



Feasibility Study of Measuring the Higgs Self-coupling Using the Muon Collider

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3TeV

- Signal: $\mu^- + \mu^+ \rightarrow \nu_\mu + \bar{\nu}_\mu + H + H$ (0.0008182 pb)
- Background:
 - $\mu^- + \mu^+ \rightarrow \nu_\mu + \bar{\nu}_\mu + \mathbf{q} + \bar{\mathbf{q}} + Z$ (0.05685 pb)
 - $\mu^- + \mu^+ \rightarrow \nu_\mu + \bar{\nu}_\mu + \mathbf{Z} + \mathbf{Z}$ (**0.081 pb**)
 - $\mu^- + \mu^+ \rightarrow \nu_\mu + \bar{\nu}_\mu + b + \bar{b} + H$ (0.003771 pb)
 - $\mu^- + \mu^+ \rightarrow \nu_\mu + \bar{\nu}_\mu + b + \bar{b} + b + \bar{b}$ (0.0009237 pb)

100k for each

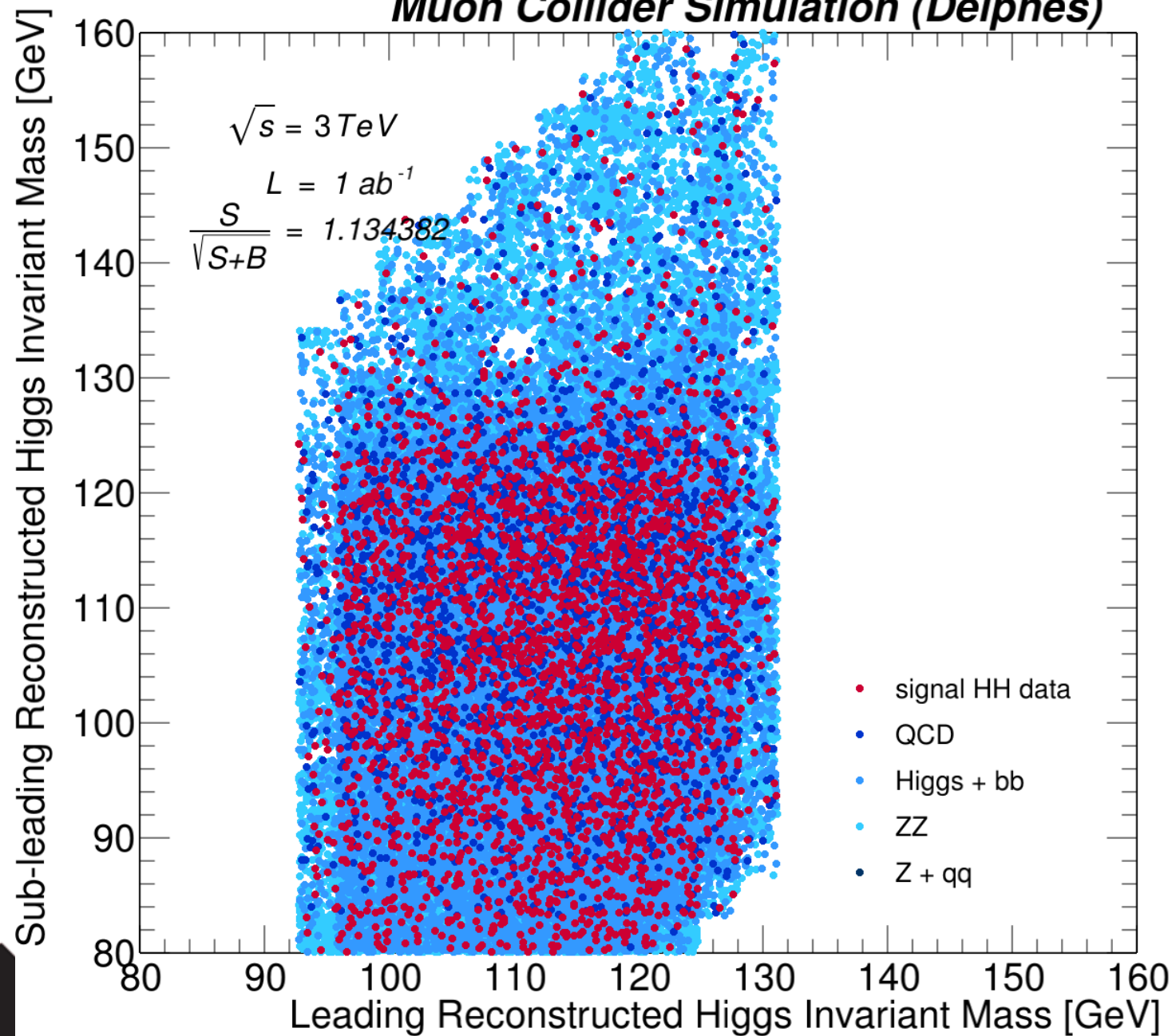


3 TeV

- Only requiring $90\text{GeV} < \text{inv mass} < 135\text{ GeV}$ on the leading reco-higgs, so that we could see that distribution for the sub-leading one.

