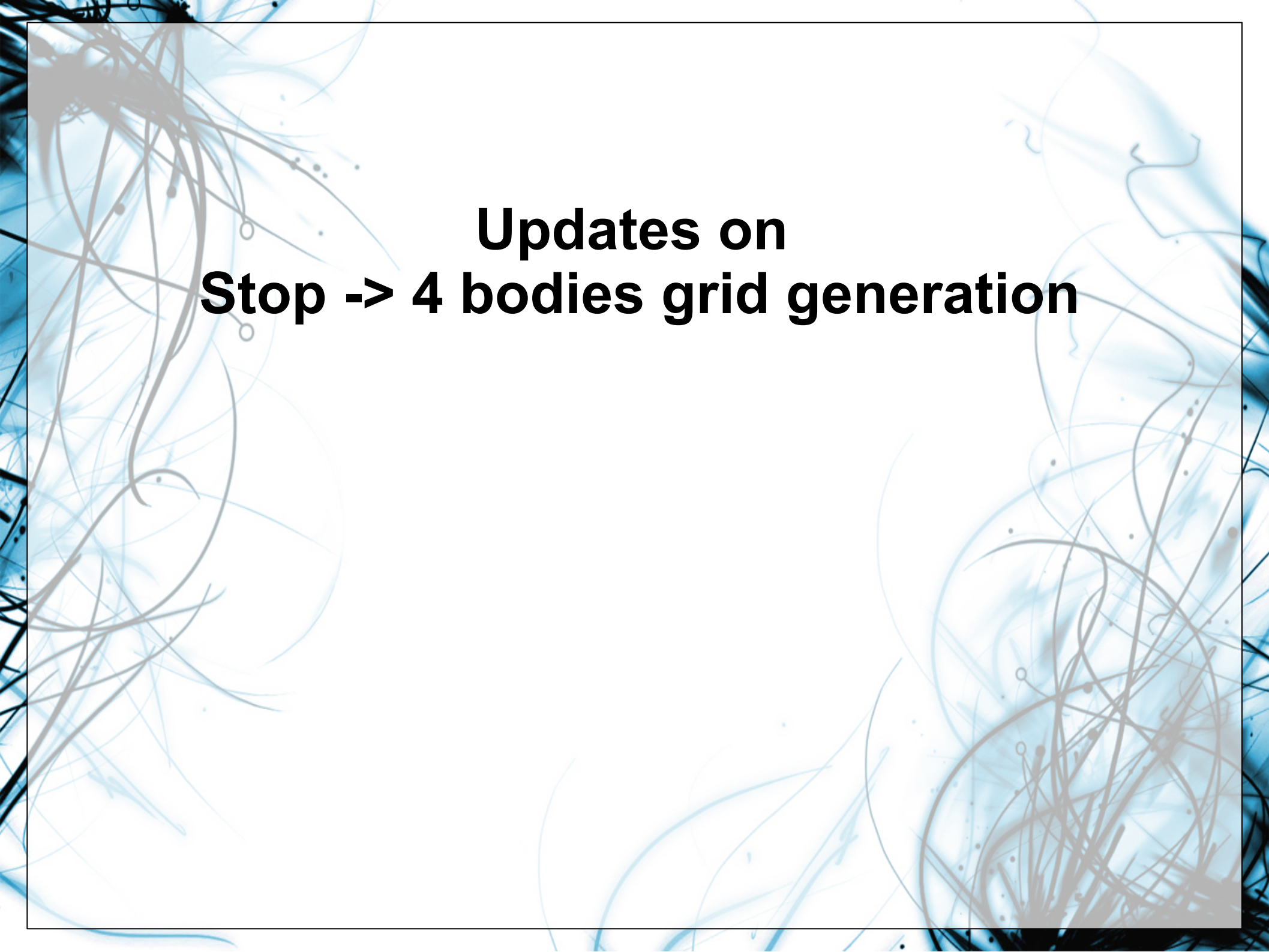




**Updates on
Stop -> 4 bodies grid generation**



ATLAS Monte Carlo Production / ATLMCPROD-2464

MC15 stop-> 4 bodies grid



Comment

Agile Board

More ▾

Needs information

Initial Sign-Off

Details

Type:



Task

Status:

TO DO

Priority:



Minor

([View Workflow](#))

Component/s:

SUSY, SUSY-3G

Resolution:

Unresolved

Labels:

13TeV

MC15

SUSY

SUSY3G

Description

Hello,

we would like to request MC15 samples for a production of a signal grid of stop decaying in $b\bar{b}N$ with a 100% BR (18 points). All points should be produced with MadGraph+Pythia8 and AtI Fast at 13 TeV. In particular, we would like to request 3 benchmark points at (stop mass, neutralino mass) = (300,220),(300,250),(350,300), if possible with higher priority.

