



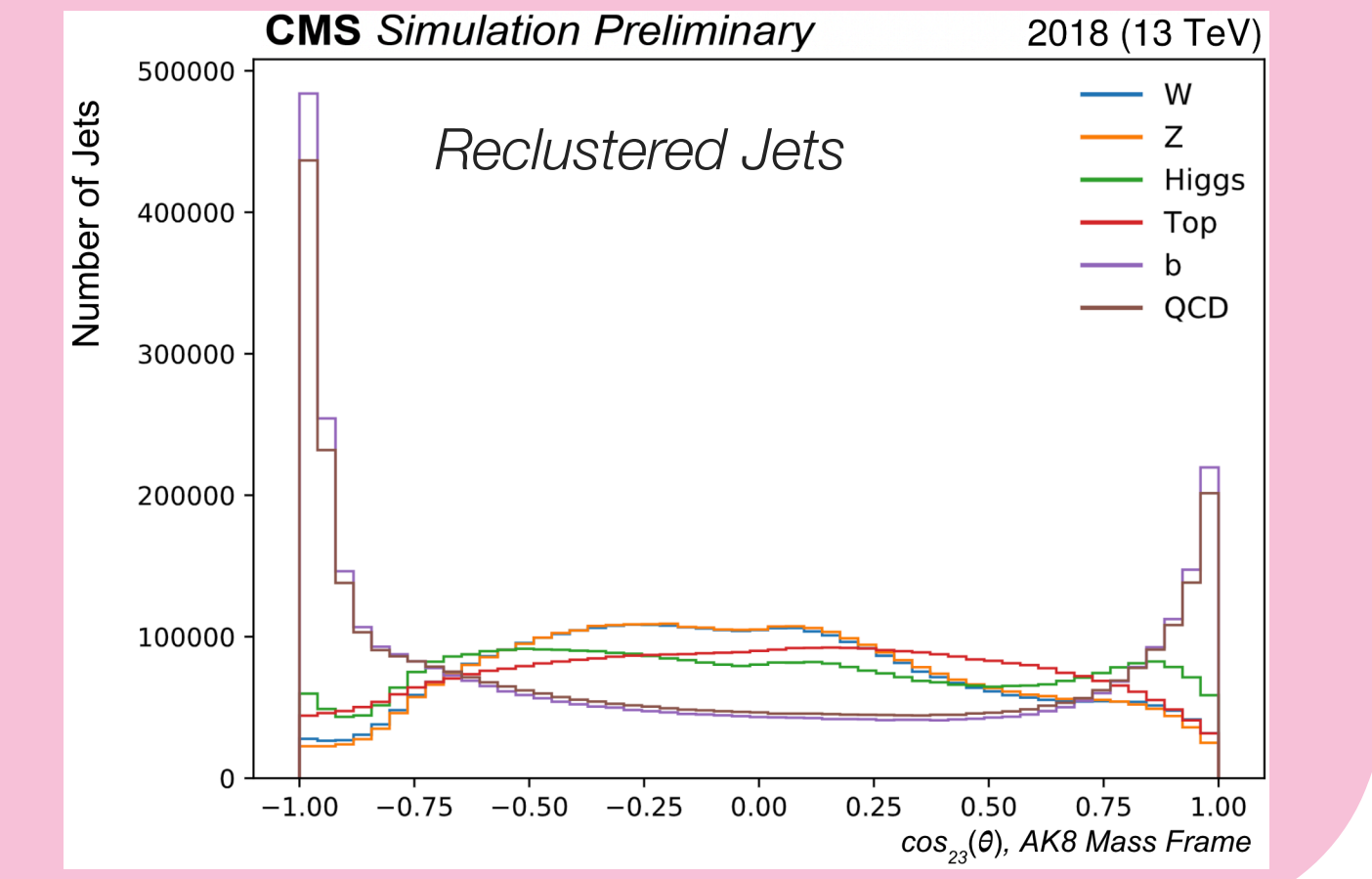
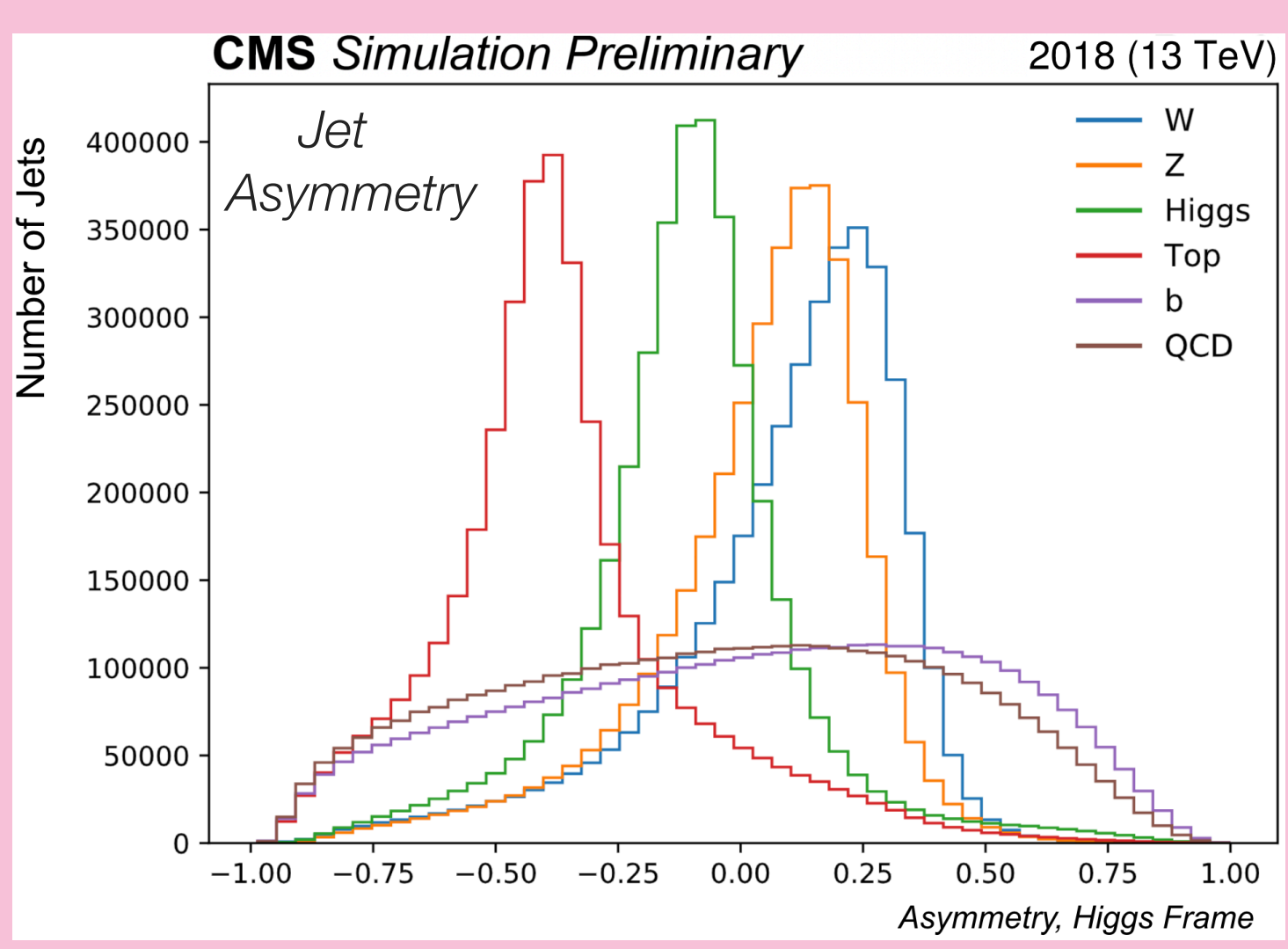
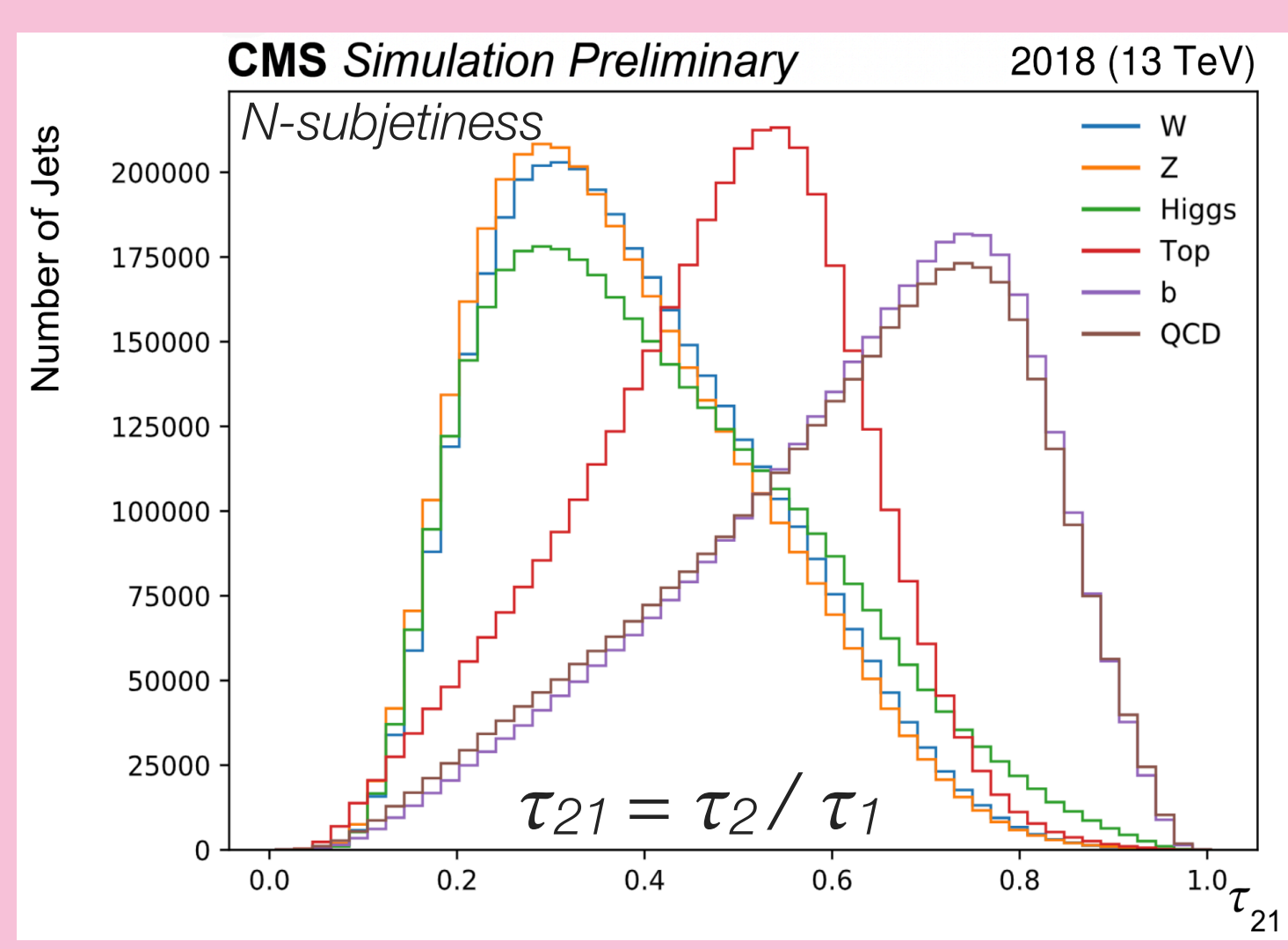
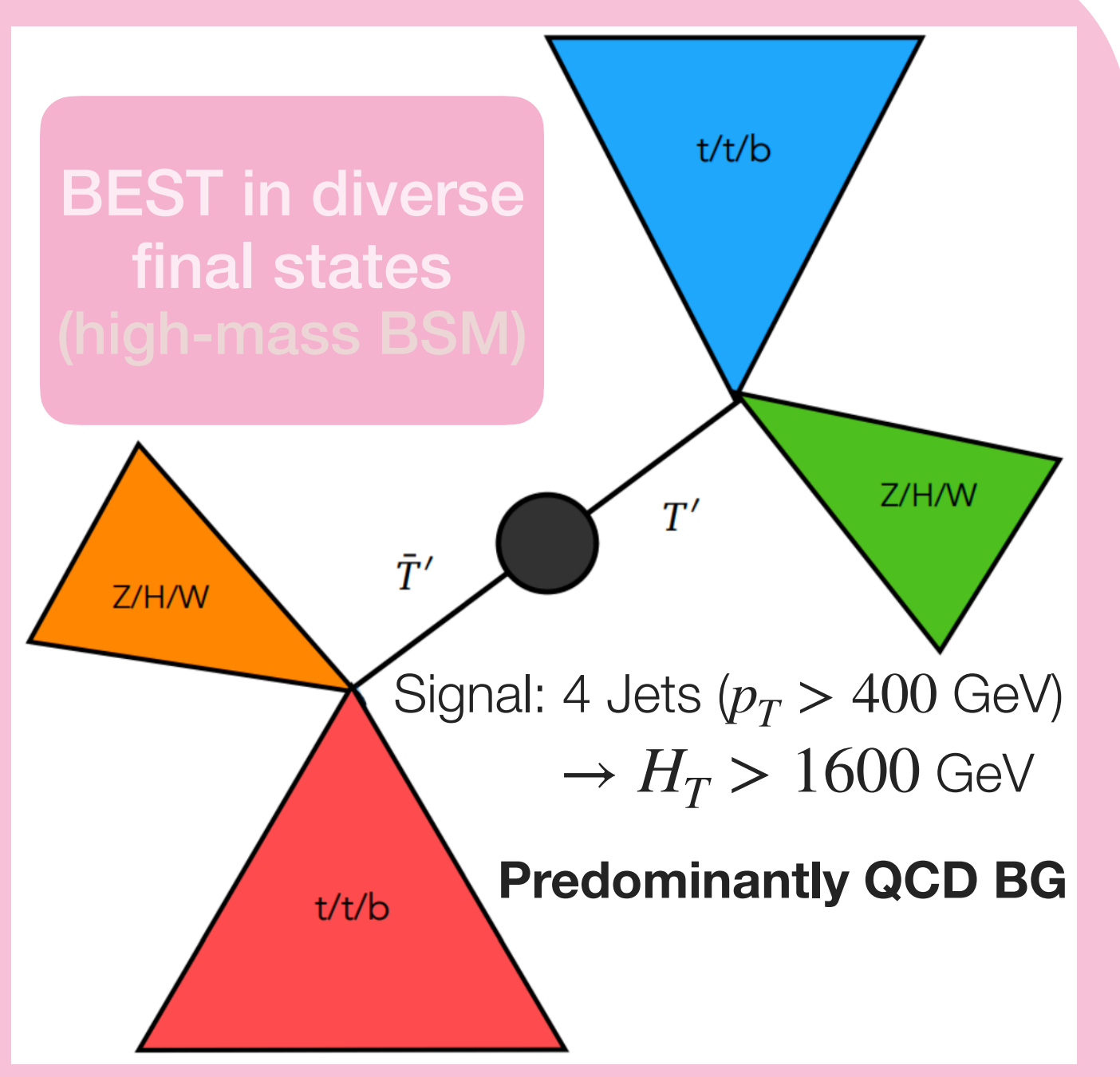
