Control Plots of 2012 5.8fb^{-1} data for Higgs to tautau to leplep

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Introduction

- We started to look at the first 5.8fb^{-1} of the 2012 data.
- Fakes are estimated by fake factor method.
- Validation of control plots.
- Fake factor method is extrapolated from fakable control region.
- F.F. is ratio that evaluated from Z+jets events.
- First I measured F.F. in 2012 data.
- I have used the default SMWZ_NTUP.

$$N_{Bkg.}^{Est.} = N_{Tight+LNT} \times F.F.$$

$$F.F = \frac{N_{Tight}}{N_{LNT}}$$

Objects definitions

Electrons

1) author is 1or 3
2) E_T >15GeV
3) medium++
4) $|\eta|<1.37$, $1.52< |\eta|<2.47$
5) $E_T$cone30/E_T<0.14
6) $p_T$cone30/E_T<0.13

Muons

1) staco tight
2) $|\eta| < 2.5$
3) $p_T > 10$GeV
4) MCP Hits, $|Z_0| < 10$mm
5) $E_T$cone30/$p_T < 0.14$
6) $p_T$cone30/$p_T < 0.13$

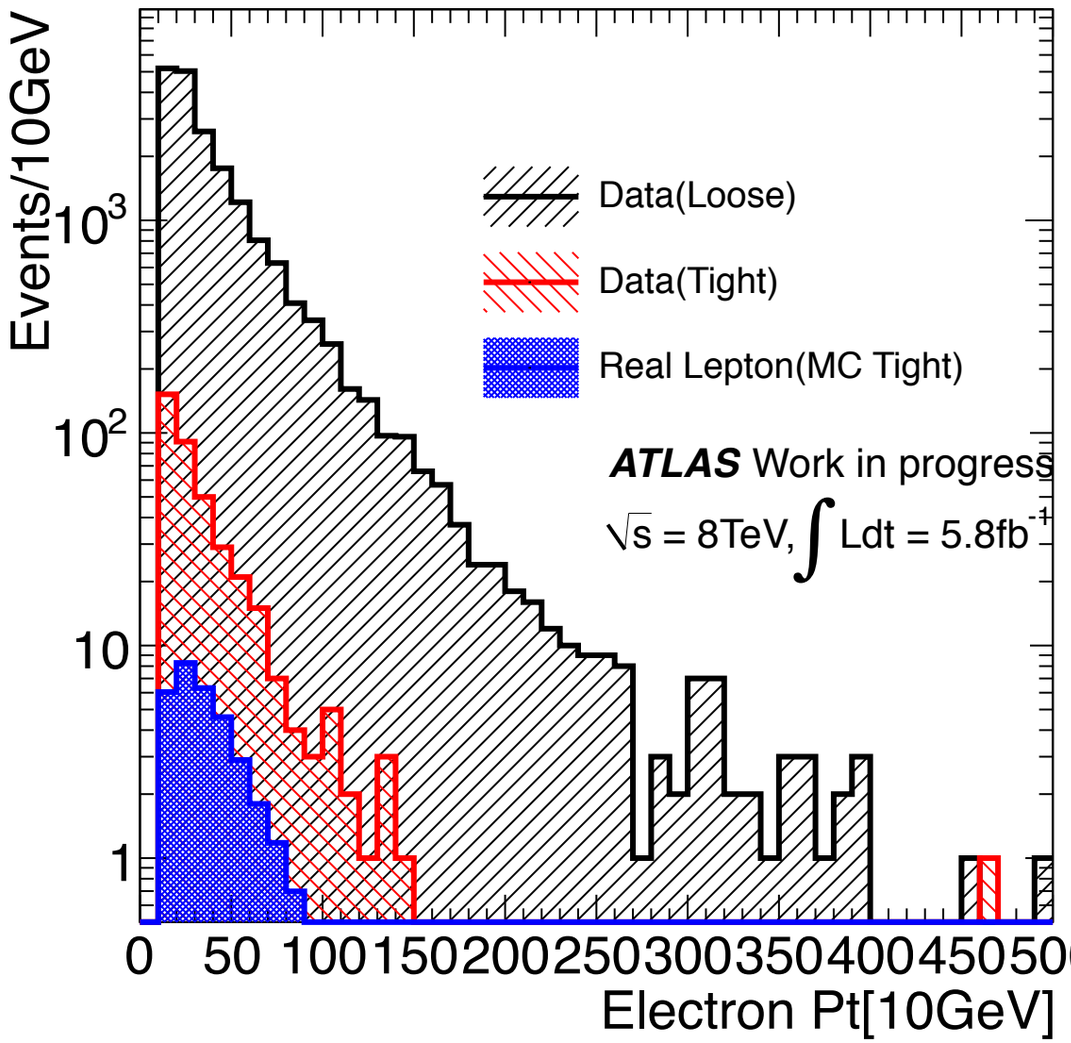
Loose Electrons

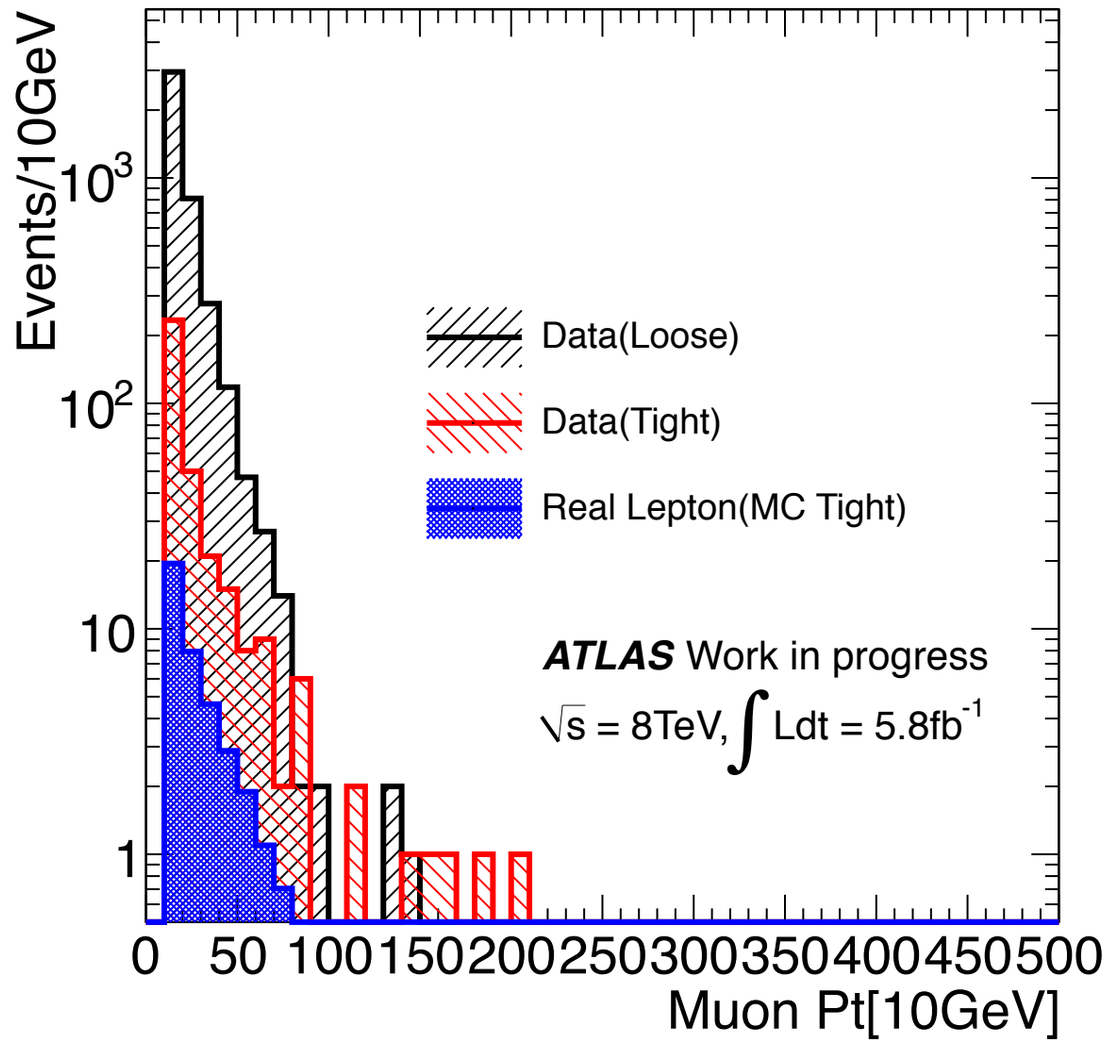
1) author is 1or 3
2) E_T >15GeV,crack eta
3) !medium++
4) $E_T$cone30/E_T<0.25
5) $p_T$cone30/E_T<0.25
6) !Tight electron(signal)

Loose Muons

1) No ID requirement
2) $|\eta| < 2.5$
3) $p_T > 10$GeV
4) MCP Hits, $|Z_0| < 10$mm
5) No isolation requirement
6) ! Tight muon(signal)

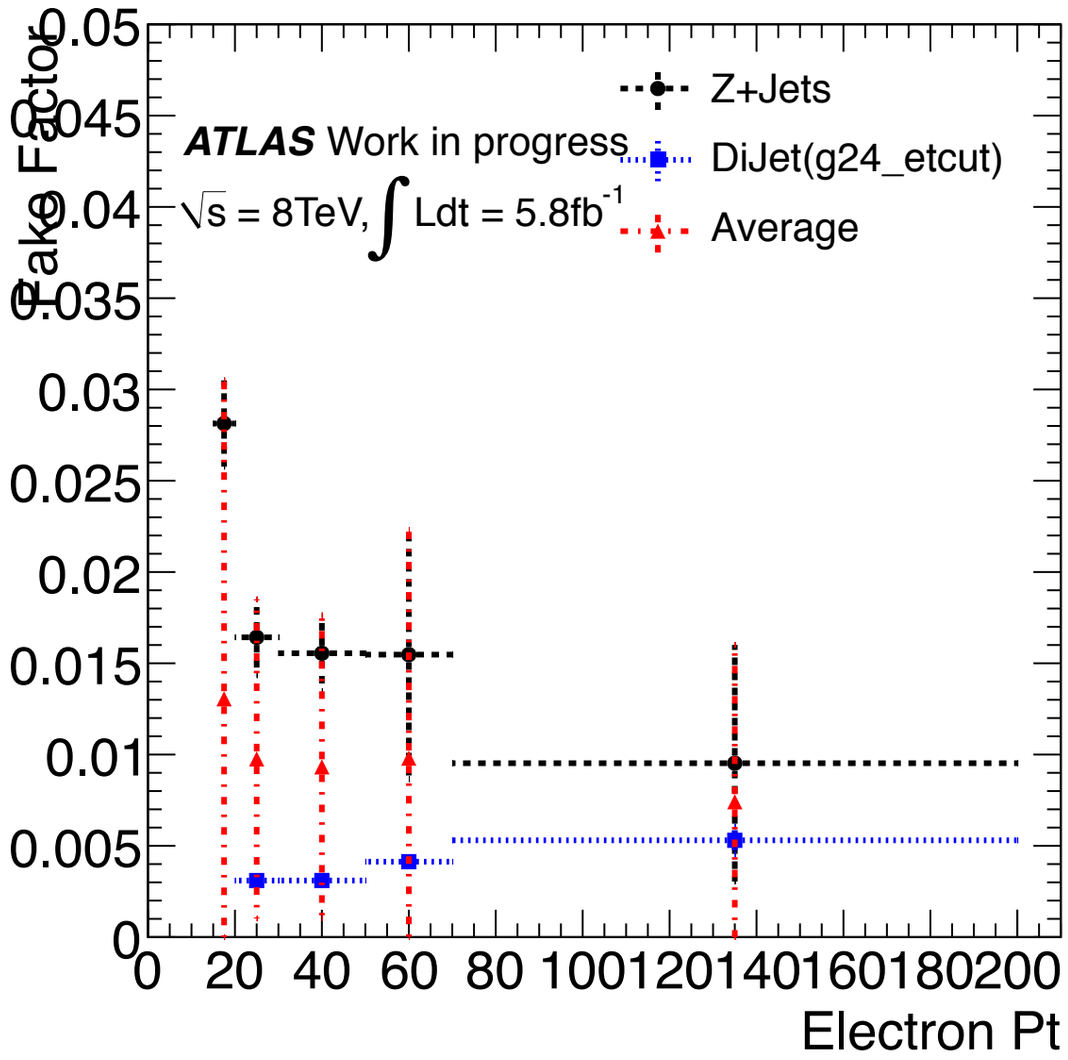
Fakable p_T distribution

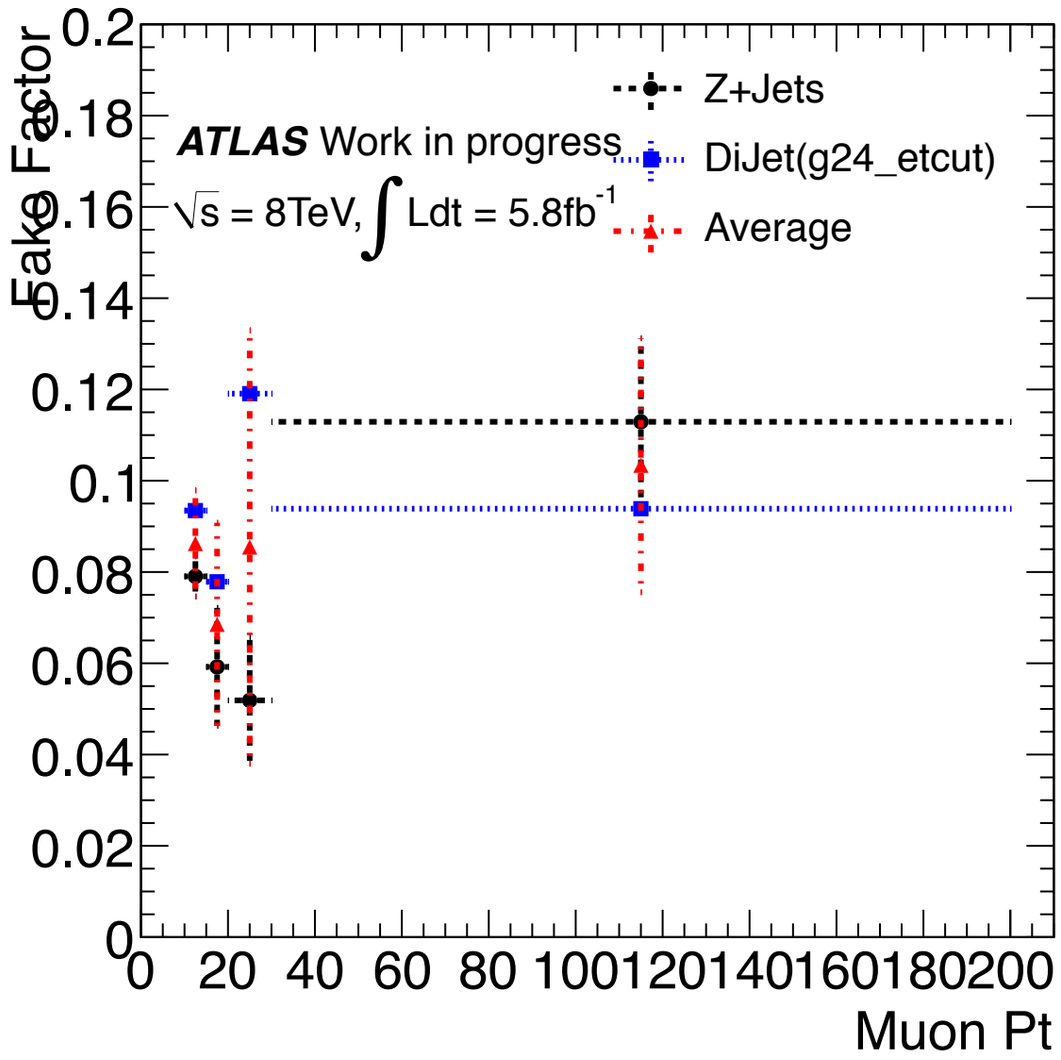




- Require exactly one Z boson event with no additional W/Z.
  - Z : $|m_Z - m_{LL}| < 15$GeV
  - W: $m_T > 30$GeV

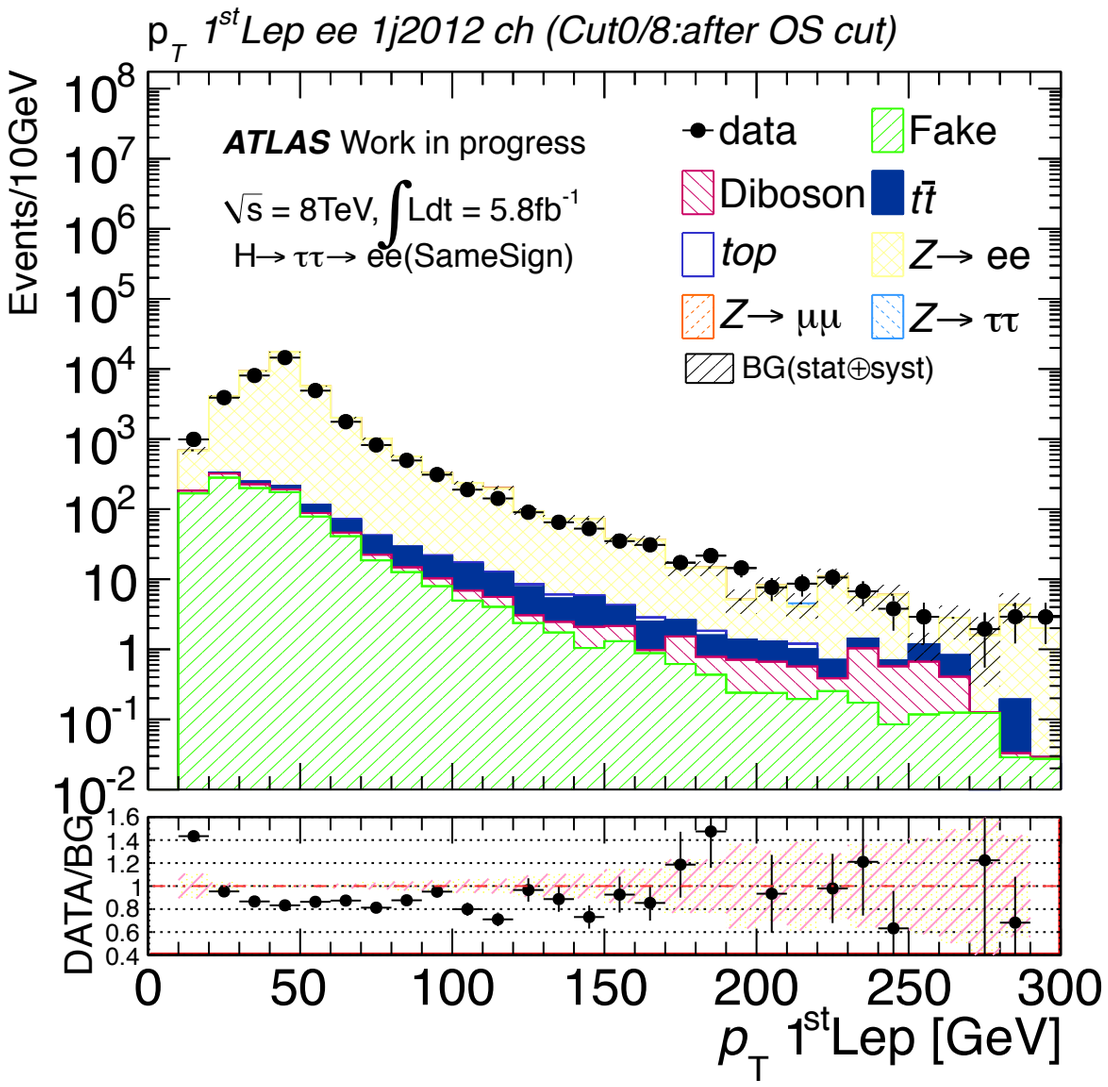
Fake Factor

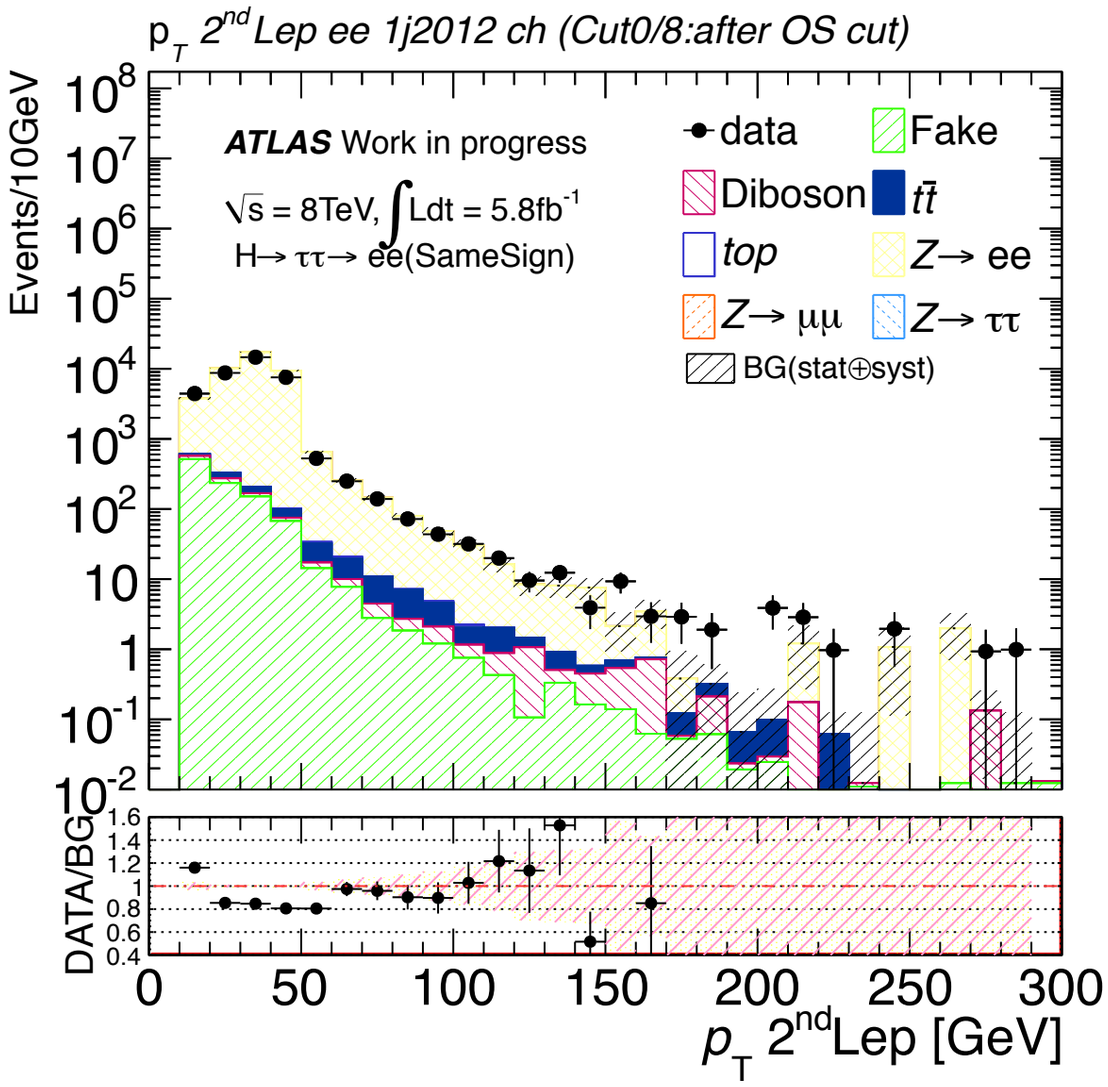




- Fake factor was evaluated an average of two factors.
  - Systematics uncertainty is mainly stat. and sample dependence.

