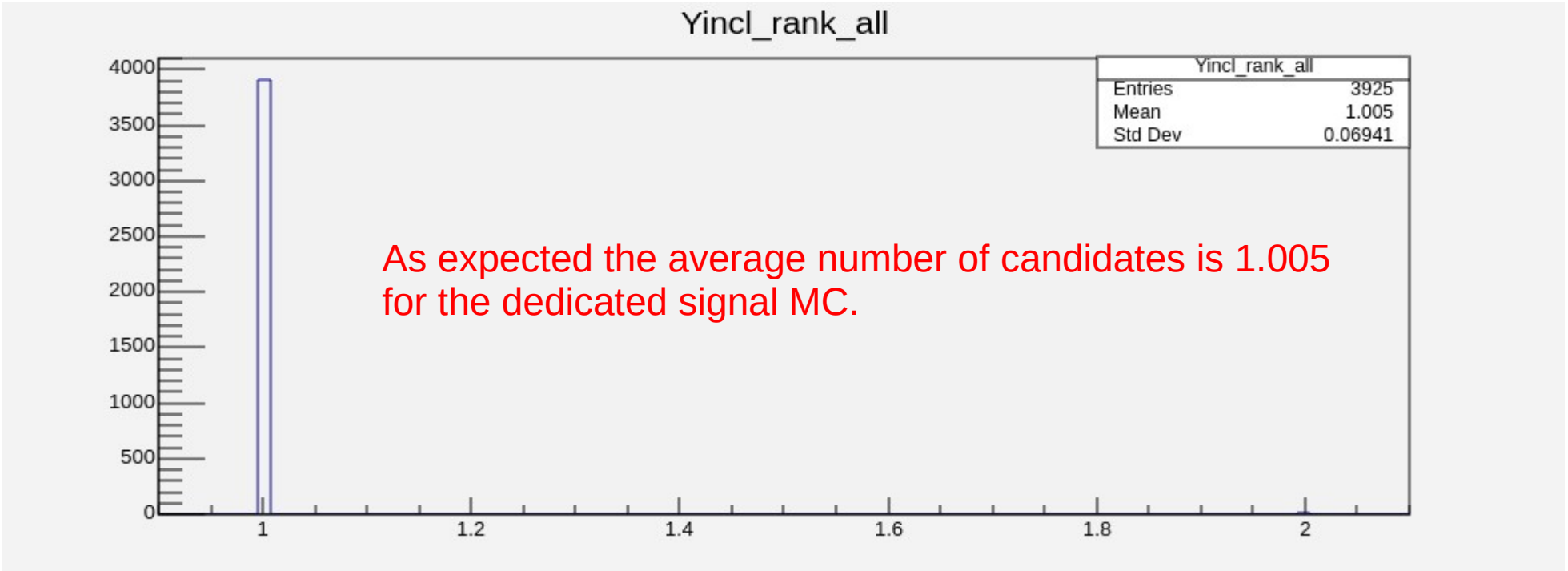
Work update

Some previous comments checks
and TMVA basic plots

02/09/2024

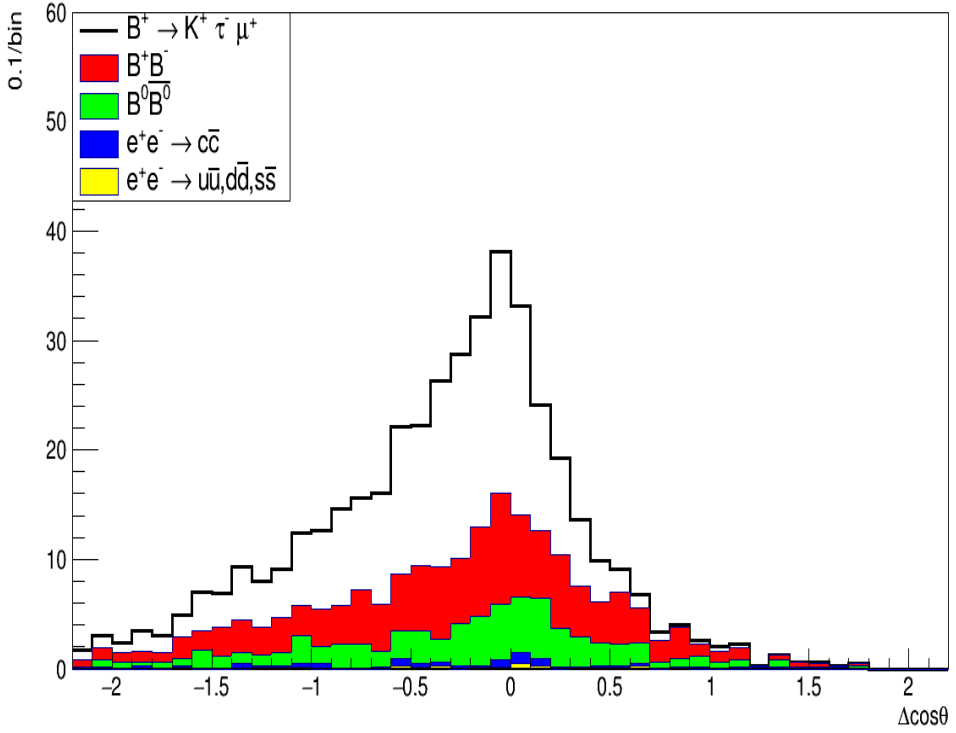
Number of candidates

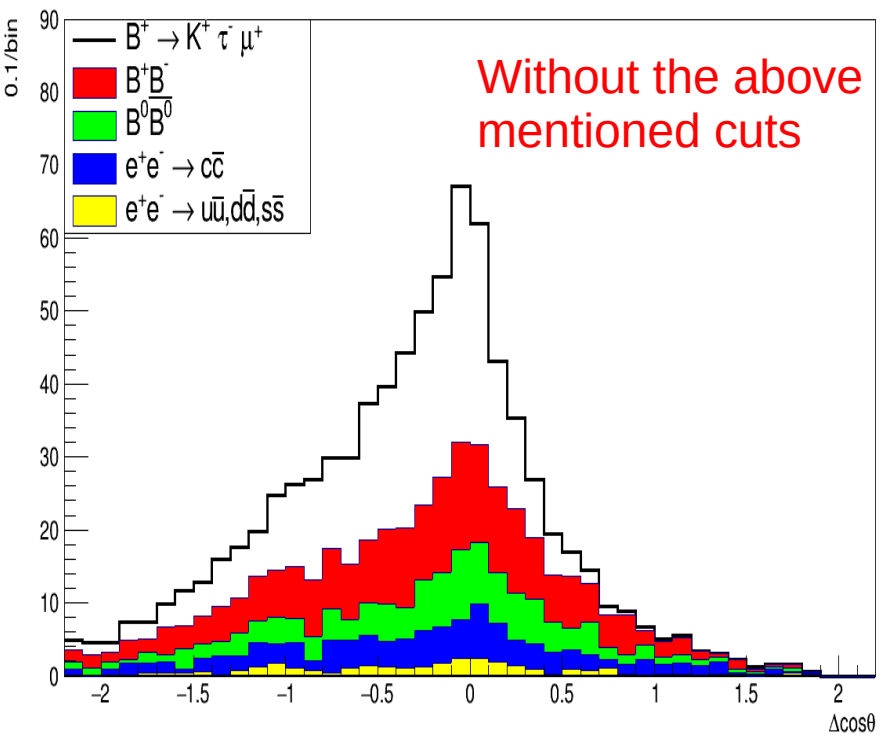
- The average number of candidates (for signal MC) after implementing all cuts on reconstruction level.



Additional cuts

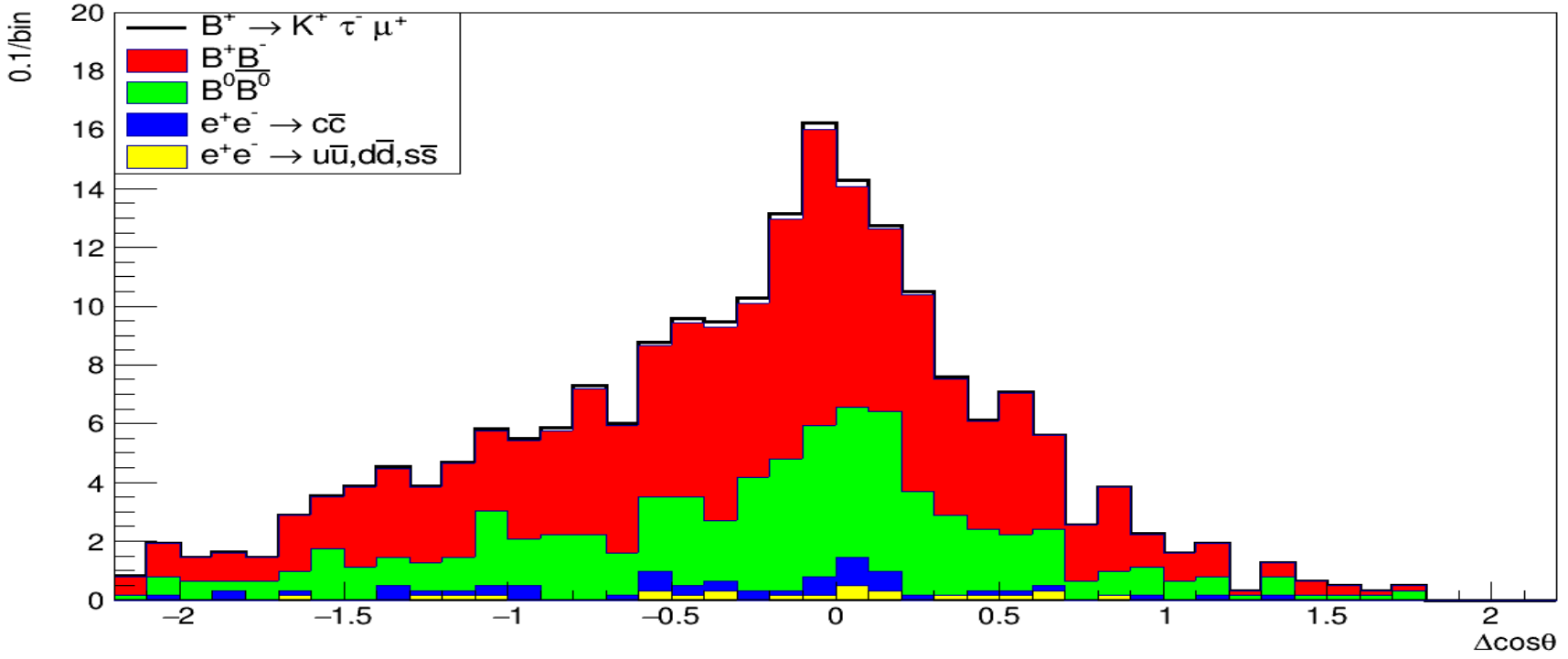
- nLeptons = 2, foxWolframR2 < 0.3, $Q_{total} = 0$





