LCFIPlus check6

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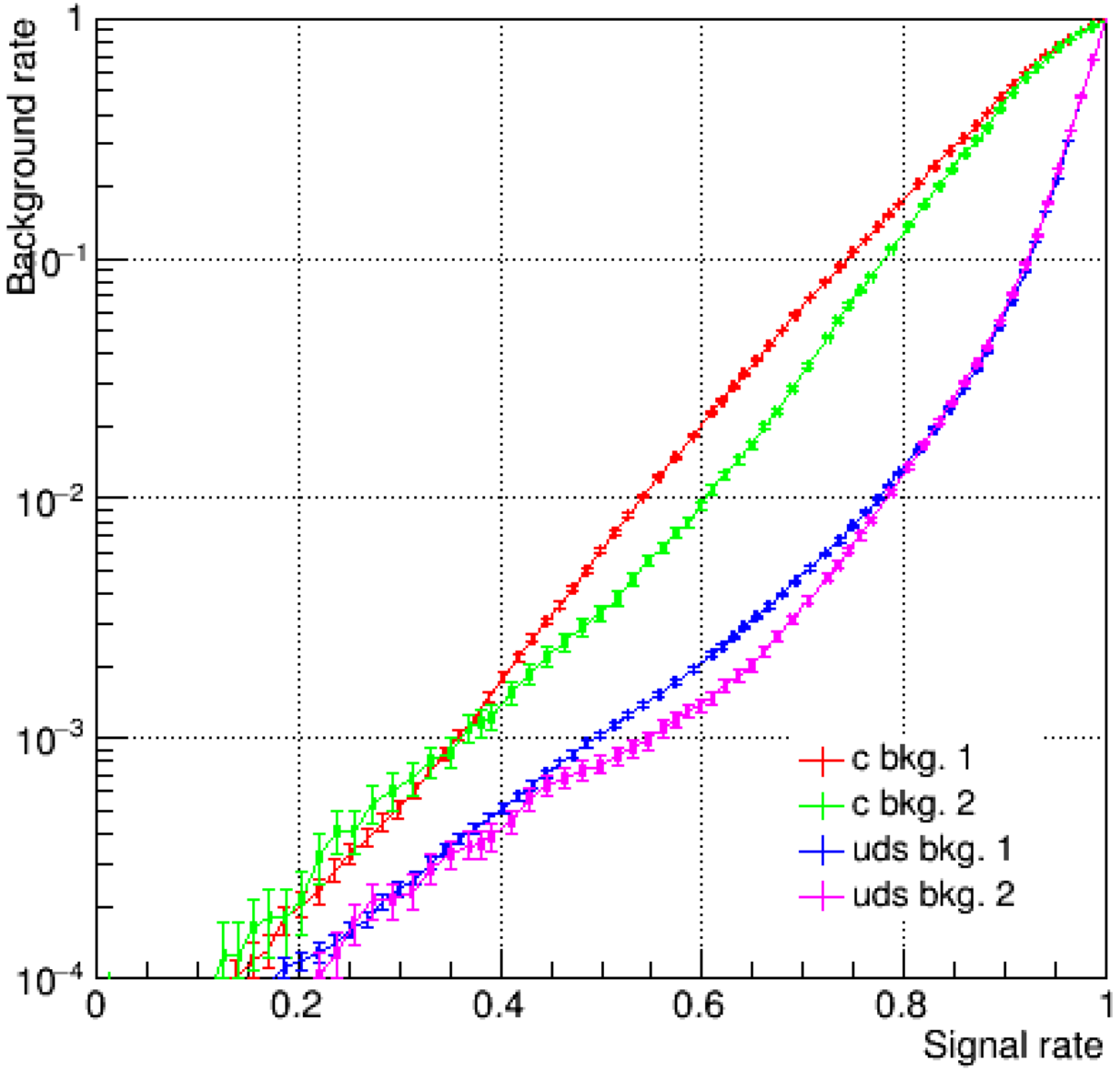
Start from here

