

Status of Finding the $J/\psi \rightarrow \gamma + \text{invisible}$

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review

```
TFile *newfile = new TFile("data-gamma-mva.root","recreate");
TTree *newtree = Tmc->CopyTree("cos(gamthe)<0.8&&cos(gamthe)>-0.8");
TBranch *ER= newtree->Branch("eR",&eR,"eR/F");
TBranch *SeedR= newtree->Branch("seedR",&seedR,"seedR/F");
TBranch *ErrR= newtree->Branch("errR",&EerrR,"errR/F");
TBranch *PN = newtree->Branch("Pn",&Pn,"Pn/F");

for(int i=0;i<Tmc->GetEntries();i++){
    Tmc->GetEntry(i);
    eR=gameIII/gameV;
    seedR=gameseed/game;
    EerrR=Err/game;
    Pn=game;

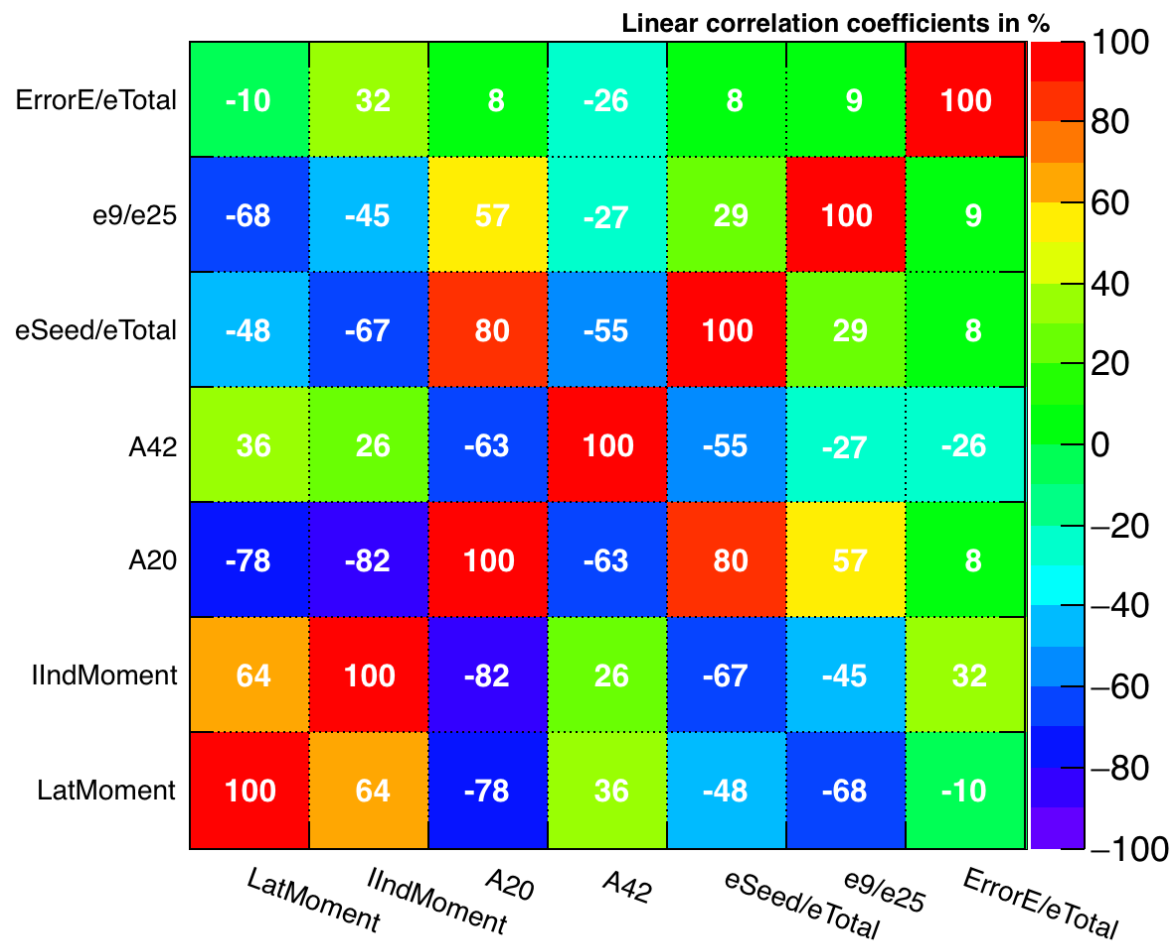
    ER->Fill();
    SeedR->Fill();
    ErrR->Fill();
    PN->Fill();
}

newtree->Write();
delete newfile;
```