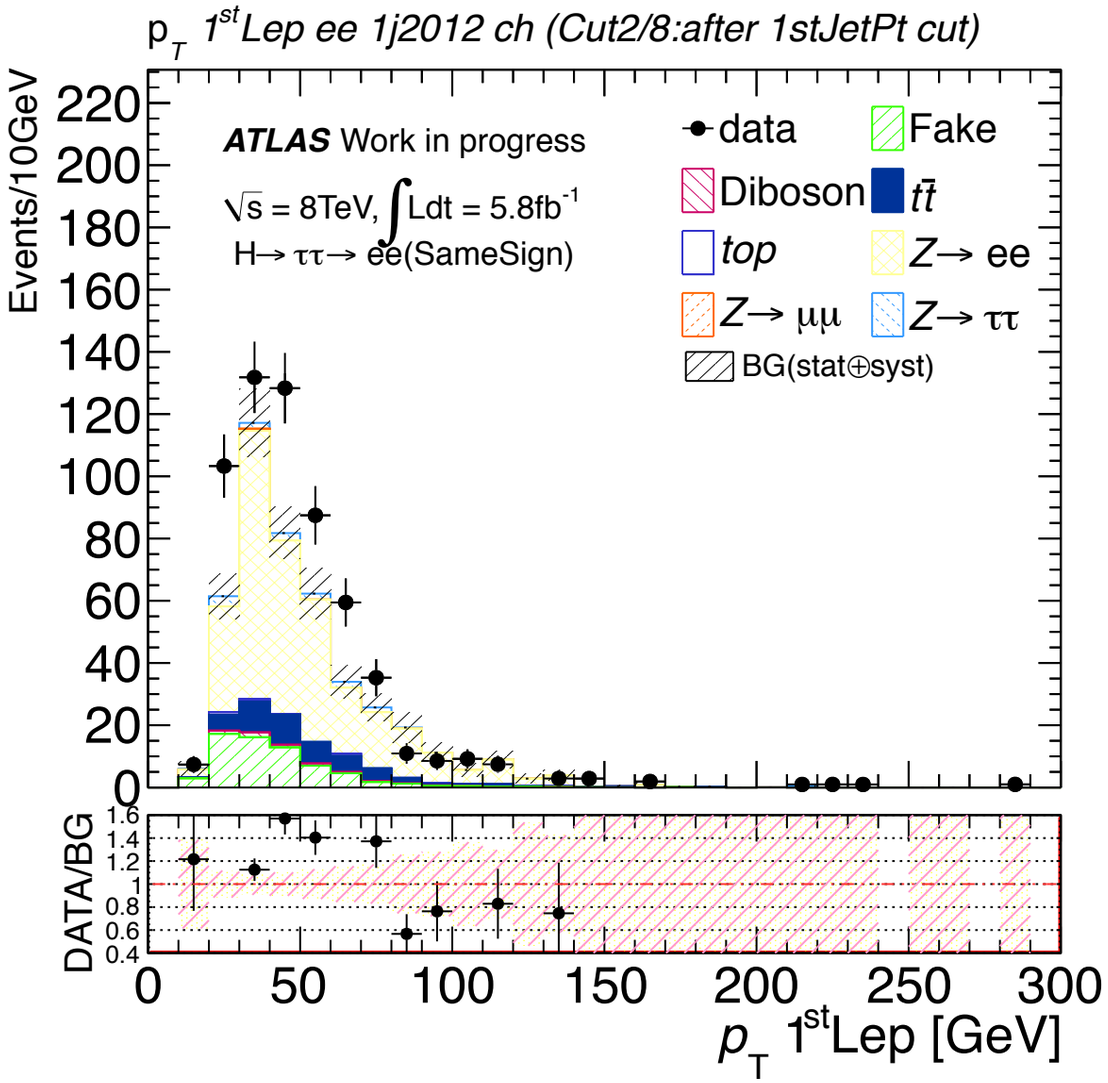
SS Control Plots

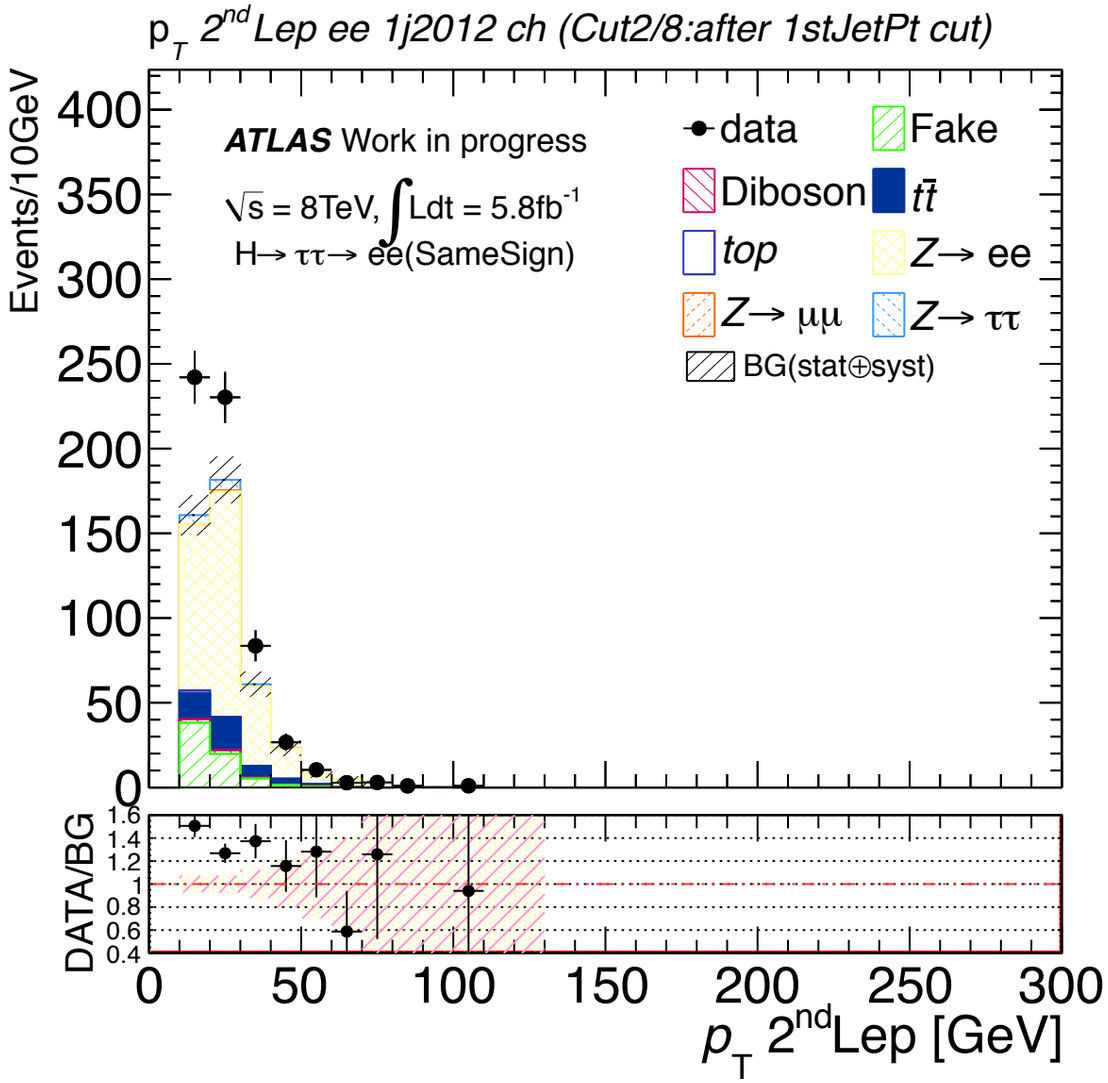




- Electron p_T distribution after SS events cut.
- ee channel

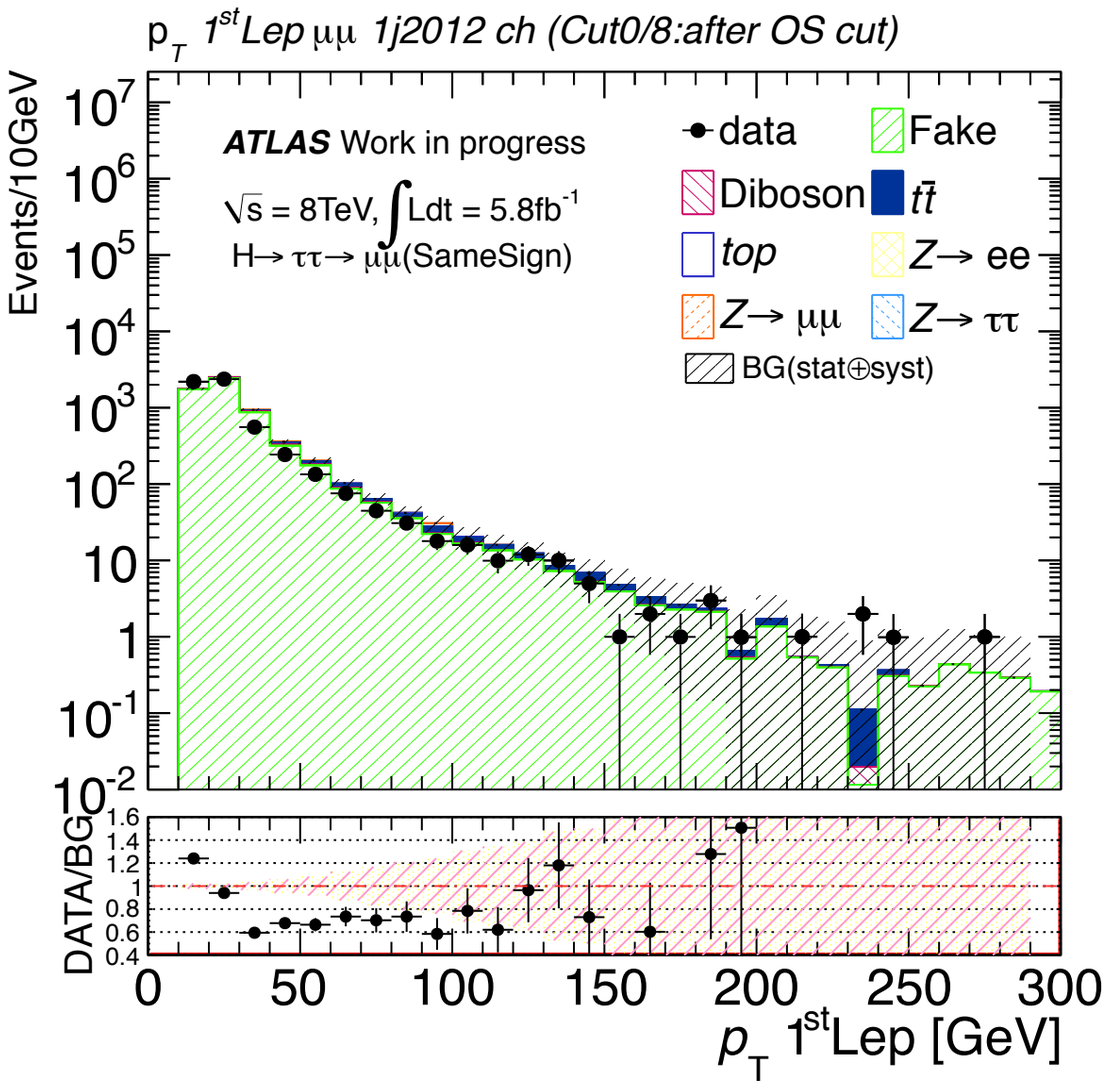
SS Control Plots

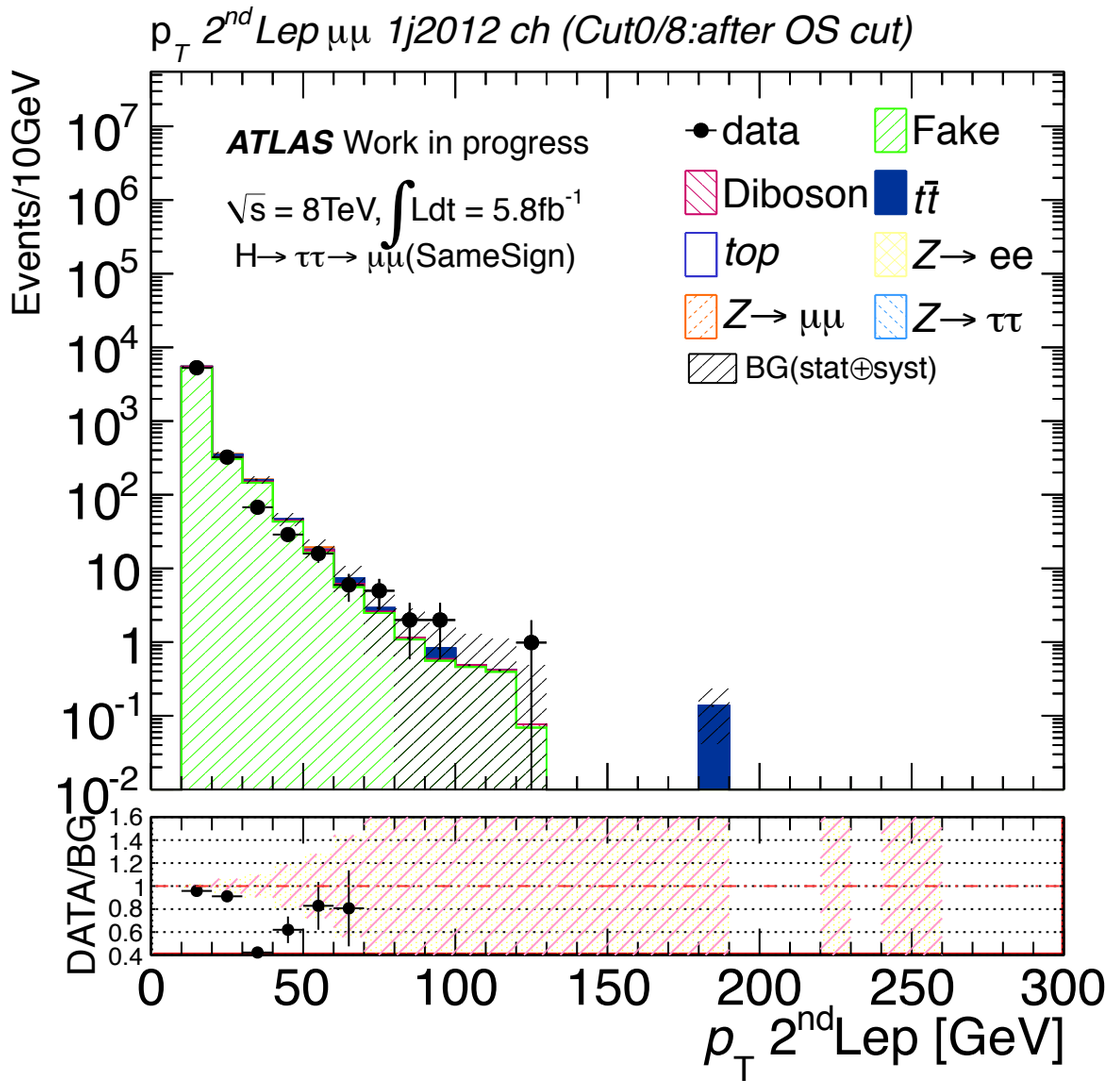




- Electron pT distribution after 1st jet $p_T > 40$ GeV.
- ee channel

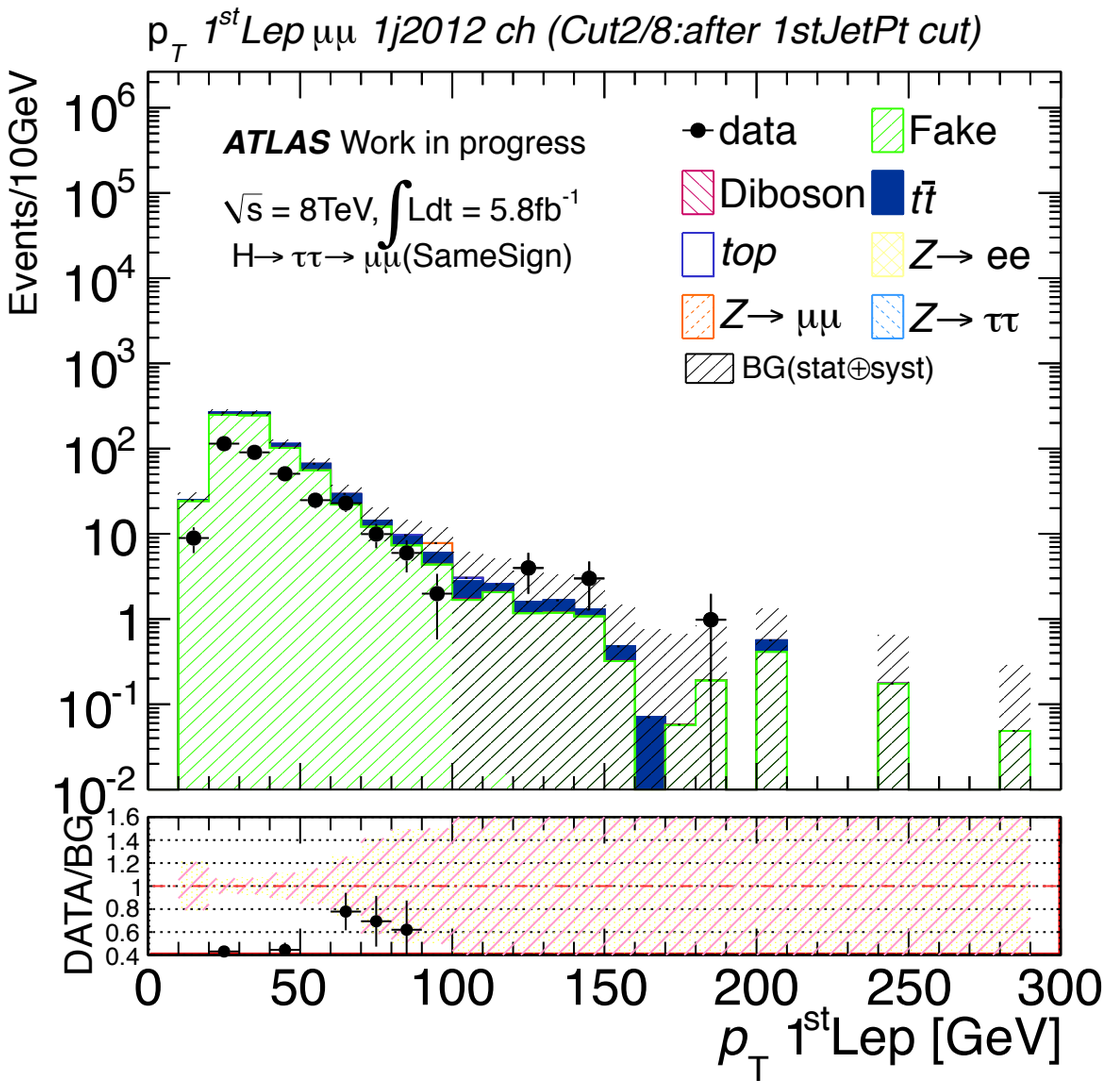
SS Control Plots

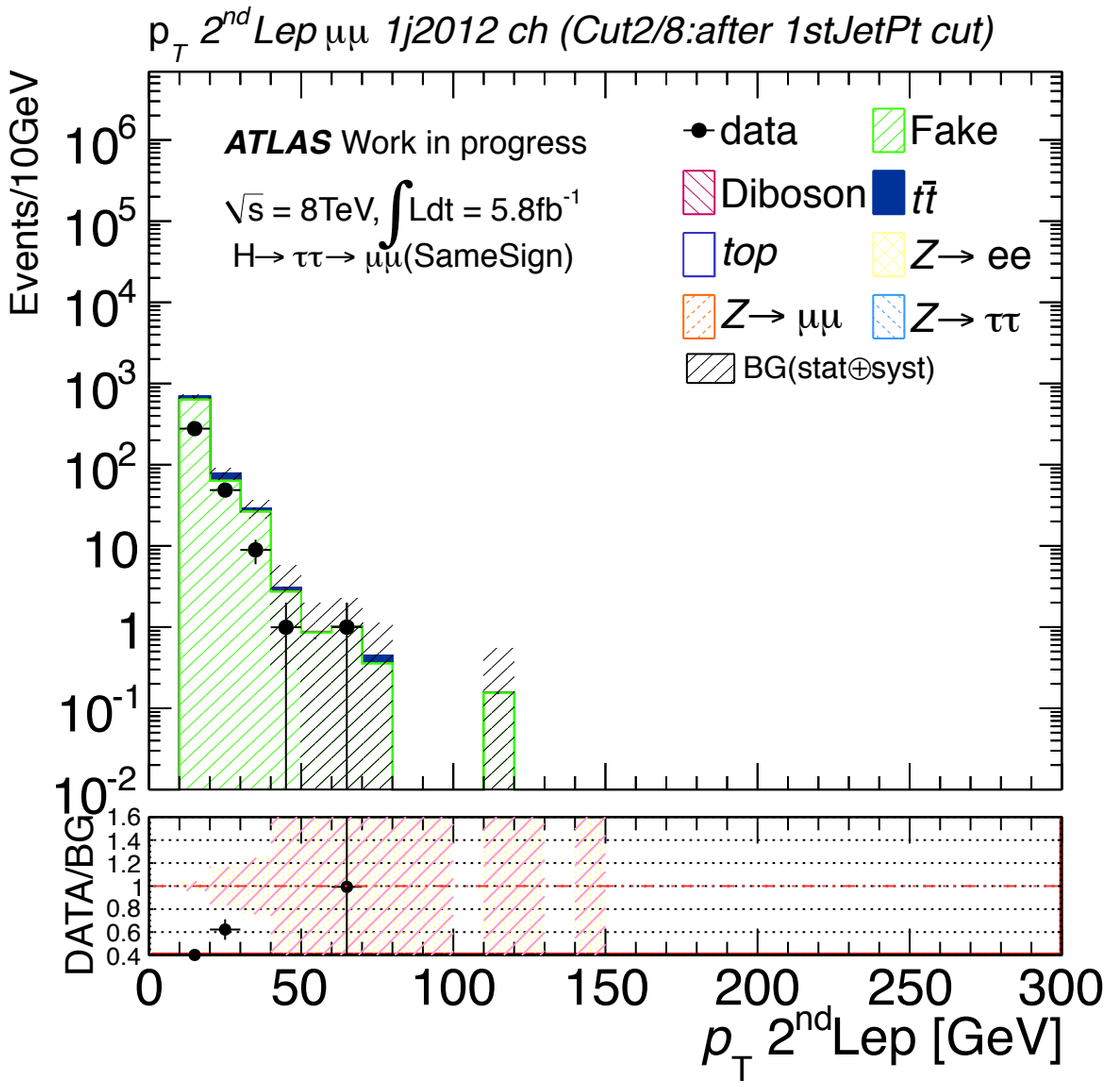




- Muon p_T distribution after SS events cut.
- μμ channel

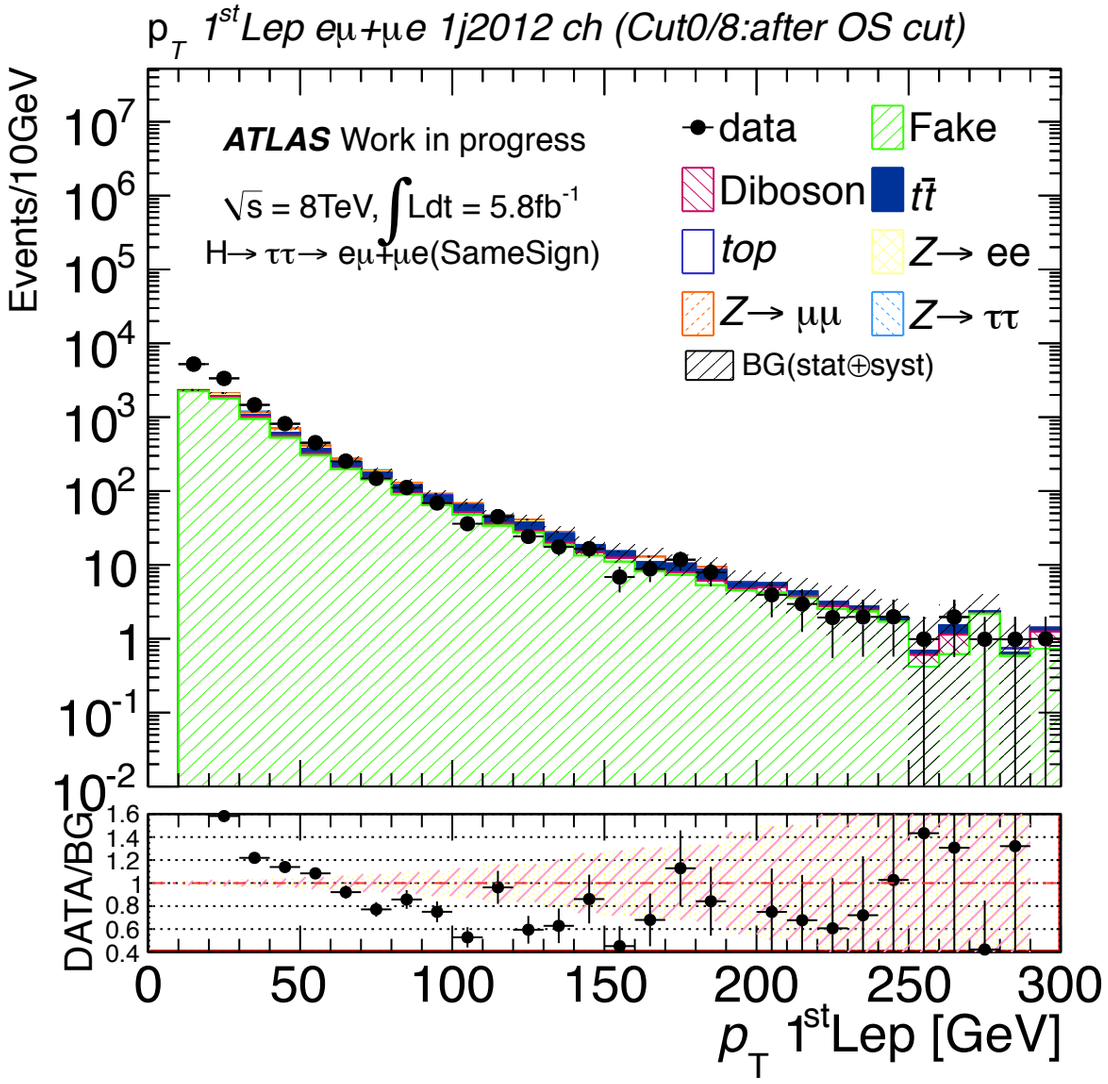
SS Control Plots

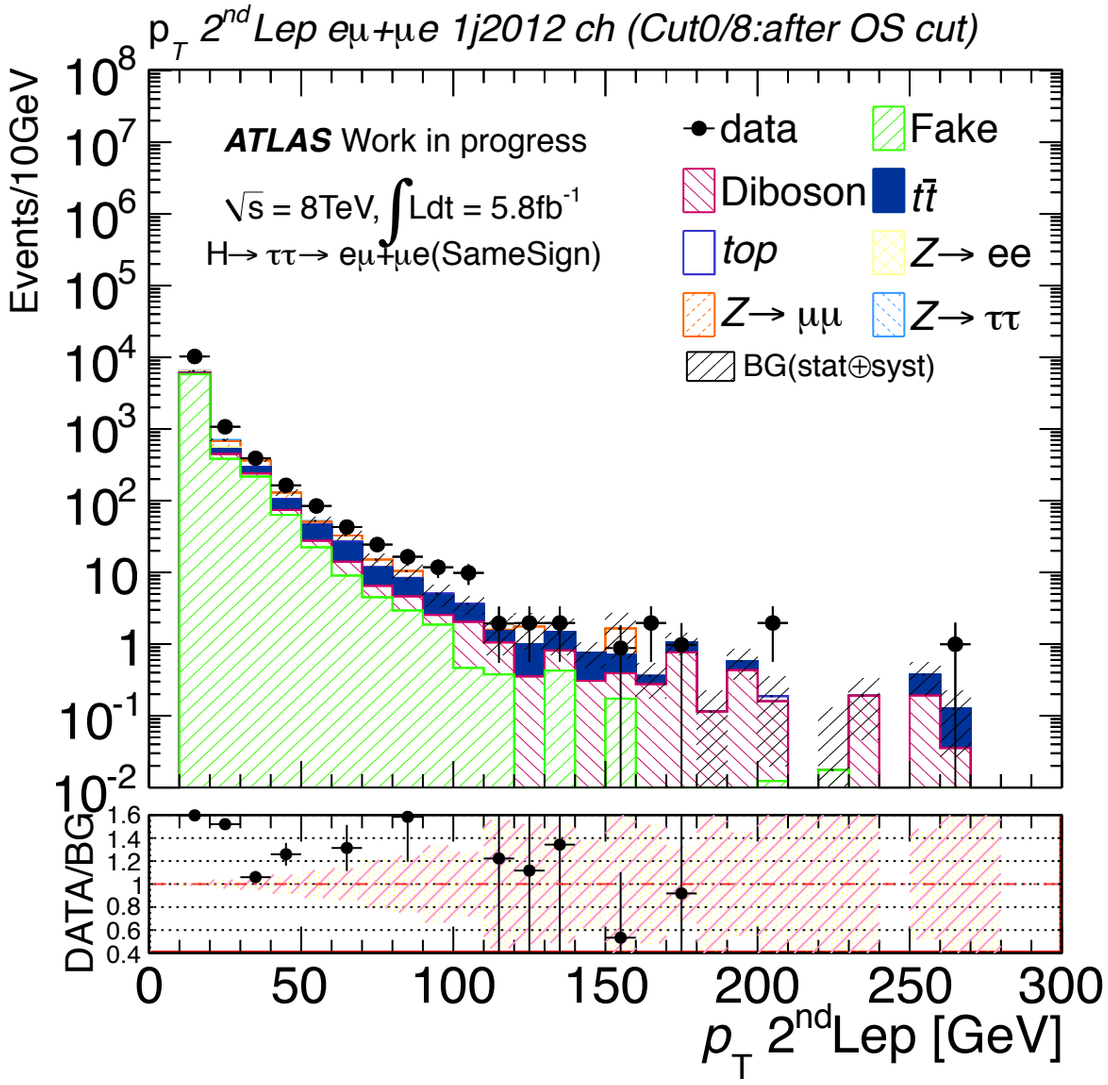




- Muon p_T distribution after 1st jet $p_T > 40$ GeV.
- μμ channel

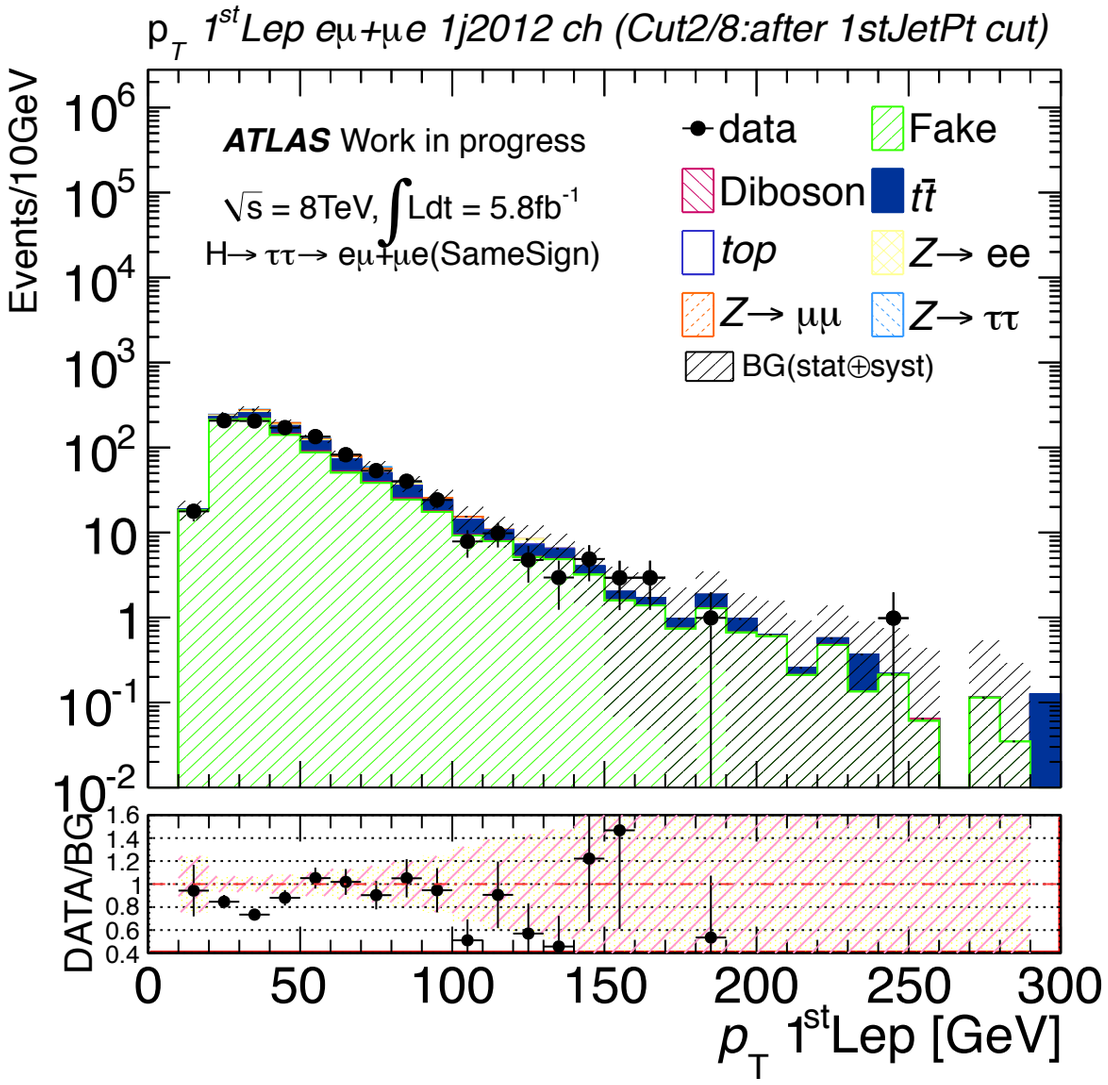
SS Control Plots

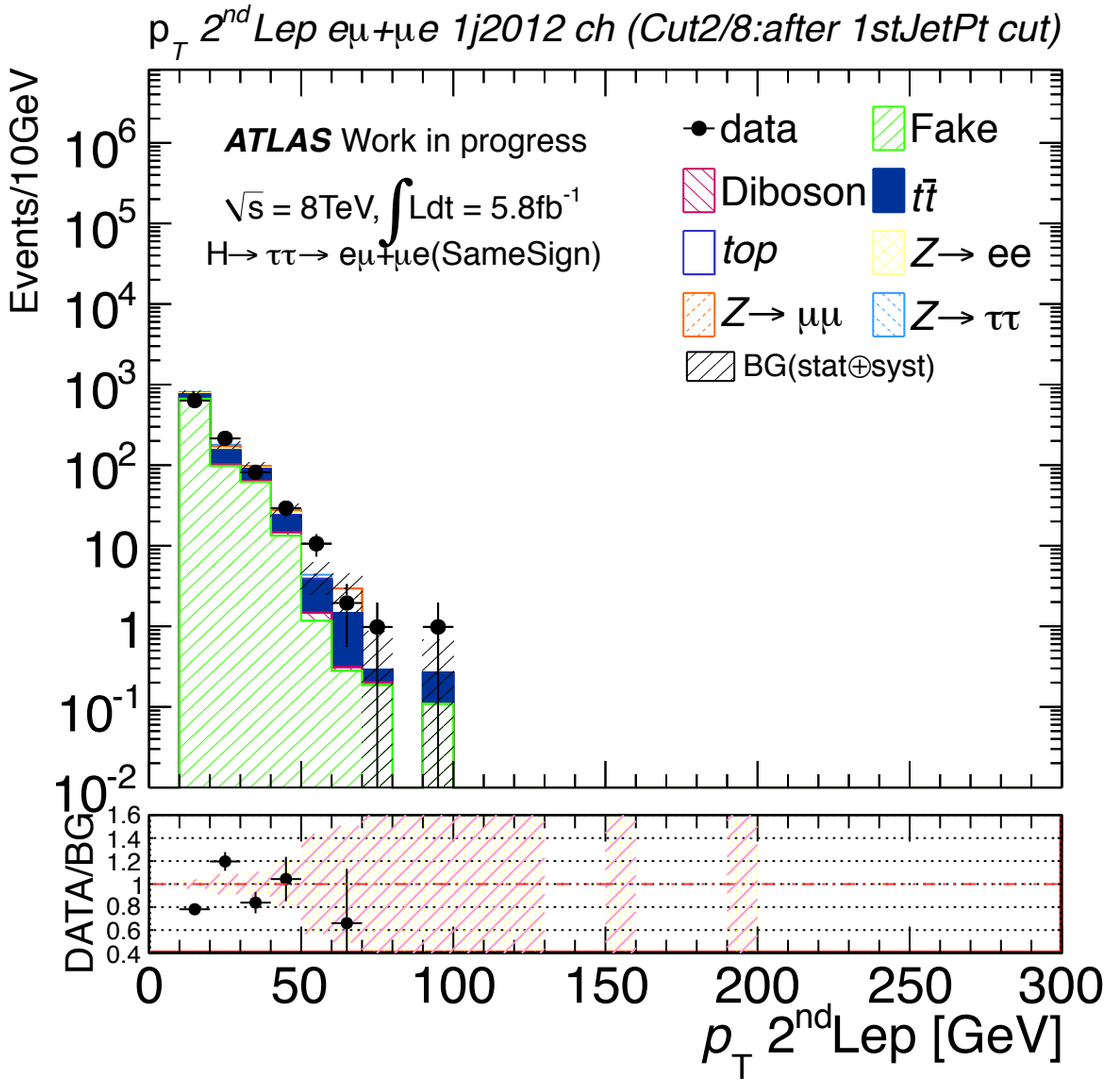




- Lepton p_T distribution after SS events cut.