Yonamine-kun's study
1: 50k samples
2: 20k samples

Fluctuation very large

And

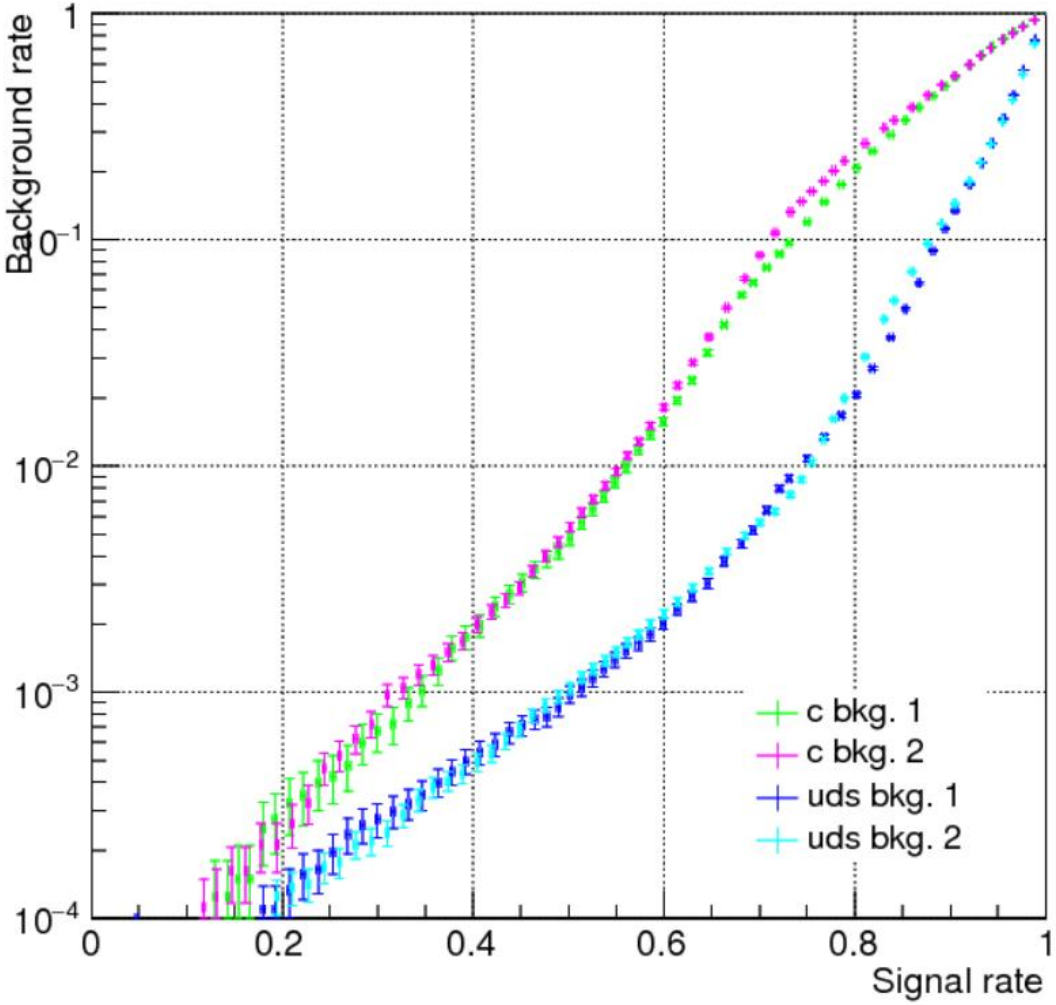
Worse than DBD



No primary vertex smearing

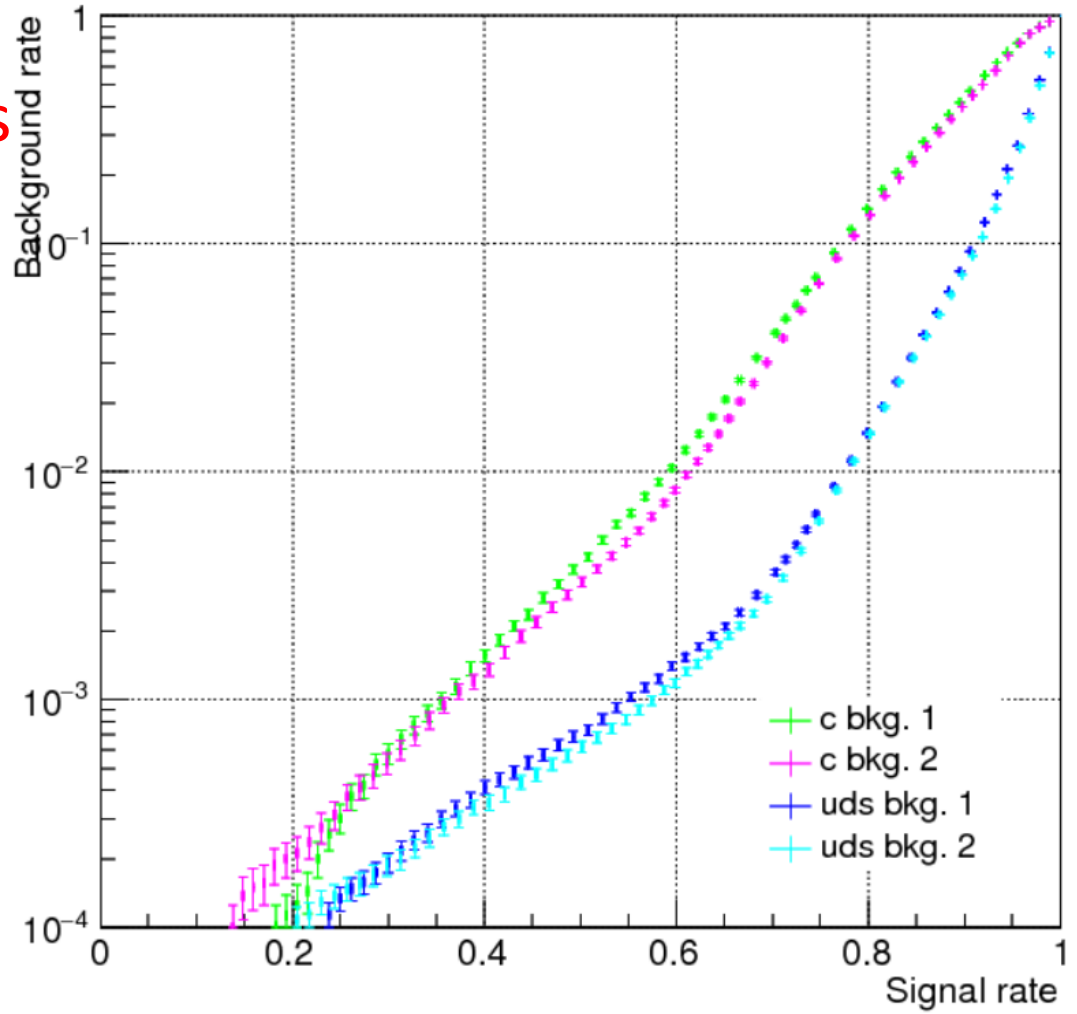
- Artificially create large statistical fluctuation
  - 1: 10k sample
  - 2: 20k sample
- BDT Parameter tuning causes large fluctuation
  - Performance degrades

MaxDepth =3
Ncuts=5



With background

- Comparison between w/ w/o background
  - 1: w beam background, 50k
  - 2: w/o, 50k
- Performance degrades
- MaxDepth=6
  - Try MaxDepth=8
  - No significant change
  - Need to change other parameters?



