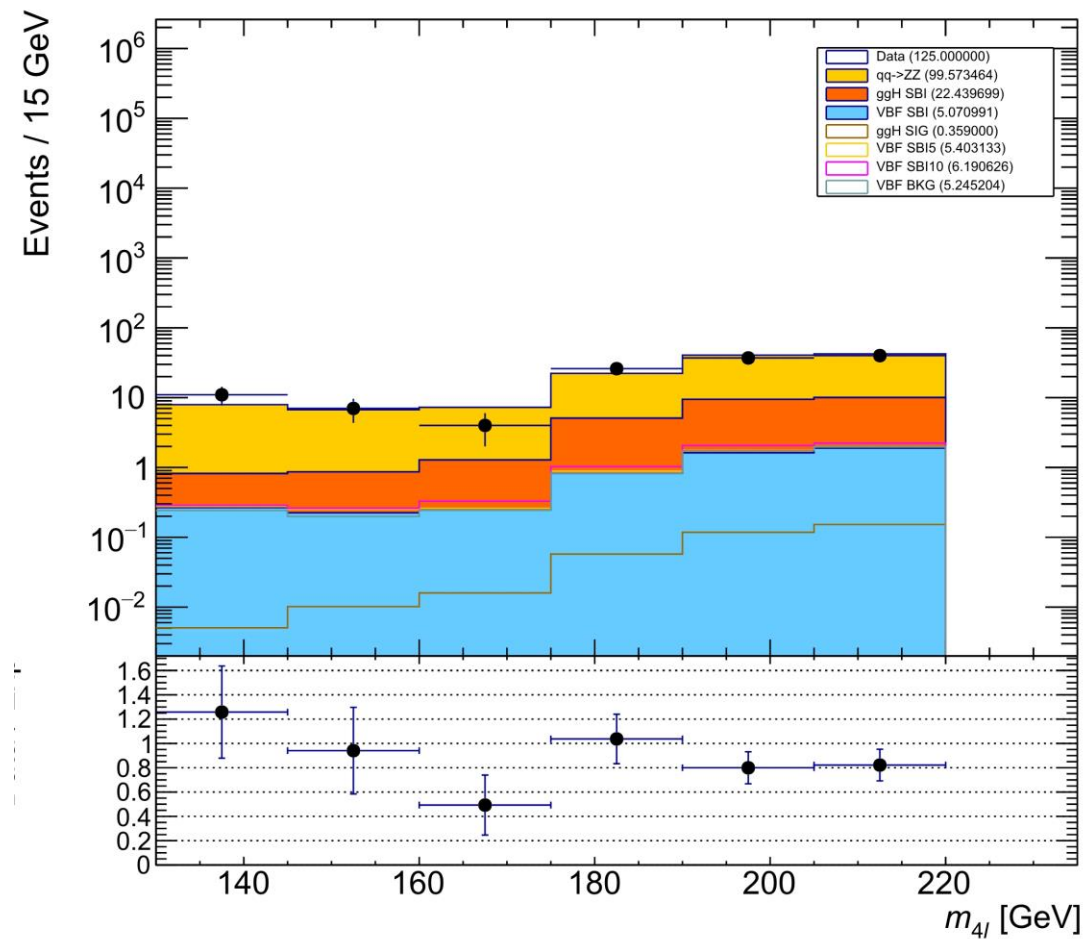
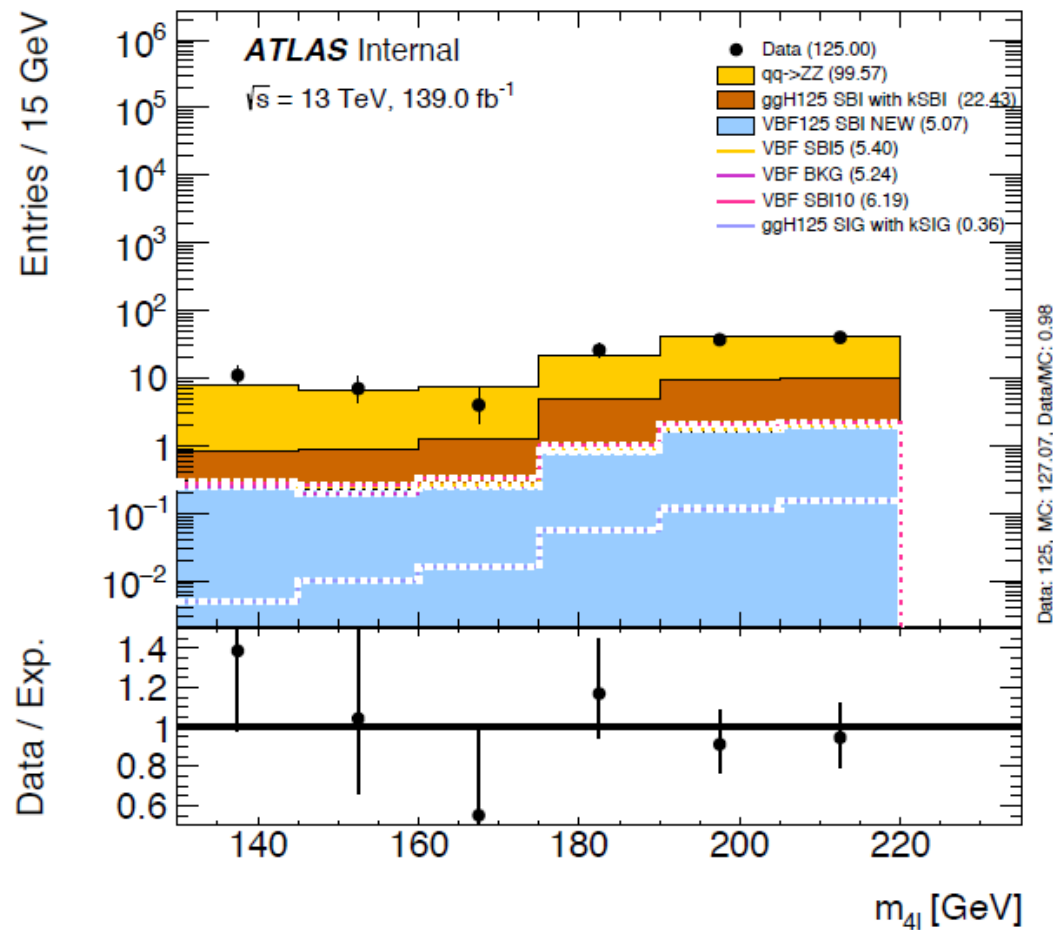


