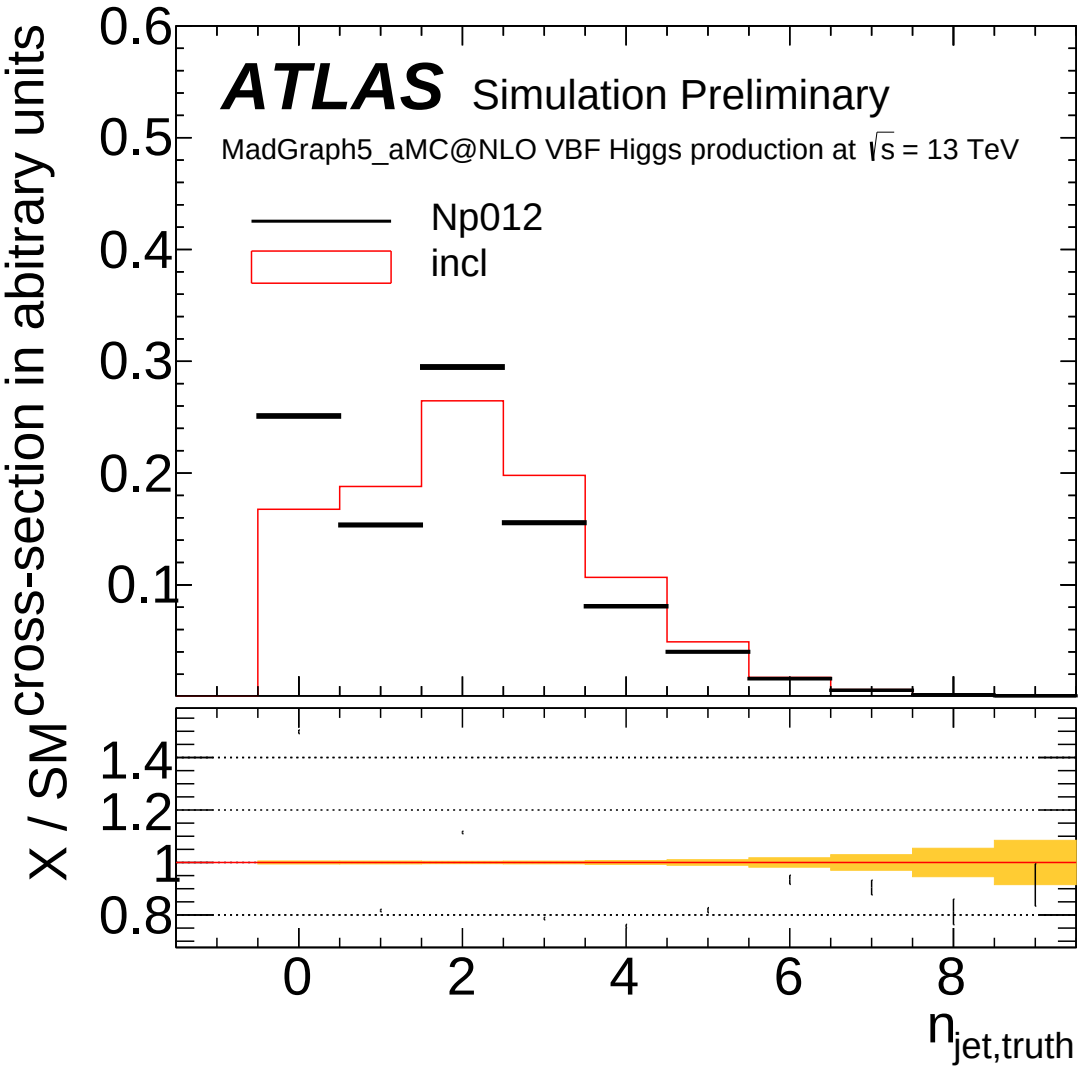

ATLAS Simulation Preliminary
MadGraph5_aMC@NLO VBF Higgs production at √s = 13 TeV
Np012
Np0
Np1
Np2
cross-section in abitrary units
X / SM
$p_t^{Z1,truth}$ [GeV]