Additional cuts & scaled to 10^{-5}

- nLeptons = 2, foxWolframR2 < 0.3, $Q_{total} = 0$

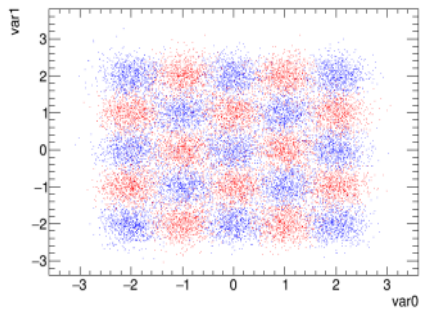


TMVA try

- Started working on it, after a meeting (end July) with Karol.
- Following script (on right side).
- Working properly,however need to understand the output plots and input parameters (process).

Entraînement avec TMVA (Train.C)

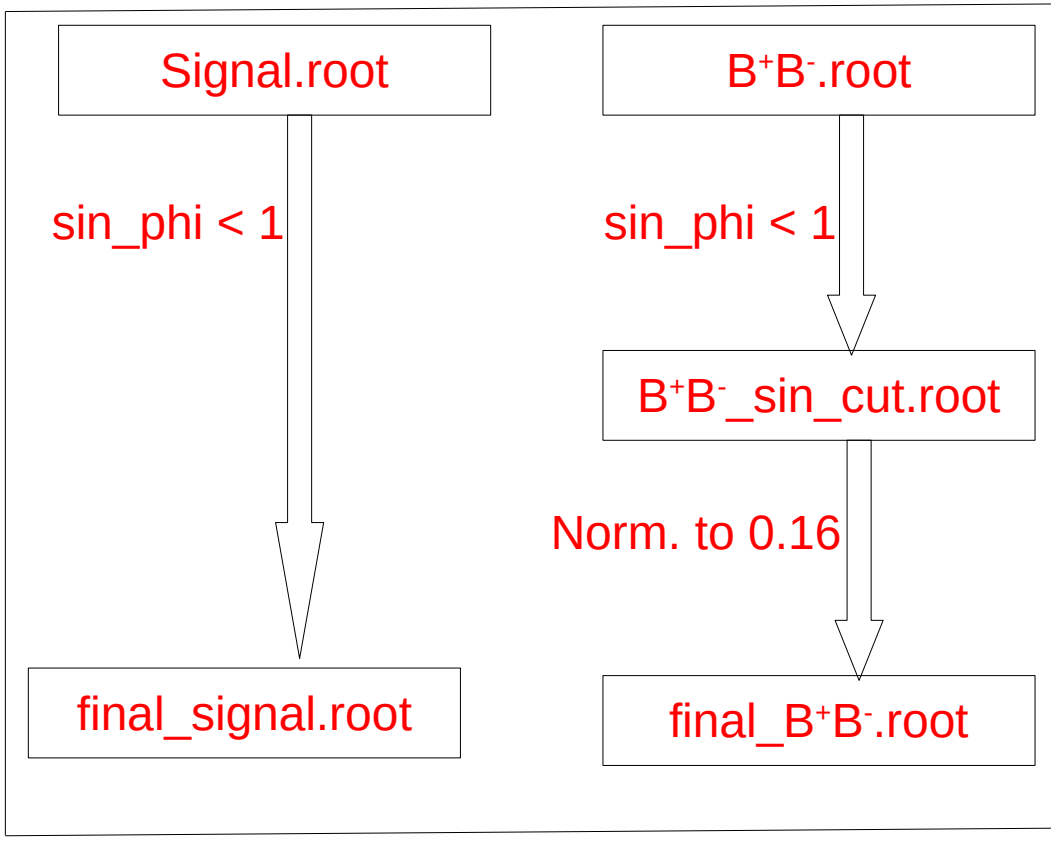
```
TFile* outputFile = TFile::Open("output.root","RECREATE");
TMVA::Factory *factory = new TMVA::Factory( "TMVAClassification", outputFile,
    "!V:Color:DrawProgressBar:Transformations=I:AnalysisType=Classification");
TFile* inputFile = new TFile("dataSchachbrett.root");
TTree* sig = (TTree*)inputFile->Get("TreeS");
TTree* bkg = (TTree*)inputFile->Get("TreeB");
double sigWeight = 1.0; double bkgWeight = 1.0;
TMVA::DataLoader *dataloader =
    new TMVA::DataLoader("dataset");
dataloader->AddSignalTree(sig, sigWeight);
dataloader->AddBackgroundTree(bkg, bkgWeight);
dataloader->AddVariable("var0", 'F');
dataloader->AddVariable("var1", 'F');
TCut mycut = "";
dataloader->PrepareTrainingAndTestTree(mycut,"SplitMode=Random");
factory->BookMethod(dataloader, TMVA::Types::kBDT, "BDT", "!H:!V:NTrees=400:
    MinNodeSize=4%:MaxDepth=5:BoostType=AdaBoost:AdaBoostBeta=0.15:nCuts=80");
factory->BookMethod(dataloader, TMVA::Types::kFisher, "Fisher", "!H:!V:Fisher");
factory->TrainAllMethods(); // Train MVAs using training events
factory->TestAllMethods(); // Evaluate all MVAs using test events
// ----- Evaluate and compare performance of all configured MVAs
factory->EvaluateAllMethods();
outputFile->Close();
delete factory; delete dataloader;
```



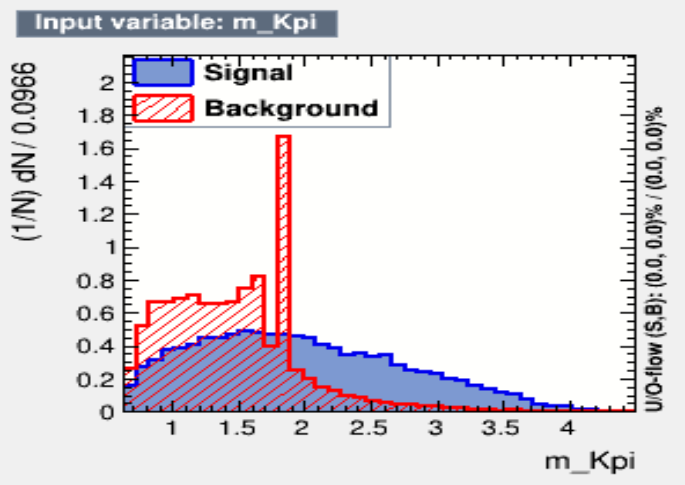

```
TMVA::TMVAGui("output.root");
```

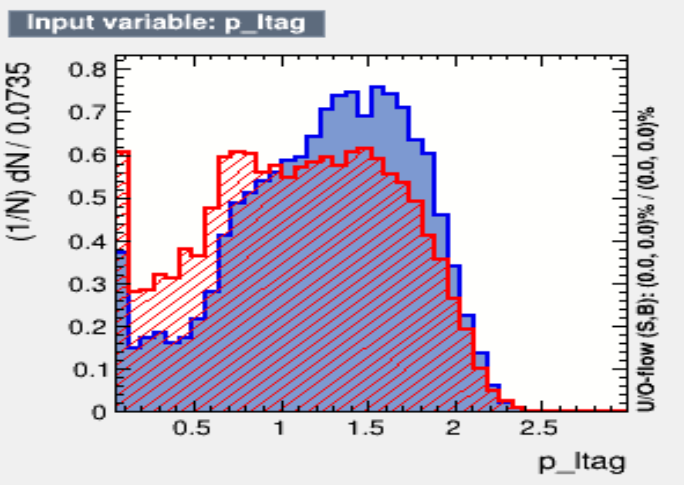
TMVA detailed workflow

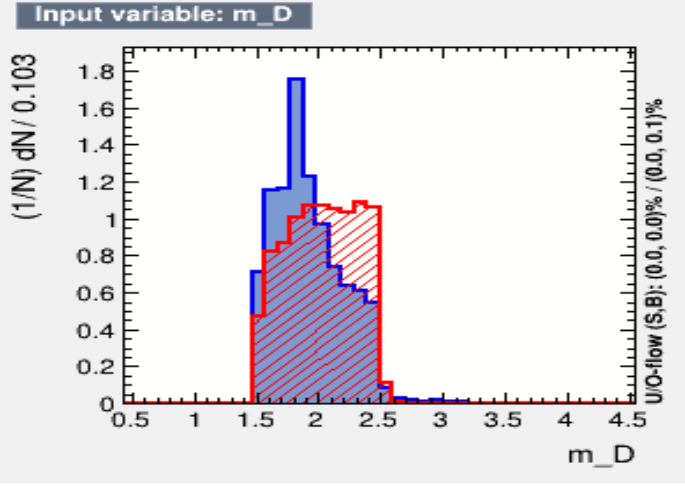
- Only working on the dedicated signal and B^+B^- generic MC.
- Not sure how to deal all the four background components.
- Only taking the following variable {m_{Kpi}, m_{ROE}, p_{ltag}, $\cos(p_{Btag},P_{vis.tag})$}.

