

Selection of $t\bar{H}$ events in the same sign
dilepton channel
And other stuffs

A first test of event selection

- Exactly 2 isolated leptons with same sign:
 - $p_t > 20 \text{ GeV}$, $|\eta| < 2.5$
 - $\text{Iso}(\text{DR}=0.4) < 0.2$
- Do jet cleaning, cone of $\text{DR}=0.1$
- At least 1 jet :
 - $p_t > 30 \text{ Ge}$ $|\eta| < 2.5$
 - $E_{\text{overH}} > 0.3$
- Exactly 1 b-tagged jet with the loose WP.
- Main background (with true opposite sign leptons) :
 - TtW in dilepton,
 - TtZ with one lepton lost,
 - TtH (no added yet).

Macro for cutflow table

- First implementation perform. To be added to SVN.
- Root macro (convert into a class ?) CutFlow.C .
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- Inputs to the code :
 - List of samples, with the naming conventions.
 - List of cuts.
 - That's all !
- Output :
 - Latex file with cuts in lines, backgrounds in columns.
 - First column :
 - Last column : sum of backgrounds.
- Remaining issue : need to merge some backgrounds. Could either be done within CutFlow.C, or directly when producing the histograms.

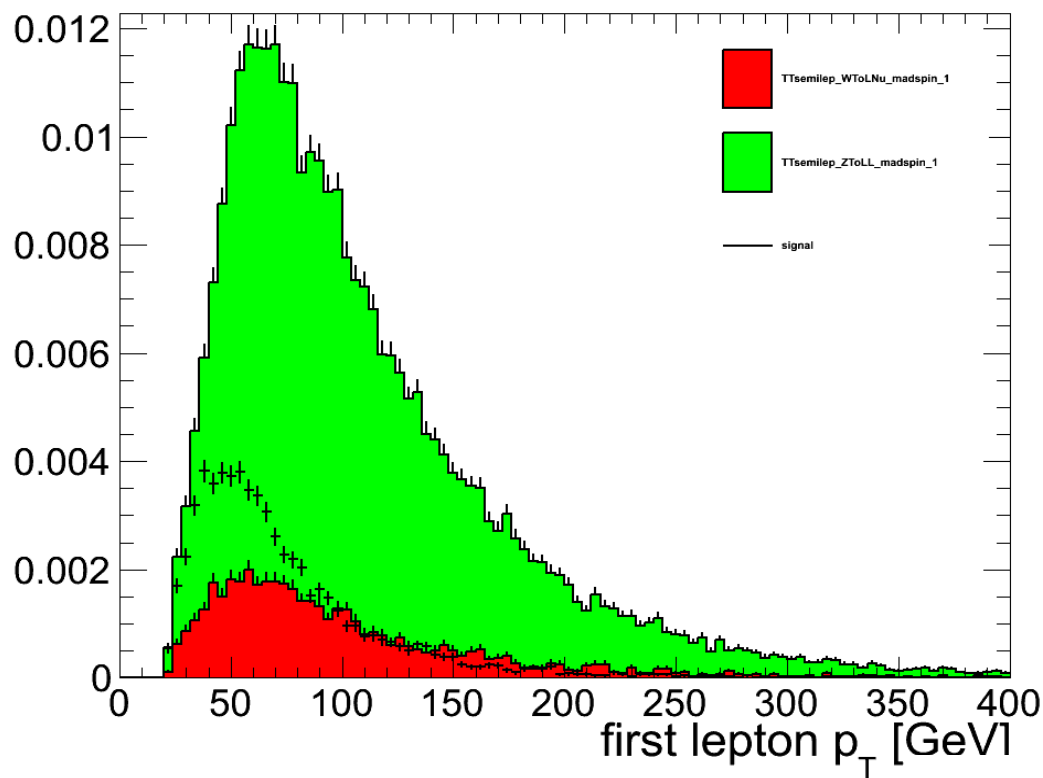
First example of cutflow

Cut	tHToWW-Kappa-gut	TTsemilep_WToLNu_madspin_1	TTsemilep_ZToLL_madspin_1	Summ bckg
no sel	9988.3 ± 31.6	8096.6 ± 33.2	3369.7 ± 10.7	11466.3 ± 68.0
2 lept	630.9 ± 7.9	358.0 ± 7.0	875.9 ± 5.4	1233.8 ± 15.8
same sign	291.3 ± 5.4	113.6 ± 3.9	135.8 ± 2.1	249.4 ± 8.4
≥ 1 jets	246.1 ± 5.0	111.3 ± 3.9	133.5 ± 2.1	244.8 ± 8.3
$= 1$ bjet	148.9 ± 3.9	47.8 ± 2.5	56.8 ± 1.4	104.5 ± 5.4

- First attempt of a format. To be modified :
 - Name of samples ...
 - Add multiple signal
 - Put signal sample at the end.

