

Status report

Feb 9, 2021

Jieun Choi

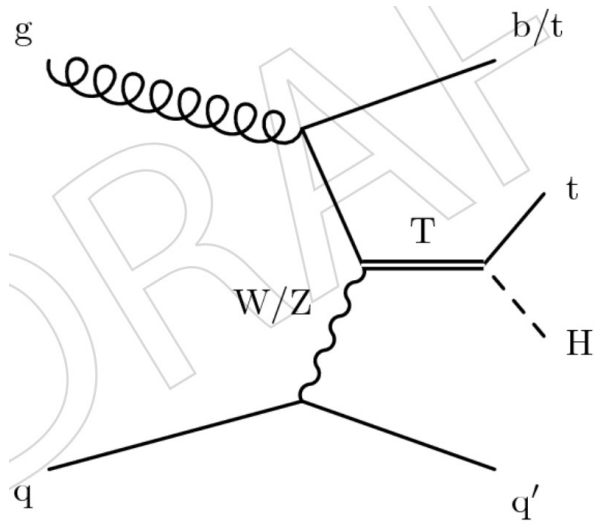
HYU / IP2I

Tprime analysis: from the scratch

HLT in all hardronic analysis?

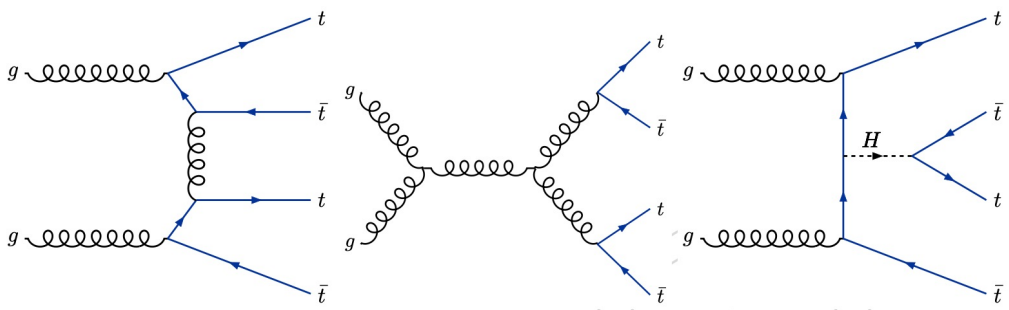
- AN2021/140: Grand Unified Note for Tprime all hadronic
- Final state: 7 jets, 4 b-tagged
- Resonance in 5 jets [top+Z/Higgs] – correspond to 3 b-tagged

2016
HLT_PFHT400.SixJet30.DoubleBTagCSV_p056
HLT_PFHT450.SixJet40.BTagCSV_p056
HLT_PFHT900.HLT_PFHT750.4JetPt70,HLT_PFHT750.4JetPt80, HLT_PFHT800.4JetPt50, HLT_PFHT850.4JetPt50
HLT_PFBTagDeepCSV_1p5
2017
HLT_PFHT380.SixJet32.DoublePFBTagCSV_2p2 (Only Run2017B)
HLT_PFHT380.SixPFJet32.DoublePFBTagDeepCSV_2p2 (Run2017CDEF)
HLT_PFHT430.SixJet40.BTagCSV_p080 (Only Run2017B)
HLT_PFHT430.SixPFJet40.PFBTagCSV_1p5 (Run2017CDEF)
HLT_HT300PT30.QuadJet.75.60.45.40.TripleCSV_p07 (Only Run2017B)
HLT_PFHT300PT30.QuadPFJet.75.60.45.40.TriplePFBTagCSV_3p0 (Run2017CDEF)
HLT_PFHT1050
HLT_PFBTagDeepCSV_1p5
2018
HLT_PFHT380.SixJet32.DoublePFBTagDeepCSV_2p2
HLT_PFHT400.FivePFJet.100.100.60.30.30.DoublePFBTagDeepCSV_4p5 (Added for Run2018D only)
HLT_PFHT430.SixPFJet40.PFBTagDeepCSV_1p5
HLT_PFHT330PT30.QuadPFJet.75.60.45.40.TriplePFBTagDeepCSV_4p5
HLT_PFHT1050
HLT_PFBTagDeepCSV_1p5



