

Weekly Report

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Plotting

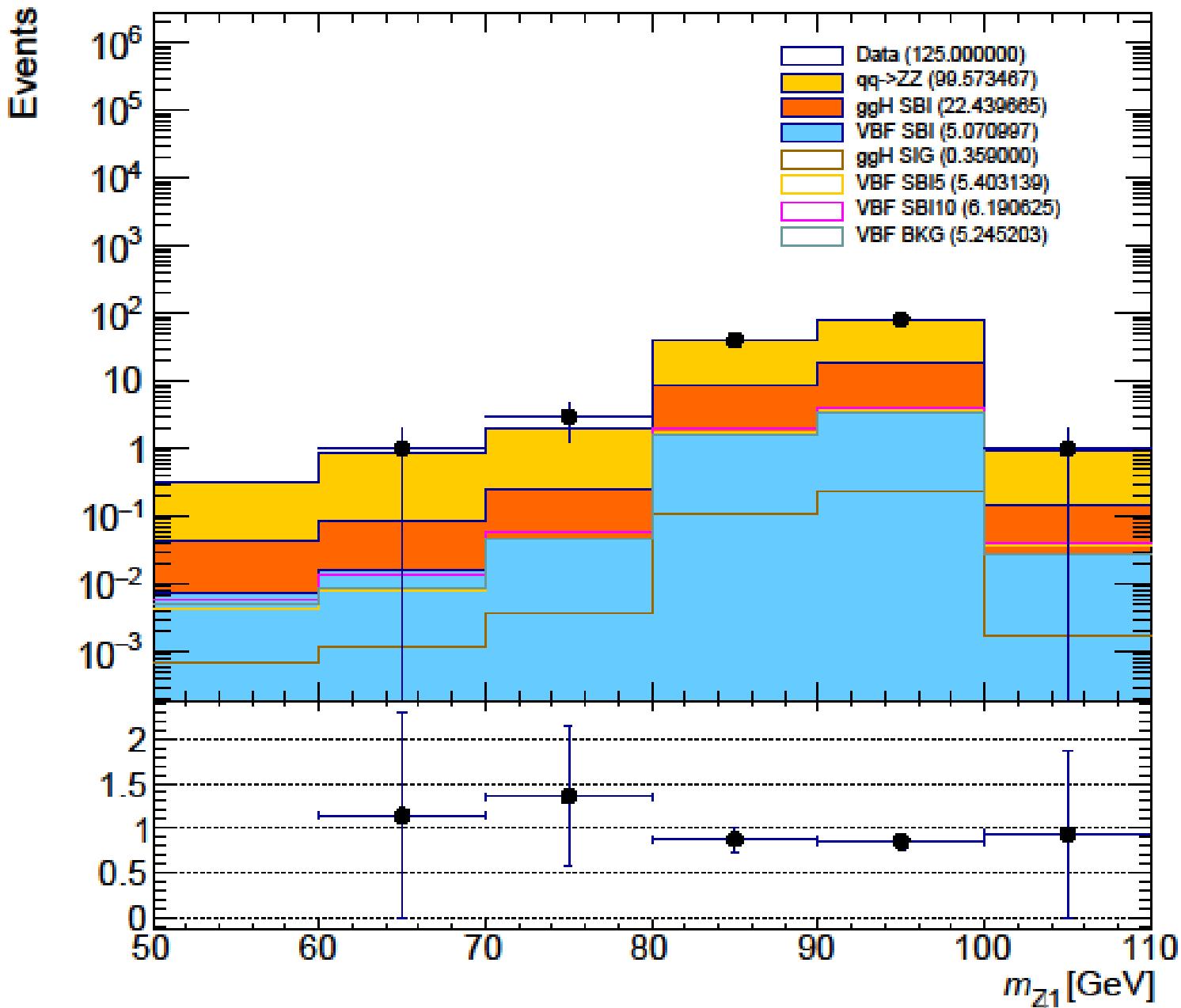
- Control region: $m4l \in [130, 220] \text{ GeV}$
 - without njets or other jets cuts
 - loose cuts: $m4l \in [130, 220] \text{ GeV}$, $m_{jj} > 120 \text{ GeV}$ and $n \text{ jets} \geq 2$
 - tight cuts: $m4l \in [180, 220] \text{ GeV}$, $m_{jj} > 300 \text{ GeV}$, $n \text{ jets} \geq 2$ and $|\Delta\eta_{jj}| > 3$
 - tighter cuts: $m4l \in [180, 220] \text{ GeV}$, $m_{jj} > 400 \text{ GeV}$ & $|\Delta\eta_{jj}| > 3.3$
- Signal region: $m4l \in [220, 2000] \text{ GeV}$
 - without cuts
 - loose
 - tight
 - tighter