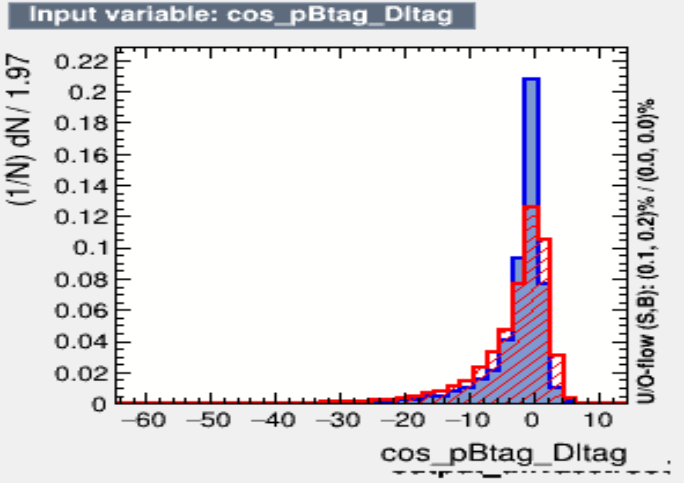


Input variables



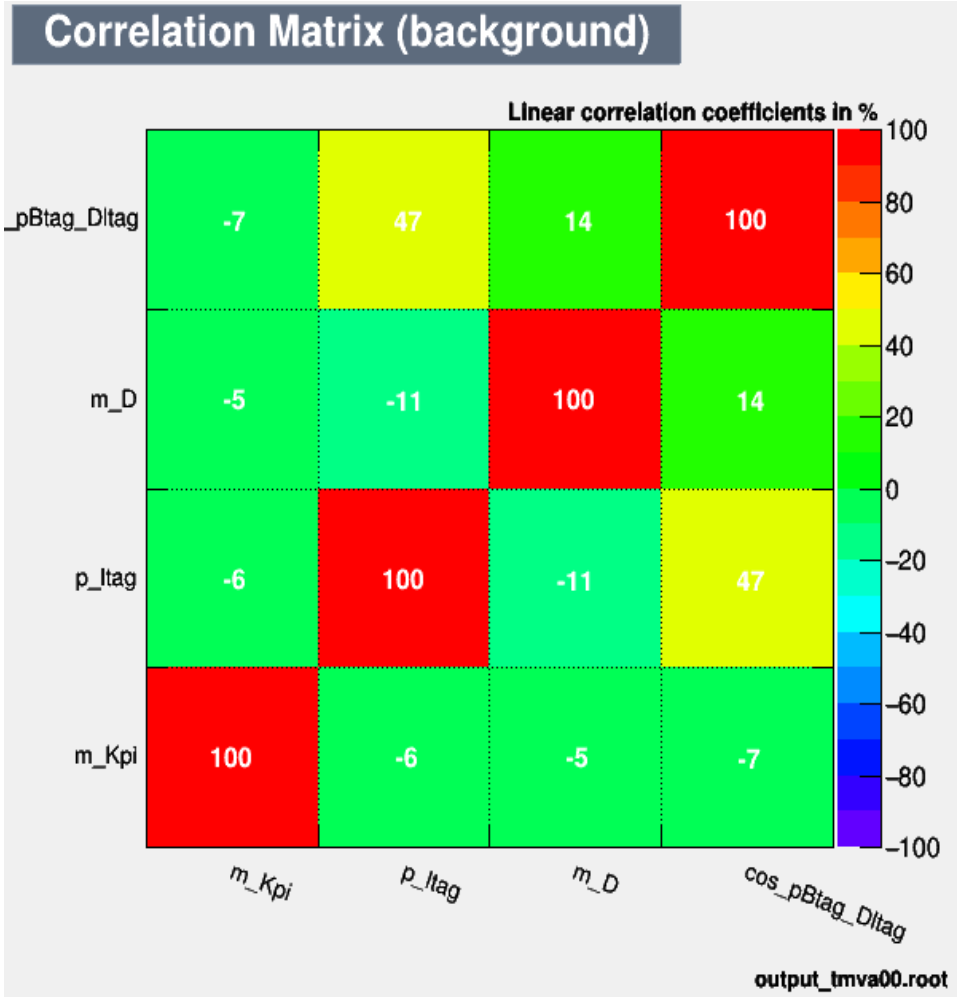


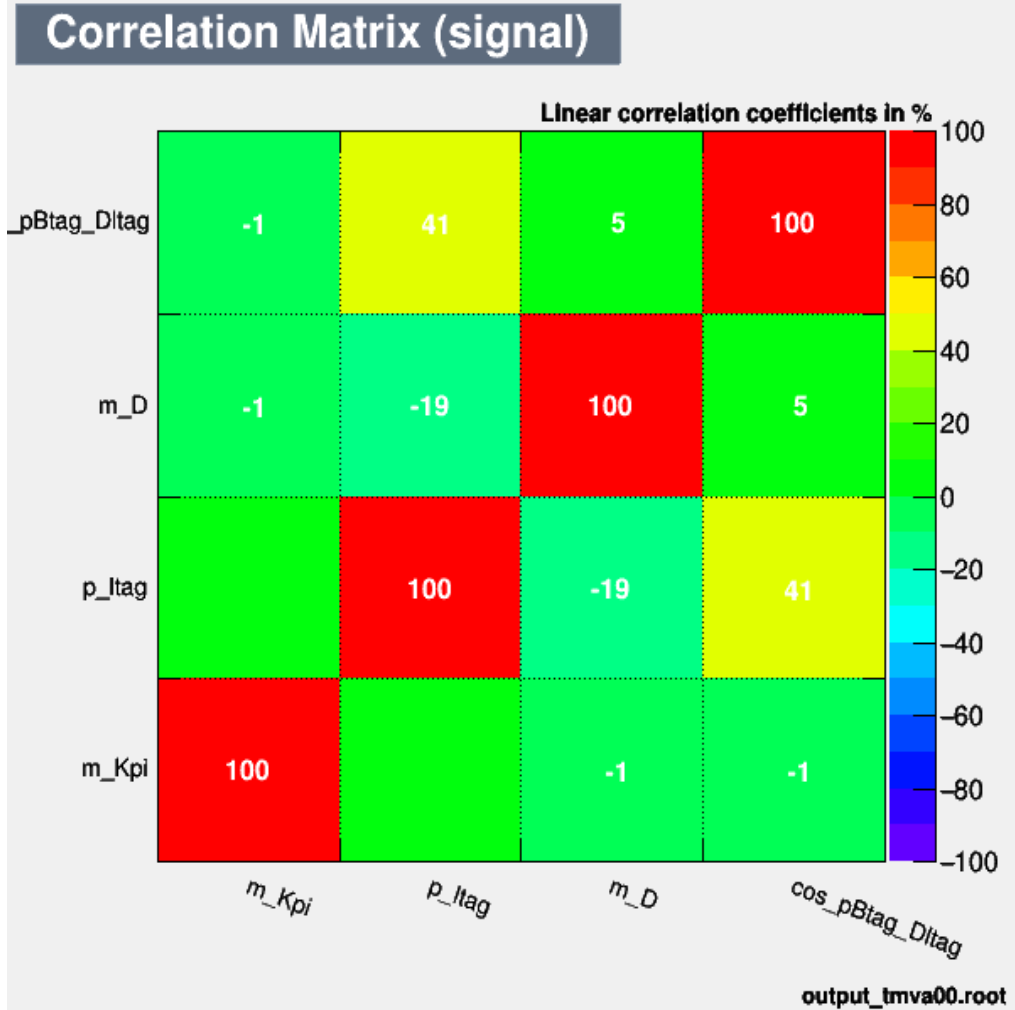




Need to understand these plots (probably can be used for cuts optimization)

