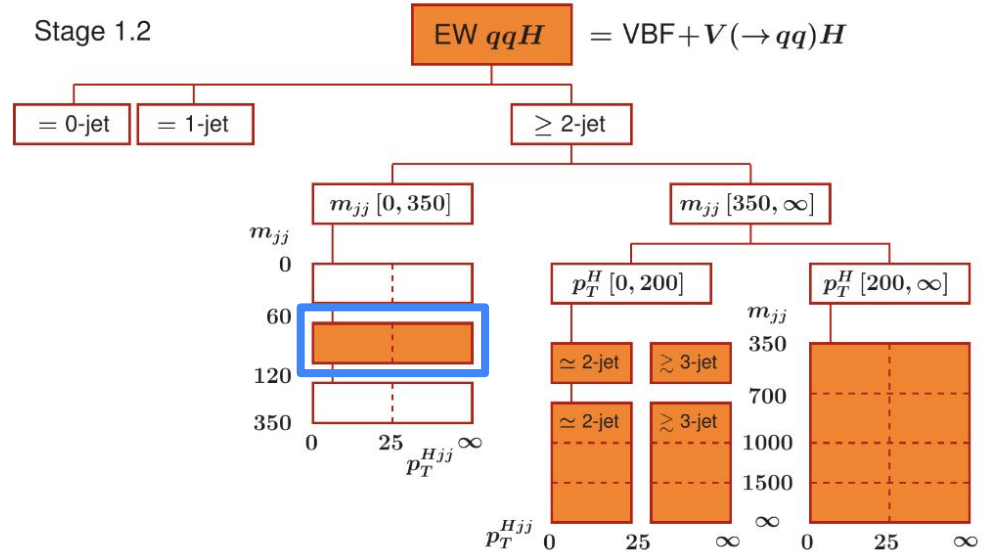


# Boosted Higgs measurements

- Boosted hadronic H decays are some of the most sensitive at high  $p_T^H$ 
  - H(bb): [CMS inclusive](#), **New!** [CMS ggF+VBF](#), [ATLAS inclusive](#), **New!** [ATLAS all-hadronic VH](#)
  - H( $\tau\tau$ ): [CMS](#), ATLAS
  - Plus additional channels still being explored
- Analyses require leading large-R jet  $p_T \gtrsim 450$  GeV for trigger reasons
- This phase space is especially sensitive to BSM effects
  - Binning conventions should capture this for most powerful interpretation
- STXS bins in ggF ( $p_T^H > 200$ ) and ttH split in  $p_T^H$ 
  - Boosted measurements will contribute to the highest  $p_T$  bins
- For VBF and hadronic VH, things are not so clear

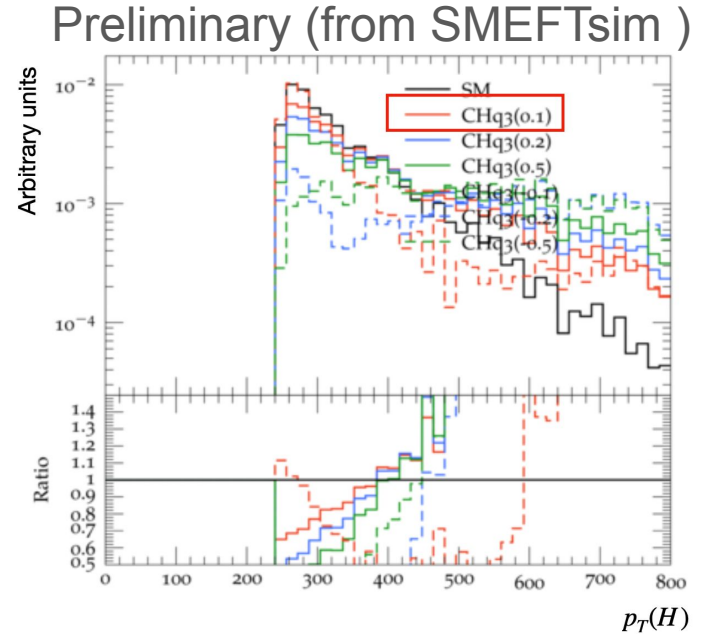
# Boosted VH, all-hadronic

- Final state has 2 large-R jets
- First STXS splitting is in small-R jet multiplicity
  - This process would ideally fall into hadronic VH bin. Need to check whether it does
  - Would like to have splitting based on  $p_T^H$