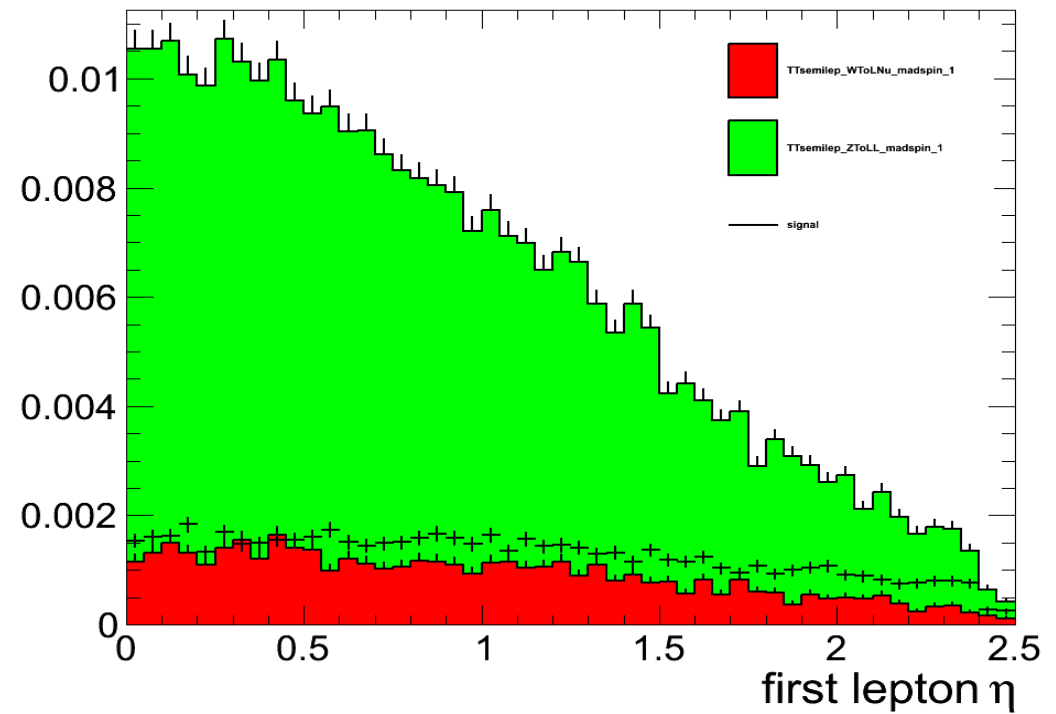
Macro for Plots

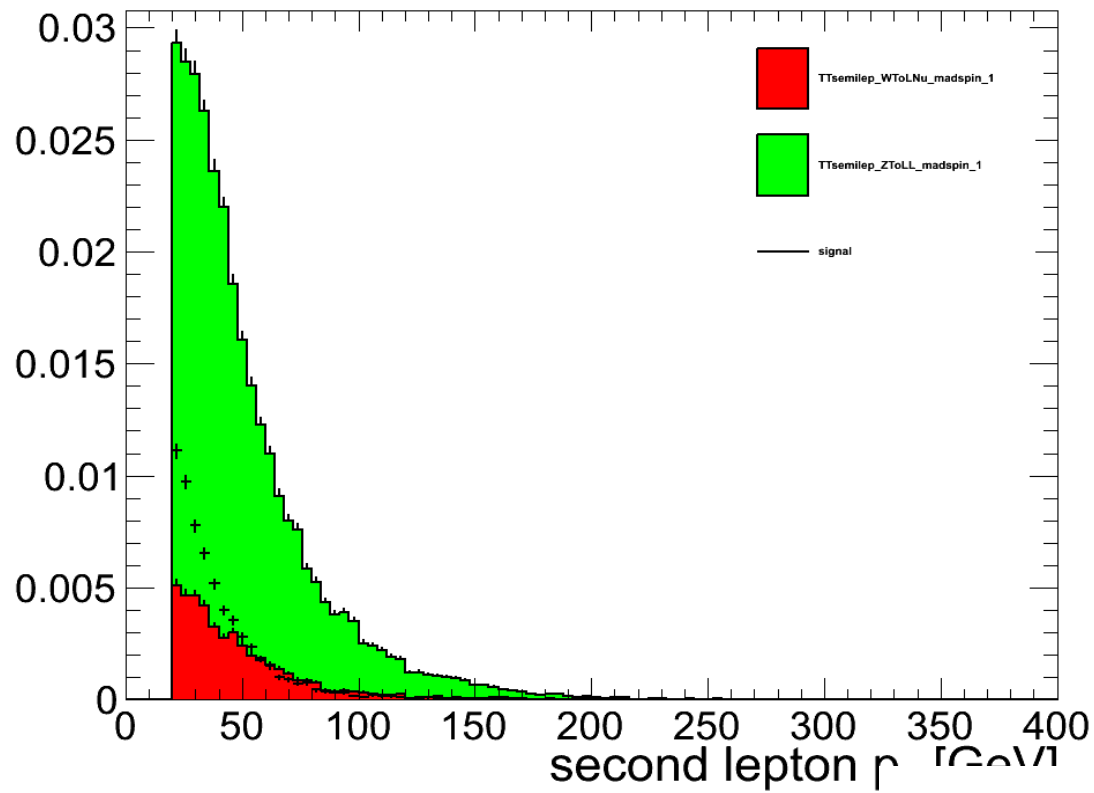
- Root macro (again) to plot automatically the histograms.
 - Backgrounds are summed in a stack,
 - Signal is a separated histograms, superimposed to the stack.
- Inputs of the macro :
 - List of sample names,