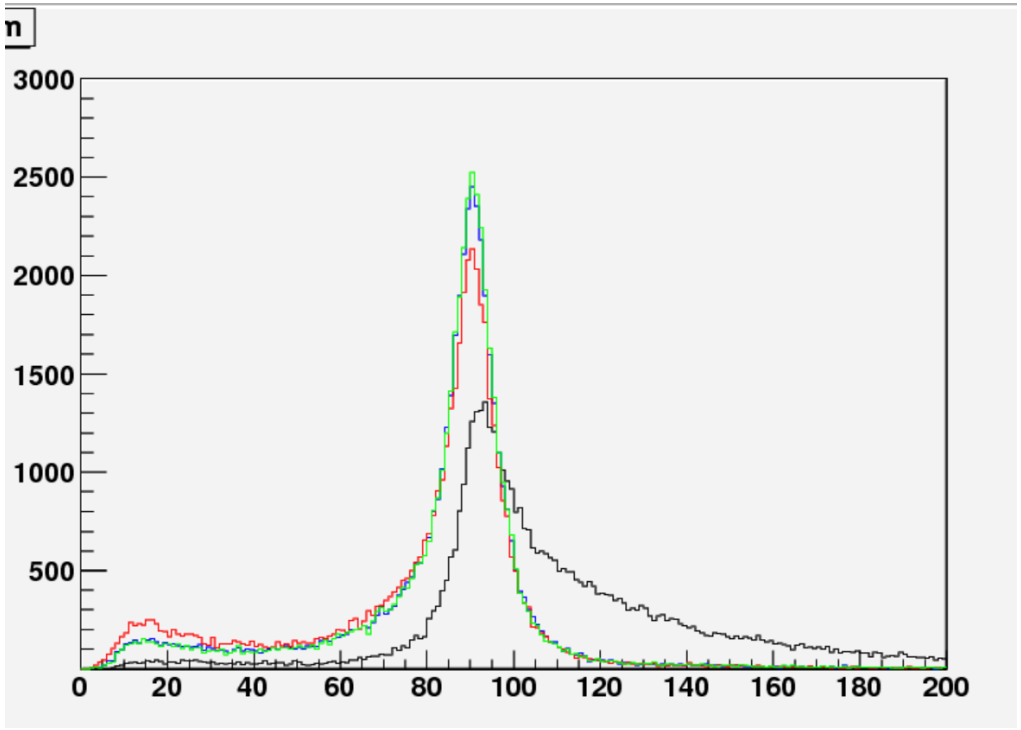
Try to recover performance

- $y_{ij} = \frac{\min(E_i^2, E_j^2)(1-\cos\theta)}{E_{vis}^2}$, $y_{beam} = \frac{2E_i^2\alpha^2(1-\cos\theta)}{E_{vis}^2}$

