

TAU VALIDATION STUDIES

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Embedded in U. Wisconsin CMS Group

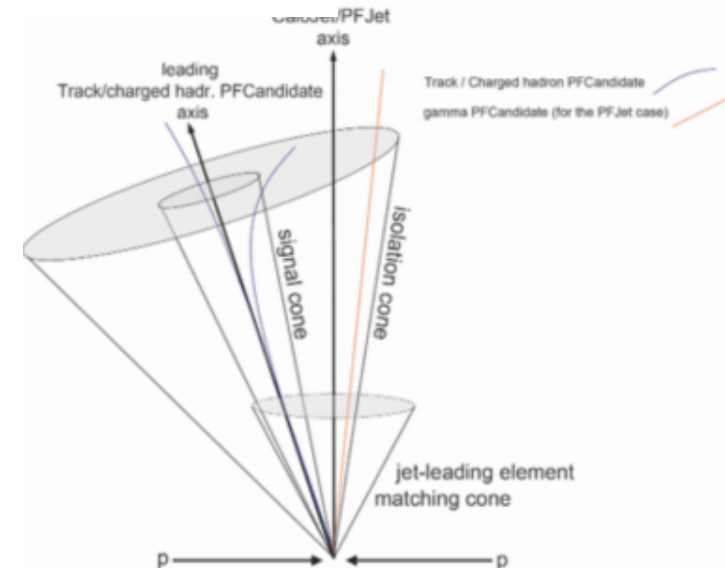
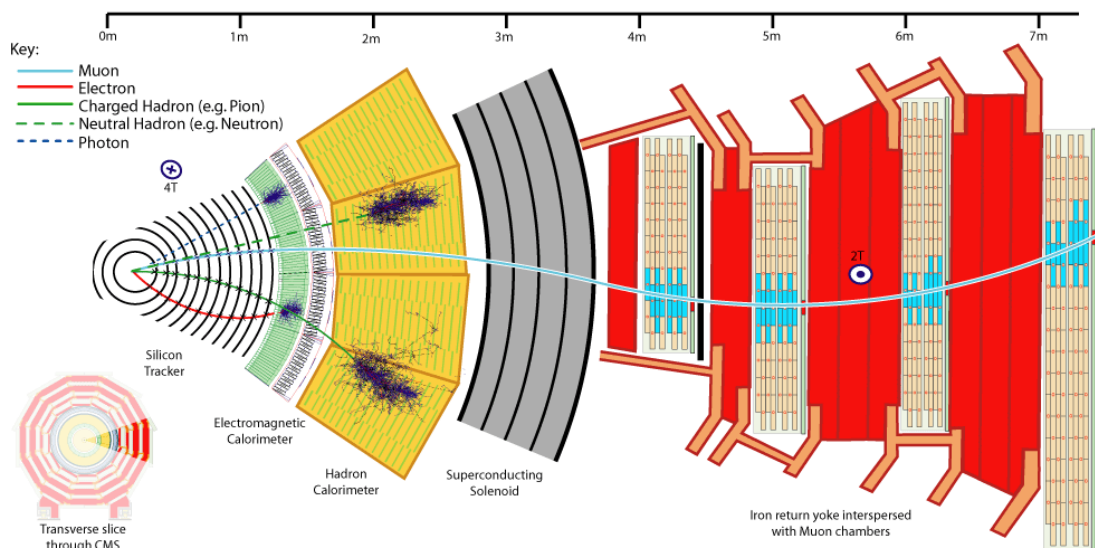