 - List of integer, corresponding to the TColor code,
 - Name of the variable to plot in the format « Variable_samplename ».
 - Name of the xaxis.
- To be added to SVN. Needed improvements :
 - Better layout,
 - Improve the legend,



Lower lepton p_T in signal events.

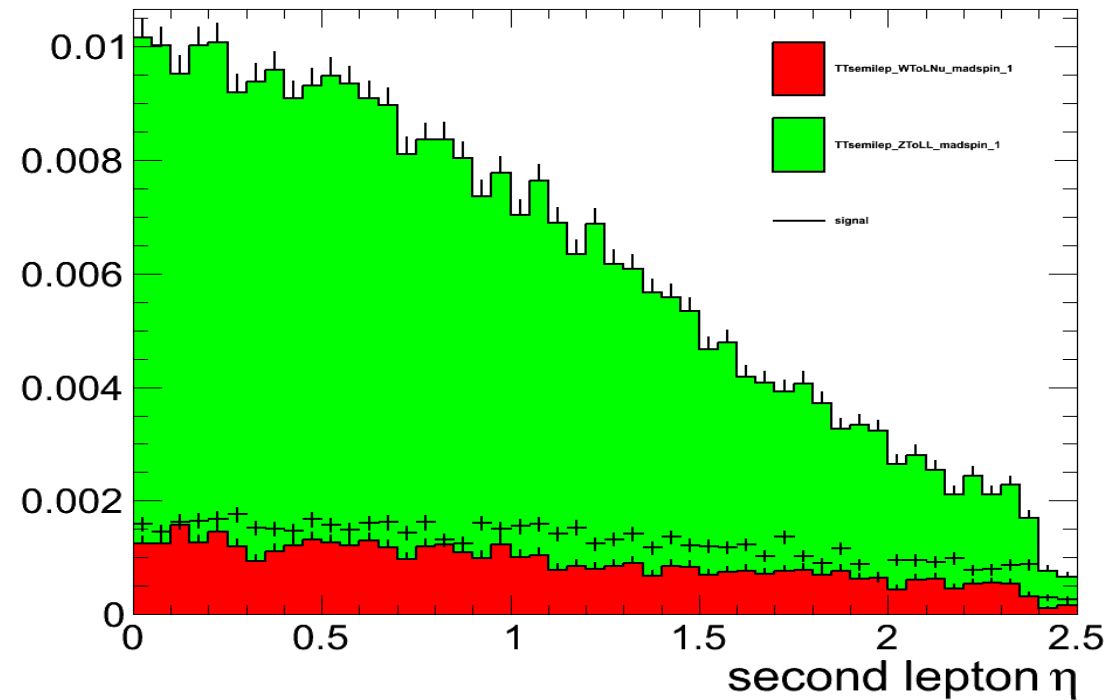
Leptons from Higgs ?