  α: beam rejection parameter

  smaller→ beam rejection becomes stronger

  - Particle i with $y_{ij}>y_{beam}$ is discarded



vvZ@500GeV

- 2 jet clustering
- Parameters are tuned for better result

w/o beam b.g. rejection

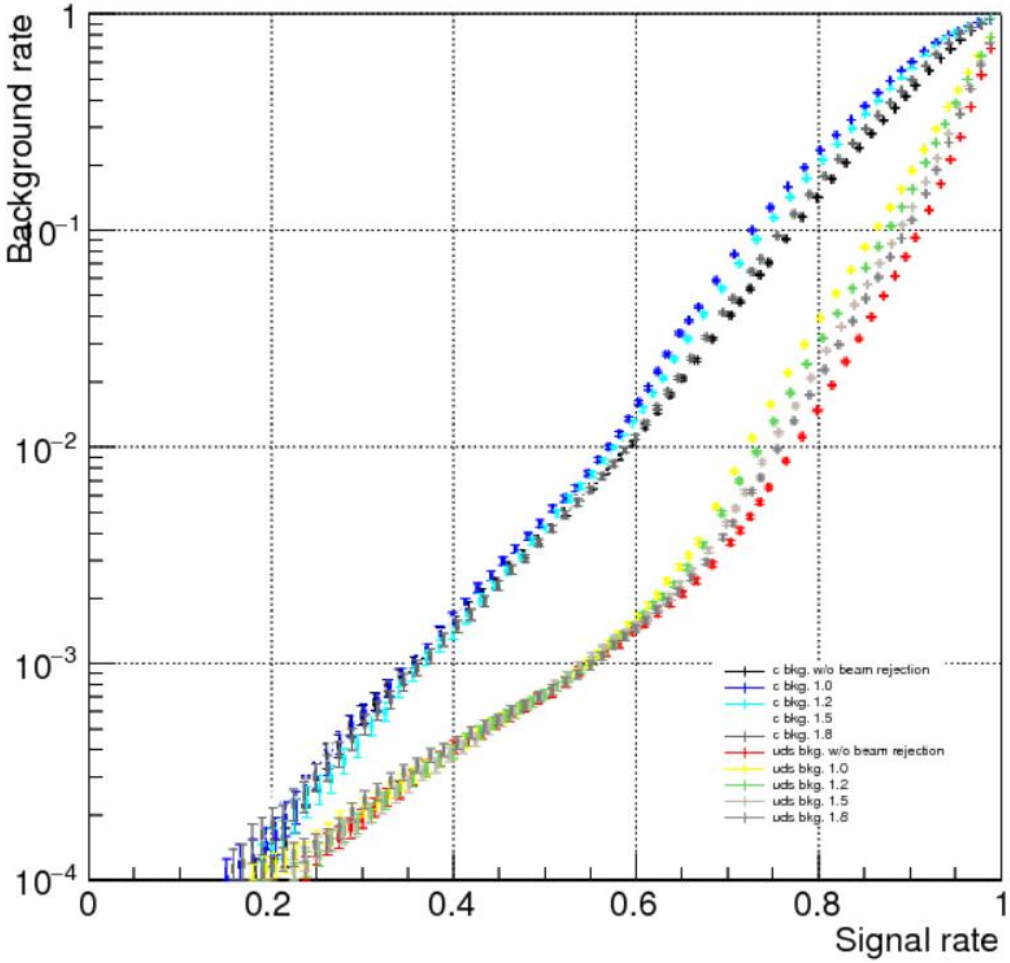