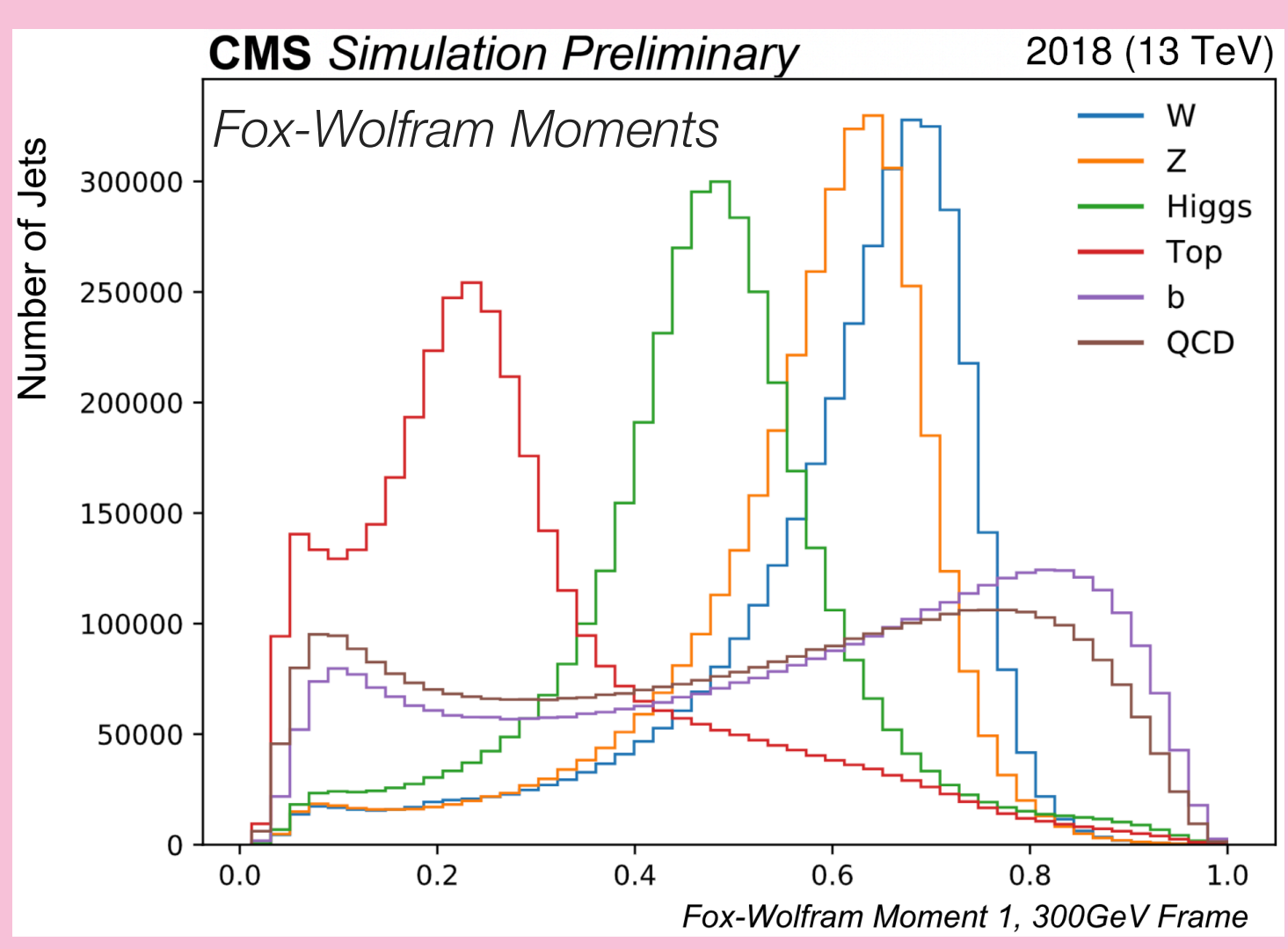
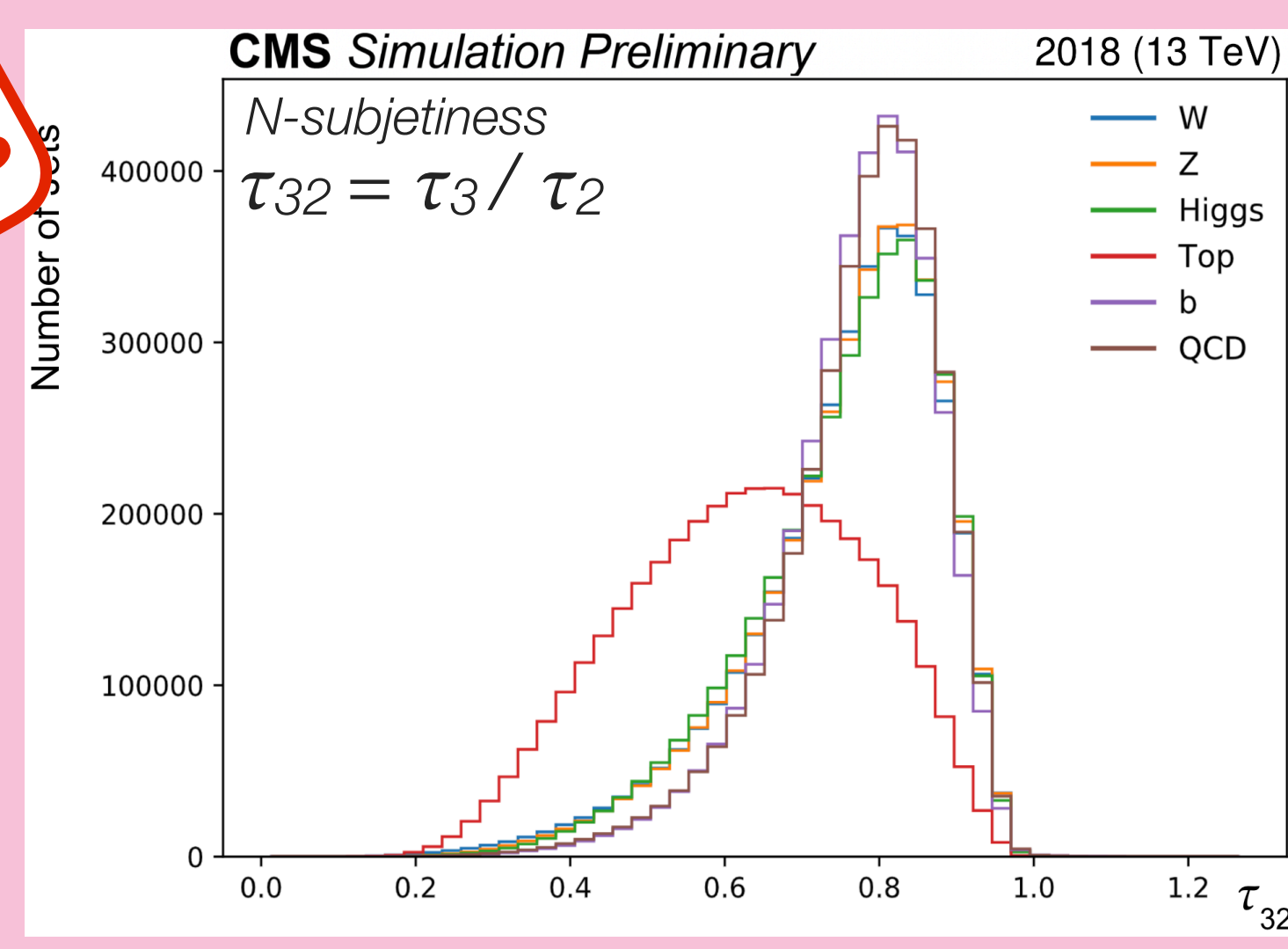
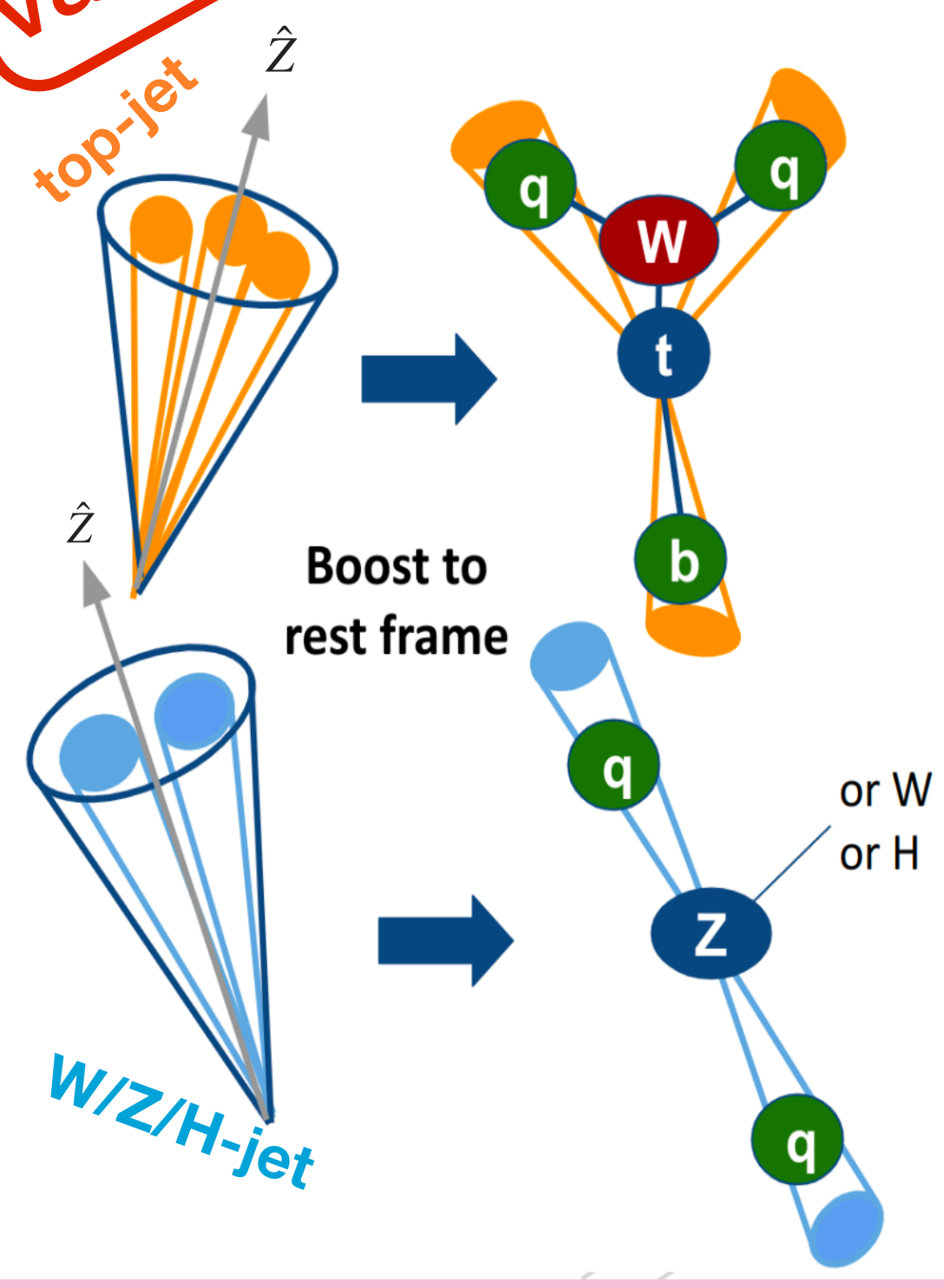
Boosted Event Shape Tagger in Searches for Vector-Like Quarks



Samantha Abbott (UC Davis)