Plotting

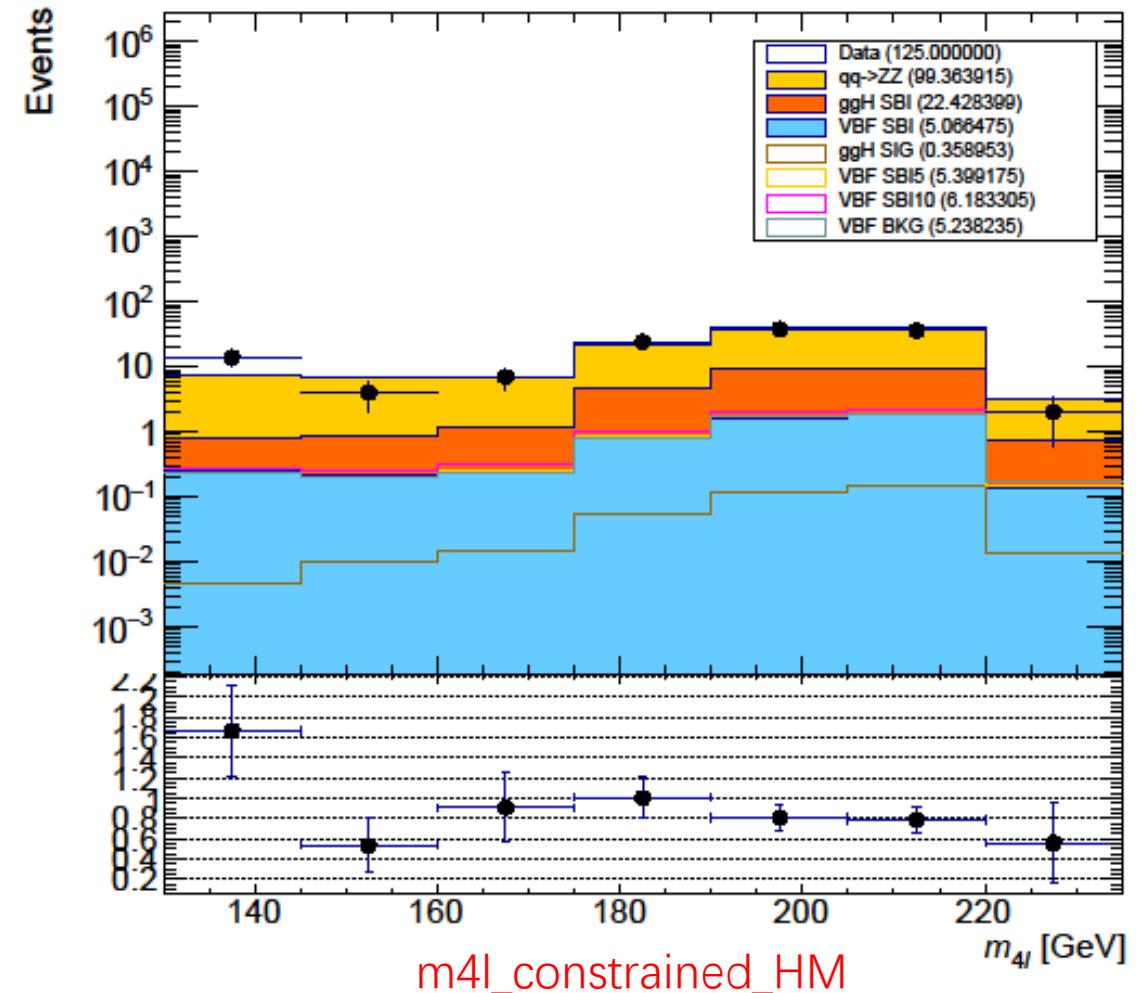
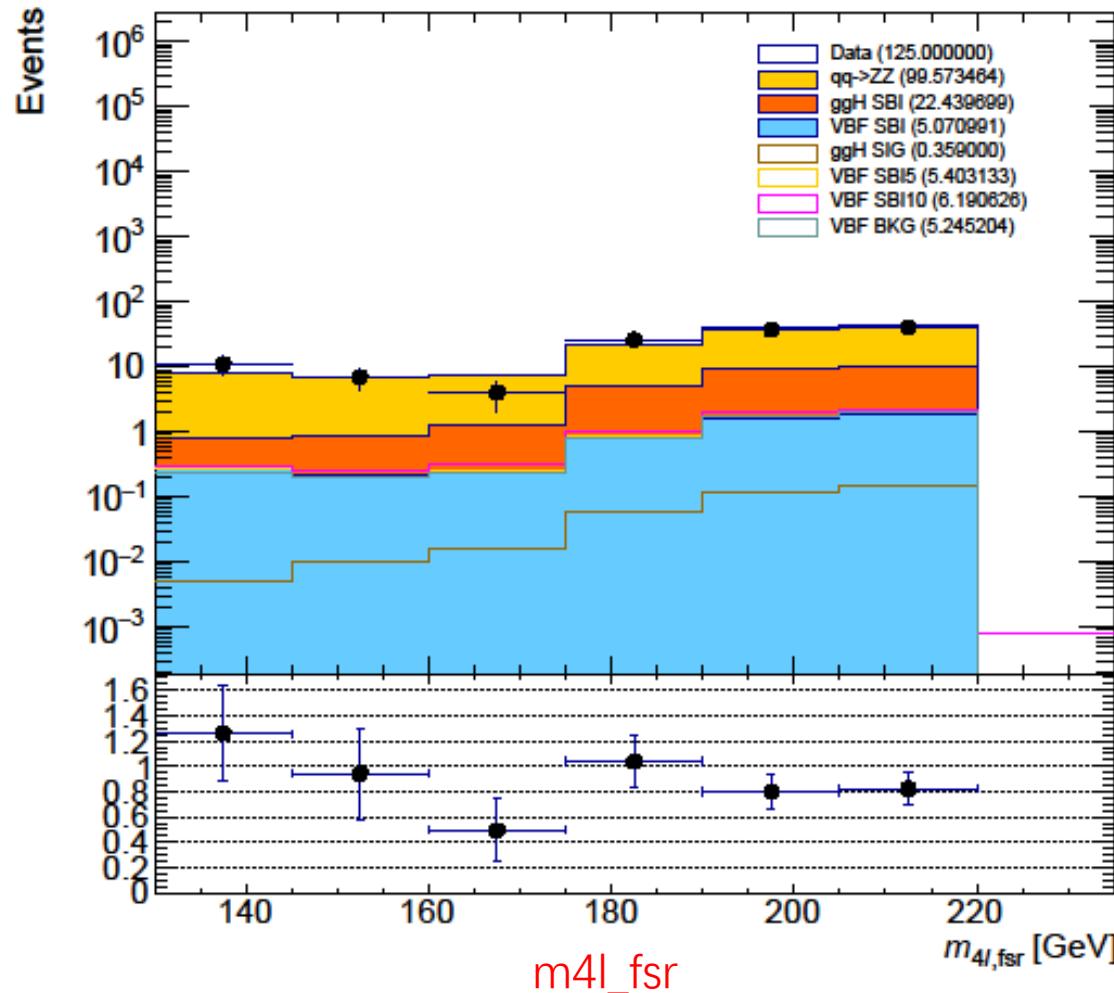
- Variables:
 - Higgs system: $H4l$ mass, H pT, H eta and ME (matrix element)
 - Jet system: Njets and pT jet, eta jet (for the 2 leading jets)
 - MELA variables: $\cos \theta^*$, $\cos \theta 1$, $\cos \theta 2$, Φ , $\Phi 1$, $Z1$ mass, $Z1$ pT, $Z2$ mass, $Z2$ pT
 - Zeppenfeld variable: $\eta^* = \eta 4l - (\eta \text{jet 1} + \eta \text{jet 2})/2$ of the H and 2 leading jets
- Total: $19*4*2=152$