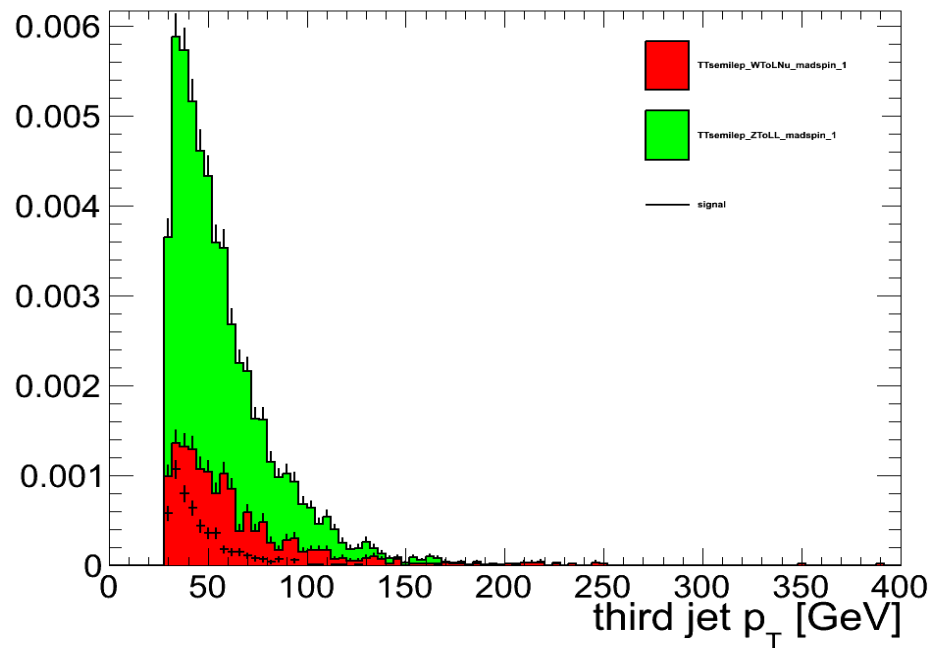
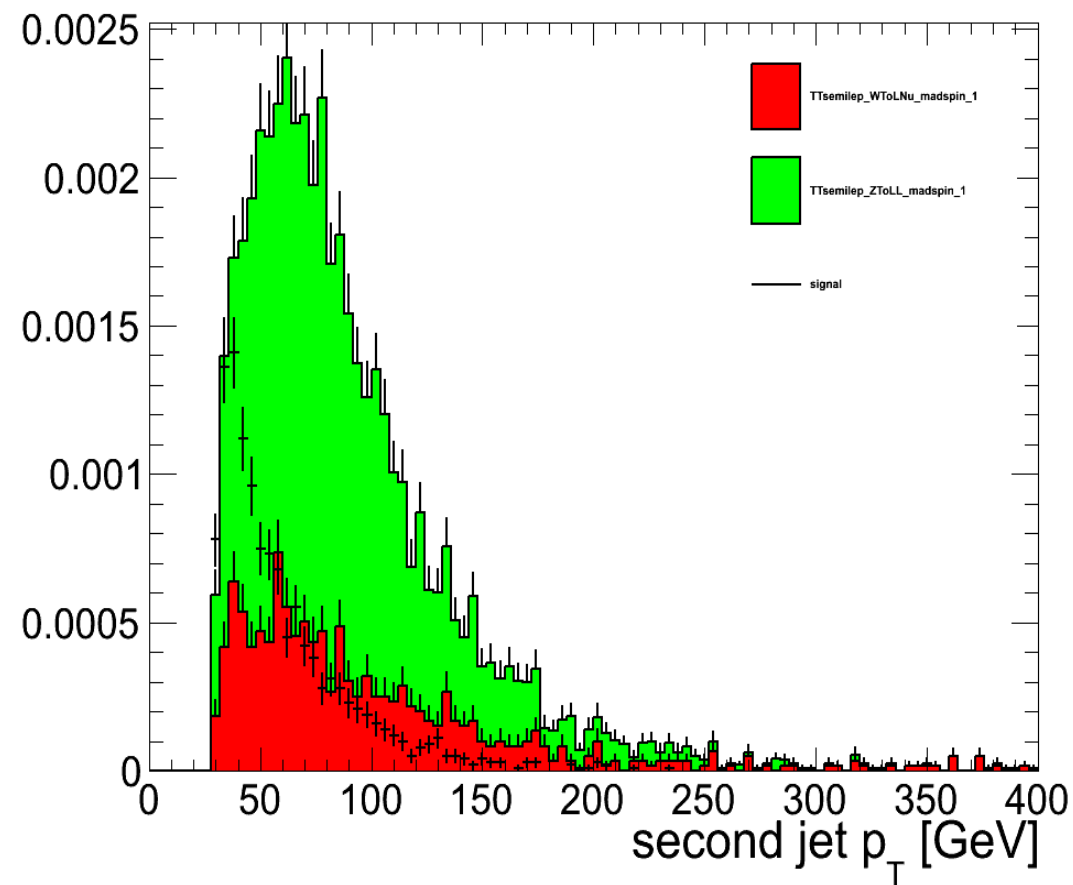