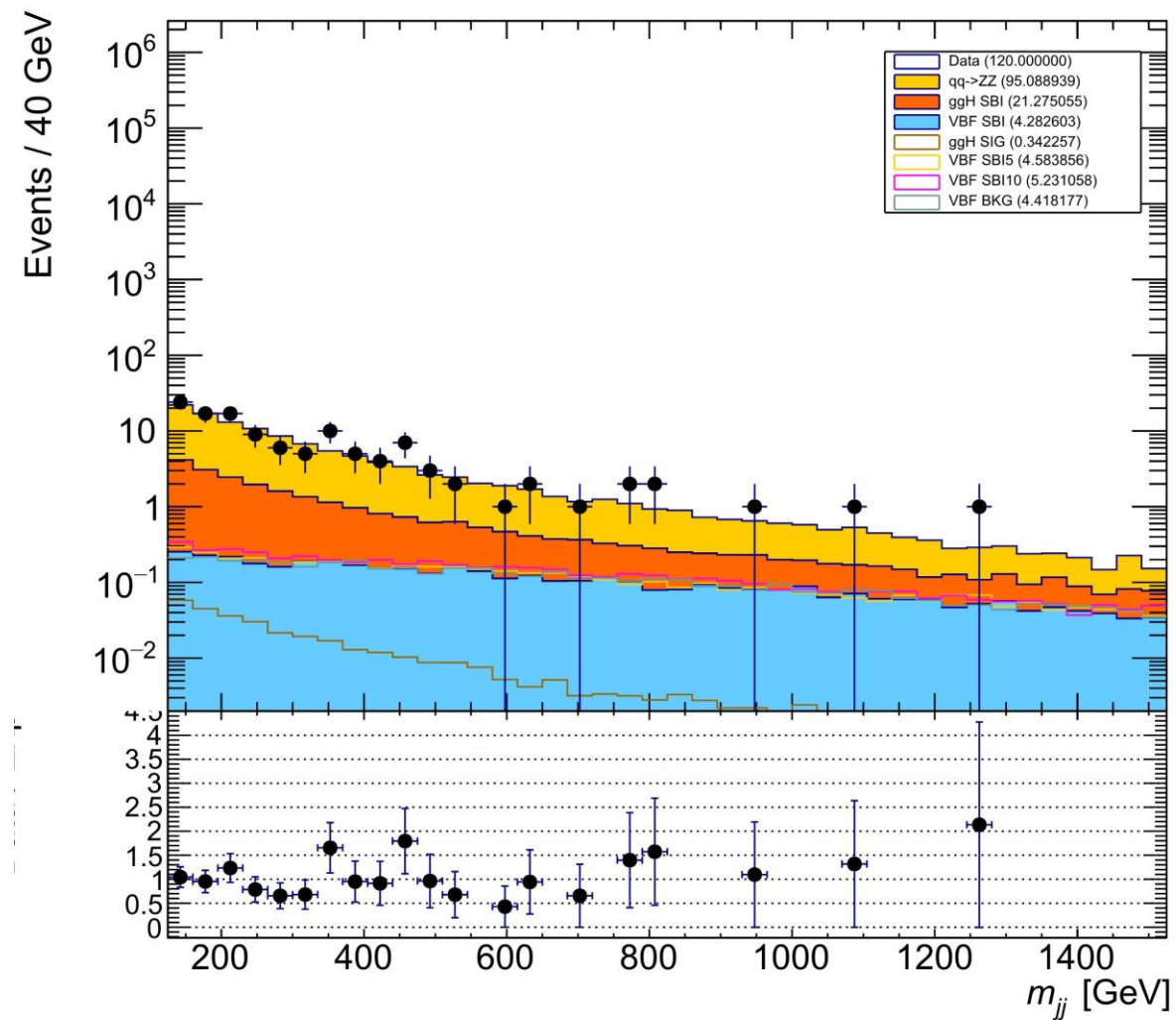
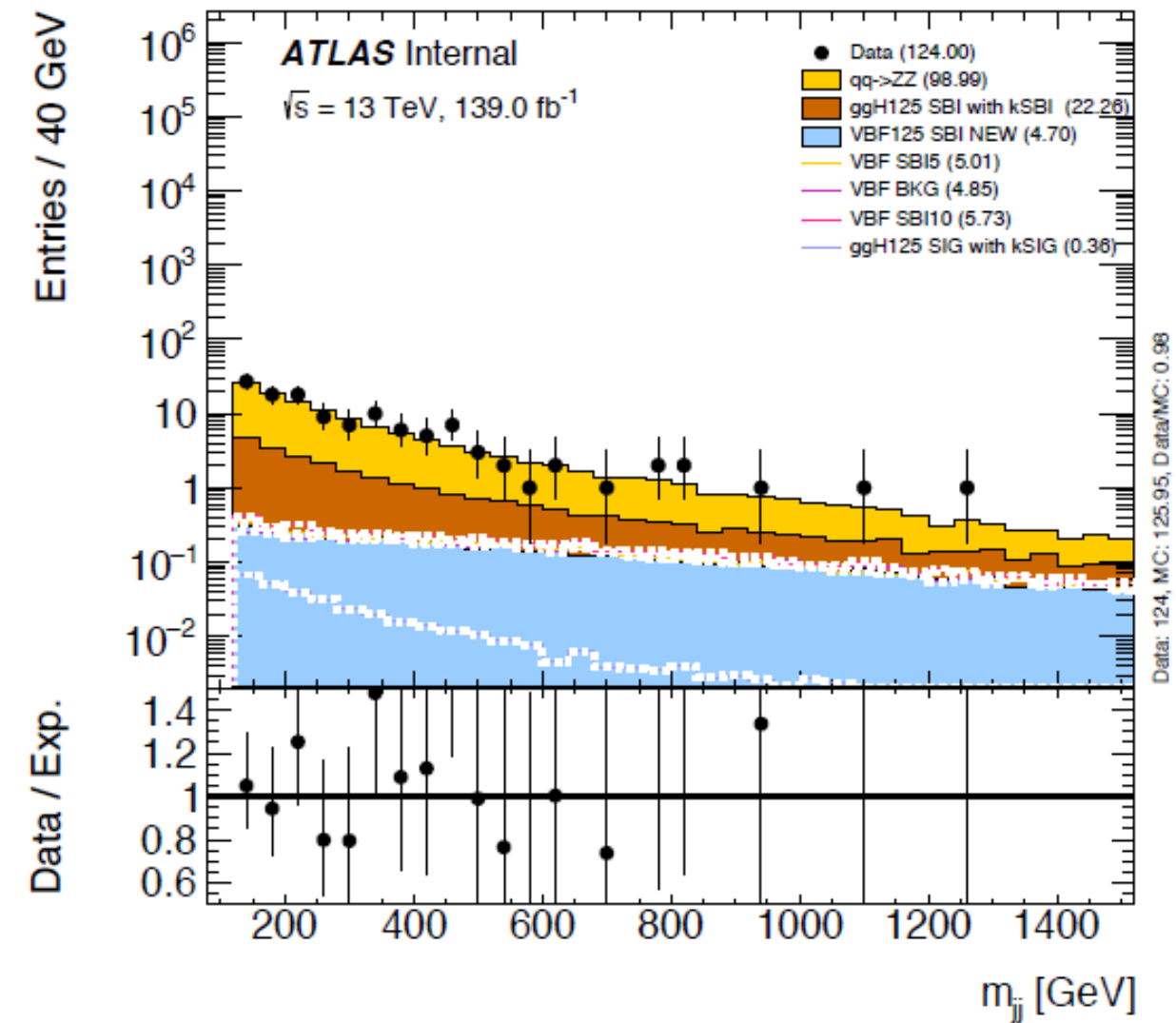
Weekly meeting