Z_1 truth

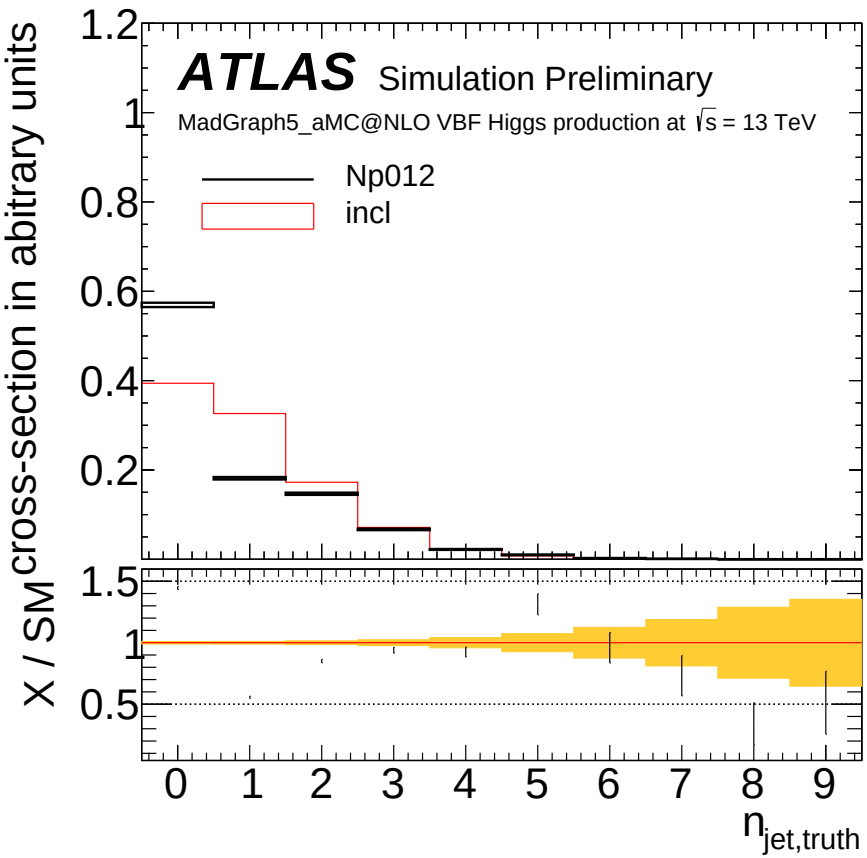

ATLAS Simulation Preliminary
MadGraph5_aMC@NLO VBF Higgs production at √s = 13 TeV
Np012
incl
cross-section in abitrary units
X / SM
η Z1,truth

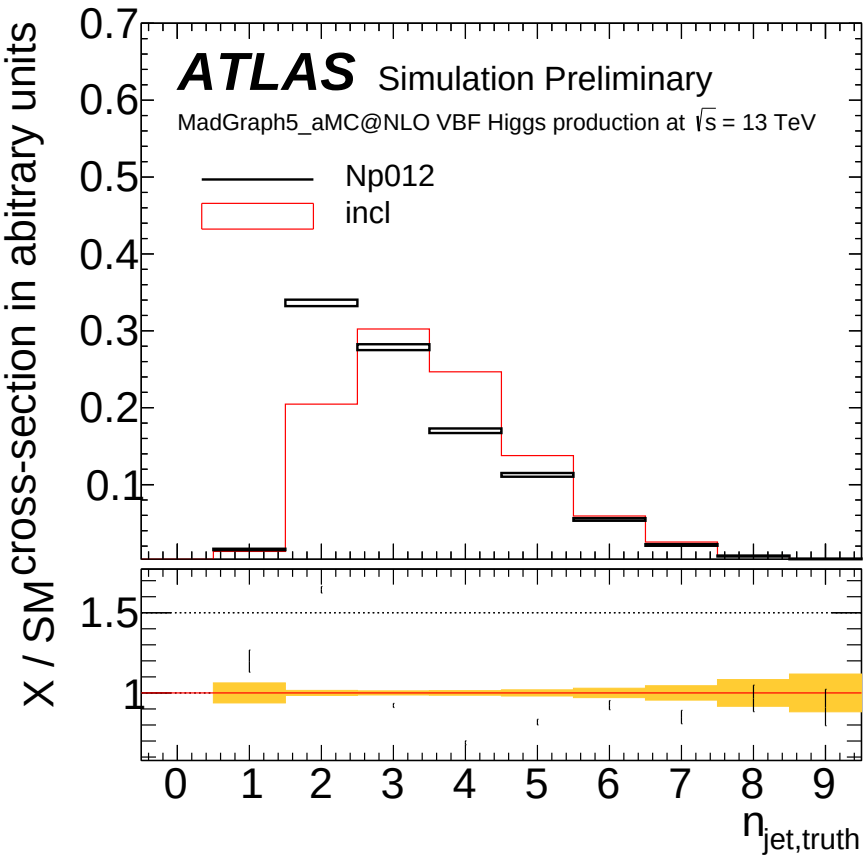

ATLAS Simulation Preliminary
MadGraph5_aMC@NLO VBF Higgs production at √s = 13 TeV
Np012
Np0
Np1
Np2
cross-section in abitrary units
X / SM
η Z1,truth

