

$$TZ \rightarrow 3\ell$$

$\mathcal{L} = 10 \text{ fb}^{-1}$ with $K_{tZu} = 2 \cdot 10^{-4}$ (the limit)

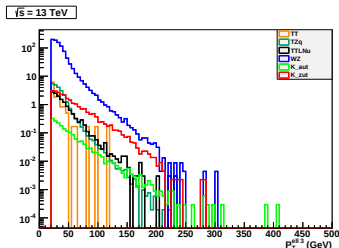
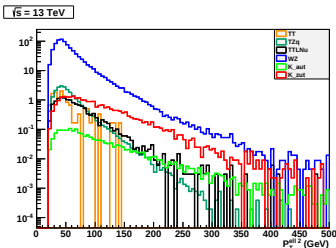
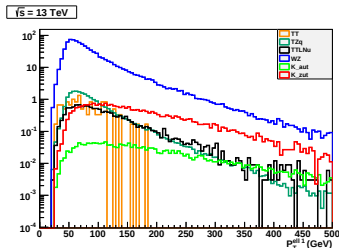
$\mathcal{L} = 10 \text{ fb}^{-1}$ with $M_{T'} = 1 \text{ TeV}$, $g = 0.1$

Lorenzo Basso

Preselection

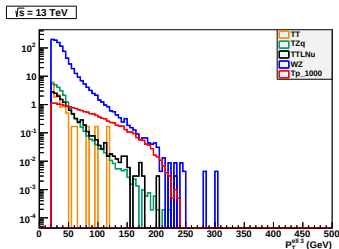
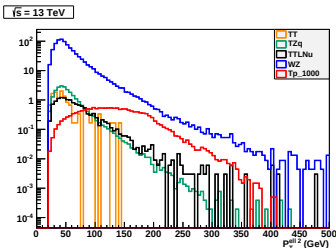
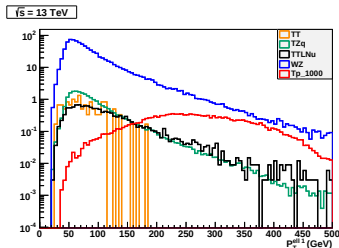
- $p_{\ell}^T > 20 \text{ GeV}$, $p_j^T > 40 \text{ GeV}$, CVSM b-tagging
- isolation: CONE04 with threshold = 0.2
- Z candidate as pair of $e^+e^- (\mu^+\mu^-)$ closest to M_Z
- W and top mass reconstructed with both transverse and invariant mass (comparison)

P_T of leptons for FCNC



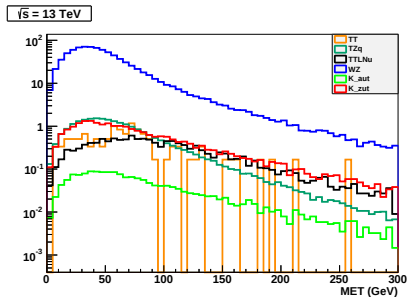
(top-left) P_T of lepton 1
(top-right) P_T of lepton 2
(bottom-left) P_T of lepton 3

P_T of leptons for T'

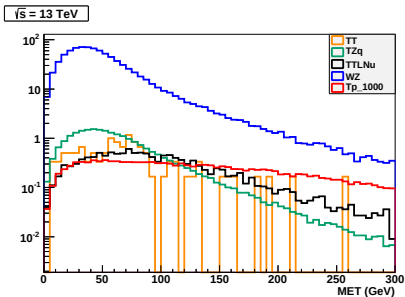


(top-left) P_T of lepton 1
(top-right) P_T of lepton 2
(bottom-left) P_T of lepton 3