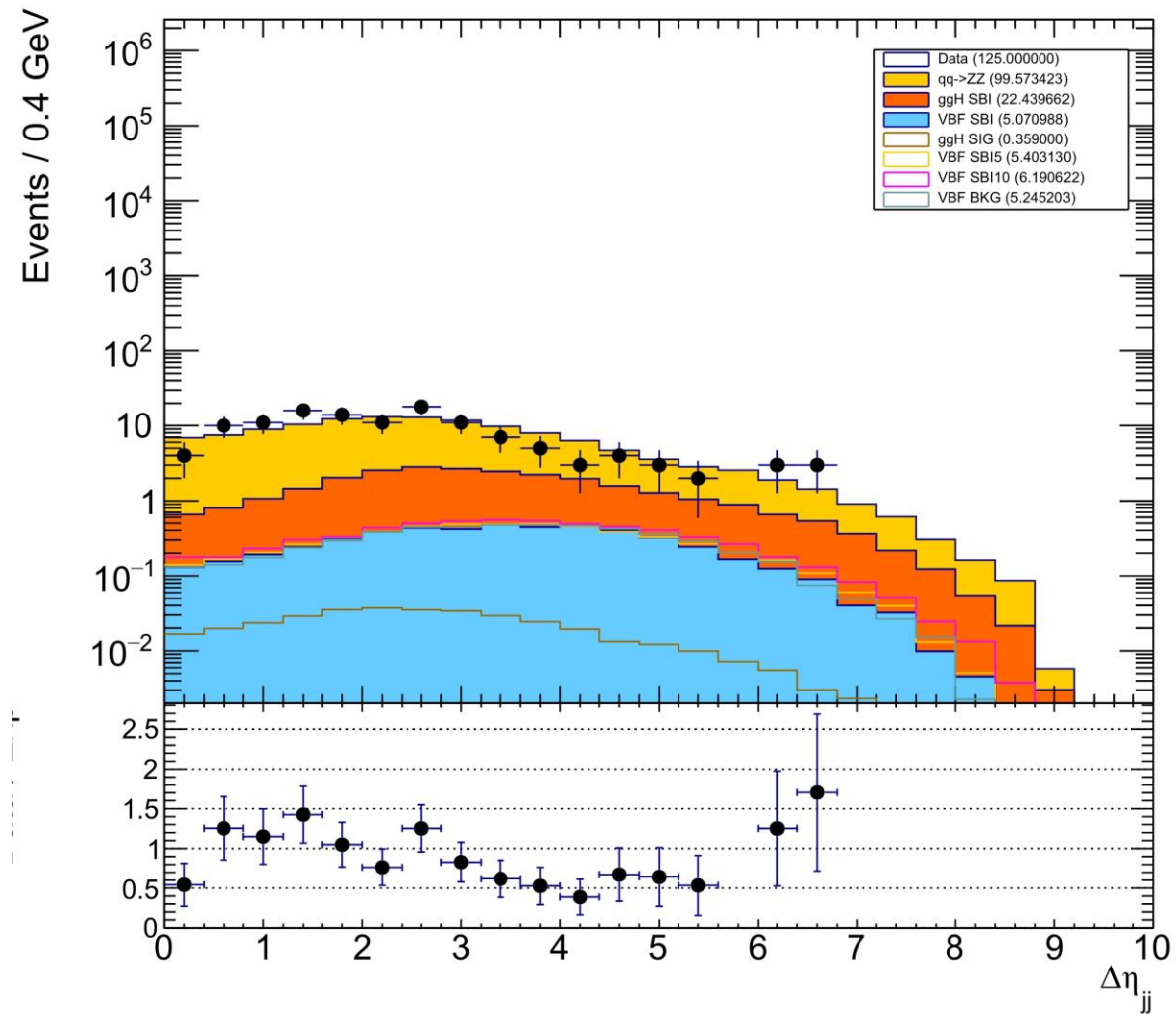
