

Status report

Apr 8, 2021

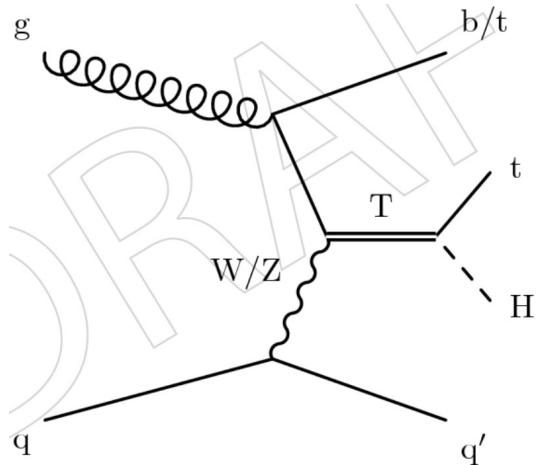
Jieun Choi

HYU / IP2I

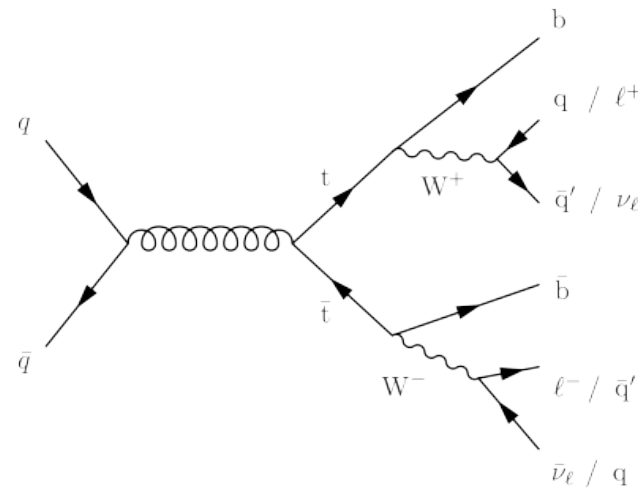
NN input features

Samples

TprimeBToTH_M-{700,1400}



TTToHadronic



Selections

- $HLT + n_{jets} \geq 6 + n_{bjets} \geq 2$
- Motivation: put current 'selection' into NN

Compared variables

1. Low-level features

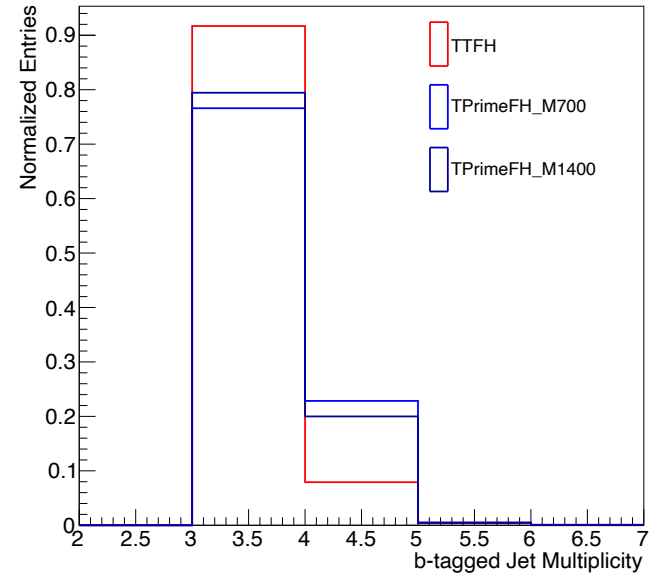
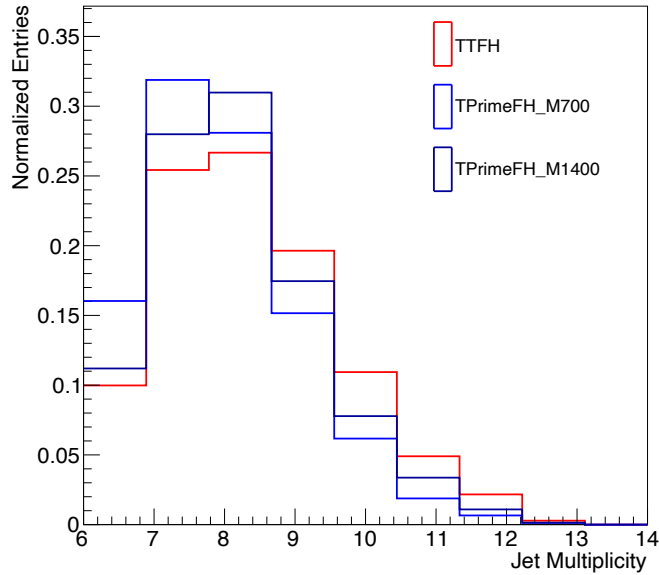
- 4 vectors (pT,Eta,Phi,M) / b-discriminant value of {1st,2nd,3rd,4th,5th} good (b)Jets
- # of (b-tagged) jets

2. High-level features

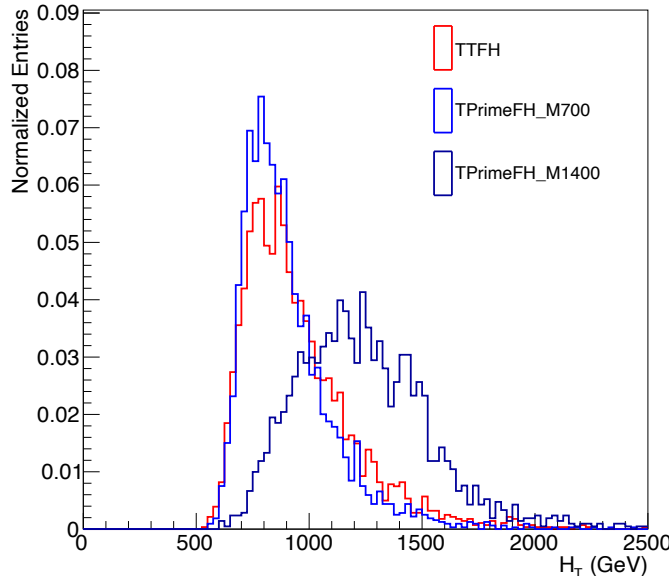
- (good)Jet HT
- 2nd Top Mass
- Higgs Mass
- Relative HT
- Min Chi2
- dR between Higgs b jets
- Higgs Chi2
- dR between W jets
- dR between top b and W jets

Cut 0	Basic selection
Cut 1	Relative $H_T > 0.4$
Cut 2	$\text{Max}(\chi^2) < 3$
Cut 3	$\Delta R(b_{Higgs}, b_{Higgs}) < 1.1$
Cut 4	$\chi^2_{Higgs} < 1.5$
Cut 5	$\Delta R(j_W, j_W) < 1.75$
Cut 6	$\Delta R(b_{Top}, W) < 1.2$

Distributions of observables: Low-level



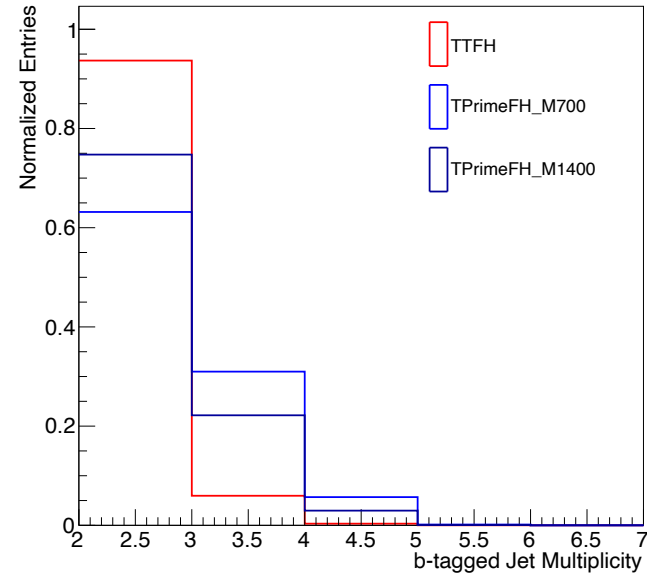
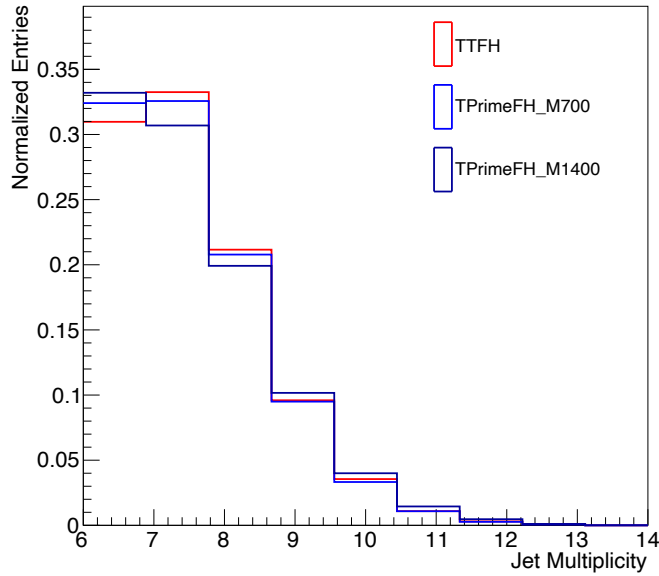
With Cut0