MET - selection

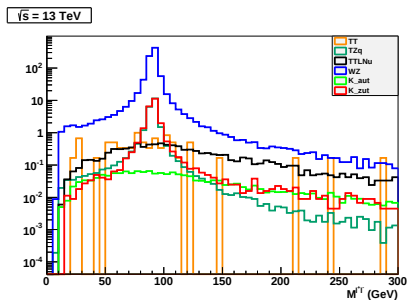


(Left) FCNC

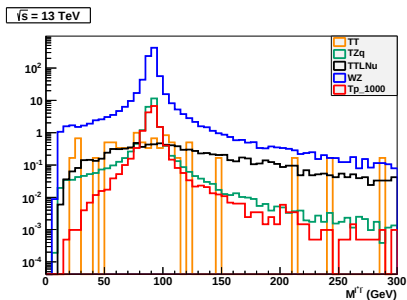


(Right) T'

MZ - selection



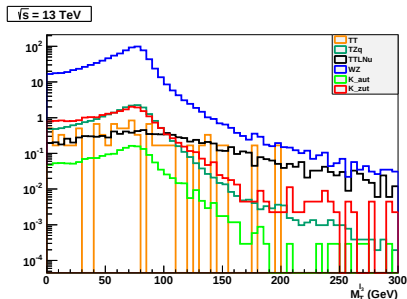
(Left) FCNC



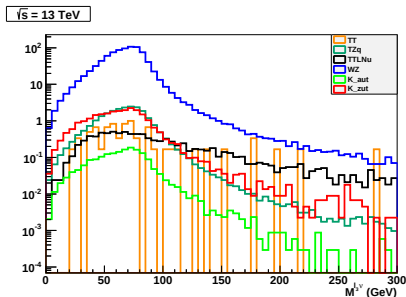
(Right) T'

Selection: $|M_{\ell+\ell^-} - 91.12| < 20$

MW - selection (FCNC)



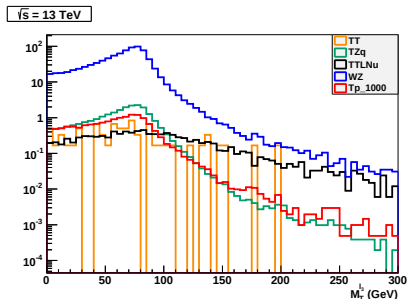
(Left) M_T



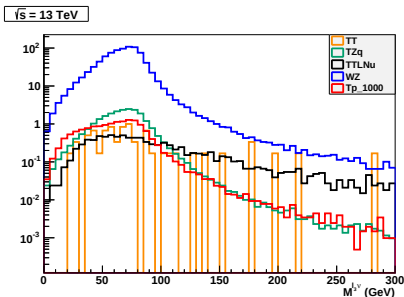
(Right) Invariant mass

Selection: $|M_{\ell_3}^T - 80| < 30$

MW - selection (T')



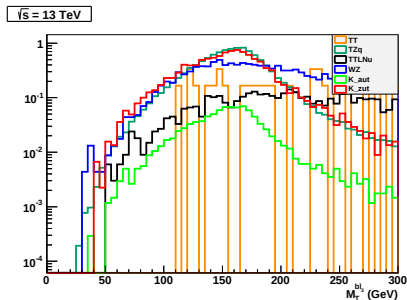
(Left) M_T



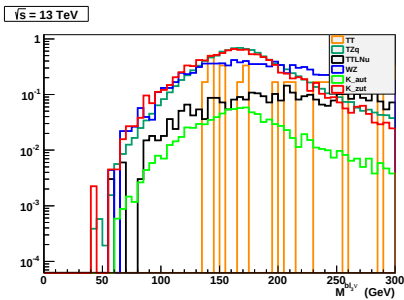
(Right) Invariant mass

Selection: $|M_{\ell_3}^T - 80| < 30$

Mtop - selection (FCNC)



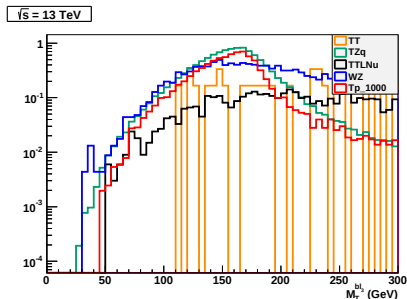
(Left) M_T



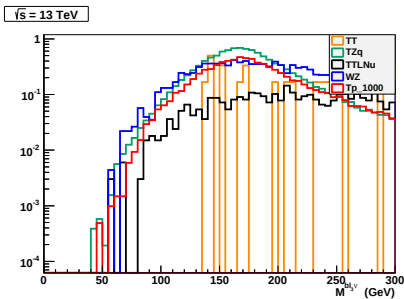
(Right) Invariant mass

Selection: $|M_{bl_3}^T - 160| < 30$

Mtop - selection (T')