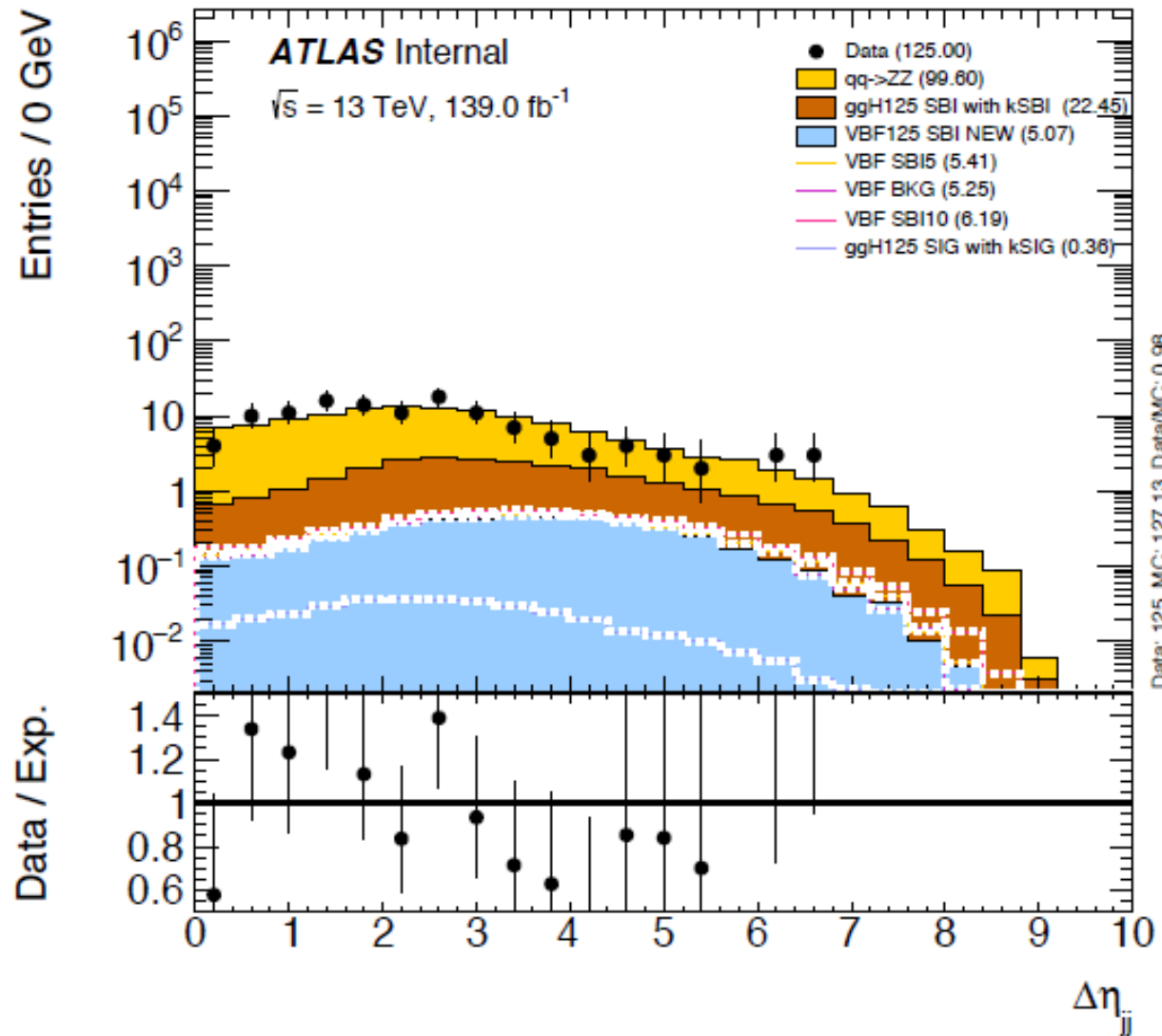
Danyi Zhang