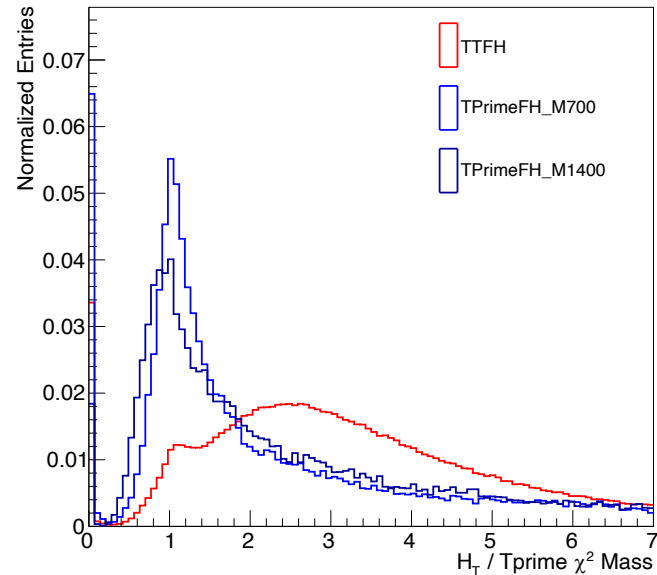
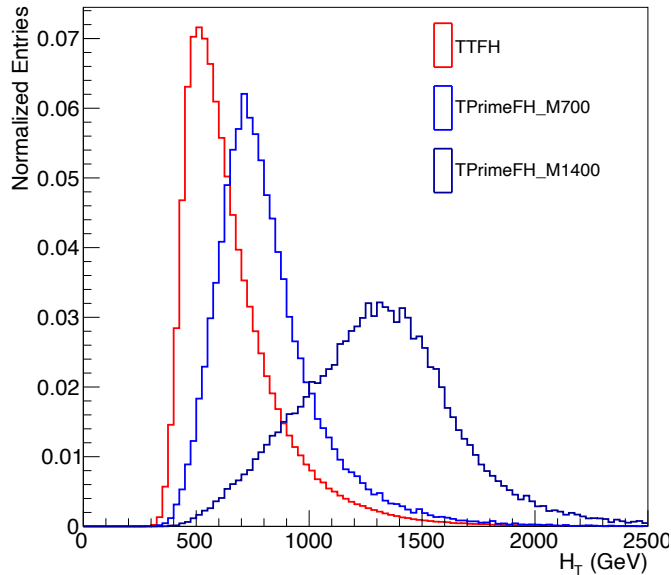
Normalized entries into 1
to compare shapes

