

tth study @ $\sqrt{s} = 500$ GeV

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Physics meeting

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Rough estimation of significance and $|\Delta g_t/g_t|$

$$\sqrt{s} = 480-610 \text{ GeV}$$

1000fb⁻¹, tth → 8jets & ln6jets

\sqrt{s} : $S/\sqrt{S+B}$: $|\Delta g_t/g_t|$ %

490 : 3.00 : 16.6

500 : 4.67 : 10.6

510 : 6.25 : 7.99

520 : 7.68 : 6.50

530 : 8.98 : 5.56

540 : 10.1 : 4.93

550 : 11.1 : 4.50

cross section (fb)

\sqrt{s} : tth(total) : ttz : ttbb : tbw

490 : 0.272 : 1.569 : 1.009 : 991.1

500 : 0.485 : 1.974 : 1.058 : 979.8

510 : 0.725 : 2.373 : 1.105 : 967.0

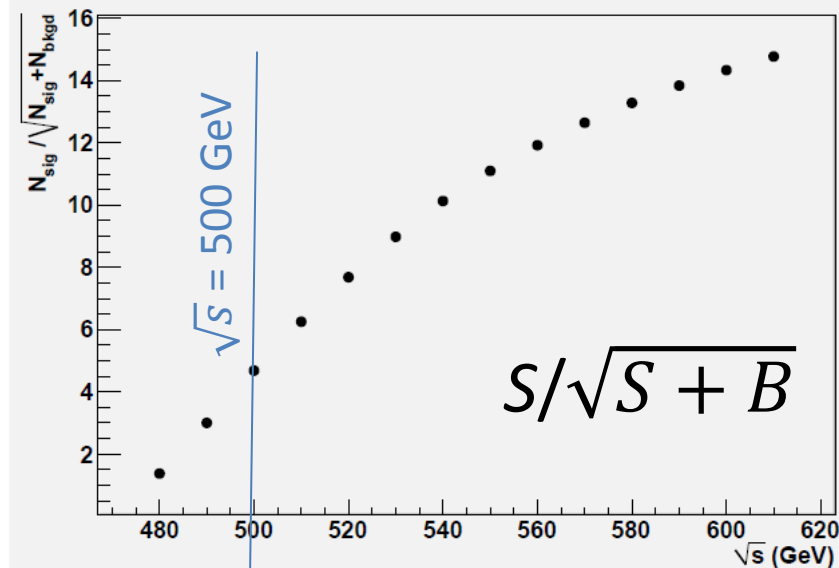
520 : 0.981 : 2.753 : 1.151 : 953.5

530 : 1.244 : 3.118 : 1.199 : 939.4

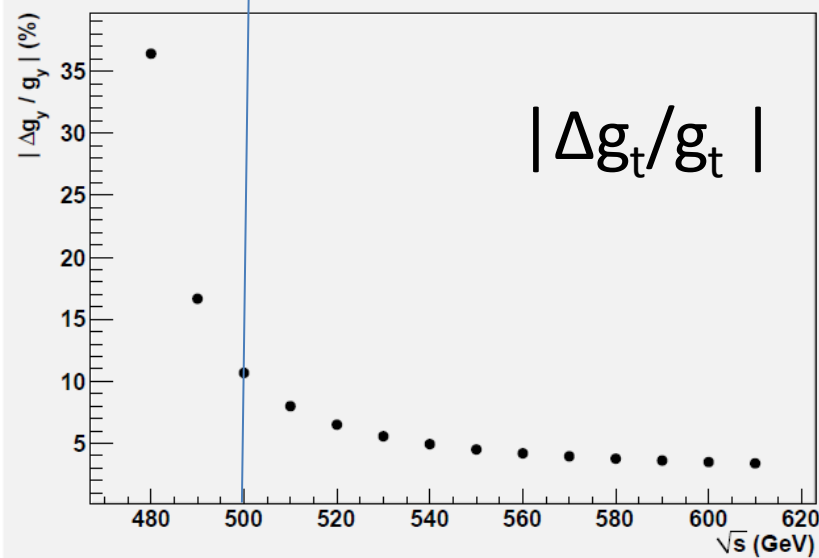
540 : 1.504 : 3.469 : 1.243 : 924.5

550 : 1.743 : 3.806 : 1.285 : 909.5

Graph



Graph



(low Pt background is not overlaid.)