Loose VBF region

$m_{4\ell} \in [130, 220]$ GeV, $m_{jj} > 120$ GeV and $n_{\text{jets}} \geq 2$

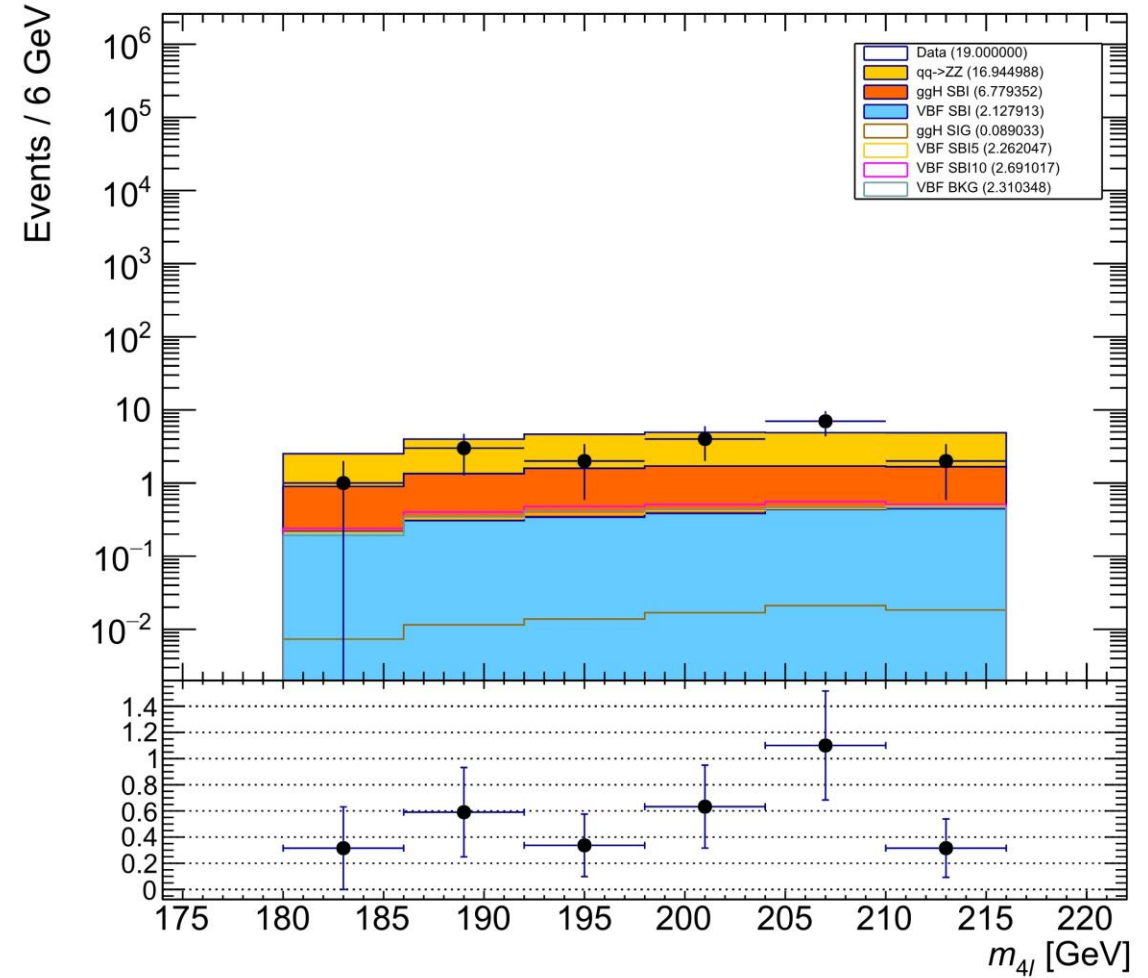
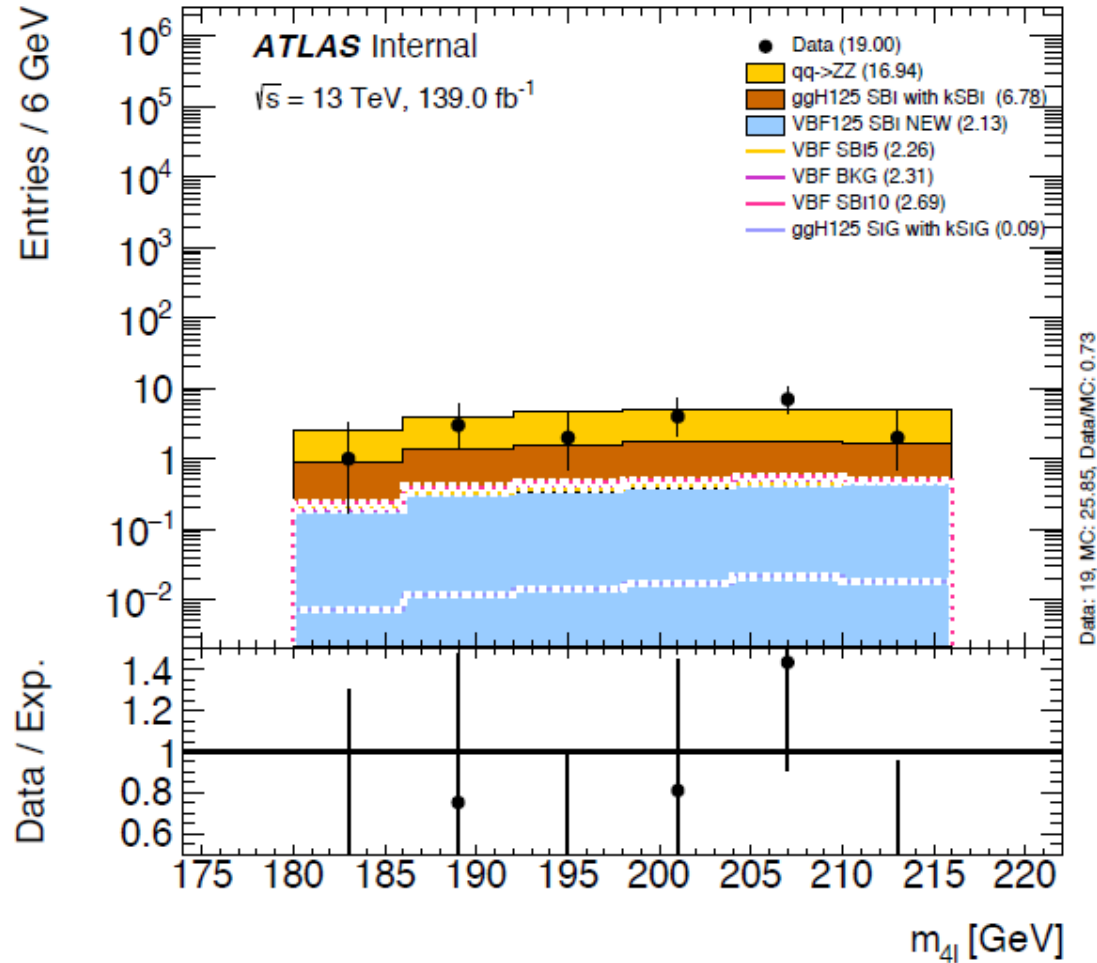


