Jet Veto Performance on Data Using Zs

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Outline

- JetVeto efficiency estimate and systematics
- Dataset and Z selections
- Jet spectrum and JetVeto efficiency
- Some discrepancies seen in data between EE/MM
- Summary and plan

Jet Veto Efficiency

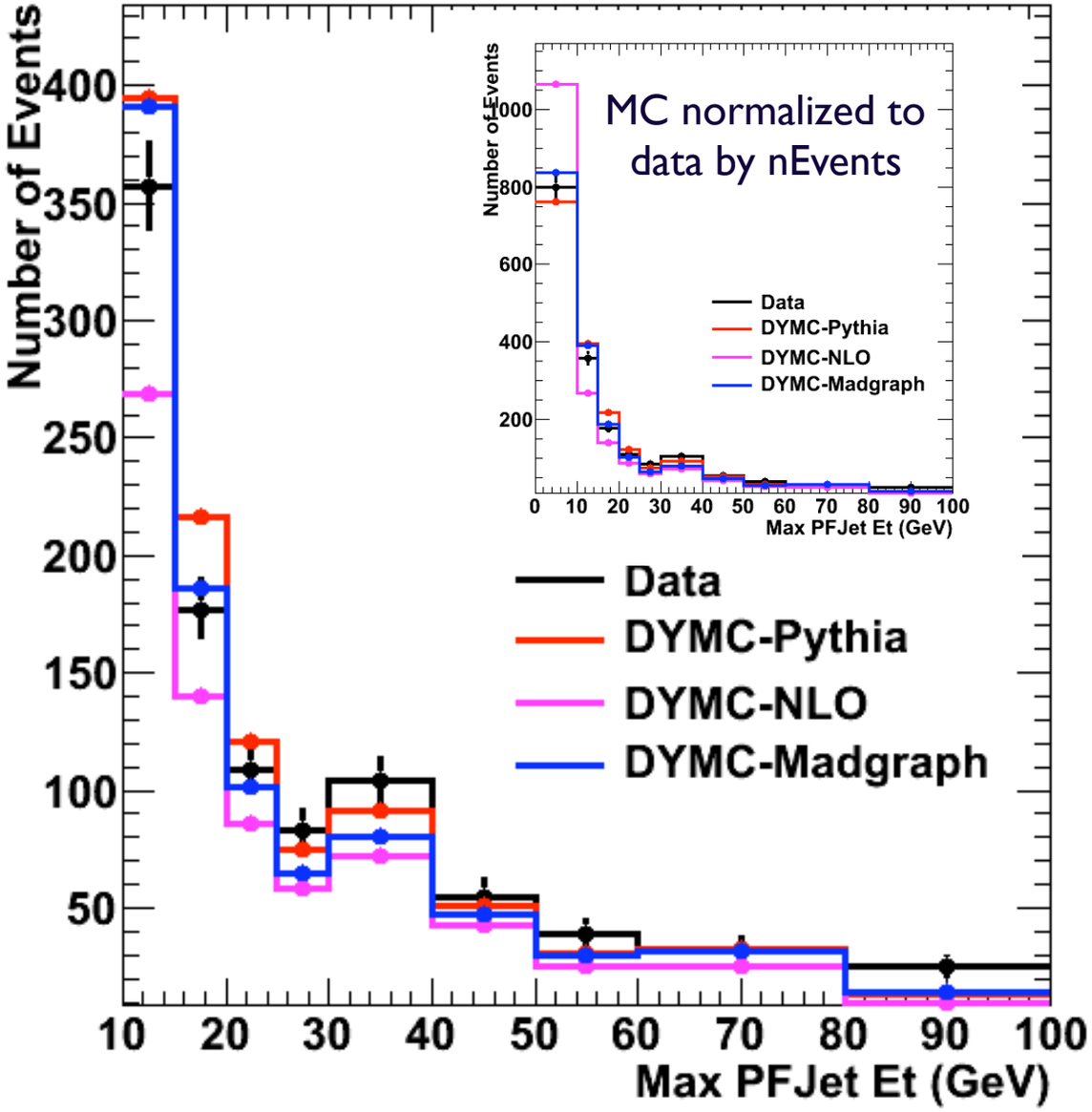
- Jet Veto is main handle to suppress top-background
  - New Proposal (working point): Max Jet Et < 25(20) GeV |η|<5(3)
  - The uncertainty in the signal efficiency is one of the main source of the systematic errors in efficiency, hence the cross-section measurement
  - ISR Jets (especially the low pT ones) are difficult to model in the MC
- Currently, we rely on MC to predict the efficiency, with "data-driven" method* for systematic errors (<10% as a goal)
  - Use the Z+Jets as a control sample to see the Data/MC matching
  - The intrinsic difference between WW/Z will be studied on MC
  - Eventually, combine the data/MC (Z) difference and the WW/Z difference on WW as the systematic error on the JetVeto efficiency