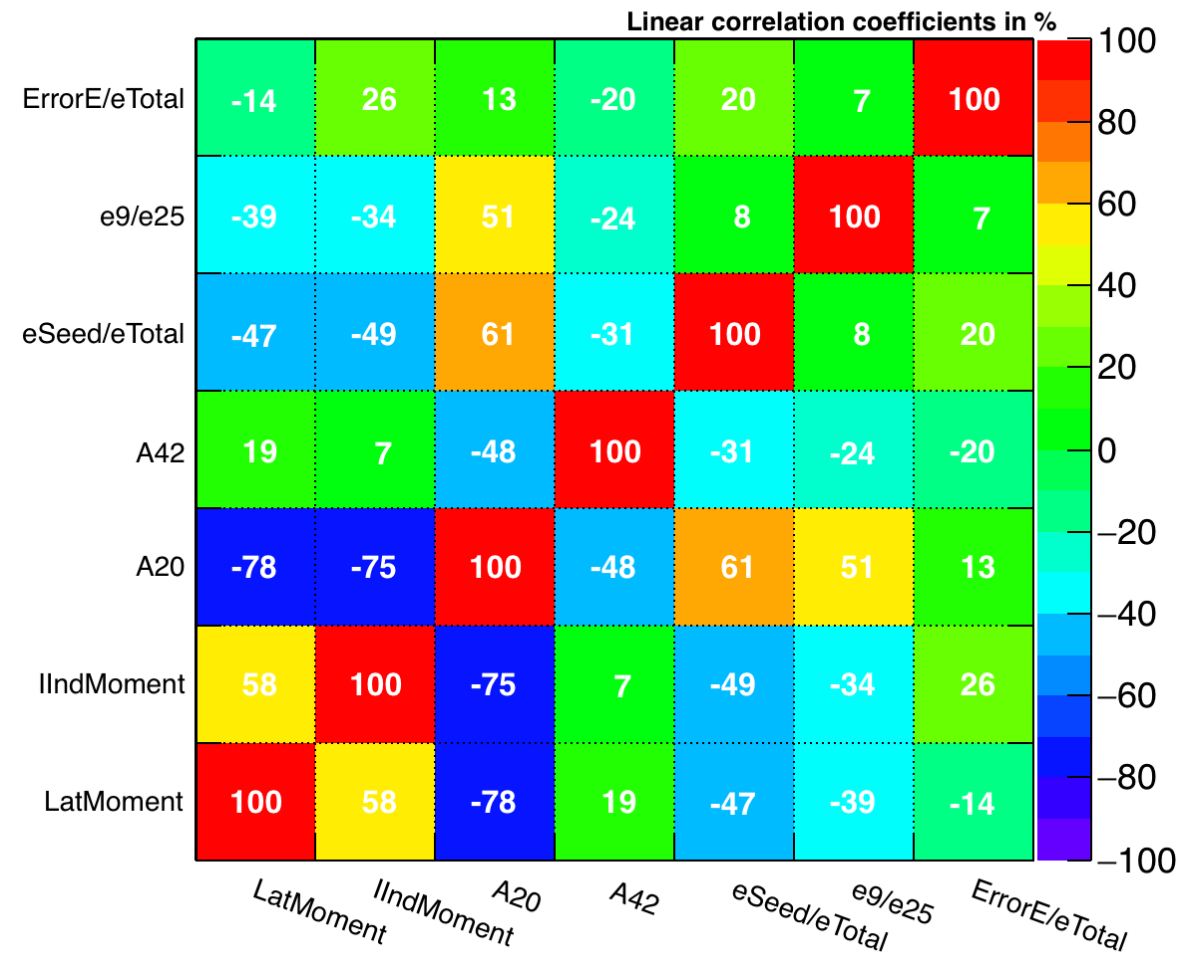
```
}
```

MVA's input variables

Correlation Matrix (signal)

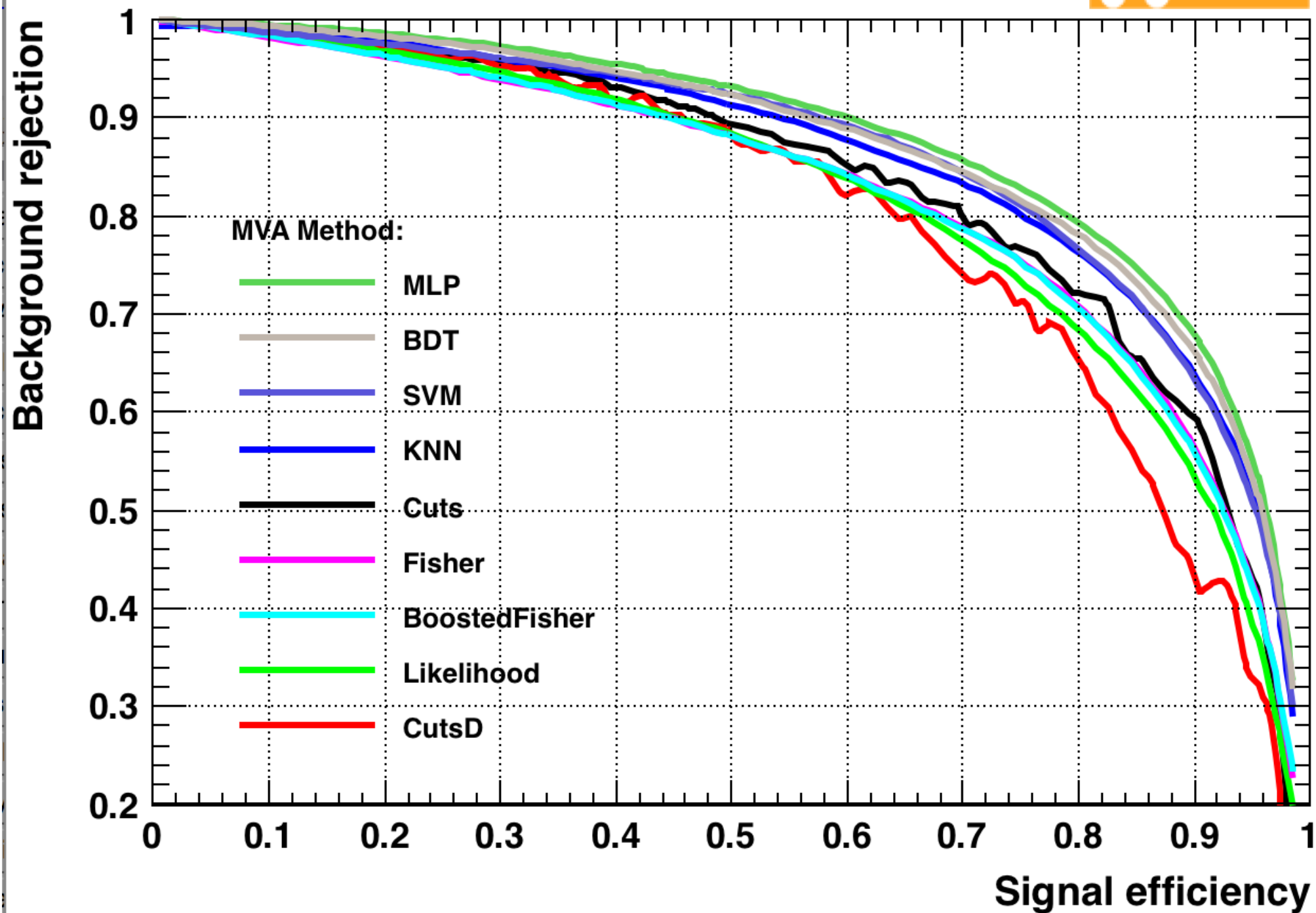


Correlation Matrix (background)