Backup

Result of event selection ($t\bar{t}h \rightarrow 8\text{jets}$)

select a range of higgs candidate M_{jj} to maximize $S/\sqrt{S+B}$

✓ 100 GeV \leq higgs candidate $M_{jj} \leq$ 160 GeV

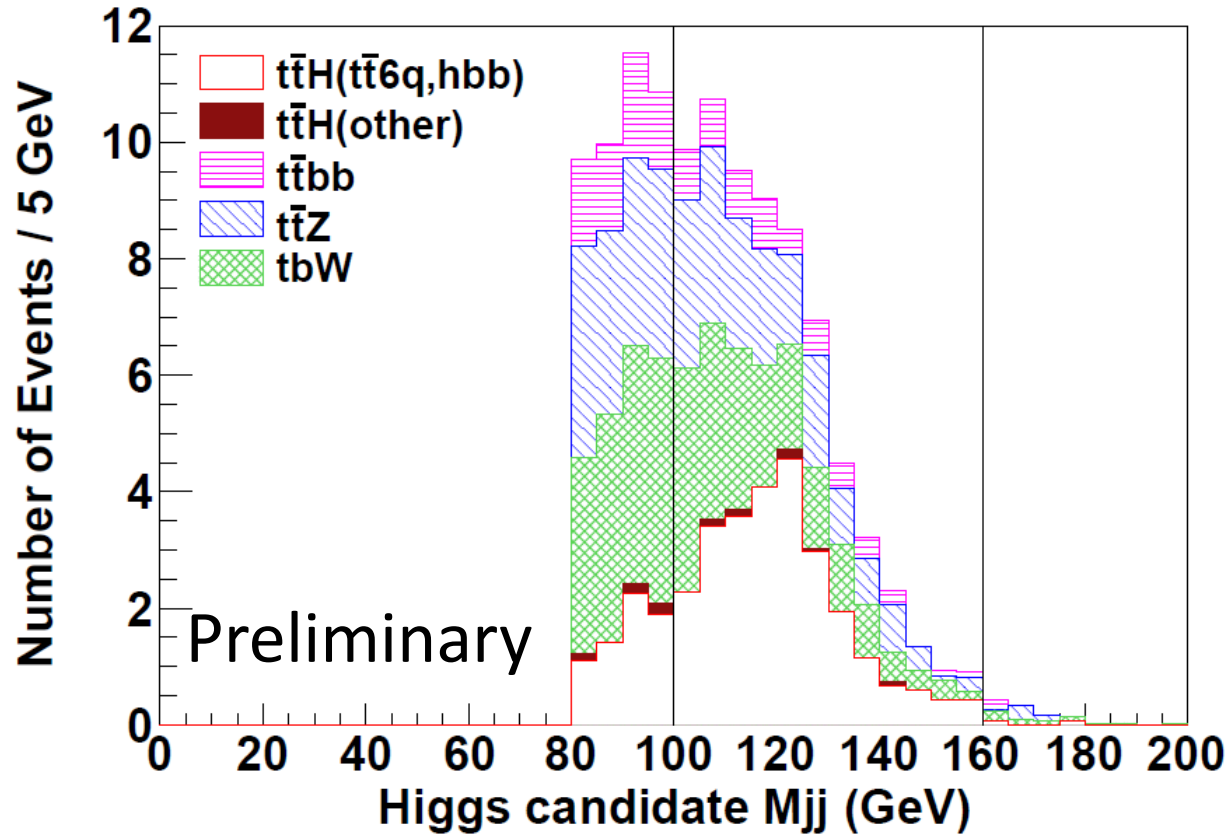
Preliminary

Selection	$t\bar{t}h(tt6j\ hbb)$	$t\bar{t}h(ttall\ hnob)$	$t\bar{t}h(t\bar{t}ln4j\ hbb)$	$t\bar{t}h(tt2l2n2j\ hbb)$	$t\bar{t}Z$	$t\bar{t}g^*(bb)$	$t\bar{t}bW$
No Cut	127.9	205.2	122.6	29.4	1974.6	1058.6	979807.7
$Y_{8\rightarrow 7}$ (8 jets)	118.7	96.4	17.6	0.412	1030.4	613.3	582660.8
No Isolated Lepton	97.3	80.8	6.8	0.060	602.2	264.7	83102.9
b jet candidate ≥ 4	57.0	2.1	3.5	0.003	71.3	111.3	1657.2
$ \text{Jet } \cos\theta \leq 0.99$	54.1	2.0	3.1	0	67.3	104.8	698.2
$\chi^2 \leq 9.5$	38.1	0.9	0.9	0	42.3	38.3	178.8
h Candidate $M_{jj} \geq 80$ (GeV)	34.9	0.7	0.4	0	34.2	20.2	89.0
Leading 2 JetEnergySum < 207.5 GeV	34.0	0.7	0.4	0	32.6	14.6	52.6
Lowest 3 JetEnergySum > 86.65 GeV	33.8	0.7	0.4	0	31.6	13.0	52.6
$M_{top} \geq 140$ (GeV)	32.8	0.7	0.3	0	30.5	11.8	34.7
$100 \leq h$ Candidate $M_{jj} \leq 160$ (GeV)	26.0	0.5	0.06	0	16.9	5.6	18.7

- no overlay of low Pt background

- $t\bar{t}h \rightarrow 8\text{jet}$: $N_{sig} = 26.0$
- $N_{bkgd} = 41.74$

Significance ($t\bar{t}H \rightarrow 8\text{jets}$)



- $\sqrt{s} = 500 \text{ GeV}, 1000 \text{ fb}^{-1}$
- Cut base + counting analysis
- $N_{\text{sig}}/\sqrt{N_{\text{sig}} + N_{\text{bkgd}}} = \underline{3.16}, |\Delta g_t/g_t| \sim 15.8\%$
- no overlay of low Pt background

Result of event selection ($t\bar{t}h \rightarrow l n + 6\text{jets}$)

