

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

2/21

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Event selection

- Signal : $t\bar{t}h \rightarrow bWbWbb \rightarrow bqqbqqbb$
- Background : $t\bar{t}z, t\bar{t}bb, t\bar{t}b\bar{a}r$

selection

- $Y_{78} > 0.0009$ (forced 8 jet)
- No isolated lepton
- At least 4 b jet ($b_{tag} > 0.85, > 0.80, > 0.60, > 0.3$)
- $|\text{Eta}(\text{jet})| < 2.7$
- $\text{Chi}^2 < 10$

Jet pairing

- Higgs(top) candidate jets have $b_{tag} > 0.3$
- Select jet pair which has minimum chi^2 value

Chi2

With Higgs mass constraint

$$\chi^2 = \left(\frac{M_{iii}(1) - M_{top}}{\sigma_{M_{top}}} \right)^2 + \left(\frac{M_{ii}(1) - MW}{\sigma_{MW}} \right)^2 \\ + \left(\frac{M_{iii}(2) - M_{top}}{\sigma_{M_{top}}} \right)^2 + \left(\frac{M_{ii}(2) - MW}{\sigma_{MW}} \right)^2 \\ + \left(\frac{M_{ii} - M_h}{\sigma_{M_h}} \right)^2$$

- Reconstruct invariant mass using jets which matched with MC and reconstructed one.
- Matched jet : $\Delta R(\text{reconstructed jet}, \text{MC jet}) < 0.4$
- Fit reconstructed mass peak with Gaussian.

$M_{top} = 171.0$ (my fit)

$\sigma_{M_{top}} = 13.0$ (my fit)

$MW = 80.395$ (PDG)

$\sigma_{MW} = 9.8$ (my fit)

$M_h = 117.9$ (my fit)

$\sigma_h = 11.2$ (my fit)

Event selection

	tth (8jet)	Ttz (all)	ttbb (all)
No cut	2100	24527	12200
$Y_{78} > 0.0009$ forced 8 jet	1428	7106	2434
nolsoLep	1340	5923	2119
4 b jet	658	626	776
$ \text{Eta}(\text{jet}) < 2.7$	630	590	741
Chi2 < 10 (with mh constraint)	492 (420)	442 (343)	463 (136)

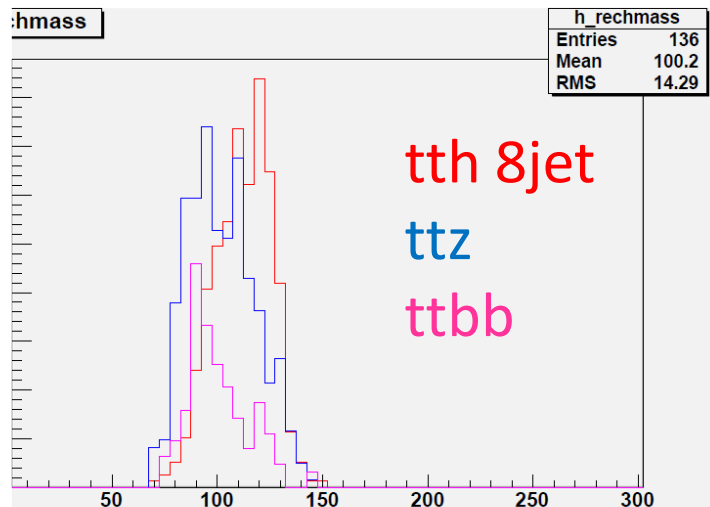
Not scaled with (cross section) x (branching ratio) x (luminosity)