- AN2020/021: Search for four top quark production at 13 TeV in the all-hadronic final state
- Final state: 12 jets, 4 b-tagged
- Trigger Requiring the presence of : ≥ 6 jets, ≥ 1 or ≥ 2 b-tagged

Data-taking period	HLT path
2016	HLT_PFHT400.SixJet30.DoubleBTagCSV_p056
	HLT_PFHT450.SixJet40.BTagCSV_p056
	HLT_PFHT380.SixJet32.DoubleBTagCSV_p075
	HLT_PFHT430.SixJet40.BTagCSV_p080
2017	HLT_PFHT380.SixPFJet32.DoublePFBTagCSV_2p2
	HLT_PFHT430.SixPFJet40.PFBTagCSV_1p5
	HLT_PFHT380.SixPFJet32.DoublePFBTagDeepCSV_2p2
	HLT_PFHT430.SixPFJet40.PFBTagDeepCSV_1p5
2018	HLT_PFHT400.SixPFJet32.DoublePFBTagDeepCSV_2p94
	HLT_PFHT450.SixPFJet36.PFBTagDeepCSV_1p59



Chi2 reconstruction

Building Chi2

- Select two b-tagged jets for Either Z or Higgs candidate
- Select two jets for W candidate
 - excluding jets from Z/H candidate
- Select a b-tagged jet with W candidate for Top candidate
 - excluding jets from Z/H/W candidate

$$\chi_{Z|Higgs}^2 = \frac{(M_{Z|Higgs} - M_{bb})^2}{\sigma_{Z|Higgs}^2}$$

$$\chi_w^2 = \frac{(M_W - M_{jj})^2}{\sigma_W^2}$$

$$\chi_{top}^2 = \frac{(M_t - M_{bjj})^2}{\sigma_t^2}$$

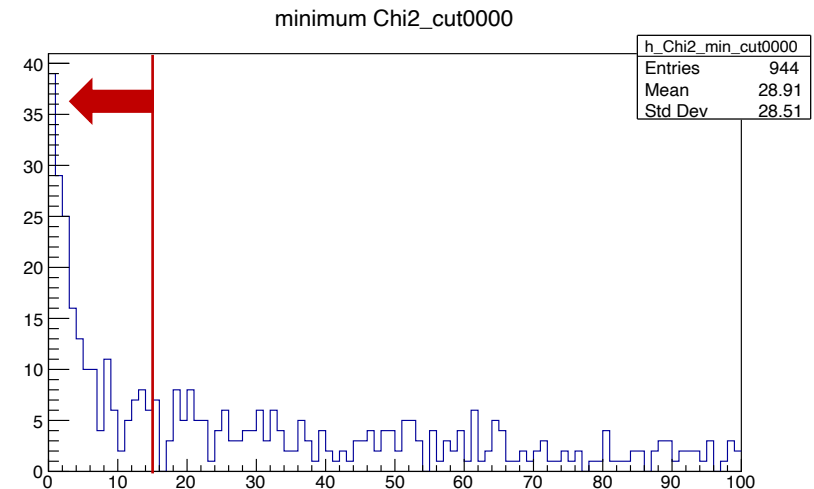
$$\chi^2 = \chi_{Z|Higgs}^2 + \chi_w^2 + \chi_{top}^2$$

- Found bugs from code, fixed
 - AN2021/140: Grand Unified Note for Tprime all hadronic

- Selection:

- 1) `HLT_PFHT330PT30_QuadPFJet_75_60_45_40_TriplePFBTagDeepCSV_4p5 || HLT_PFHT1050 || HLT_PFJet500`
- 2) `nJets == 6 && nb(DeepCSV)Jets > 3`
- 3) `jet1pt > 170 && jet2pt > 130 && jet3pt > 80`
- 4) `HT > 500`
- 5) `minimum Chi2 < 15`