Review

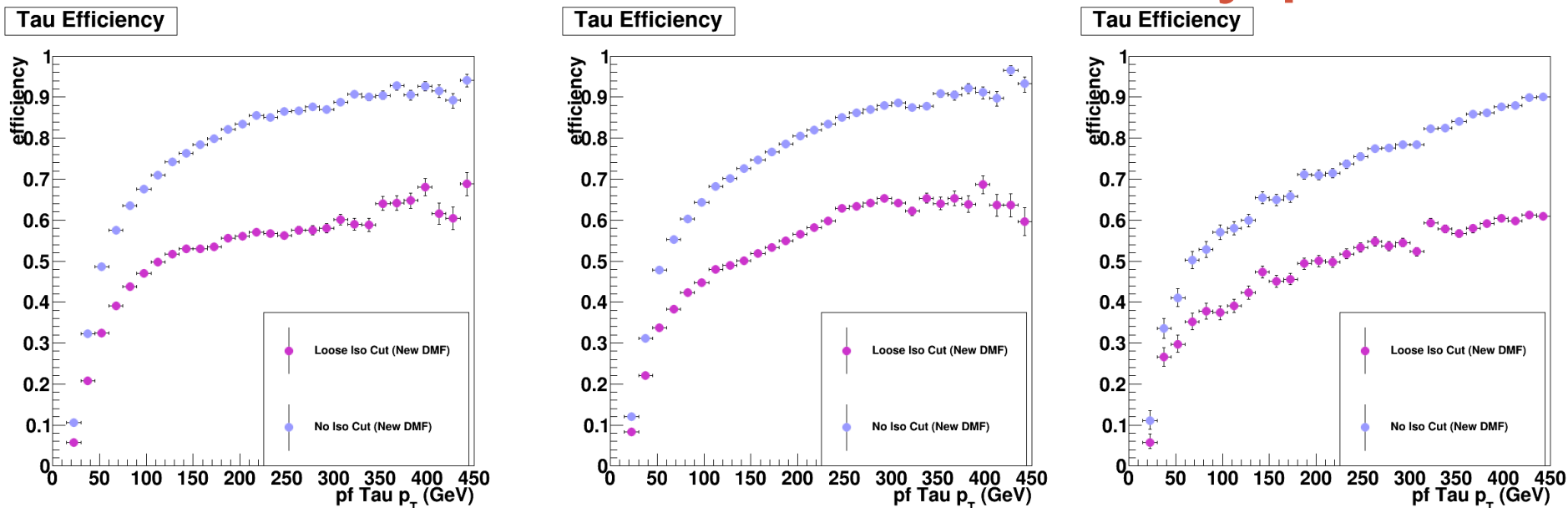
- Tau ID with hadron plus strips (HPS) algorithm
 - Comparing decay mode finding algorithms, discriminators, samples
- Still running over MC samples

$$\epsilon = \frac{p_T^{rec} > 20 \text{ GeV} \ \& \ |\eta_{rec}| < 2.3 \ \& \ \text{DM-finding} \ \& \ \text{tau ID discriminator}}{p_T^{gen} > 20 \text{ GeV} \ \& \ |\eta_{gen}| < 2.3}$$

$$P_{fr} = \frac{p_T^\tau > 20 \text{ GeV} \ \& \ |\eta_\tau| < 2.3 \ \& \ \text{DM-finding} \ \& \ \text{tau ID-discriminator}}{p_T^{jet} > 20 \text{ GeV} \ \& \ |\eta_{jet}| < 2.3}$$