Reconstructed h mass

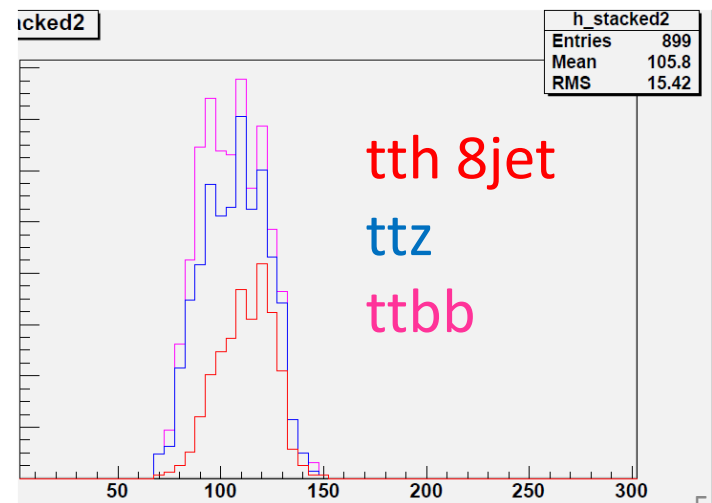
With Higgs mass constraint

$$\chi^2 = \left(\frac{M_{iii}(1) - M_{top}}{\sigma_{M_{top}}} \right)^2 + \left(\frac{M_{ii}(1) - M_W}{\sigma_{M_W}} \right)^2$$
$$+ \left(\frac{M_{iii}(2) - M_{top}}{\sigma_{M_{top}}} \right)^2 + \left(\frac{M_{ii}(2) - M_W}{\sigma_{M_W}} \right)^2$$
$$+ \left(\frac{M_{ii} - M_h}{\sigma_{M_h}} \right)^2$$

- Select jet pair which has minimum chi2 value



Reconstructed mass of higgs candidate (GeV)



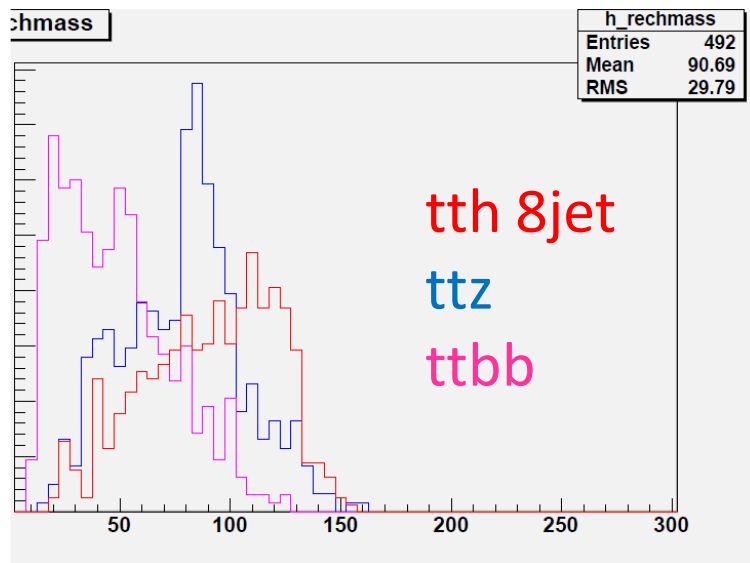
Reconstructed mass of higgs candidate (GeV)

Reconstructed h mass

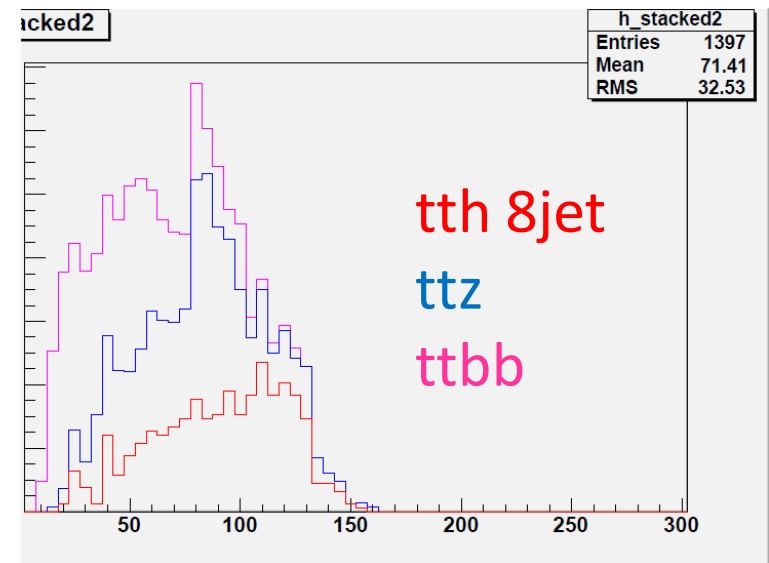
Without Higgs mass constraint

$$\chi^2 = \left(\frac{M_{iii}(1) - M_{top}}{\sigma_{M_{top}}} \right)^2 + \left(\frac{M_{ii}(1) - M_W}{\sigma_{M_W}} \right)^2 + \left(\frac{M_{iii}(2) - M_{top}}{\sigma_{M_{top}}} \right)^2 + \left(\frac{M_{ii}(2) - M_W}{\sigma_{M_W}} \right)^2$$

- Select jet pair of minimum chi2



Reconstructed mass of higgs candidate (GeV)



Reconstructed mass of higgs candidate (GeV)