- eμ+μe channel

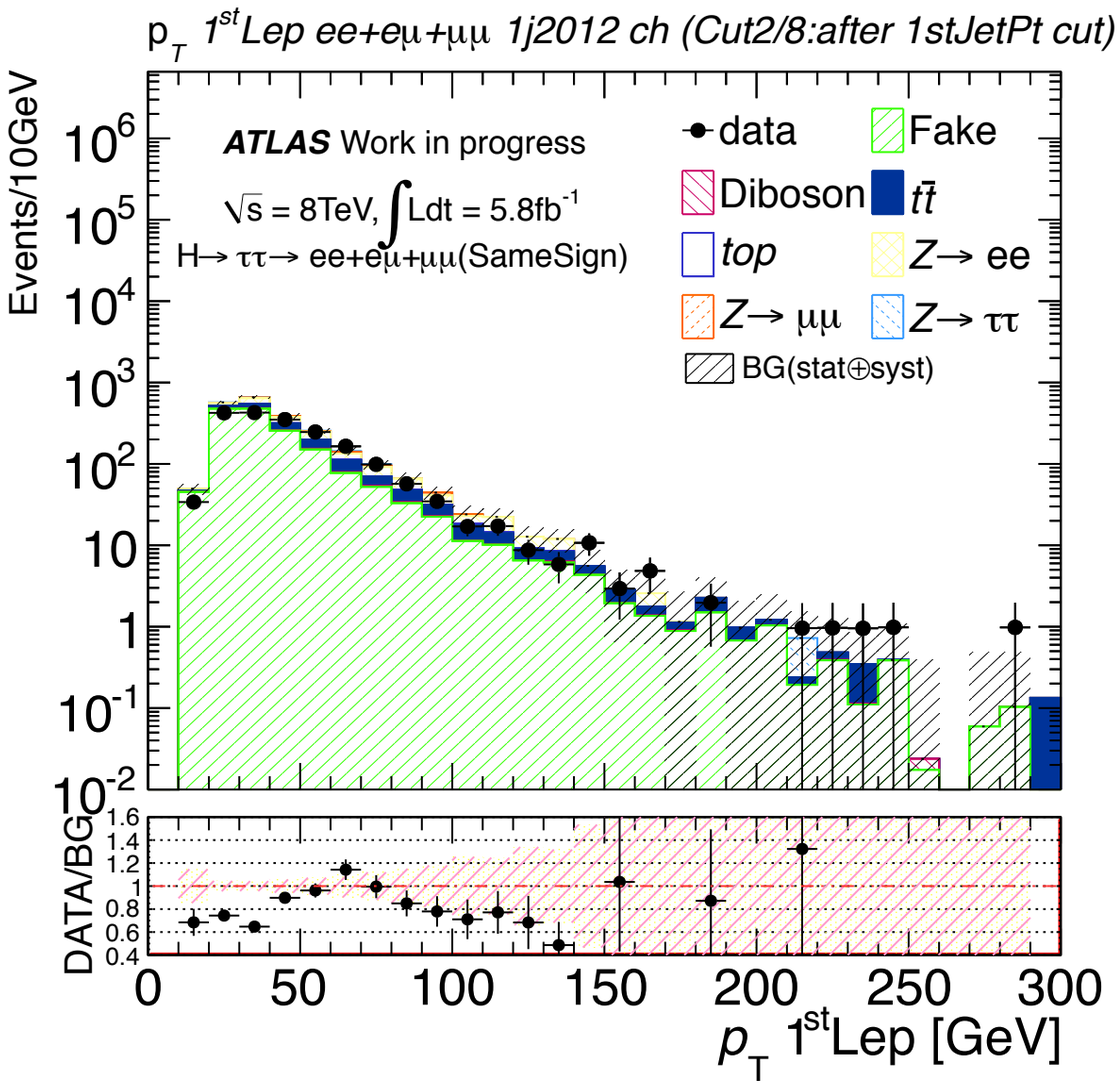
SS Control Plots

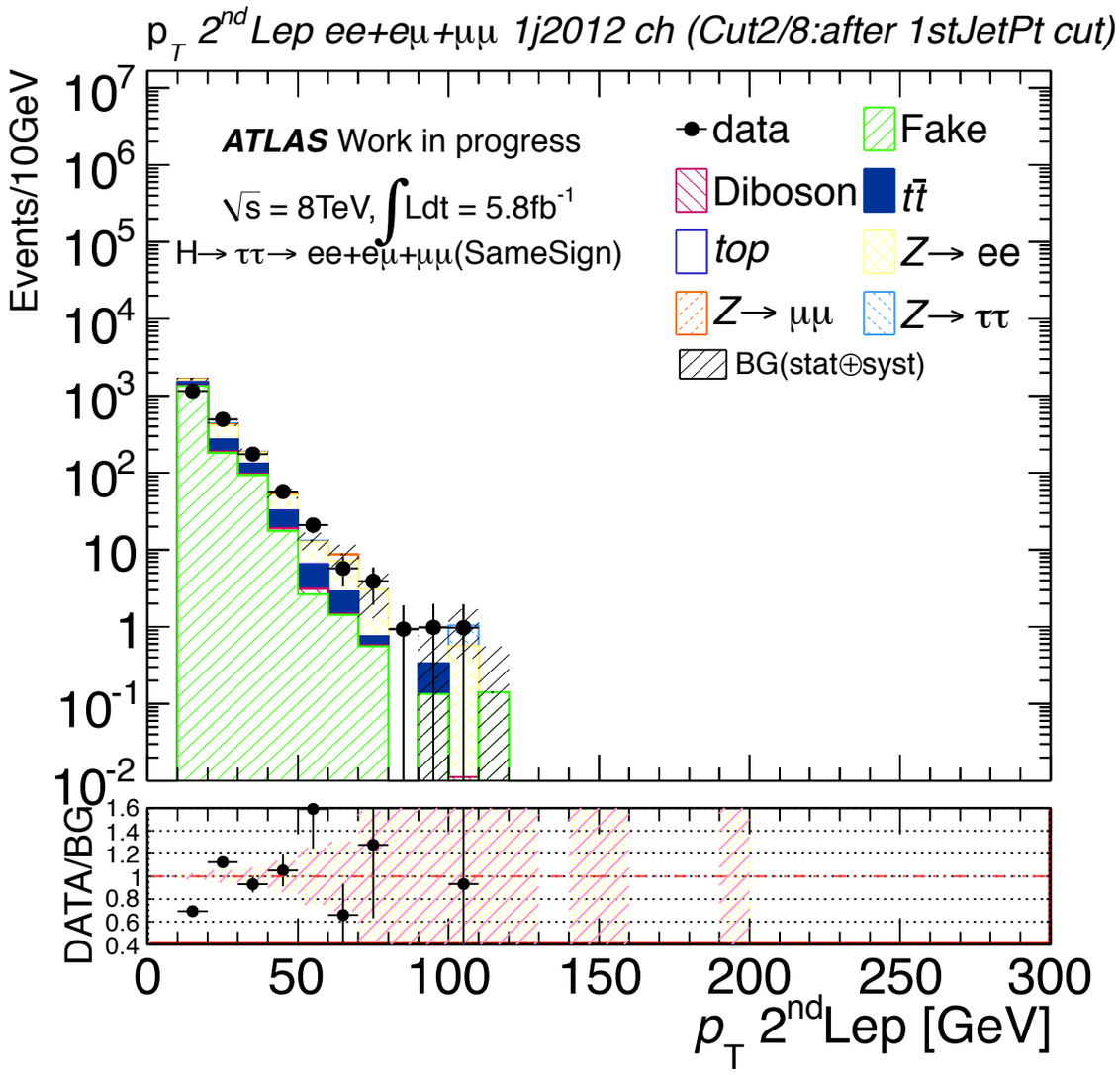




- Lepton p_T distribution after 1st jet $p_T > 40$ GeV.
- eμ+μe channel

SS Control Plots





- Lepton p_T distribution after 1st jet $p_T > 40$ GeV.
- ee+eμ+μe+μμ

Categorization

1) Preselection, and exactly two leptons with OS and veto tau leptons
2) $30<m_{LL}<75(100)$ for SF(DF) and $p_T^{L1}+ p_T^{L2} >35$GeV
3) At least 1 jet with $p_T >40$GeV ($|JVF| > 0.5$ if $|\eta|<2.4$)
4) MET > 40(20)GeV for SF(DF)
5) $0.1 < X_{1,2} < 1.0$
6) $0.5 < \Delta\varphi_{LL} < 2.5$

0jet(eμ only)

2) $30<m_{LL}<100$, $p_T^{L1}+ p_T^{L2} >35$
3) No jet with $p_T > 40$GeV
4) $\Delta\varphi_{LL} > 2.5$

2jet VBF

7) $p_T^{j2} > 25$GeV
8) $\Delta\eta_{JJ} > 3.0$
9) $m_{JJ} > 400$GeV
10) b-tag veto
11) CJV
12) Lep Centr.