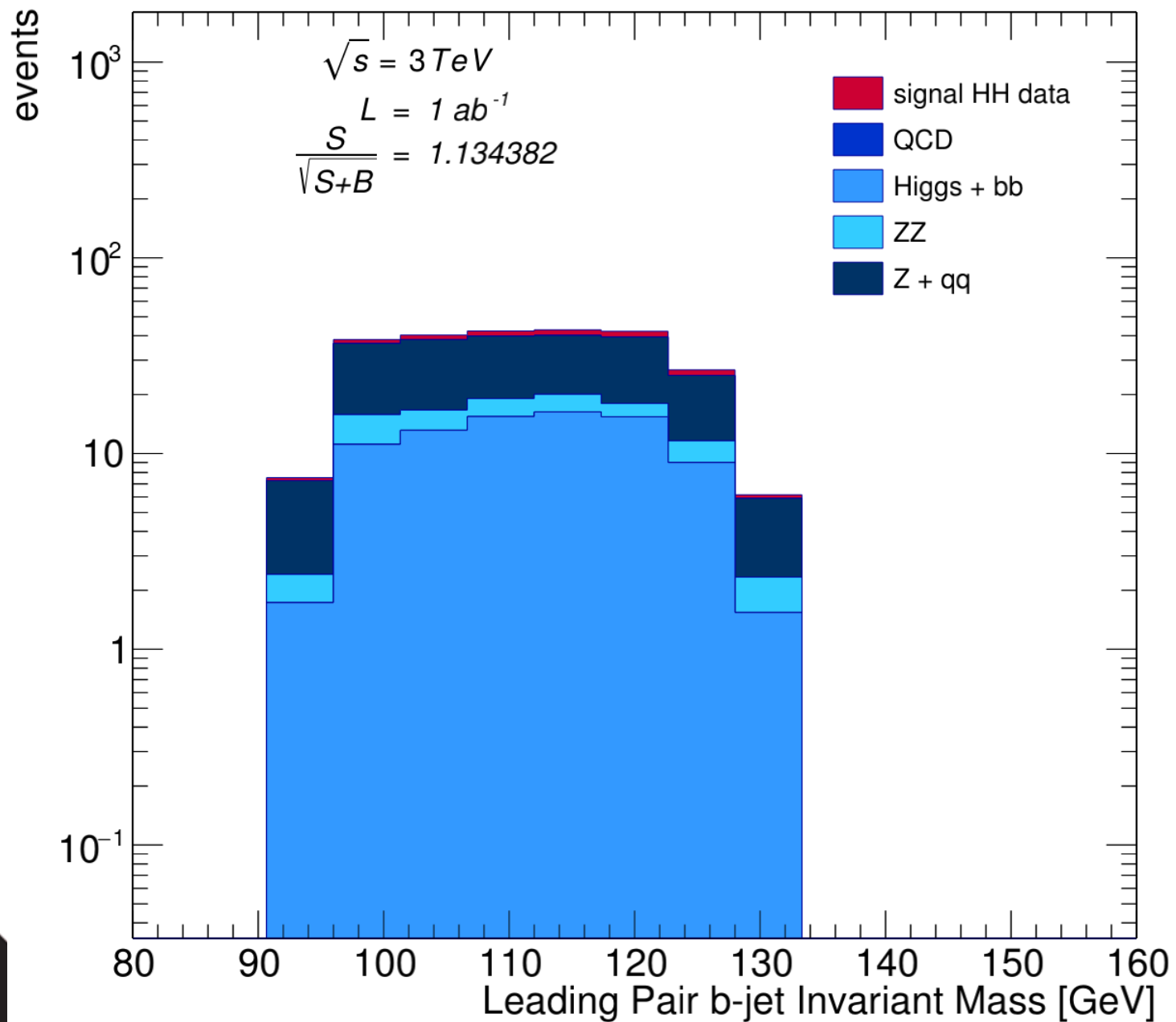