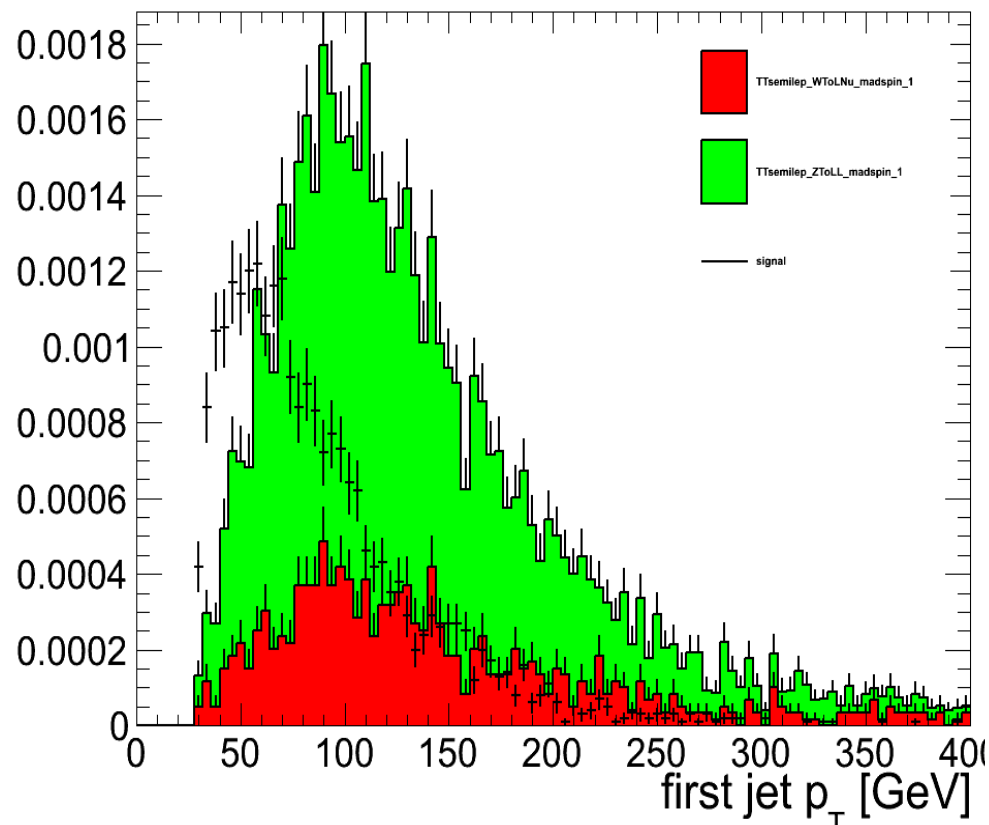




