

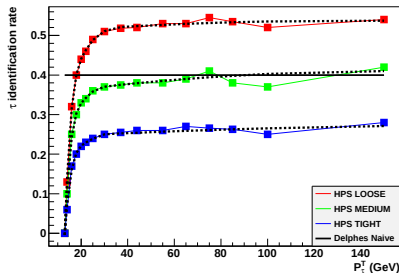
Tau-tagging validation in MA5

Generated sample: $Z \rightarrow \tau\tau \rightarrow \mu\tau_h$

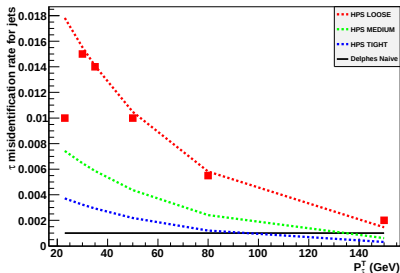
Generated sample: TTsemilept-madspin

Lorenzo Basso

Tagging done according to HPS algorithm (CMS-TAU-11-001)



Tagging rate



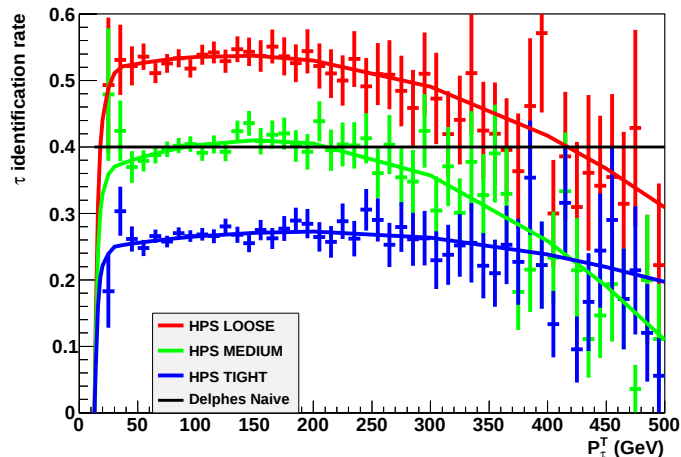
Mis-tag rate

Tagging done according to HPS algorithm (CMS-TAU-11-001)

```
// -----  
// isHPSL  
// -----  
bool AnalysisHelper::isHPSL(int flavour, float pT, float a_random) const  
{  
    float eff=0;  
    flavour=std::abs(flavour);  
  
    if (flavour==15) // tau  
    {  
        if (pT > 15 && pT <= 30) eff = -13.1181+2.5974*pT-0.199005*pT*pT+0.08760289*pT*pT*pT-0.008143896*pT*pT*pT*pT+1.0766e-06*pT*pT*pT*pT*pT;  
        else if (pT > 30) eff = 0.506503+0.000460978*pT-1.71257e-06*pT*pT;  
    }  
    else // jets  
    {  
        if (pT > 30) eff = 0.028*exp(-0.0196573*pT);  
    }  
    if (a_random>eff) return true;  
    else return false;  
}  
// -----  
// isHPSM  
// -----  
bool AnalysisHelper::isHPSM(int flavour, float pT, float a_random) const  
{  
    float eff=0;  
    flavour=std::abs(flavour);  
  
    if (flavour==15) // tau  
    {  
        if (pT > 15 && pT <= 30) eff = -11.2685+2.26747*pT-0.176806*pT*pT+0.06684945*pT*pT*pT-0.000131273*pT*pT*pT*pT+0.93258e-07*pT*pT*pT*pT*pT;  
        else if (pT > 30) eff = 0.35+0.0007788*pT-2.51723e-06*pT*pT;  
    }  
    else // jets  
    {  
        if (pT > 30) eff = 0.005/0.012*(0.028*exp(-0.0196573*pT));  
    }  
    if (a_random>eff) return true;  
    else return false;  
}  
// -----  
// isHPSST  
// -----  
bool AnalysisHelper::isHPSST(int flavour, float pT, float a_random) const  
{  
    float eff=0;  
    flavour=std::abs(flavour);  
  
    if (flavour==15) // tau  
    {  
        if (pT > 15 && pT <= 30) eff = -6.8779+1.35581*pT-0.103195*pT*pT+0.00390228*pT*pT*pT-7.30393e-05*pT*pT*pT*pT+5.40301e-07*pT*pT*pT*pT*pT;  
        else if (pT > 30) eff = 0.241939+0.000314825*pT-8.10509e-07*pT*pT;  
    }  
    else // jets  
    {  
        if (pT > 30) eff = 0.0025/0.012*(0.028*exp(-0.0196573*pT));  
    }  
    if (a_random>eff) return true;  
    else return false;  
}
```

