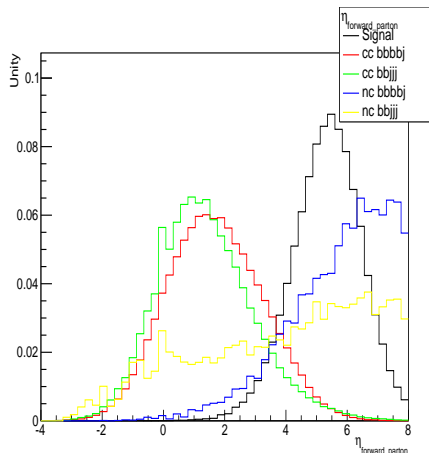
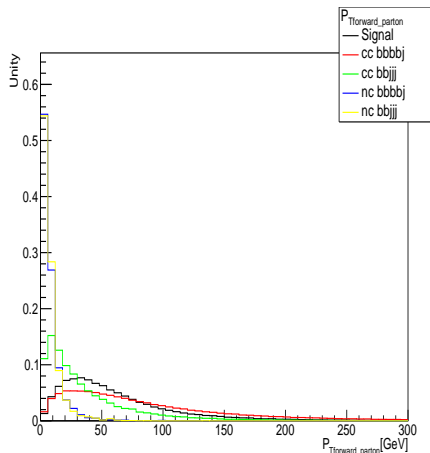
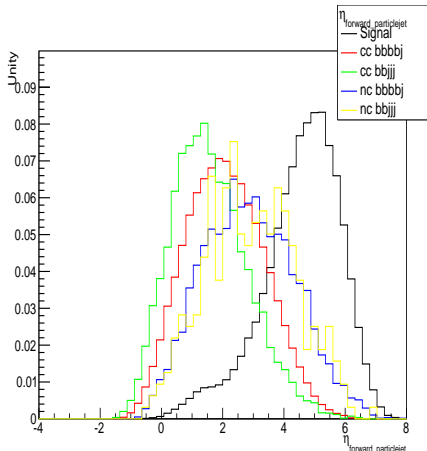
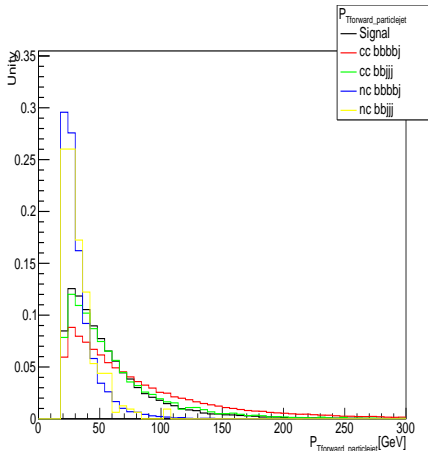


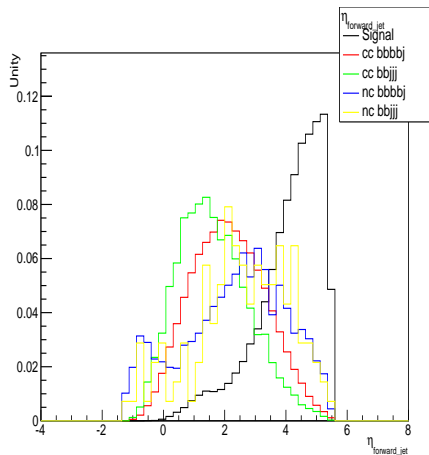
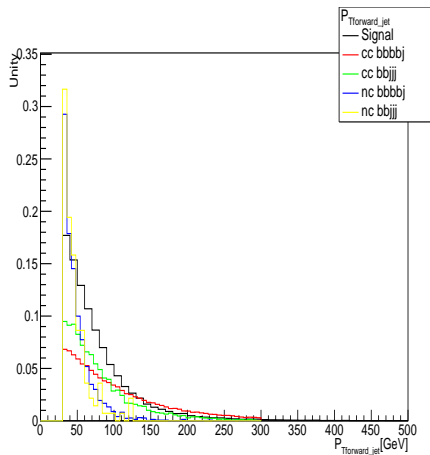
# Forward Jet: Parton-Level