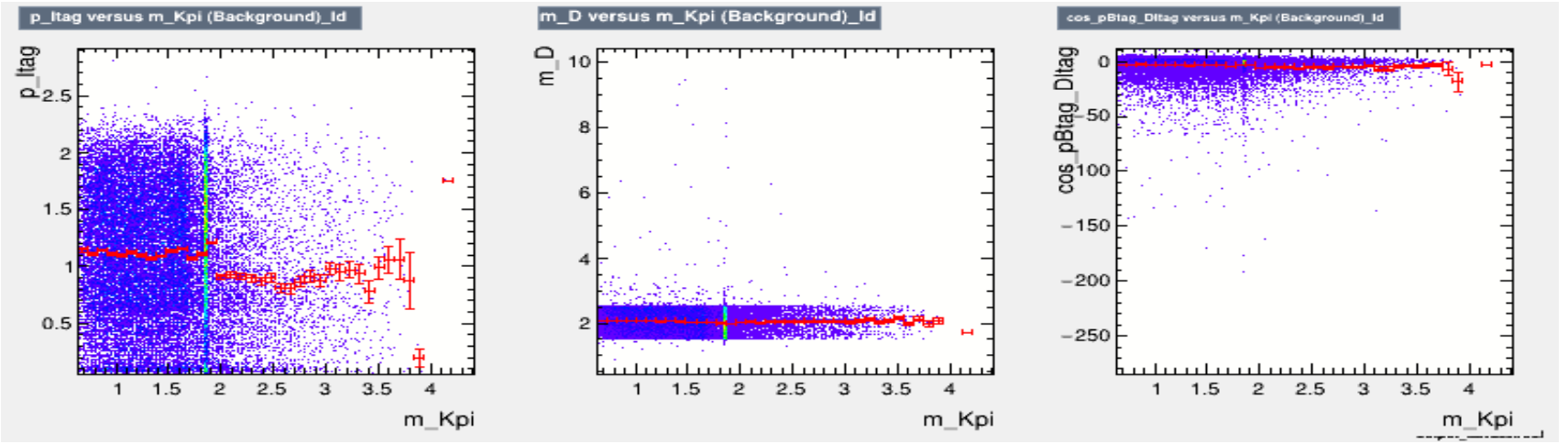
Correlation Matrix



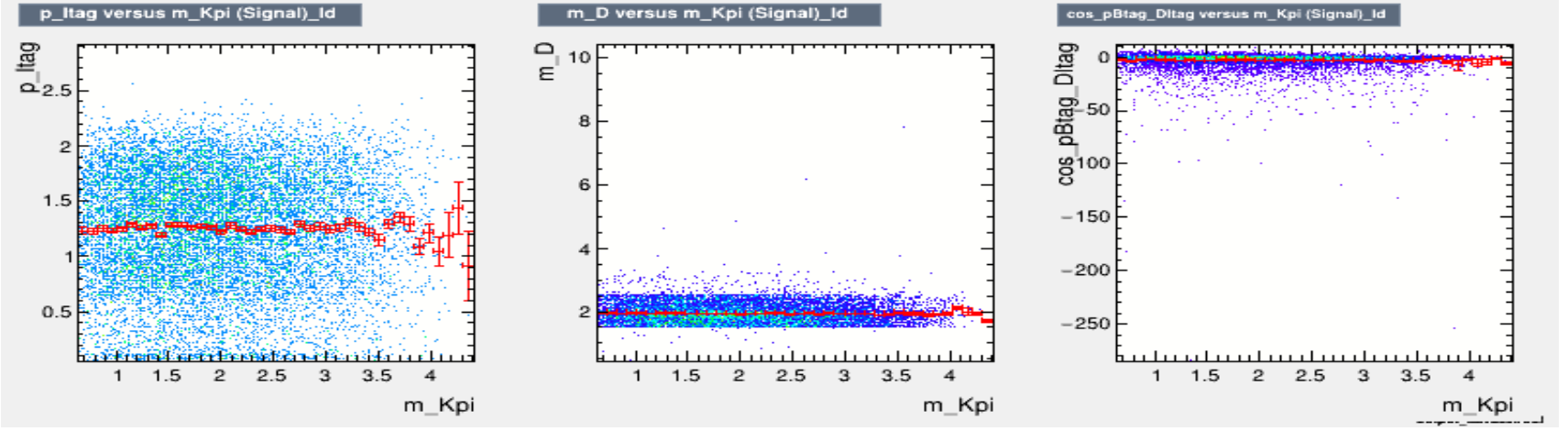


Scattered correlation plot (m_{Kpi})

Background

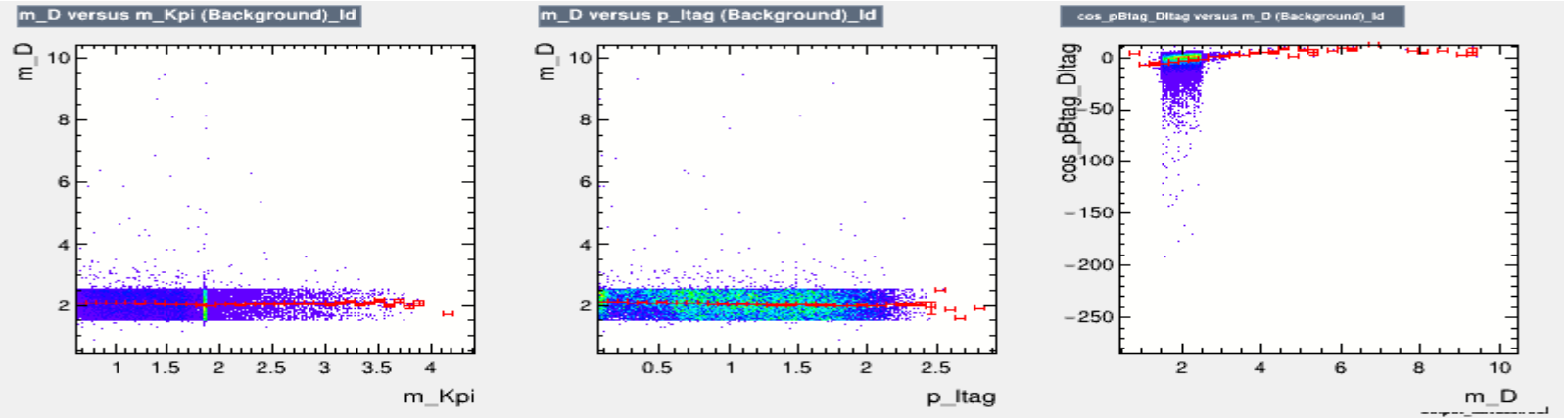


Signal

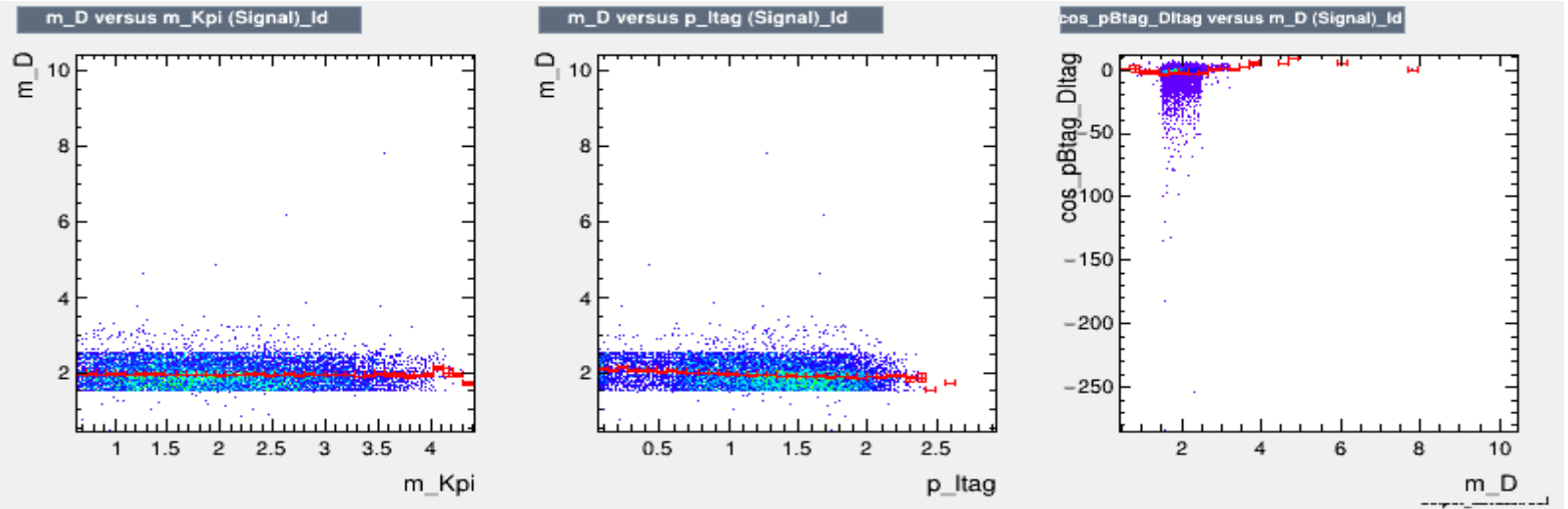


Scattered correlation plot (m_{ROE})

