

TTH report

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I had a problem that tt & ttZ B.G. were generated with wrong detector model parameters. In this report, I will show some analysis results for re-generated event data .

Comparison with old and new result

previous result

Beam Polarization Processes	(0.0,0.0)				(-0.8,+0.3)			
	$t\bar{t}H$	$t\bar{t}Z$	$t\bar{t}$	$t\bar{t}g (b\bar{b})$	$t\bar{t}H$	$t\bar{t}Z$	$t\bar{t}$	$t\bar{t}g (b\bar{b})$
No Cut	449.0	1340.0	514040.5	697.5	759.0	2407	863500.4	1159.6
$N_{iso.lep}=1$	159.4	435.9	209718.4	242.2	269.4	783.0	303879.0	397.7
$Y_{cut} (6 \text{ jets}) > 0.002$	139.2	307.8	22851.3	152.5	235.4	552.9	38477.2	249.6
btag & mass cut	23.0	12.2	11.9	6.9	38.9	21.8	19.7	11.3

significance 4.1σ

significance 5.4σ

this result

449.0	1339.9	514075	697.5	759.3	2406.9	863503	1159.6
159.8	440.7	180037	242.2	271.2	790.5	302399	397.7
156.2	397.9	23207.5	223.4	265.1	713.7	39000	366.7
25.5	17.0	21.4	9.3	43.2	30.1	35.8	15.5

significance 3.7σ

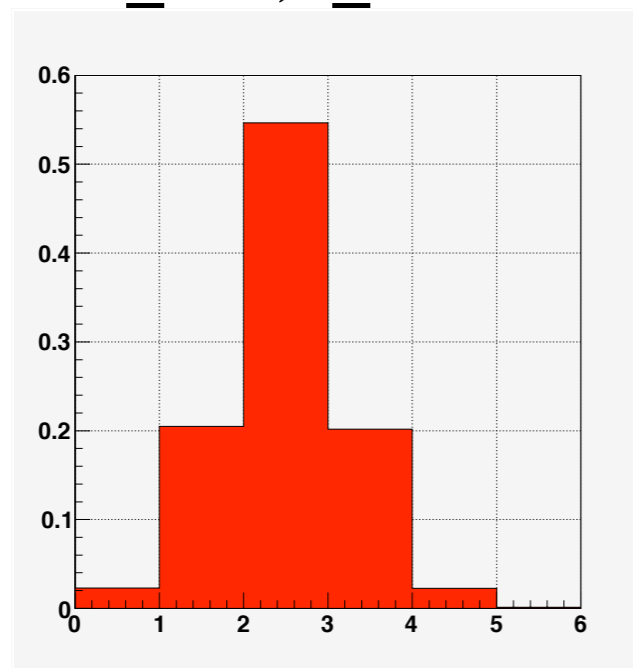
significance 4.8σ

The change seems to be too much. Is this reasonable ?

I checked single b-tagging efficiency.

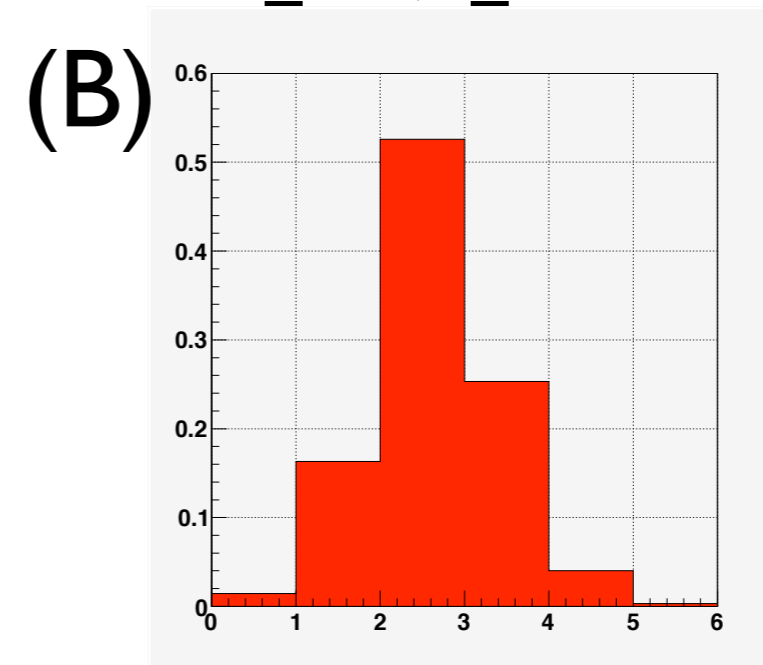
of b-jet distribution (tt event (2b-jet))

(A) before (wrong detector parameters)
 $n_\sigma=2, n_{\text{offvtx}}=2$



of b-tagged jets out of 6 jets
(previously executed force-6-jet algorithm)

(B) after (correct detector parameters)
 $n_\sigma=2, n_{\text{offvtx}}=2$



of b-tagged jets out of 6 jets
(previously executed force-6-jet algorithm)