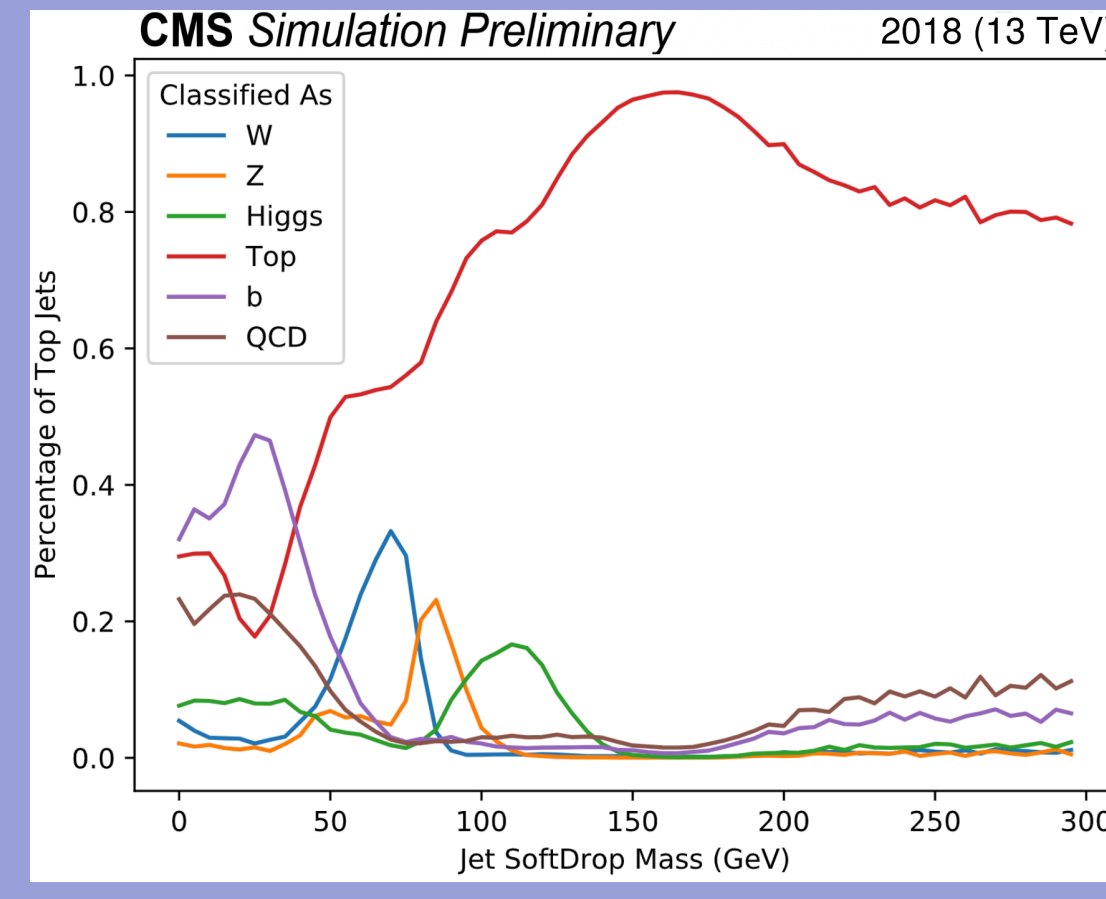
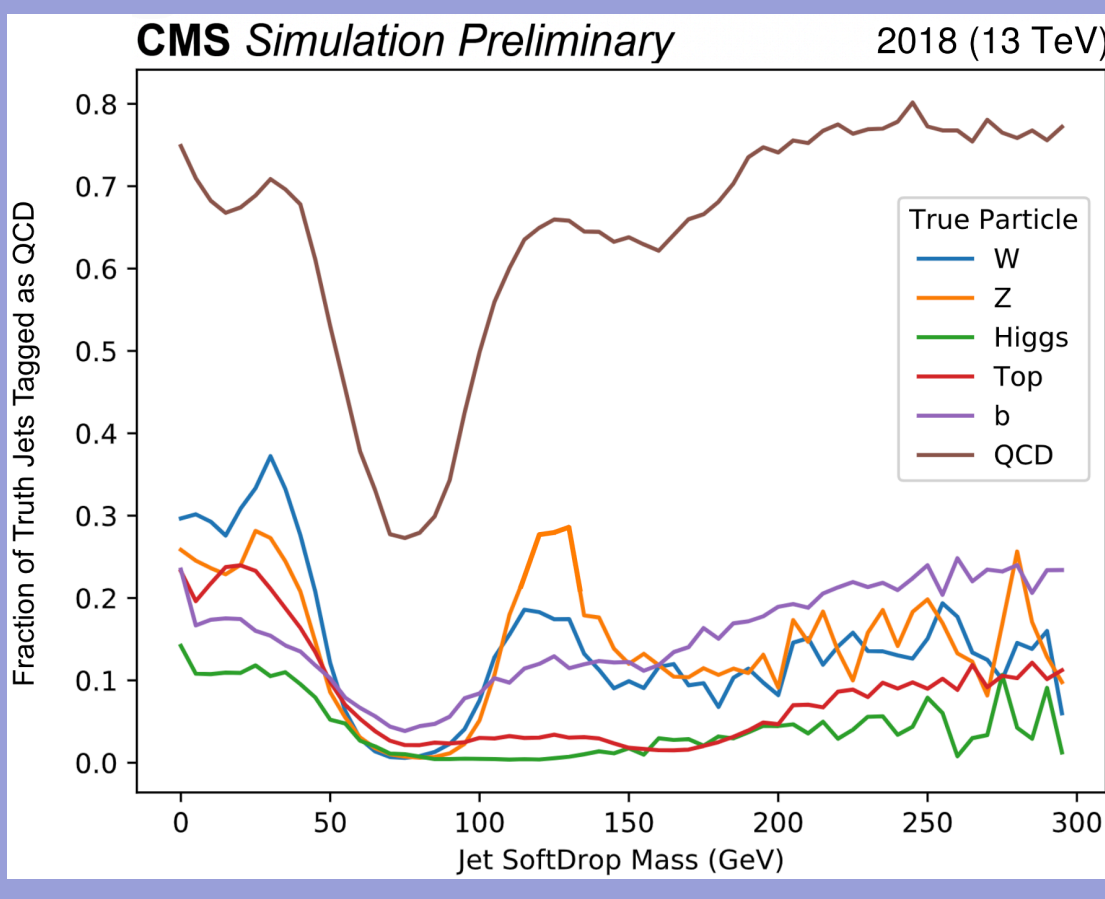
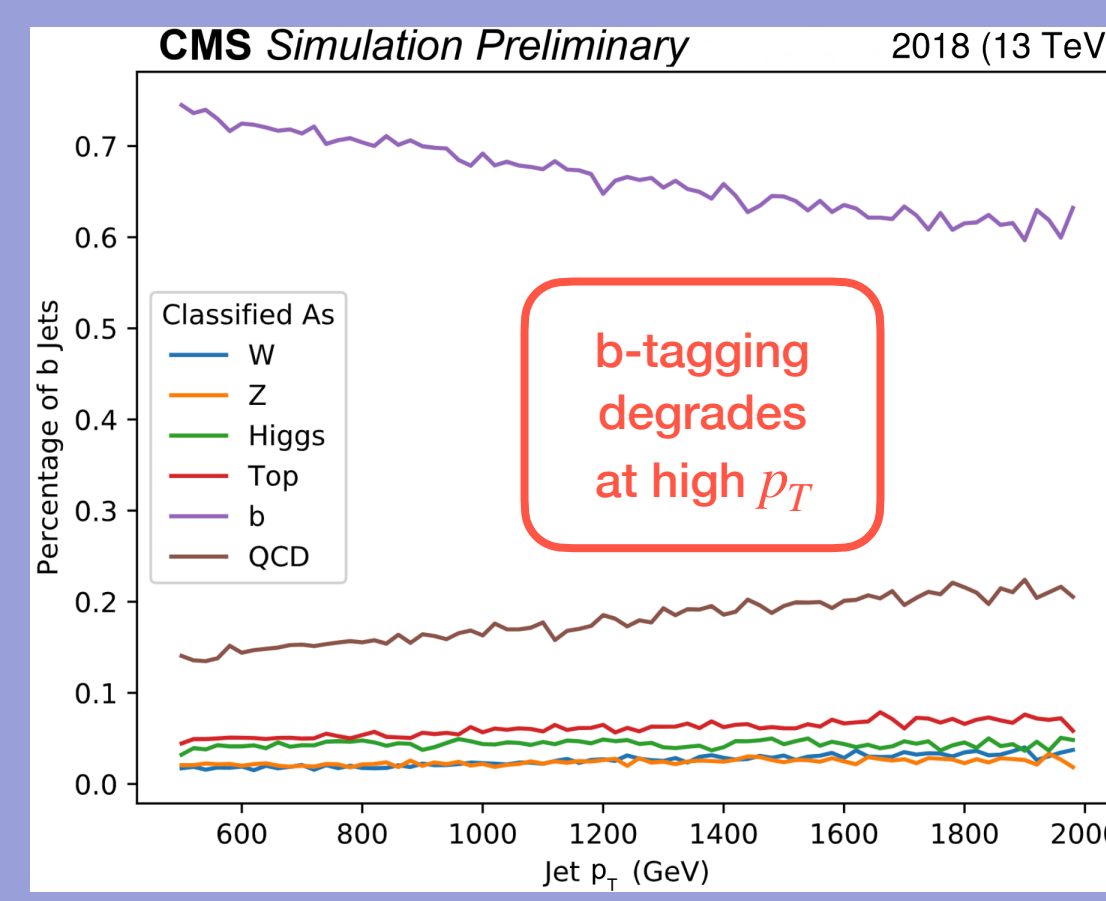
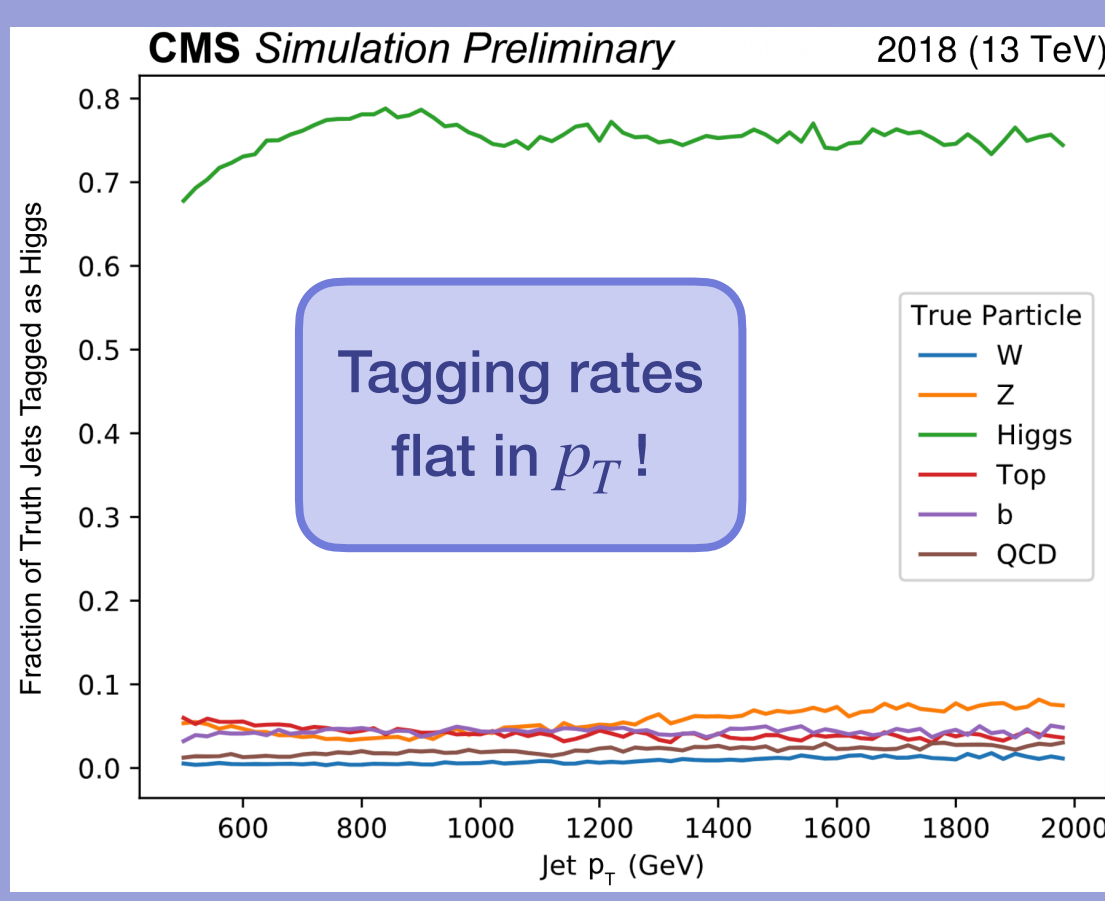