$\langle \text{GoodHT} = \text{HT of jets } p_T > 30 \text{ GeV} \rangle$

Distributions of observables: Low-level

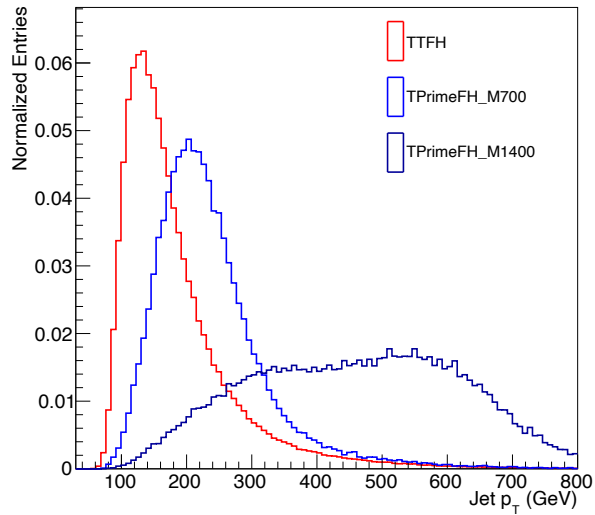


nJet ≥ 6
nbtag ≥ 2

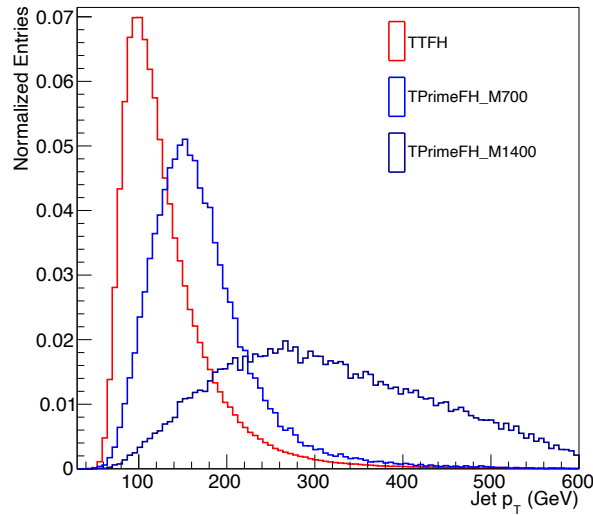


Distributions of observables: Jet pT

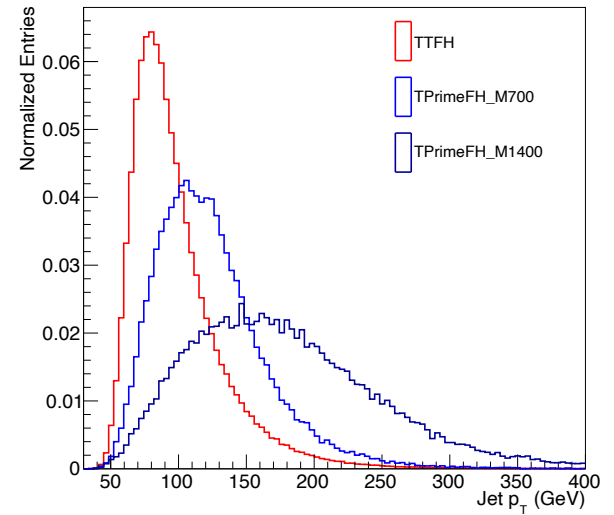
1st Jet



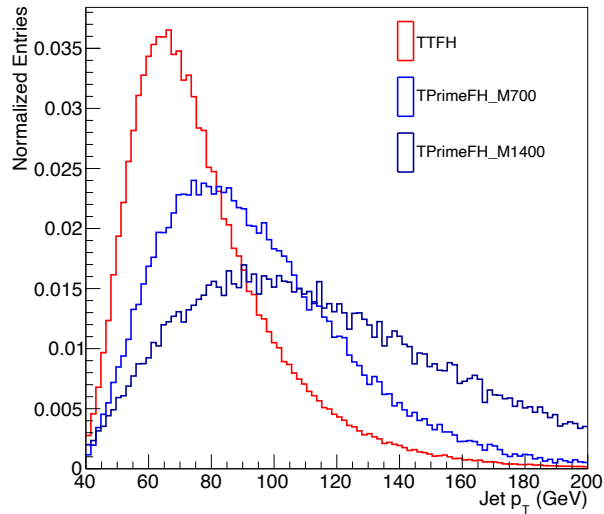
2nd Jet



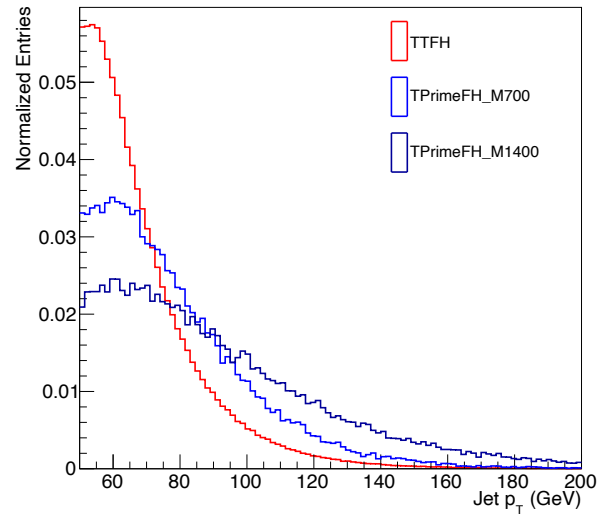
3rd Jet



4th Jet

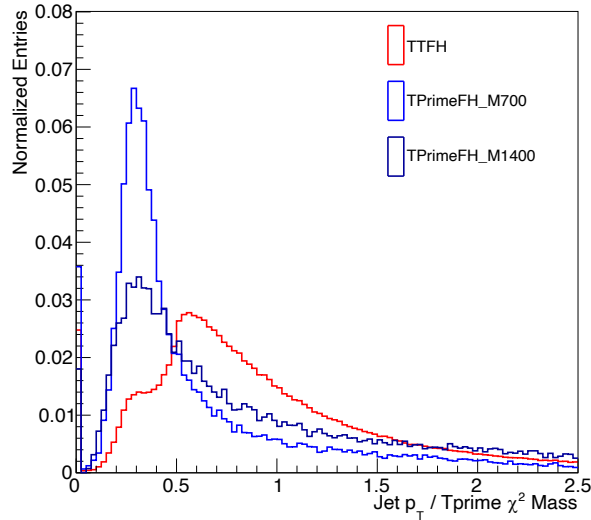


5th Jet

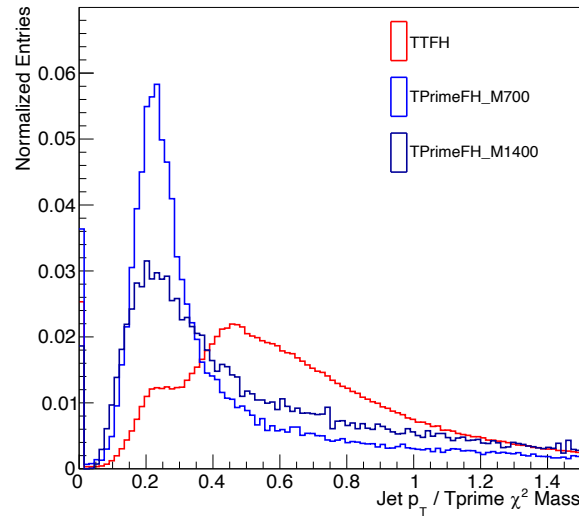


Distributions of observables: Jet pT / mass

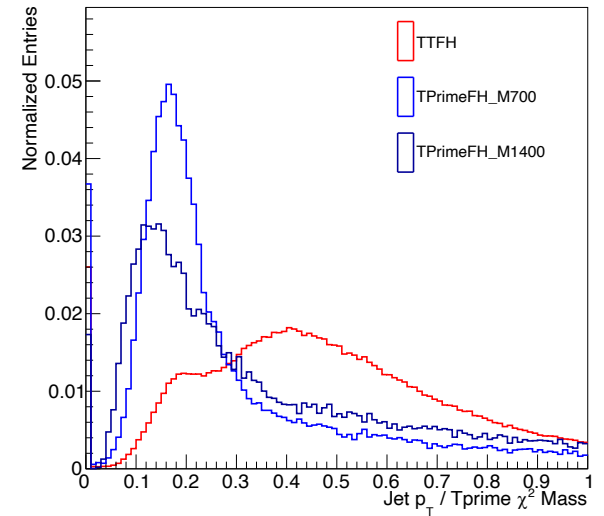
1st Jet



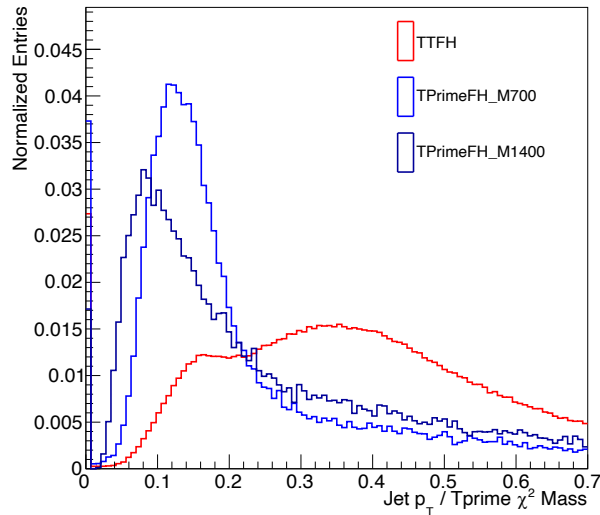
2nd Jet



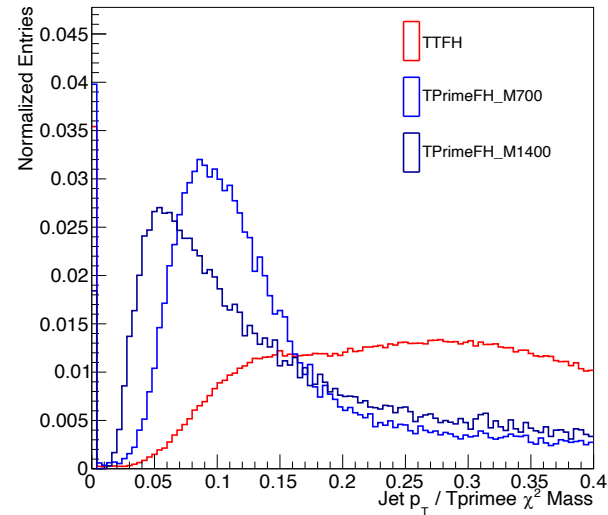