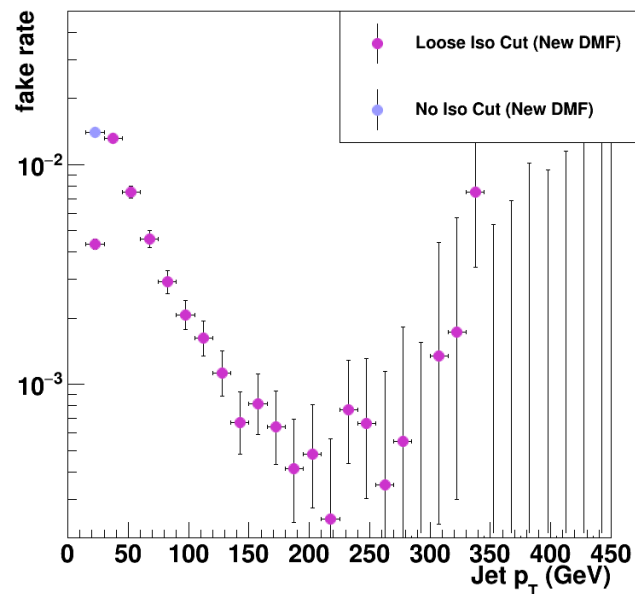
Effect of Isolation Cut—on effi, by pT



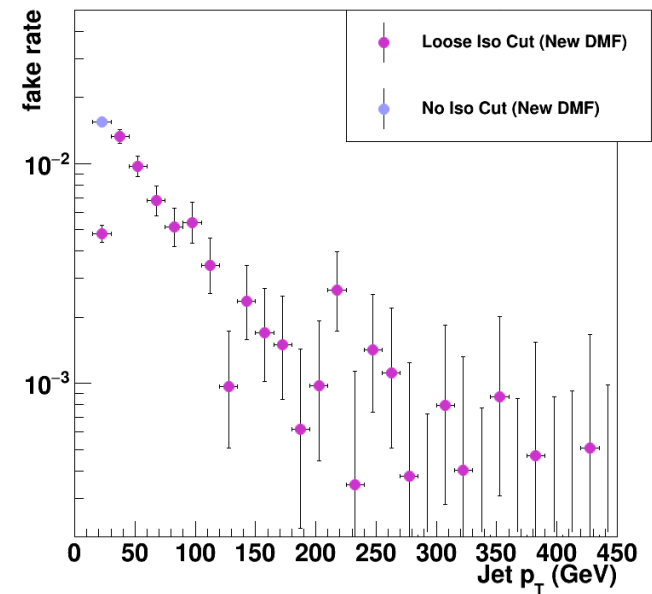
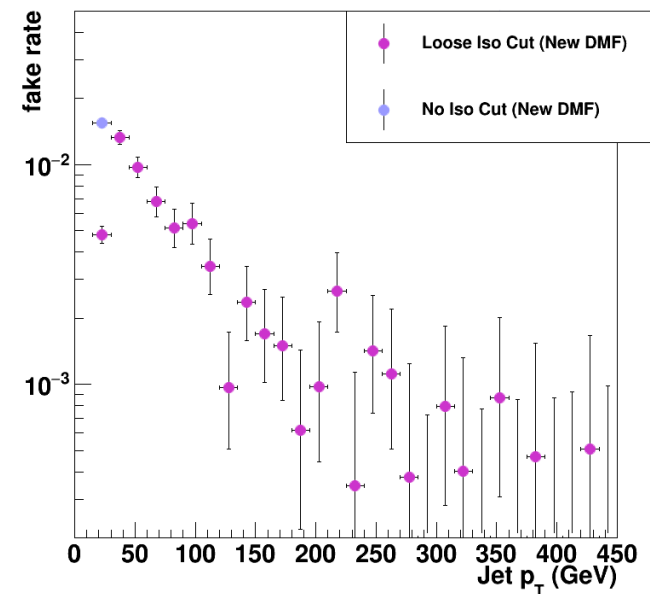
- Left: Wjets; Center: Z' -> tautau, M500; Right: Z' -> tautau, M1500
- New DMF algorithm; p_T > 20, eta < 2.3; by LooseCombinedIsolationDeltaBetaCorr3Hits
- Slow rise at low p_T, replicated by some others
- Isolation cut affects Wjets samples somewhat more (less isolated)