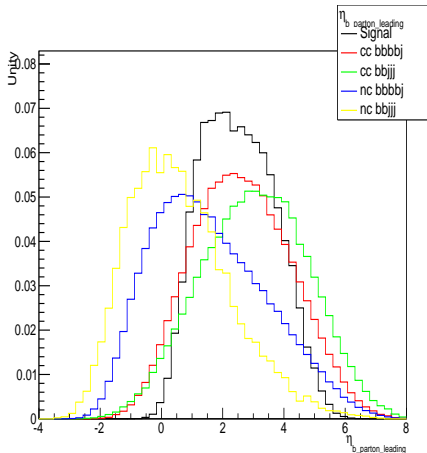
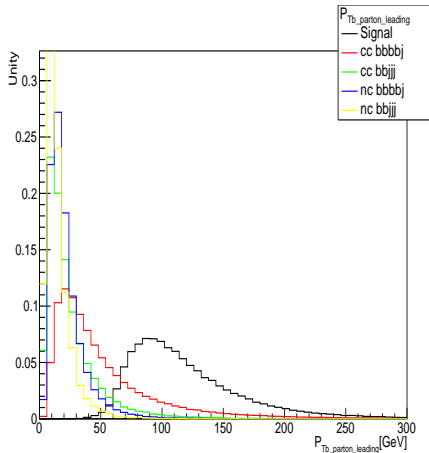
# Forward Jet: After Hadronization



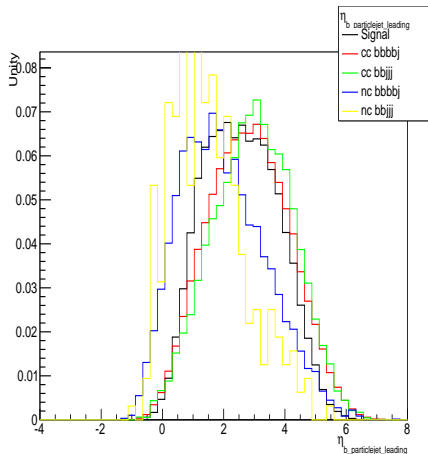
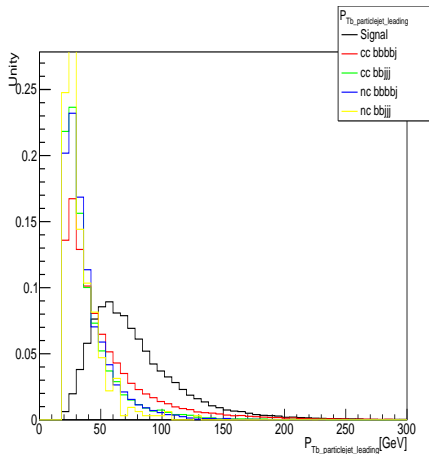
# Forward Jet: After DELPHES



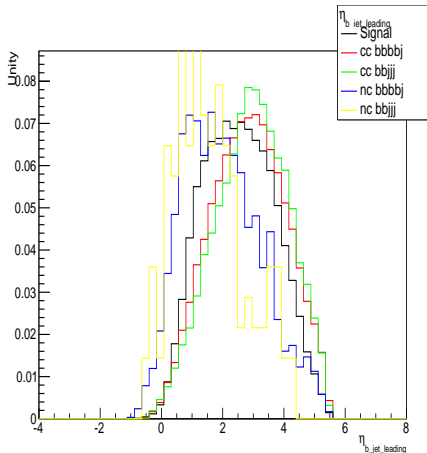
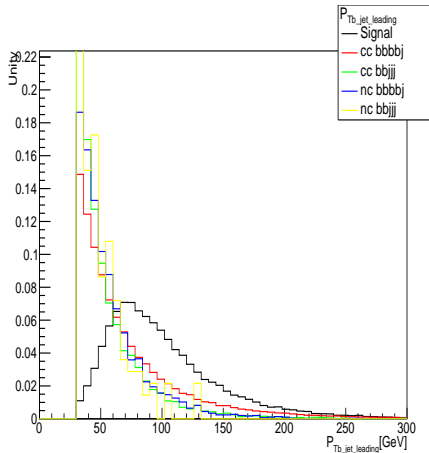
# Leading $b$ Jet: Parton-Level