n_{jets}: AntiKt4TruthJets

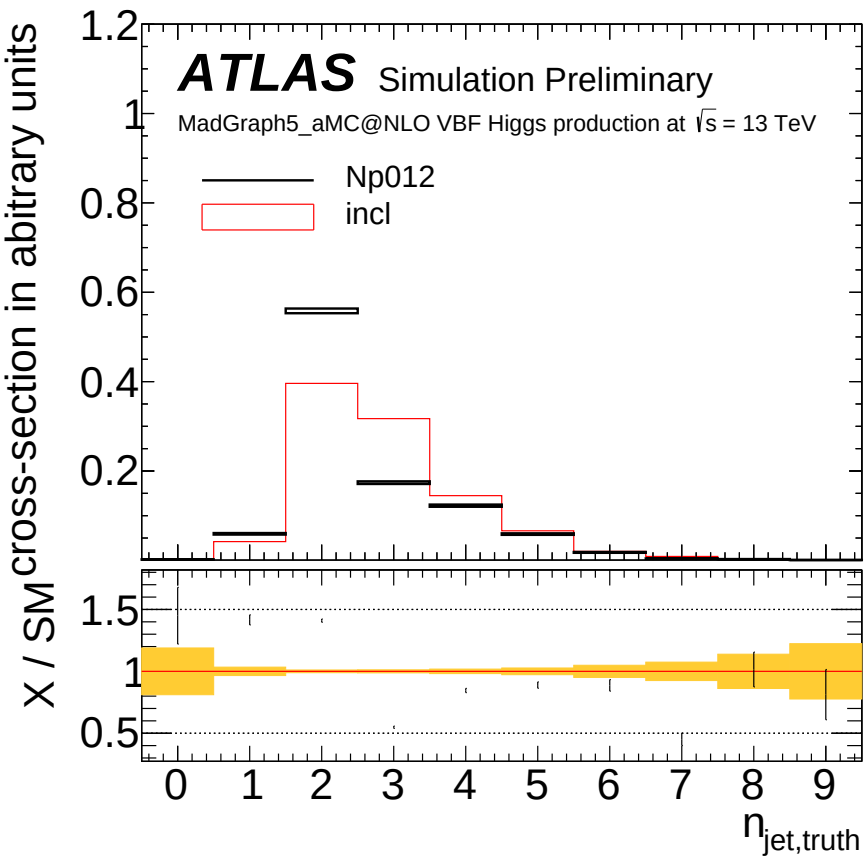


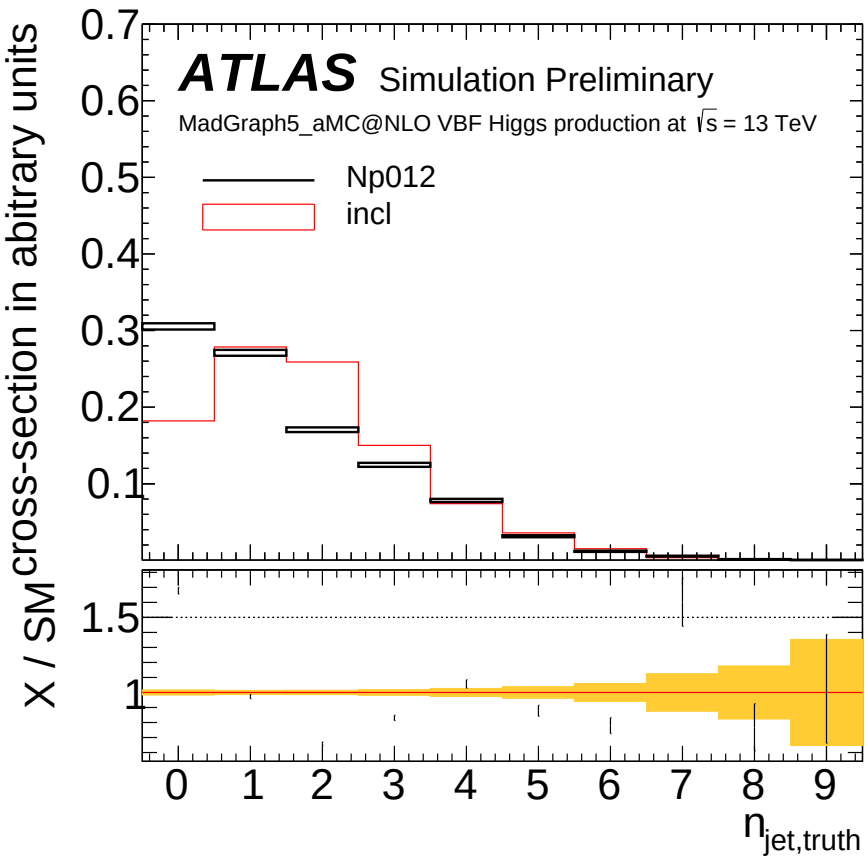
n_{jets} before electron-jet overlap removal for 4mu and 4e final states