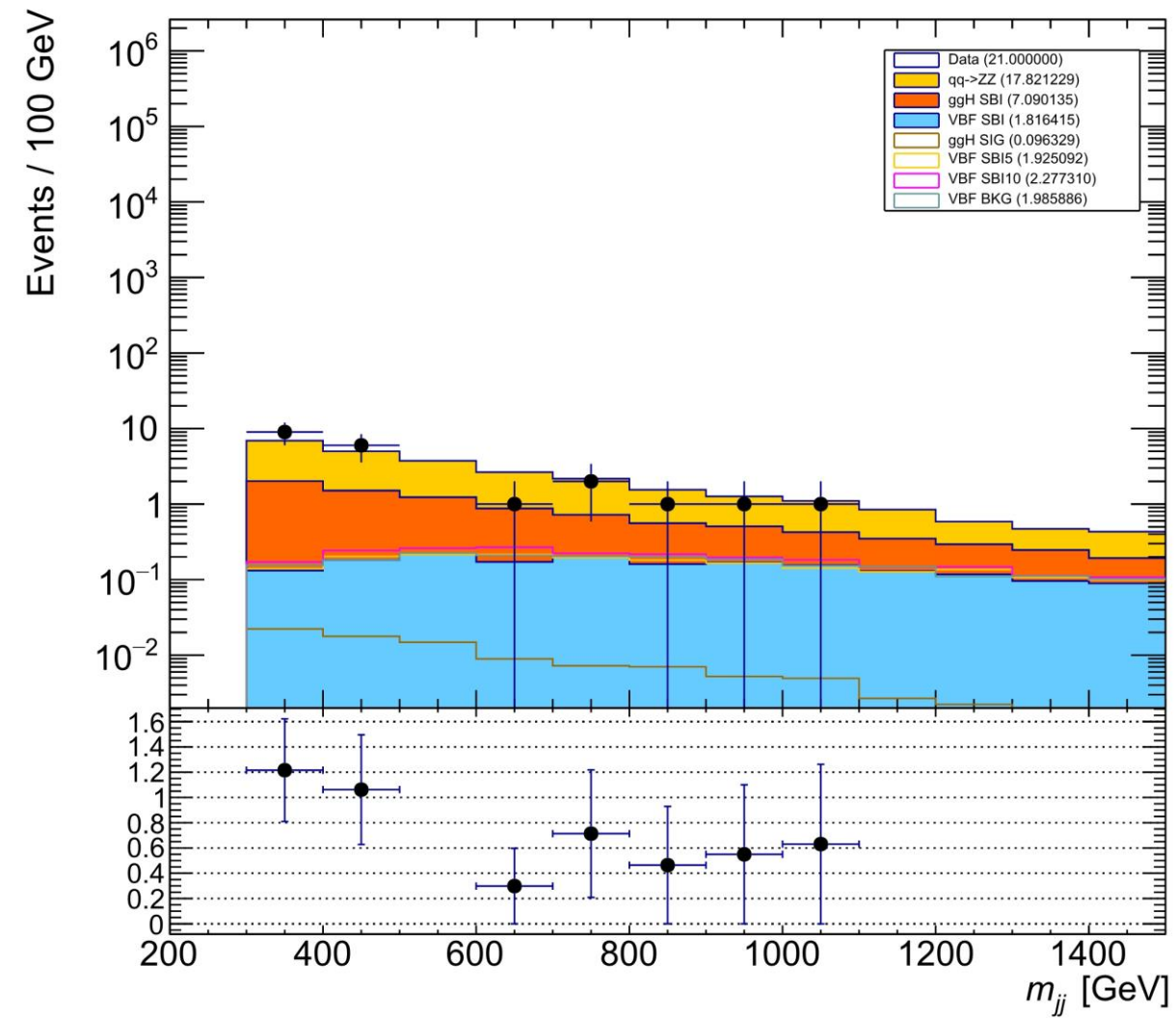
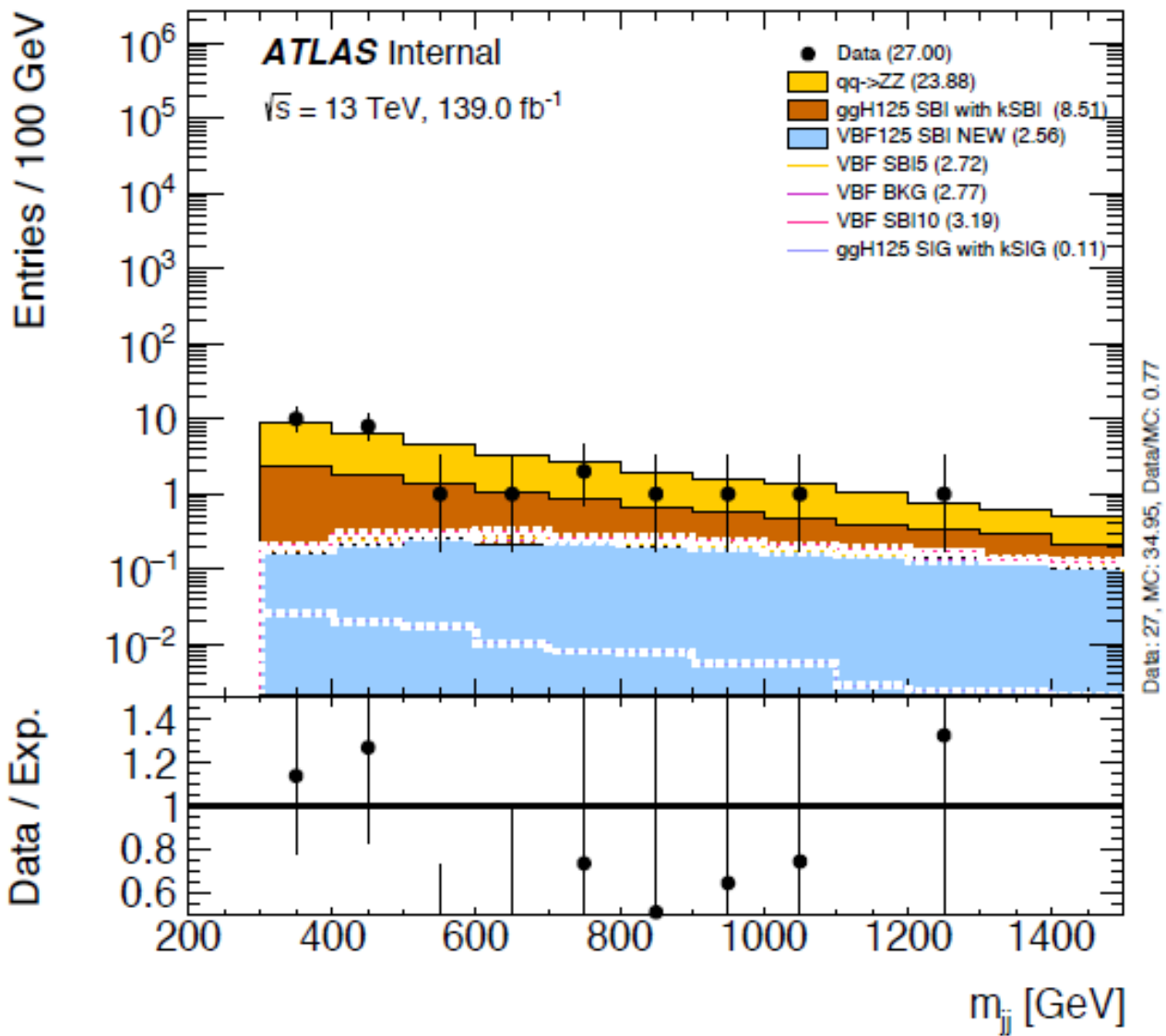




