Cross feeds update
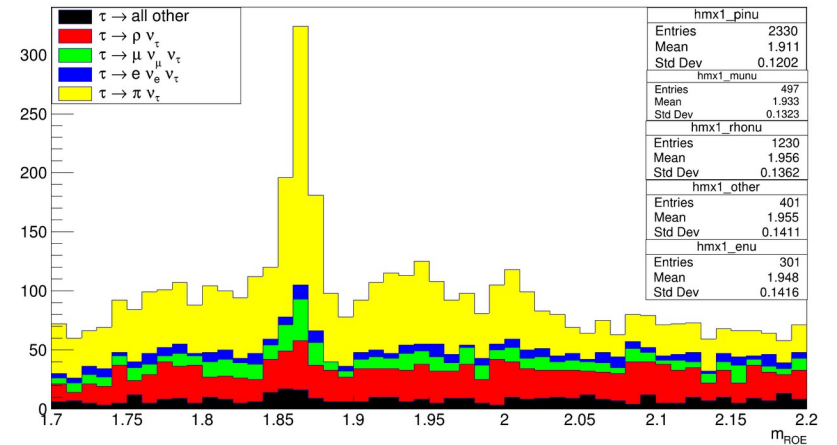
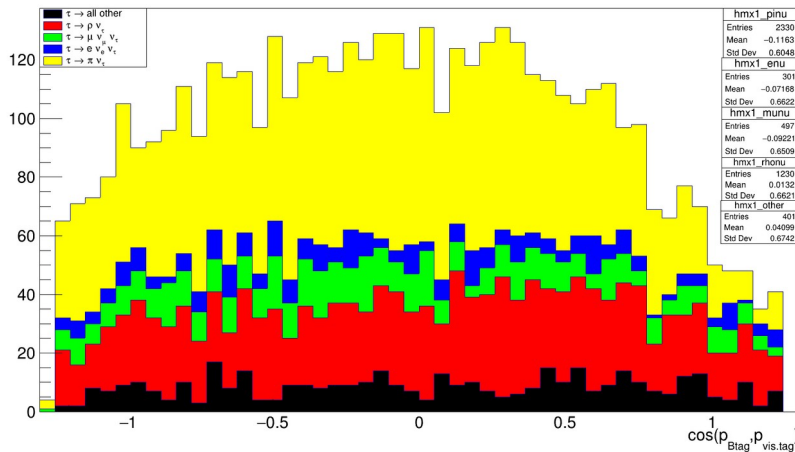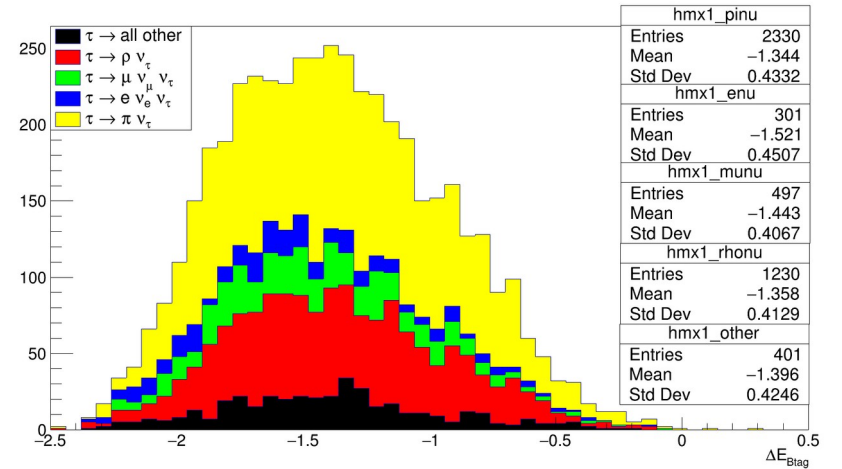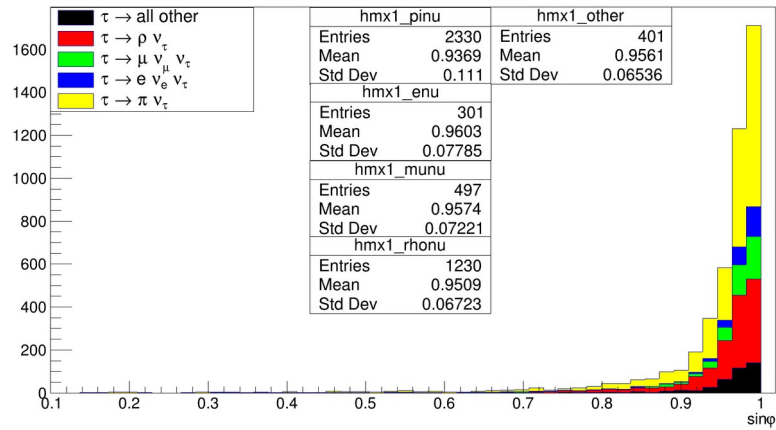Included