Kt

Durham

Valencia

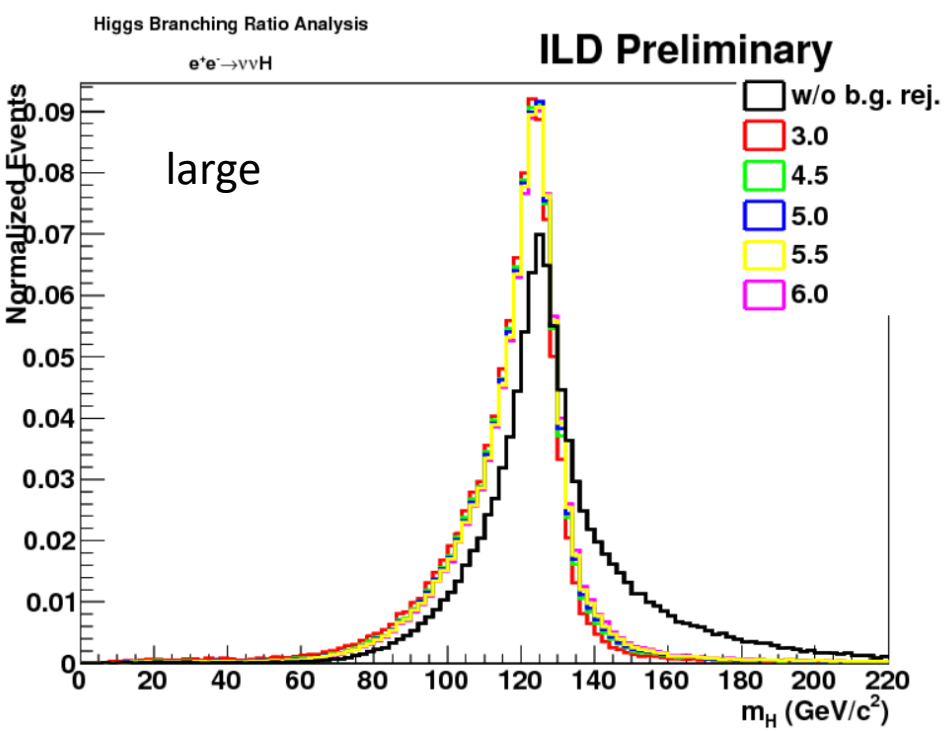
Try to recover performance

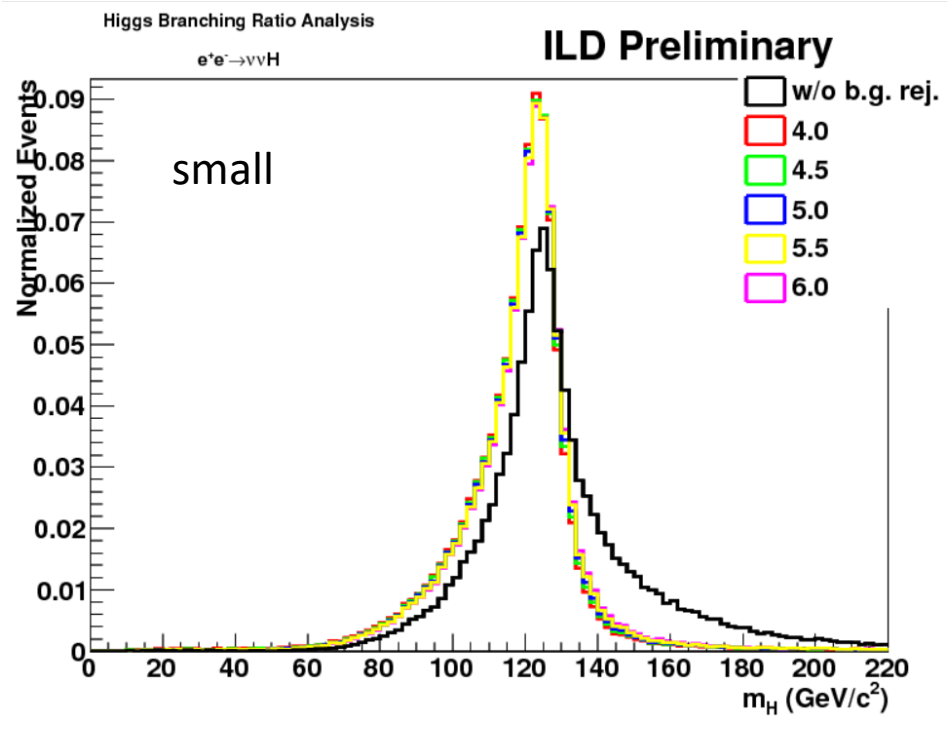
- Durham beam background rejection on
  - Parameter check
- Performance degrades more…
  - Still under investigation