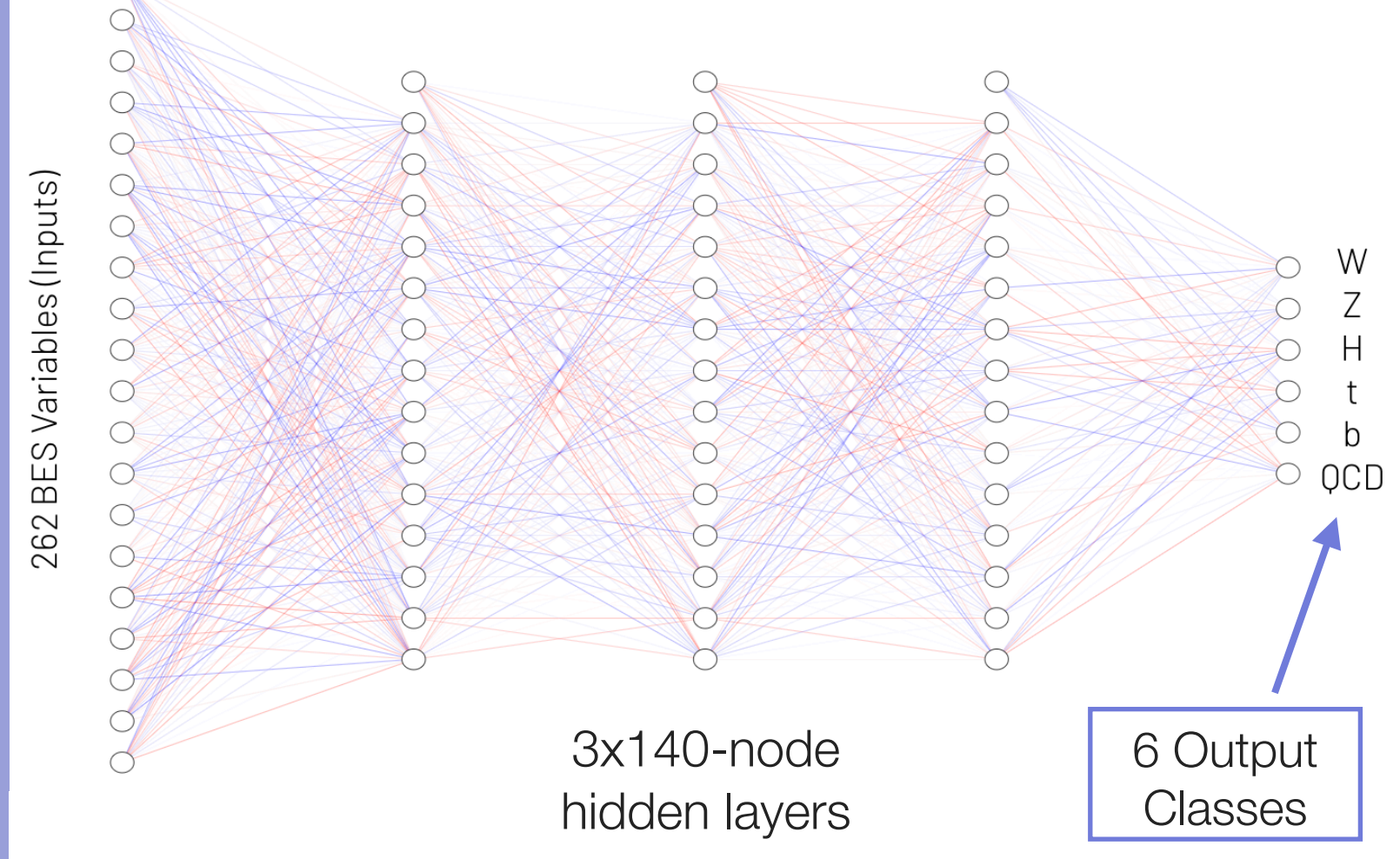
on behalf of the CMS Collaboration

Calculate Boosted Event Shape variables to tag AK8 jets



Tagger Performance

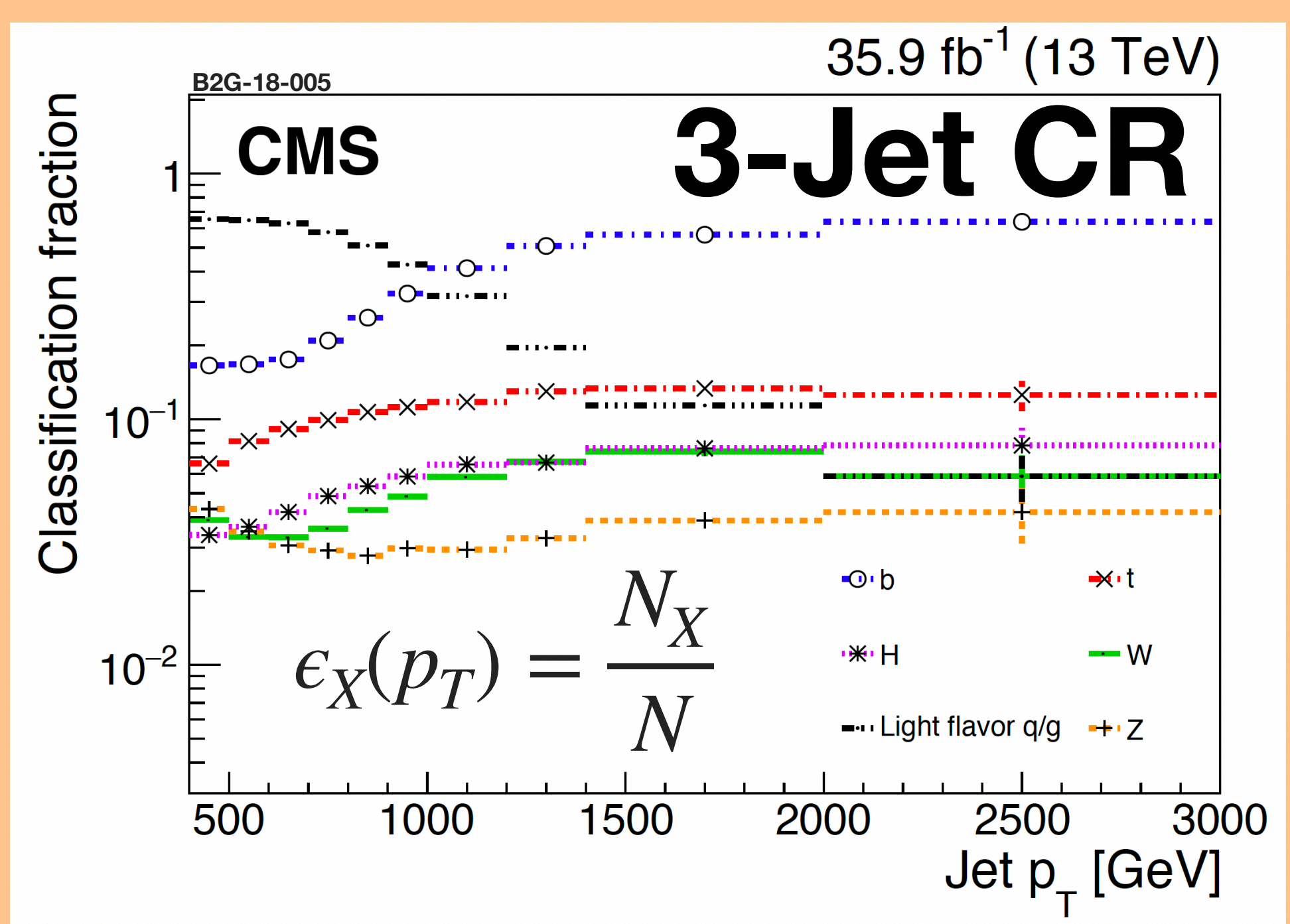