muIDBelle<0.98,eIDBelle<0.98 in pi+ cuts
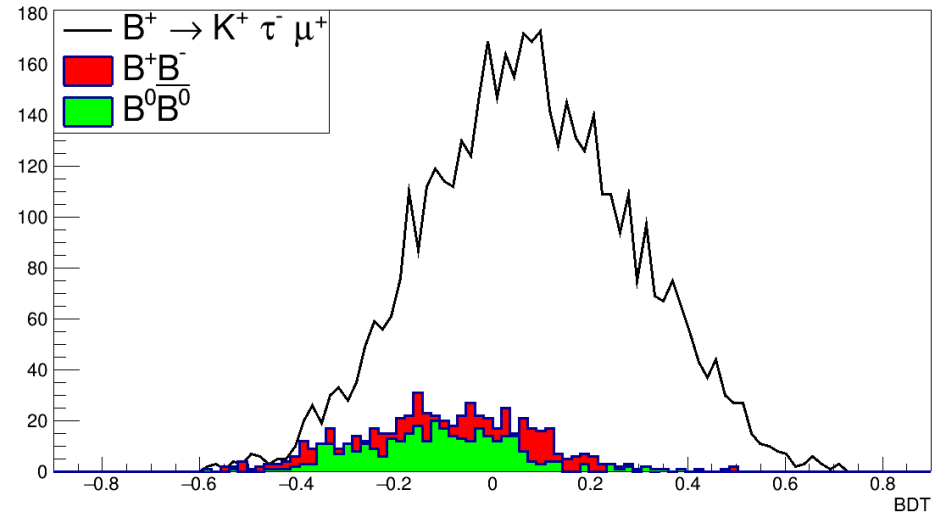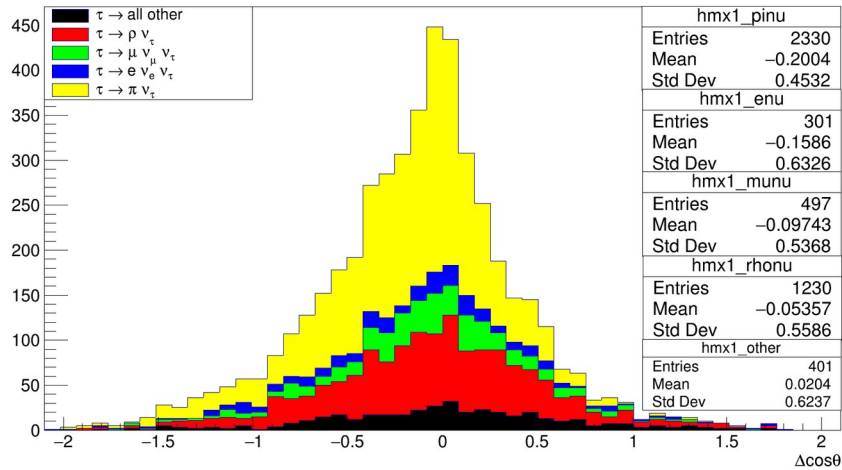
Training and testing on the different signal sample