- So,
  - Not yet finished



Apply to nnH events

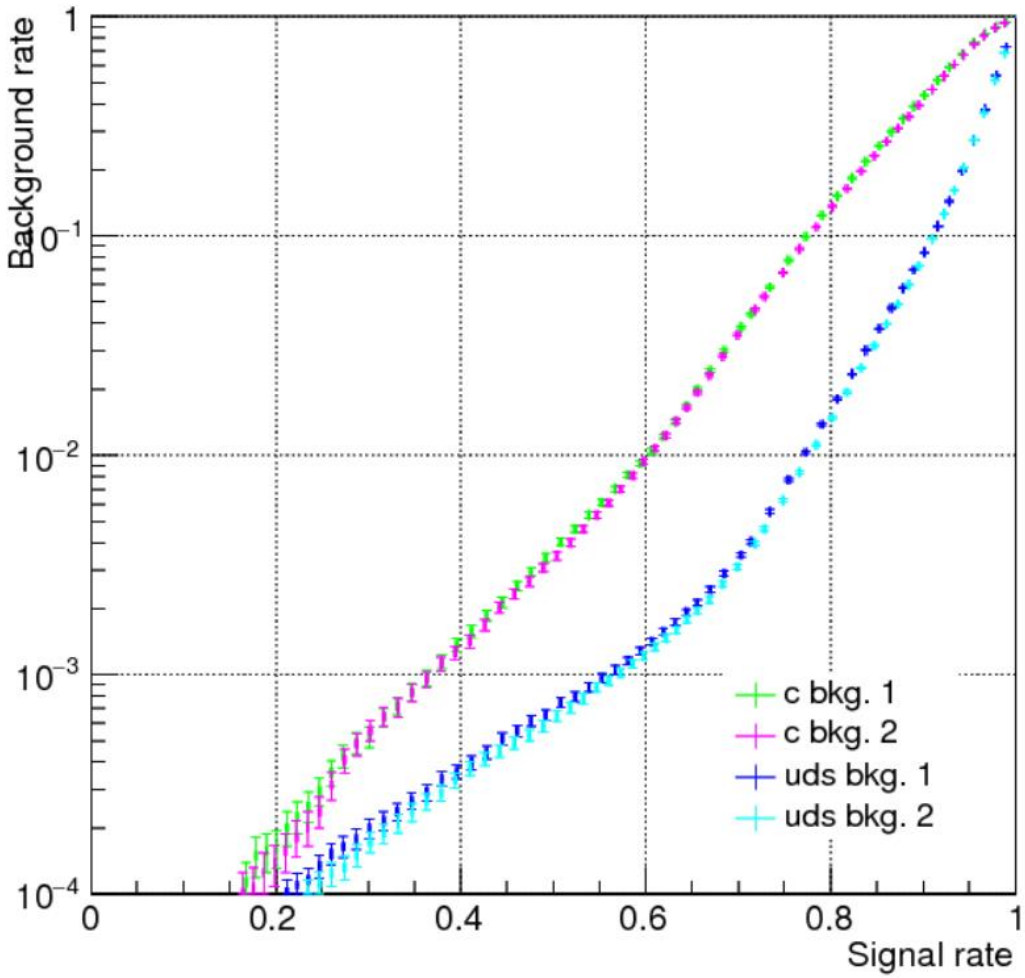
- Apply Durham beam b.g. rejection to nnH→nnbb events
- Parameter scan to make Higgs mass distribution better
  - 5.5 seems best for both detector models