Boosted

7) excl. VBF
8) $p_T^{H} >130$GeV
9) b-tag veto

2jet VH

7) excl. VBF,Bst
8) $p_T^{j2} >25$GeV
9) $\Delta\eta_{JJ} < 2.0$
10) $30< m_{JJ} < 160$
11) b-tag veto

1jet

7) excl. 2jet,Bst
8) $m_{HJ} > 225$GeV
9) b-tag veto

Objects definitions

Electrons

1) author is 1or 3
2) E_T >15GeV
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5) $E_T$cone30/E_T<0.14
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Muons

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5) $E_T$cone30/$p_T < 0.14$
6) $p_T$cone30/$p_T < 0.13$

Jets

1) Anti k_T 40 EMTopo
2) $p_T > 20$GeV
3) $|\eta| < 4.5$
4) $|JVF| > 0.5$ (if $|\eta| < 2.4$)

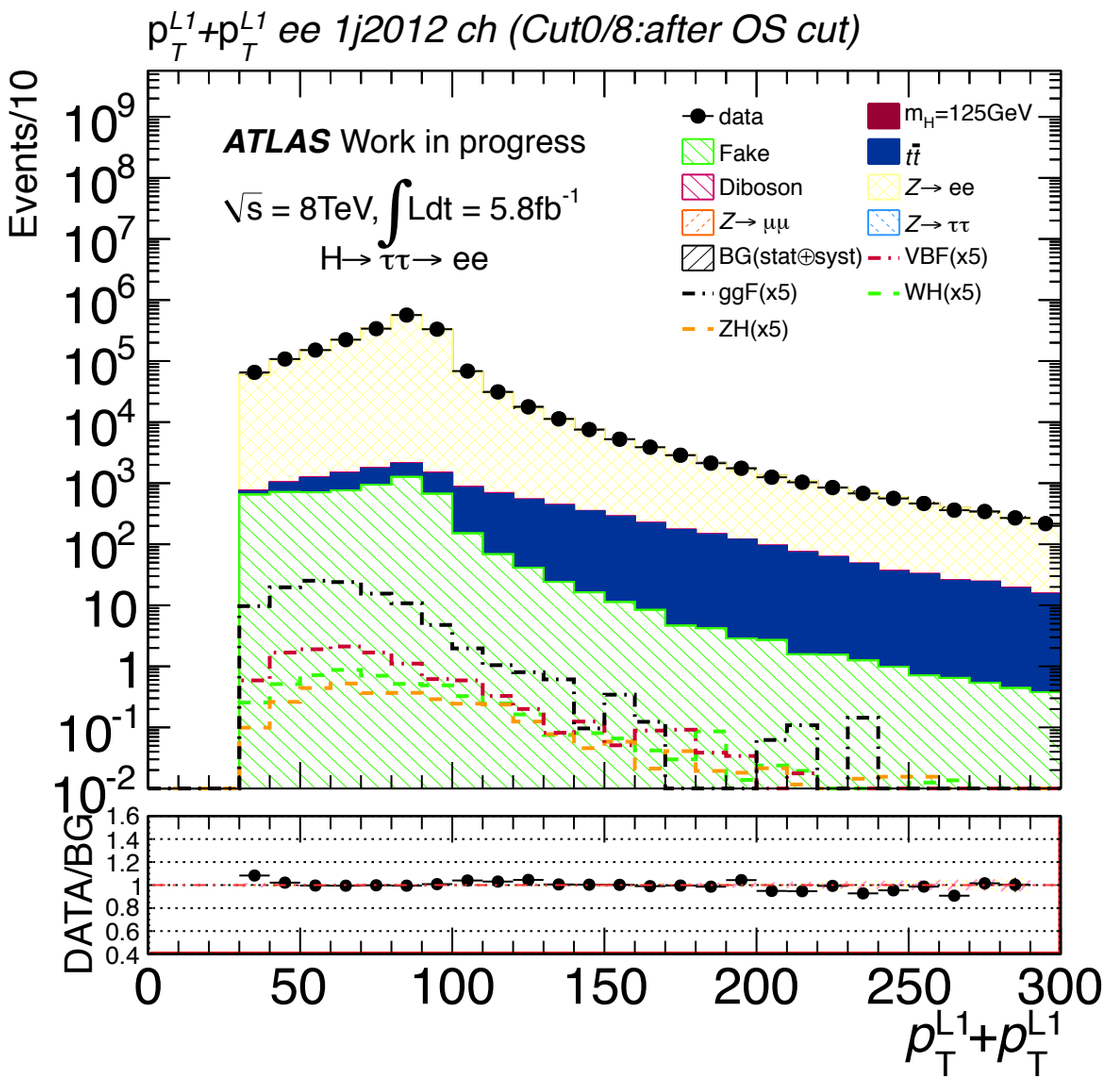
Missing E_T

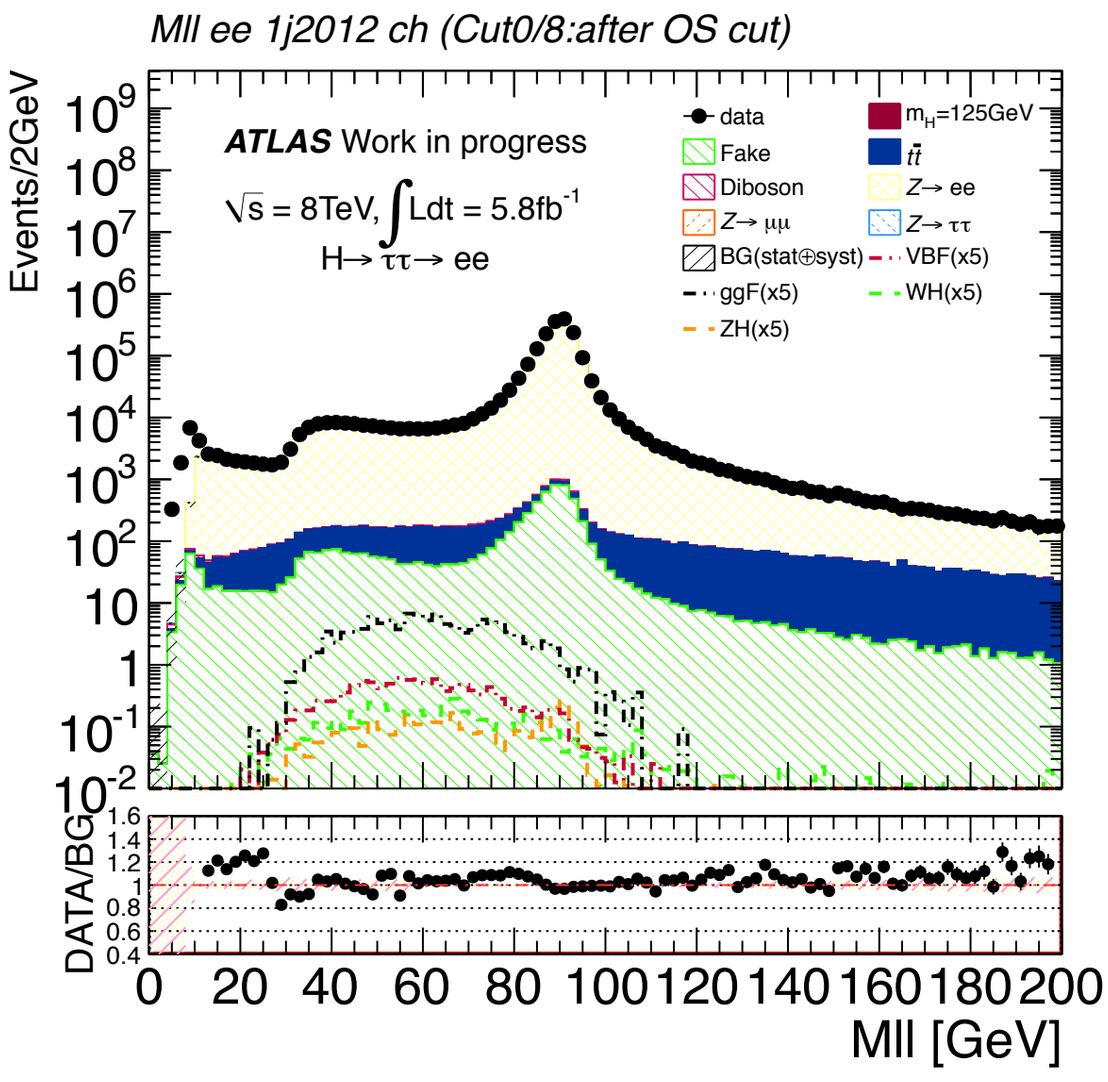
1) MET RefFinal STVF

Taus

1) author is 1or 3
2) $E_T > 20$GeV
3) $|\eta| < 2.5$
4) JetBDTMedium is 1
5) EleBDTMedium id 0
6) muonVeto is 0

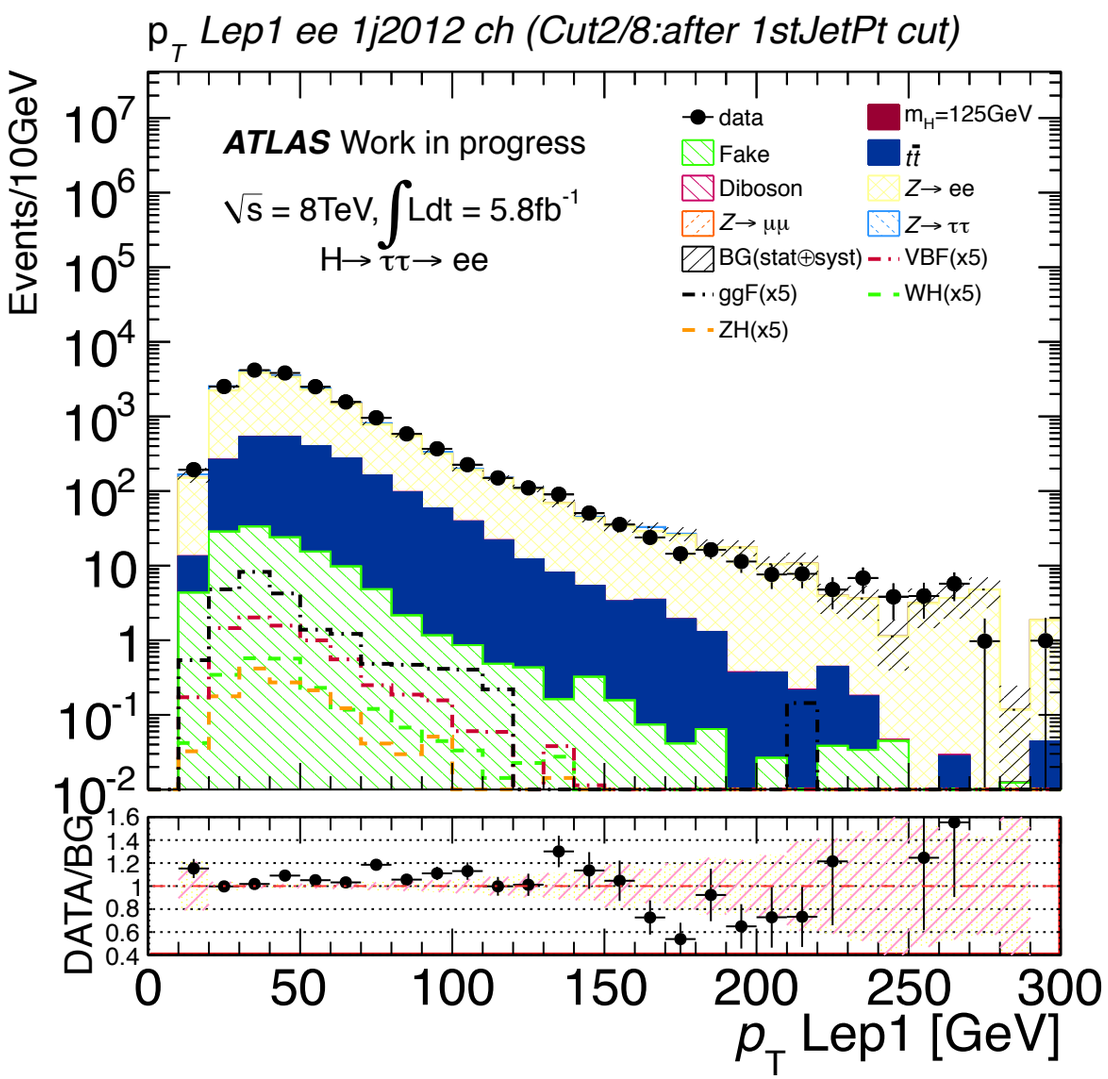
Control Plots

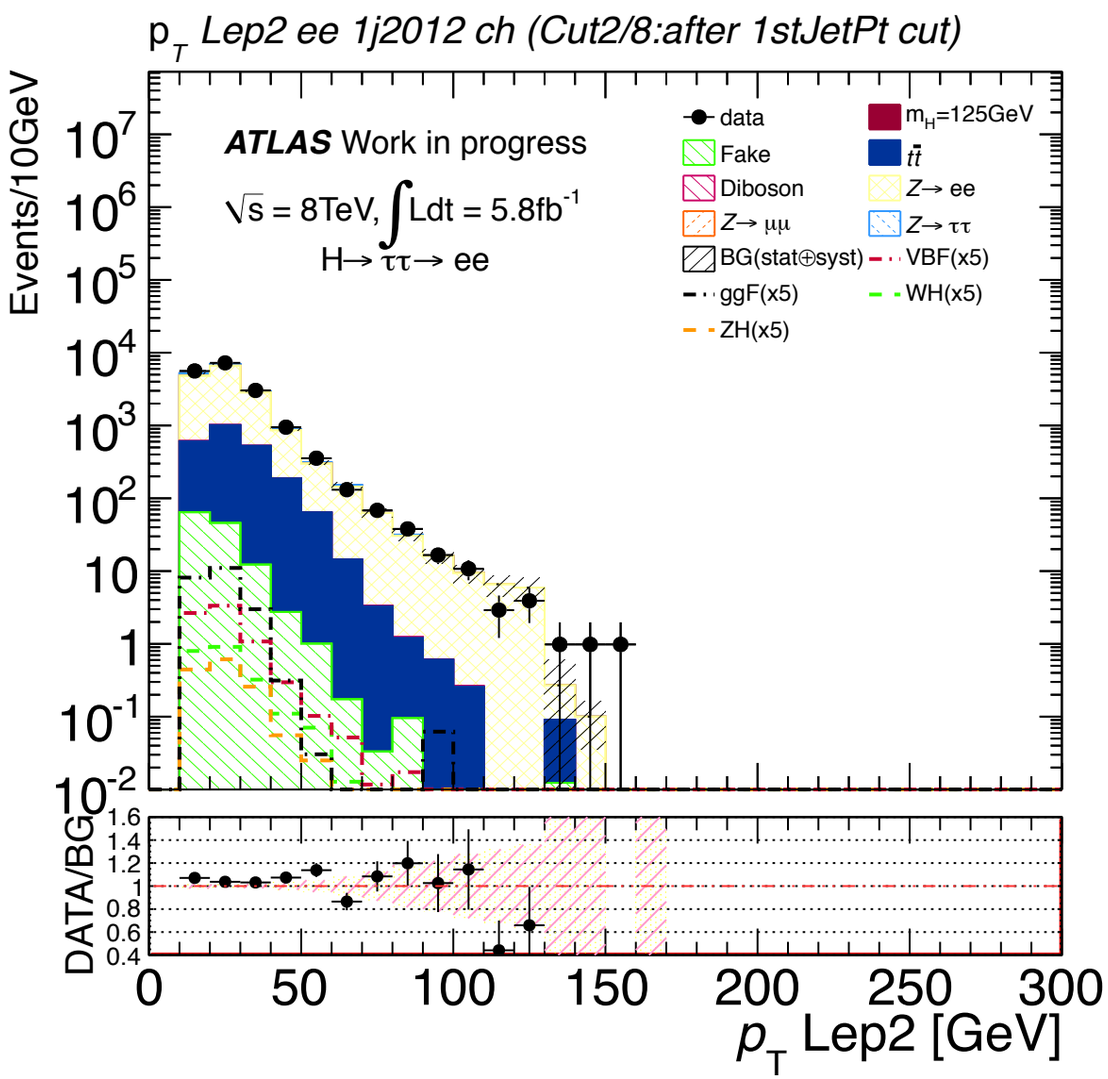




- L_T,m_{LL} distribution after OS cut in ee.
- After this figure, apply L_T,m_{LL} cut.

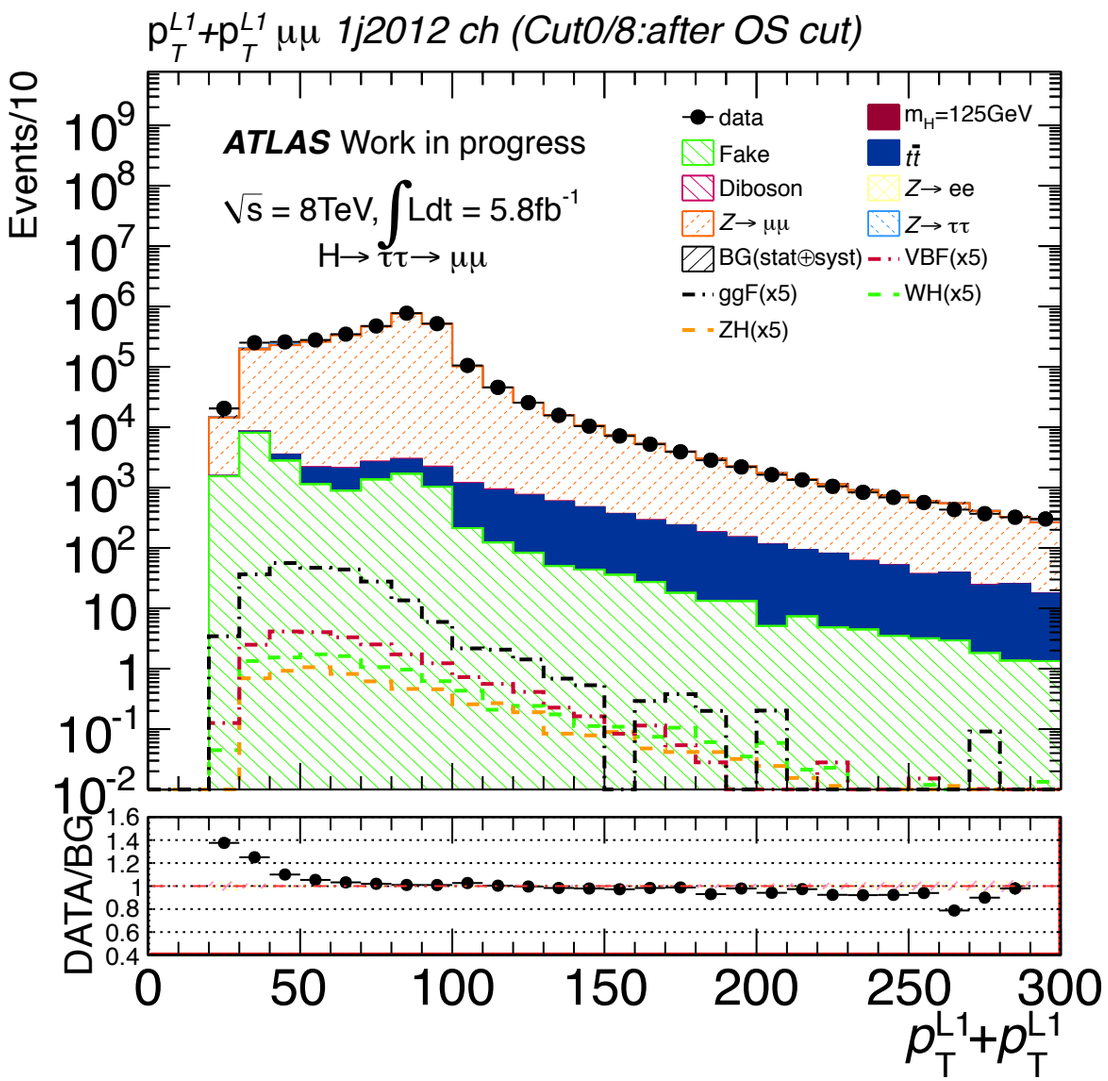
Control Plots

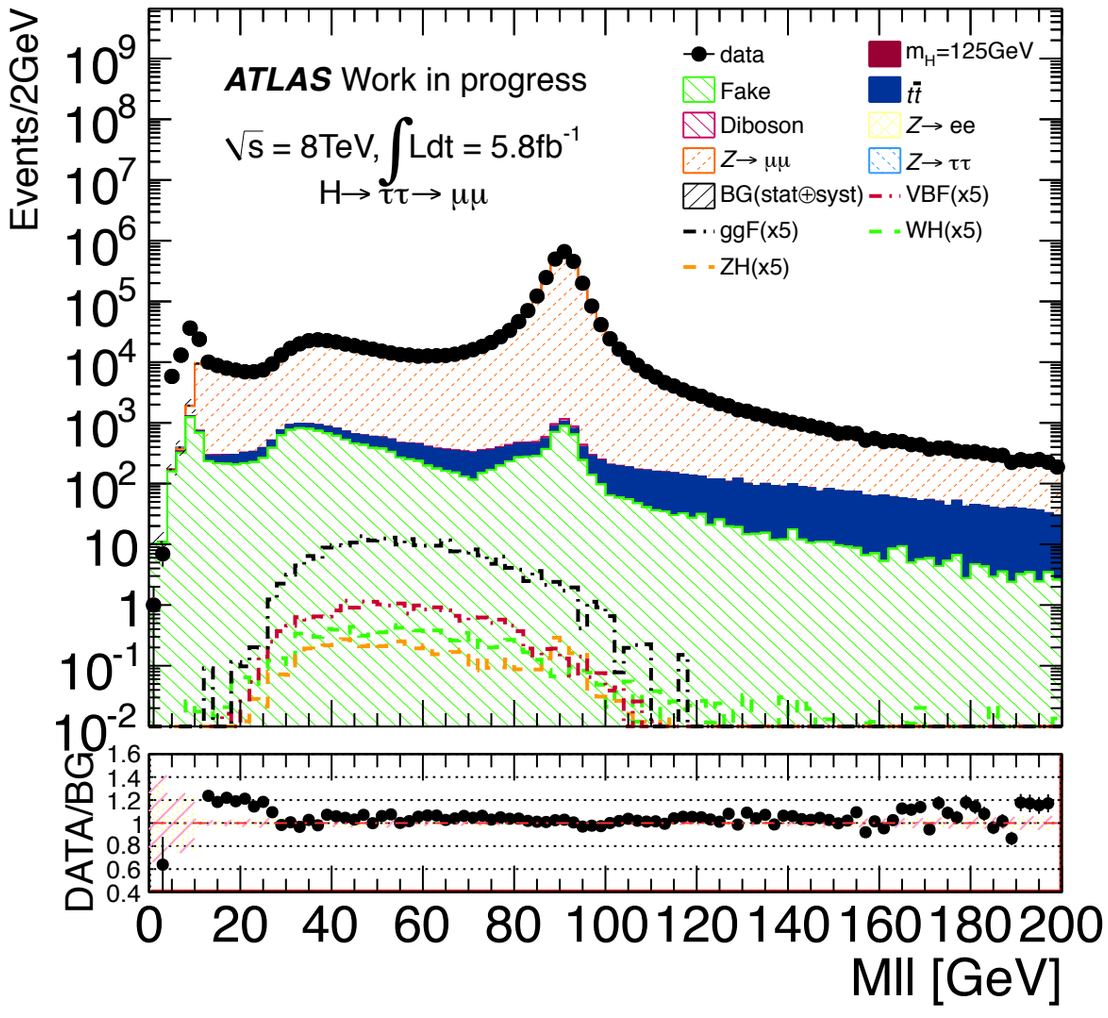




- Lepton p_T distribution after L_T,m_{LL},1st jet p_T cut in ee channel.