- Only some HLT are accessible in nanoAODv9 ([doc](#))



2018

`HLT_PFHT400_FivePFJet_100_100_60_30_30_DoublePFBTagDeepCSV_4p5 (Added for Run2018D only)`

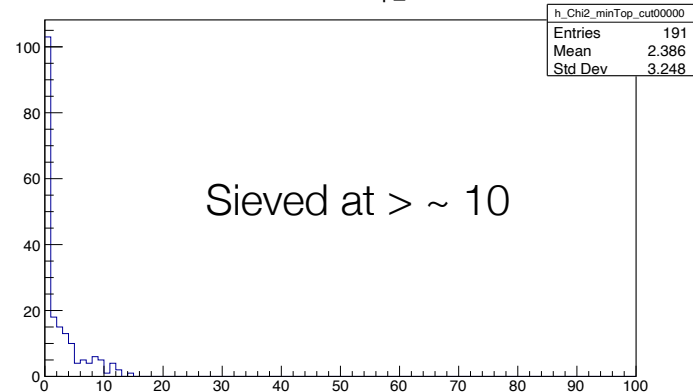
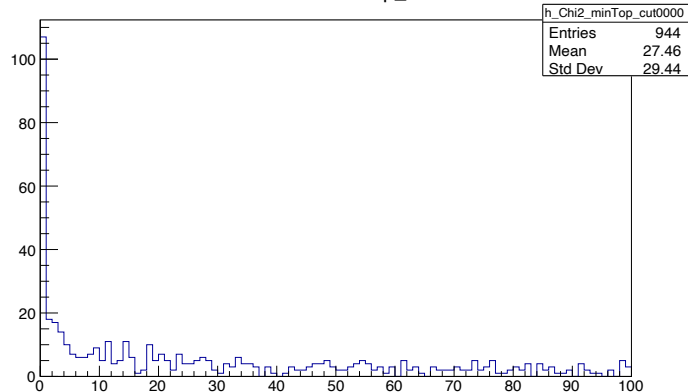