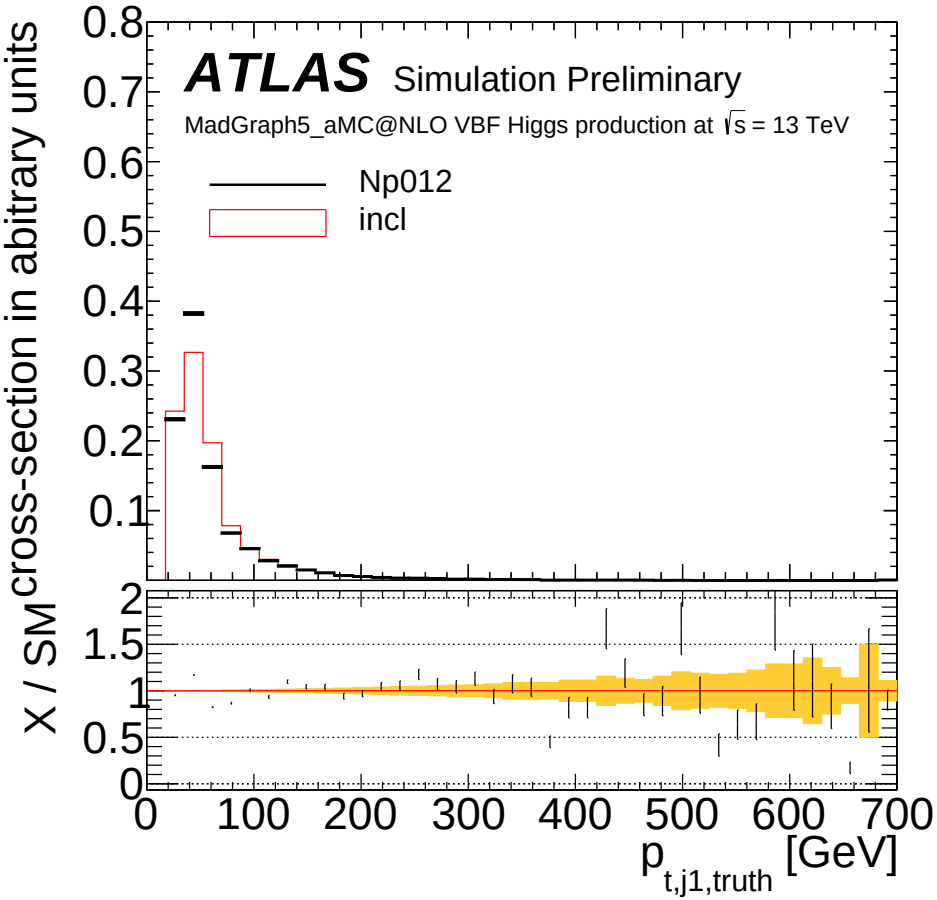


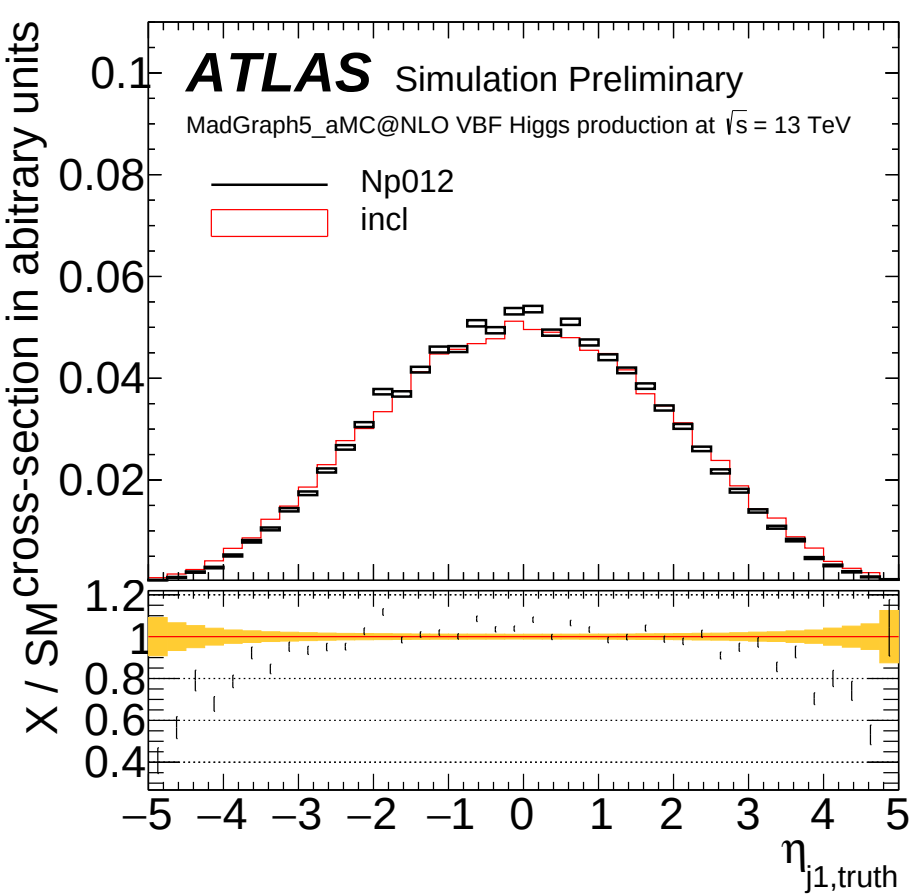
n_{jets} before electron-jet overlap removal for 2e2mu and 2mu2e final states