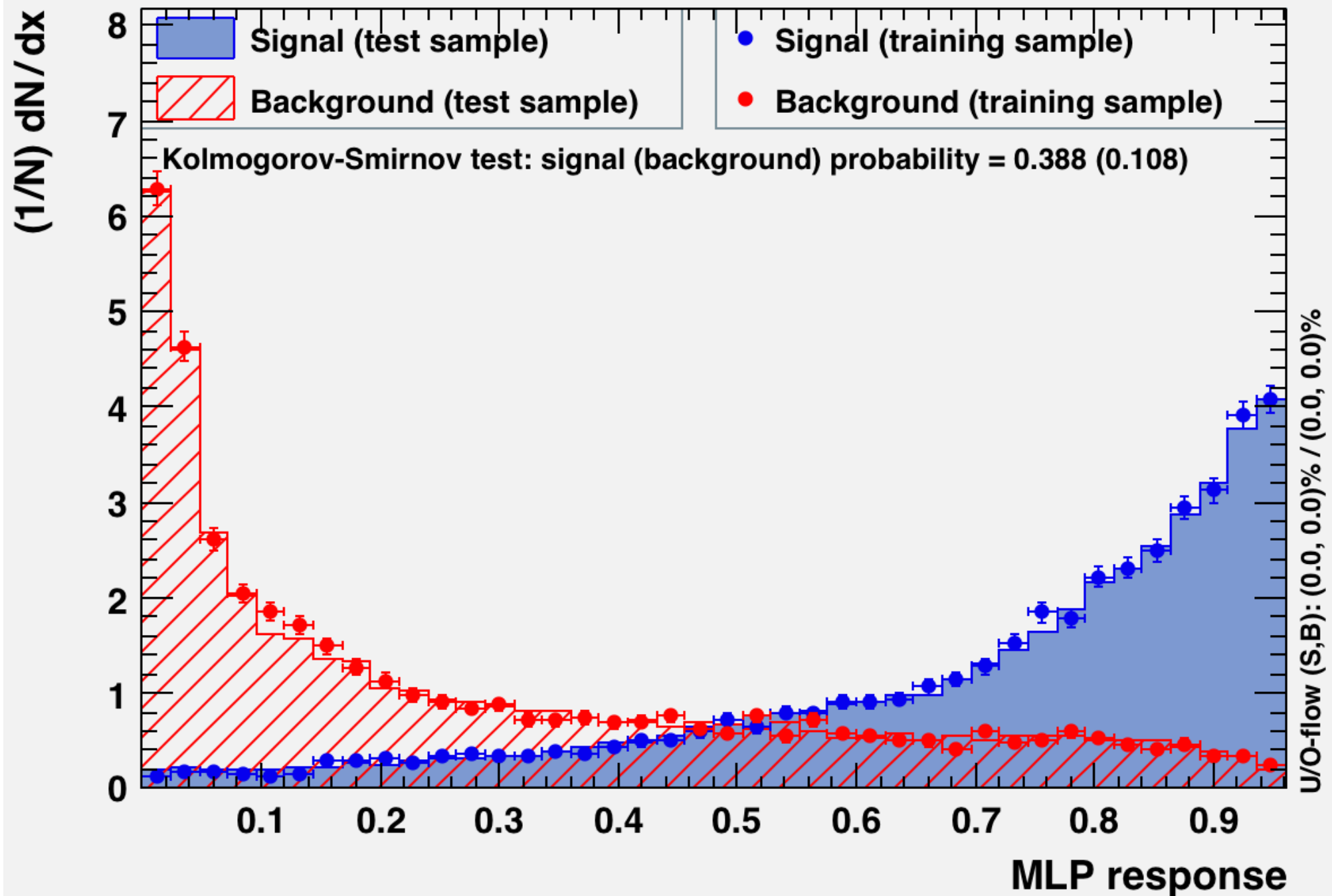
MVA

Background rejection versus Signal efficiency



MVA's Output

TMVA overtraining check for classifier: MLP



MC: $\text{psip} \rightarrow \text{pi pi J/psi}$, $\text{J/psi} \rightarrow \text{anything}$