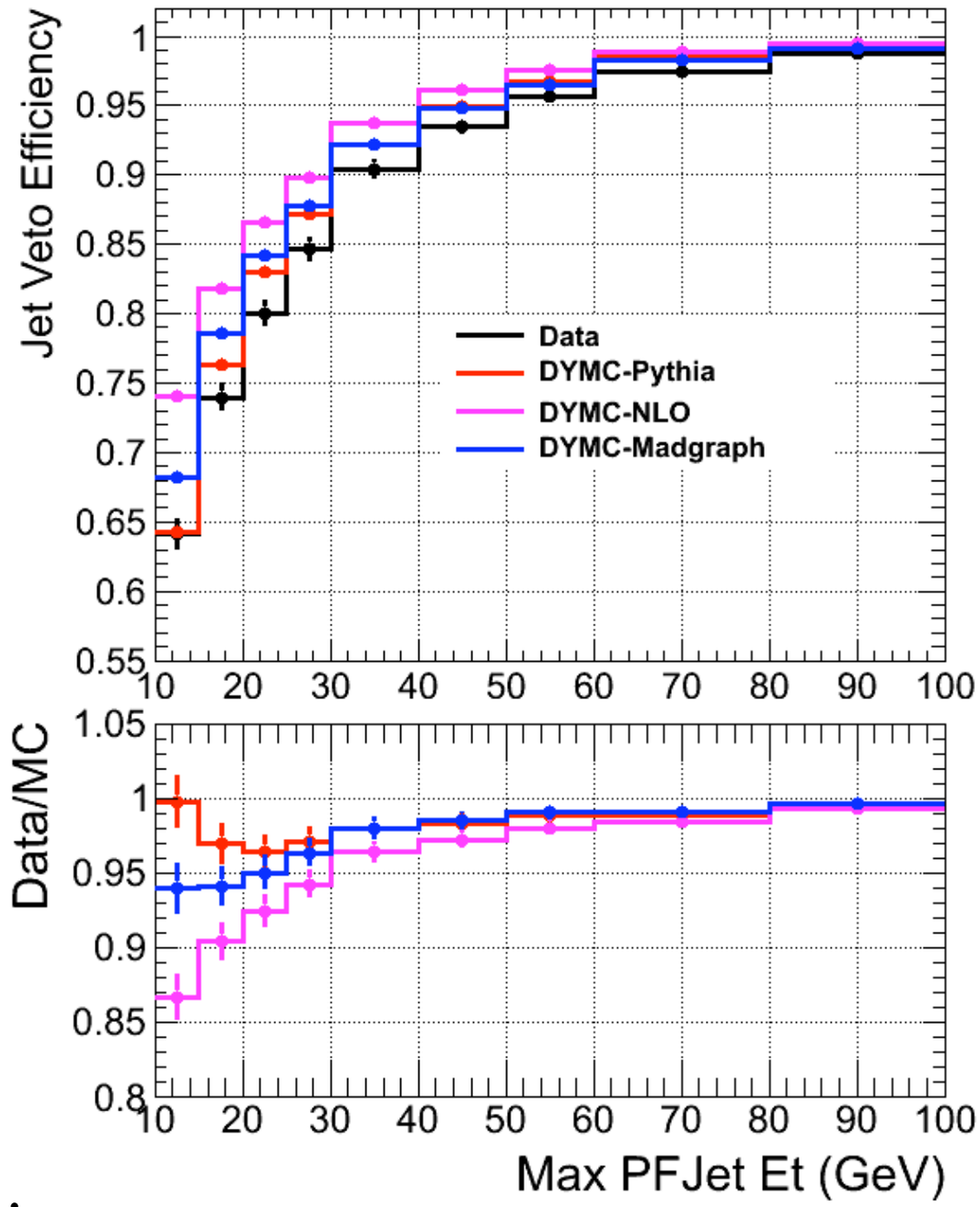
*Previous talk: http://indico.cern.ch/getFile.py/access?contribId=3&resId=0&materialId=slides&confId=89930