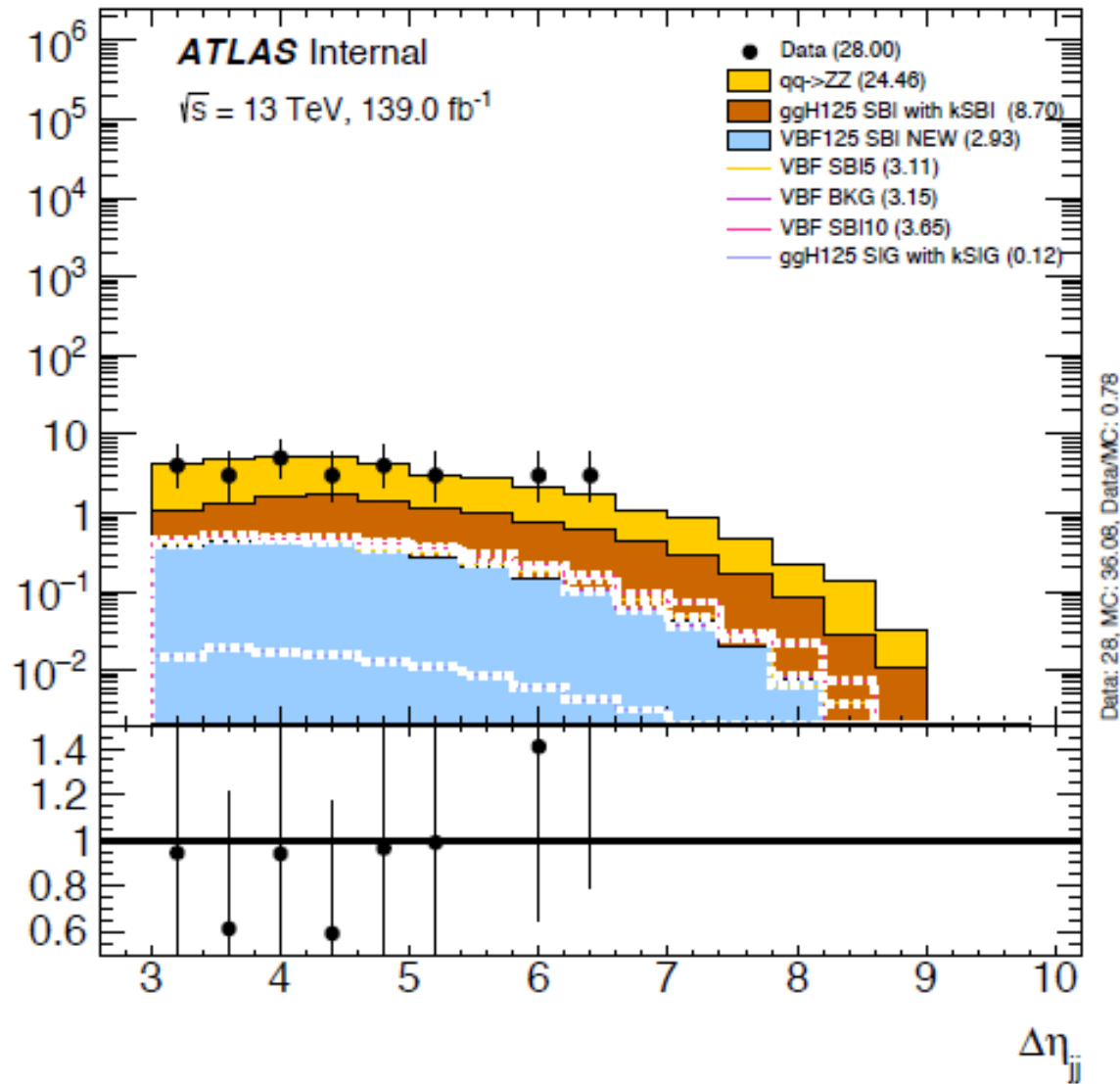
Tight VBF region

$m_{4\ell} \in [180, 220]$ GeV, $m_{jj} > 300$ GeV, $n_{\text{jets}} \geq 2$ and $|\Delta\eta_{jj}| > 3$