Lower lepton p_T in signal events.

Loose of signal efficiency because of too high p_T cuts ?

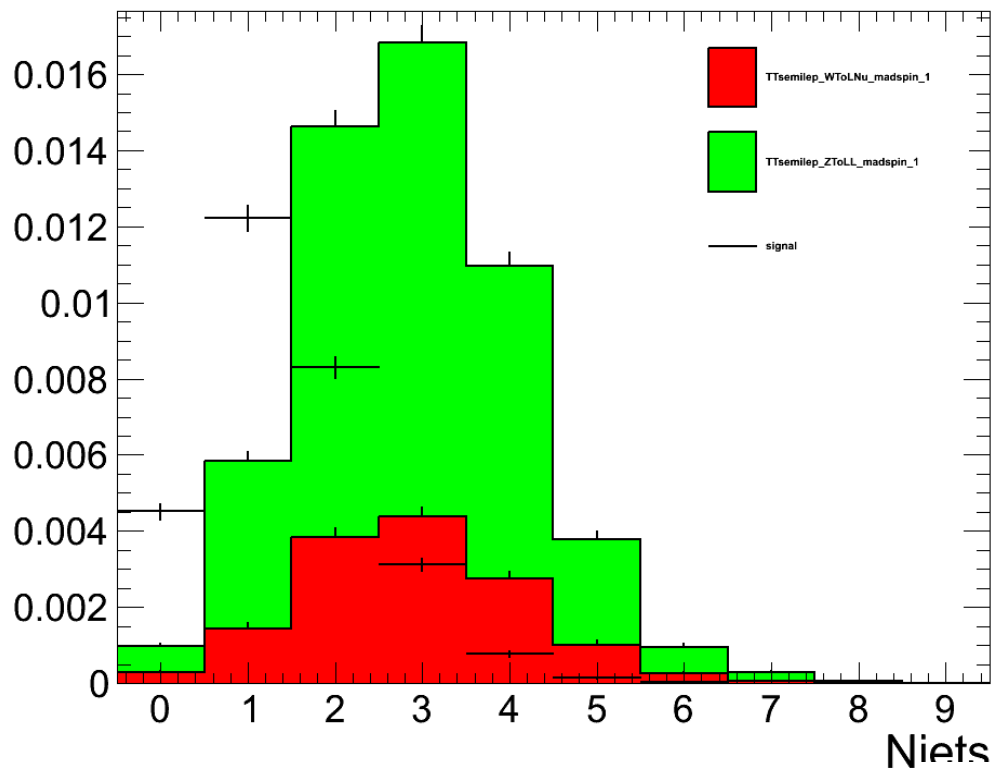




After same sign lepton selection.

Much softer jets in signal compare to ttZ and ttW.

Is it expected ?