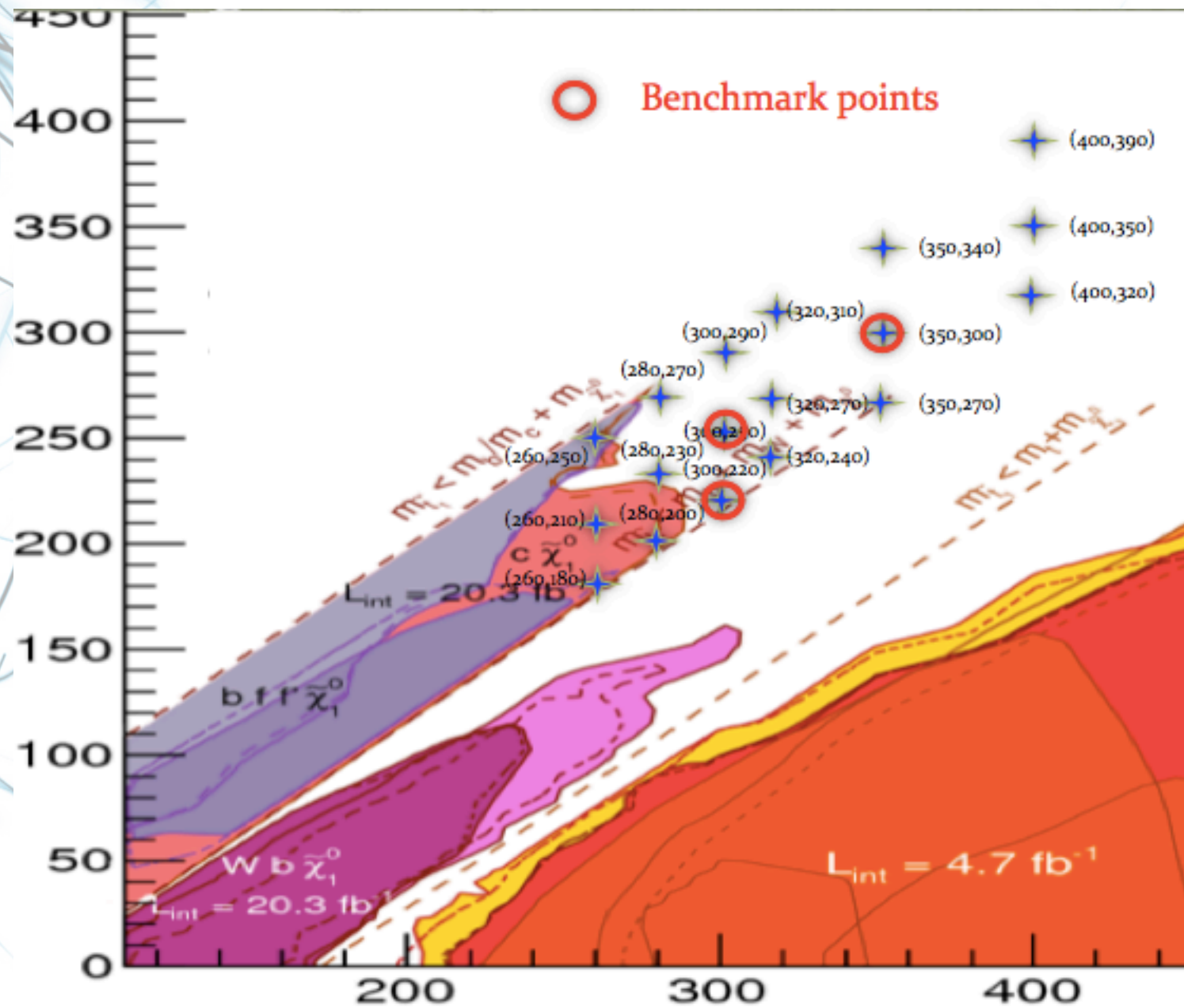
The slides presented in 3rd generation meeting are in

https://indico.cern.ch/event/446796/contribution/1/attachments/1198083/1742122/SUSY_20151202_

We attach here a couple of slides describing the grid, the filter efficiency (met>100 GeV && 2 leptons with $p_t > 3$ GeV), the cross sections and the required statistics. We also attach the log file from the pilot generation we did with the point (300,220).