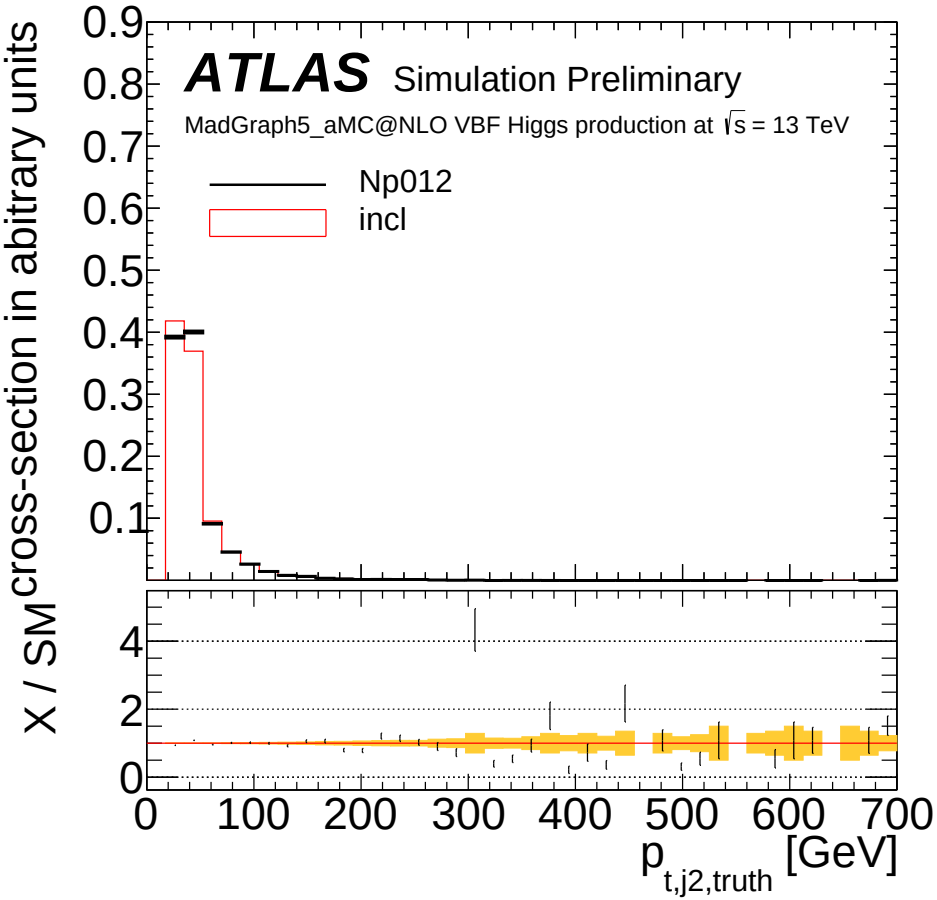


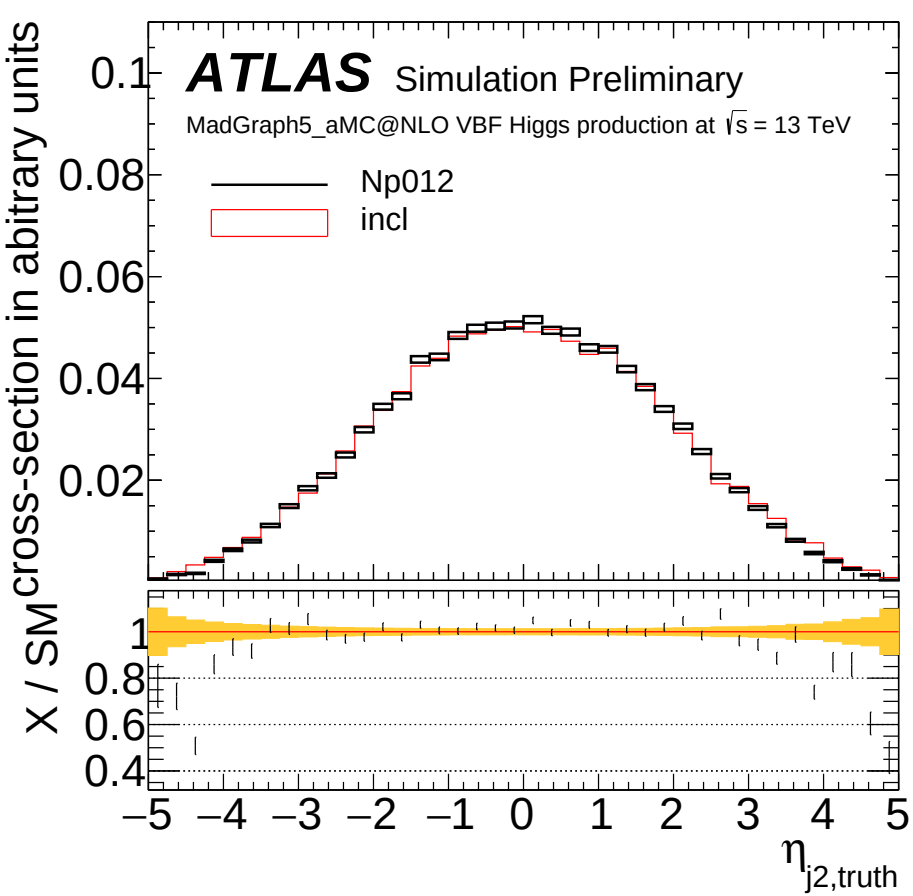
Jets truth: Leading jet



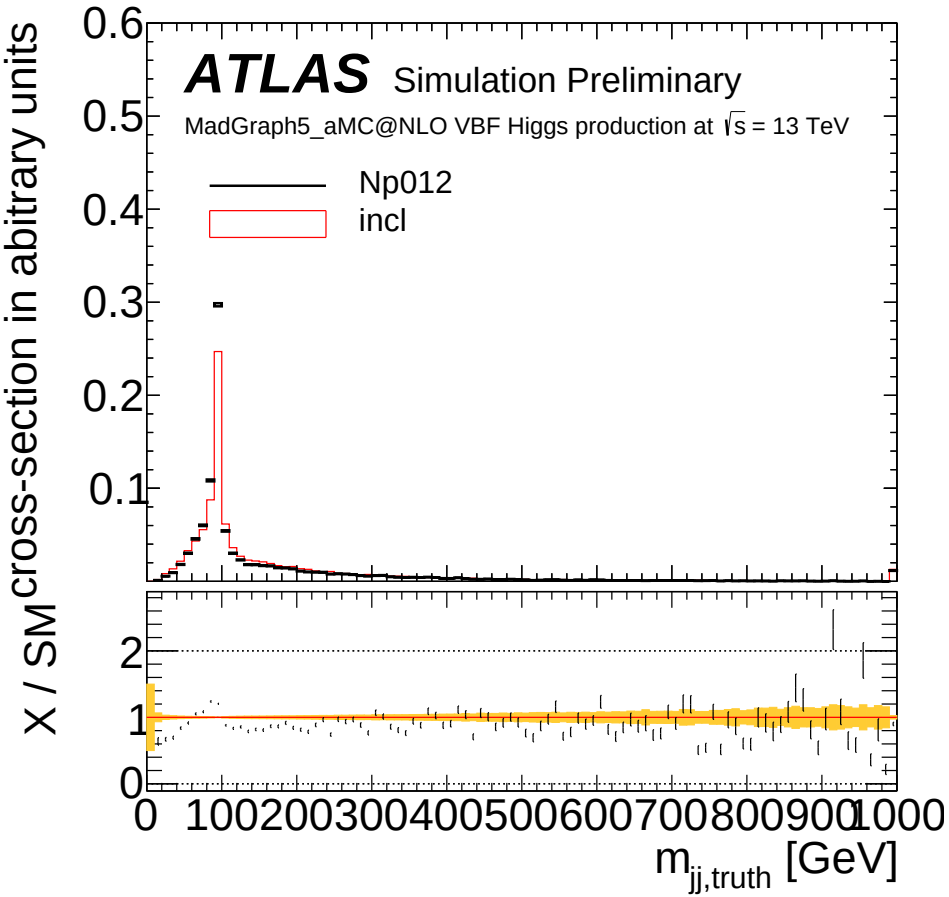