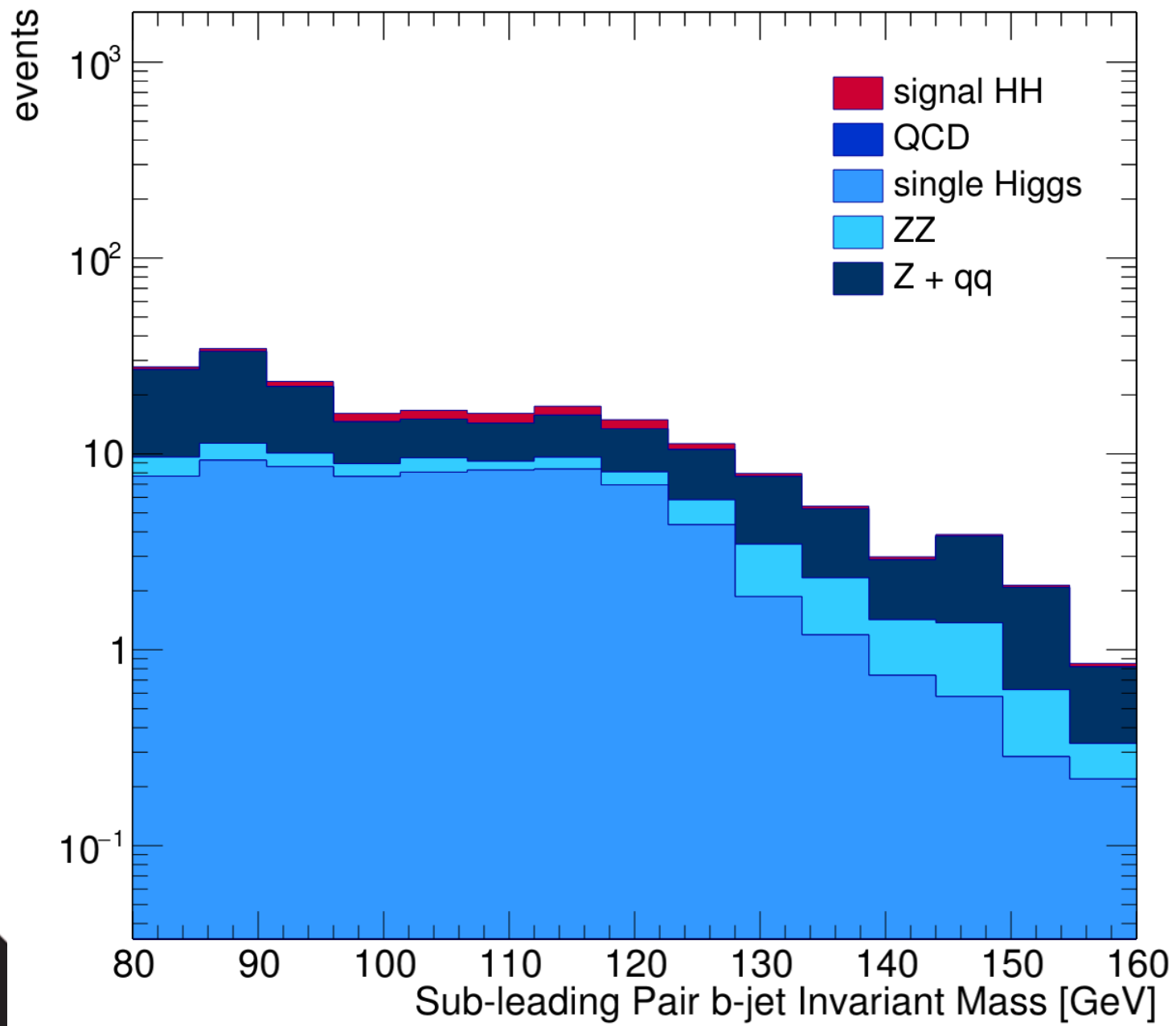
Muon Collider Simulation (Delphes)