Thanks,

Margherita



Stop mass (GeV)	Neutralino mass (GeV)	Cross section (pb) @13 TeV	Un-weighted Filter efficiency (MET100 && 2Lep3)	# of events	Int. Lumi (fb ⁻¹)
260	180	17.7	0.078	140000	100
260	210	17.7	0.078	140000	100
260	250	17.7	0.078	140000	100
280	200	12.2	0.078	100000	100
280	230	12.2	0.078	100000	100
280	270	12.2	0.078	100000	100
300	220	8.5	0.078	70000	100
300	250	8.5	0.078	70000	100
300	290	8.5	0.078	70000	100
320	240	6.1	0.078	50000	100
320	270	6.1	0.078	50000	100
320	310	6.1	0.078	50000	100
350	270	3.8	0.078	30000	100
350	300	3.8	0.078	30000	100
350	340	3.8	0.078	30000	100
400	320	1.8	0.078	15000	100
400	350	1.8	0.078	15000	100
400	390	1.8	0.078	15000	100

We were also asked (in JIRA discussion), by Takashi, to modify the param_card by adding the BR also for the suppressed decays and changing the mass parameters to the recommended values

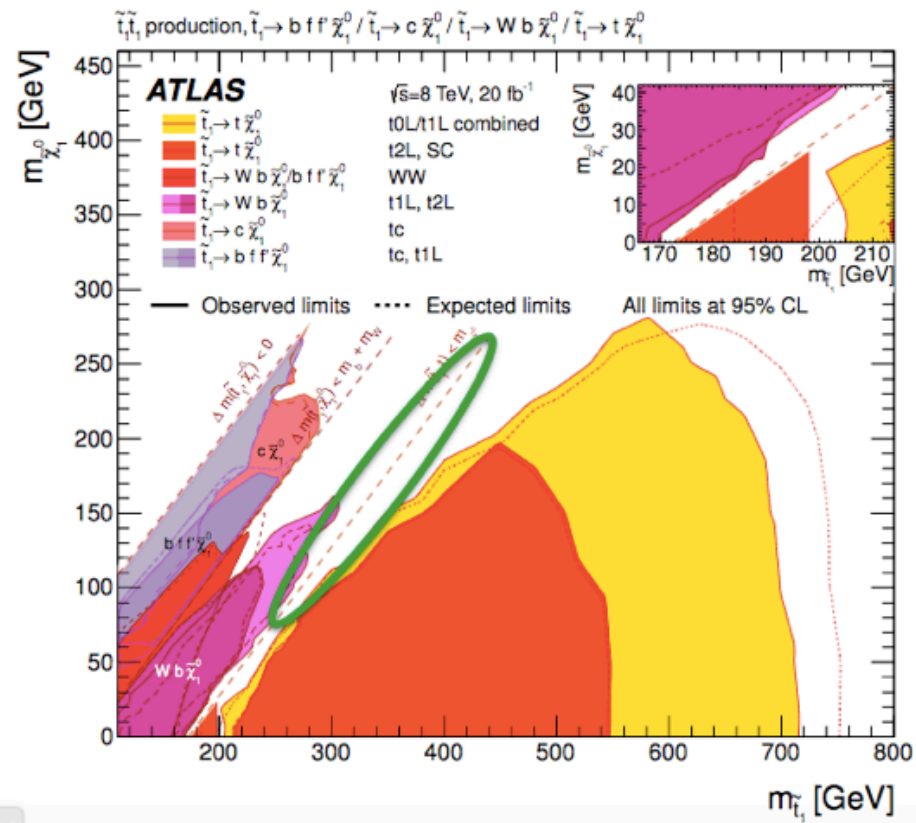
(<https://twiki.cern.ch/twiki/bin/viewauth/AtlasProtected/McProductionCommonParametersMC15>)

#	PDG	Width	# stop1 decays		
DECAY	1000006	1.34259598E-01			
#	BR	NDA	ID1	ID2	
0.00000000E+00	2	1000022	6		# BR(~t_1 -> ~chi_10 t)
0.00000000E+00	2	1000023	6		# BR(~t_1 -> ~chi_20 t)
0.00000000E+00	2	1000025	6		# BR(~t_1 -> ~chi_30 t)
0.00000000E+00	2	1000035	6		# BR(~t_1 -> ~chi_40 t)
0.00000000E+00	2	1000024	5		# BR(~t_1 -> ~chi_1+ b)
0.00000000E+00	2	1000037	5		# BR(~t_1 -> ~chi_2+ b)
0.00000000E+00	2	1000021	6		# BR(~t_1 -> ~g t)
0.00000000E+00	2	1000005	37		# BR(~t_1 -> ~b_1 H+)
0.00000000E+00	2	2000005	37		# BR(~t_1 -> ~b_2 H+)
0.00000000E+00	2	1000005	24		# BR(~t_1 -> ~b_1 W+)
0.00000000E+00	2	2000005	24		# BR(~t_1 -> ~b_2 W+)
3.208525E-01	4	1000022	5	2	-1 # BR(~t_1 -> chi_10 b u dbar)
1.74404E-02	4	1000022	5	4	-1 # BR(~t_1 -> chi_10 b c dbar)
1.74639E-02	4	1000022	5	2	-3 # BR(~t_1 -> chi_10 b u sbar)
3.201099E-01	4	1000022	5	4	-3 # BR(~t_1 -> chi_10 b c sbar)
5.3E-06	4	1000022	5	2	-5 # BR(~t_1 -> chi_10 b u bbar)
5.993E-04	4	1000022	5	4	-5 # BR(~t_1 -> chi_10 b c bbar)
1.082E-01	4	1000022	5	-11	12 # BR(~t_1 -> chi_10 b e+ nu)
1.082E-01	4	1000022	5	-13	14 # BR(~t_1 -> chi_10 b mu+ nu)
1.082E-01	4	1000022	5	-15	16 # BR(~t_1 -> chi_10 b tau+ nu)