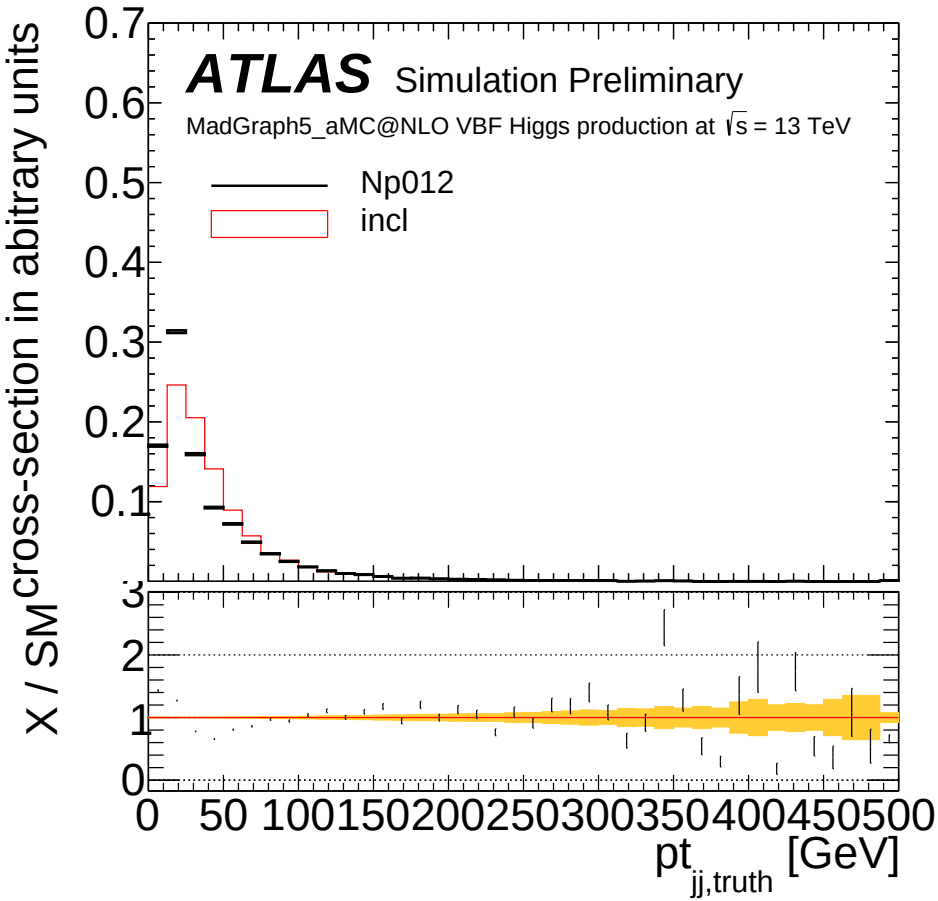
Jets truth: Subleading jet



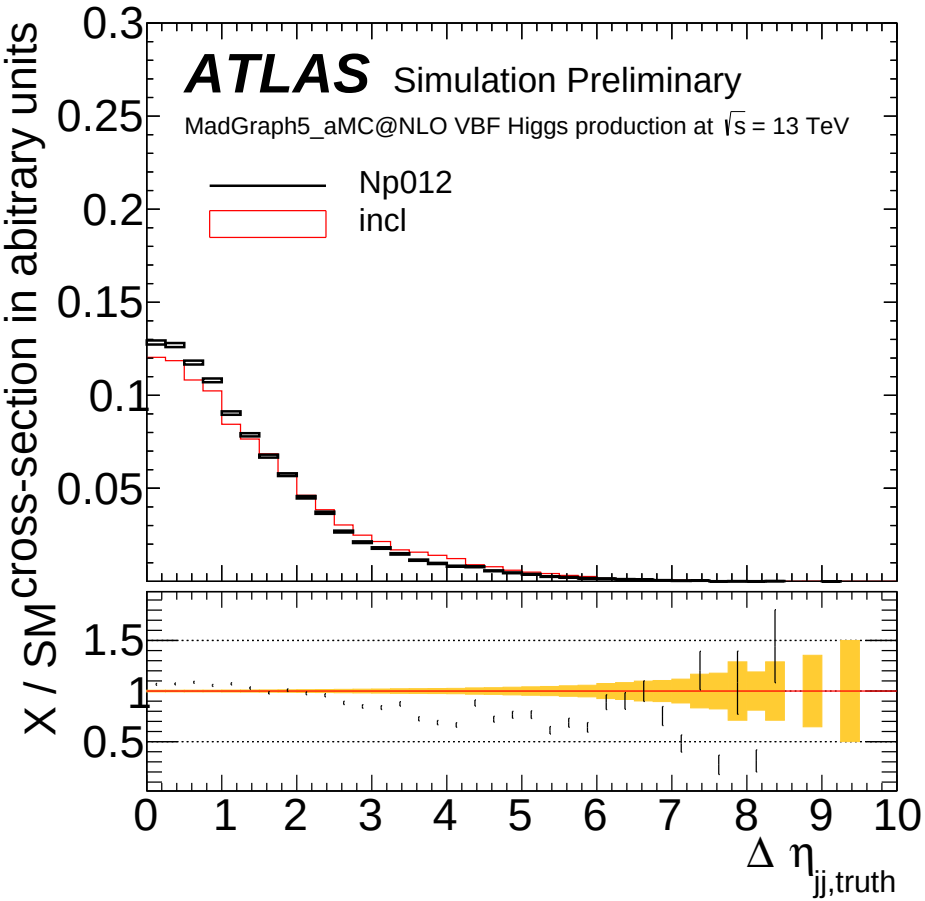