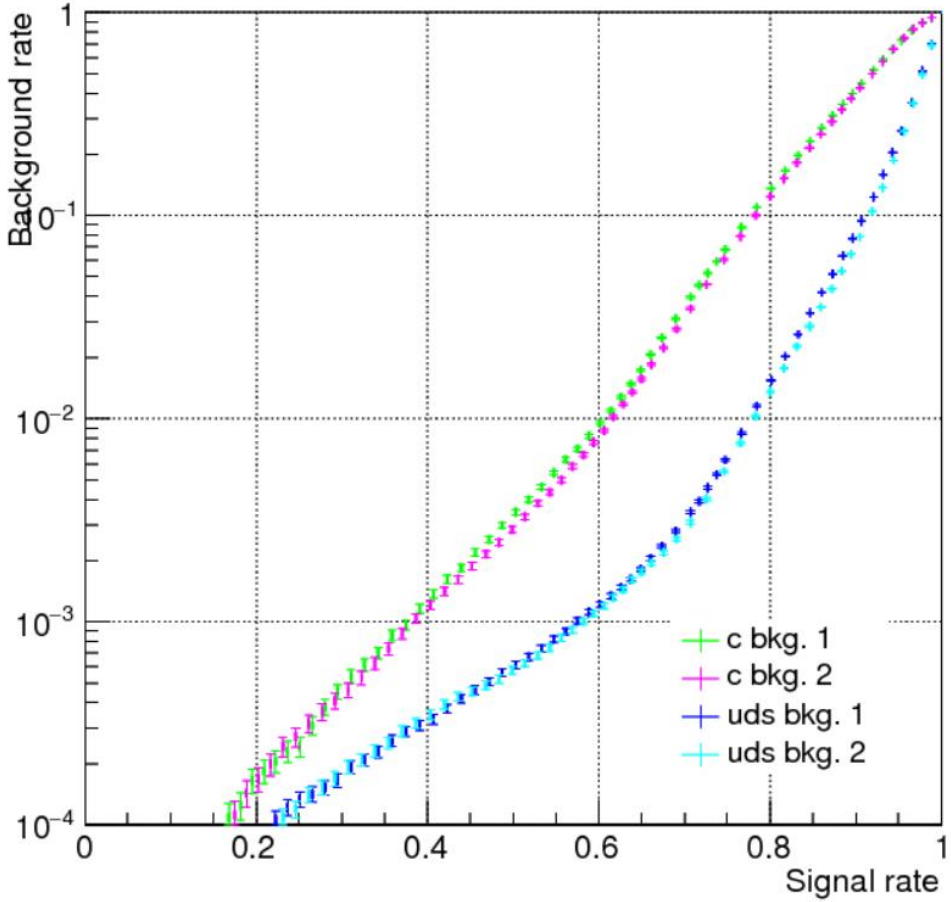
Can recover performance?