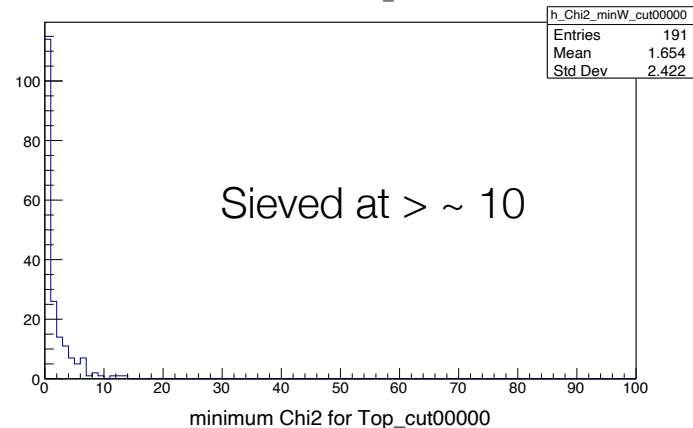
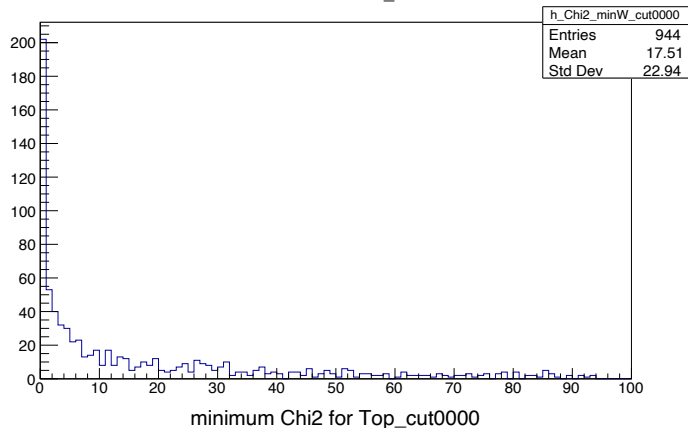
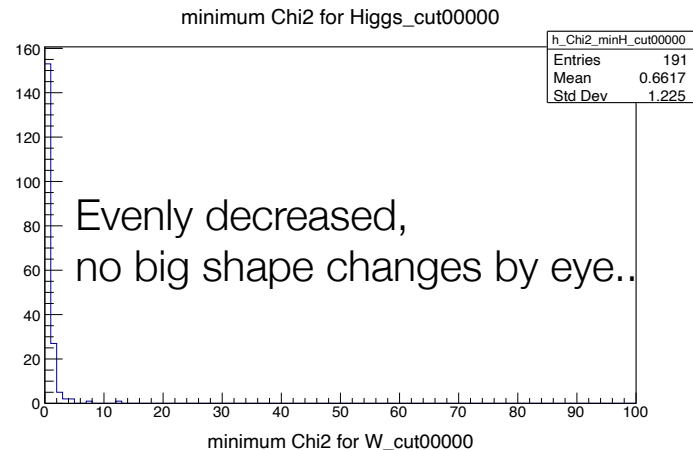
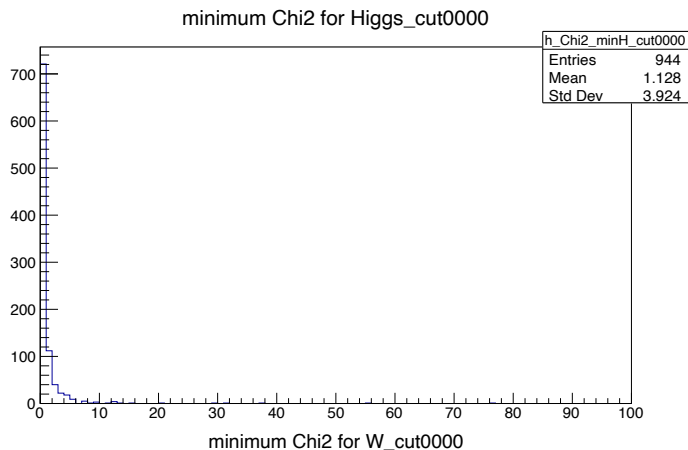
`HLT_PFHT330PT30_QuadPFJet_75_60_45_40_TriplePFBTagDeepCSV_4p5`