if nbar hit barrel and produced a shower

n

if not

pure gamma

Correct hit eff, if still hit

n-hit

if not

n-non-hit

Apply nbar veto

Sample the veto eff

58925

Apply nbar veto

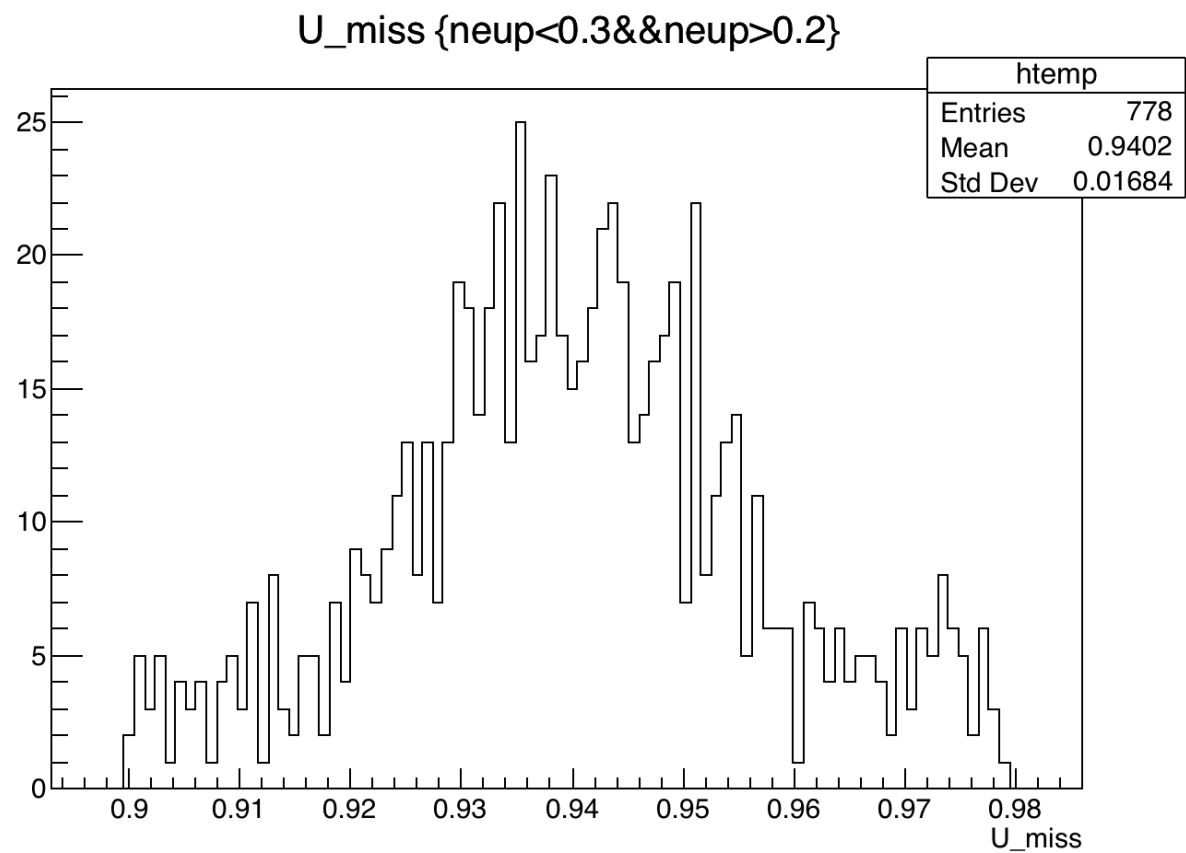
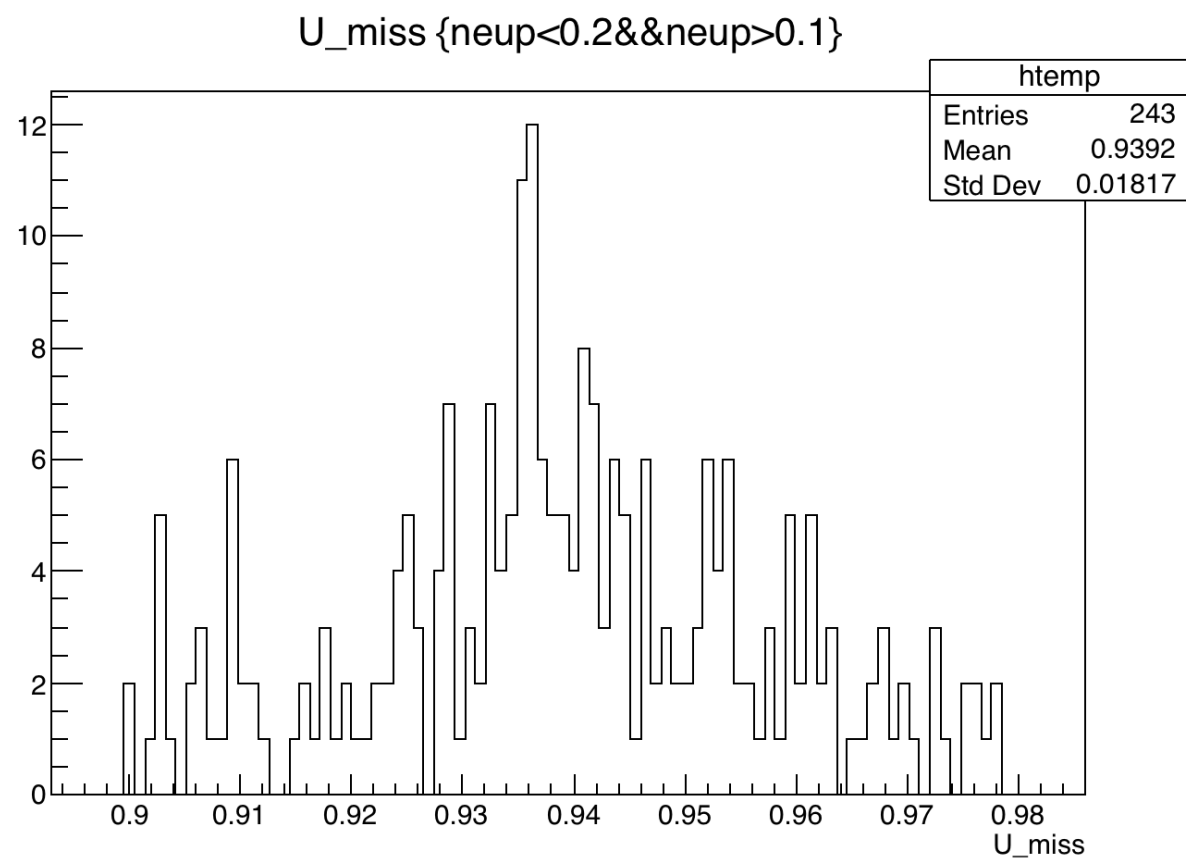
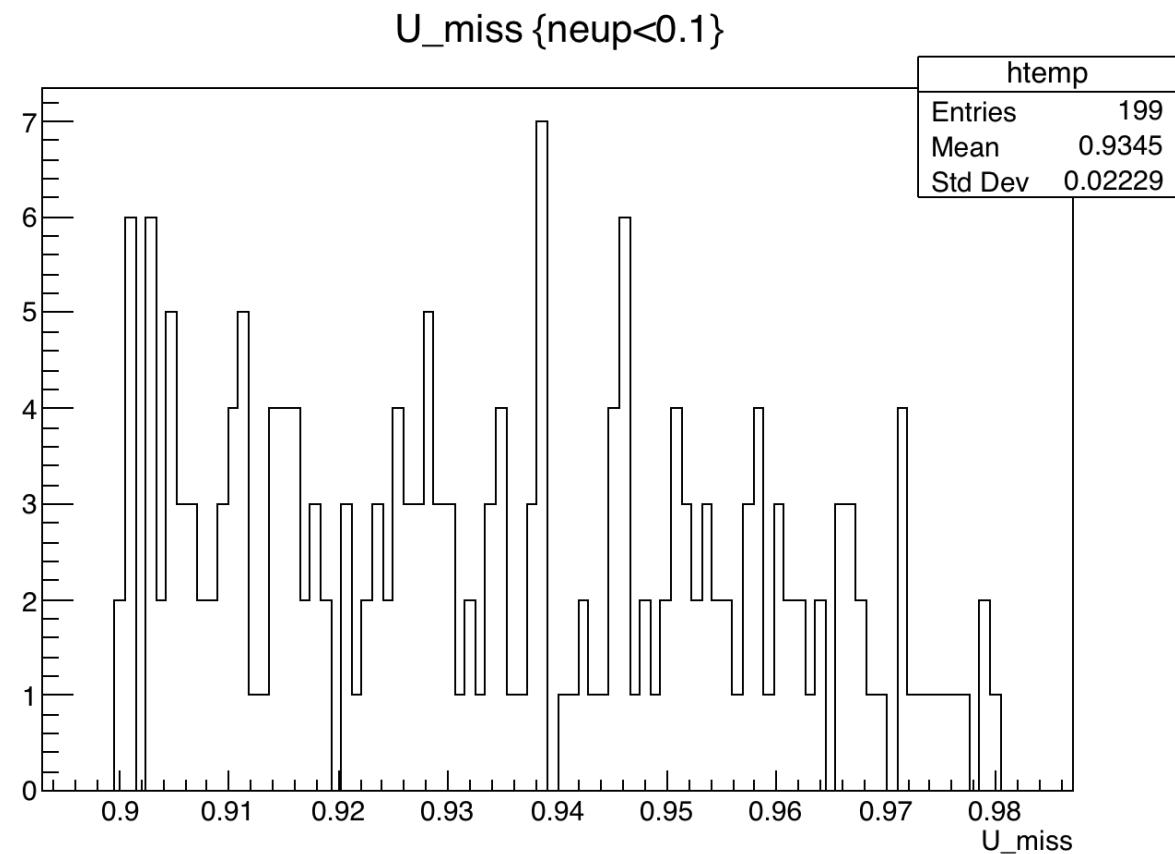
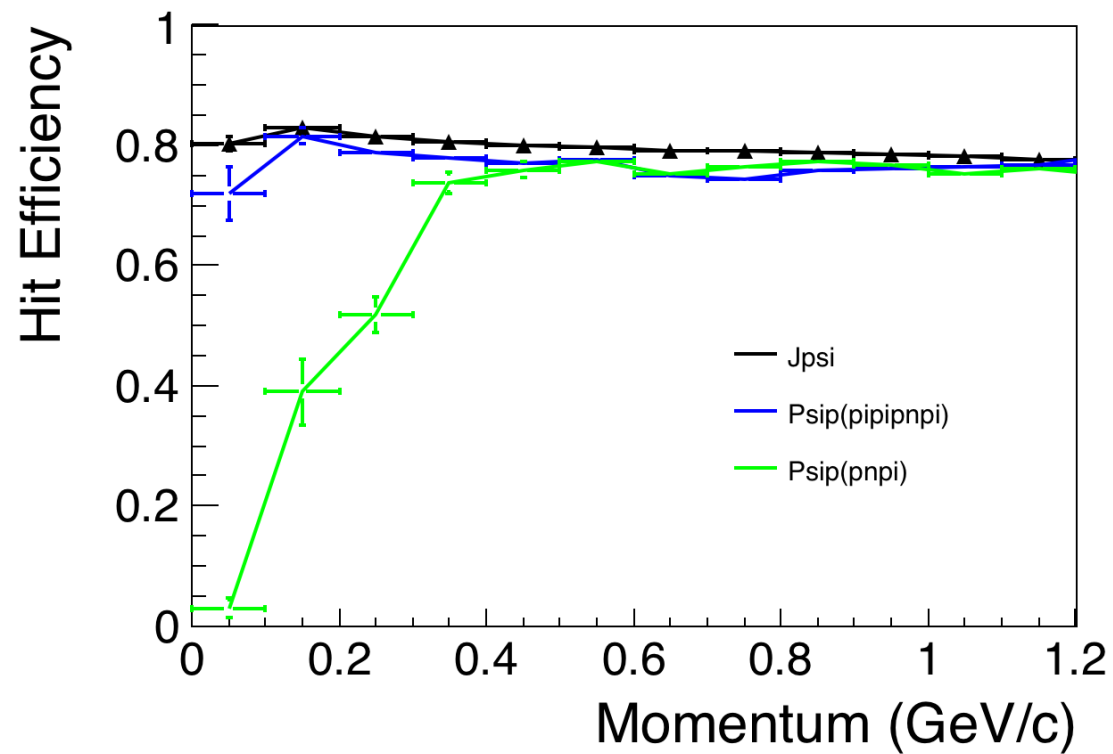
50146

