



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

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- Signal: $\mu^- + \mu^+ \rightarrow \nu_\mu + \bar{\nu}_\mu + H + H$ ($0.0008182 \pm 6.2e - 7$ pb)
- Background:
 - $\mu^- + \mu^+ \rightarrow \nu_\mu + \bar{\nu}_\mu + b + \bar{b} + Z$ (0.03183 ± 0.000025 pb)
 - $\mu^- + \mu^+ \rightarrow \nu_\mu + \bar{\nu}_\mu + b + \bar{b} + H$ ($0.003771 \pm 3.1e - 6$ pb)
 - $\mu^- + \mu^+ \rightarrow \nu_\mu + \bar{\nu}_\mu + b + \bar{b} + b + \bar{b}$ ($0.0009237 \pm 7.2e - 7$ pb)

100k for each



MVA to discriminate $v\bar{v}HH$ with dominant bkg $v\bar{v}bbZ$

- With TMVA, a built-in package in ROOT
 - Support different ML approach:
 - Boosting Decision Tree
 - Multilayer perceptron
 - Deep Neural Network

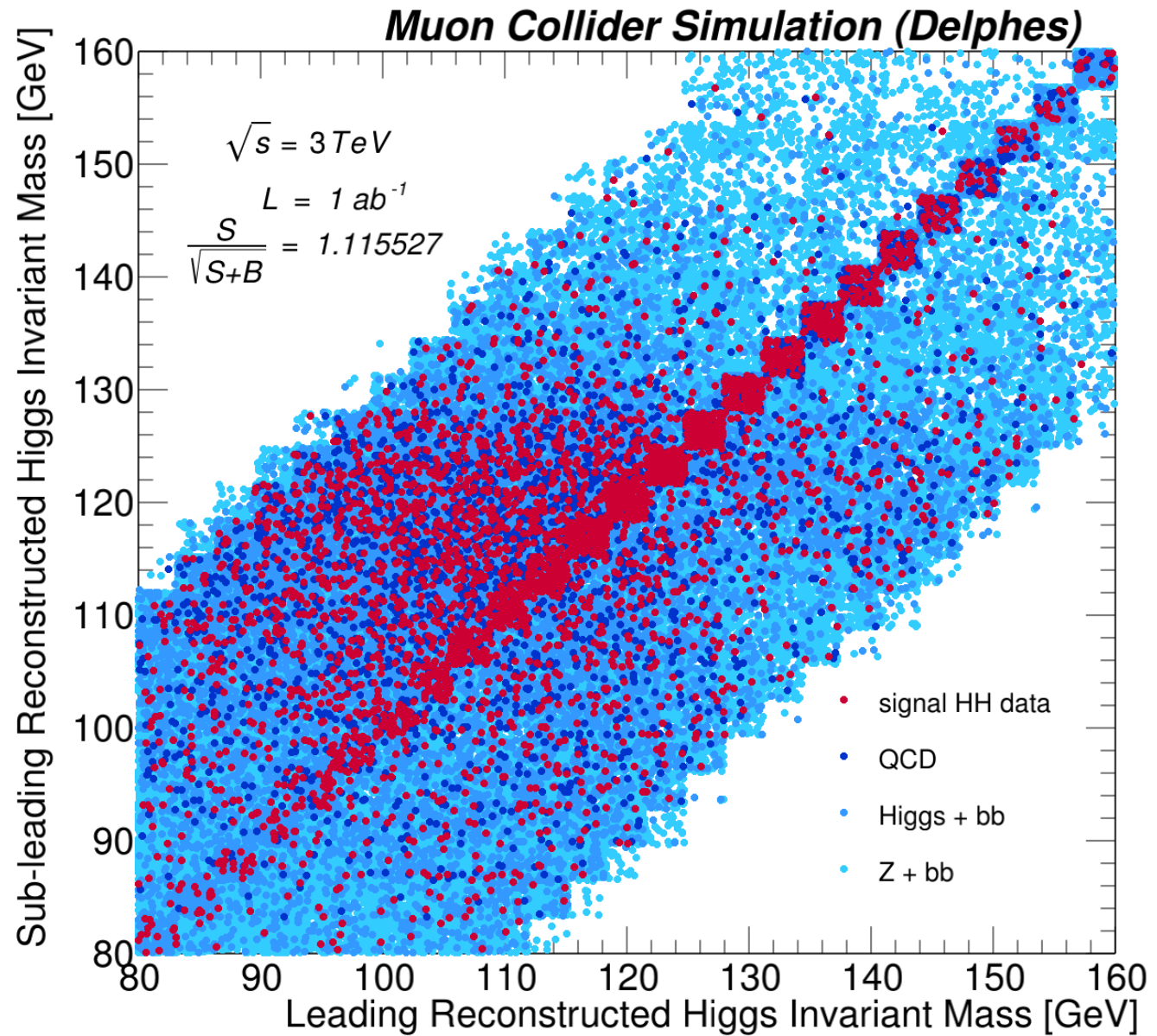




- Comparison between requiring two tight(50%) b-jets with requiring two loose(90%) b-jets
- Angle between two reco-higgs(no results yet)