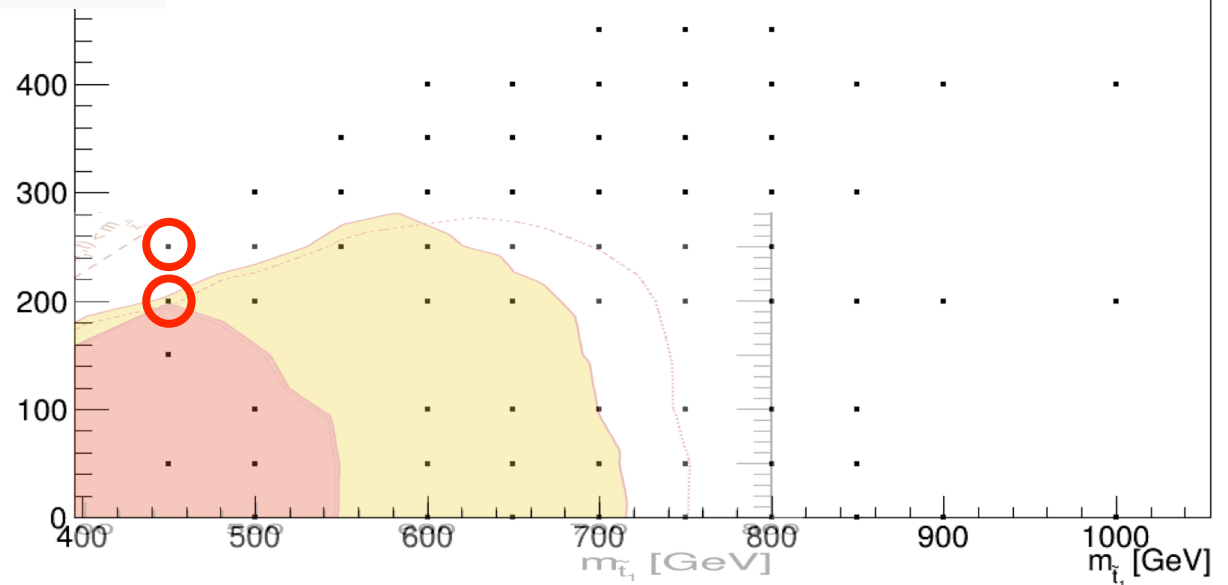


Updates on Stop- $\rightarrow$ top+Neutralino analysis

Region of interest



Stop -> top neut



Last meeting status

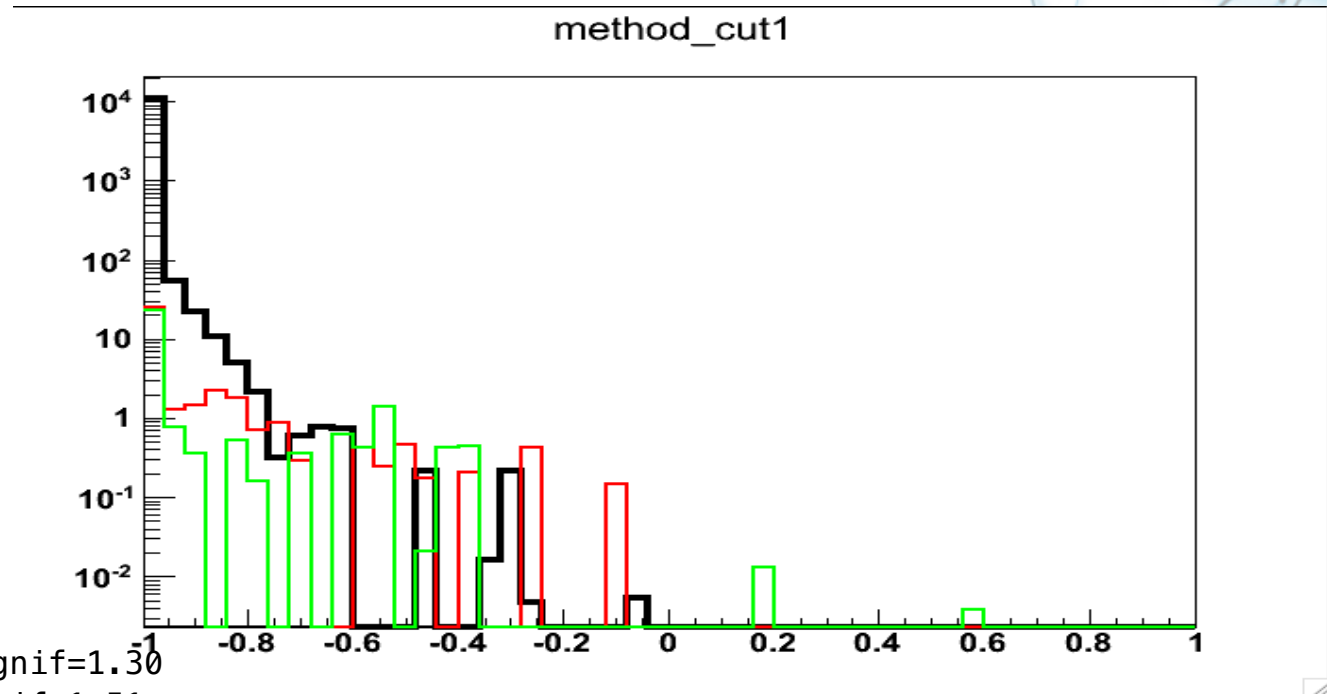
- T450L200+T450L250 vs ttbar
- INPUT VARIABLES: mT2, pblmod, ptJet1, ptJet2, Emiss/meff, Emiss/ptleps, [Emiss/ptJet1, Emiss/ptJets](#)
- Presel Cuts: mll > 20GeV, ptL1 > 25GeV, **ptJet1 > 150GeV**, ptJet2 > 20GeV, Emiss > 50GeV, meff > 300GeV
- 1000trees, qw=10