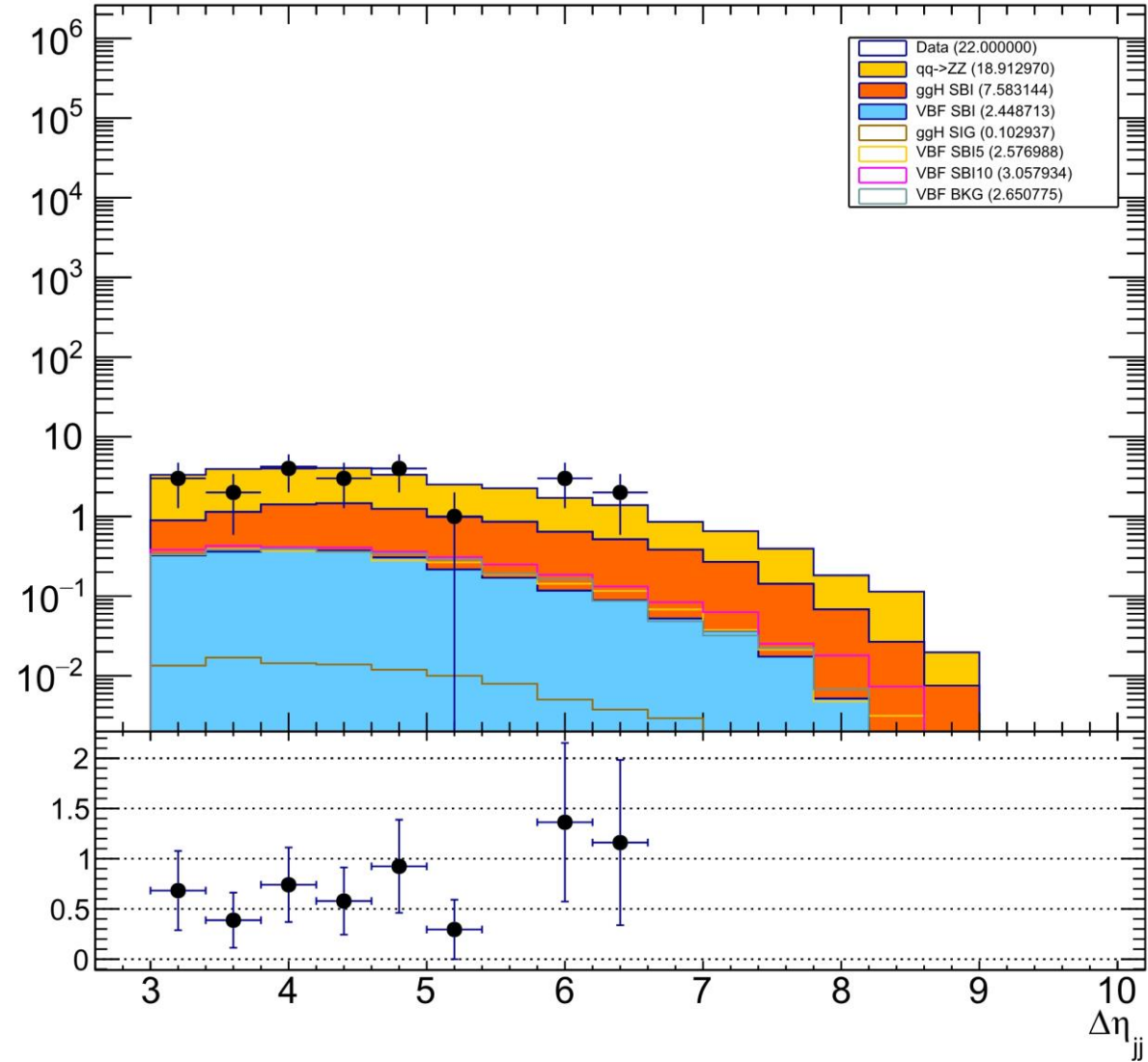




Entries / 0 GeV



Events / 0.4 GeV



- Possible problems:
 - different numbers of bins
 - different bin width
 - different variables (e.g. `m4l_constrained_HM` / `m4l_fsr`)
 - different files
- Next steps:

In summary, please make the following control region plots, a) `m4l:130-220 GeV` b) `m4l: 180-220 GeV`, for the 4 sets of cuts:

1) without `Njets` or other jets cuts (`mjj`, `Detajj`), 2) with loose 3) with tight cuts (like in Martina' s slides) and 4) with tighter jets cuts e.g. `mjj>400 GeV & Detajj>3.3` (high mass paper) or `mjj>500 GeV & Detajj>4.25` (Sam' s optimization).

Of the following variables:

Higgs system

1) `H4l` mass, `H` `pT`, `H` `eta` and `ME` (matrix element)

Jet system

2) `Njets` and `pT jet`, `eta jet` (for the 2 leading jets)

Other useful variables

MELA variables

3) `cos θ*`, `cos θ1`, `cos θ2`, `Φ`, `Φ1`, `Z1` mass, `Z1` `pT`, `Z2` mass, `Z2` `pT`

4) Zeppenfeld variable

$\eta^* = \eta_{4l} - (\eta_{jet\ 1} + \eta_{jet\ 2})/2$ of the `H` and 2 leading jets

Next step, will be to make VBF signal optimizations with MC in the `m4l` signal region 220-2000 GeV using the above variables. Therefore, it' s useful to plot them *only* for the MC in this region. A) w/o cuts B) `Njets >=2`