3rd Jet



4th Jet

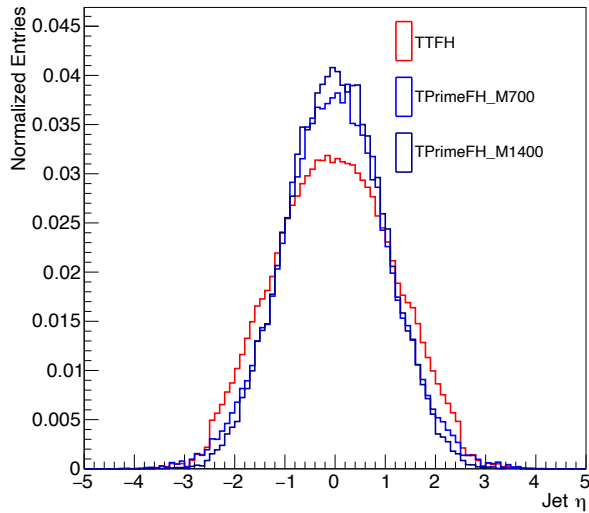


5th Jet

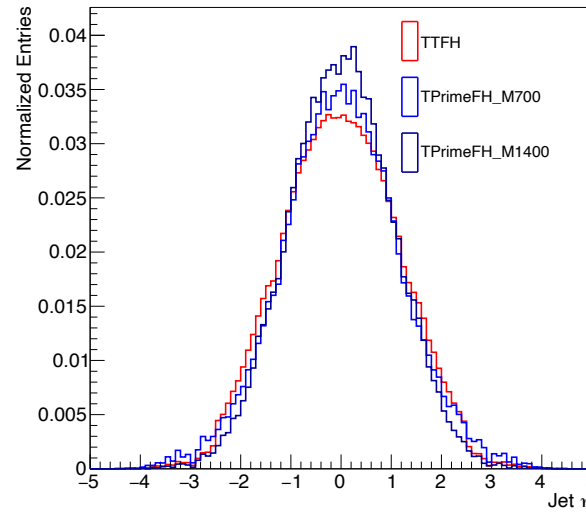


Distributions of observables: Jet eta

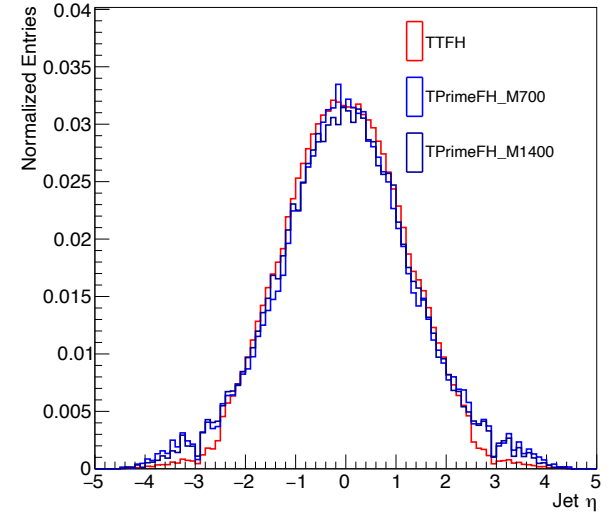
1st Jet



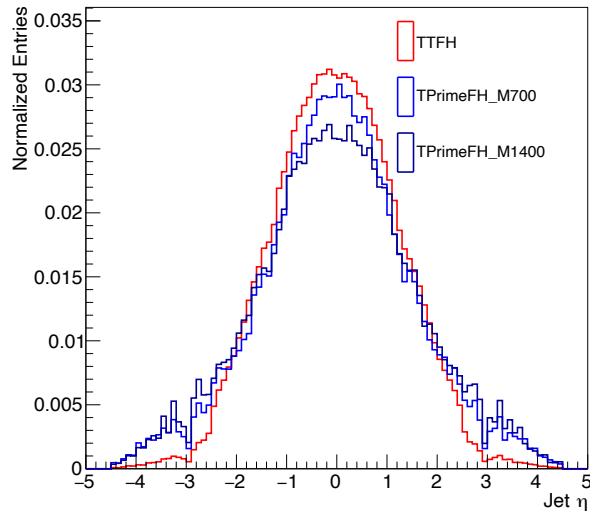
2nd Jet



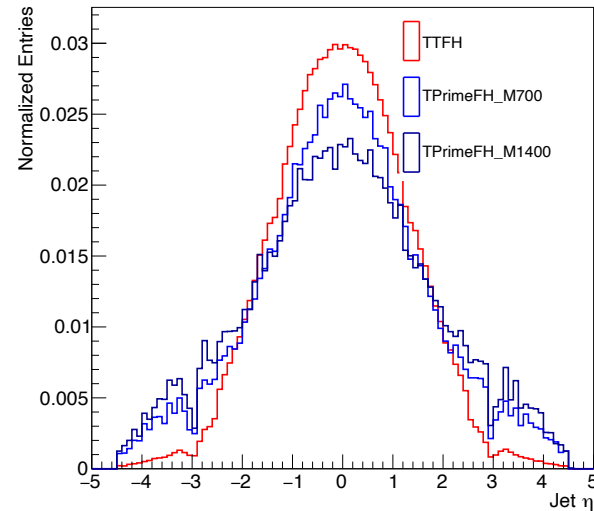
3rd Jet



4th Jet

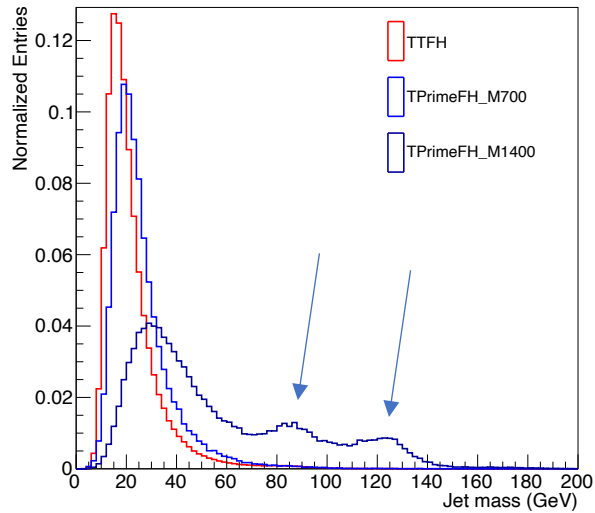


5th Jet

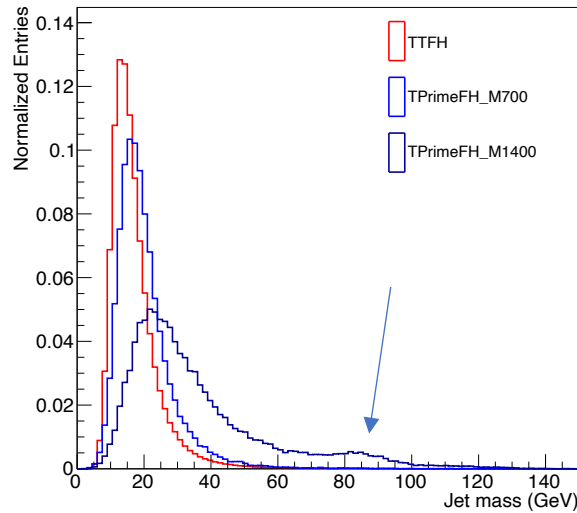


Distributions of observables: Jet mass

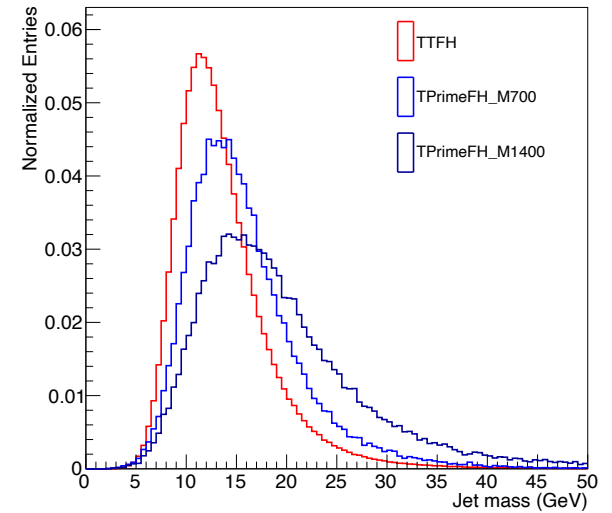
1st Jet



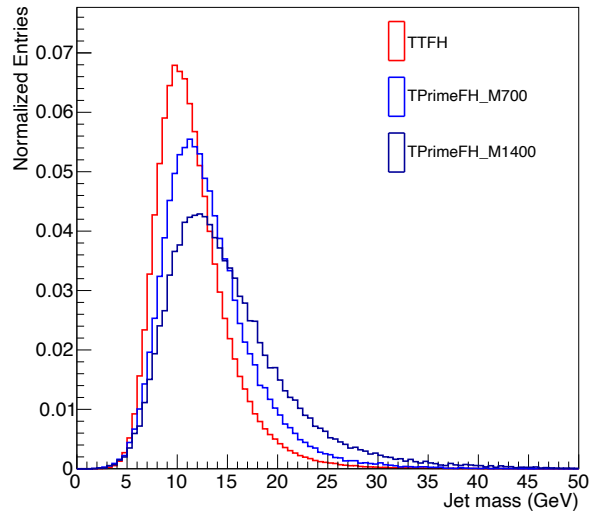
2nd Jet



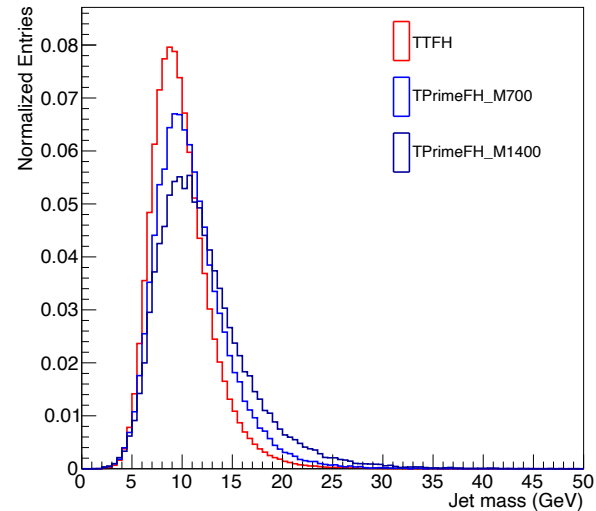
3rd Jet



4th Jet

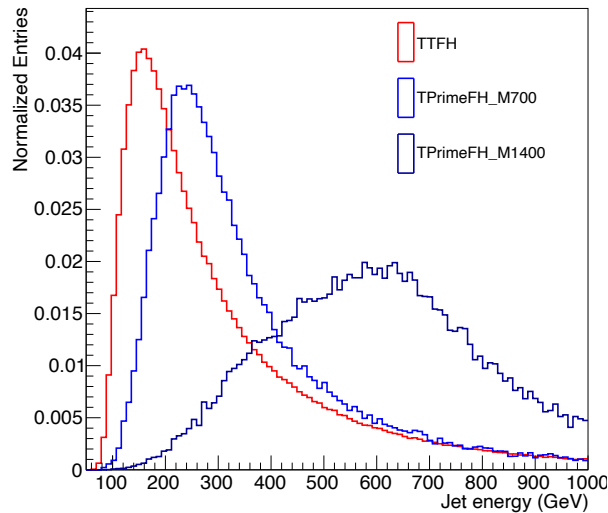


5th Jet