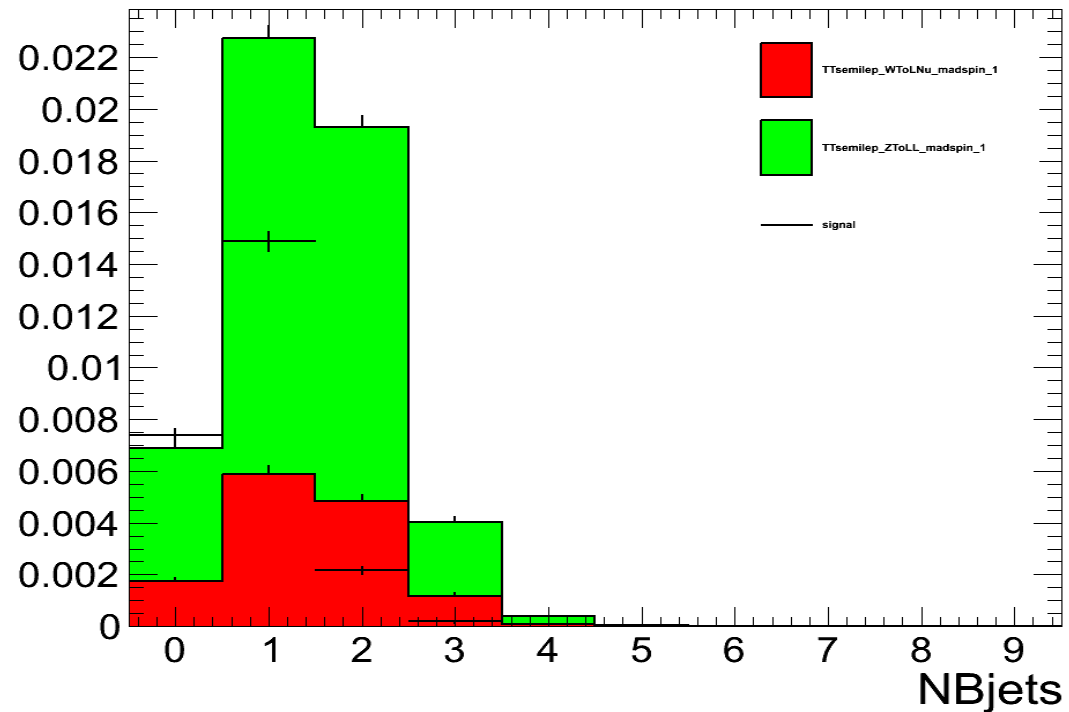


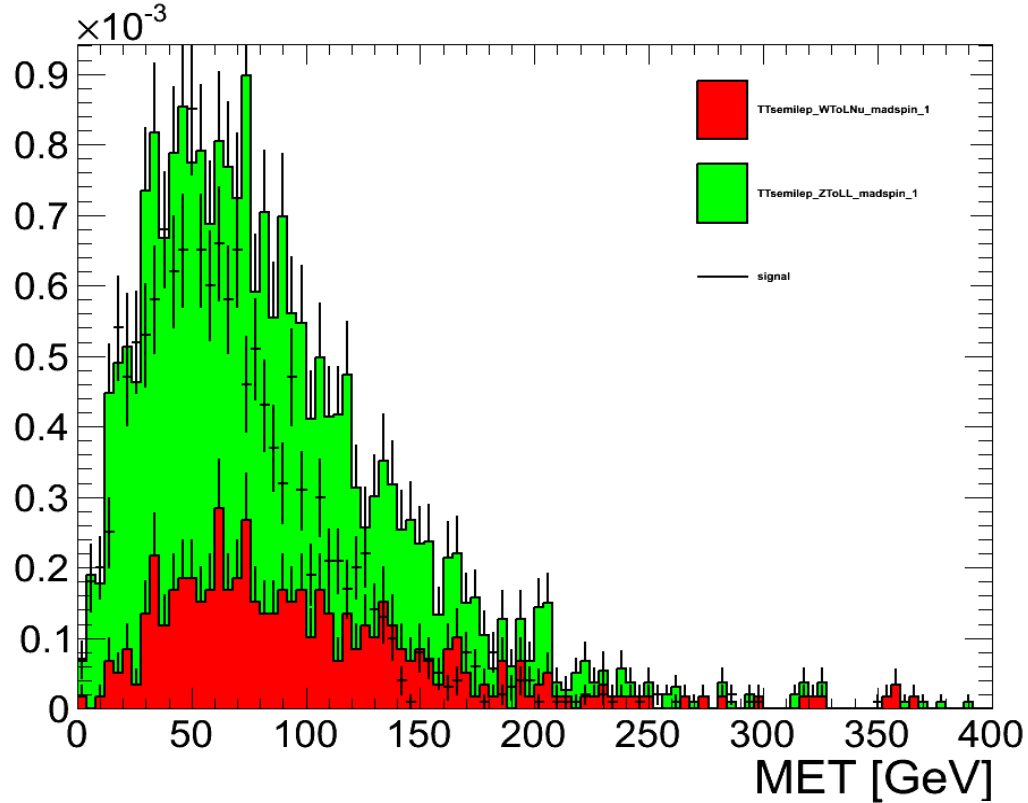
After same sign lepton selection

Jet multiplicity in signal is peaking at 1 jets (lower jet pT from Higgs).

Signal peaking at 1 b-tagged jet, as it should.

ttZ and ttW also peaking at 1 jet. Is it expected ?





MET in signal lower than ttZ and ttW.

After few selection, a signal over background close to 1.

