



हैदराबाद विश्वविद्यालय
University of Hyderabad

My Progress

MonoHiggs to $b\bar{b}$

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University of Hyderabad

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Basic kinematic plots (Without any scale factors or corrections)

2. Thu, 26th October 2023

MET Filters / MET Flags

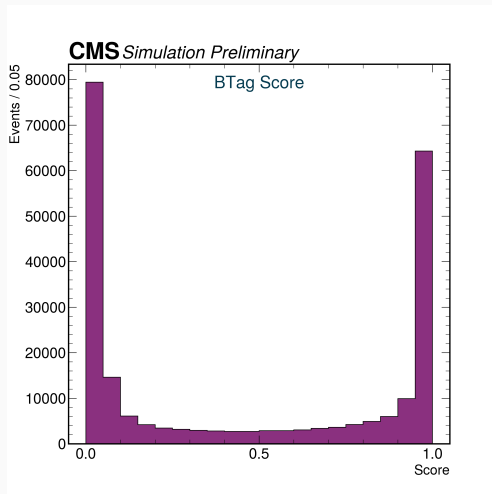
3. Tue, 2nd January 2024

Contribution of various backgrounds: Resolved; 2018

4. Tue, 8th February 2024

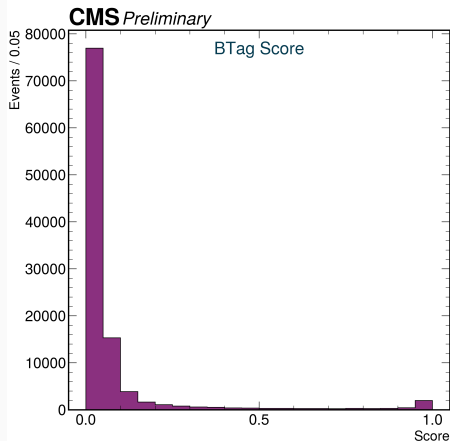
Top Muon Control Region:: Resolved; 2018

Basic kinematic plots



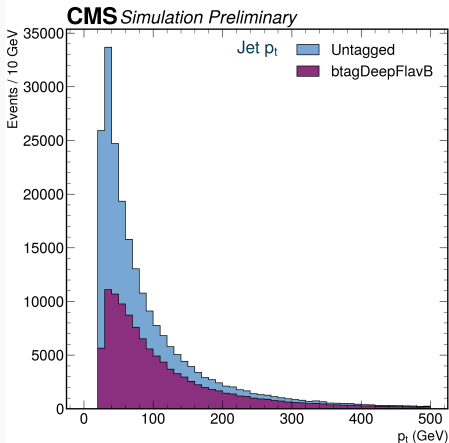
- Btagger used : `btagDeepFlavB`
- Sample used:
`MonoHTobb_ZpBaryonic`
- Lots of bjets in Signal MC

Figure 1: BTag score for signal MC sample



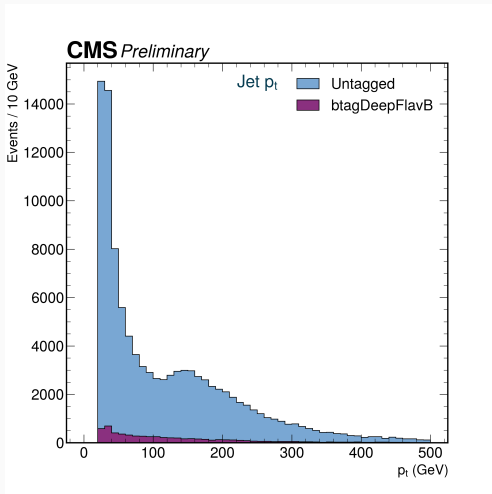
- Btagger used : `btagDeepFlavB`
- Sample used: Run2018A/MET
- Less number of bjets in Data

Figure 2: BTag score for Data samples



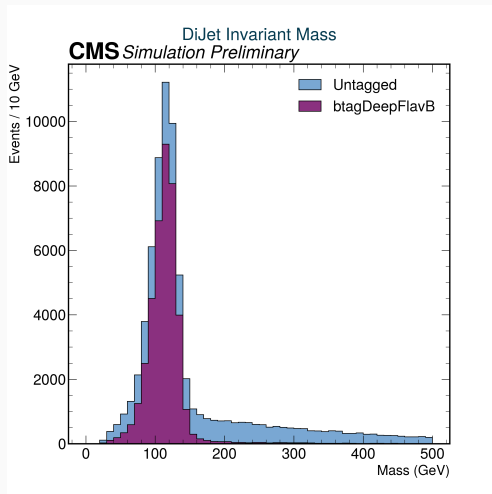
- Basic selections : $p_t > 25\text{GeV}$ and $|\eta| < 2.5$
- Btagger used : **btagDeepFlavB**
- Sample used:
MonoHTobb_ZpBaryonic
- Medium Weight Parameter used for ak4bjets : 0.3040