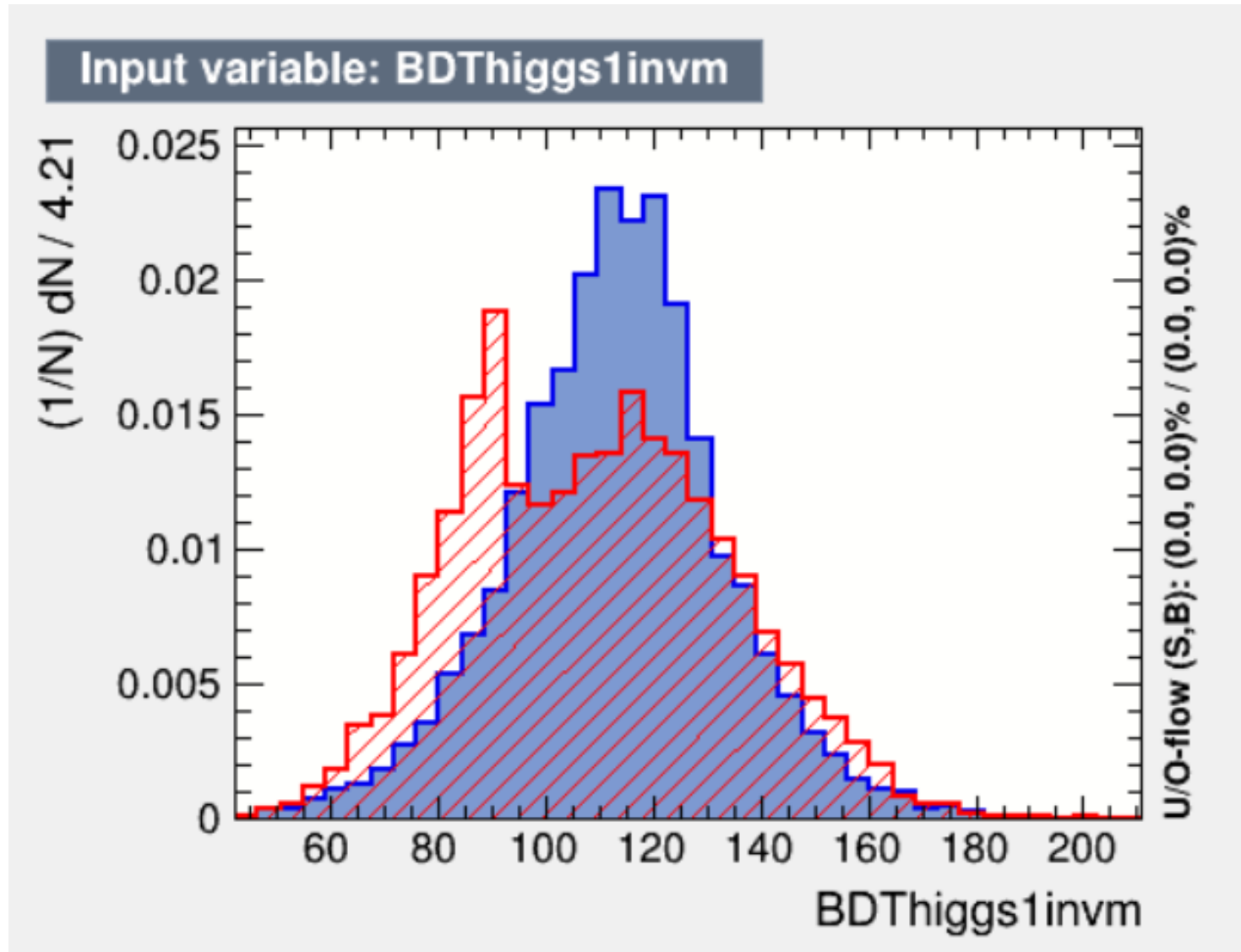


Two loose



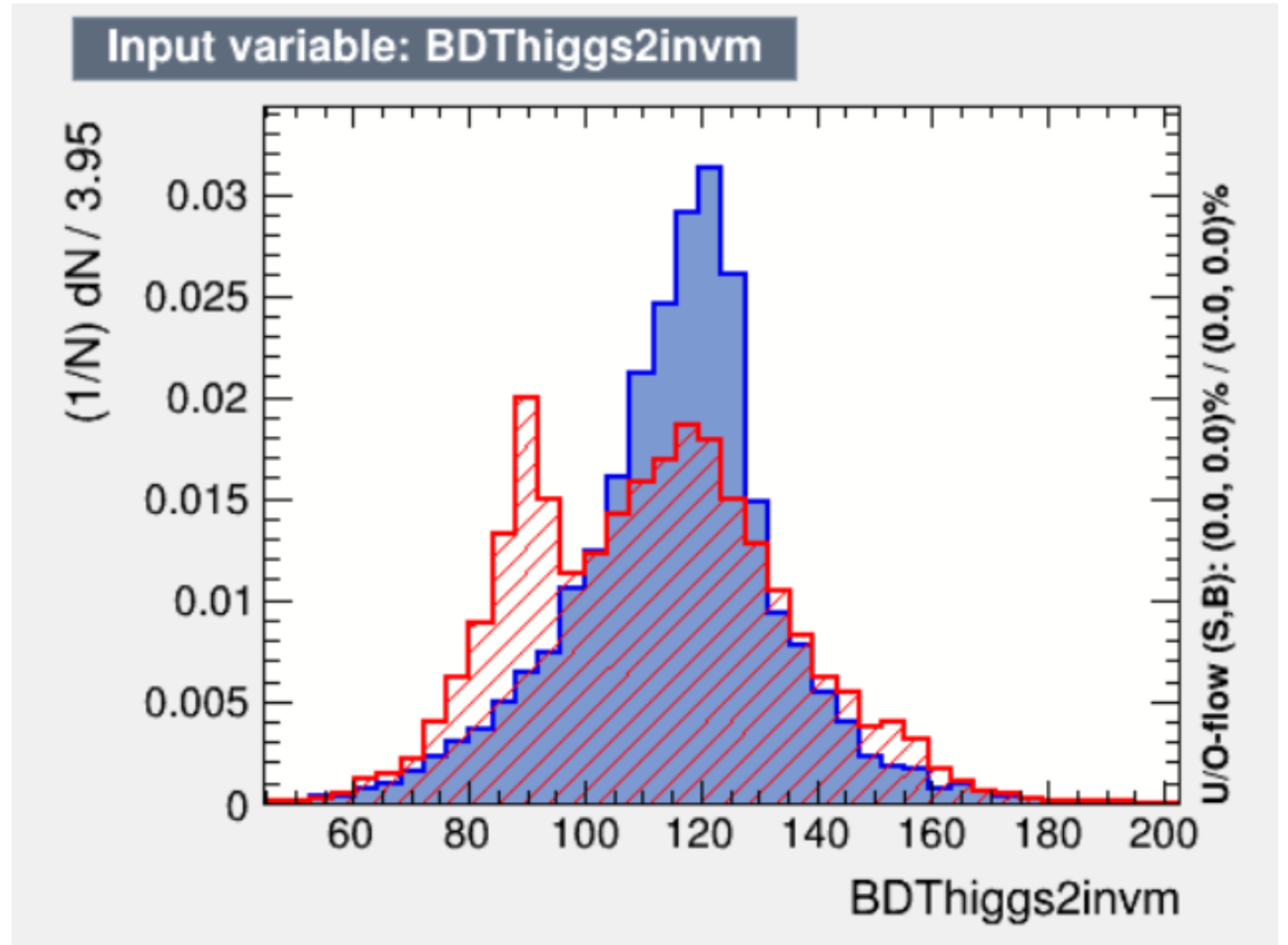


Two loose