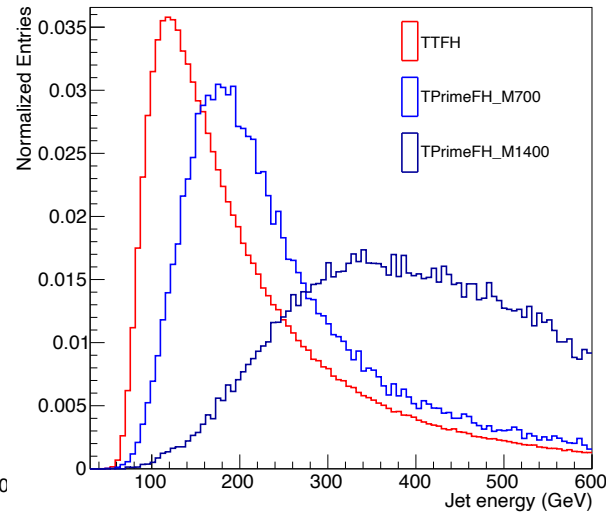


Distributions of observables: Jet energy

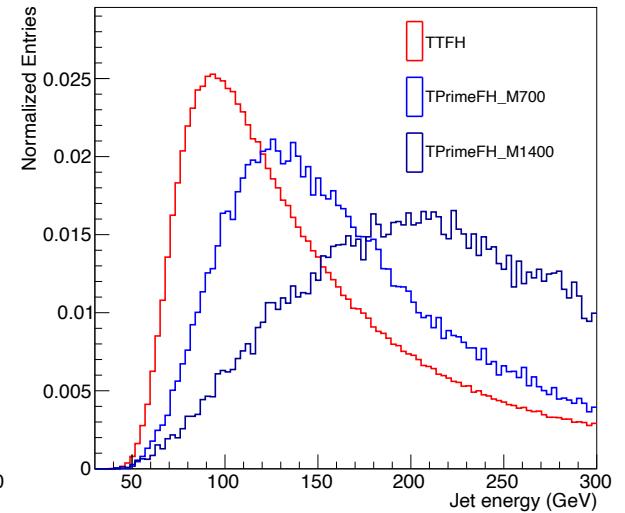
1st Jet



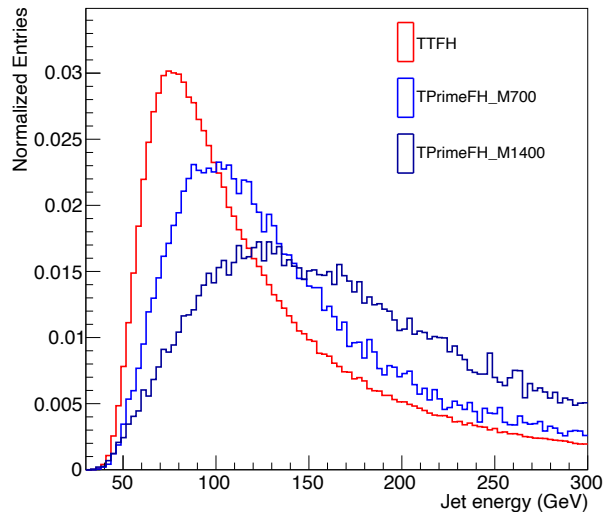
2nd Jet



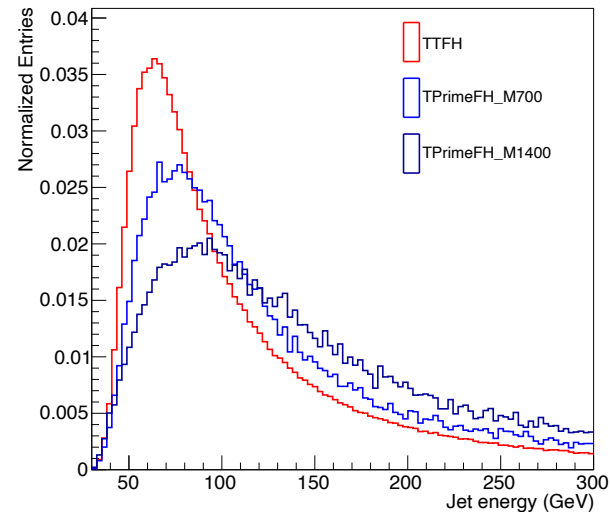
3rd Jet



4th Jet

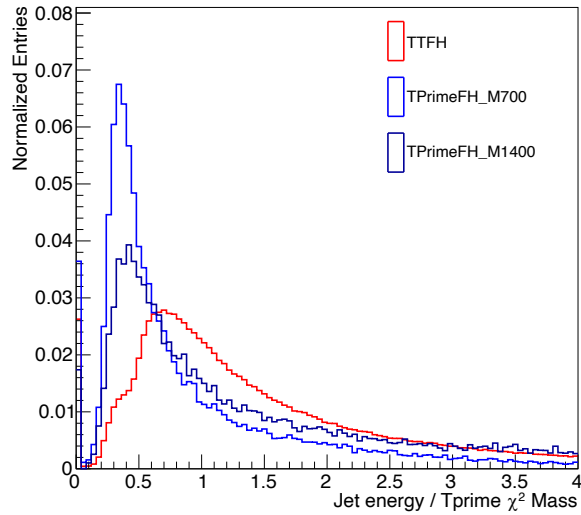


5th Jet

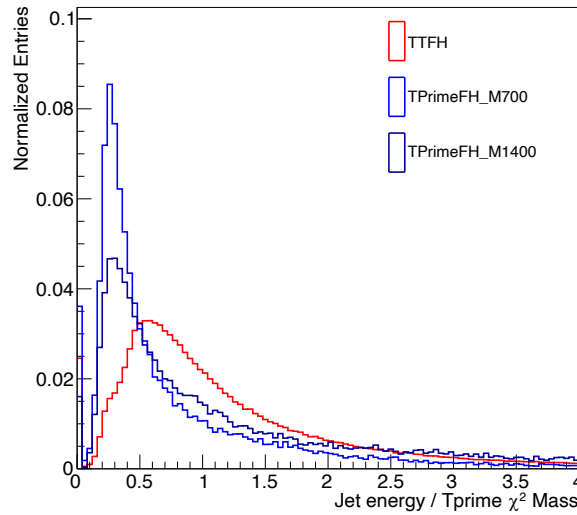


Distributions of observables: Jet E / Mass

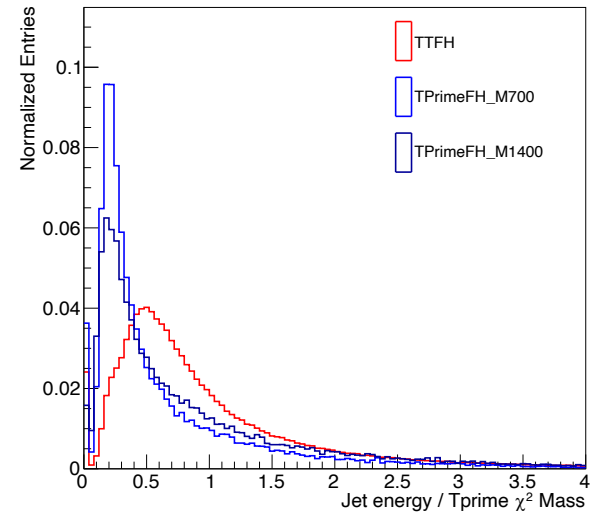
1st Jet



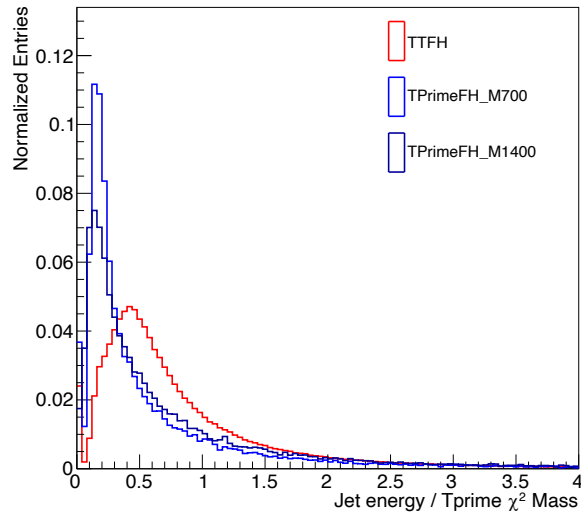
2nd Jet



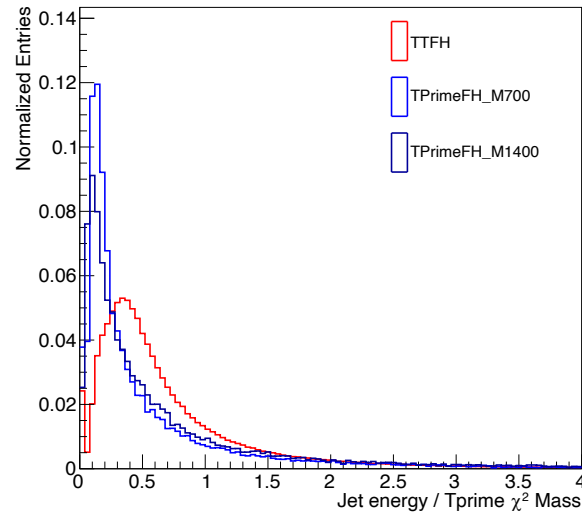
3rd Jet



4th Jet

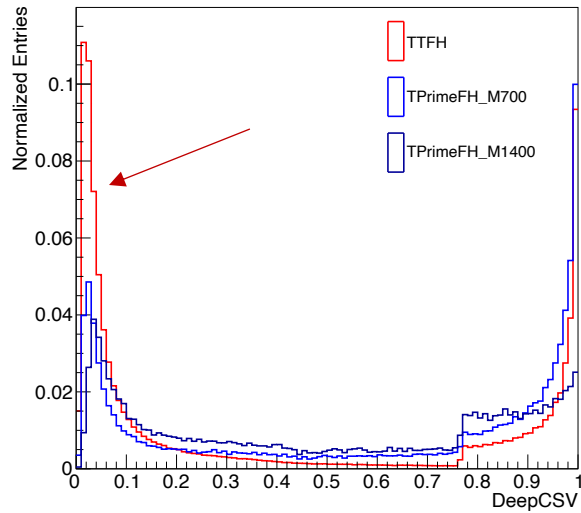


5th Jet

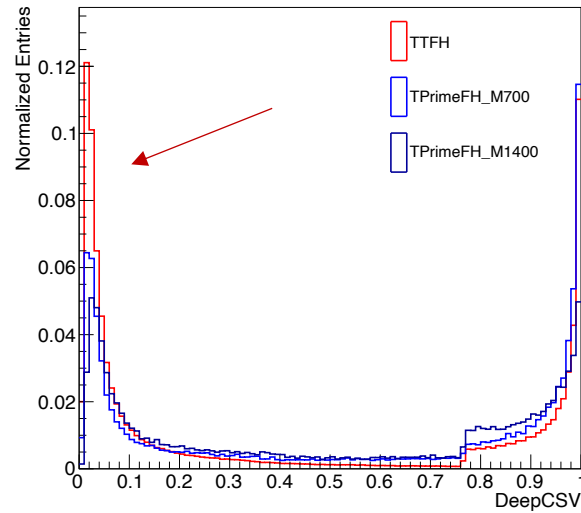


Distributions of observables: Jet btag disc.