Tau tagging

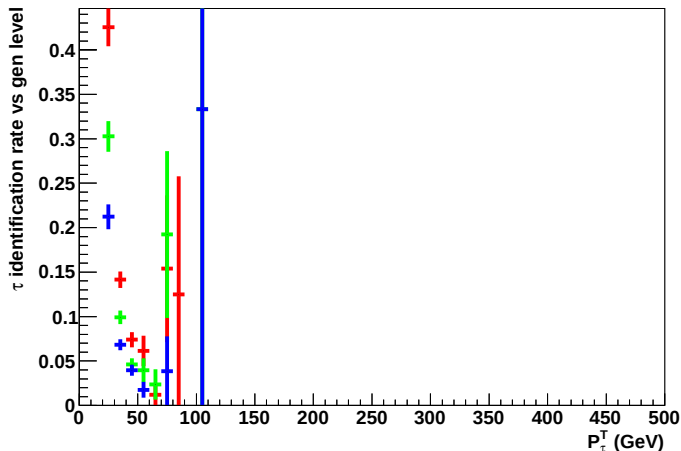
p_T -tau tagged / p_T jet to be tagged



Ok up to 150 GeV, but what to expect for afterwards? To be tuned

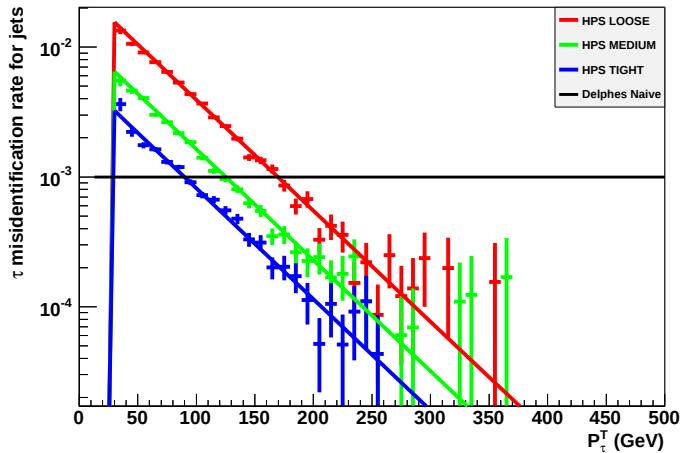
Tau tagging

p_T -tau tagged / p_T tau at parton level



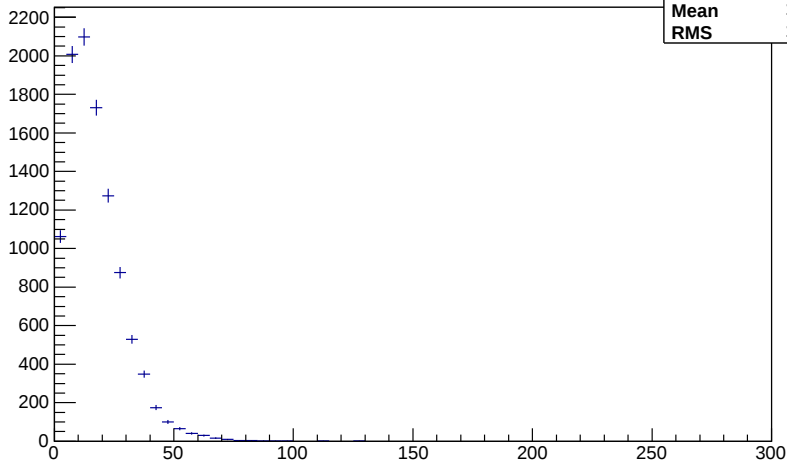
Jet $\leftrightarrow \tau$ matching not efficient