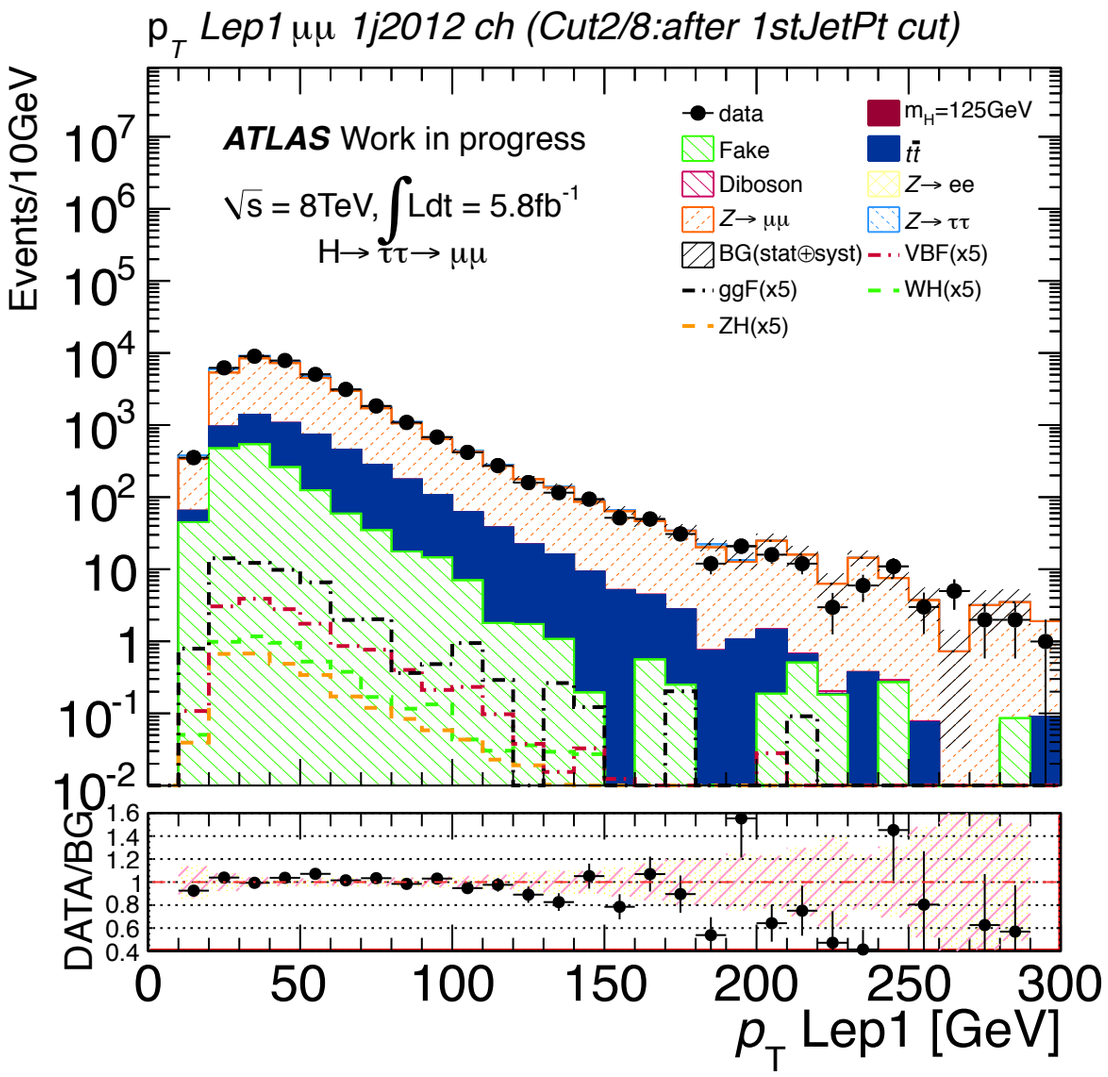
Control Plots

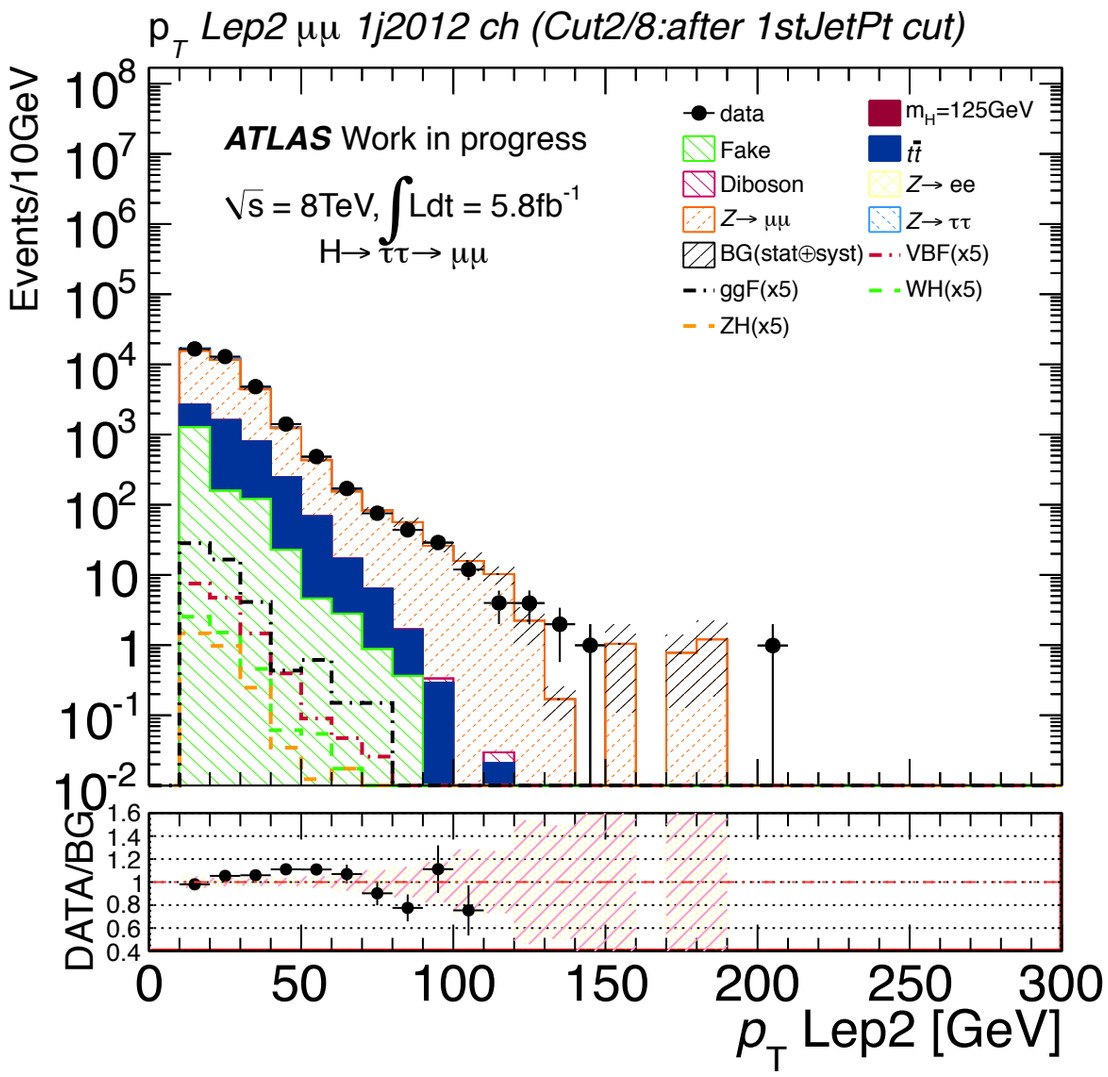




- L_T,m_{LL} distribution after OS cut in μμ.
- After this figure, apply L_T,m_{LL} cut.

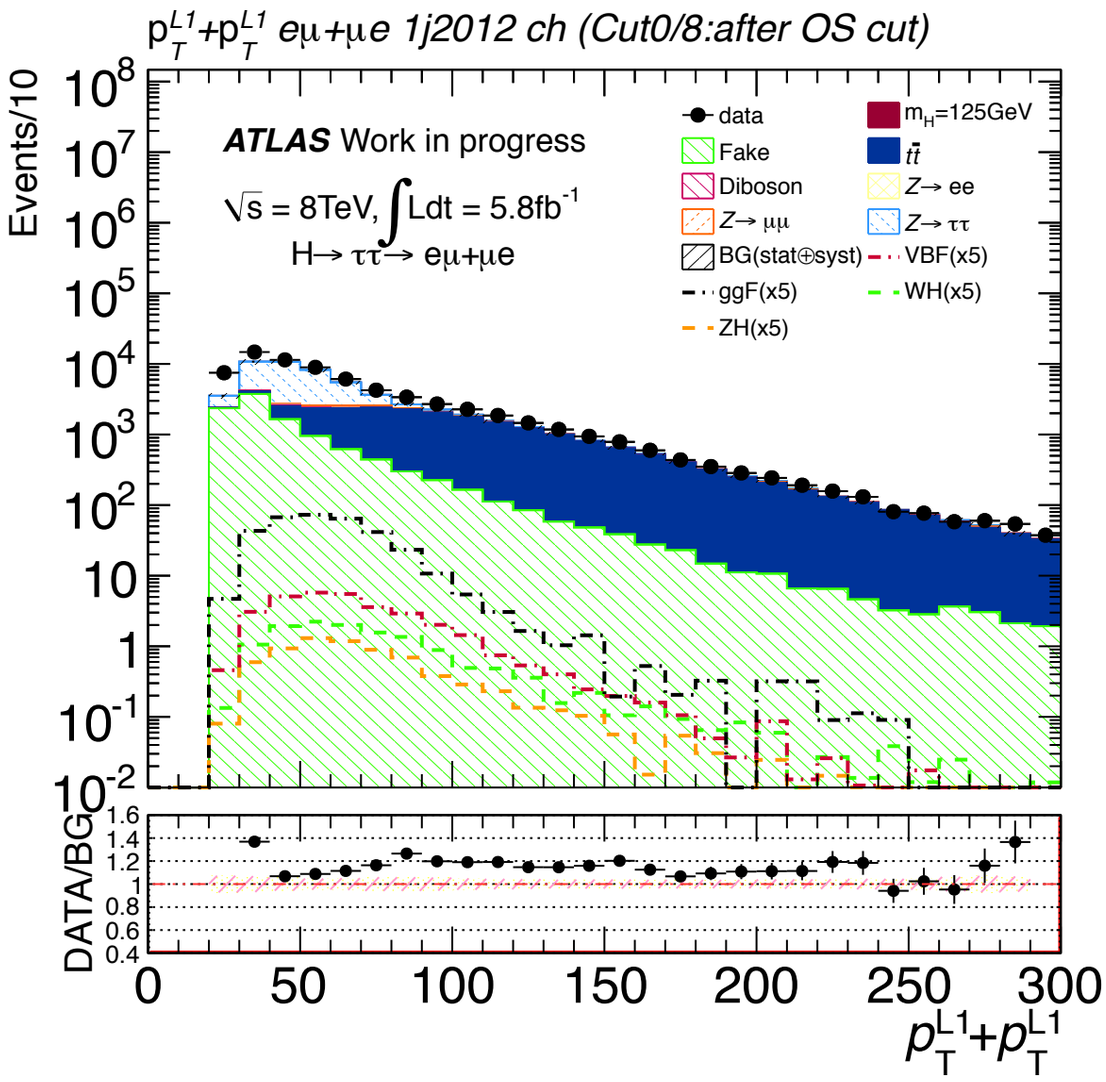
Control Plots

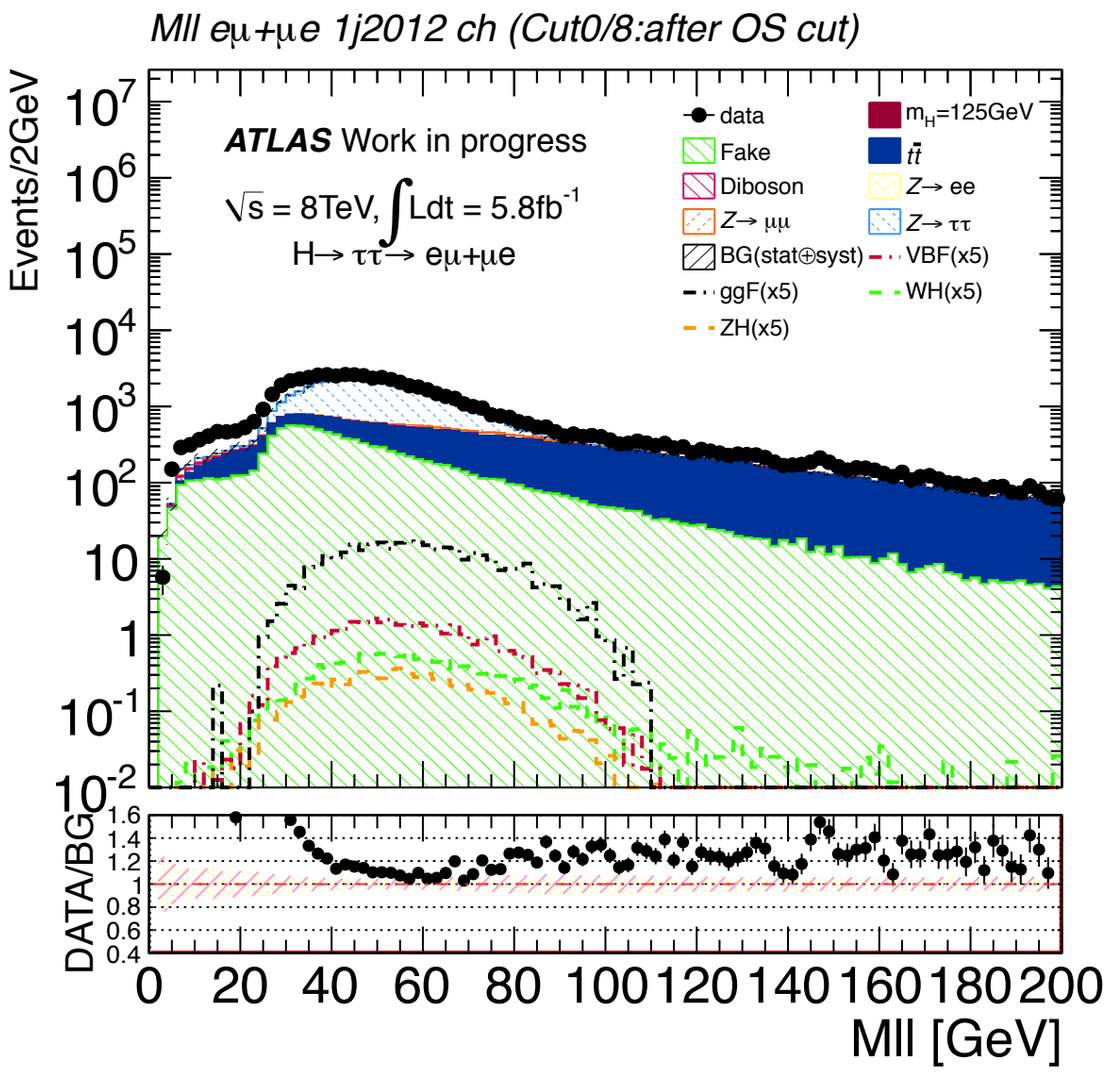




- Lepton p_T distribution after L_T,m_{LL},1st jet p_T cut in μμ channel.

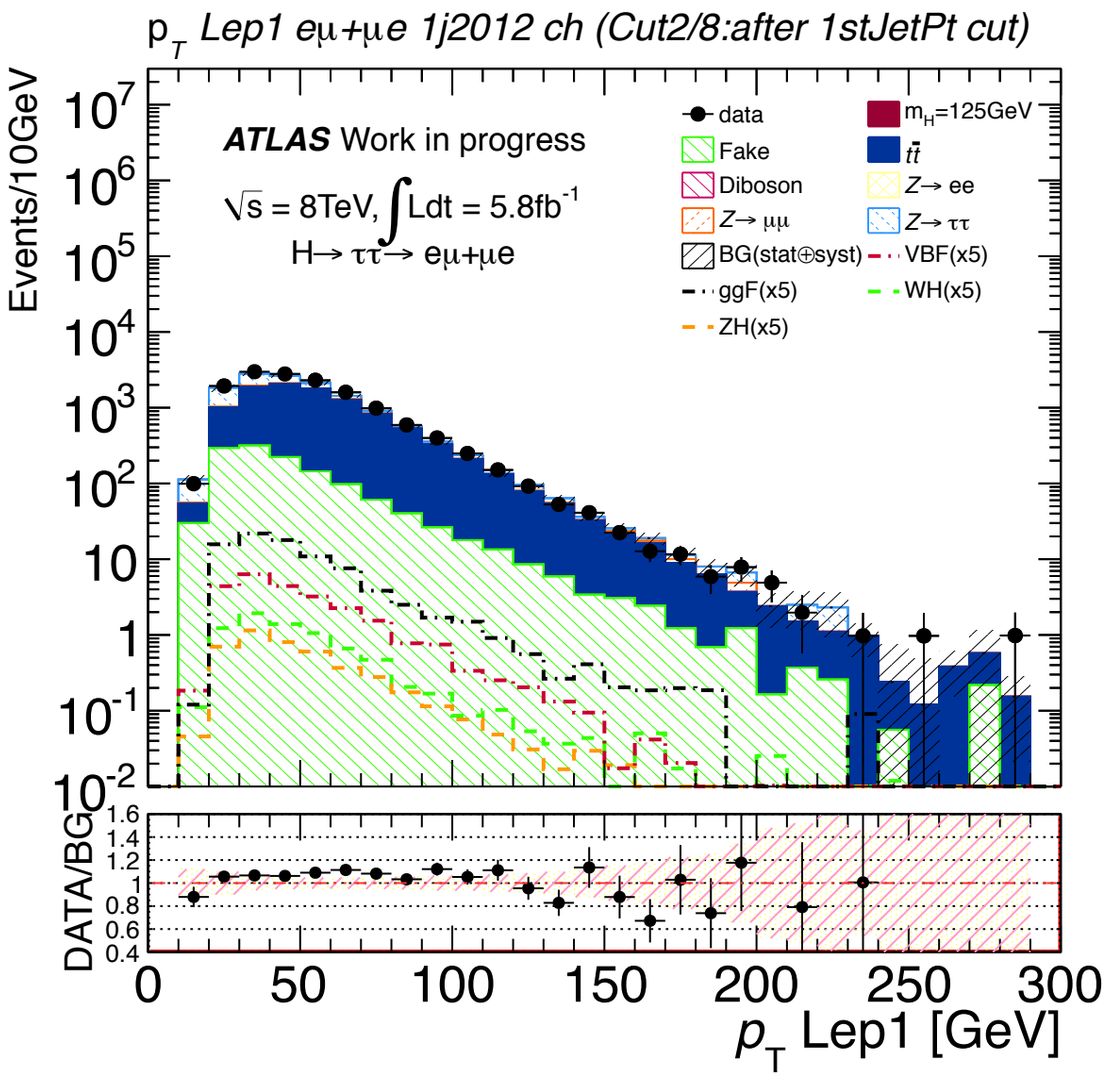
Control Plots

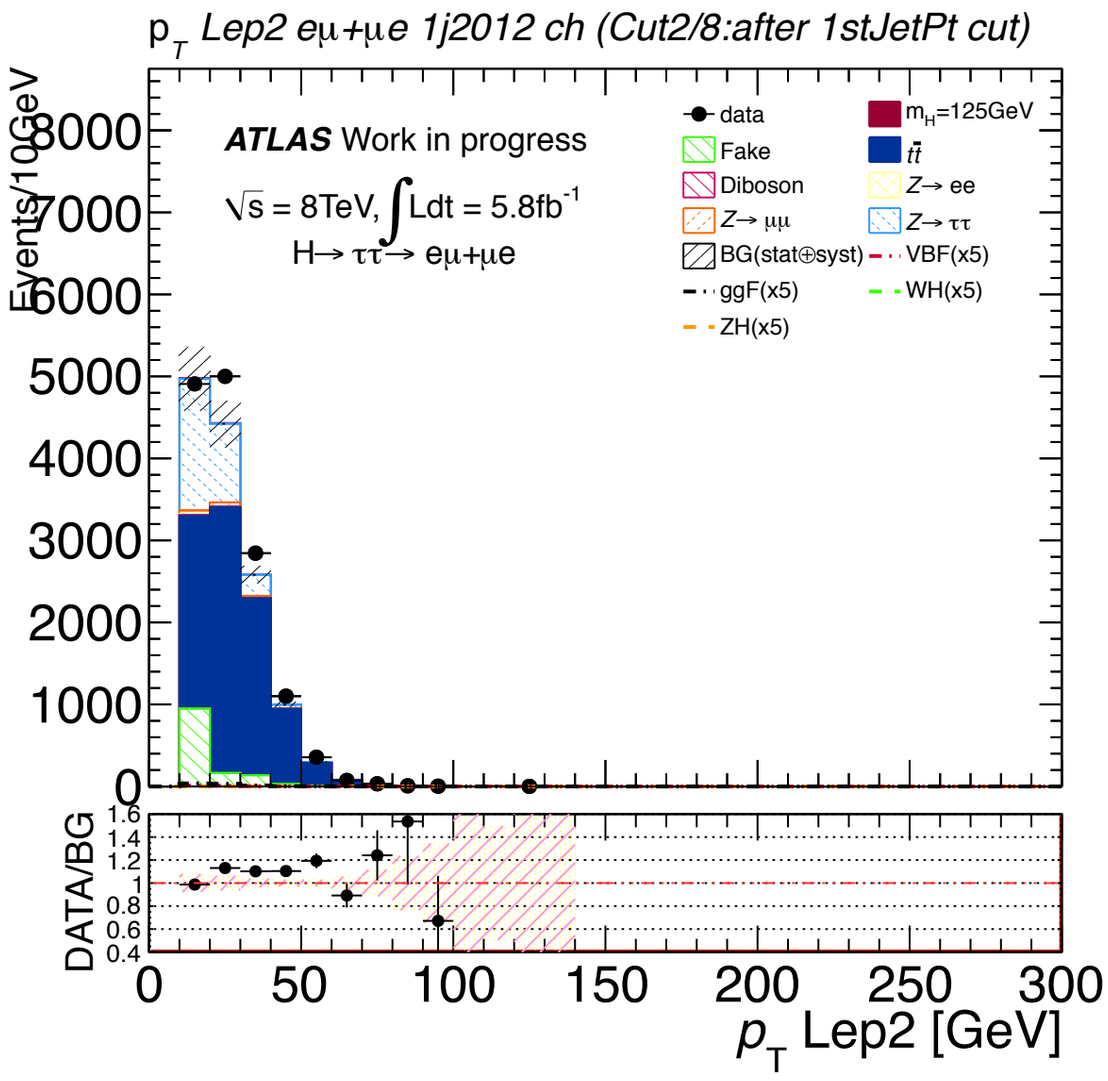




- L_T,m_{LL} distribution after OS cut in eμ+μe.