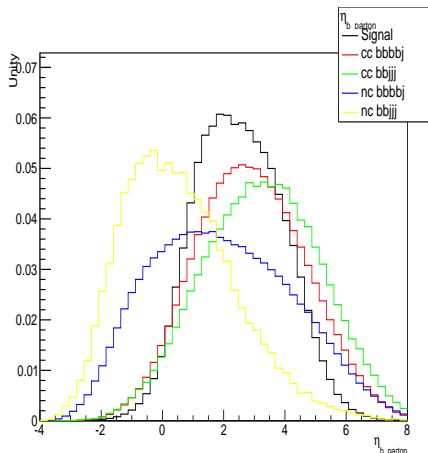
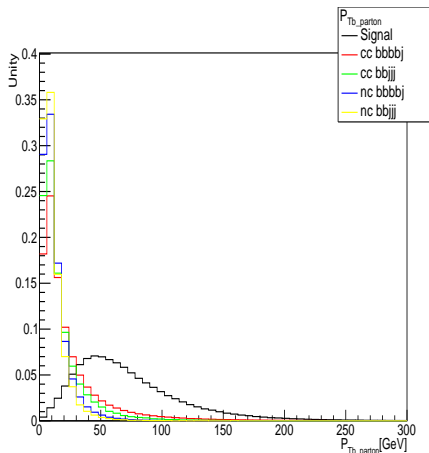
# Leading $b$ Jet: After Hadronization



# Leading $b$ Jet: After DELPHES

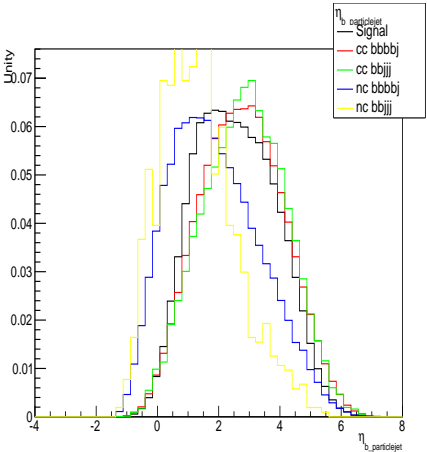
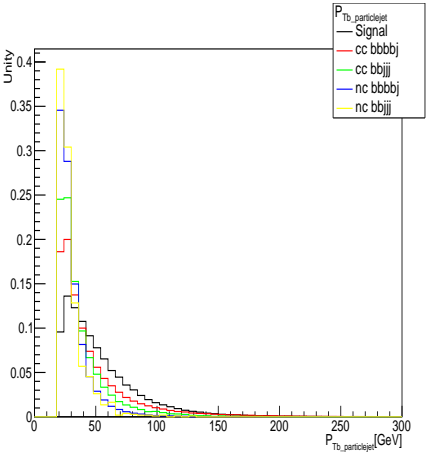