19/11/2024

Introduction

- Trained the BDT on 1.0 M B $\to K\tau(\pi)\ell$ sample.

- Tested the BDT on 5.0 M B $\to K\tau\ell$ sample.

- Still a lot of things to implement (from technical point of view).

Basic distributions

Basic distributions cont.

Left plot legend:
- τ → all other (black)
- τ → ρ ν_τ (red)
- τ → μ ν_μ ν_τ (green)
- τ → e ν_e ν_τ (blue)
- τ → π ν_τ (yellow)

hmx1_pinu	
Entries	2330
Mean	−0.2004
Std Dev	0.4532
hmx1_enu	
Entries	301
Mean	−0.1586
Std Dev	0.6326
hmx1_munu	
Entries	497
Mean	−0.09743
Std Dev	0.5368
hmx1_rhonu	
Entries	1230
Mean	−0.05357
Std Dev	0.5586
hmx1_other	
Entries	401
Mean	0.0204
Std Dev	0.6237

Right plot legend:
- $B^+ \to K^+ \tau^- \mu^+$
- $B^+ B^-$
- $B^0 \overline{B^0}$
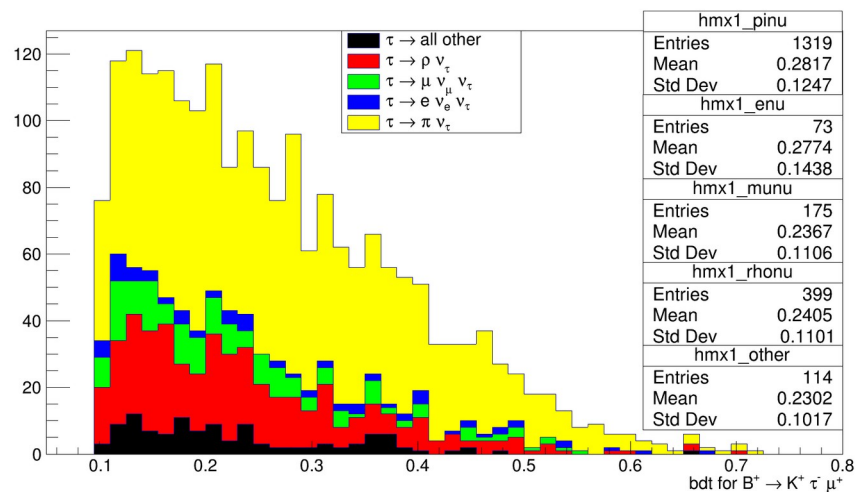
BDT distribution for signal
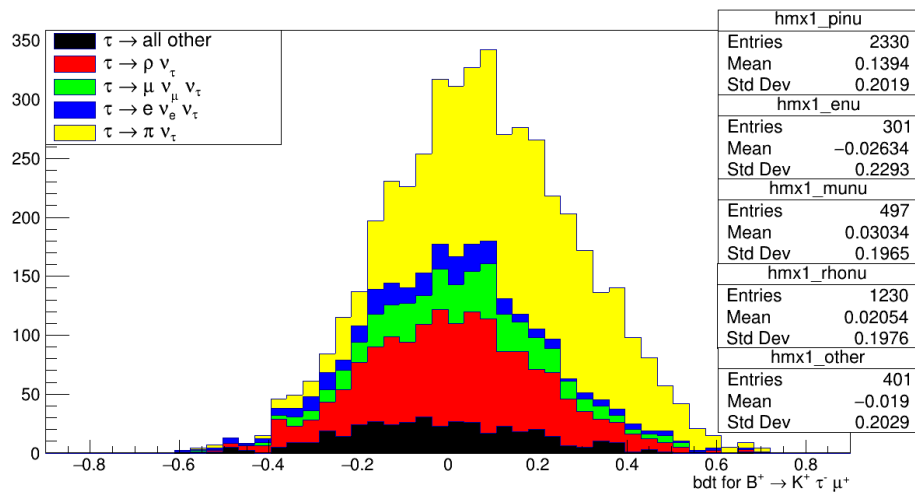
Back up

Particle selection

```
# cuts on particles ID and IP
e_cut = 'eIDBelle > 0.6 and muIDBelle < 0.98 and atcPIDBelle(3,0) < 0.98 and d0 < 1 and abs(z0) < 4 and p > 0.05'
mu_cut = 'muIDBelle > 0.6 and eIDBelle < 0.98 and atcPIDBelle(3,1) < 0.98 and d0 < 1 and abs(z0) < 4 and p > 0.05'
pi_cut = 'atcPIDBelle(3,2) < 0.6 and d0 < 1 and abs(z0) < 4 and p > 0.05 and muIDBelle < 0.98 and eIDBelle < 0.98'
K_cut = 'atcPIDBelle(3,2) > 0.6 and muIDBelle < 0.98 and eIDBelle < 0.98 and d0 < 1 and abs(z0) < 4 and p > 0.05'
p_cut = 'atcPIDBelle(4,2) > 0.6 and atcPIDBelle(4,3) > 0.6 and muIDBelle < 0.98 and eIDBelle < 0.98 and d0 < 1 and abs(z0) < 4 and p > 0.05'
```

Decay modes of tau without e and mu ID cuts

tau → pi tau_nu

tau → e e_nu tau_nu

tau → mu mu_nu tau_nu

tau → rho tau_nu

hmx1_pinu	
Entries	2456
Mean	−0.192
Std Dev	0.4621
hmx1_enu	
Entries	1718
Mean	−0.09847
Std Dev	0.5508
hmx1_munu	
Entries	1726
Mean	−0.09125
Std Dev	0.5431
hmx1_rhonu	
Entries	1340
Mean	−0.02853
Std Dev	0.5566

$\Delta\cos\theta$