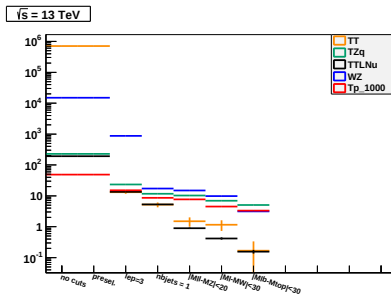
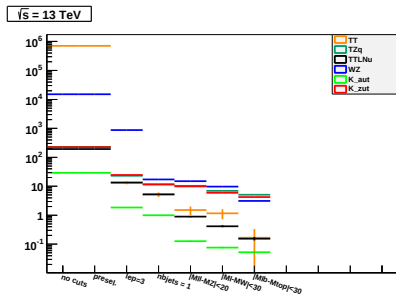
(Left) M_T



(Right) Invariant mass

Selection: $|M_{bl_3}^T - 160| < 30$

CutFlow

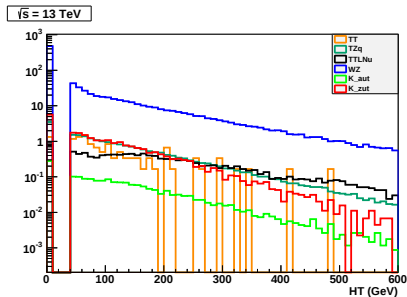


Reduction factors:

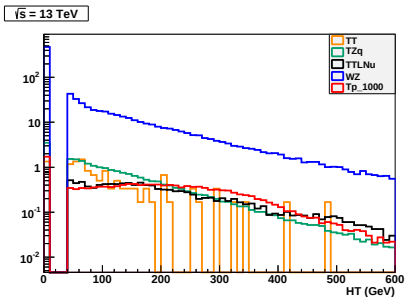
z_{ut} : 50, aut : 560, $T' \rightarrow tZ$: 15

$t\bar{t}W$: 1200, WZ : 4800, tZq : 45, $t\bar{t}$: $4 \cdot 10^6$

Extra variables: H_T

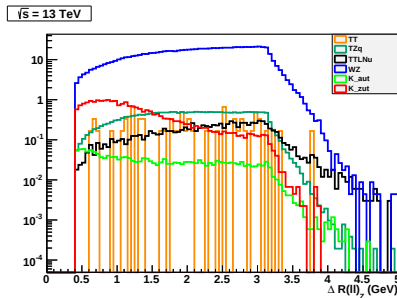


(Left) FCNC

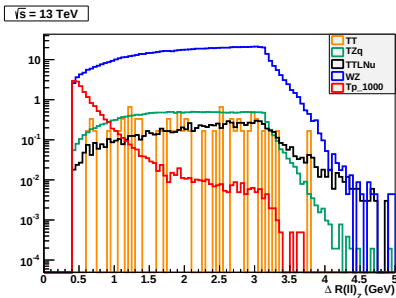


(Right) T'

Extra variables: $\Delta R(\ell^+ \ell^-)_Z$

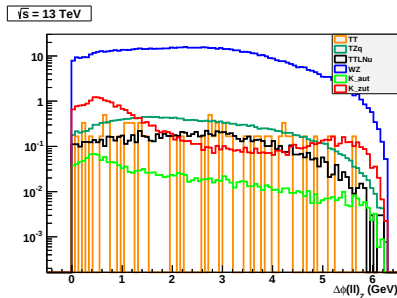


(Left) FCNC

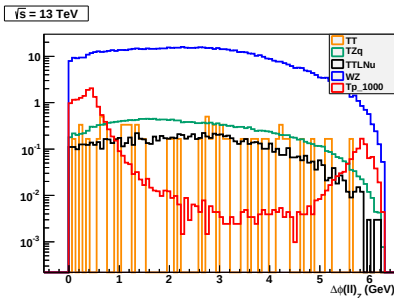


(Right) T'

