

# Progress Report on Tau Final States of TTTT

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# Outline

# EventSelection

- MET fillters
- HLT requirements
  - `HLT_PFHT450_SixJet40_BTagCSV_p056==1,`  
`HLT_PFHT400_SixJet30_DoubleBTagCSV_p056==1`
- loose preselection
  - `tausL.size()>0, jets.size()>3, bjetsL.size()>1`
- Subchannel requirements

# MC reweighting

- genWeight
- prefireWeight
- PileUp reweighting

# Event Yield

```
1Tau0L
TTTT      = 9.47371
TT        = 6218.8
TTX       = 158.203
single top = 128.119
TX        = 13.0152
DYJets    = 0
VV        = 0.103319
VVV       = 0.982638
QCD       = 7288.82
Total BKG = 13835.6
```

```
1Tau1E
TTTT      = 3.418
TT        = 1109.19
TTX       = 35.3617
single top = 23.1377
TX        = 3.4963
DYJets    = 0
VV        = 0.0537144
VVV       = 0.249651
QCD       = 2.36108
Total BKG = 1183.01
```

```
1Tau1Mu
TTTT      = 4.27635
TT        = 1256.29
TTX       = 39.082
single top = 19.9296
TX        = 4.01954
DYJets    = 0
VV        = 0.0786659
VVV       = 0.0812971
QCD       = 0
Total BKG = 1329.96
```

```
1Tau2OS
TTTT      = 1.21544
TT        = 60.2678
TTX       = 11.5648
single top = 0.508183
TX        = 0.962345
DYJets    = 0
VV        = 0.0375234
VVV       = 0.0953384
QCD       = 0
Total BKG = 76.1811
```

- Finally ZhangYu and Fabio and me, we get the exact same number of raw entries for all samples, though we have slightly different cross section

# Event Yield

```
1Tau2SS
TTTT      = 0.627434
TT        = 3.42344
TTX       = 3.47985
single top = 0.0469887
TX        = 0.498109
DYJets    = 0
VV        = 0
VVV       = 0.0625488
QCD       = 0
Total BKG = 8.91849
```

```
1Tau3L
TTTT      = 0.12722
TT        = 0
TTX       = 0.852466
single top = 0.00572658
TX        = 0.0294773
DYJets    = 0
VV        = 0
VVV       = 0.00242049
QCD       = 0
Total BKG = 1.04911
```

```
2Tau0L
TTTT      = 0.506514
TT        = 247.514
TTX       = 12.6591
single top = 7.16537
TX        = 2.56187
DYJets    = 0
VV        = 0.042014
VVV       = 0.0348188
QCD       = 1.41845
Total BKG = 275.662
```

```
2Tau1E
TTTT      = 0.119437
TT        = 11.6903
TTX       = 2.39018
single top = 0.0753027
TX        = 0.495236
DYJets    = 0
VV        = 0
VVV       = 0
QCD       = 0
Total BKG = 15.799
```

# Event Yield

```
2Tau1Mu
TTTT      = 0.140225
TT        = 11.2643
TTX       = 2.80037
single top = 0.0611482
TX        = 0.530434
DYJets    = 0
VV        = 0
VVV       = 0
QCD       = 0
Total BKG = 15.9151

2Tau20S
TTTT      = 0.0177159
TT        = 0.0437823
TTX       = 0.263465
single top = 0.00388105
TX        = 0.031774
DYJets    = 0
VV        = 0
VVV       = 0.00269306
QCD       = 0
Total BKG = 0.434313
```

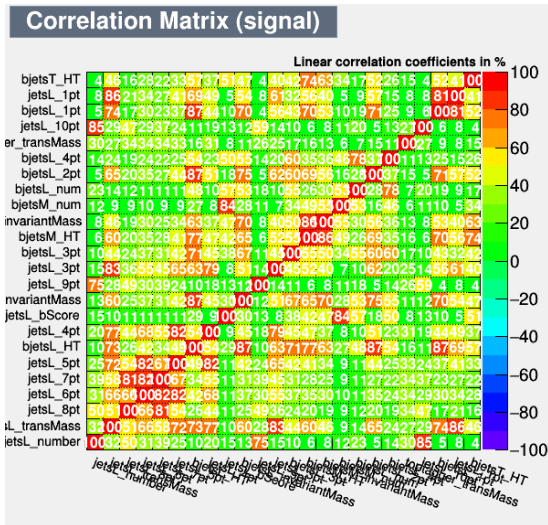
```
2Tau25S
TTTT      = 0.00962764
TT        = 0
TTX       = 0.0271836
single top = -8.60342e-06
TX        = 0.00315698
DYJets    = 0
VV        = 0
VVV       = 0
QCD       = 0
Total BKG = 0.0506098
```

# TMVA Setup

- ROOT6, TMVA4.3.0
- Signal: TTTT\_TuneCP5; Background: TTTo2L2Nu, TTToHadronic, TTToSemiLeptonic
- Global weight and event weight same in event yield calculation
- Input Variables: 24, same as before

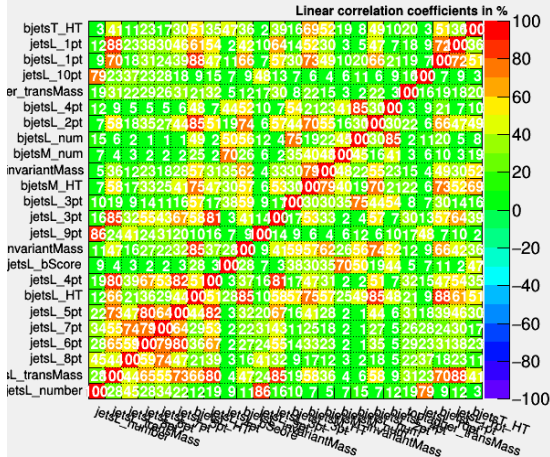


# Input Variable Correlation

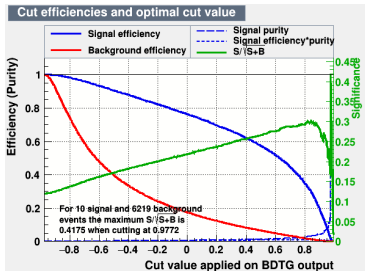
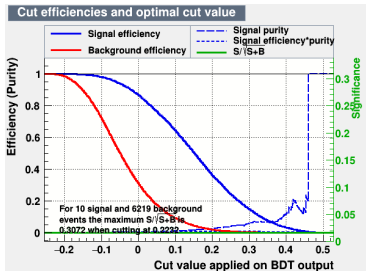


# Input Variable Correlation

## Correlation Matrix (background)



# Significance



- because I am using ROOT6 now, the TMVA interface is a bit different than root5
- Significance plot seems strange, don't know how to fix this yet .
- here only TT bg is considered, should add other bg especially QCD.

# Significance

```
--- Classifier ( #signal, #backgr.) Optimal-cut S/sqrt(S+B) NSig NBkg EffSig EffBkg
--- CutsSA: ( 9.5, 6219) 0.1850 0.228903 1.709737 54.08042 0.18 0.008696
--- BDTG: ( 9.5, 6219) 0.9772 0.41752 0.174323 0 0.01835 0
--- BDT: ( 9.5, 6219) 0.2232 0.307185 2.927587 87.90062 0.3082 0.01413
```