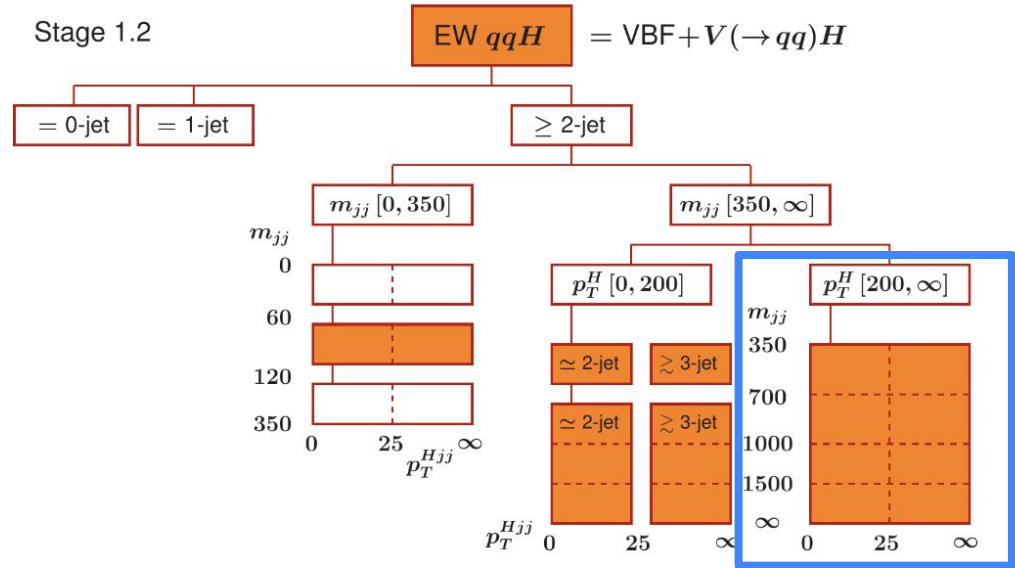
# Boosted VH, all-hadronic

- Introducing additional  $p_T^H$  bins in  $p_T^H > 450$  GeV range will enhance separation for BSM effect
  - Possible  $p_T^H$  bin splitting: [250, 450] GeV, [450, 650] GeV, and  $p_T^H > 650$  GeV
  - Preliminary suggestion



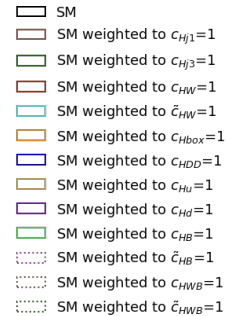
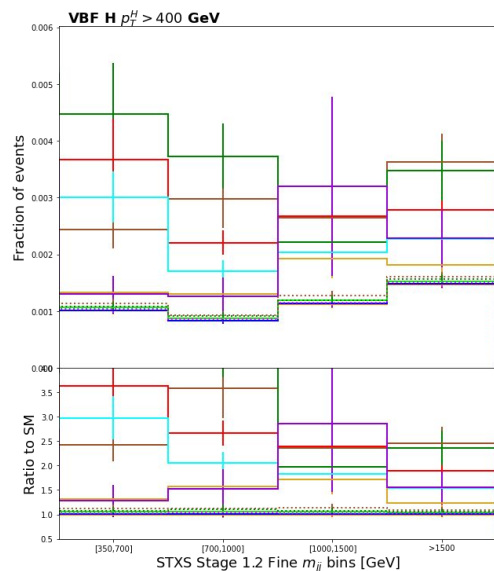
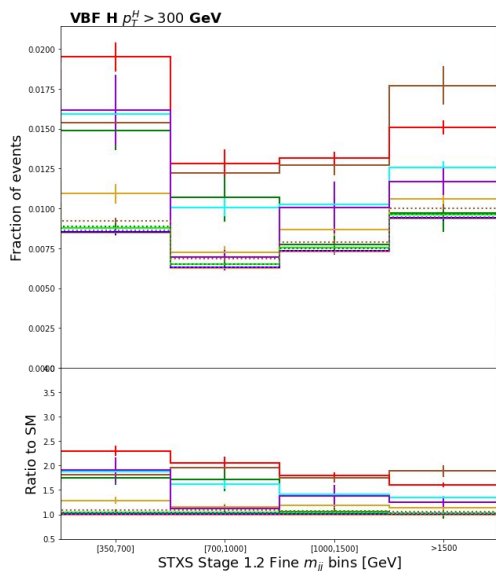
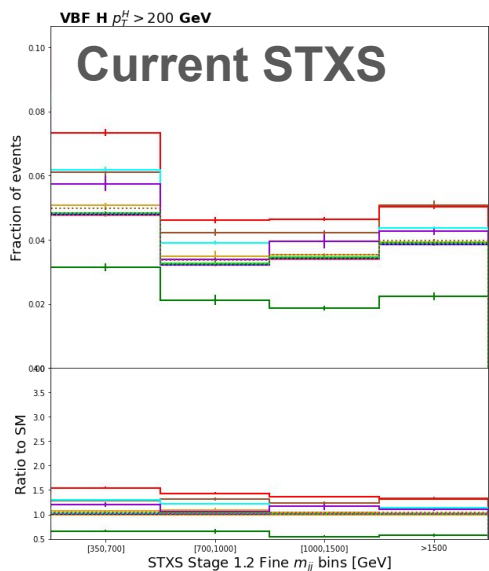
# Boosted VBF