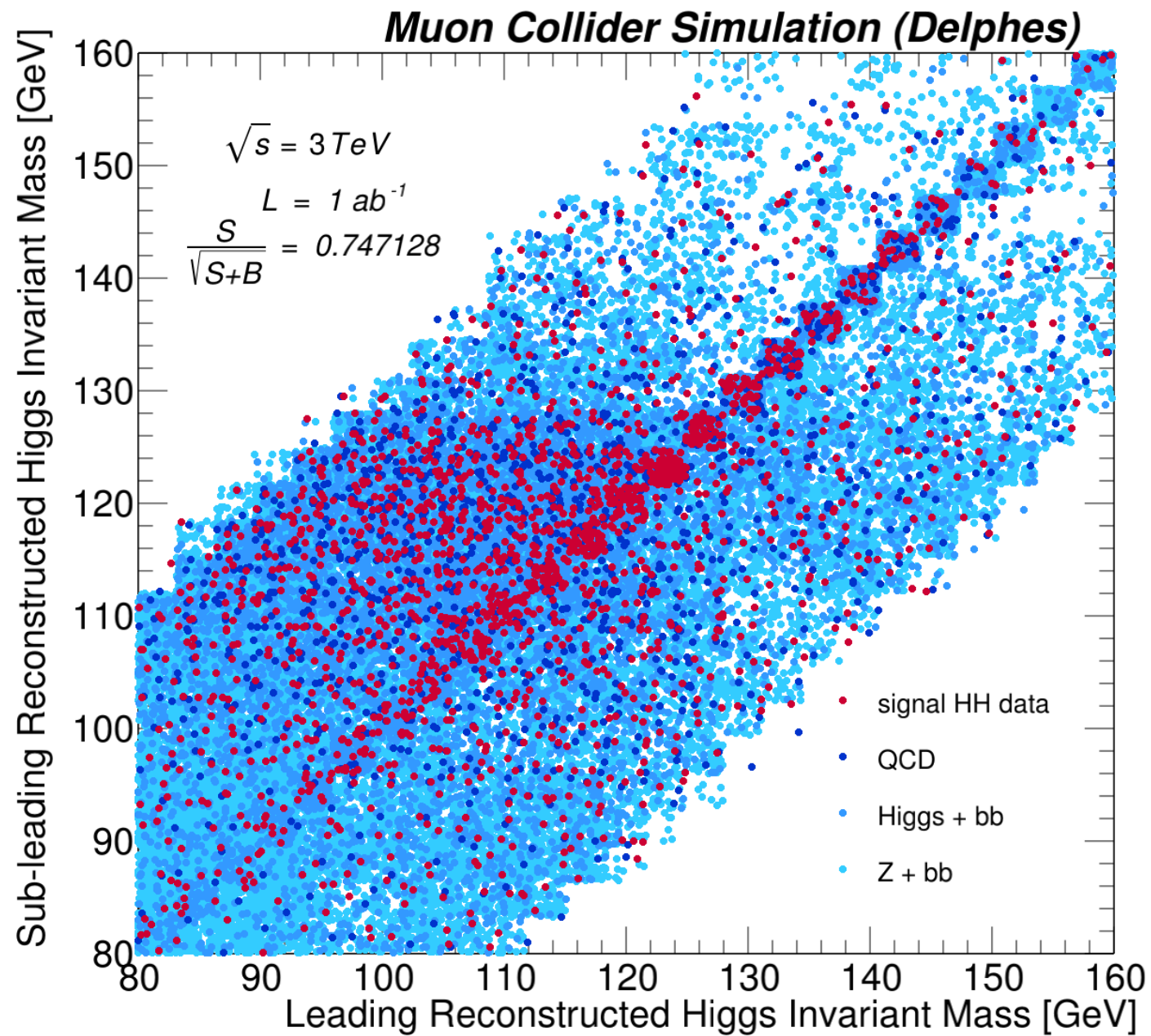


Two loose





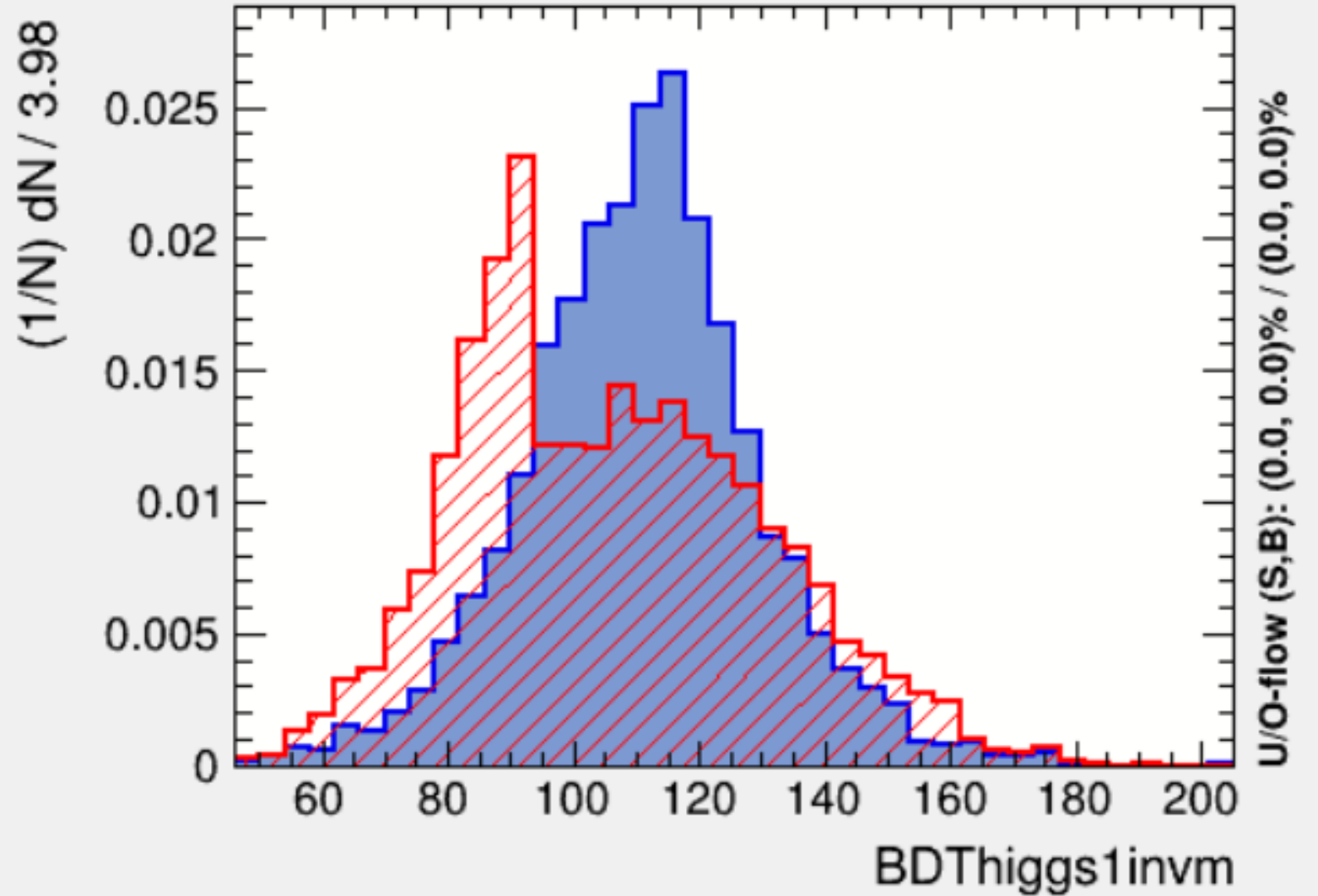
Two tight