# $b$ Jet: Parton-Level

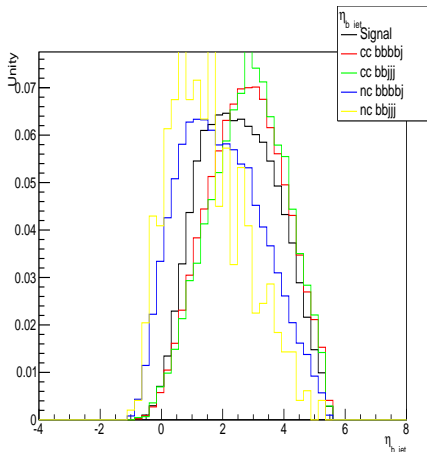
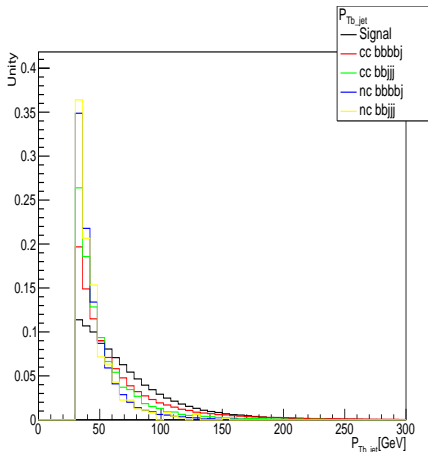




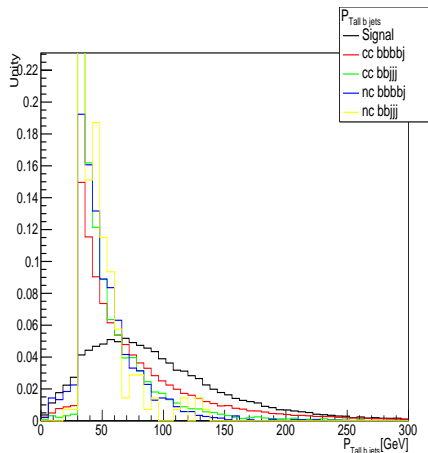
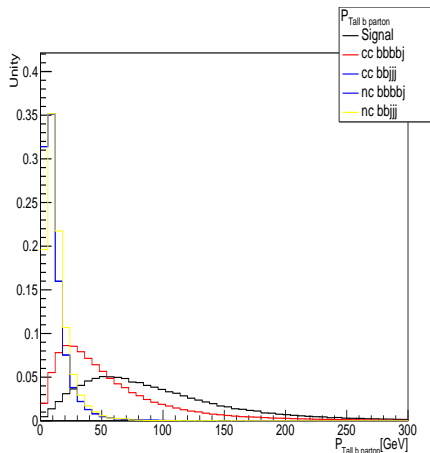
# b Jet: After Hadronization

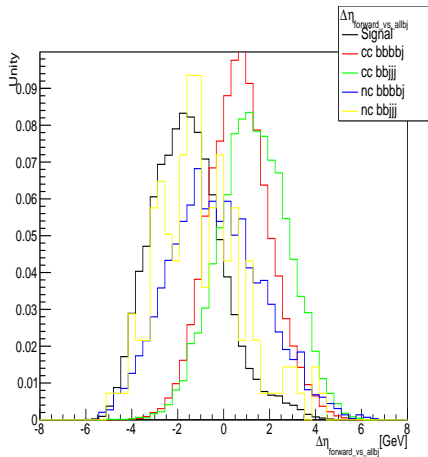
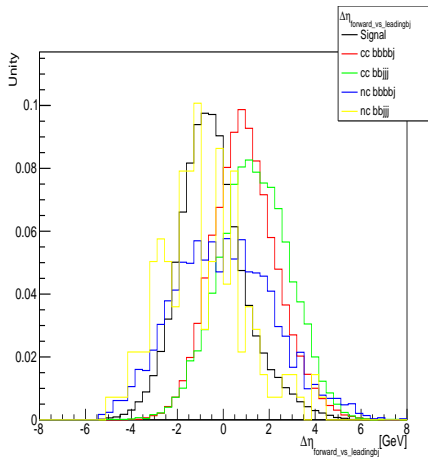