`HLT_PFHT1050`

`HLT_PFJet500`

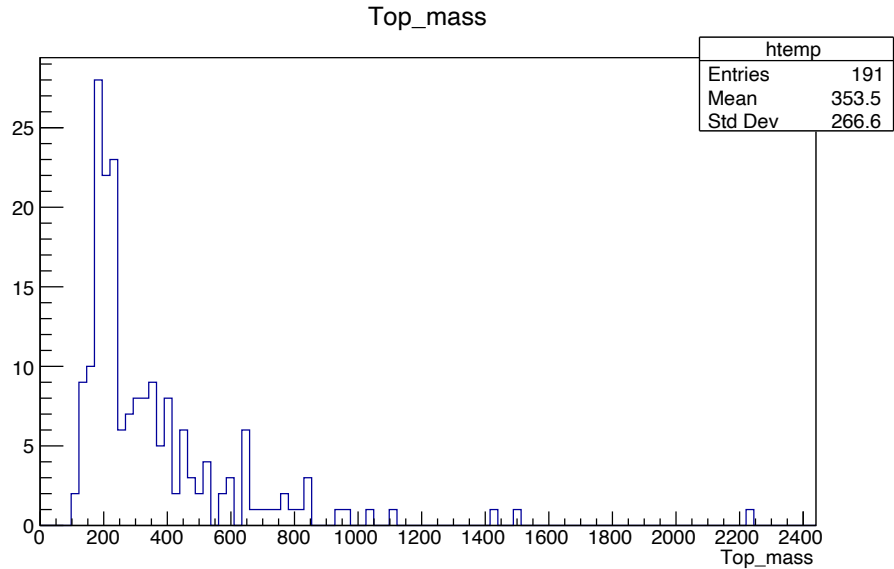
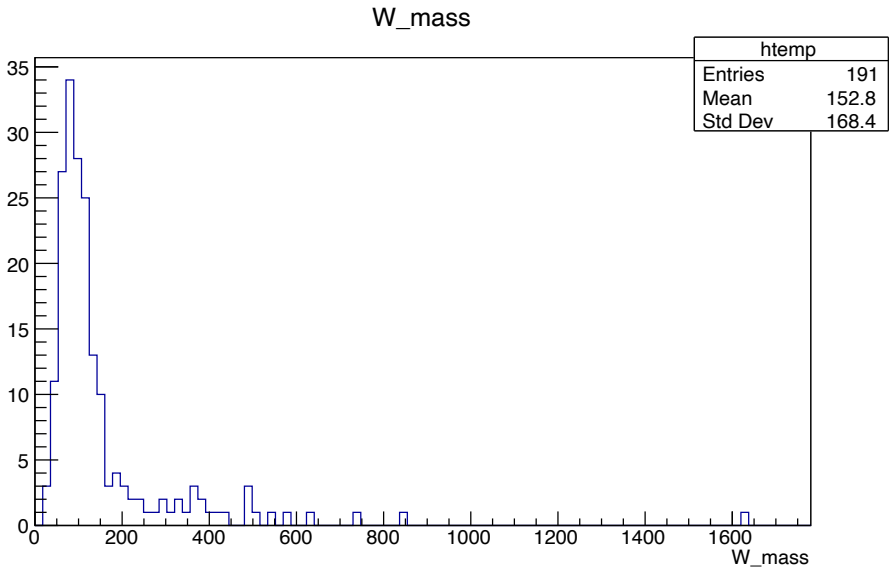
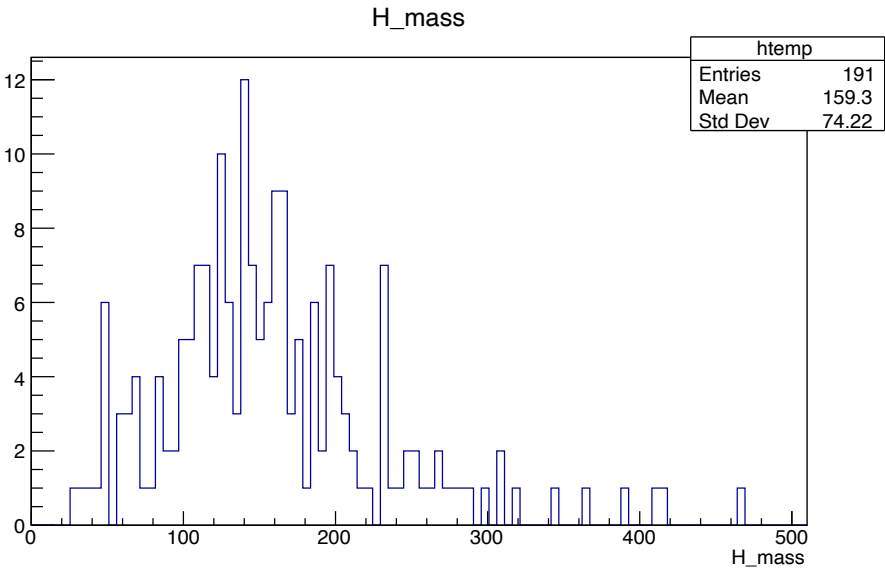
Chi2 distribution

↓ After Chi2 < 15 ↓



Mass distribution from Chi2 reconstruction

For all entries



Mass distribution from Chi2 reconstruction