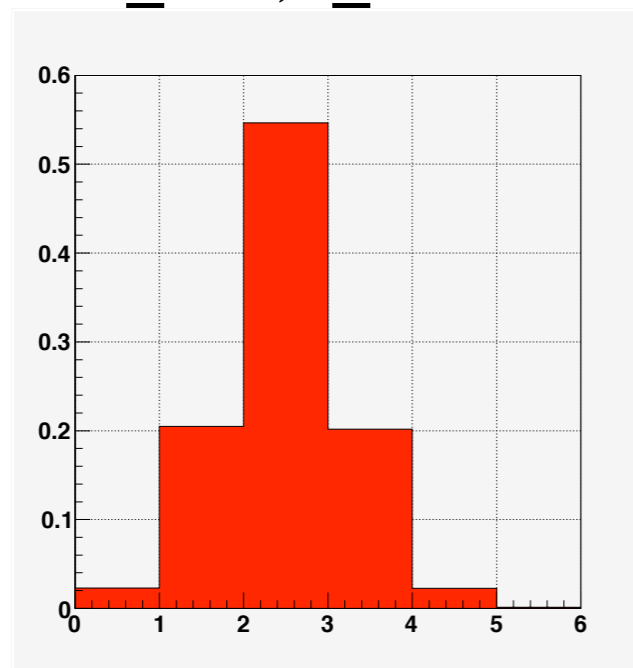
From these results, I feel that b-tagging efficiency got better, but purity got worse. (A & B)

If this comes from getting better resolution, b-tagging parameters should be changed. (# of off vertex tracks & n_σ).

of b-jet distribution (tt event (2b-jet))

before (wrong detector parameters)
 $n_\sigma=2, n_{\text{offvtx}}=2$

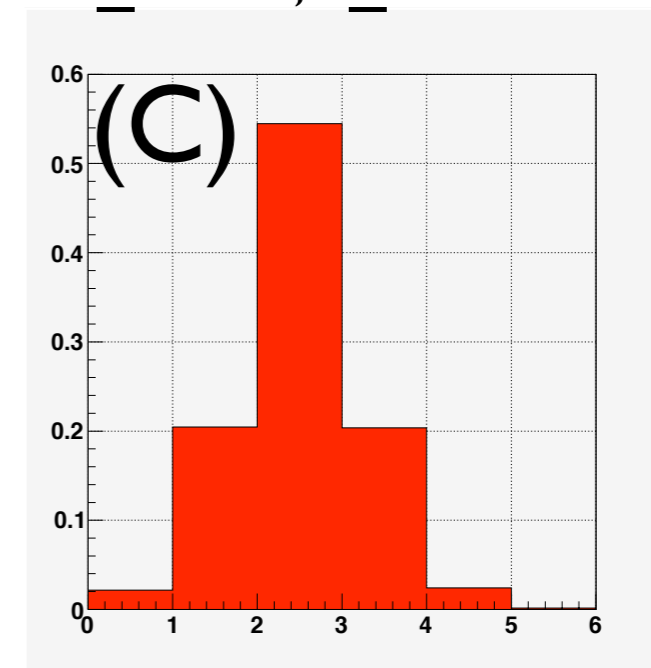
(A)



of b-tagged jets out of 6 jets
(previously executed force-6-jet algorithm)

after (correct detector parameters)
 $n_\sigma=2.5, n_{\text{offvtx}}=2$

(C)



of b-tagged jets out of 6 jets
(previously executed force-6-jet algorithm)

As a result of changing n_σ value ($2 \rightarrow 2.5$), the distribution become similar. (A & C)

reasonable ?