# *b* Jet: After DELPHES

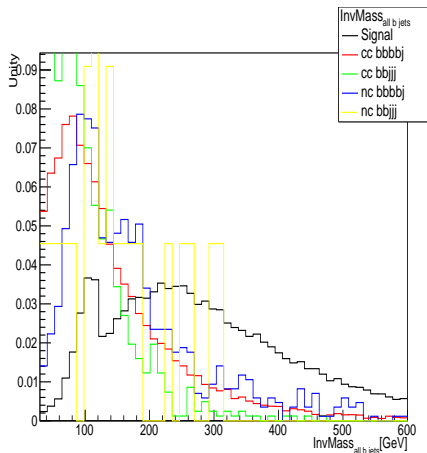
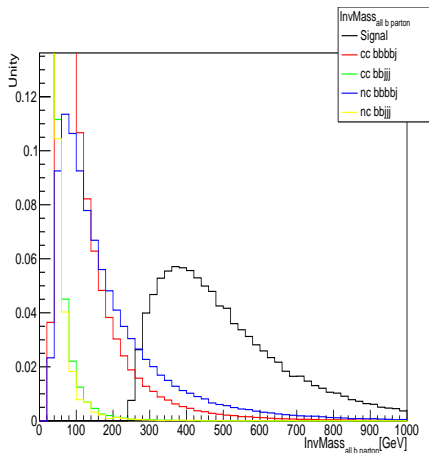


# All $b$ Jet:

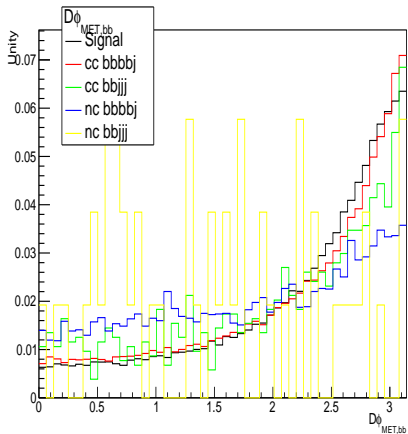
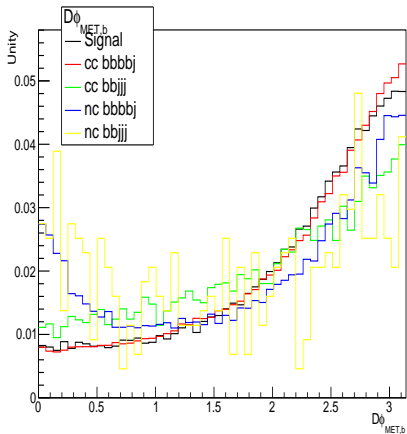


$\Delta\eta$ :

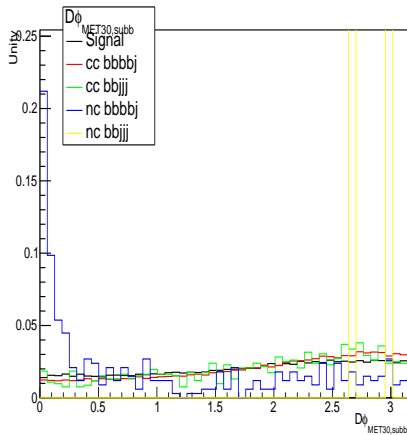
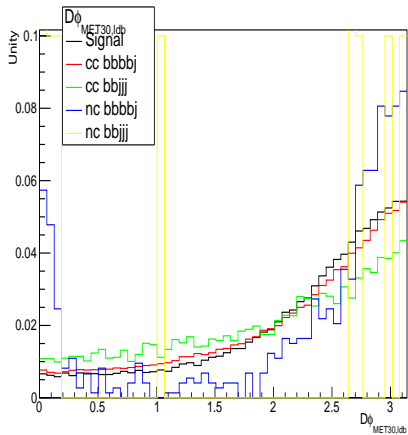
# Invariant Mass:



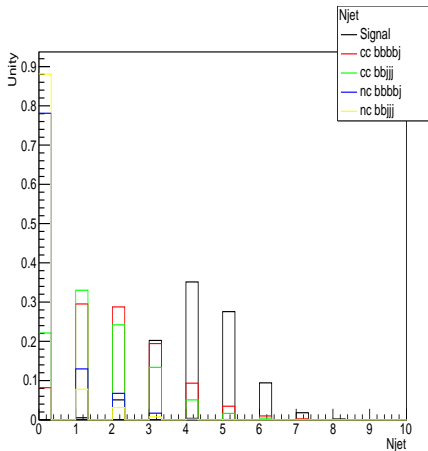
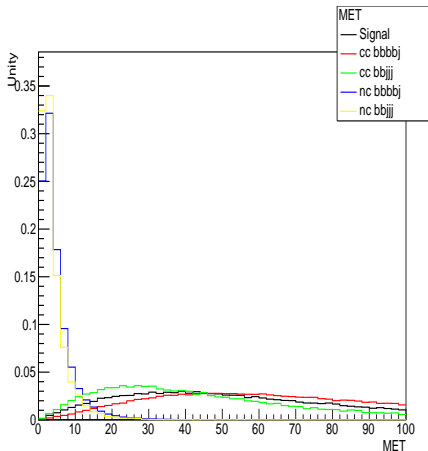
$$\Delta\phi_{MET-b}$$



$$\Delta\phi_{MET>30-b}$$



# MET, Njets:





## Cross section and Cut flows

Based on above plots we make following choice for cut flows:

	Process	$\sigma$ (No cut)	$\sigma(p_{min}^T = 10\text{ GeV})$
Sig:	$p e^- \rightarrow \nu_e h h j, h \rightarrow b\bar{b}$	0.15 fb	0.13 fb
CCBkg:	$p e^- \rightarrow \nu_e b\bar{b}b\bar{b}j$	1.24 fb	0.24 fb
NCBkg:	$p e^- \rightarrow e^- b\bar{b}b\bar{b}j$	26.5 pb	0.23 pb

Table : Cross sections in fb.  $E_e = 60$  GeV,  $E_p = 50$  TeV,  $j = gu\bar{u}d\bar{d}s\bar{s}c\bar{c}$ .

Cut flows (after FastJet  $\Delta R_{min} = 0.4$ ).

- Cut 1. at least 4 b jets  $p_j^T > 5$  GeV
- Cut 2. at least 2 b jets  $p_j^T > 5$  GeV
- Cut 3. at least 2 b jets  $p_j^T > 5$  GeV with  $MET > 10$  GeV
- Cut 4. at least 2 b jets  $p_j^T > 5$  GeV with  $MET > 10$  GeV,  $\Delta\phi_{MET-b_1b_2} > 0.5$
- Cut 5. at least 4 b jets  $p_j^T > 5$  GeV with  $MET > 10$  GeV,  $\eta_{fwd-jet} > 3$ ,  $\Delta\phi_{MET-b_1b_2} > 0.5$ ,  $M_{4b-parton} > 300$  and  $p_{\nu}^T > 10$  GeV (status of  $e^-$ )
- Cut 6. at least 4 b jets  $p_j^T > 5$  GeV with  $MET > 10$  GeV,  $\eta_{fwd-jet} > 3$ ,  $\Delta\phi_{MET-b_1b_2} > 0.5$ ,  $M_{4b-parton} > 300$
- Cut 7. same as 5 b-parton  $\rightarrow$  b-jets
- Cut 8. same as 6 b-parton  $\rightarrow$  b-jets
- Significance:  $s = \frac{S}{\sqrt{S + \sum_{i=1}^6 B_i}}$  is calculated with  $\mathcal{L} = 10 ab^{-1}$

Cut	NSig	CCNBkg	NCBkg	$s$	$s'$
0	80000	240000	276120	0.092	0.86
1	10353	1192	24	1.272	8.63
2	29991	8804	212	1.244	10.07
3	26515	8682	54	2.164	13.85
4	23080	7167	42	2.134	13.29
5	5236	226	1	3.002	8.70
6	6348	262	2	2.628	9.32
7	4728	199	1	2.725	8.23
8	5751	231	1	3.282	9.16

Table : Significance calculated  $s(s')$  w/o cut (with cut) cross section

- Jobs are given to get large number of background events