803681

Sample the MLP eff

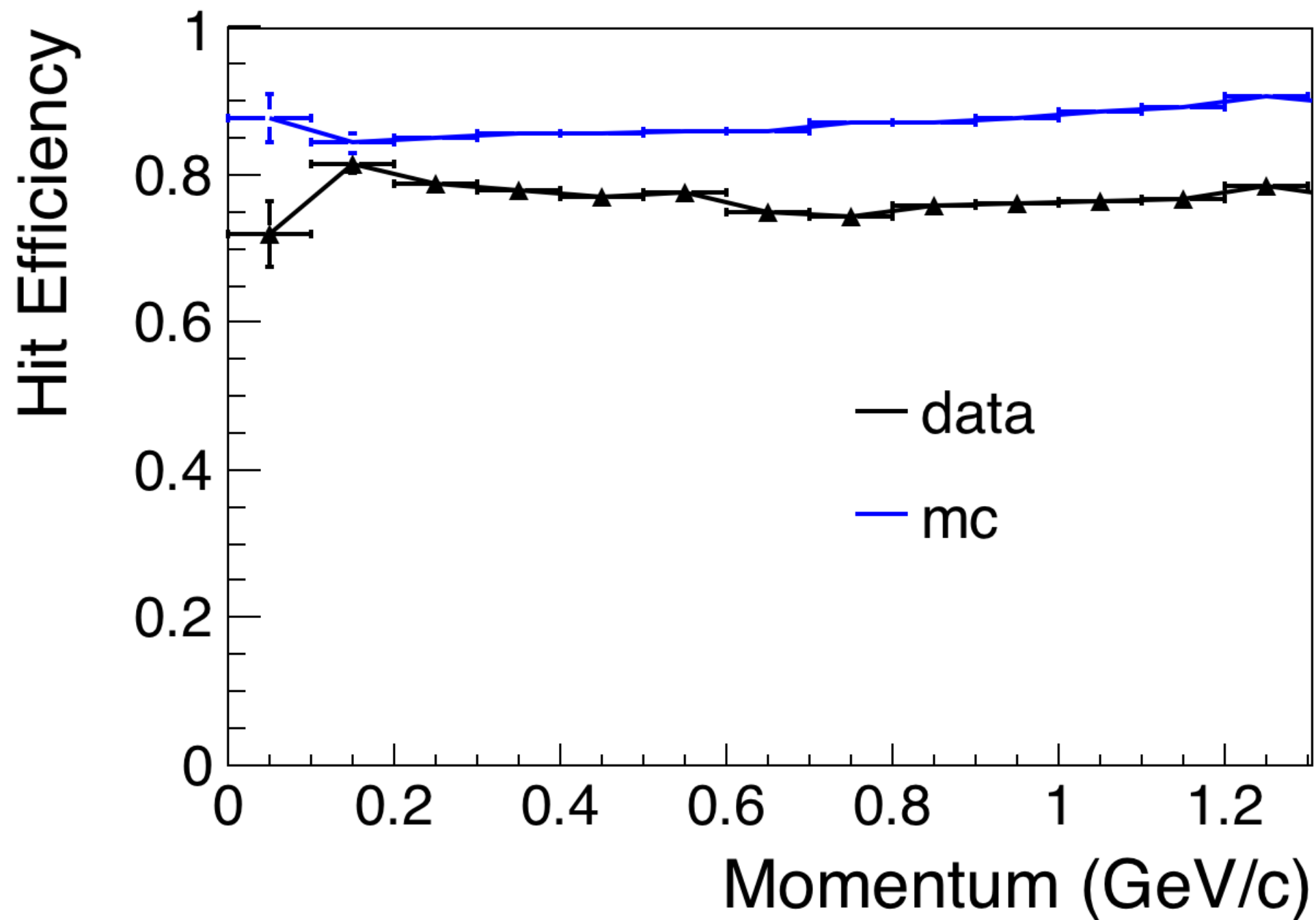
Apply MLP veto

Apply MLP veto

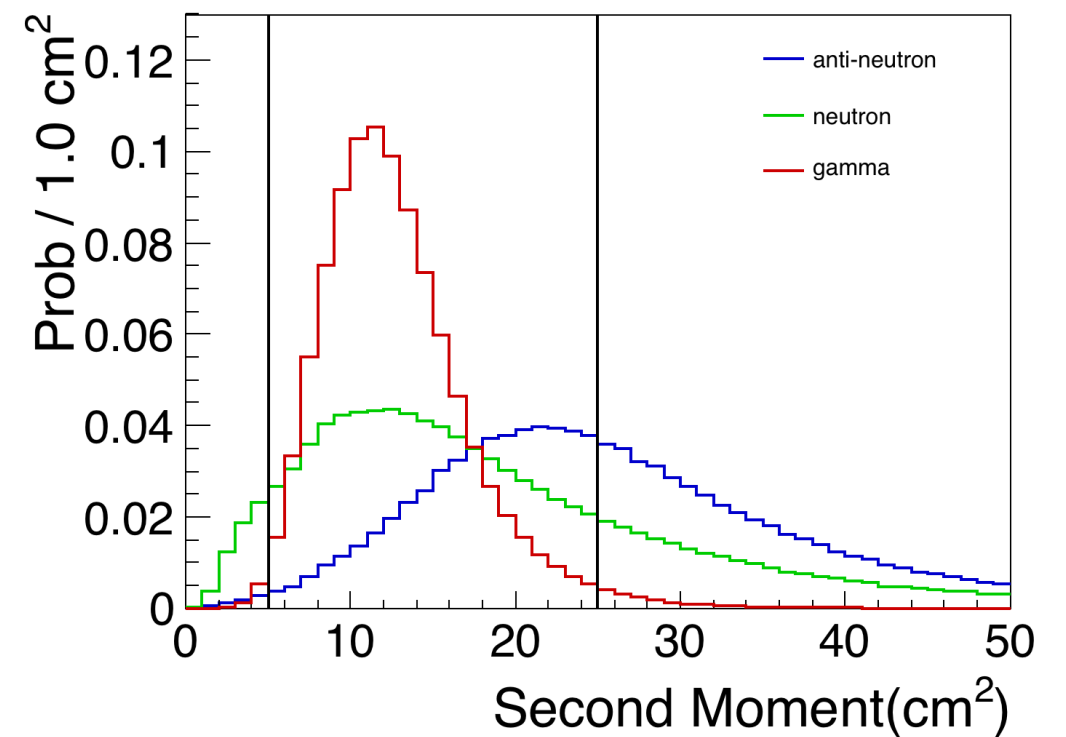
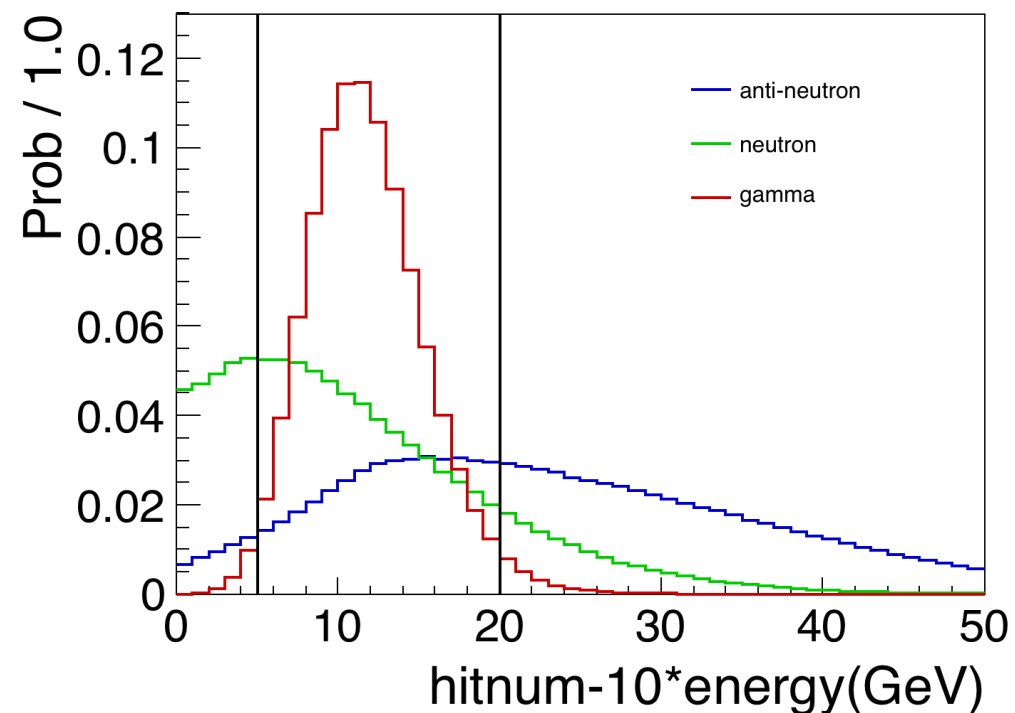