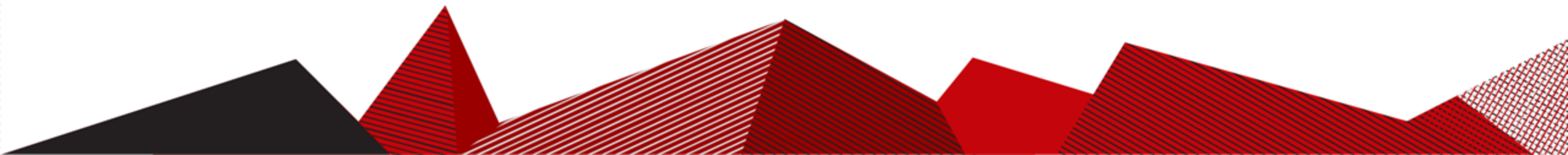
Muon Collider Simulation (Delphes)





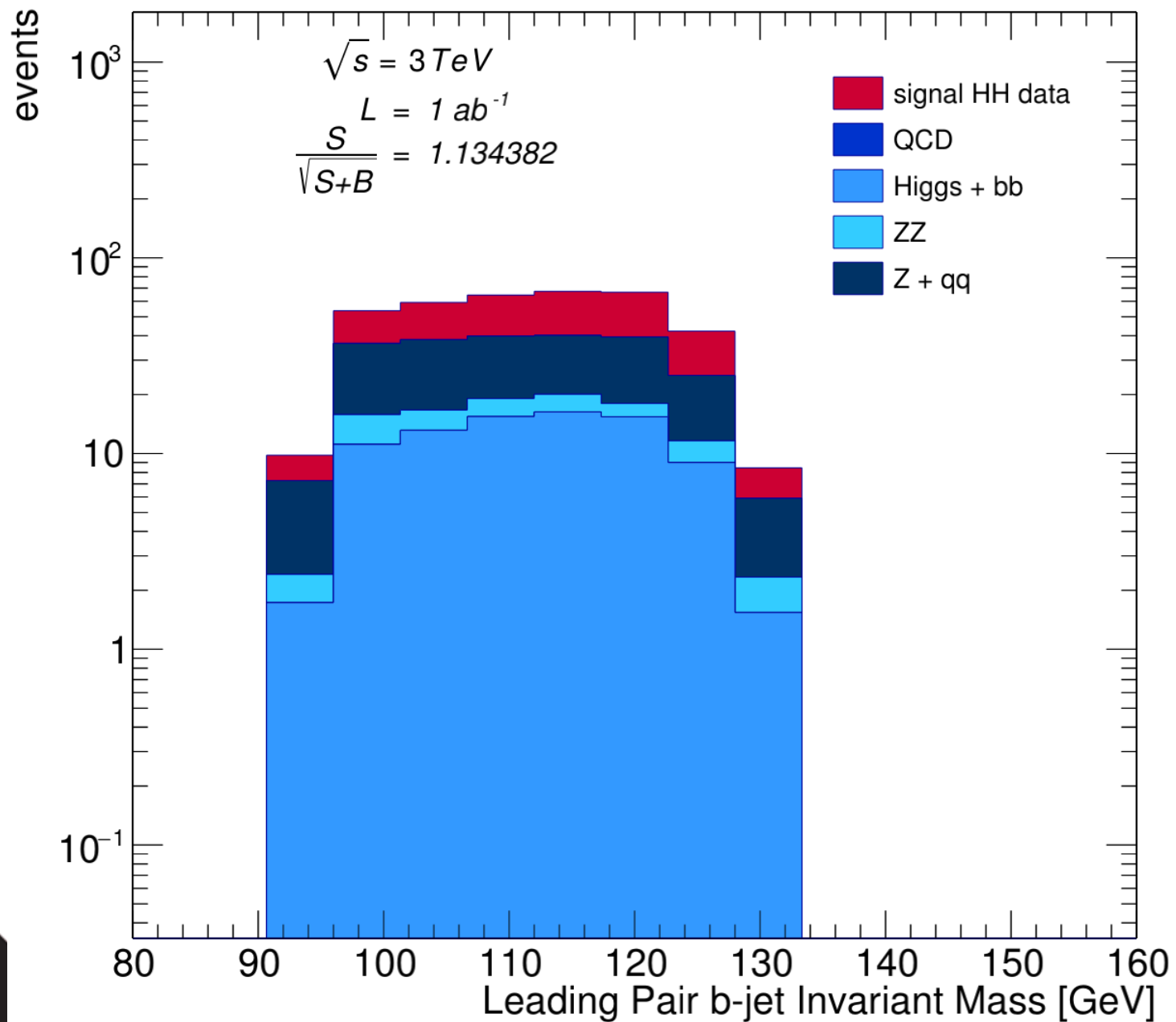


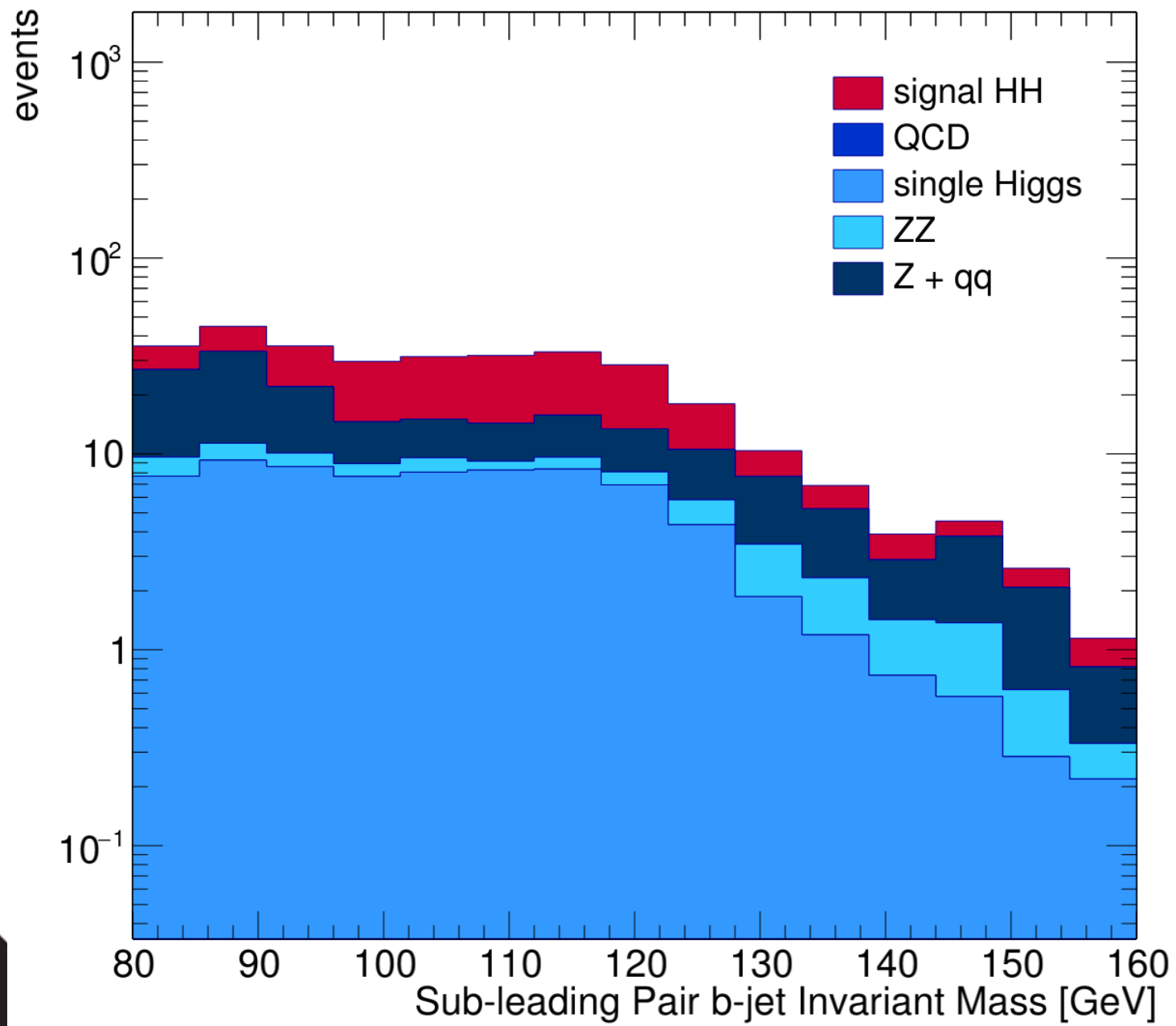
Signal enhanced plot





Muon Collider Simulation (Delphes)







- Cut on (H_1-H_2) probably affect the exponential bkg fit
- 10x enhancement is probably too strong for the sub-leading jets pair
- Bin adjustment



10 TeV and 30 TeV

- Data generation takes longer than expected
- Will probably see 10TeV plot next week, and 30TeV plot on next next week.
- files in /nfs_scratch/hjia38 occupy 110G exceeding the 100G quota with only 10TeV data, larger quota or anywhere else?