- Tagged with 2 small-R jets with high invariant mass
- Events passing boosted selection ( $p_{\text{T}}^{\text{H}} > 450$  GeV) comprise only a small fraction of the **high  $p_{\text{T}}$  STXS bin** ( $p_{\text{T}}^{\text{H}} > 200$ )
- Higher  $p_{\text{T}}^{\text{H}}$  gives better sensitivity to EFT operators that enhance rate at high  $p_{\text{T}}$



# Sensitivity to EFT operators

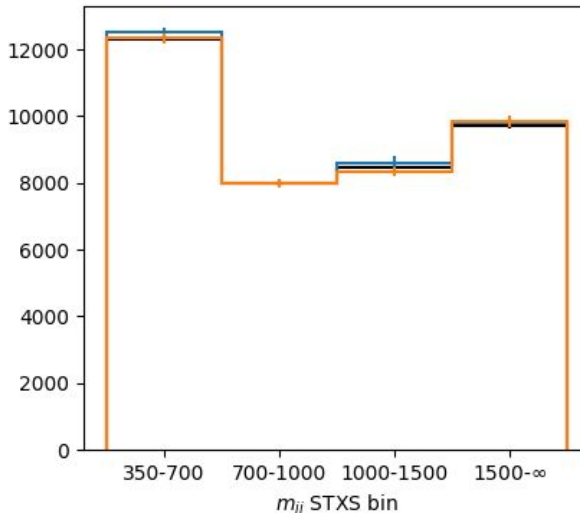
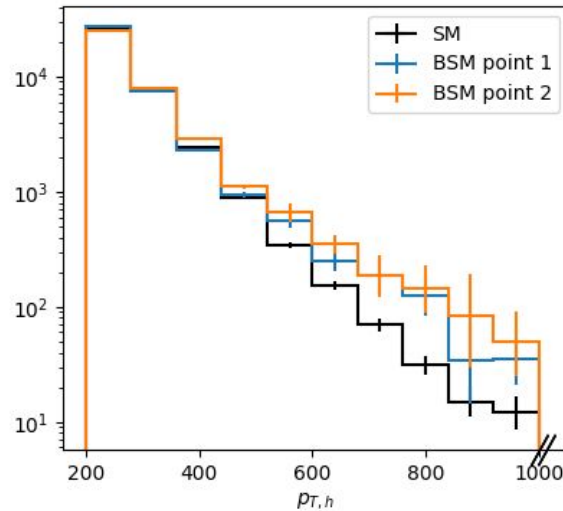
- Try different  $p_T^H$  thresholds on the high  $p_T^H$  STXS bins
  - Higher threshold  $\rightarrow$  better separation of the effects of various EFT operators



[cards](#)

# Searching for maximal deviation

- Sample allowed WC space from recent ATLAS STXS+EWPO fit
  - Draw 100 toys from Fig. 12 of ATL-PHYS-PUB-2022-037 (9 WC in common with our sample)
  - Select two with most deviation in Higgs  $p_T$ , least deviation in  $m_{jj}$ 
    - N.B. complex trials factor



```
BSM point 1
cHB = -0.420
cHDD = 1.861
cHW = -0.452
cHWB = -0.861
cHbox = 0.667
cHd = -0.282
cHj1 = -0.065
cHj3 = 0.019
cHu = 0.213
BSM point 2
cHB = 0.110
cHDD = -0.944
cHW = 0.219
cHWB = 0.275
cHbox = -1.055
cHd = -0.332
cHj1 = -0.158
cHj3 = 0.006
cHu = -0.252
```