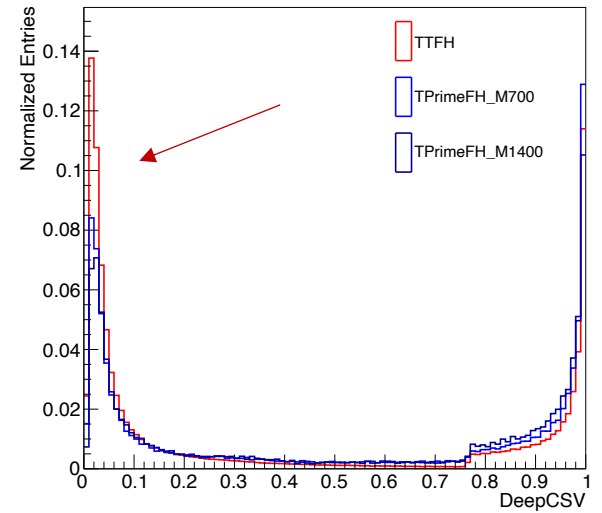
1st Jet



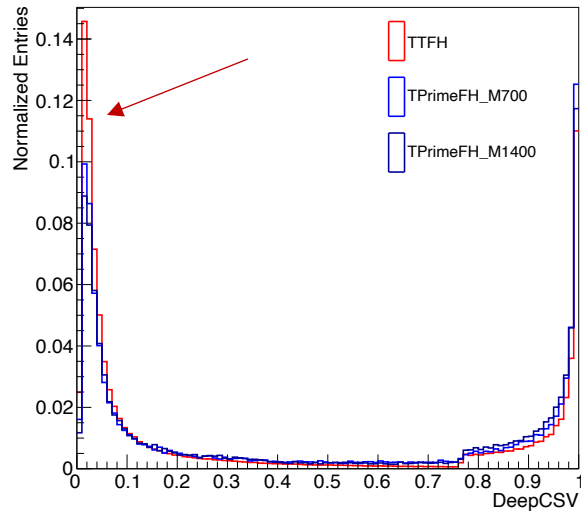
2nd Jet



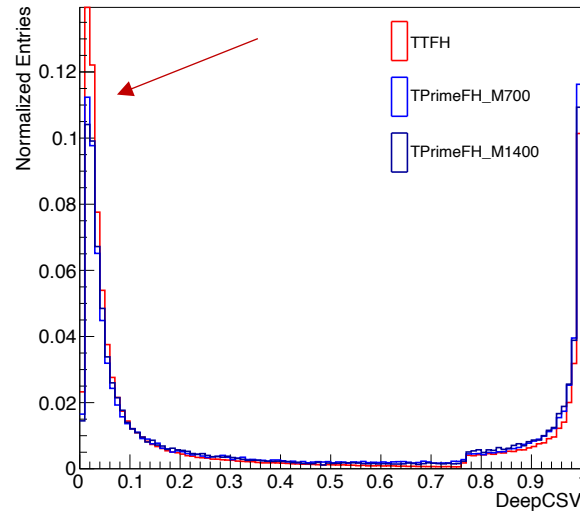
3rd Jet



4th Jet



5th Jet

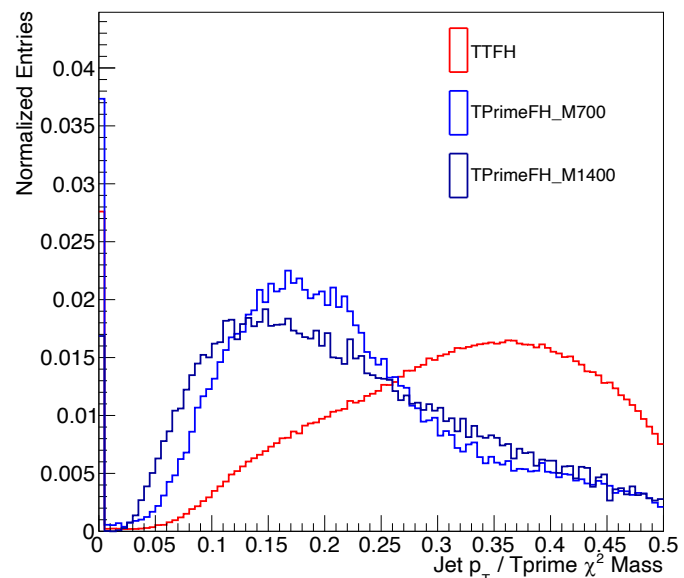
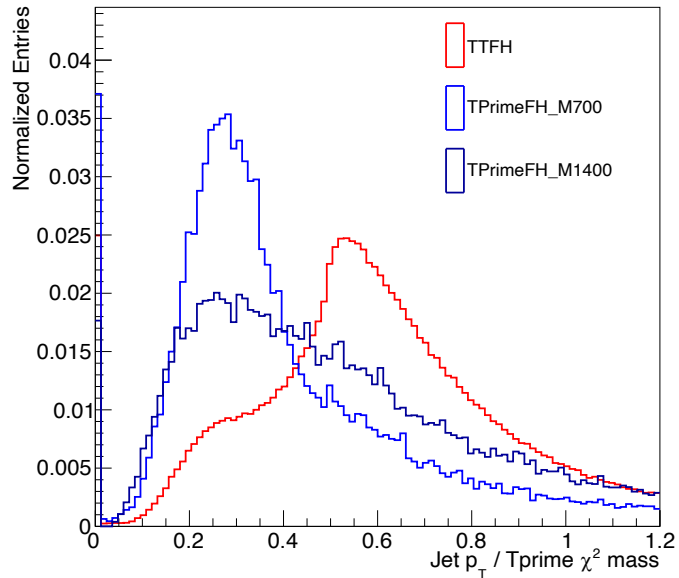
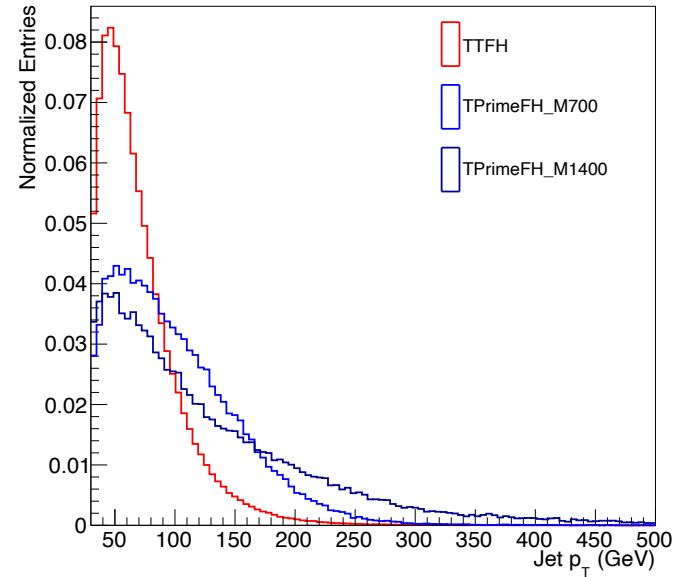
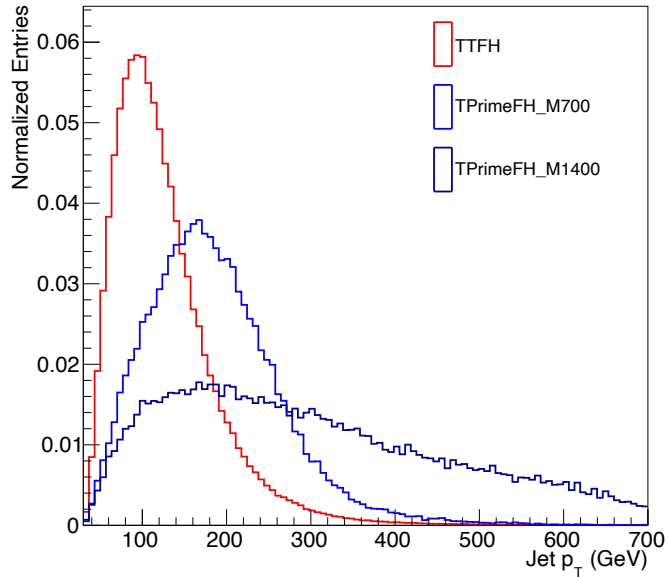


Distributions of observables: b-Jet pT / Mass

pT order

1st b-tagged Jet

2nd b-tagged Jet

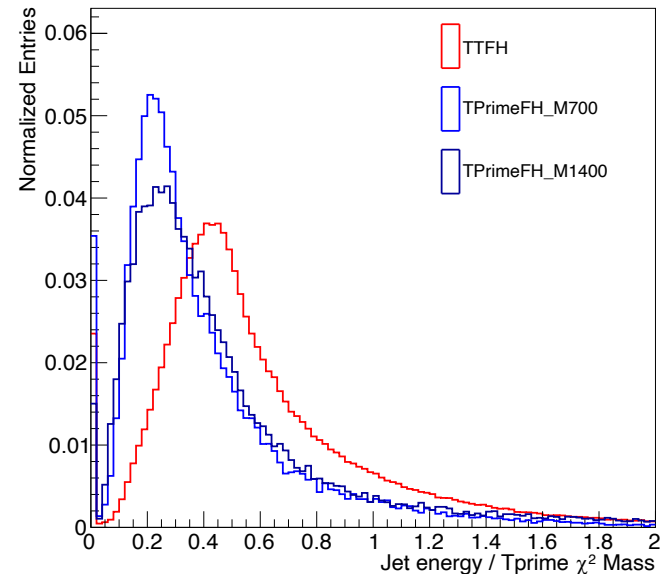
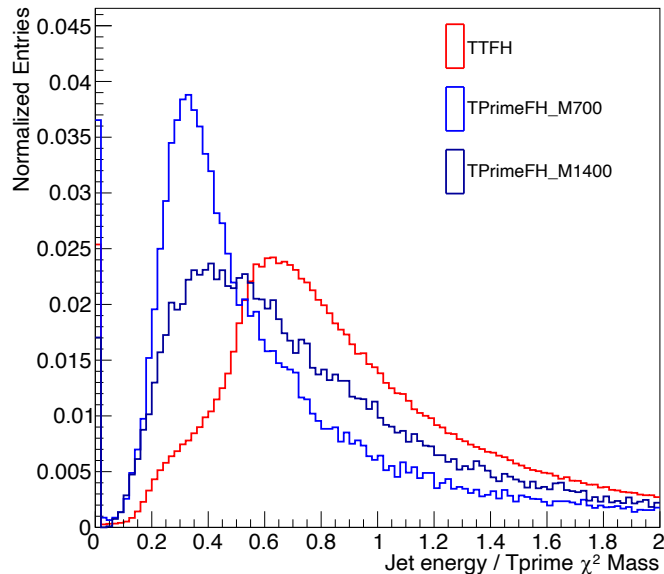
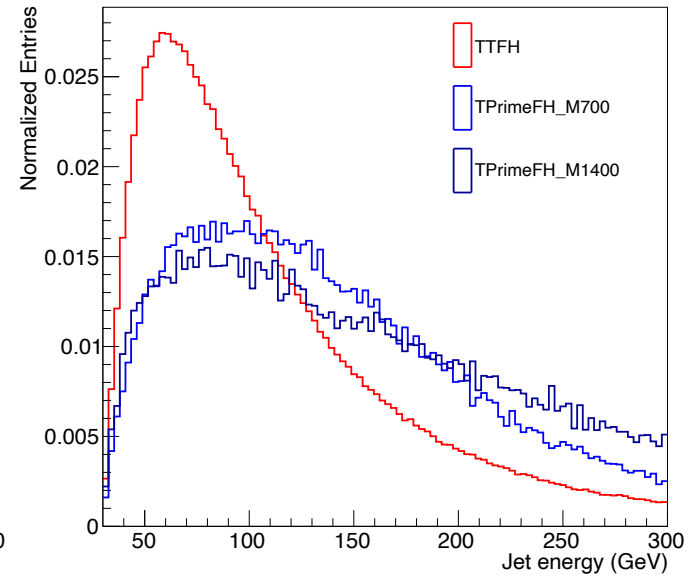
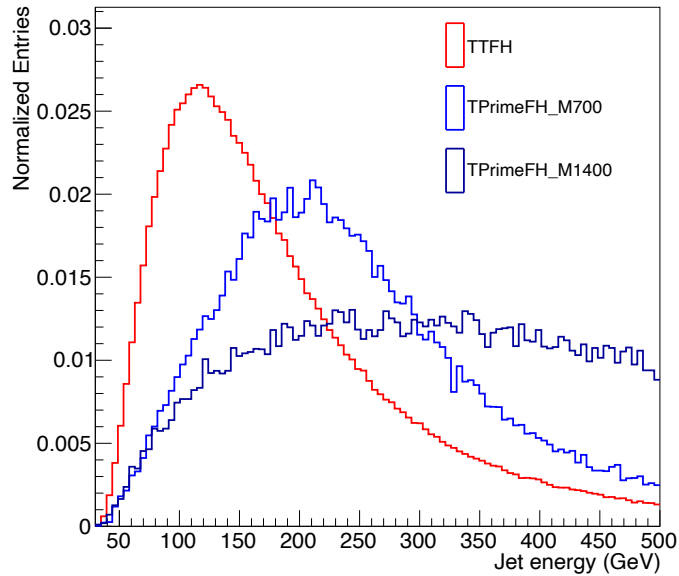