BDTG>-0.6

NEvents(ttbar)=0.46

NEvents(S_450_L200)=2.09 → signif=1.30

NEvents(S_450_250)=2.71 → signif=1.51



Now still trying to optimize the training

Updates

Request for a 3° jet

(i.e. 2 jets coming from stop pair decay + an ISR jet)

→ **New variable defined:**

$$\text{meff}_{23} = \text{EtMiss} + \text{ptLep1} + \text{ptLep2} + \text{ptJet2} + \text{ptJet3}$$

NEW TRAINING CONFIGURATION:

- T450L200+T450L250 vs ttbar
- INPUT VARIABLES: mT2, pblmod, ptJet1, ptJet2, Etmiss/meff, Etmiss/ptleps, Etmiss/ptJet1, Etmiss/ptJets
- Presel Cuts: mll > 20GeV, ptL1 > 25GeV, **ptJet1 > 150GeV**, ptJet2 > 20GeV, **ptJet3 > 20GeV**, Etmiss > 50GeV, meff_23 > 300GeV
- 1000trees, qw=10

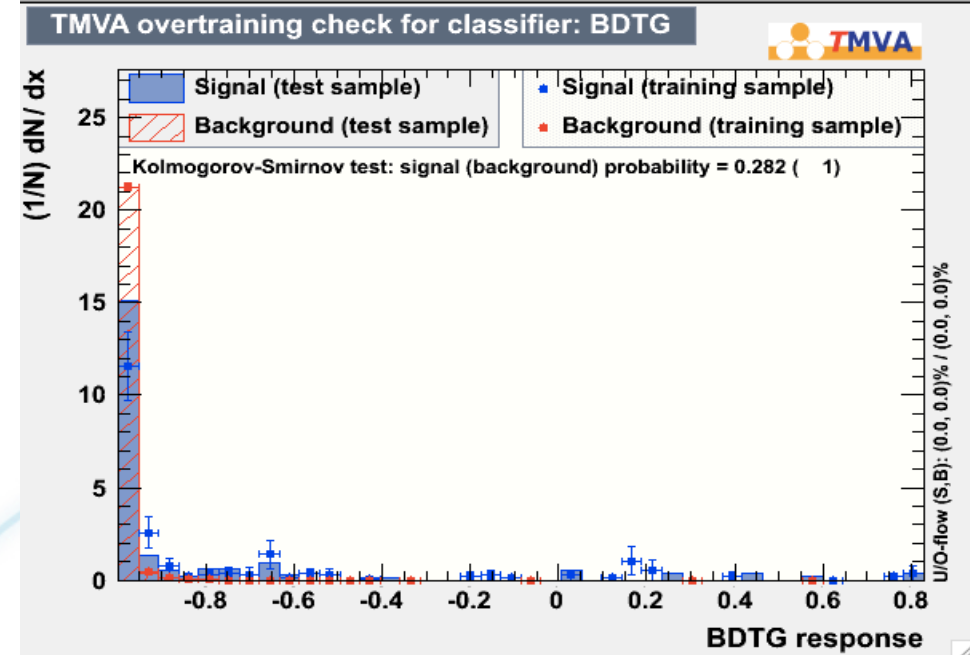
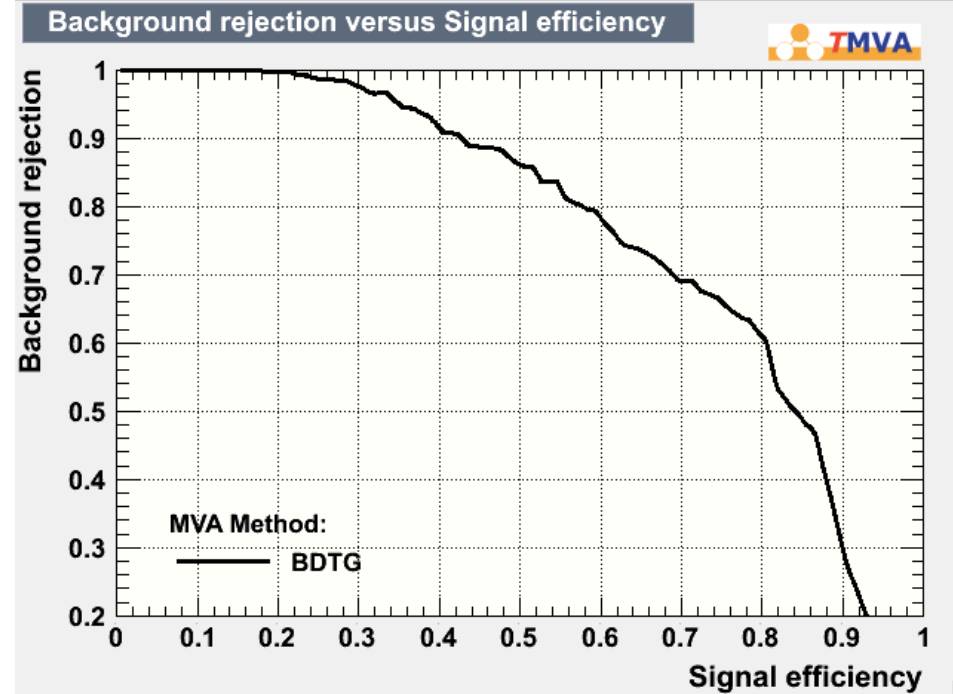
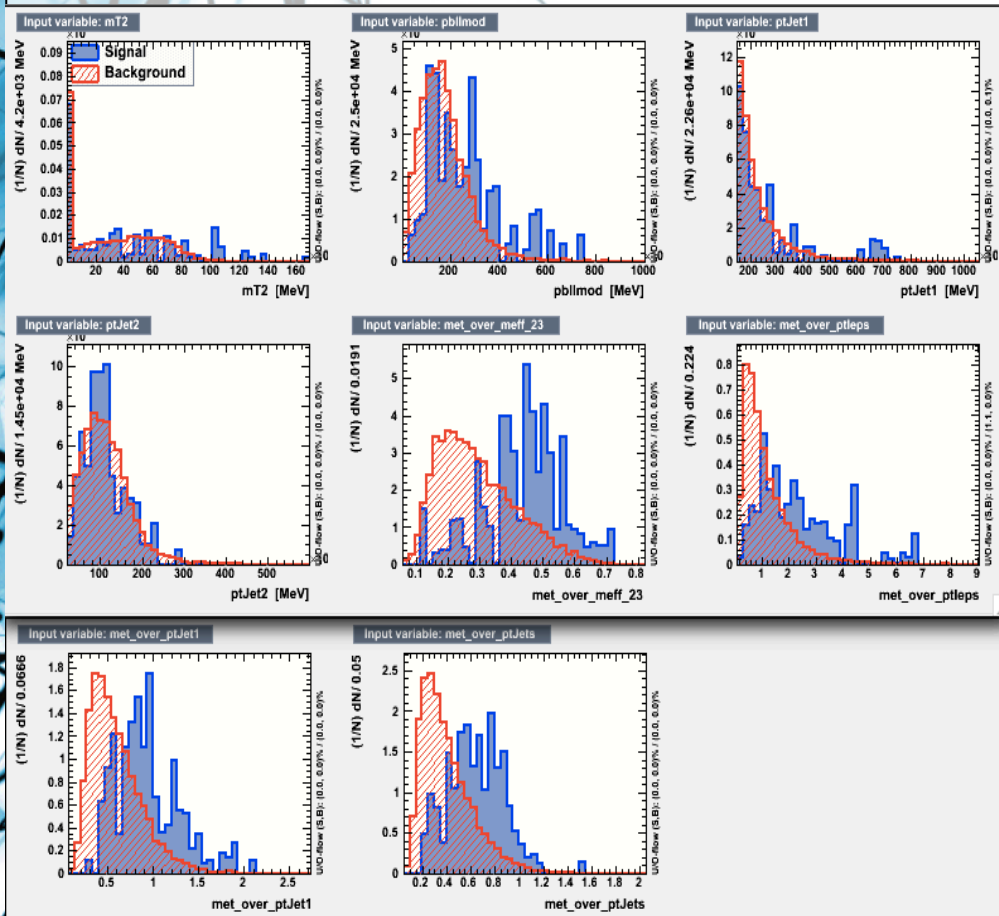
STATISTICS:

	Number of Events	After Presel Cuts	Efficiency
SIGNAL	2837 (446,27 weighted events)	340 (50.7 weighted events)	0.13
BACKGROUND	1077349 (219127 weighted events)	46045 (80785.2 weighted events)	0.04

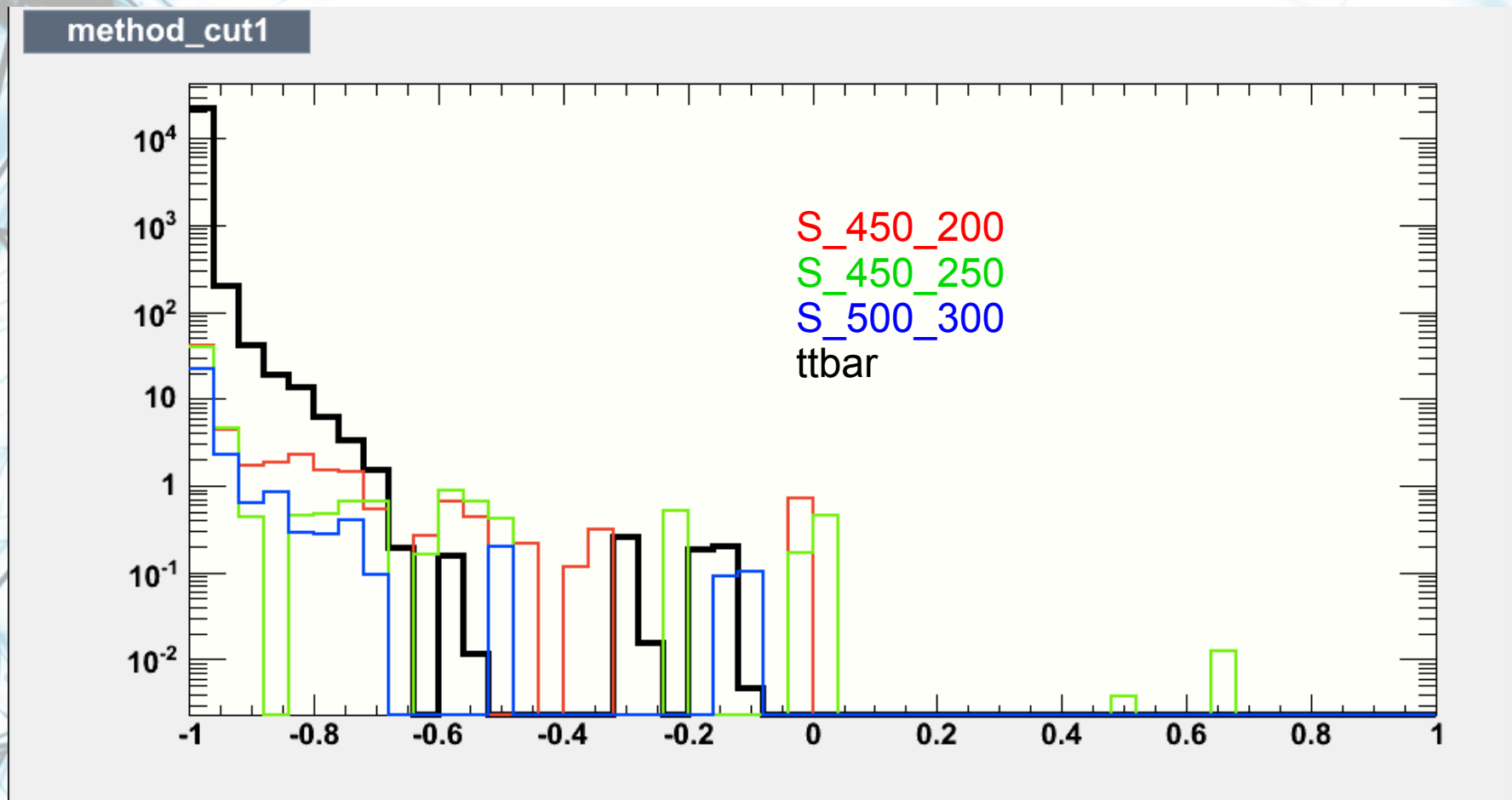
VARIABLES RANKING:

```
--- BDTG      : 1 : MT2                : 2.123e-01
--- BDTG      : 2 : met_over_ptleps      : 1.846e-01
--- BDTG      : 3 : pblmod              : 1.789e-01
--- BDTG      : 4 : met_over_meff_23     : 1.283e-01
--- BDTG      : 5 : (EtMissTST/ptJet1)    : 1.191e-01
--- BDTG      : 6 : ptJet1              : 9.584e-02
--- BDTG      : 7 : EtMissTST/(ptJet1+ptJet2) : 6.421e-02
--- BDTG      : 8 : ptJet2              : 1.676e-02
--- BDTG      : -----
```