Effect of Isolation Cut—on FR, by pT

Jet to Tau Fake Rate



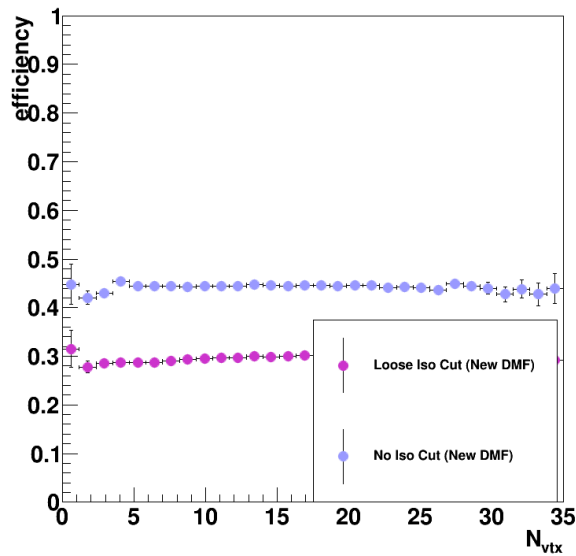
Jet to Tau Fake Rate



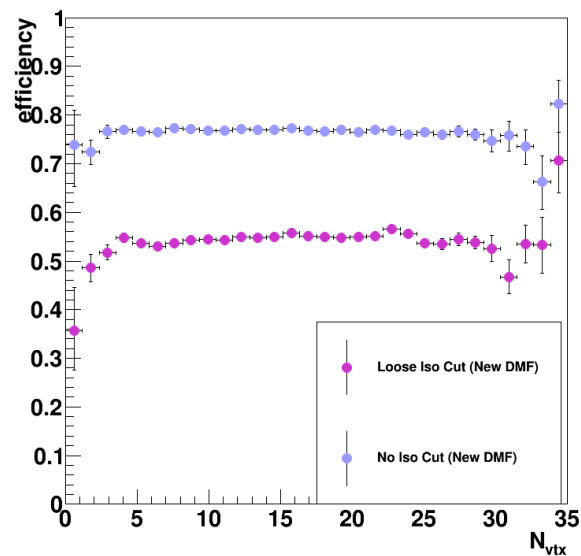
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Effect of Isolation Cut—on effi by N vertices