Tau mis-tagging



MET

METpt_Ztautau



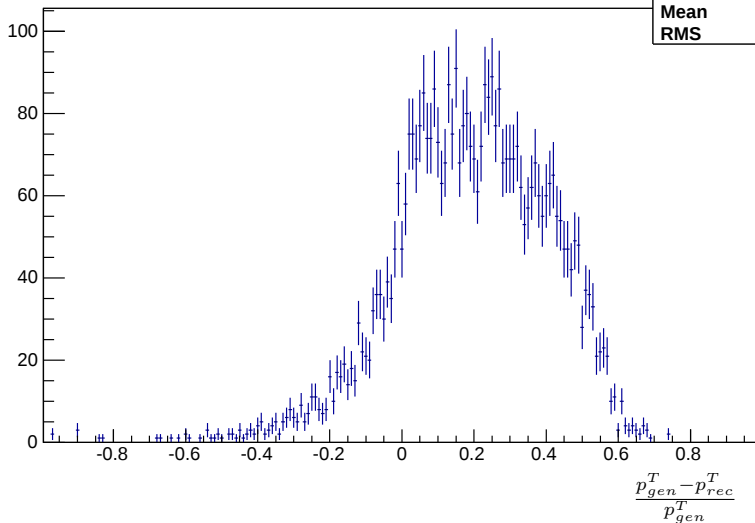
METpt_Ztautau	
Entries	10373
Mean	17.37
RMS	11.55

PT smearing

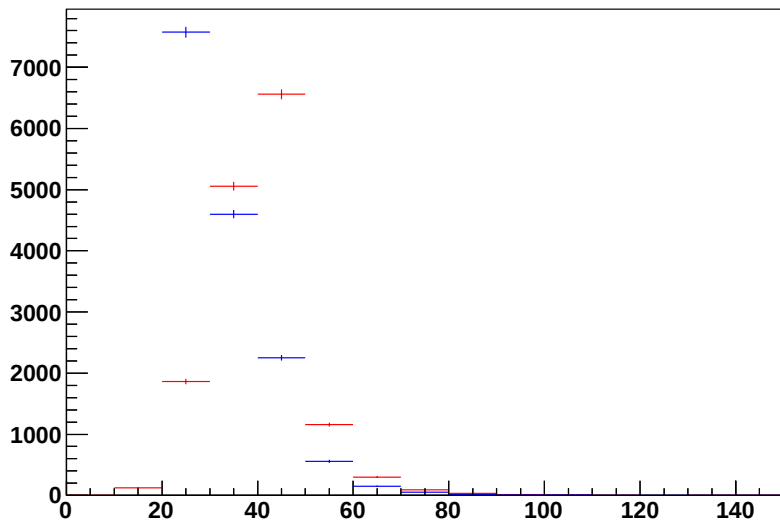
plotdPTtau_Ztautau

plotdPTtau_Ztautau

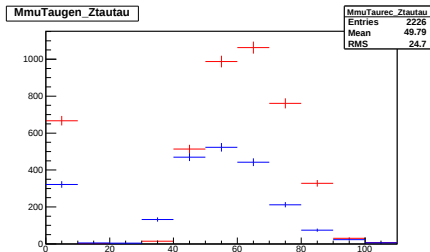
Entries	4389
Mean	0.1911
RMS	0.2135



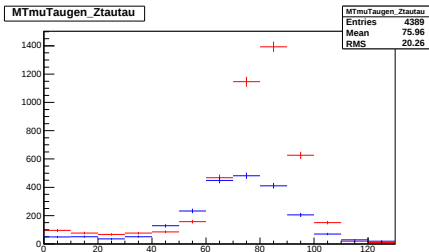
PT comparison



Z reconstruction



Invariant mass



Transverse mass