Some problems

- Number of events < 1
- Normalization?
- loose cuts, m_{Z1}



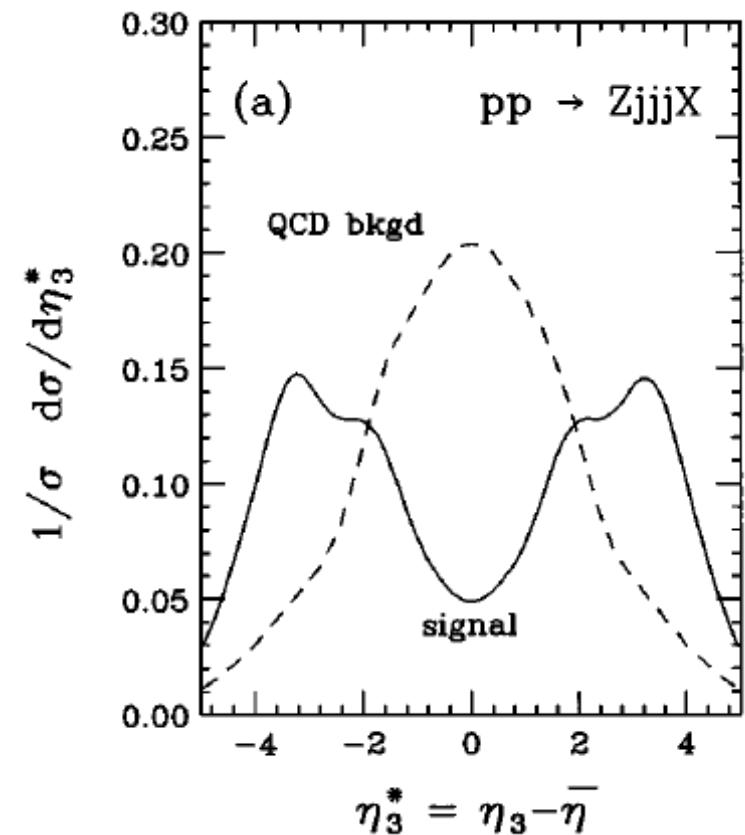
Some problems



loose cuts: $m_{4l} \in [130, 220]$ GeV, $m_{jj} > 120$ GeV and n jets ≥ 2

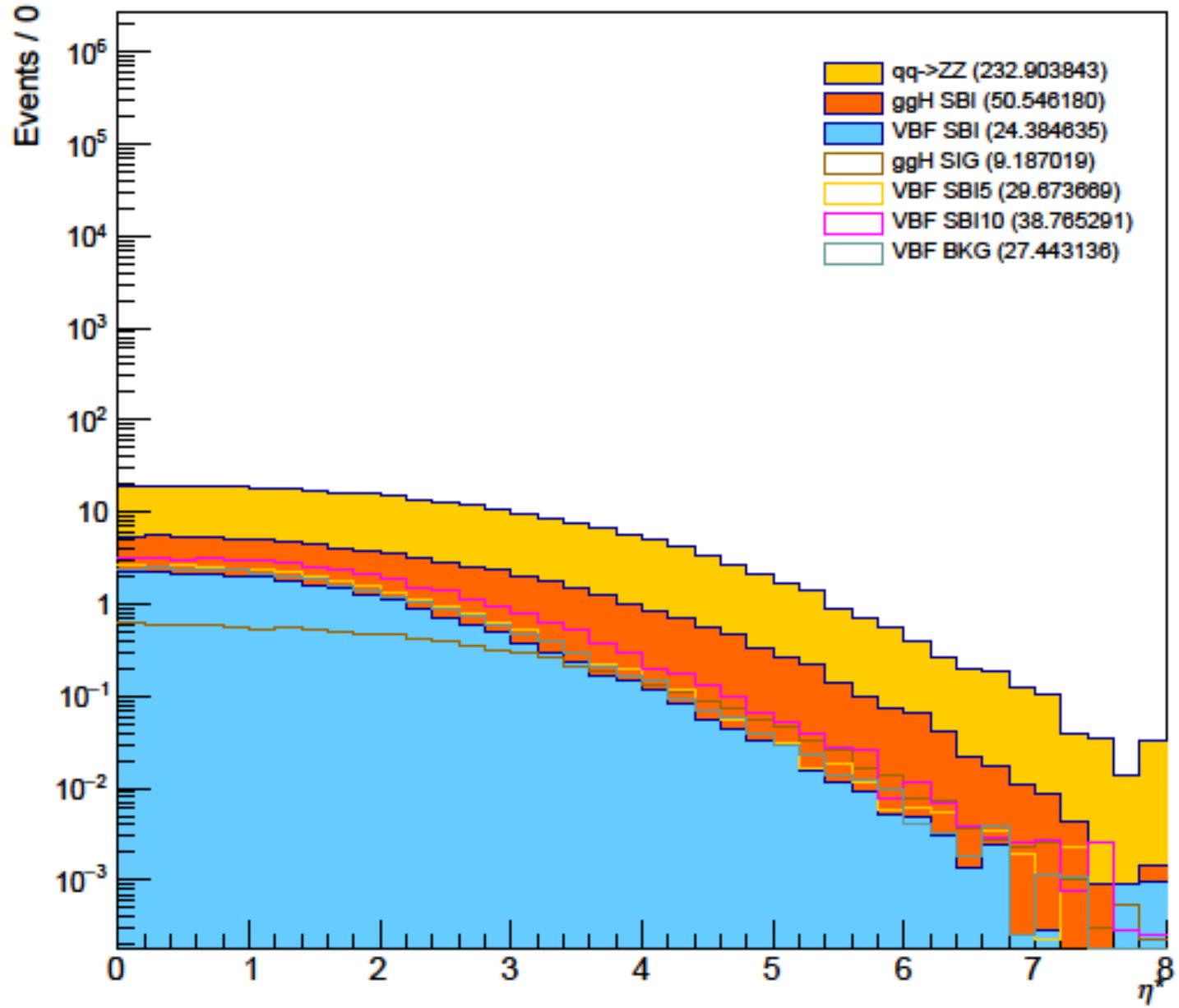
Some problems

- Zeppenfeld variable: $\eta^* = \eta_{4l} - (\eta_{\text{jet 1}} + \eta_{\text{jet 2}})/2$
 - Original definition: $\eta_3^* = \eta_3 - \bar{\eta} = \eta_3 - \frac{\eta_j^{\text{tag1}} + \eta_j^{\text{tag2}}}{2}$
 - Zjj events: Z+3-parton signal and bkg events (3 jets)
 - Tagging jets: the two most energetic jets
 - Color exchange between the incident partons, as in the case of the QCD background, leads to minijet activity in the central region.
 - Our case: 4l- \rightarrow the third jet, the two jet- \rightarrow tagging jets



Some problems

- Signal region, loose cut
- No signal?



Next steps

- Check which variables have the most discriminating power
- Discriminate
 - 1) VBF against ggH
 - 2) VBF against Bkgs