BEST Architecture



True label \ Predicted label	W	Z	Higgs	Top	Bottom	QCD
W	0.73	0.17	0.01	0.03	0.02	0.04
Z	0.22	0.64	0.05	0.03	0.03	0.04
Higgs	0.02	0.08	0.75	0.05	0.08	0.03
Top	0.04	0.03	0.04	0.81	0.04	0.04
Bottom	0.02	0.02	0.04	0.06	0.68	0.17
QCD	0.05	0.03	0.02	0.05	0.19	0.66

All of the above plots are on 2018 simulation

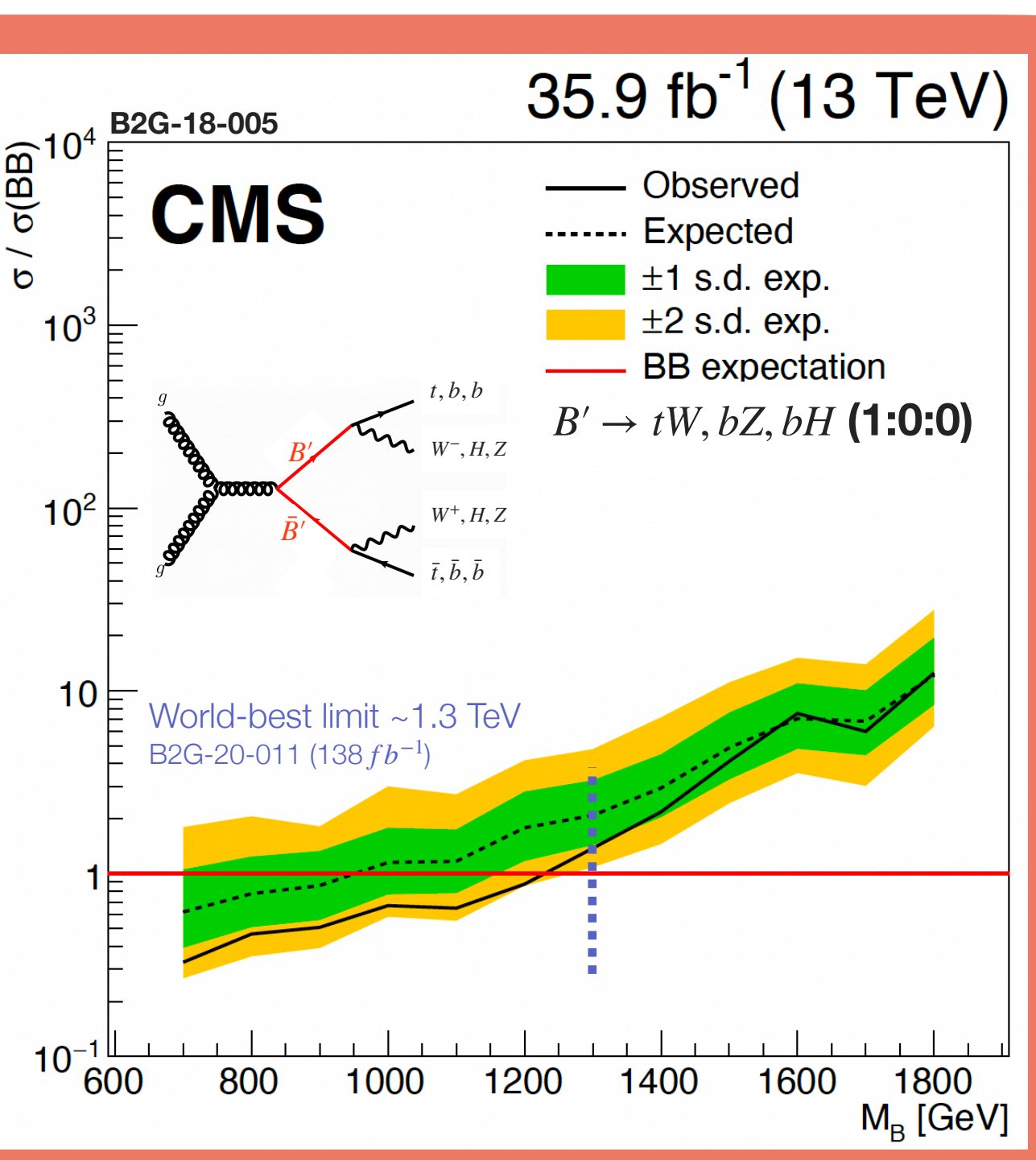