Back-Up

Hit Eff of $\text{Psip} \rightarrow \text{pipi pnpi}$

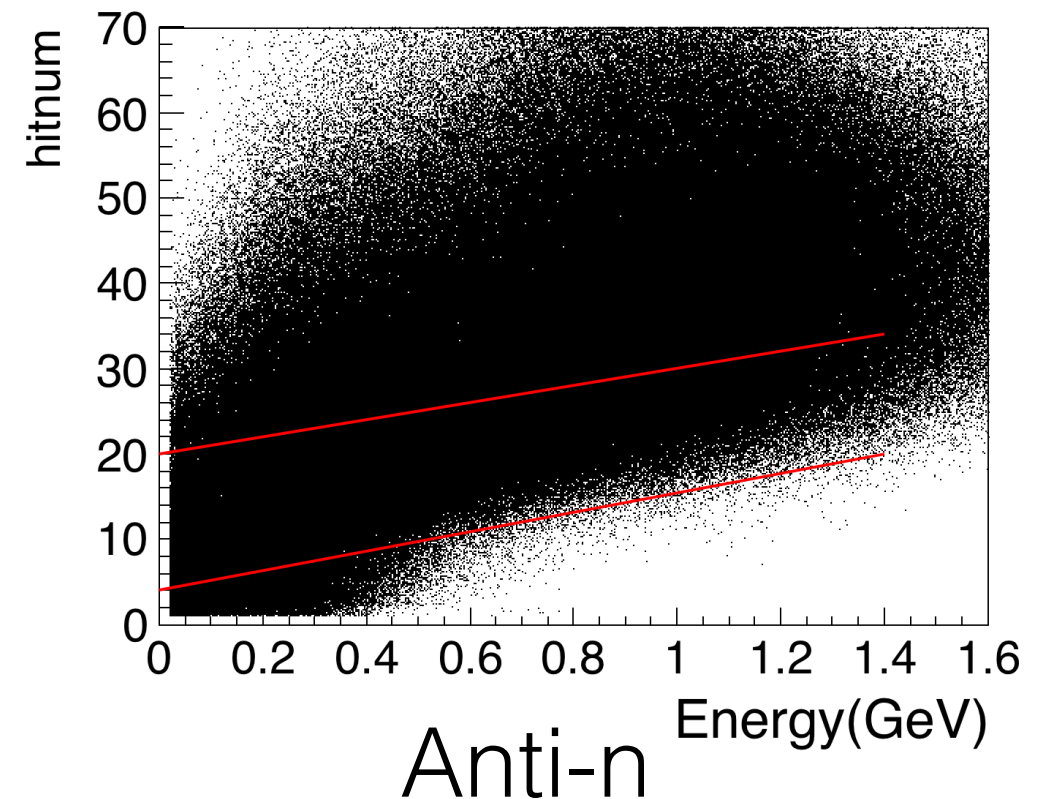
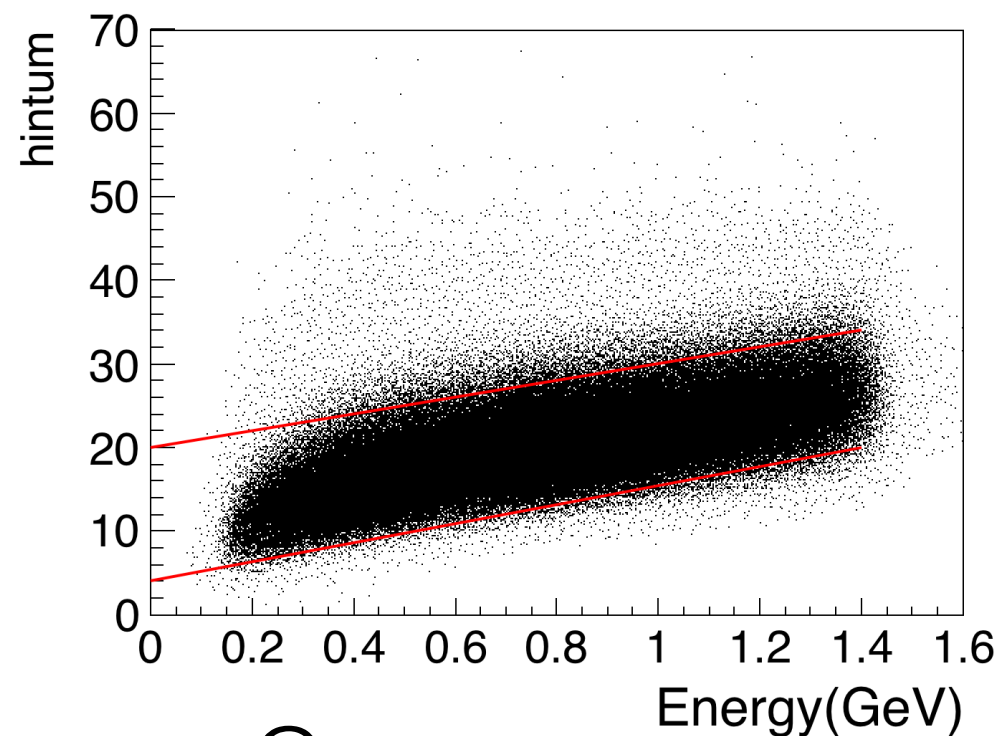


the anti-n background

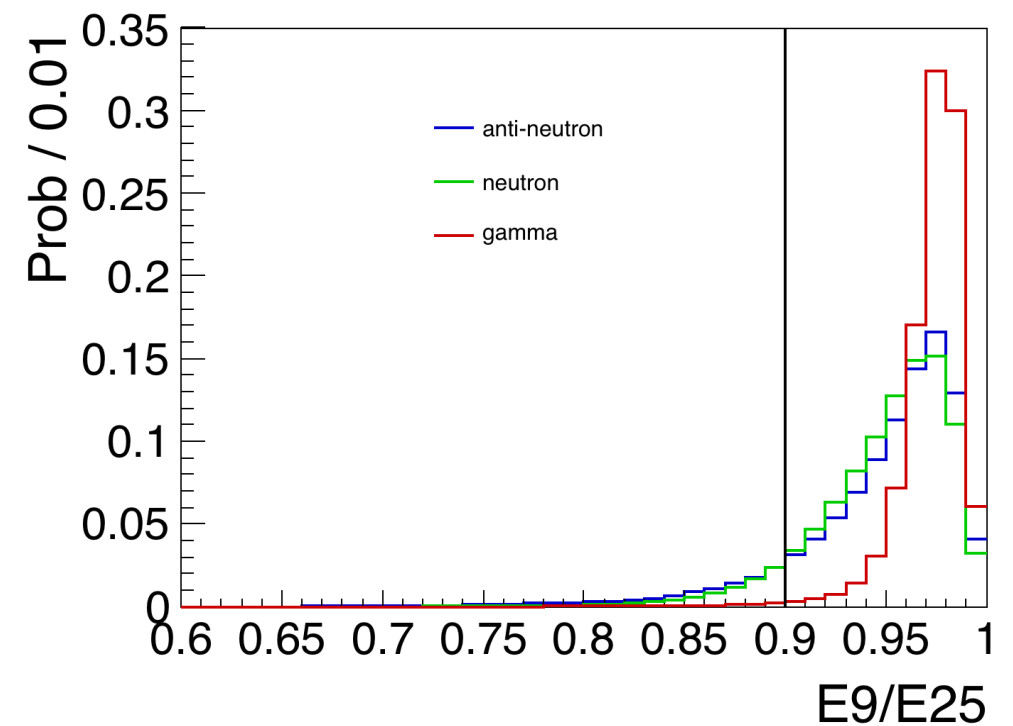
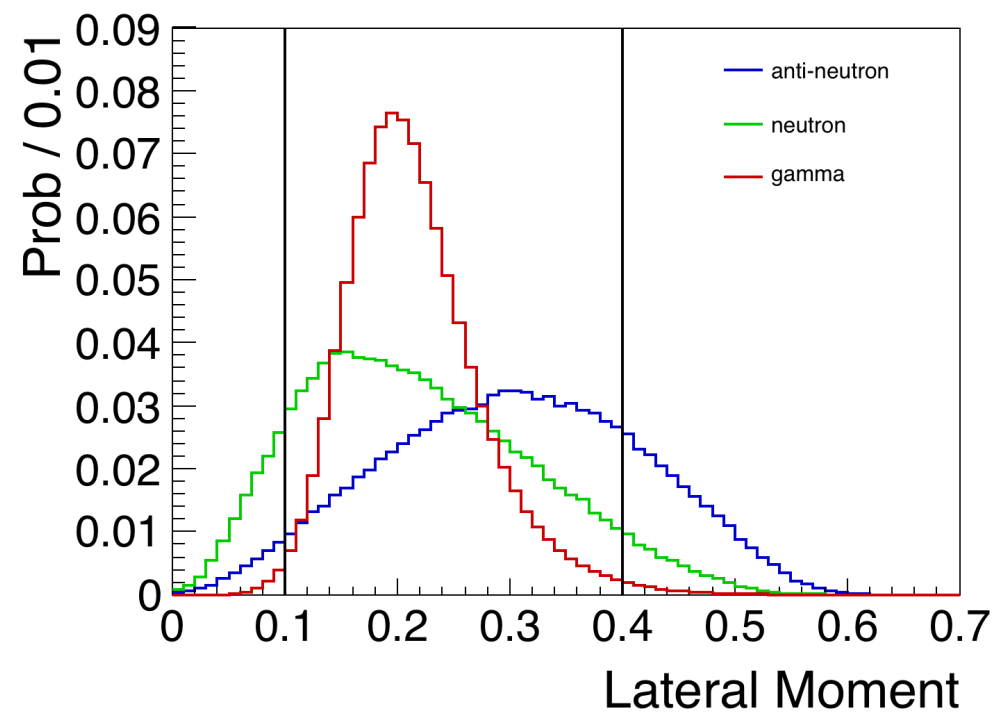