At last, We select a range of higgs candidate M_{jj} to maximize $S/\sqrt{S+B}$

✓ $90 \text{ GeV} \leq \text{higgs candidate } M_{jj} \leq 150 \text{ GeV}$

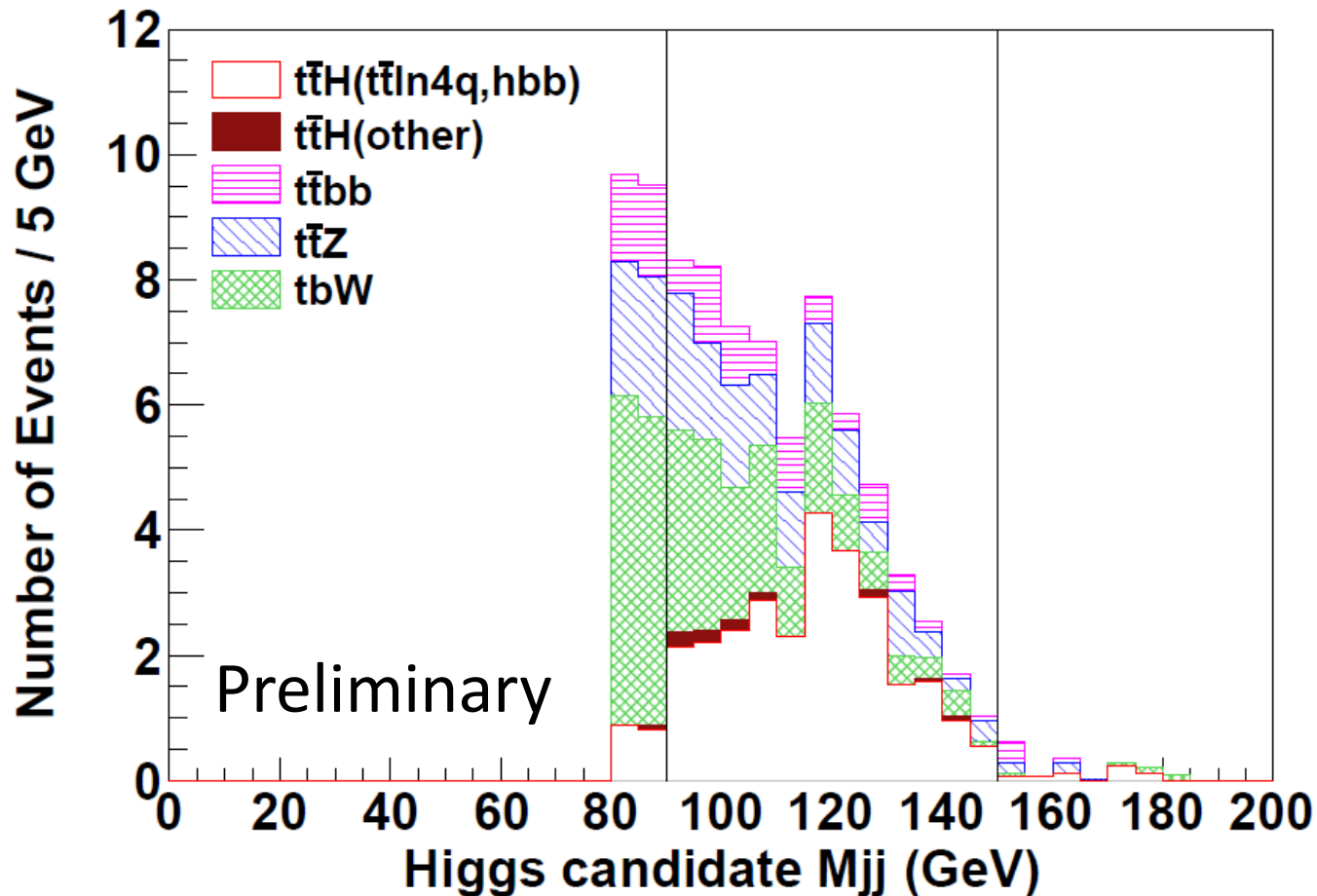
Preliminary

Selection	$t\bar{t}h(t\bar{t}l n 4j \text{ hbb})$	$t\bar{t}h(t\bar{t}all \text{ hno}bb)$	$t\bar{t}h(t\bar{t}6j \text{ hbb})$	$t\bar{t}h(t\bar{t}2l 2n 2j \text{ hbb})$	$t\bar{t}Z$	$t\bar{t}g^*(bb)$	$t\bar{t}bW$
No Cut	122.6	205.2	127.9	29.3	1974.6	1058.6	979807.7
Y_{cut} (6 jets)	99.6	76.9	8.9	6.3	695.4	378.5	342027.9
One Isolated Lepton	82.3	67.5	8.7	1.8	419.9	176.7	49812.8
b jet candidate ≥ 4	45.4	1.2	4.6	1.0	41.4	76.6	806.3
$ \text{Jet } \cos \theta \leq 0.99$	44.4	1.2	4.2	1.0	40.2	73.4	339.8
Missing P > 20	44.1	1.2	1.1	1.0	36.8	66.2	311.6
$\chi^2 \leq 19$	39.1	1.0	0.6	0.7	30.5	46.5	185.8
h Candidate $M_{jj} \geq 80$ (GeV)	34.0	0.6	0.4	0.3	21.2	19.7	72.1
Leading 2 JetEnergySum < 210 GeV	33.5	0.6	0.3	0.3	20.0	15.5	49.3
$M_{top} \geq 140$ (GeV)	29.6	0.6	0.06	0.17	17.1	9.2	26.8
$90 \leq h$ Candidate $M_{jj} \leq 150$ (GeV)	27.4	0.5	0.06	0.17	12.4	6.0	16.4

- no overlay of low Pt background

- $t\bar{t}h \rightarrow l n + 6\text{jet}$: $N_{sig} = 27.4$
- $N_{bkgd} = 35.64$

Significance ($t\bar{t}H \rightarrow l n + 6\text{jets}$)



- $\sqrt{s} = 500 \text{ GeV}, 1000 \text{ fb}^{-1}$
- no overlay of low Pt background
- Cut base + counting analysis
- $N_{\text{sig}}/\sqrt{N_{\text{sig}} + N_{\text{bkgd}}} = \underline{3.45}, |\Delta g_t/g_t| \sim 14.5\%$