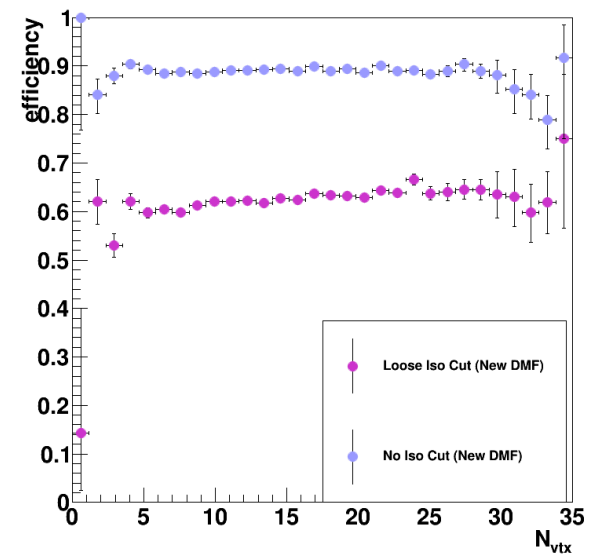
Tau Efficiency



Tau Efficiency

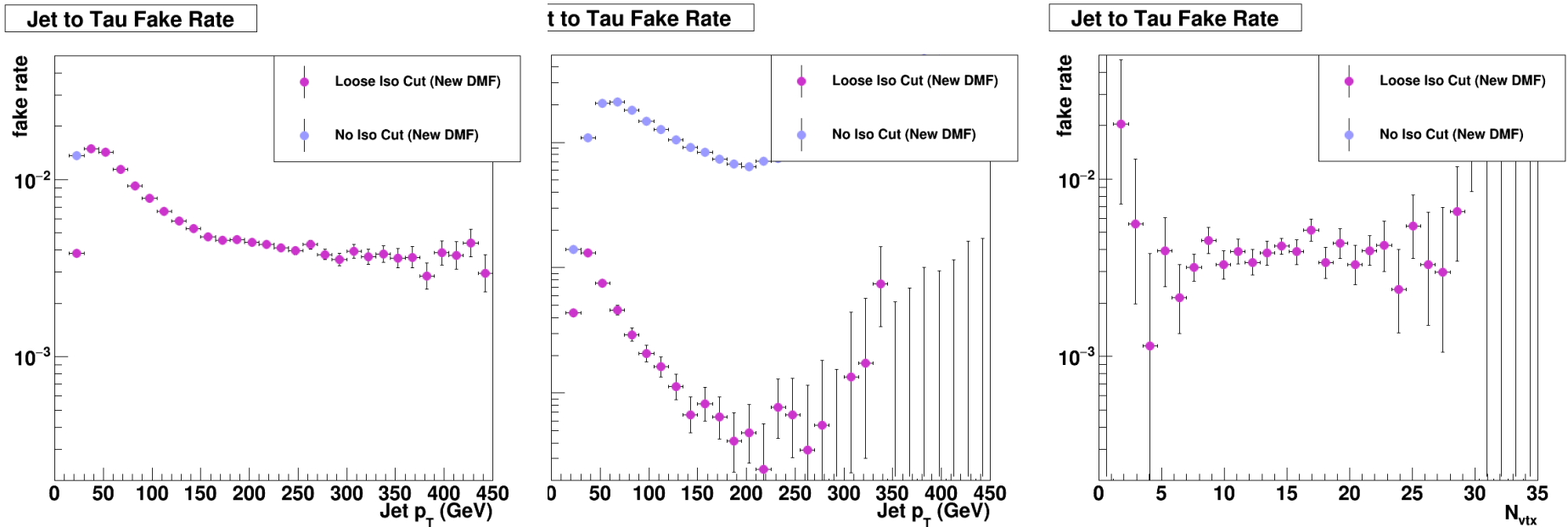


Tau Efficiency



- Left: Wjets; Center: $Z' \rightarrow \tau\tau$, M500; Right: $Z' \rightarrow \tau\tau$, M1500
- New DMF algorithm; $p_T > 20$, $|\eta| < 2.3$; by LooseCombinedIsolationDeltaBetaCorr3Hits
- Mostly insensitive to n_{vtx}

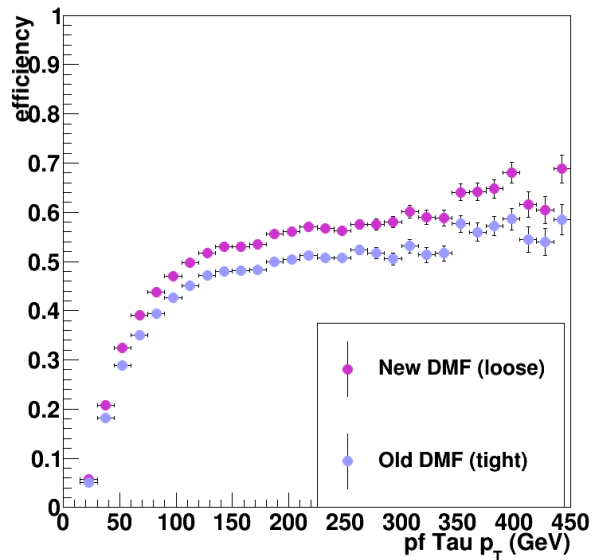
Effect of Isolation Cut—on FR by N vertices



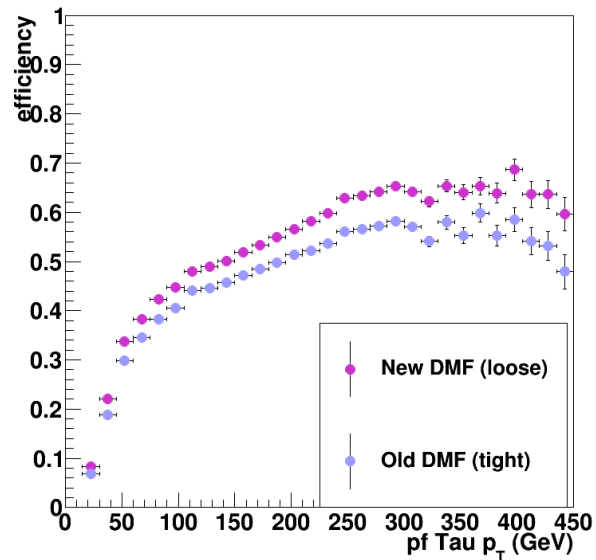
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- New DMF algorithm; $p_T > 20$, $|\eta| < 2.3$; by LooseCombinedIsolationDeltaBetaCorr3Hits
- Mostly insensitive to n_{vtx}

New vs Old DMF (effi)