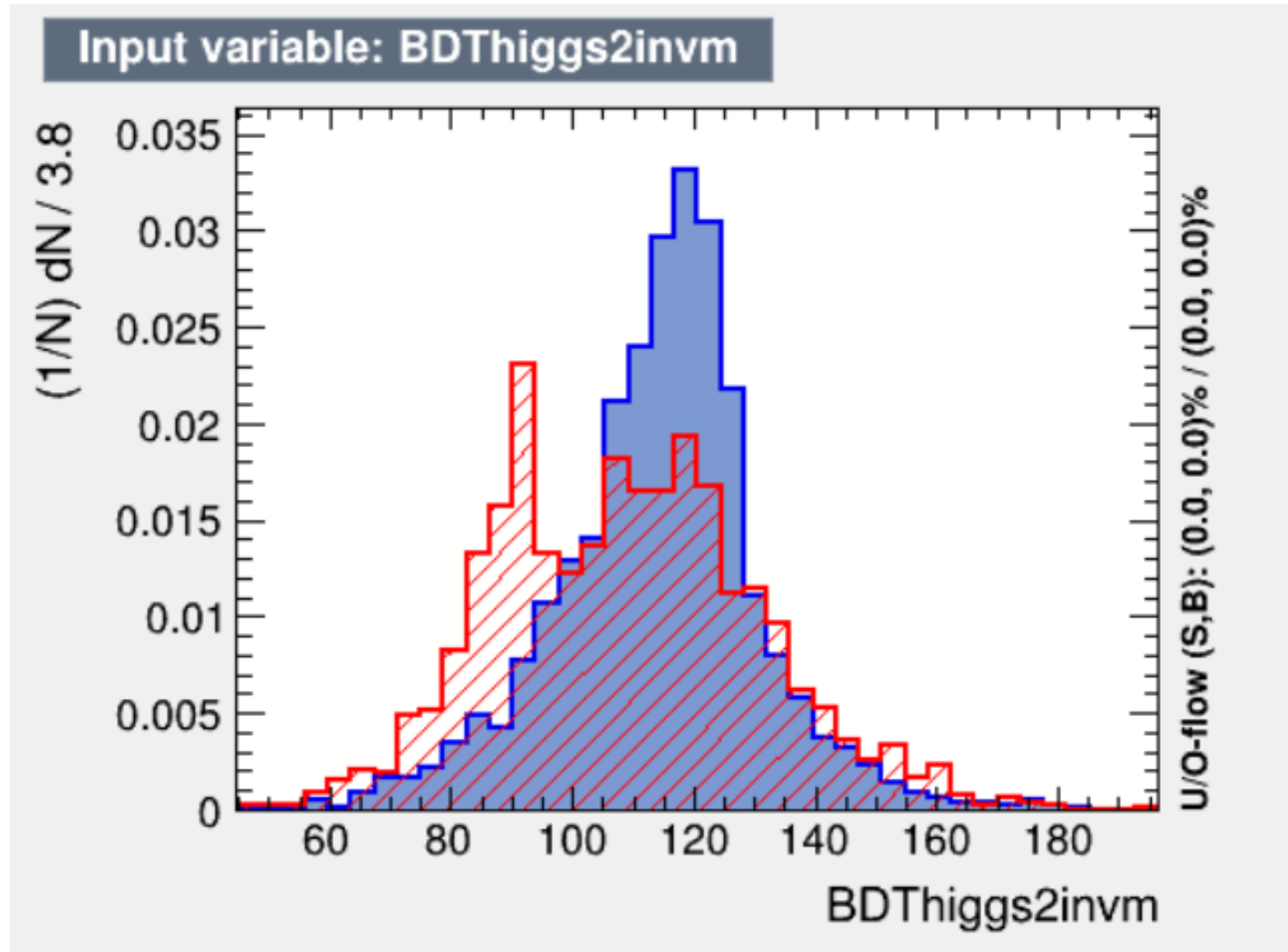
Two tight

Input variable: BDThiggs1invm





Two tight





Unable to access my home directory sometime since yesterday.
Problem reported to help@hep.wisc.edu. Chad had fixed it twice.
Currently, it is accessible again.



Plan for next week

- Adding angle between two reco-higgs as a new train variable:
 - `Double_t angle = H1.Angle(H2.Vect());`