Updates



Updates



BDTG>-0.65

ttbar = 0.82

S450200 = 2.74514628201723099e+00 → **SIGNIF=1.42**

S450250=3.29608384915627539e+00 → **SIGNIF=1.59**

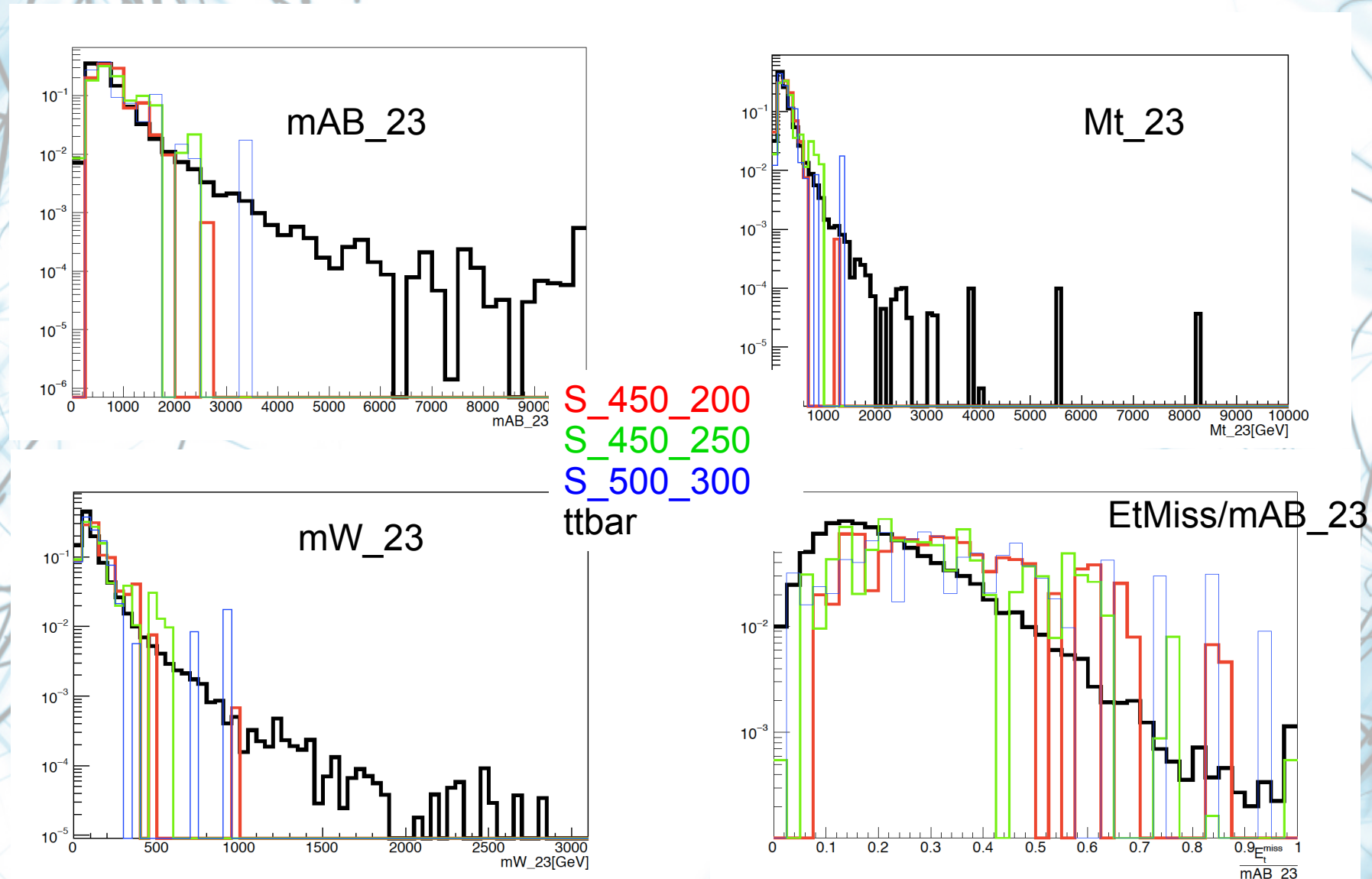
S500300=0.39

**a little improvement
is observed!**

What next?

A set of new variables is under investigation:

Package: Optimass-v1.0.3 (From a Giacomo suggestion)



Now we are working in order to understand how to exploit them