Background

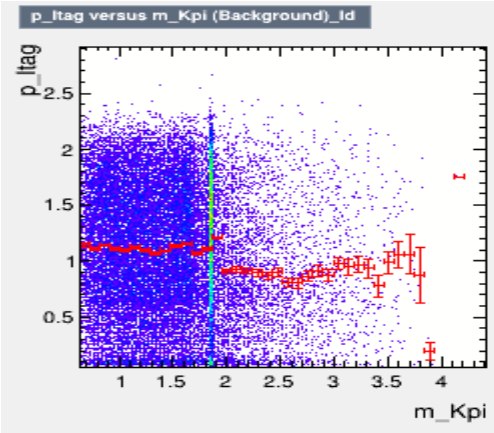


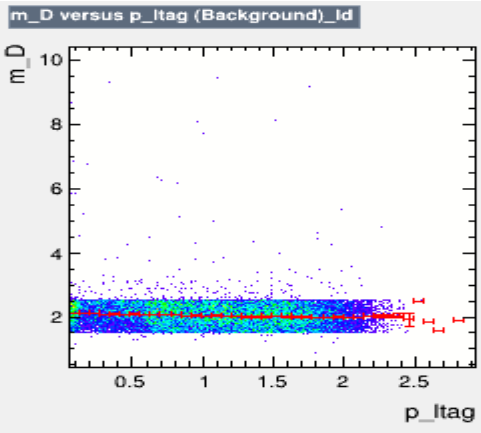
Signal

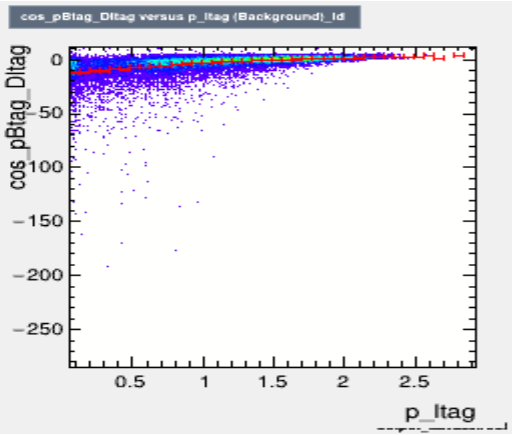


Scattered correlation plot (p_{ltag})

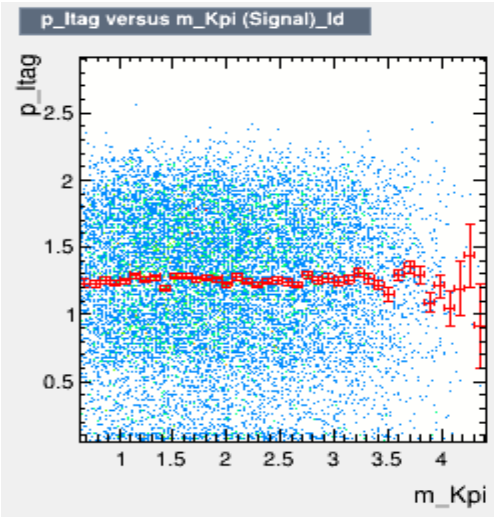
Background

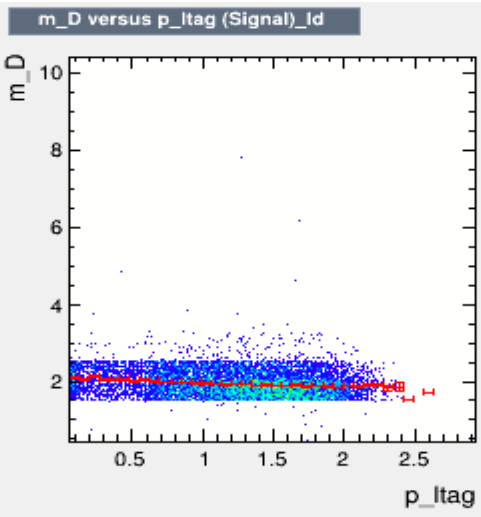


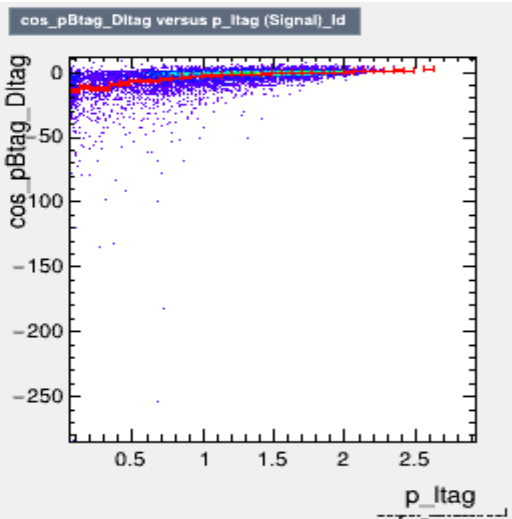




Signal

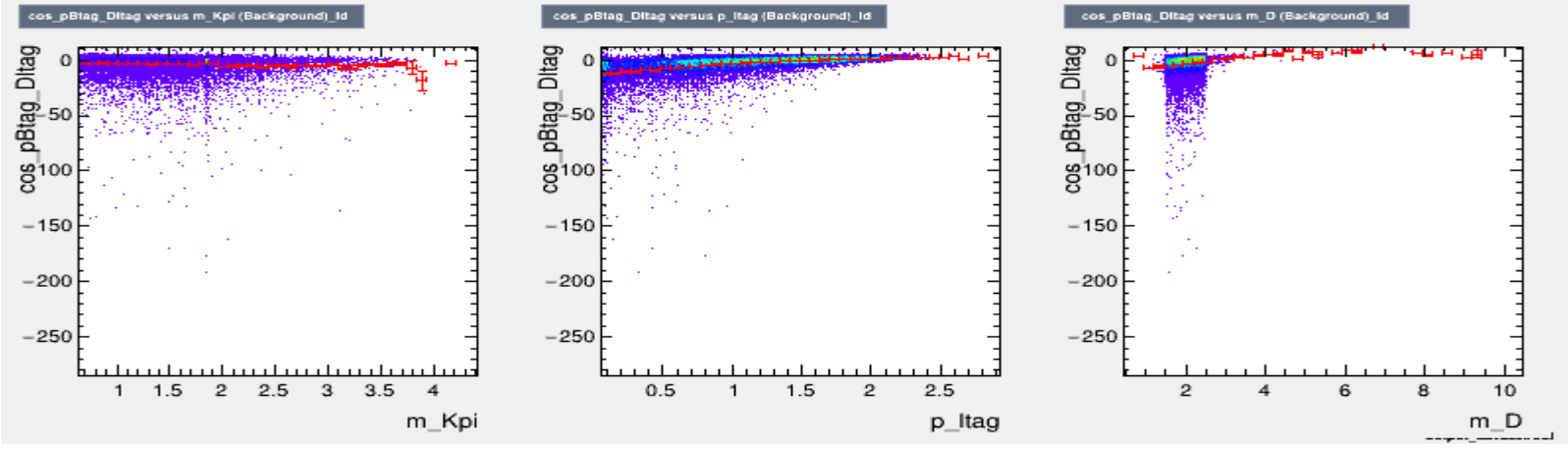




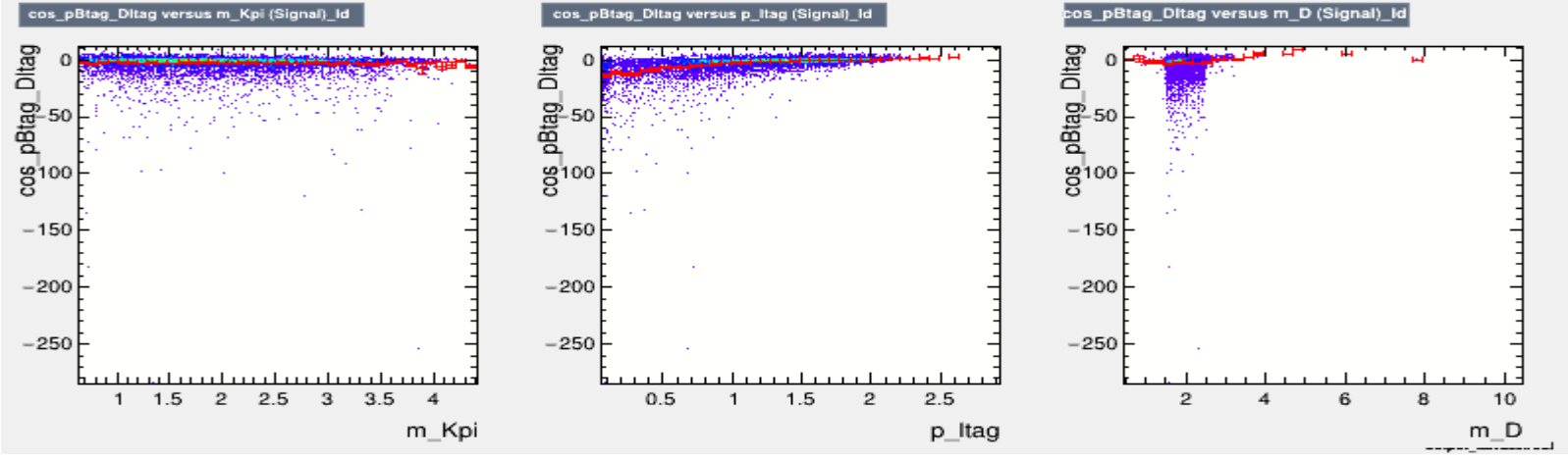


Scattered correlation plot cos(p_{Btag},$p_{vis.tag}$)