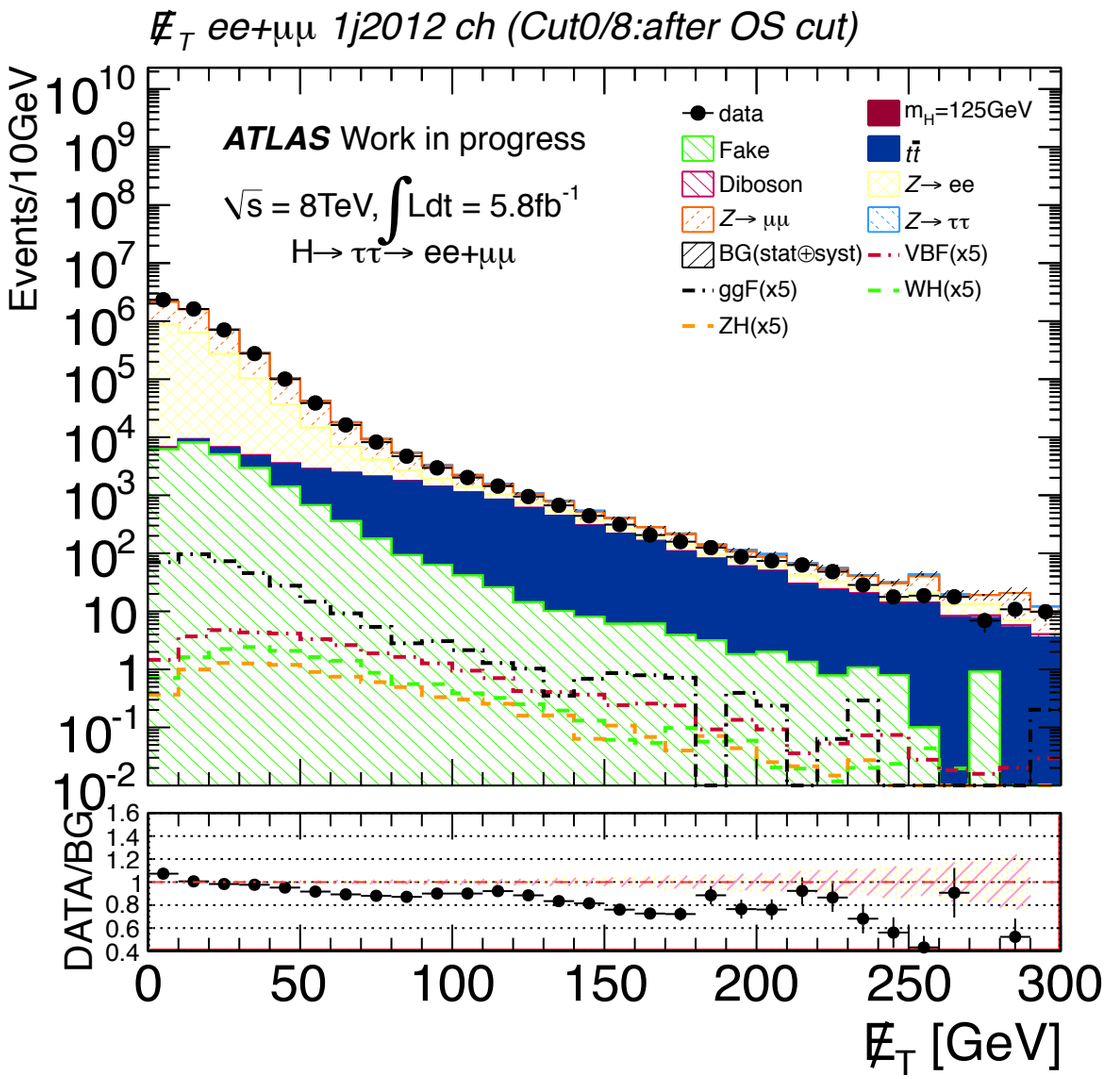
Control Plots

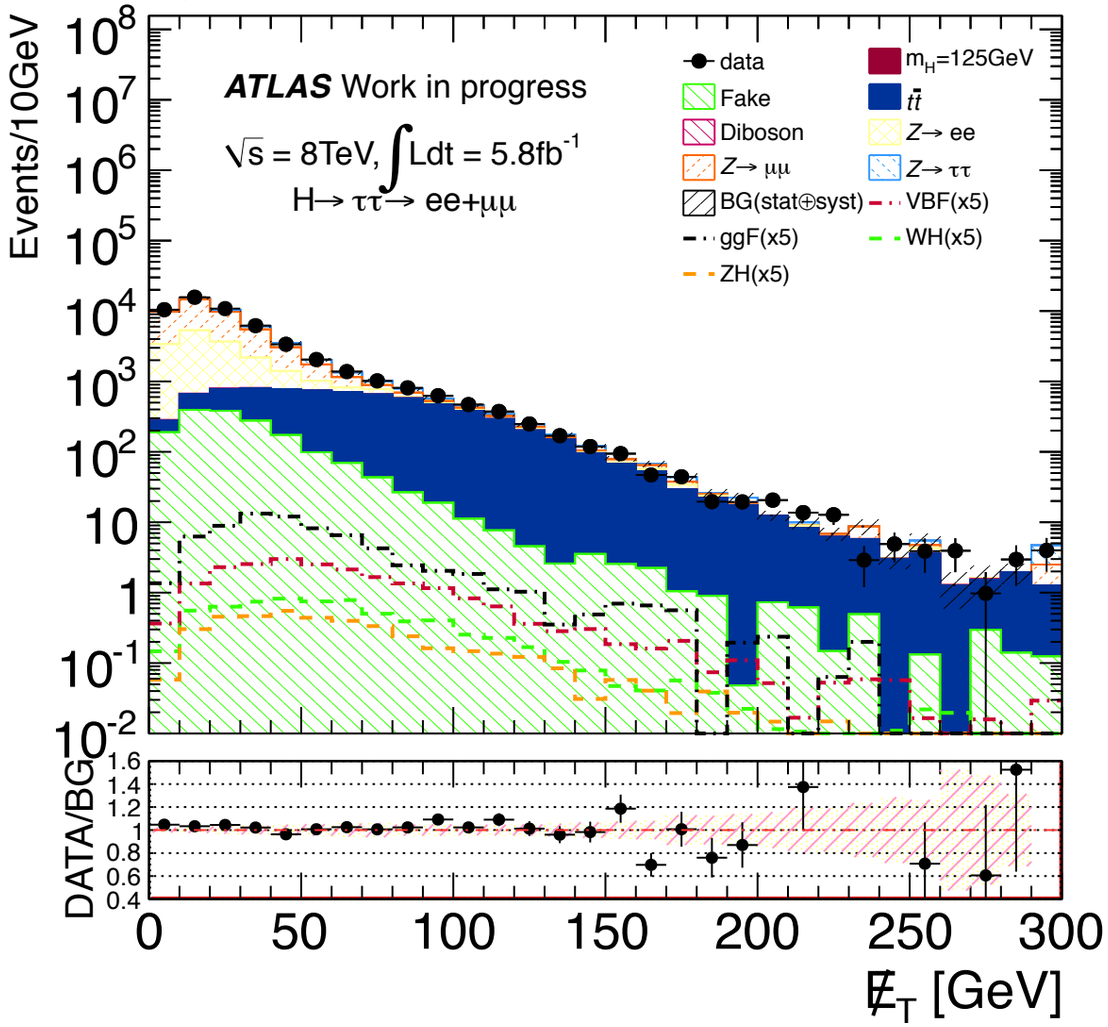




- Lepton p_T distribution after L_T,m_{LL},1st jet p_T cut in eμ+μe channel.

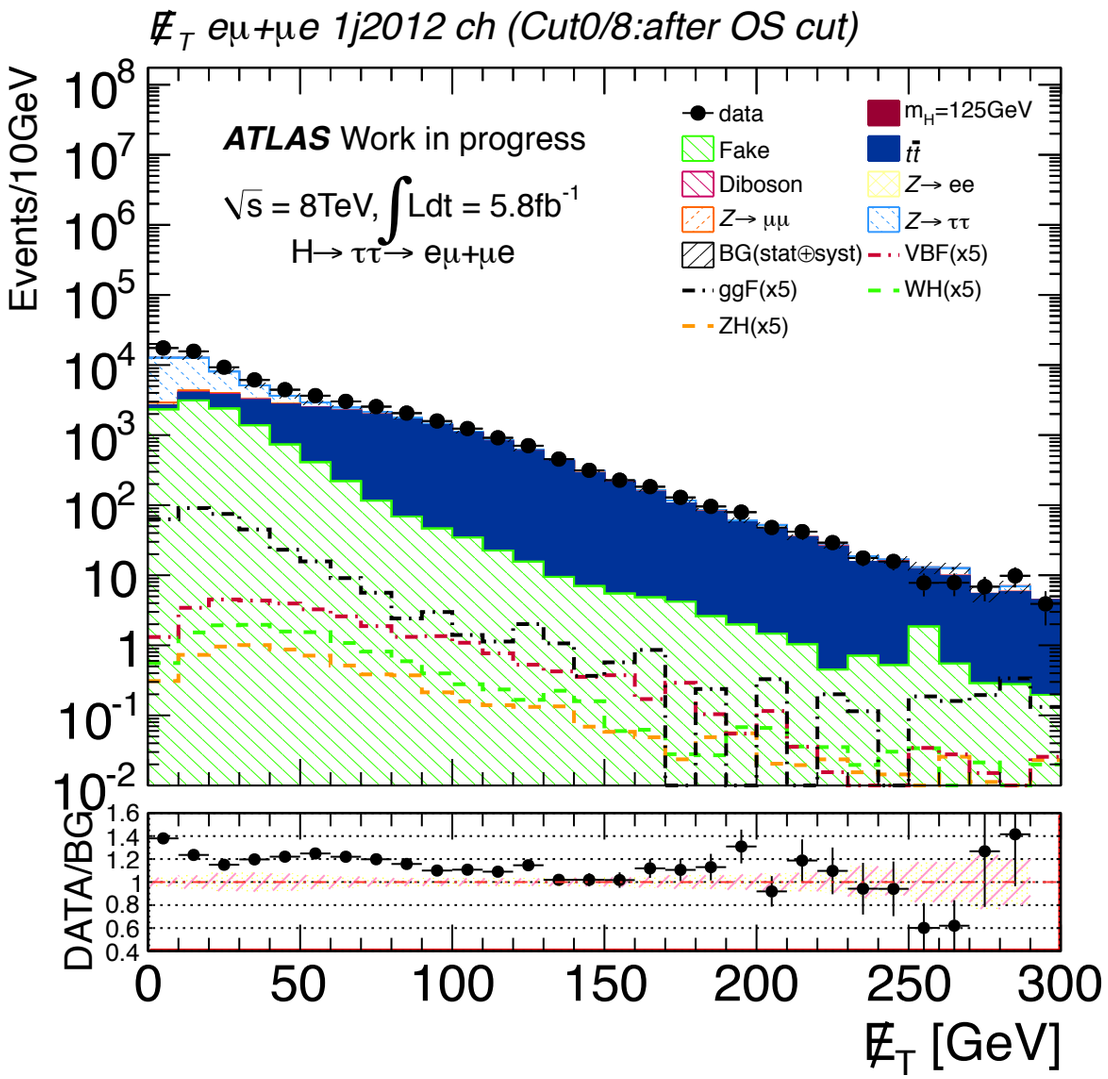
Control Plots

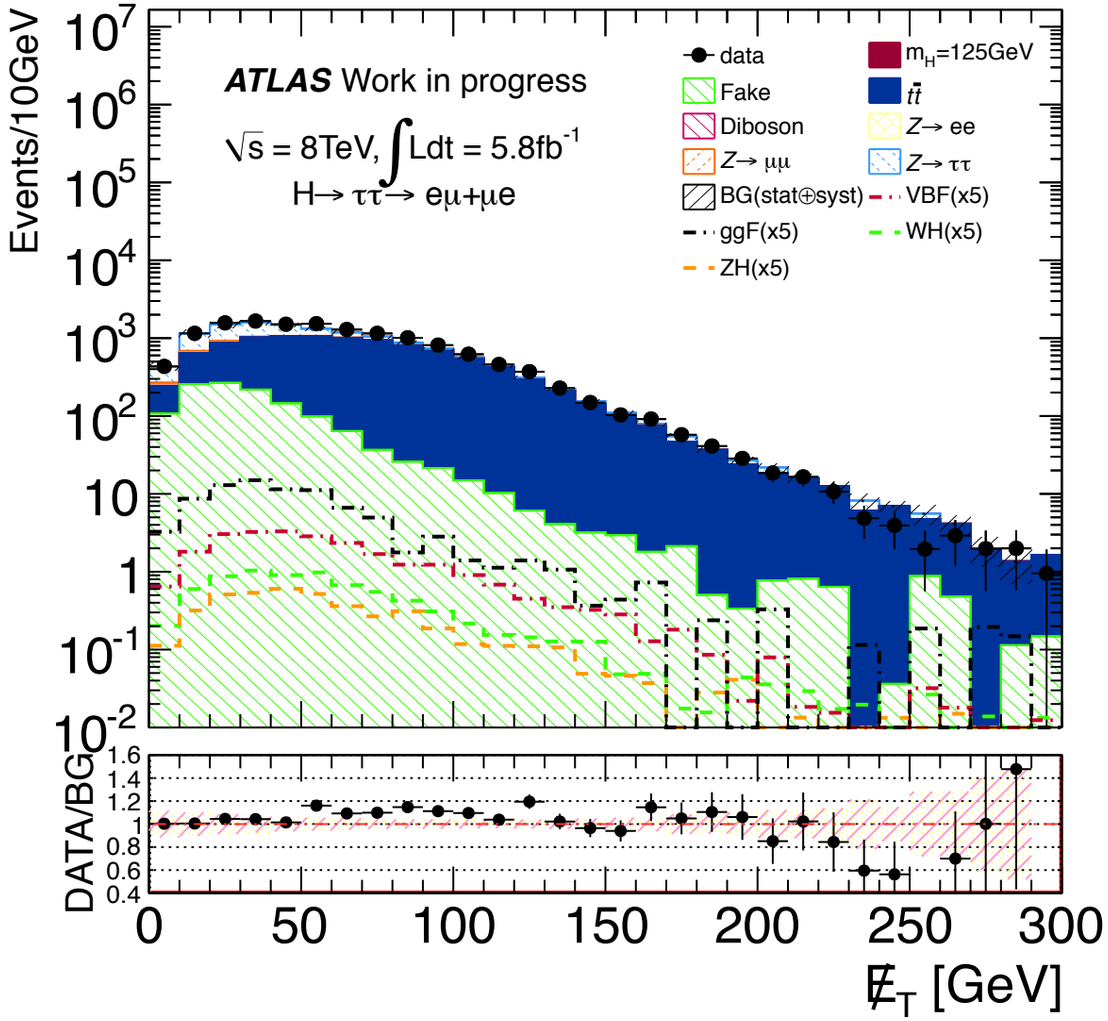




- E_T^{miss} distribution in ee+μμ channel.
  - left: OS cut
  - right: 1st jet p_T cut

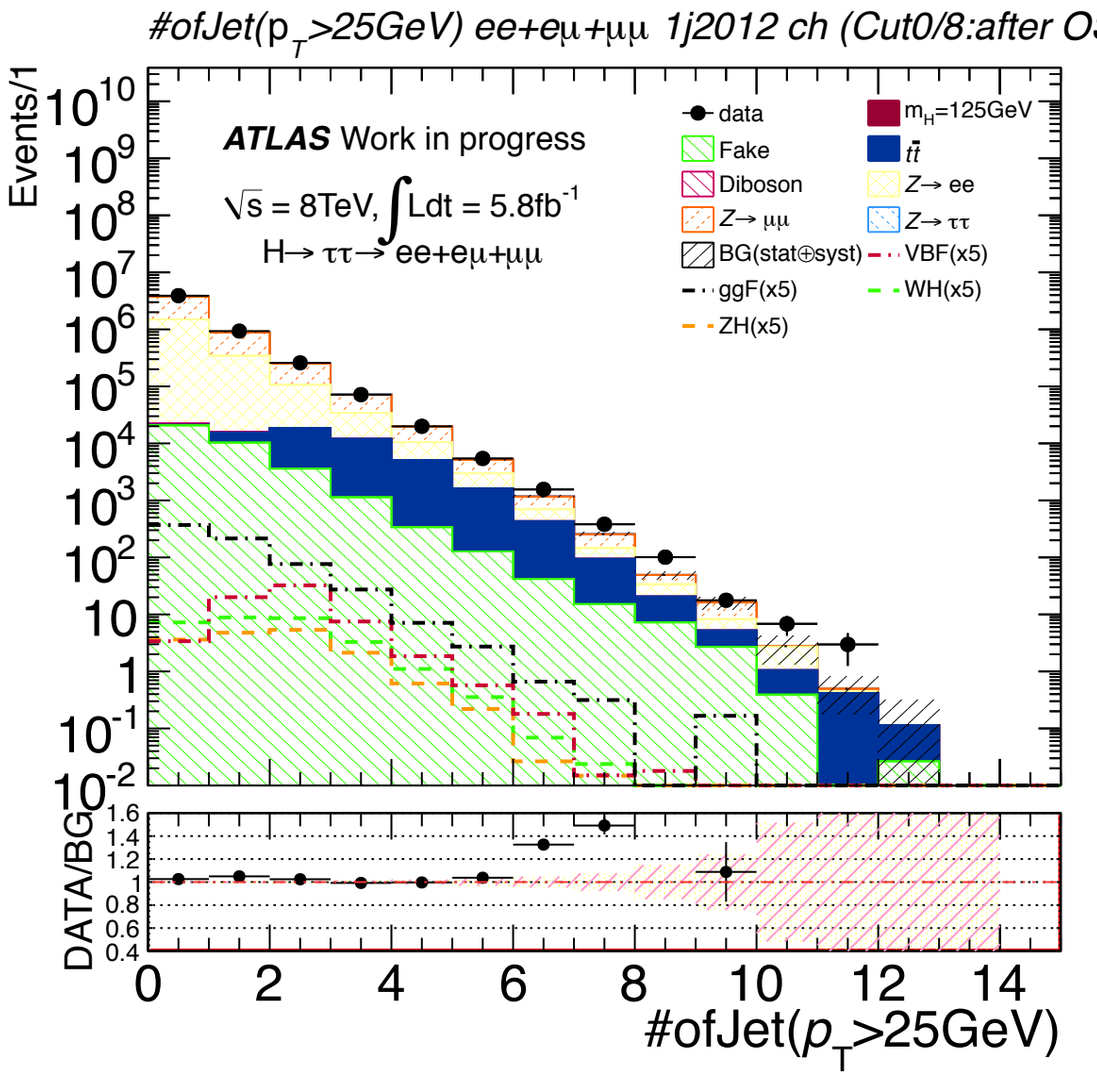
Control Plots

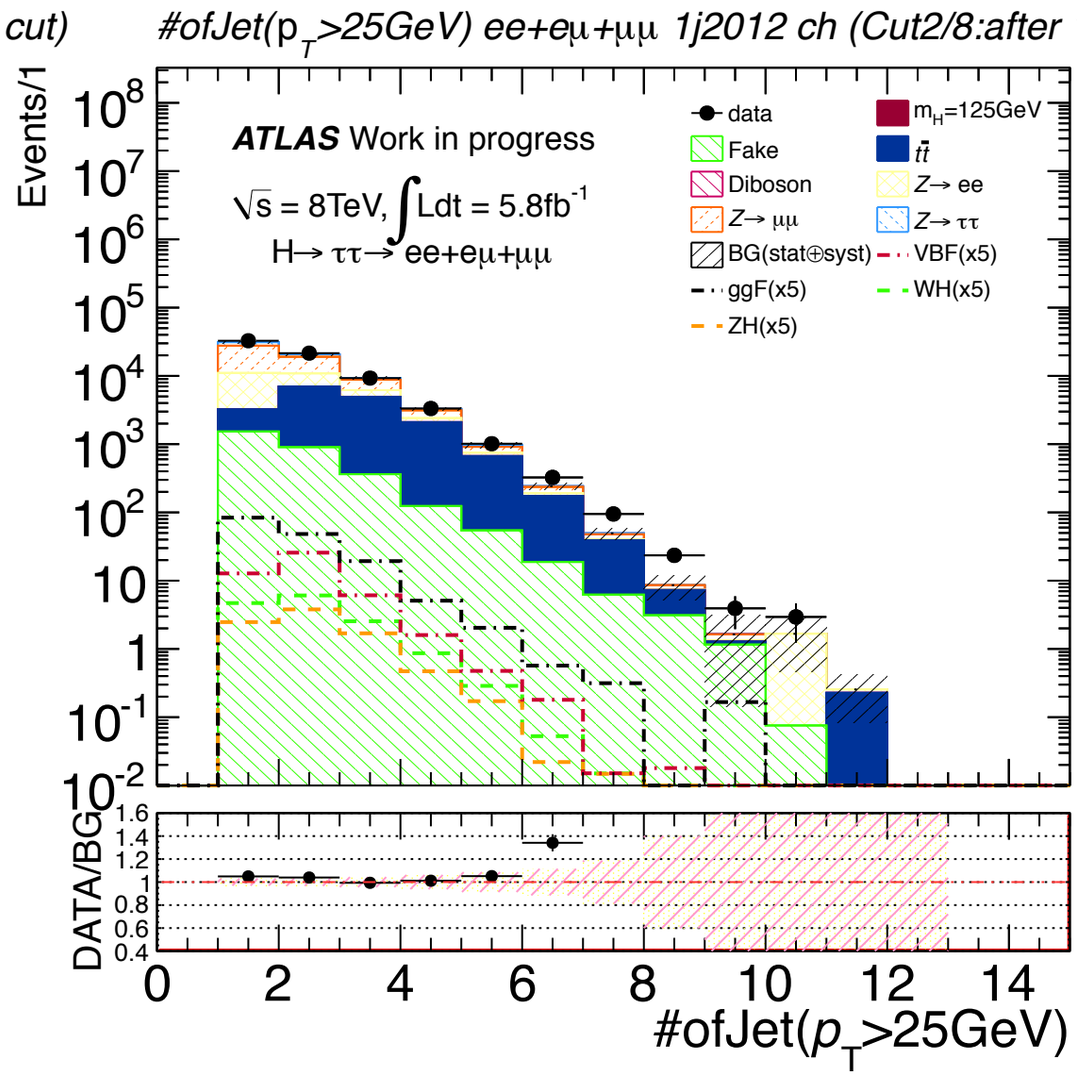




- E_T^{miss} distribution in eμ+μe channel.
  - left: OS cut
  - right: 1st jet p_T cut