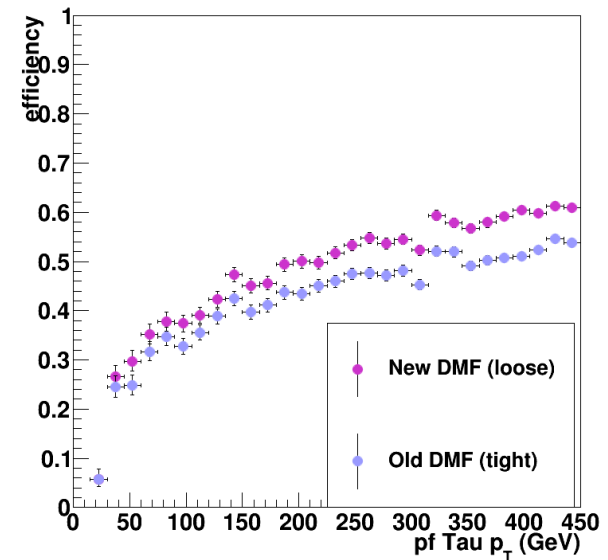
Tau Efficiency



Tau Efficiency

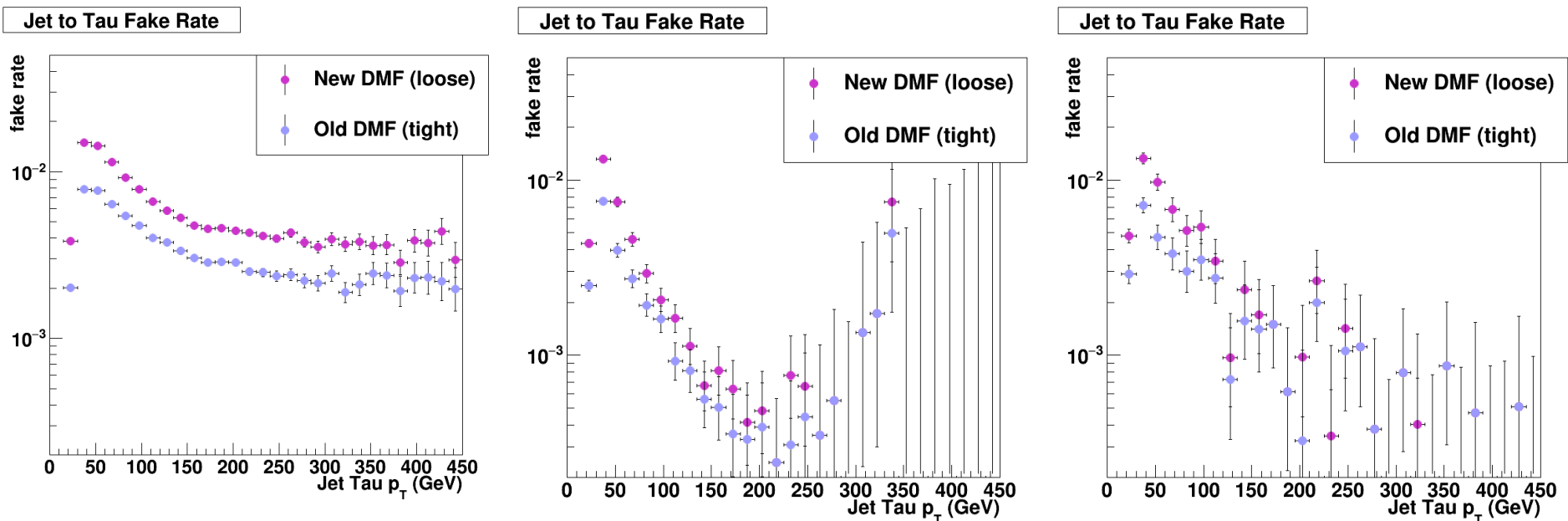


Tau Efficiency



- Left: Wjets; Center: $Z' \rightarrow \text{tautau}$, M500; Right: $Z' \rightarrow \text{tautau}$, M1500
- New or Old DMF; $p_T > 20$, $\eta < 2.3$;
by LooseCombinedIsolationDeltaBetaCorr3Hits
- New DMF algorithm meant to perform better at high p_T