Extra variables: $\Delta\varphi(\ell^+\ell^-)_Z$

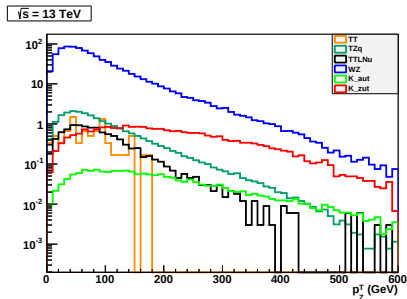


(Left) FCNC

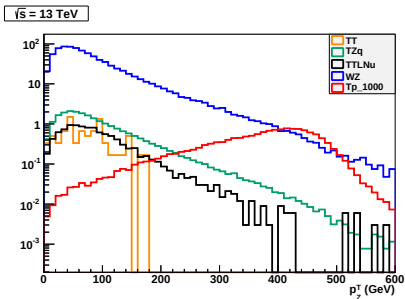


(Right) T'

Extra variables: p_Z^T

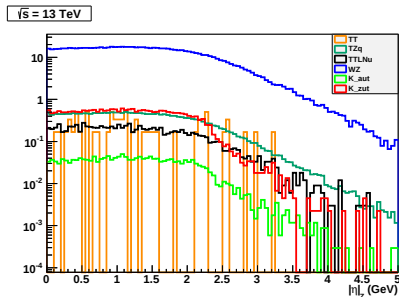


(Left) FCNC

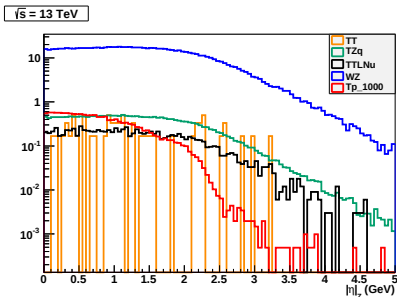


(Right) T'

Extra variables: $|\eta|_Z$



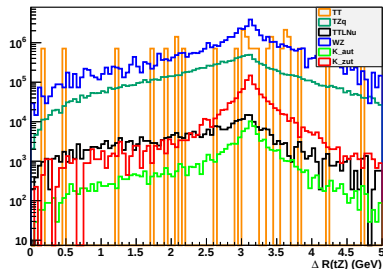
(Left) FCNC



(Right) T'

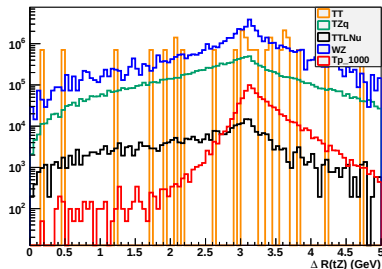
Extra variables: $\Delta R(tZ)$

$\sqrt{s} = 13 \text{ TeV}$



(Left) FCNC

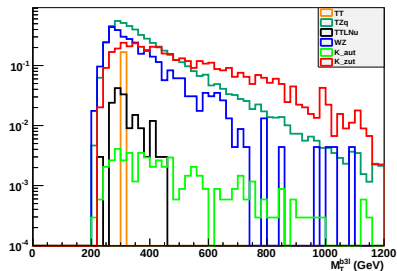
$\sqrt{s} = 13 \text{ TeV}$



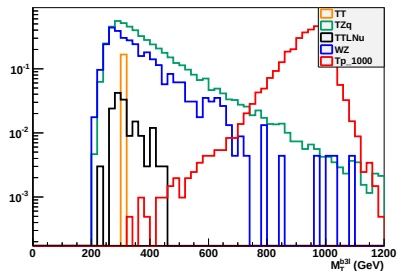
(Right) T'

Bonus level: M_{tZ}

$\sqrt{s} = 13 \text{ TeV}$



$\sqrt{s} = 13 \text{ TeV}$



M_{bell}^T : transverse mass of top and Z (useful if tZ is resonant: T')