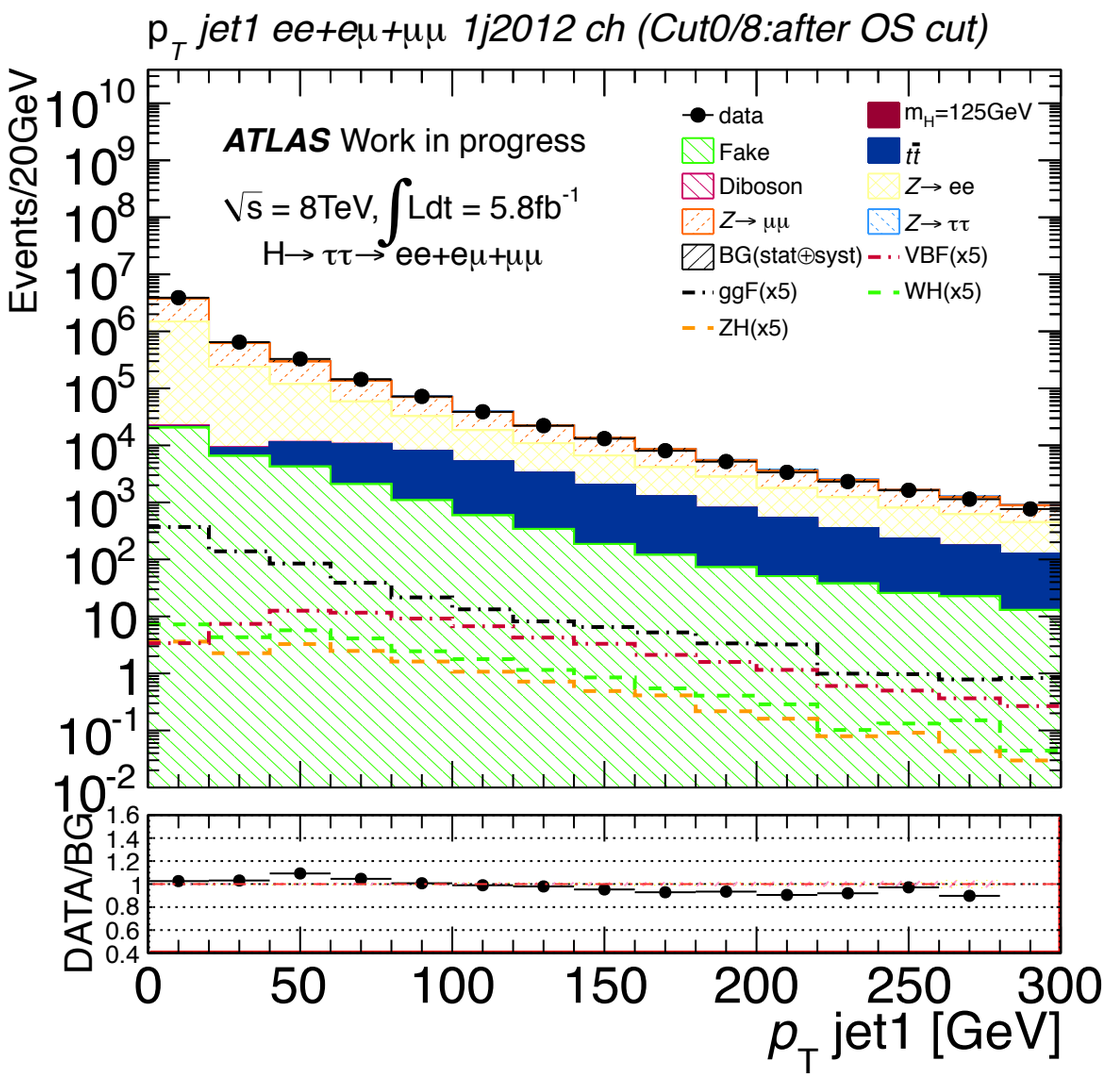
Control Plots

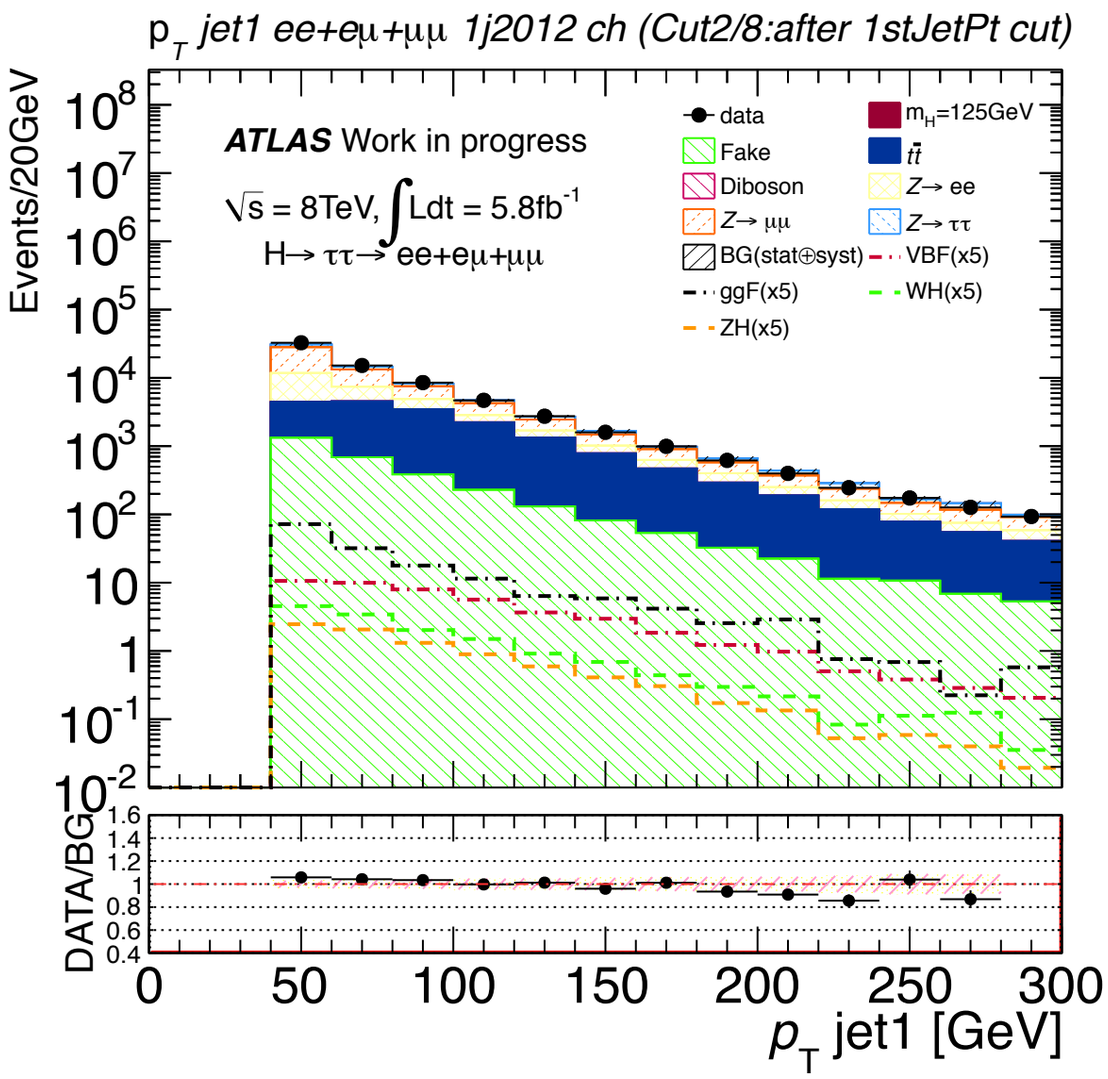




- #of jet with p_T > 25GeV JVF cut distribution
  - left: OS cut
  - right: 1st jet p_T