Background

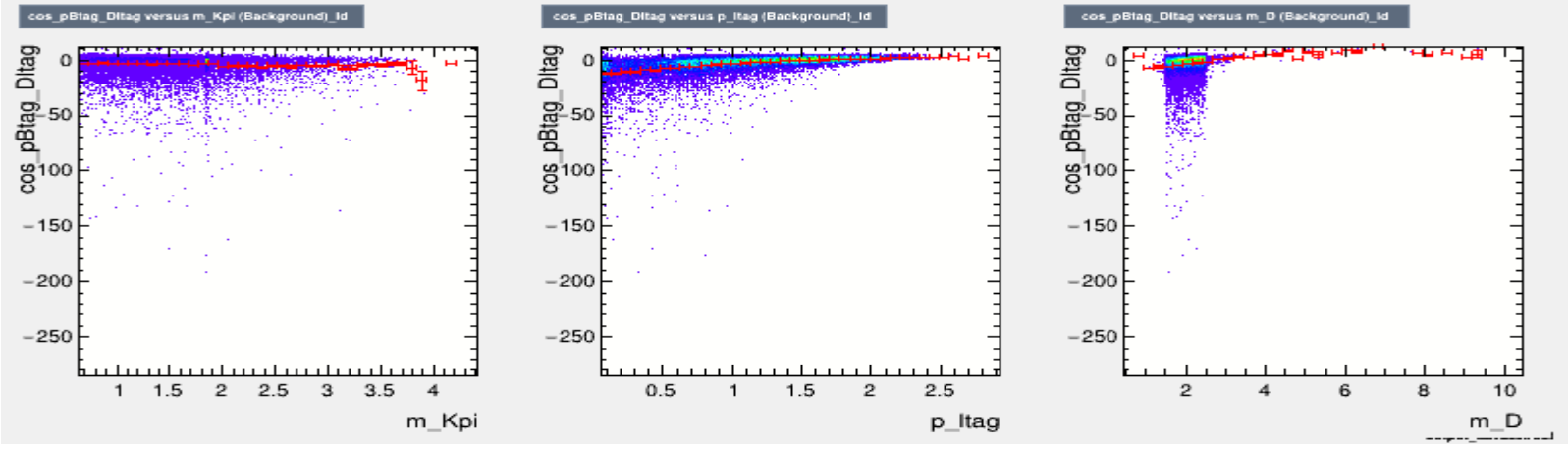


Signal

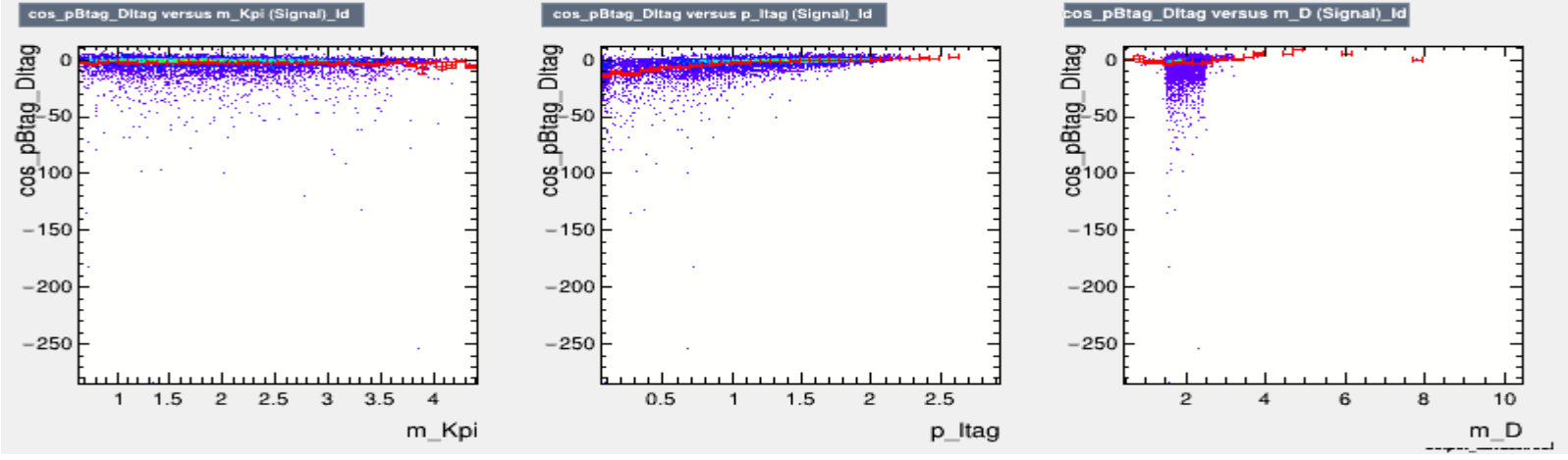


Scattered correlation plot cos(p_{Btag},$p_{vis.tag}$)