Figure 3: Jet p_t of signal MC samples



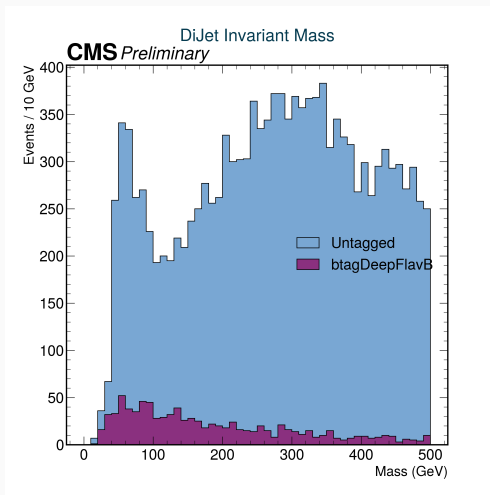
- Basic selections : $p_t > 25\text{GeV}$ and $|\eta| < 2.5$
- Btagger used : **btagDeepFlavB**
- Sample used: Run2018A/MET
- Medium Weight Parameter used for ak4bjets : 0.3040
- Not as predictable as signal MC

Figure 4: Jet p_t of Data samples



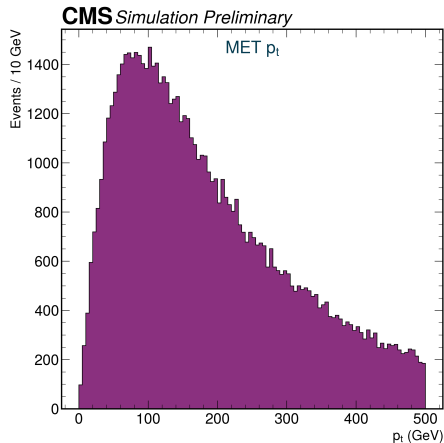
- Basic selections : $p_t > 25\text{GeV}$ and $|\eta| < 2.5$ for each jet
- Btagger used : **btagDeepFlavB**
- Sample used:
MonoHTobb_ZpBaryonic
- Medium Weight Parameter used for ak4bjets selection : 0.3040
- Peaks around SM Higgs mass

Figure 5: Dijet mass of signal MC samples



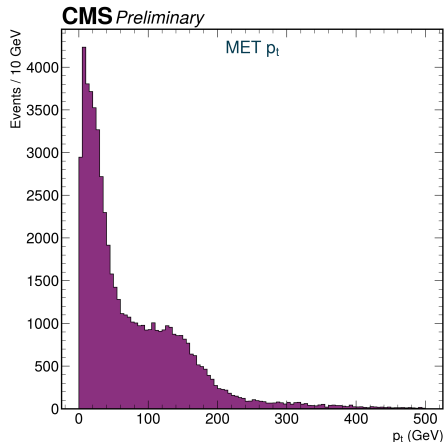
- Basic selections : $p_t > 25\text{GeV}$ and $|\eta| < 2.5$ for each jet
- Btagger used : **btagDeepFlavB**
- Sample used: Run2018A/MET
- Medium Weight Parameter used for ak4bjets selection : 0.3040
- Lot of noise, no clear structure