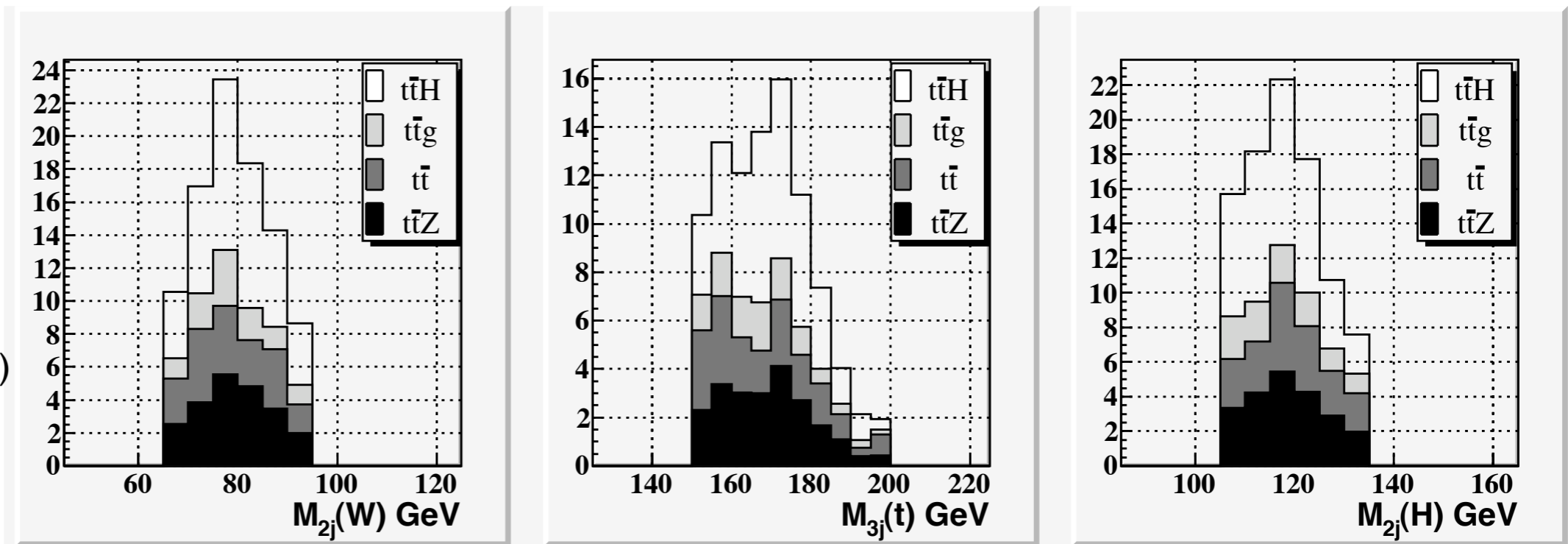
Mass spectrum

before

(wrong detector parameters)

b-tagging parameters

$n_\sigma=2$, $n_{\text{offvtx}}=2$

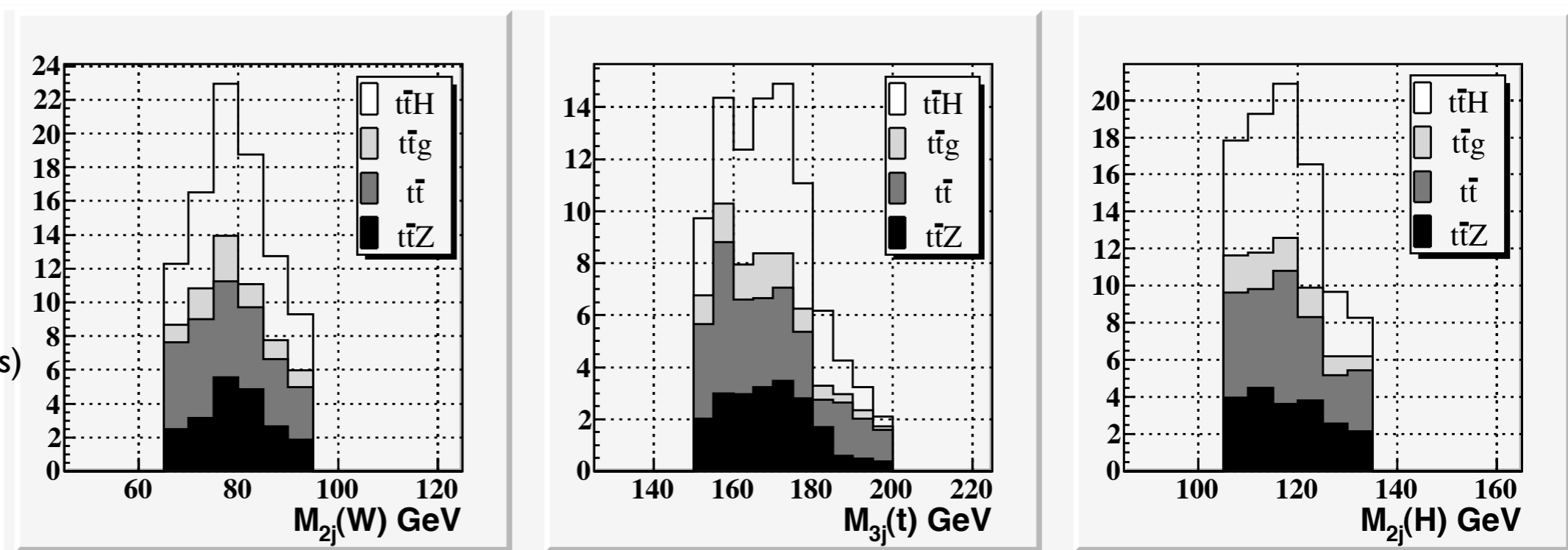


after

(correct detector parameters)

b-tagging parameters

$n_\sigma=2.5$, $n_{\text{offvtx}}=2$



Comparison with old and new result

previous result
(wrong detector parameters)
 $n_\sigma=2$, $n_{\text{offvtx}}=2$

Beam Polarization Processes	(0.0,0.0)				(-0.8,+0.3)			
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significance 4.1σ

significance 5.4σ

this result
(correct detector parameters)
 $n_\sigma=2.5$, $n_{\text{offvtx}}=2$

449.0	1339.9	514075	697.5	759.3	2406.9	863503	1159.6
159.8	440.6	180050	242.2	2,712	790.5	302430	397.7
139.6	310.9	23212.5	152.5	236.7	557.7	39011.6	249.6
20.0	15.2	12.9	5.6	34.2	26.7	20.9	9.2

significance 3.2σ

significance 4.5σ

Summary

Analysis for re-generated was done.

(Optimization for cut parameters is not yet done.)

Next step

optimize cut parameters ? (likelihood analysis)