Distributions of observables: b-Jet E / Mass

pT order

1st b-tagged Jet

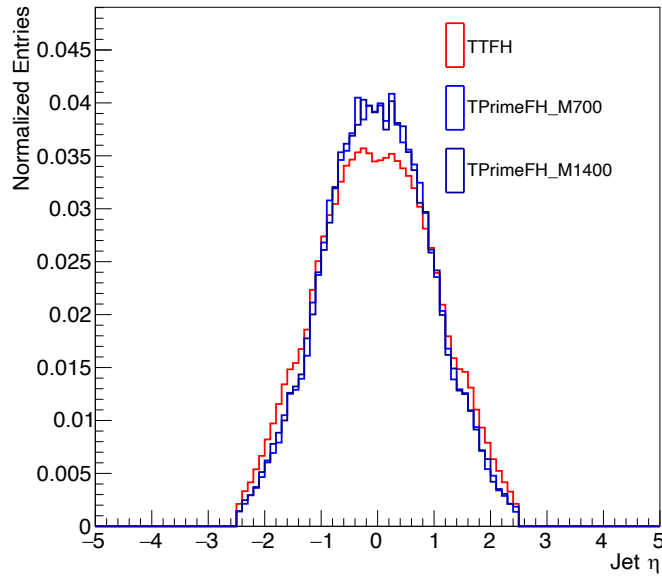
2nd b-tagged Jet



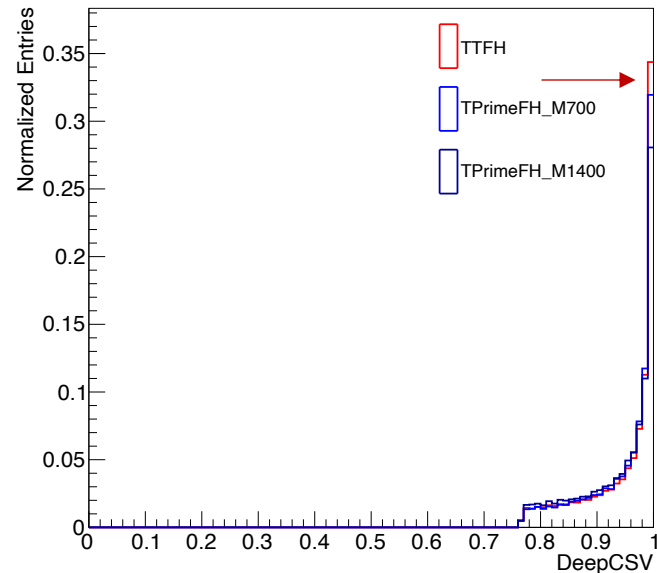
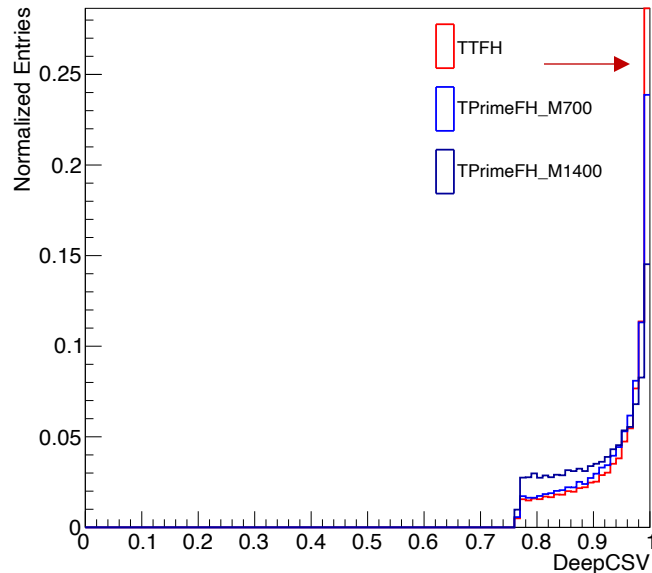
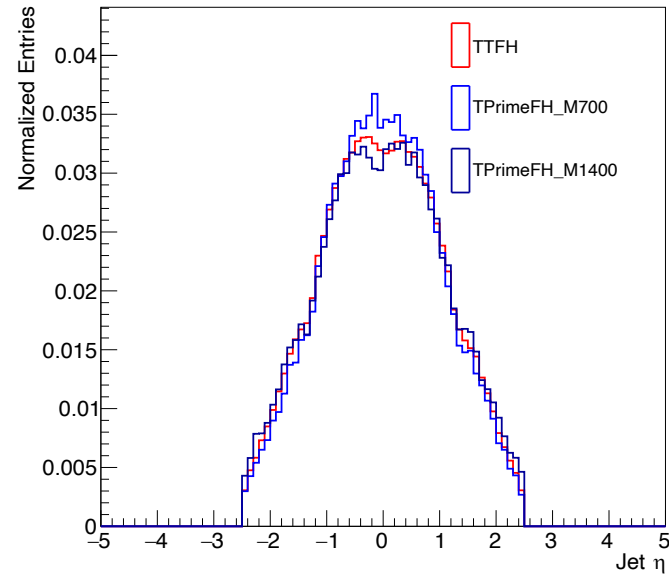
Distributions of observables: bJet eta, b disc.

pT order

1st b-tagged Jet

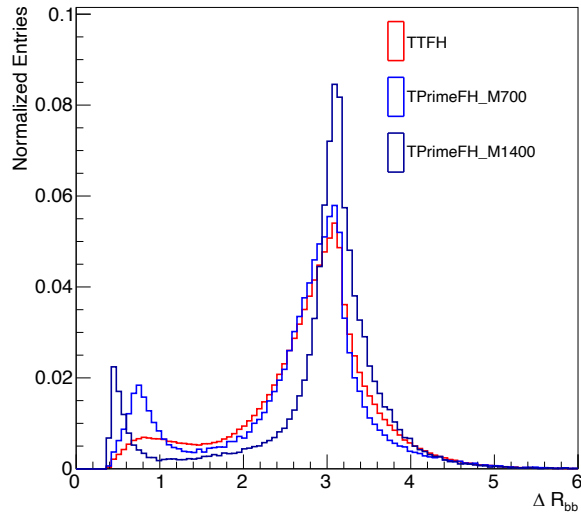


2nd b-tagged Jet

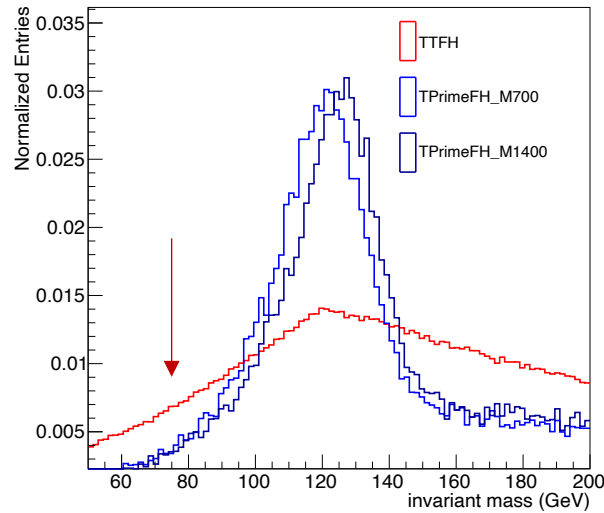


Distributions of observables: Chi2 variables

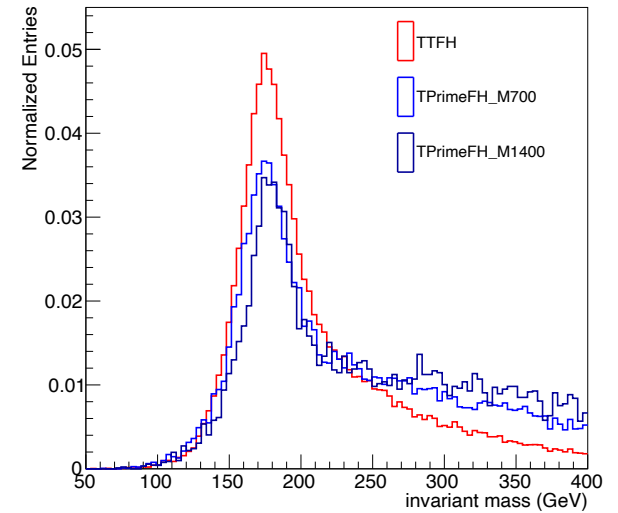
dR(b,b)



