



# Jet Muon Analysis



권우연

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- In high Eta range Jet, checking out results of the jet muon reconstructions.
- Check the distribution of Jet muons in the eta bin range and their 4-momentum
- Next step, we will study how to improve jet muon reconstruction.

## MC era : Run3Summer22

QCD samples : QCD-4Jets\_HT-\*\_TuneCP5\_13p6TeV\_madgraphMLM-pythia8 (for all HT range)

*WW to semi leptonic : WWtoLNu2Q\_TuneCP5\_13p6TeV\_powheg-pythia8 (on going...)*

- Jet\_MuonIdx only show up to 2 muons
- However, Muon\_jetIdx also exist.
- We can find out which jet the muon came from
- Also, we have 4-momentum information of the muon

## ※ Jet definition in NANO AOD

:ak4 PFJets Puppi with JECs applied, after basic selection (pt > 15)

```

root [18] tree->Show(42656)
===== EVENT:42656
nJet          = 7
Jet_nMuons    = 0,
              2, 0, 0, 0, 1, 0
Jet_muonIdx1  = -1,
              0, -1, -1, -1, 2, -1
Jet_muonIdx2  = -1,
              1, -1, -1, -1, -1, -1
Jet_muEF      = 0,
              0.158203, 0, 0, 0, 0.269531,
              0
nMuon         = 4
Muon_jetIdx   = 1,
              1, 5, -1
Muon_pt       = 4.27121,
              4.16957, 4.13201, 3.01763
Jet_genJetIdx = 1,
              0, -1, 2, -1, 4, 3
nGenJet       = 6
nGenPart      = 17
Muon_genPartIdx = -1,
              15, 12, -1
GenPart_pt    = 0,
              0, 26.4375, 26.4375, 1.16406, 2.58594,
              9.40625, 5.5, 13.1875, 11.6562, 15,
              2.38281, 4.03125, 0.179199, 14.1875, 4.125,
              0.354492
    
```

## Event selection

- $n\text{Jet} > 0 \ \&\& \ n\text{Muon} > 0$

## Matching Method

1. Select muon whose “Muon\_genPartIdx”  $\neq -1$  (*muon matching*)
2. Find the “Muon\_jetIdx” of the muon. And select if the “Muon\_jetIdx  $\neq -1$ ” (*jet muon checking*)
3. Check the “Jet\_genJetIdx[Muon\_jetIdx]  $\neq -1$ ” (*jet matching*)

I select jet muons both matched muon and matched jet

```

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nJet          = 7
Jet_nMuons    = 0,
              ② 0, 0, 0, 1, 0
Jet_muonIdx1  = -1,
              0, -1, -1, -1, 2, -1
Jet_muonIdx2  = -1,
              1, -1, -1, -1, -1, -1
Jet_muEF      = 0,
              ① 0.158203, 0, 0, 0, 0.269531,
              0
nMuon         = 4
Muon_jetIdx   = 1,
              2 ① 5, -1
Muon_pt       = 4.27121,
              4.16957, 4.13201, 3.01763
Jet_genJetIdx = 1,
              3 ③ ① -1, 2, -1, 4, 3
nGenJet       = 6
nGenPart      = 17
Muon_genPartIdx = -1,
              1 ① 15, 12, -1
GenPart_pt    = 0,
              0, 26.4375, 26.4375, 1.16406, 2.58594,
              9.40625, 5.5, 13.1875, 11.6562, 15,
              2.38281, 4.03125, 0.179199, 14.1875, 4.125,
              ① 0.354492
    
```