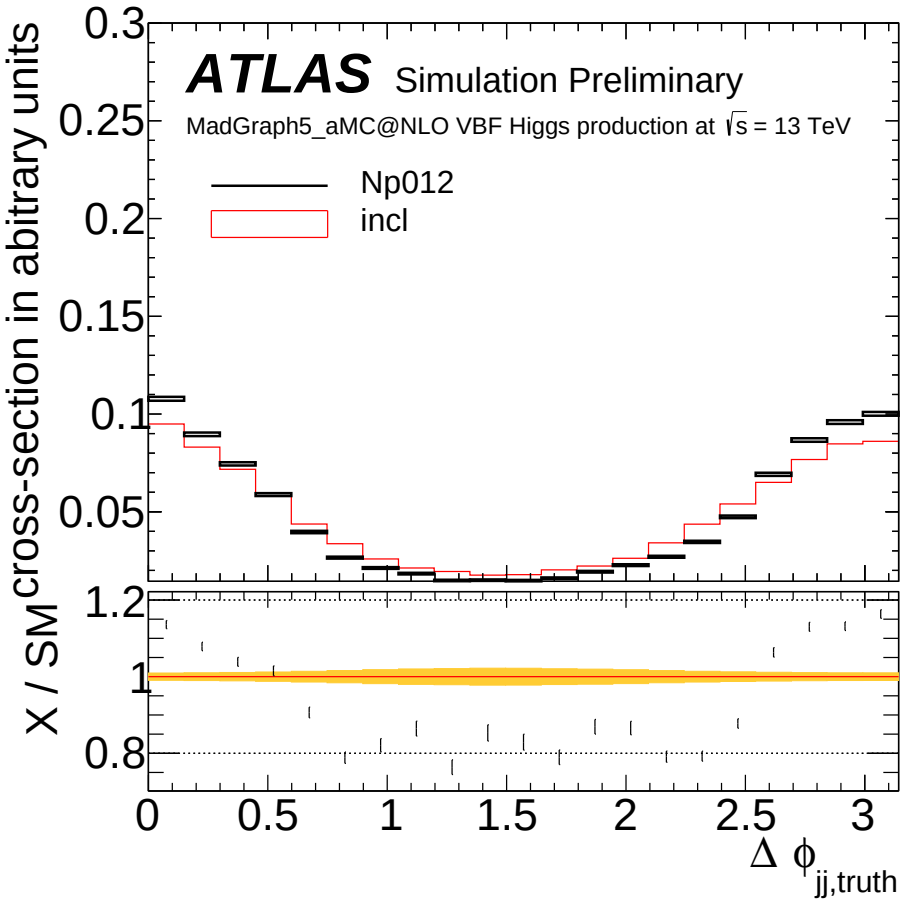
Dijets truth





Dijets truth





Cross sections

sample	$cos(\alpha)$	κ_{SM}	κ_{Hgg}	cross section [pb^{-1}]
incl	1.0	1.0	1.0	0.002058
Np012	1.0	1.0	1.0	0.003658
Np0	1.0	1.0	1.0	0.002069
Np1	1.0	1.0	1.0	0.001116
Np2	1.0	1.0	1.0	0.000495