Figure 6: Dijet mass of Data samples



- No filters or Trigger applied

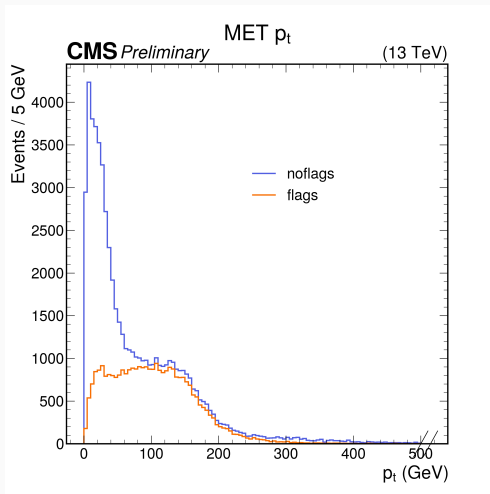
Figure 7: MET p_t for signal MC samples



- No filters or Trigger applied
- Looks similar to the Jet data

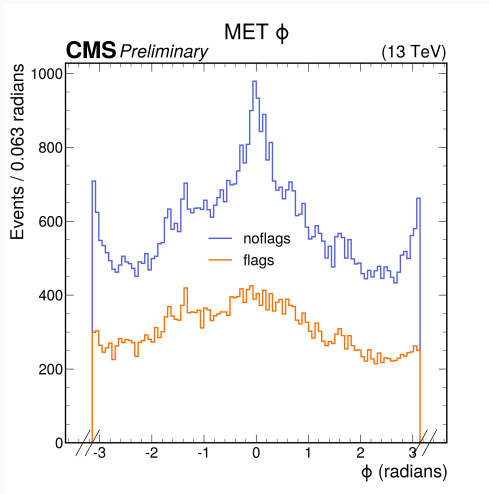
Figure 8: MET p_t for Data samples

MET Filters



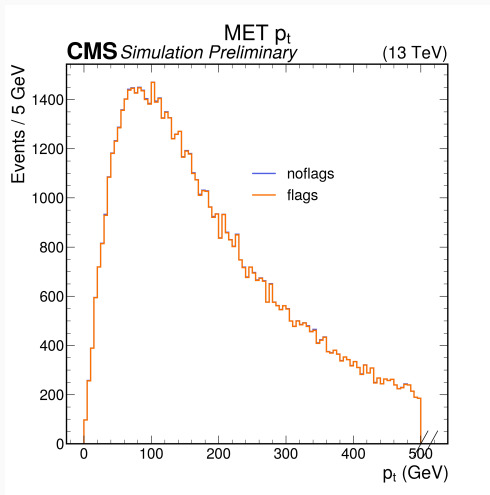
- Compared how the MET p_t looks with and without MET triggers on Data
- .

Figure 9: MET p_t for MET2018A



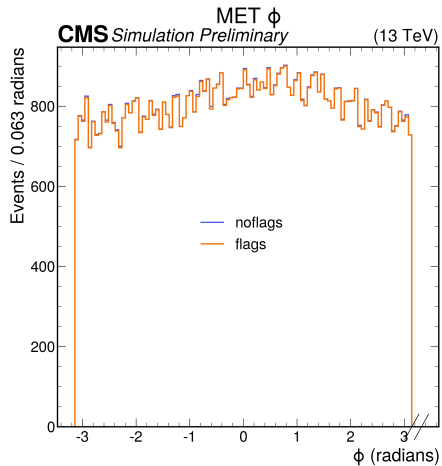
- Compared how the MET ϕ looks with and without MET triggers
- .jf

Figure 10: MET ϕ for MET2018A



- Compared how the MET p_t looks with and without MET triggers on Signal MC
- .jf

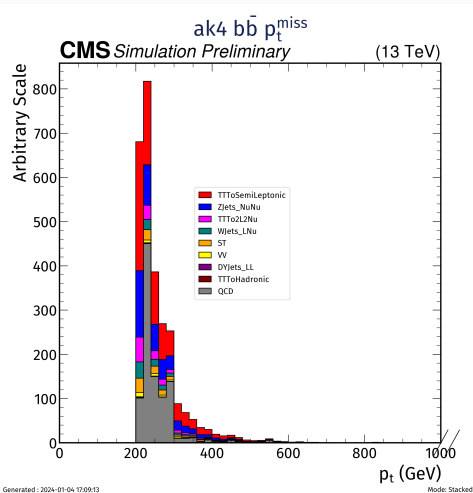
Figure 11: MET p_t for MonoHtobb_ZpBaryonic



- Compared how the MET ϕ looks with and without MET triggers on Signal MC
- .