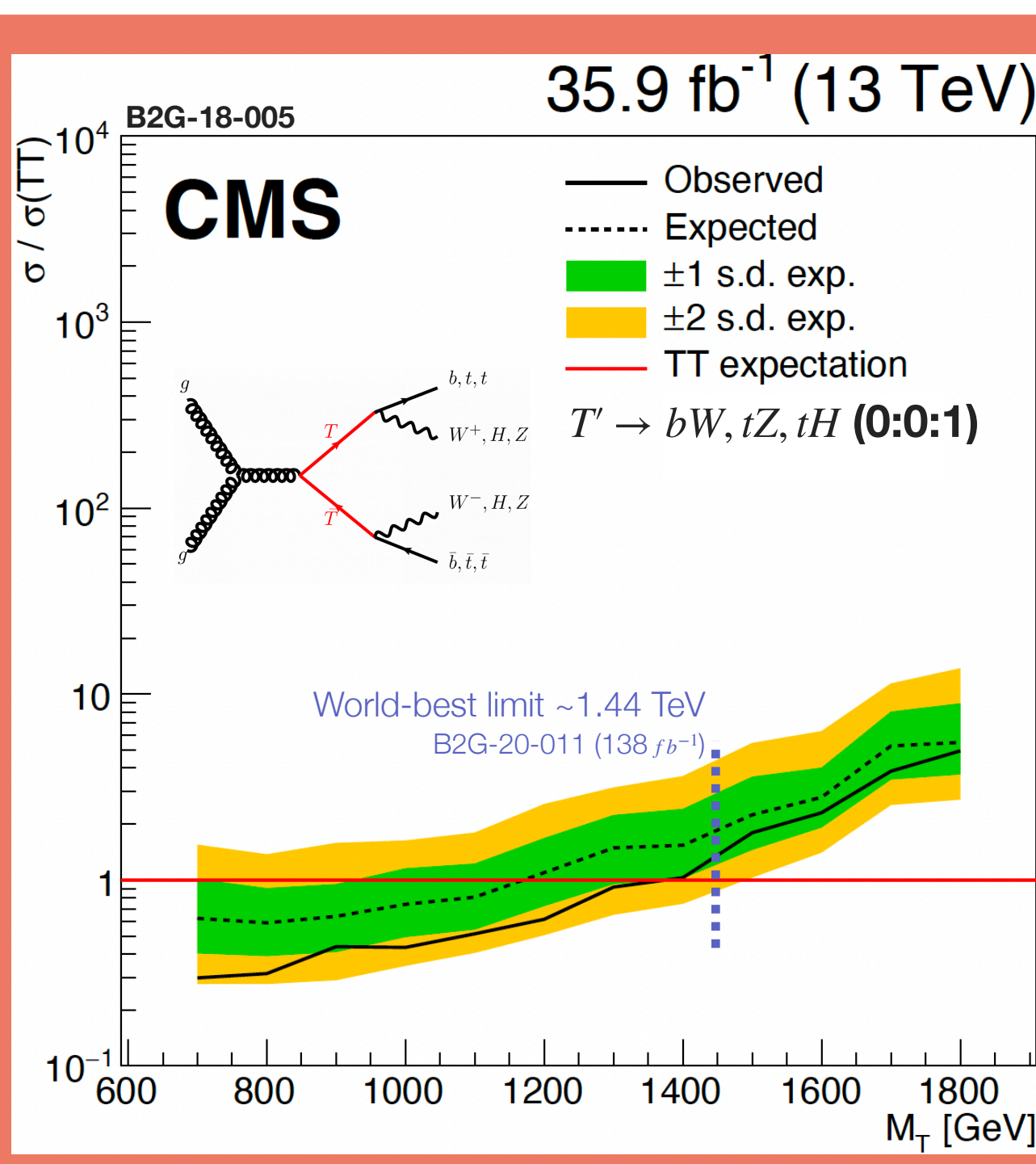
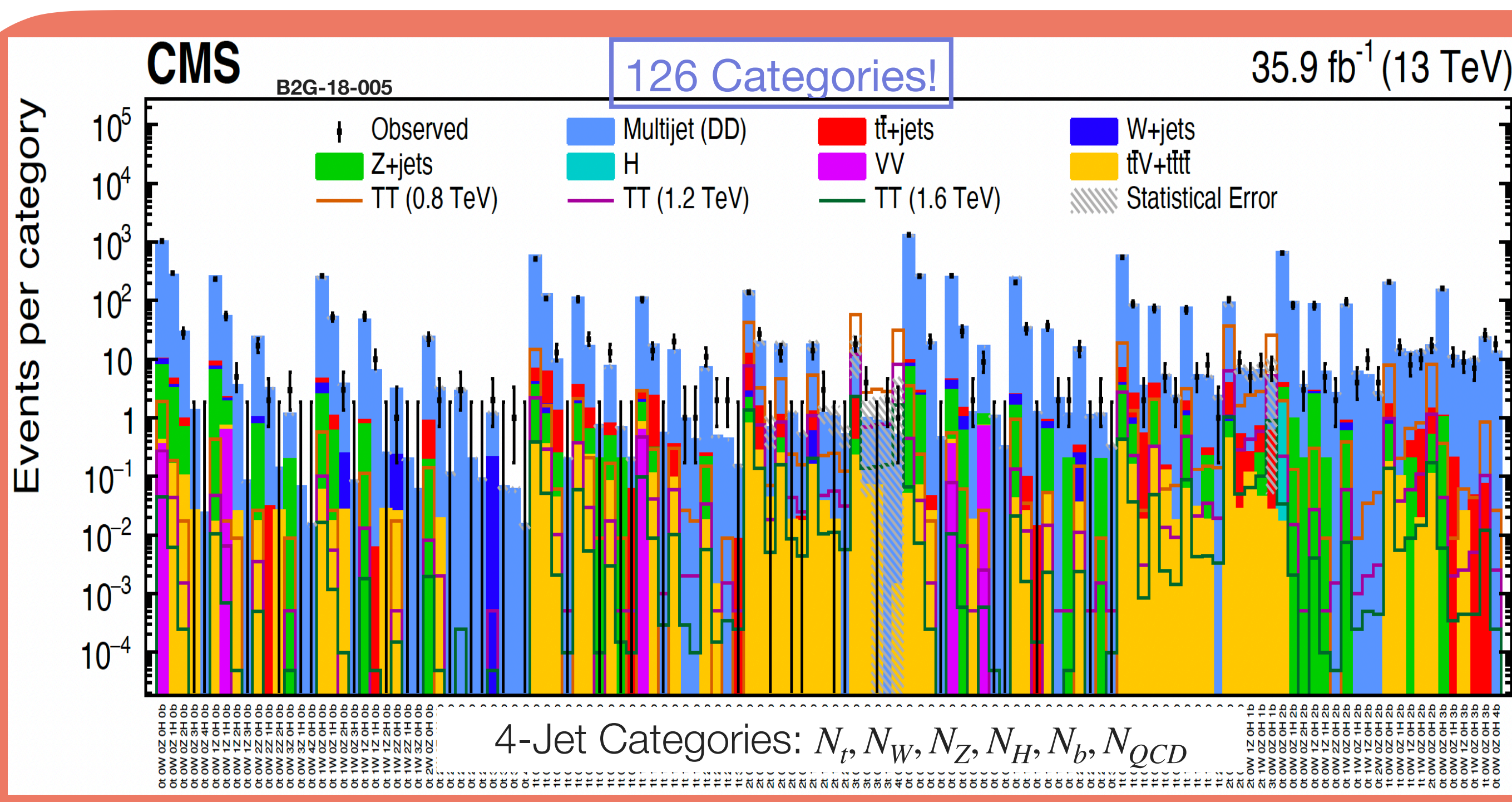
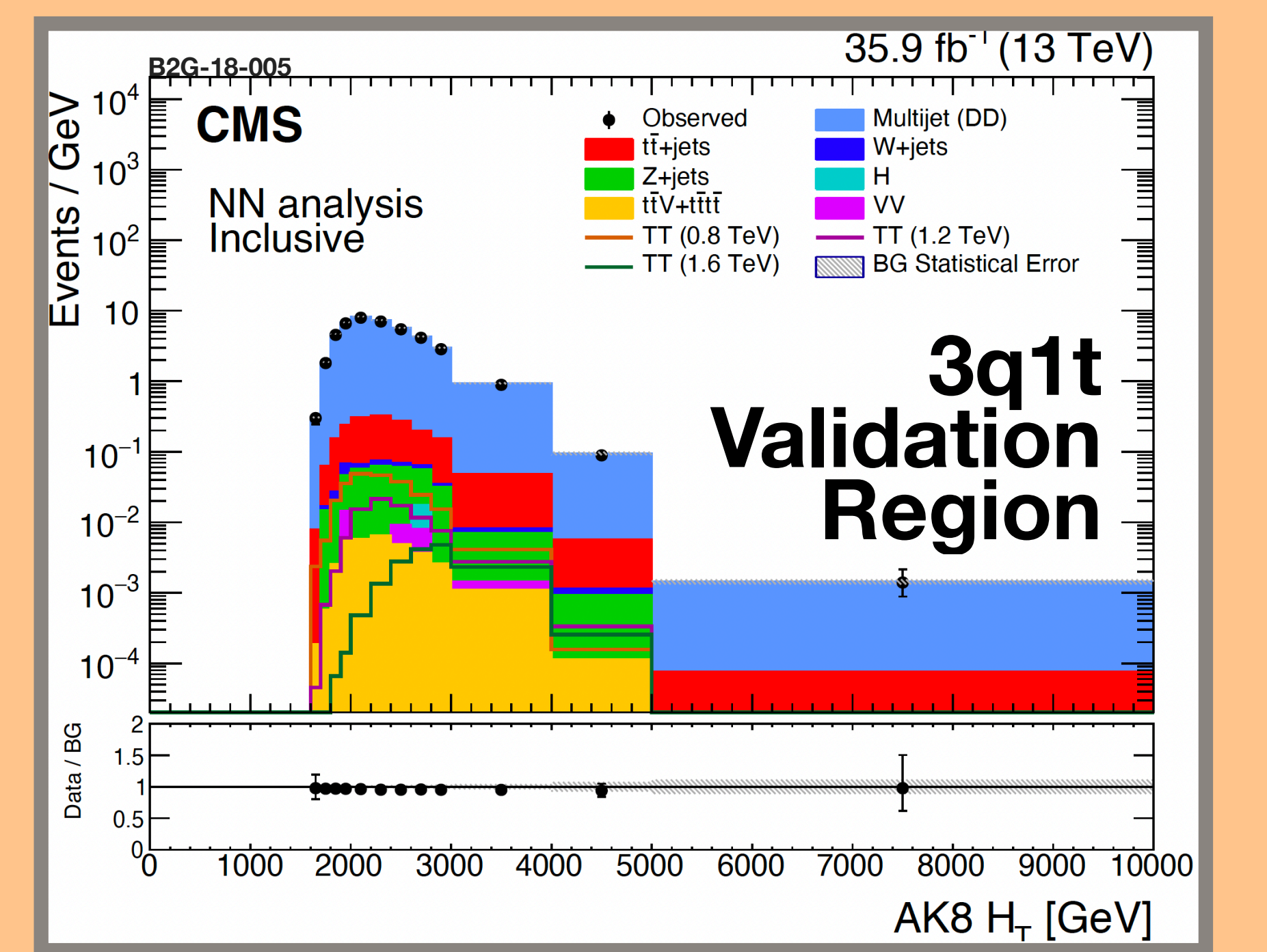
All of the below plots are on 2016 data



Multi-Jet (BG) Estimate

$$r = \sum_{\text{events}} \left\{ \sum_{\text{permutations}} \left[\prod_{i=1}^4 \epsilon_{X_i}(p_T(i)) \right] \right\}$$

Each data event contributes to QCD based on mistag rates



Results