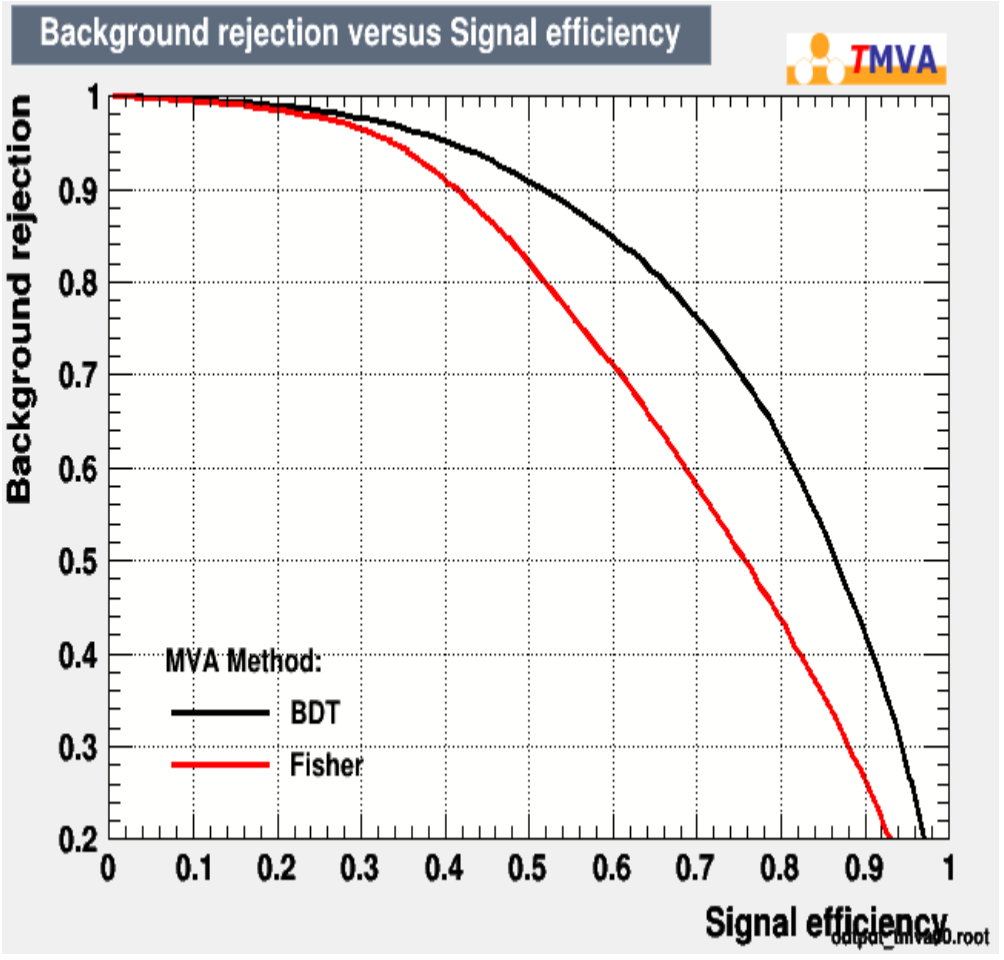
Background

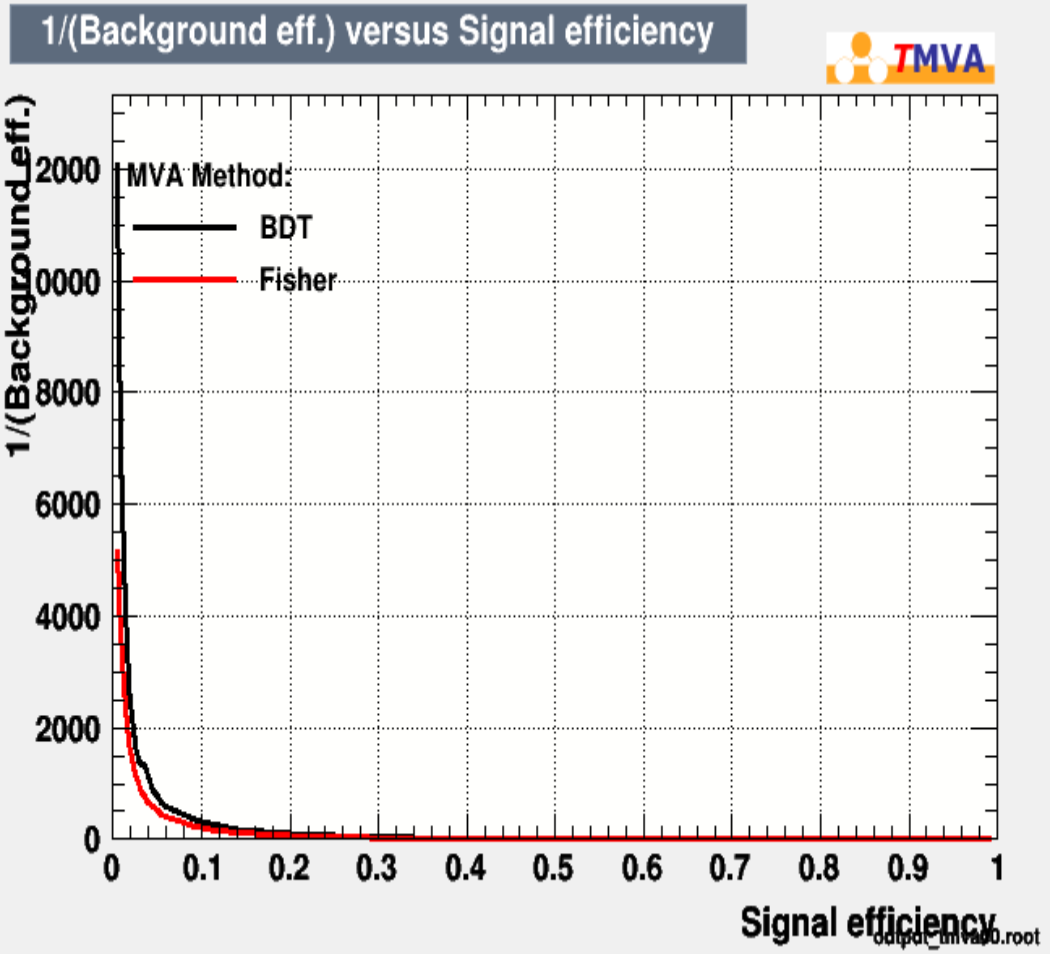


Signal

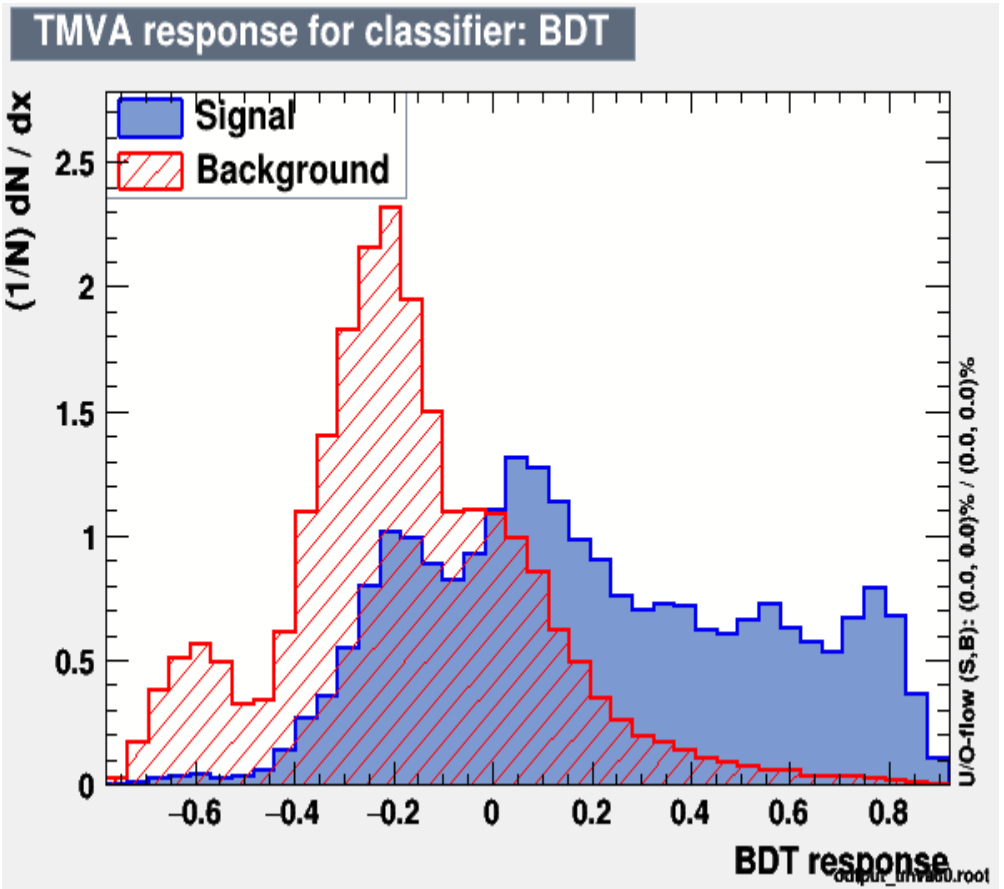


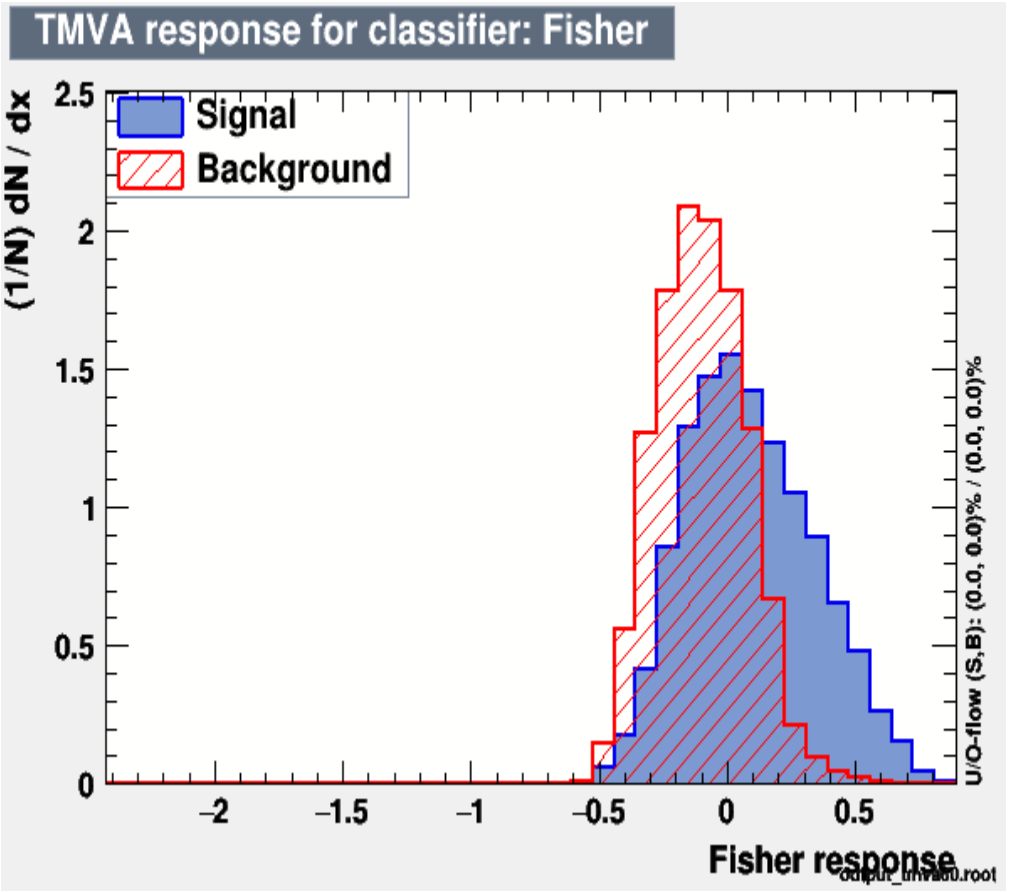
Background Vs Signal efficiency