$4 < \text{hits number} - 10 \times \text{Energy(GeV)} < 20$

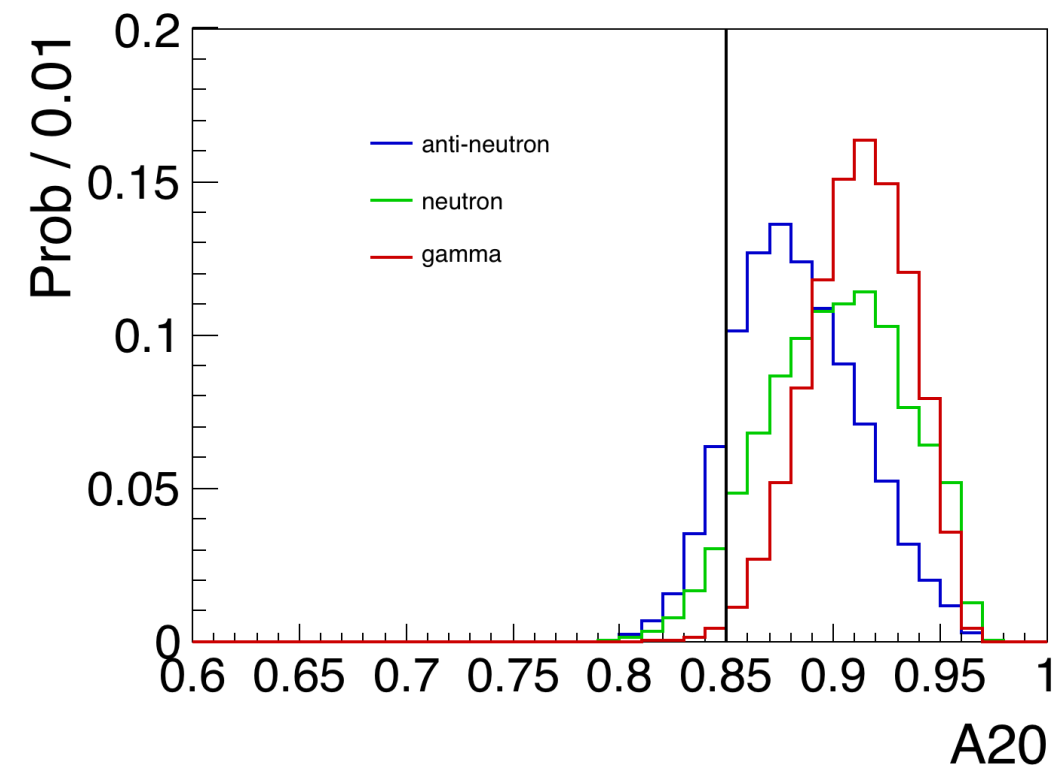
$5 < \text{Second Moment} < 25$



the anti-n background

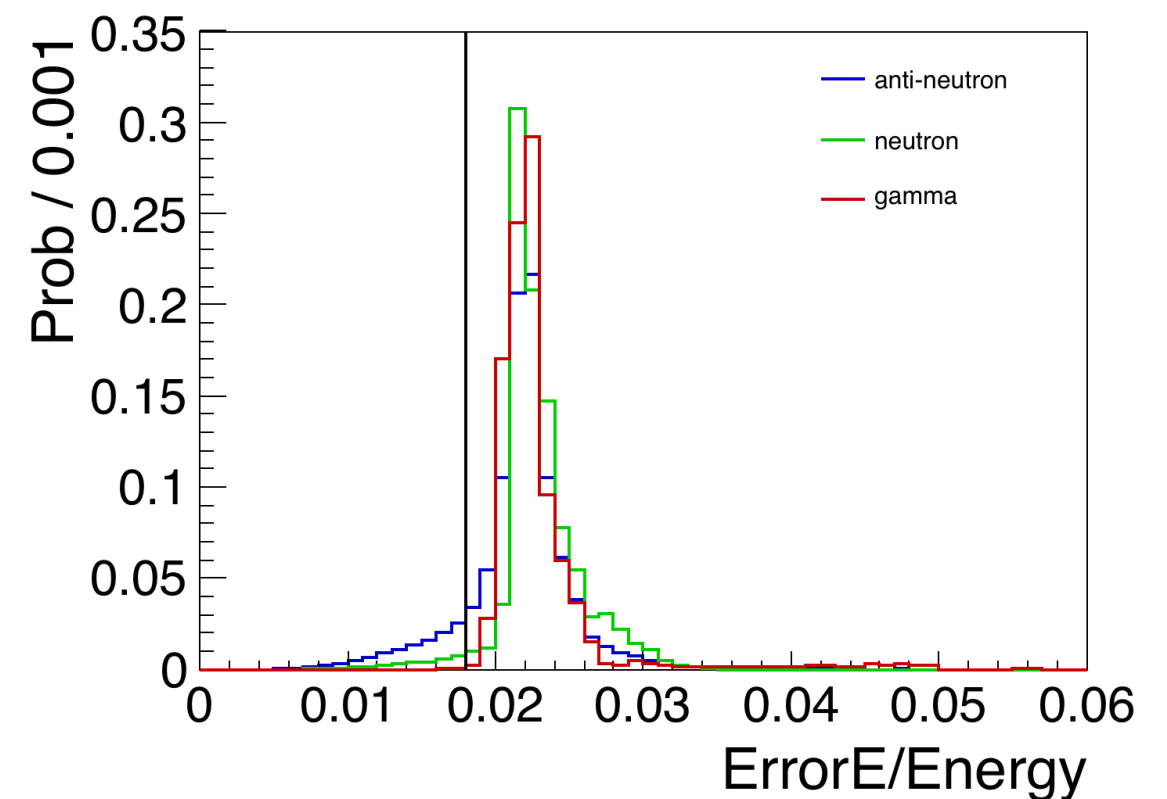


$0.1 < \text{Lateral Moment} < 0.4$



$0.85 < A20$

$0.90 < E9/E25$



$0.018 < \text{ErrorE/Energy}$