- Durham beam background rejection on
  - Parameter set 5.5
- Performance cannot be recovered
  - 1: 5.5
  - 2: w/o background rejection
- No drastic change
- So,
  - Train flavor tag without any background rejection
  - And apply background rejection with certain parameter for each analysis?



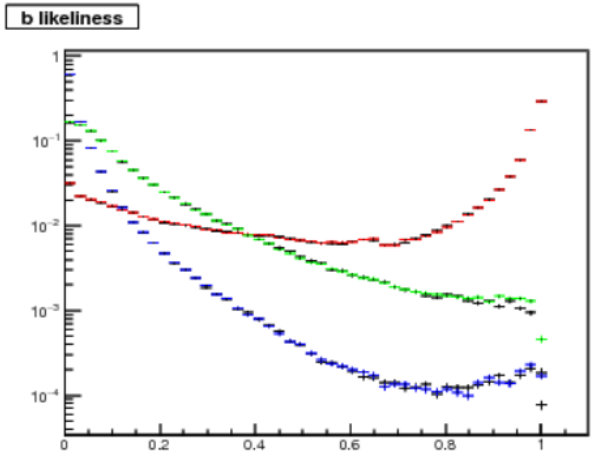
Other trial

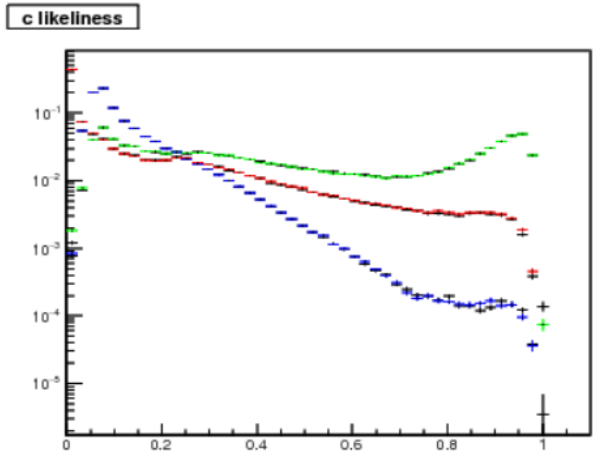
- Change BDT parameters
  - MaxDepth=6, Ncuts=30(20→30)
- Comparison between w/ and w/o beam background
  - Same parameters
  - 1: w beam background
  - 2: w/o beam background
- Almost same performance
- Same performance as DBD

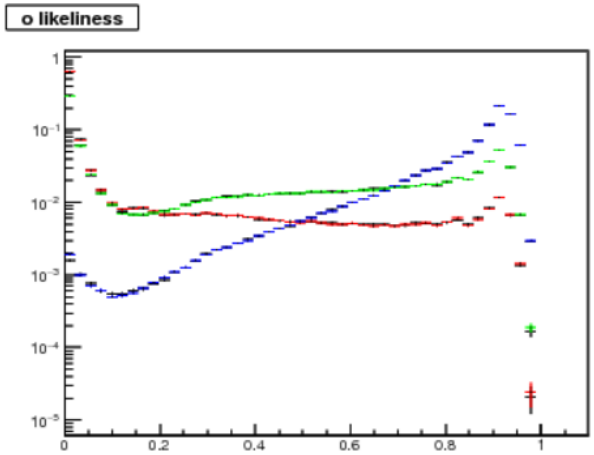


Over training check

- Check MVA output
  - w/ beam background







Black dots: training
Color dots: test
red: b jets
green: c jets
blue: light flavor

Log scale

No over training

Summary: Comparison among any situation

- BDT Parameters set same(MaxDepth=6 && Ncuts=30)