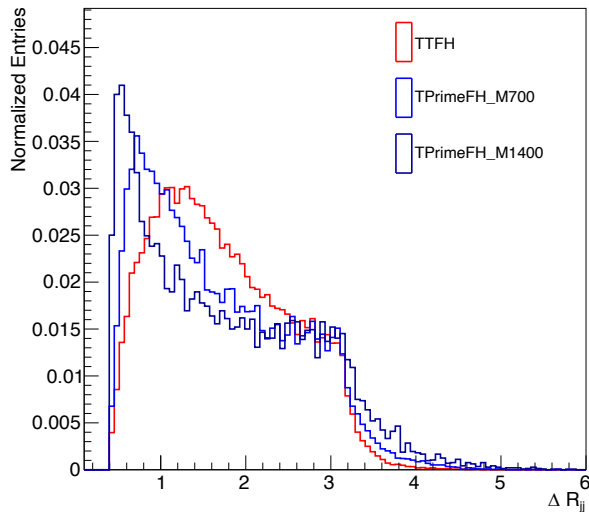
Higgs mass



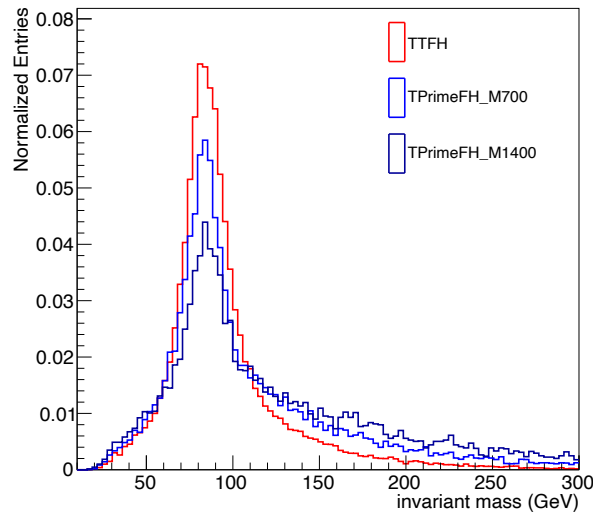
Top mass



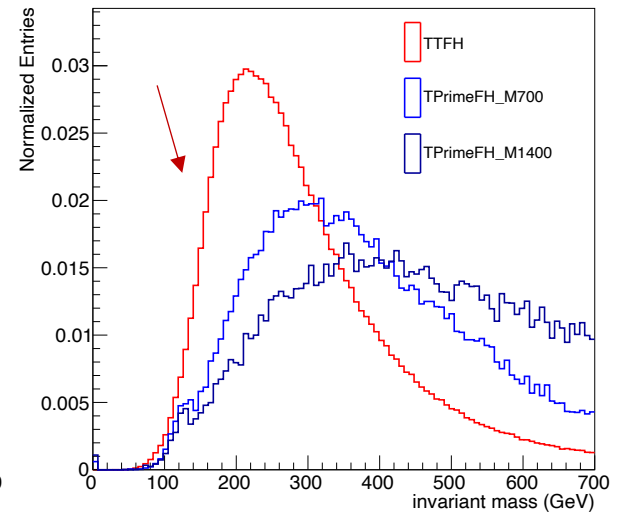
dR(j,j)



W mass

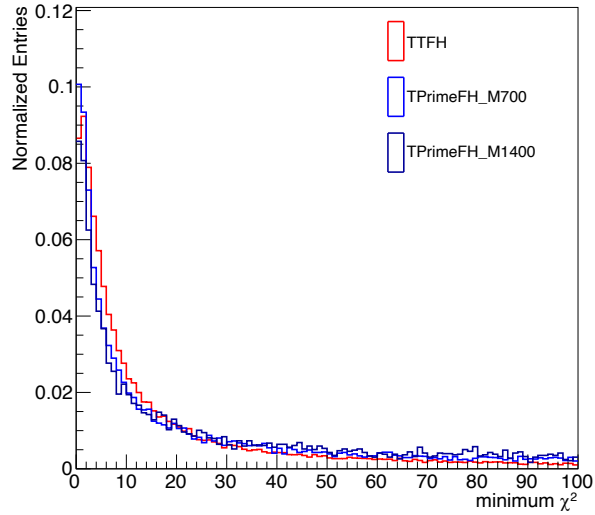


2nd Top mass

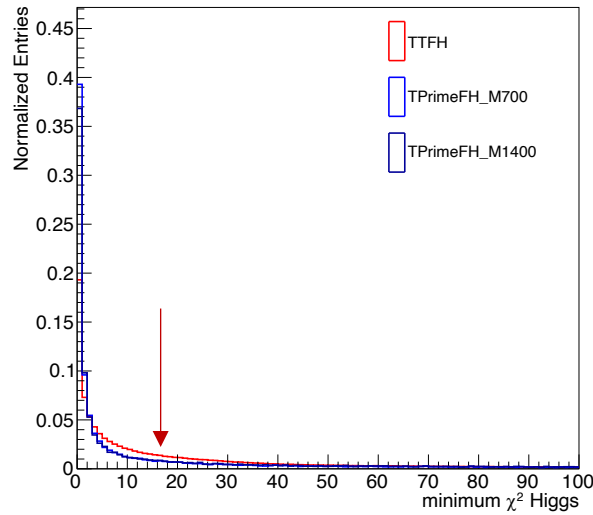


Distributions of observables: Chi2 variables

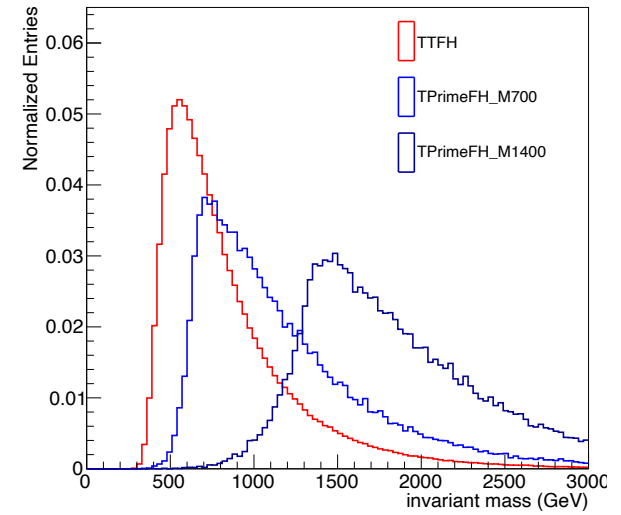
Chi2



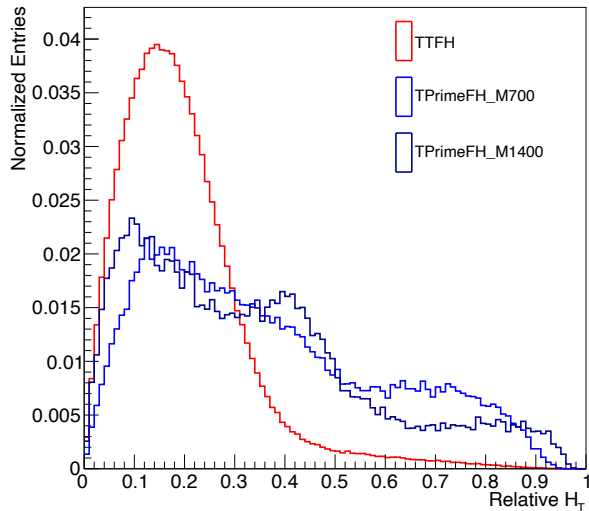
Chi2 H



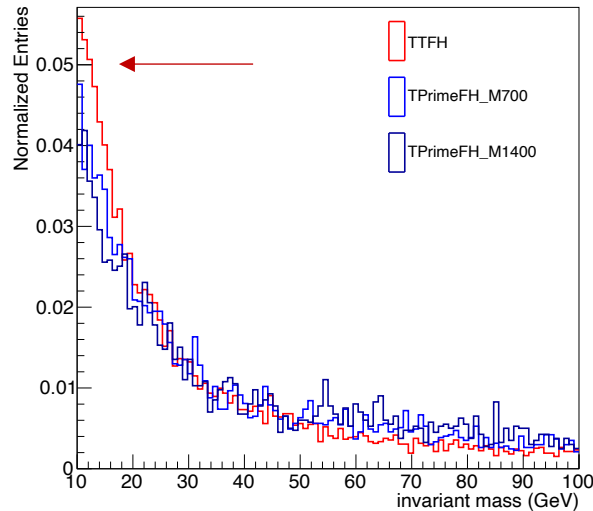
M of 5 leading jets



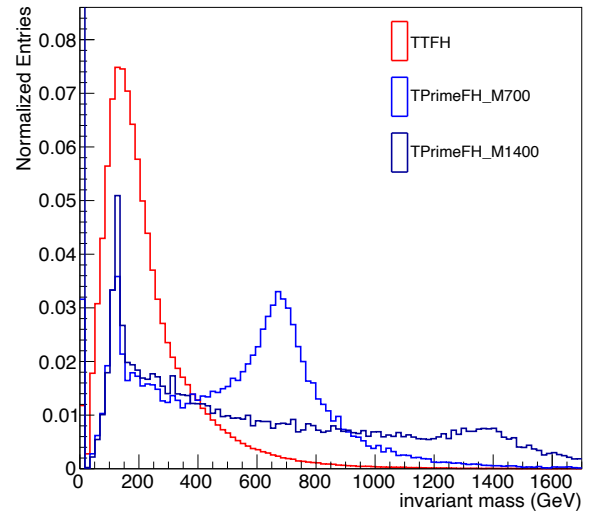
RelHT



Chi2 W



M of 5 chi2 jets



Trigger efficiencies: DeepCSV vs DeepJet

Samples

- Tprime M 700 GeV
- After Cut 0
- Tight selection

# of MC events	DeepJet T	DeepCSV T
noHLT	5367	3098
HLT	5091	2989
Efficiencies (%)	94.8	96.5

Distribution comparison

- Jet pT / Eta / Phi / E?