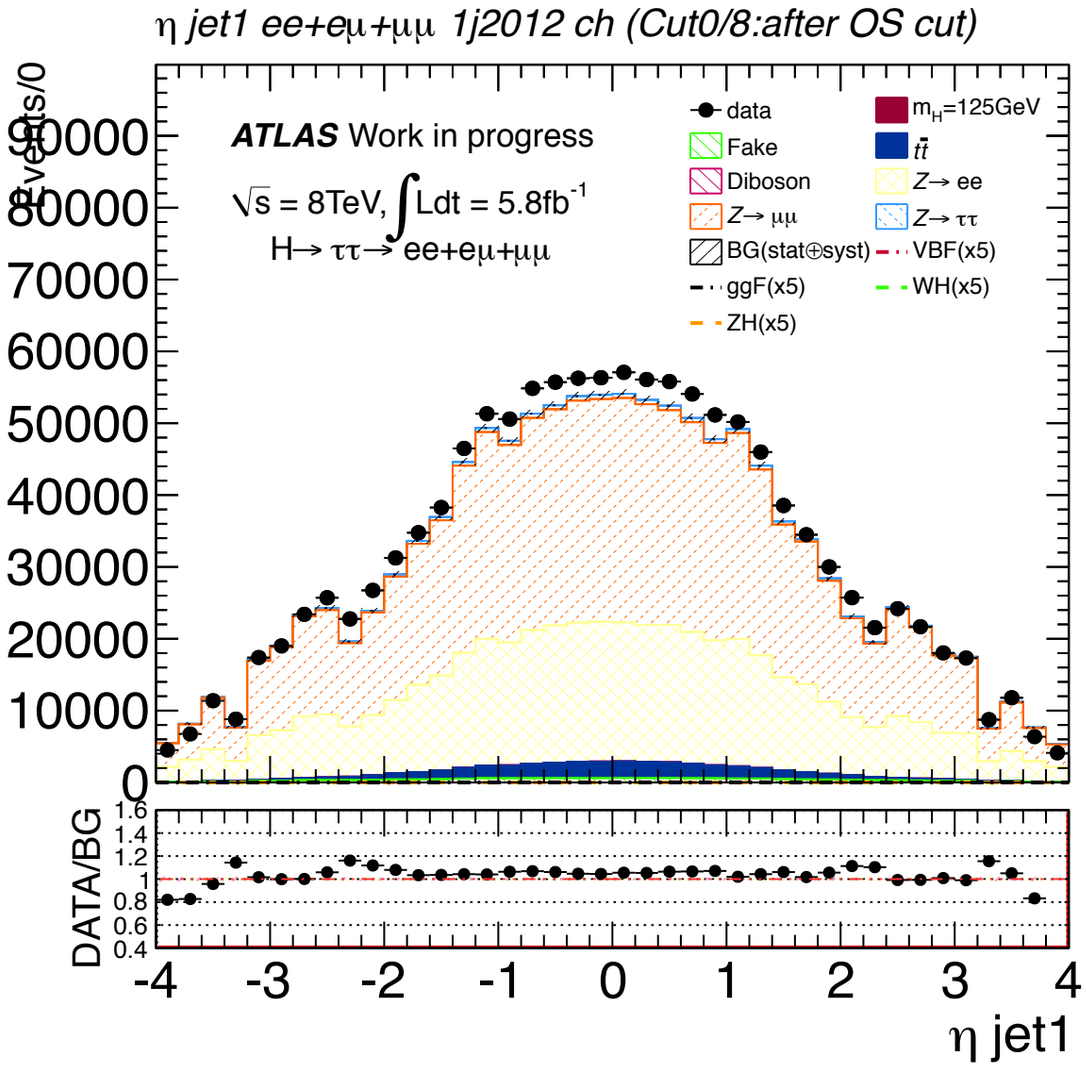
Control Plots

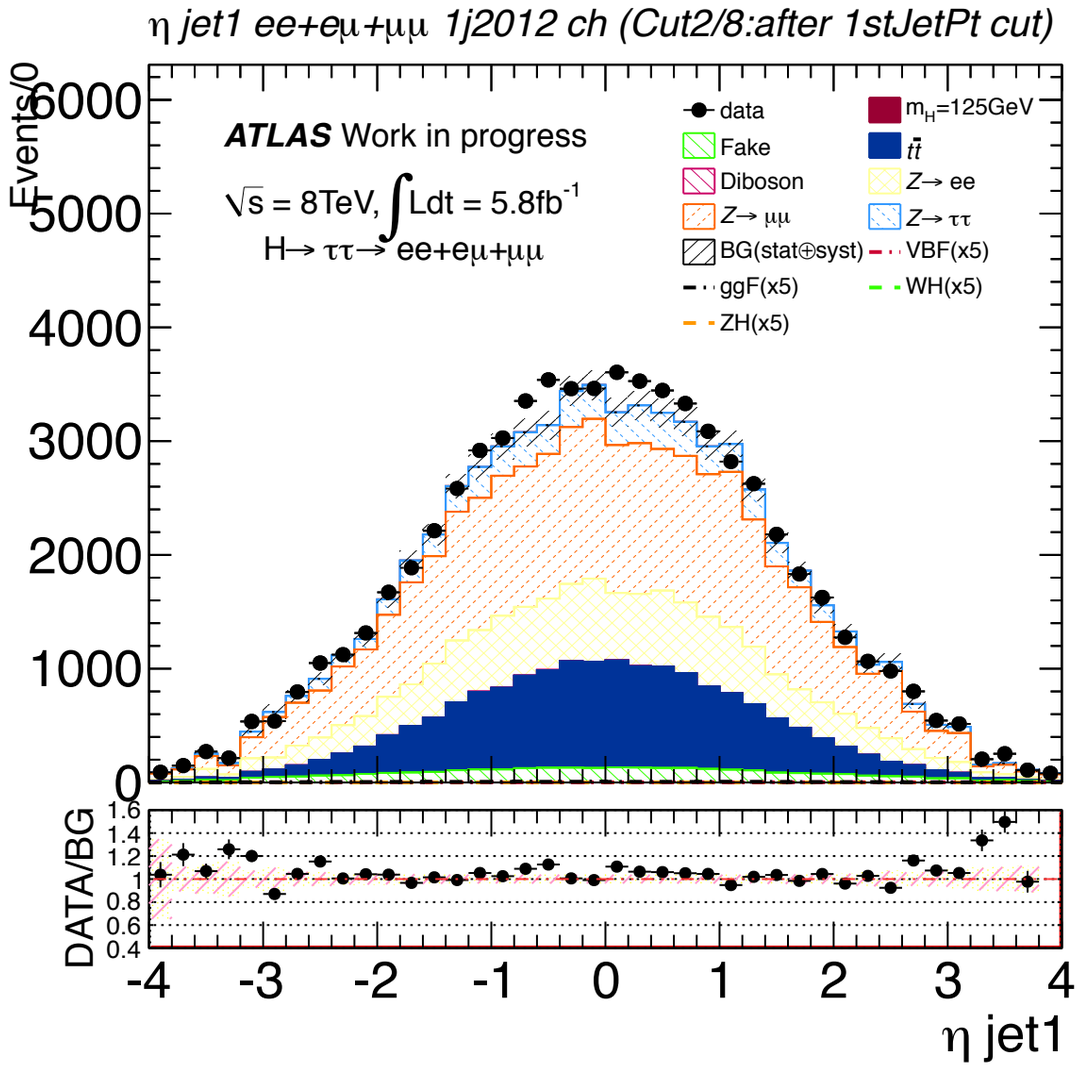




- 1st jet p_T distribution
  - left: OS cut
  - right: 1st jet p_T

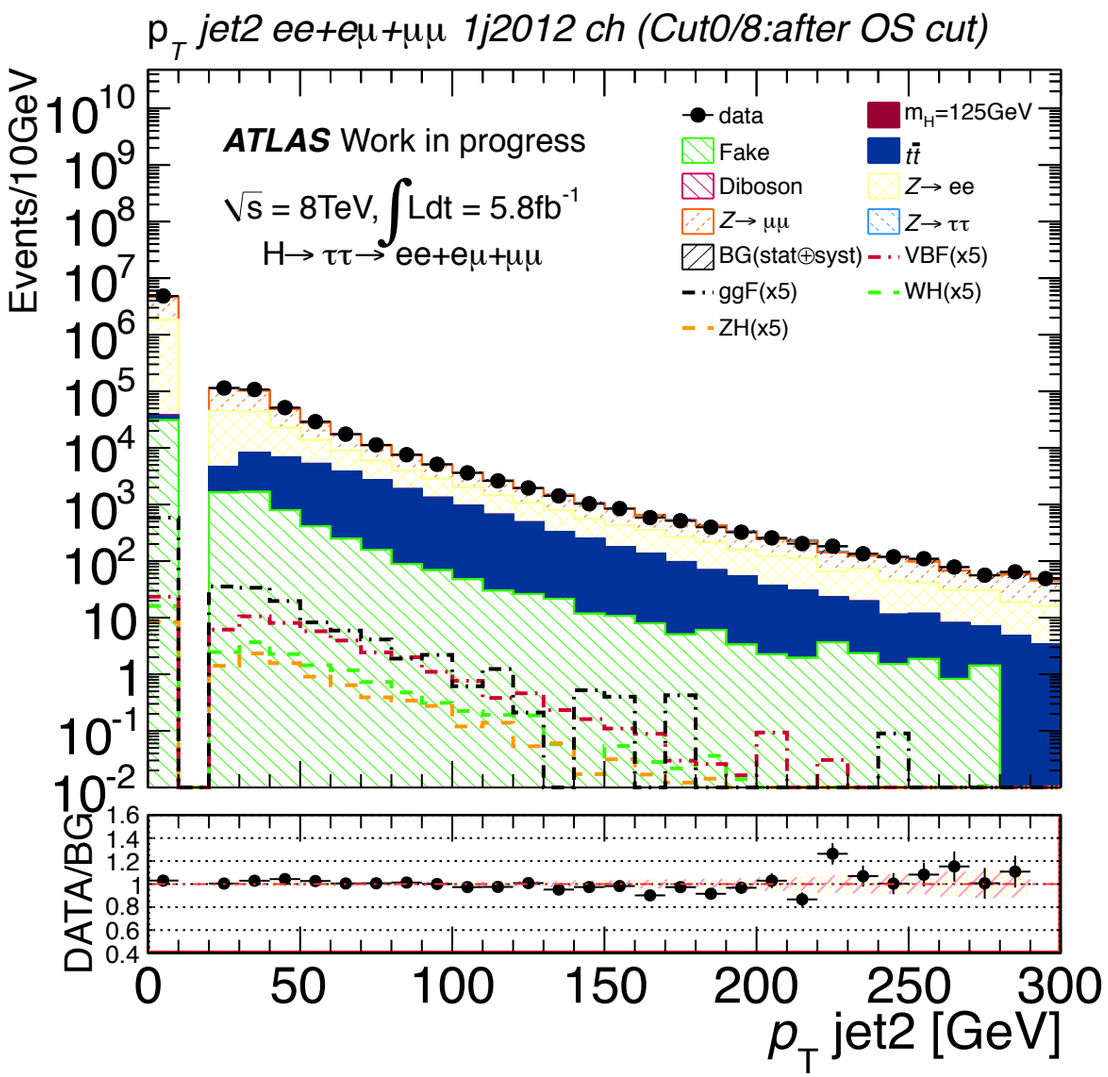
Control Plots

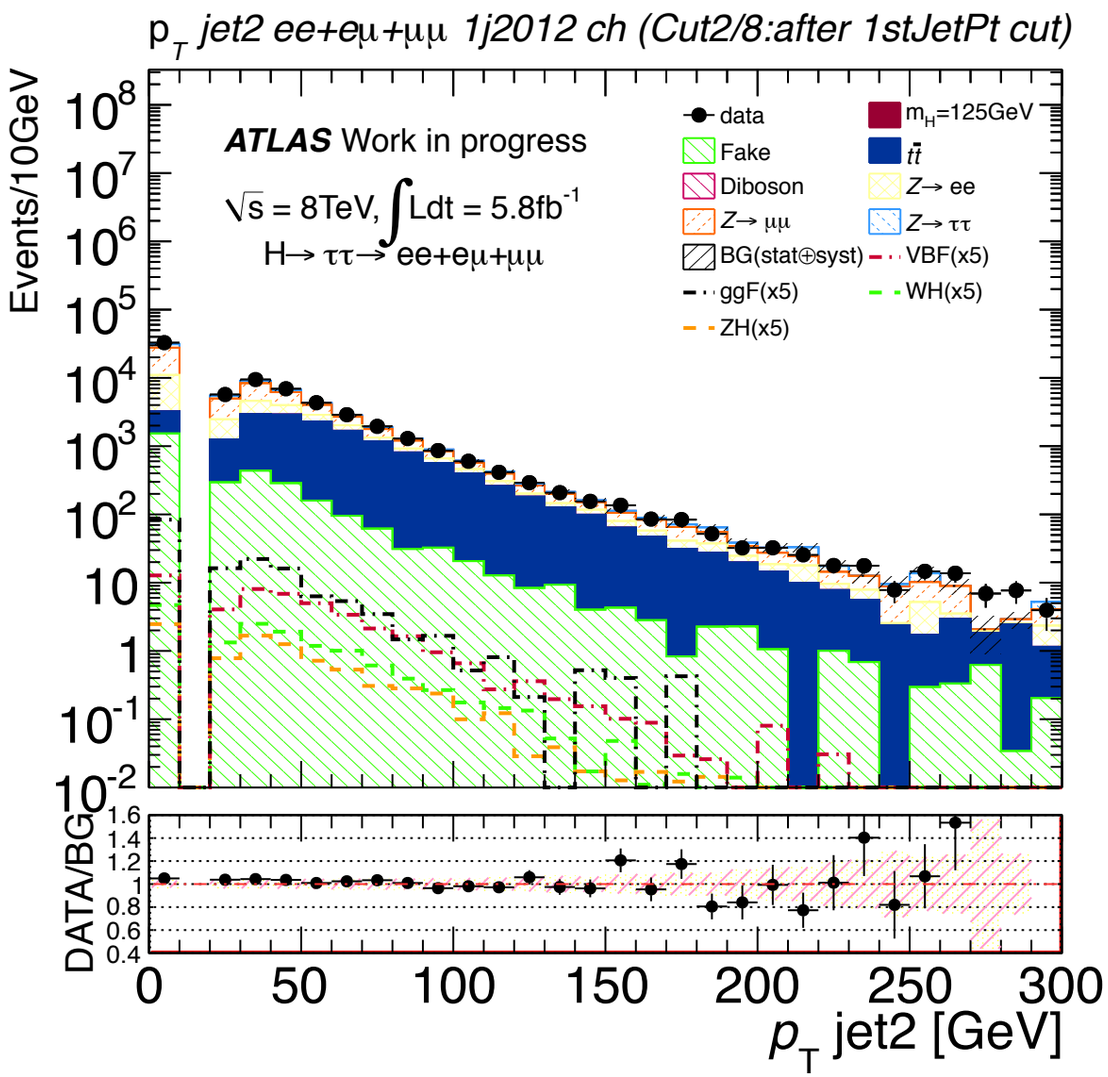




- 1st jet η distribution
  - left: OS cut
  - right: 1st jet p_T

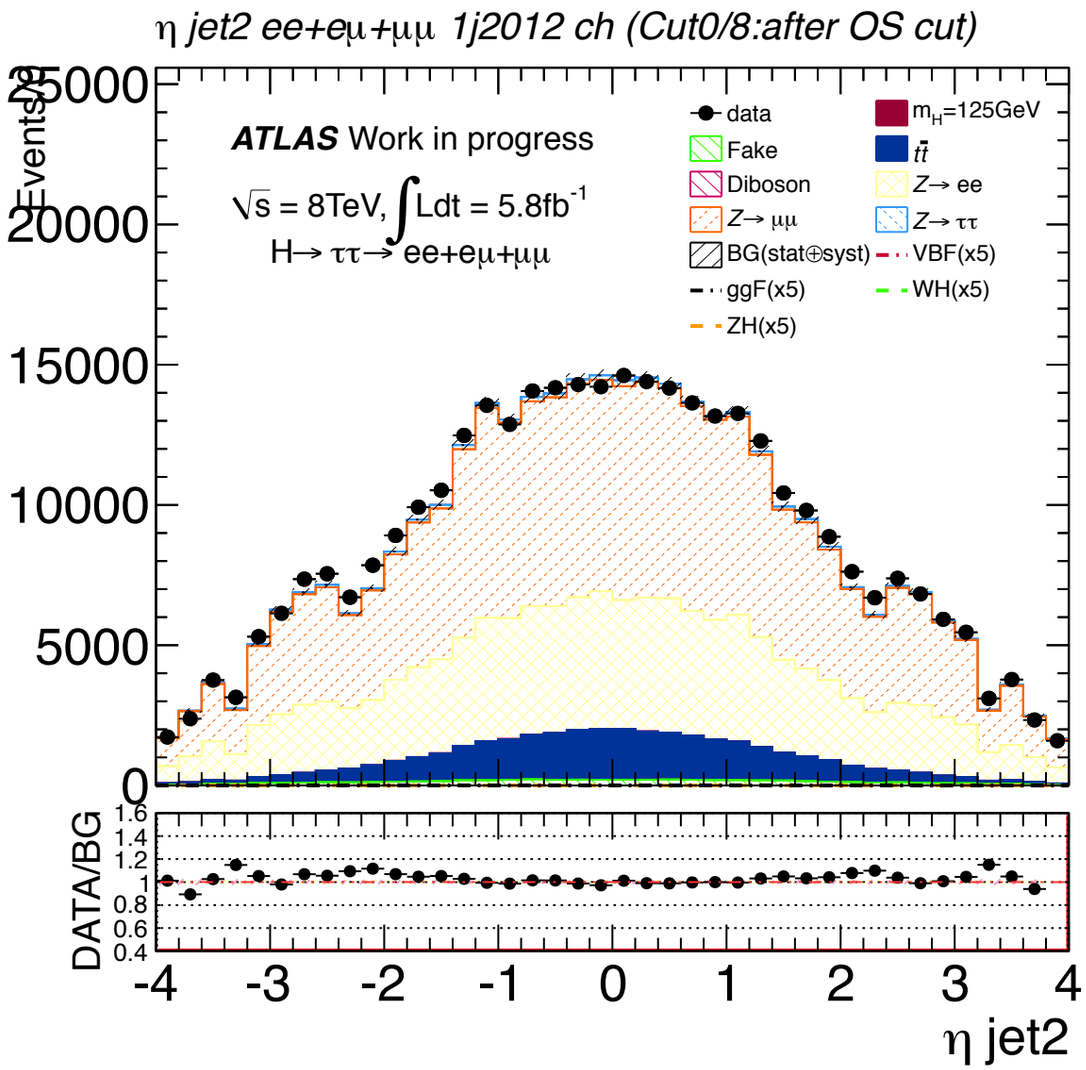
Control Plots

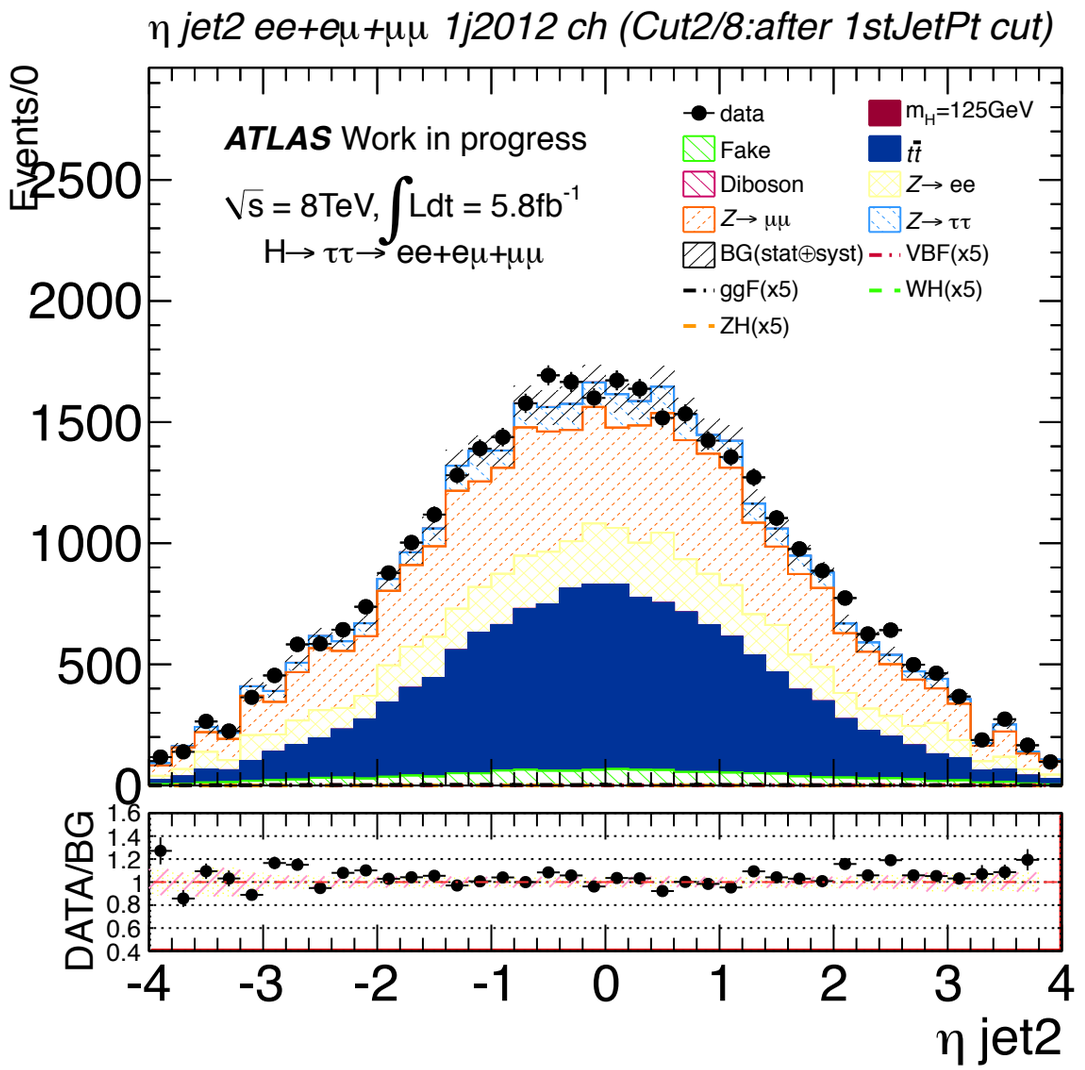




- 2nd jet p_T distribution
  - left: OS cut
  - right: 1st jet p_T

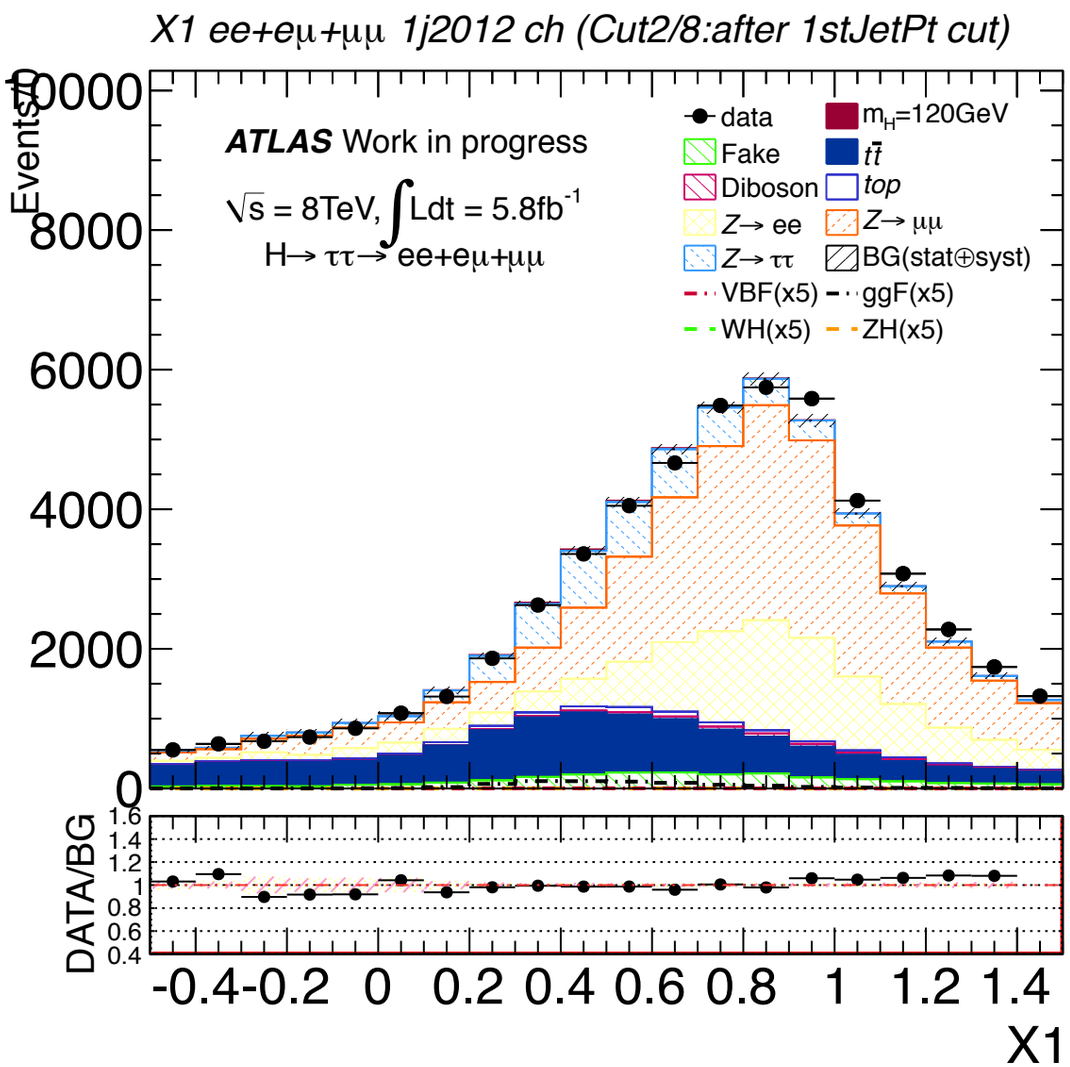
Control Plots

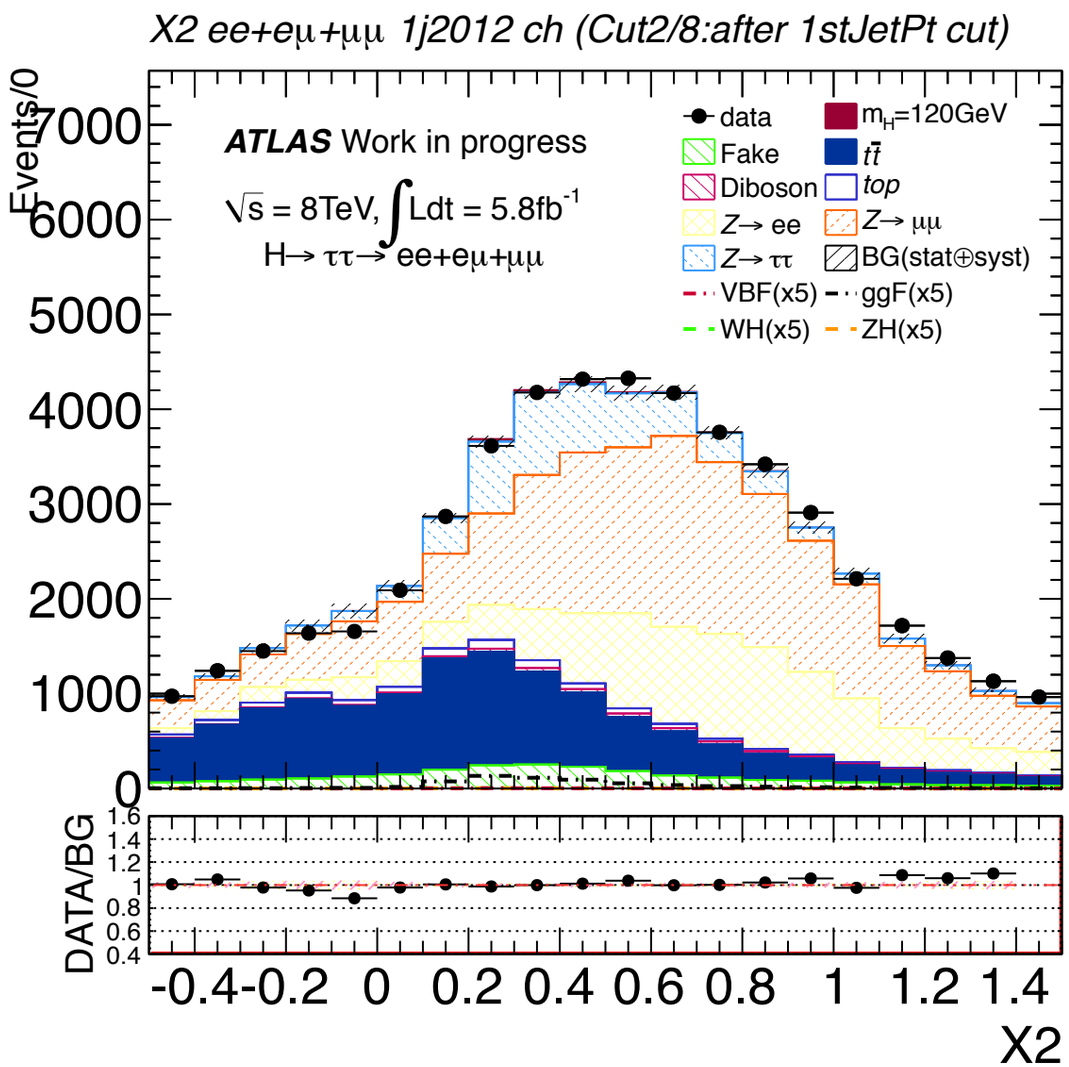




- 2nd jet η distribution
  - left: OS cut
  - right: 1st jet p_T

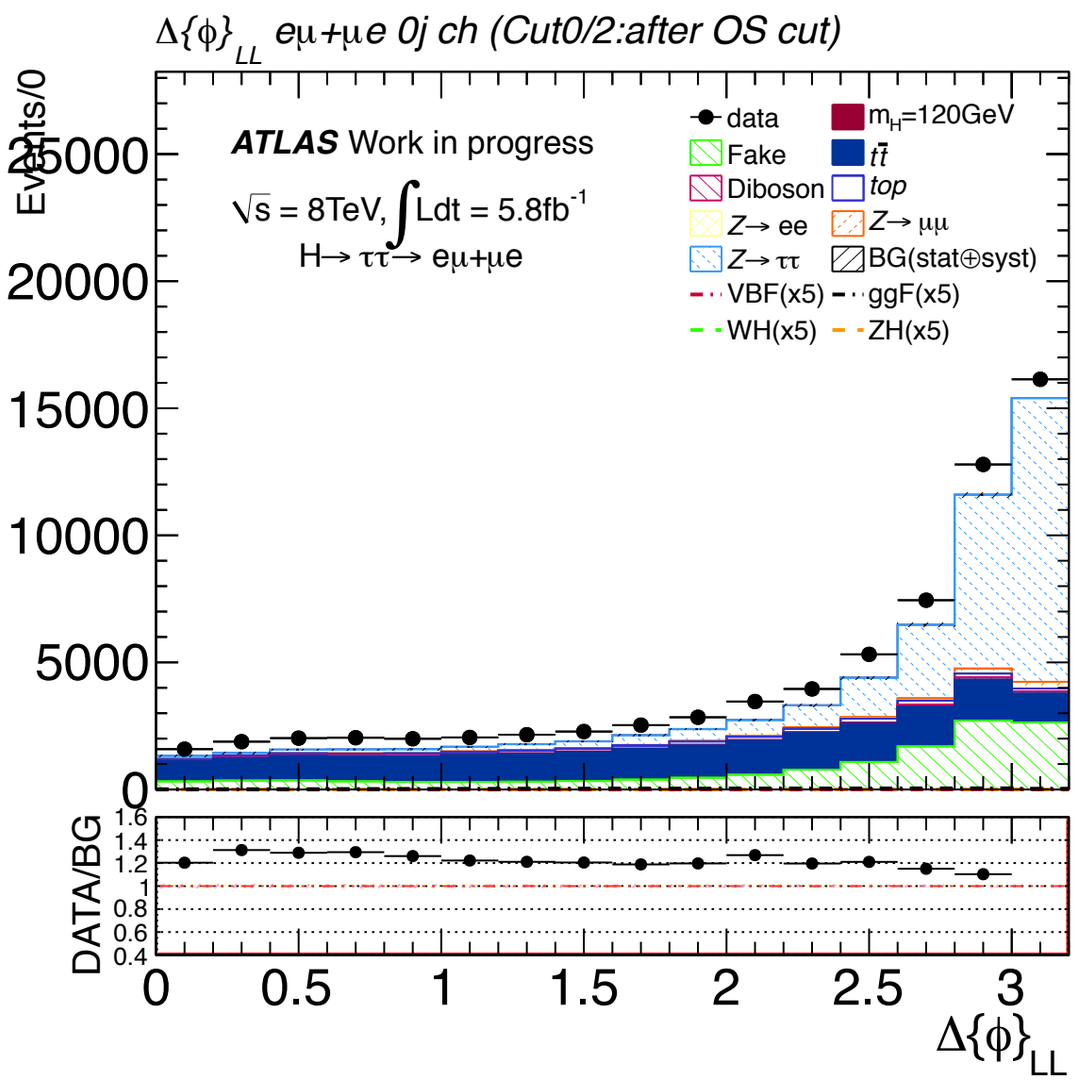
Control Plots

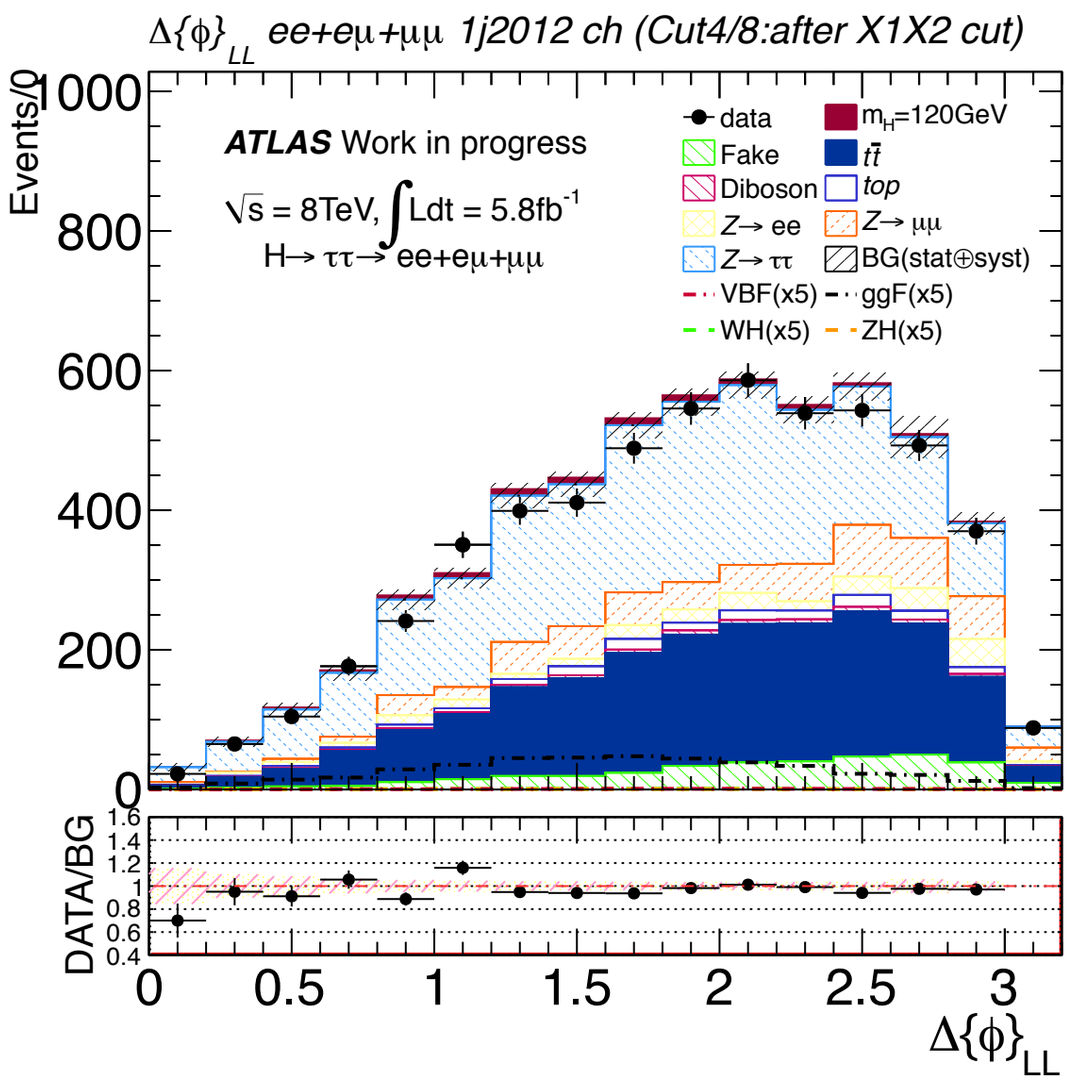




- Collinear X1,X2 distribution after 1st jet p_T > 40GeV cut.
  - Left(right): X1(X2)

Control Plots





- $\Delta\varphi_{LL}$ distribution after OS(eμ+μe 0jet) and collinear(except 0jet) cut.
  - Left(right): 0jet(1jet, Bst, VBF,VH)

Back Up!