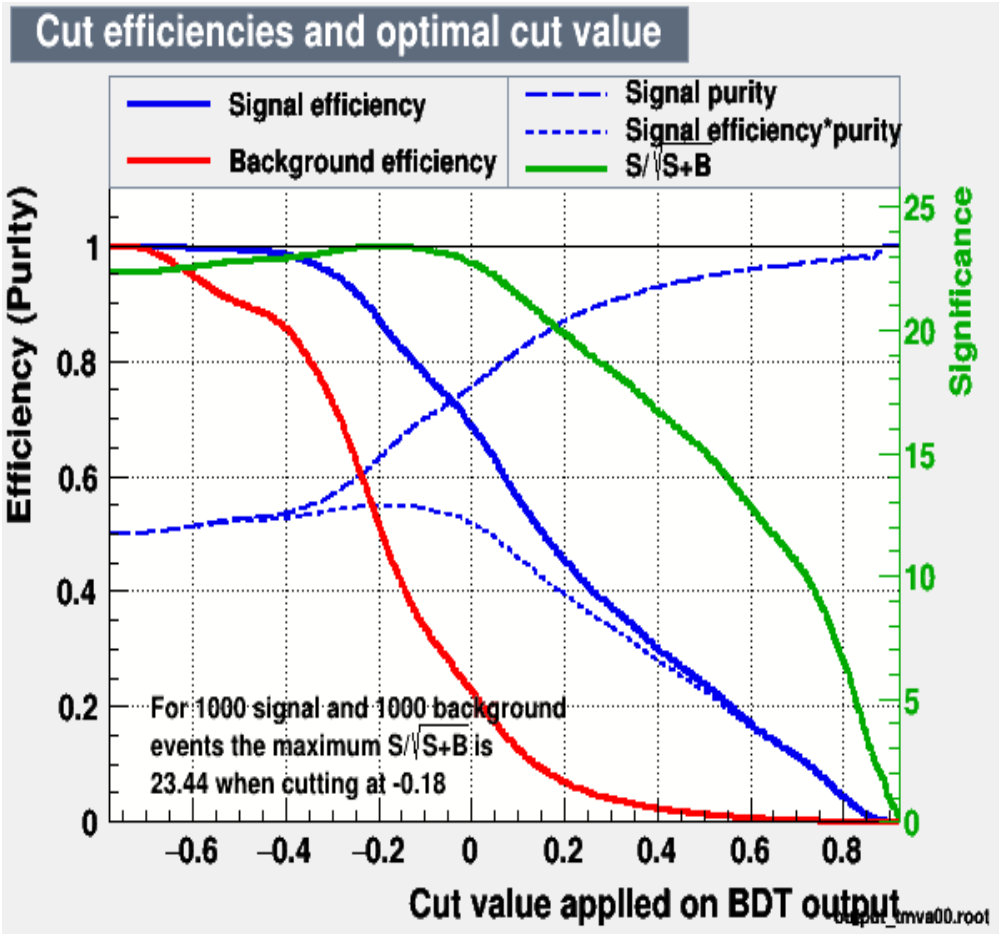


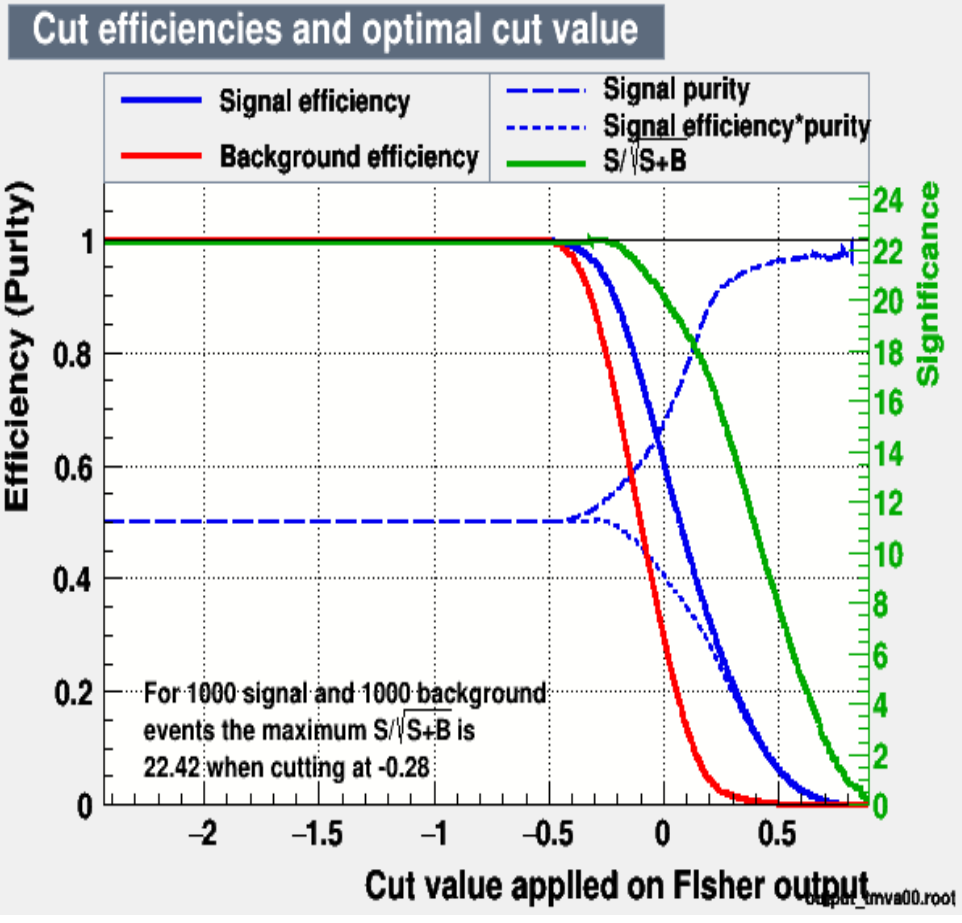
TMVA response





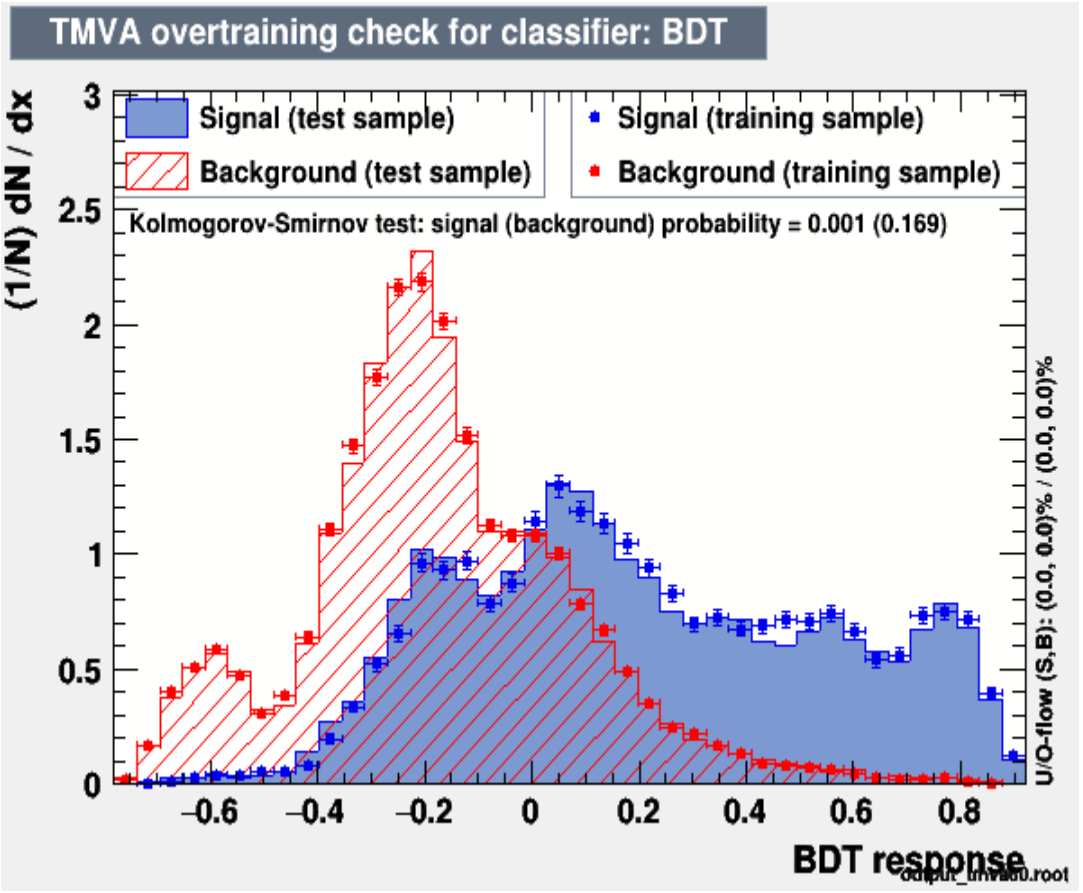
Cut efficiencies

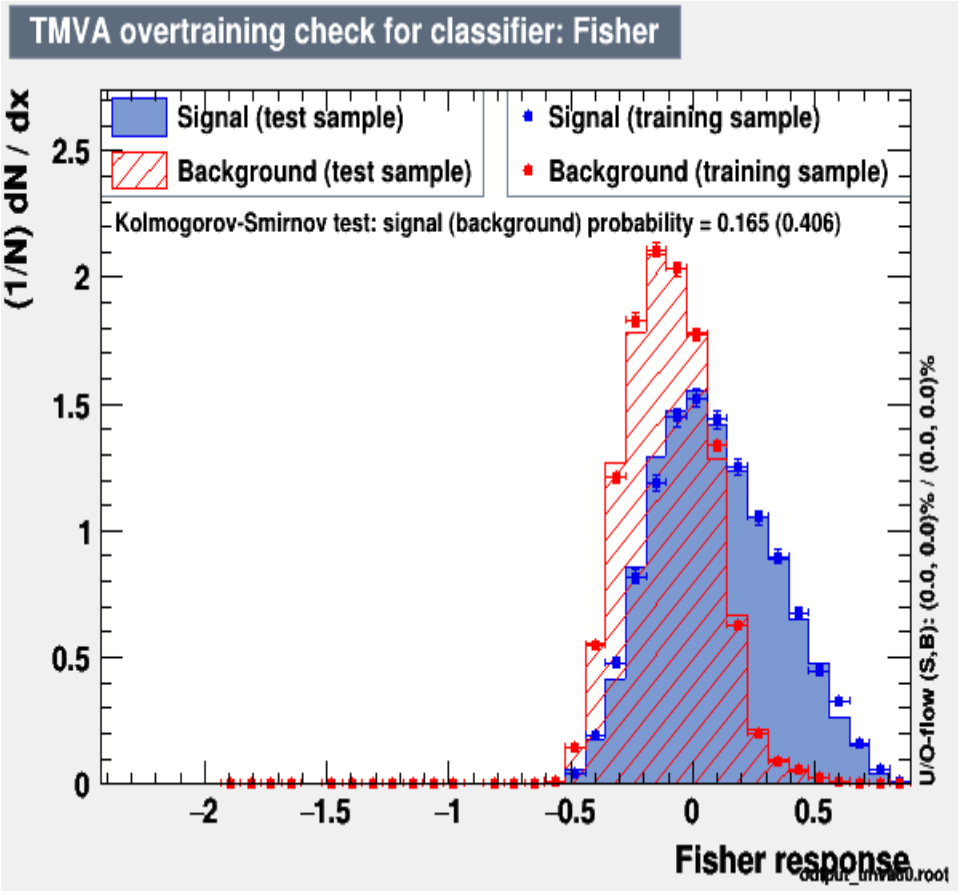




Backup

TMVA over training check





BDT control plot