Figure 12: MET ϕ for MC

Contribution of various
backgrounds:Resolved;2018



Selections Applied:

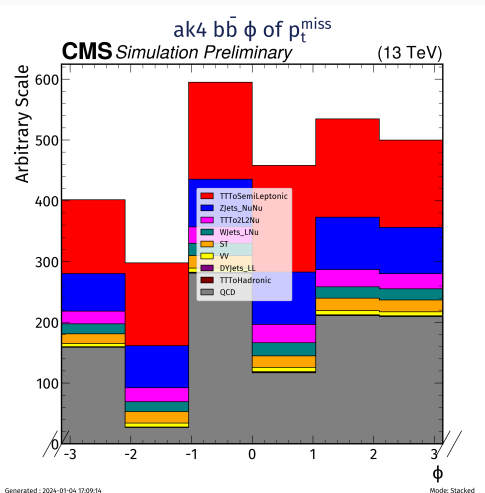
Event Selections:

- $\text{MET} > 200 \text{ GeV}$
- no leptons
- no photons

Object Selections:

- jet $p_t > 30 \text{ GeV}$
- jet $|\eta| < 2.5$
- $\Delta\phi(\text{jet}, \text{MET})$
- at least 2 tight bjets (algorithm:DeepFlavB)
- leading bjet $p_t > 50 \text{ GeV}$
- subleading bjet $p_t > 30 \text{ GeV}$
- atmost 2 additional jets

Figure 13: Simulated contribution of various backgrounds to the signal in the resolved $b\bar{b}$ bar case for 2018



Selections Applied:

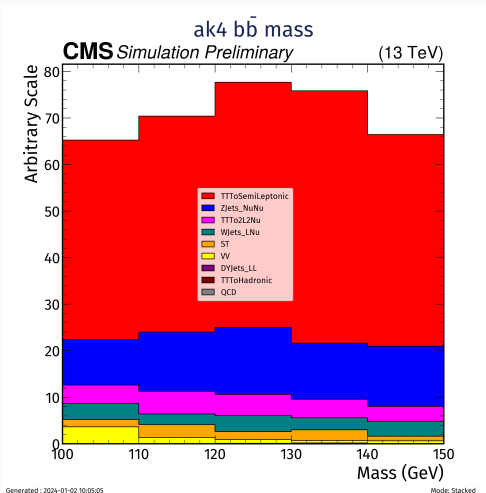
Event Selections:

- $\text{MET} > 200 \text{ GeV}$
- no leptons
- no photons

Object Selections:

- jet $p_t > 30 \text{ GeV}$
- jet $|\eta| < 2.5$
- $\Delta\phi(\text{jet}, \text{MET})$
- at least 2 tight bjets (algorithm:DeepFlavB)
- leading bjet $p_t > 50 \text{ GeV}$
- subleading bjet $p_t > 30 \text{ GeV}$
- atmost 2 additional jets

Figure 14: Simulated contribution of various backgrounds to the signal in the resolved $b\bar{b}$ bar case for 2018



Selections Applied:

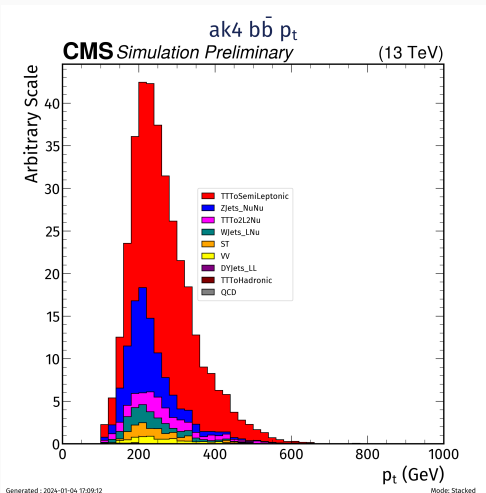
Event Selections:

- $MET > 200$ GeV
- no leptons
- no photons

Object Selections:

- jet $p_T > 30$ GeV
- jet $|\eta| < 2.5$
- $\Delta\phi(\text{jet}, MET)$
- at least 2 tight bjets (algorithm:DeepFlavB)
- leading bjet $p_T > 50$ GeV
- subleading bjet $p_T > 30$ GeV
- atmost 2 additional jets
- dijet = leading bjet + subleading bjet
- dijet mass between (100 GeV,150 GeV)
- dijet $p_T > 100$ GeV

Figure 15: Simulated contribution of various backgrounds to the signal in the resolved $b\bar{b}$ bar case for 2018



Selections Applied:

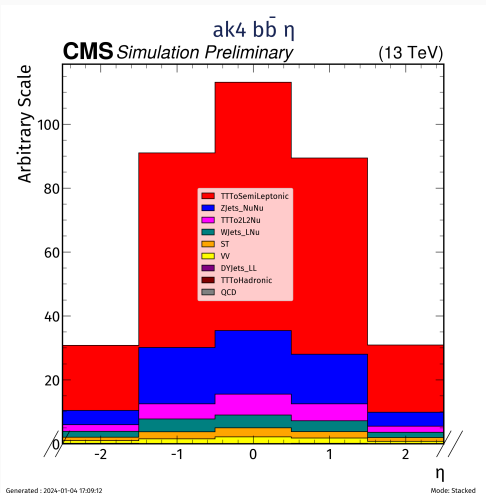
Event Selections:

- $MET > 200$ GeV
- no leptons
- no photons

Object Selections:

- jet $p_t > 30$ GeV
- jet $|\eta| < 2.5$
- $\Delta\phi(\text{Jet}, MET)$
- at least 2 tight bjets (algorithm:DeepFlavB)
- leading bjet $p_t > 50$ GeV
- subleading bjet $p_t > 30$ GeV
- atmost 2 additional jets
- dijet = leading bjet + subleading bjet
- dijet mass between (100 GeV,150 GeV)
- dijet $p_t > 100$ GeV

Figure 16: Simulated contribution of various backgrounds to the signal in the resolved $b\bar{b}$ bar case for 2018



Selections Applied:

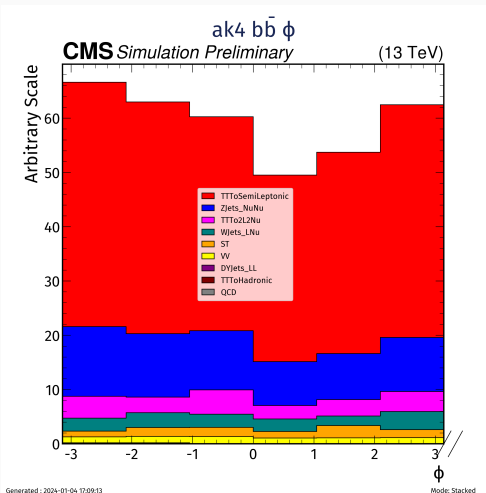
Event Selections:

- $\text{MET} > 200 \text{ GeV}$
- no leptons
- no photons

Object Selections:

- jet $p_T > 30 \text{ GeV}$
- jet $|\eta| < 2.5$
- $\Delta\phi(\text{jet}, \text{MET})$
- at least 2 tight bjets (algorithm:DeepFlavB)
- leading bjet $p_T > 50 \text{ GeV}$
- subleading bjet $p_T > 30 \text{ GeV}$
- atmost 2 additional jets
- dijet = leading bjet + subleading bjet
- dijet mass between (100 GeV,150 GeV)
- dijet $p_T > 100 \text{ GeV}$

Figure 17: Simulated contribution of various backgrounds to the signal in the resolved $b\bar{b}$ case for 2018



Selections Applied:

Event Selections:

- $MET > 200$ GeV
- no leptons
- no photons

Object Selections:

- jet $p_T > 30$ GeV
- jet $|\eta| < 2.5$
- $\Delta\phi(jet, MET)$
- at least 2 tight bjets (algorithm:DeepFlavB)
- leading bjet $p_T > 50$ GeV
- subleading bjet $p_T > 30$ GeV
- atmost 2 additional jets
- dijet = leading bjet + subleading bjet
- dijet mass between (100 GeV,150 GeV)
- dijet $p_T > 100$ GeV

Figure 18: Simulated contribution of various backgrounds to the signal in the resolved $b\bar{b}$ bar case for 2018

Top Muon Control
Region:Resolved;2018

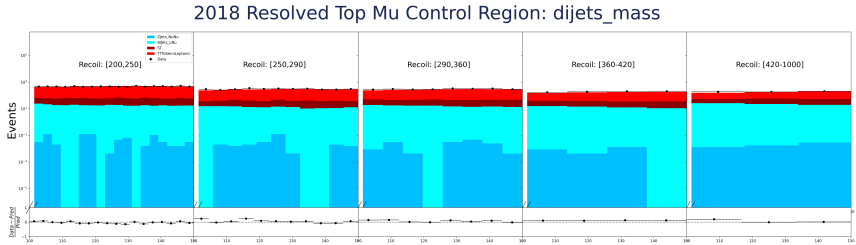


Figure 19: Dijet Mass in various Recoil windows