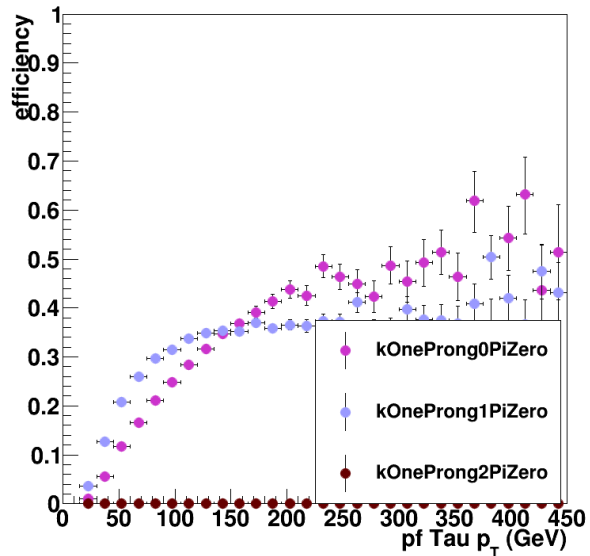
New vs Old DMF (FR)



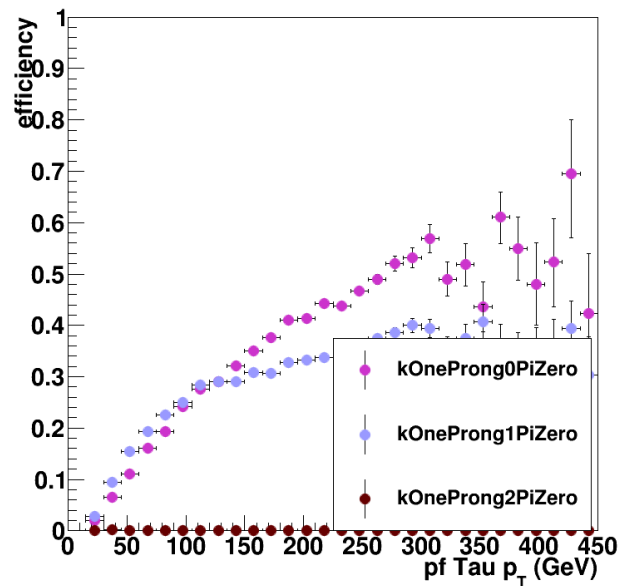
- Left: Wjets; Center: $Z' \rightarrow \text{tautau}$, M500; Right: $Z' \rightarrow \text{tautau}$, M1500
- New or Old DMF; $p_T > 20$, $|\eta| < 2.3$;
by LooseCombinedIsolationDeltaBetaCorr3Hits
- New DMF algorithm meant to perform better at high p_T
- Poor statistics at high p_T

Effect of tau decay mode

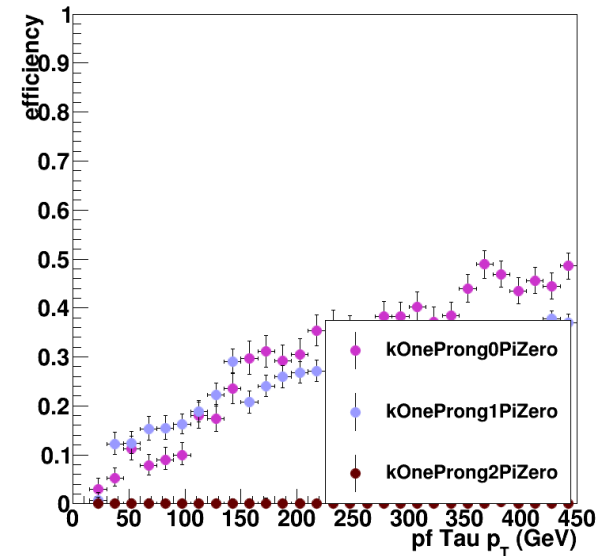
Tau Efficiency



Tau Efficiency



Tau Efficiency



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To do:

- Near term:
 - Corresponding fake rate plots
 - Double check decay mode plots
- Medium term:
 - Running on data

23 July 2015

Travels



At Work