Datasets and Z Selection

- Data 3.1/pb with the goodruns list provided on 09/11
- MC (ll: ee + mumu)
  - Pythia: /Zll_Spring10-START3X_V26_S09-v1/
  - Madgraph: /ZJets-madgraph_Spring10-START3X_V26_S09-v1/
  - NLO: /Zgamma_ll_M20-mcatnlo_Spring10-START3X_V26_S09-v1/
- Z selection differences from WW reference
  - |M(ll)- 91.1876| <15 GeV in EE/MM
  - If multiple hypo. are found, choose the one with m(ll) closest to Z mass
  - Relax all JetVeto and MET cuts
  - Relax all trigger selections
  - Relax softMuon and third lepton vetos

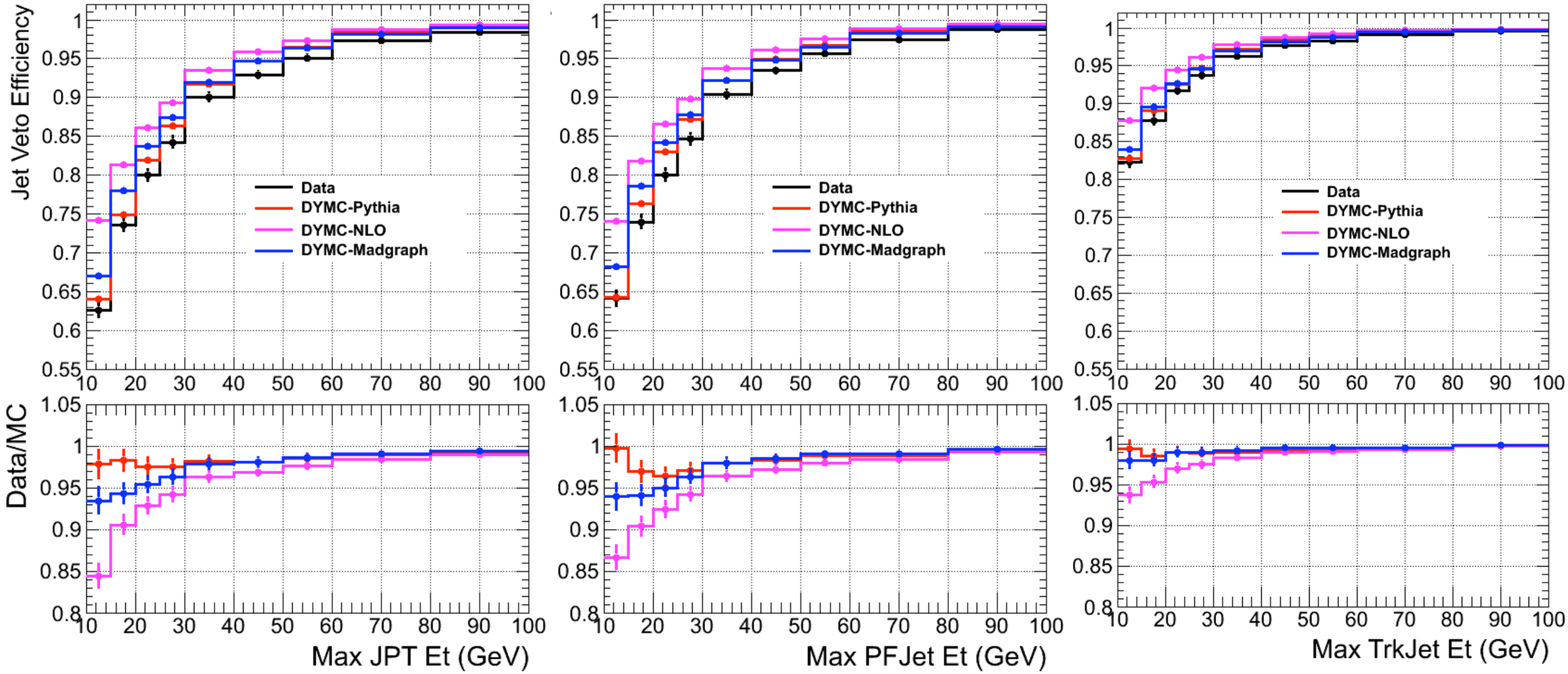
PF Jets |η|<5 (EE+MM)





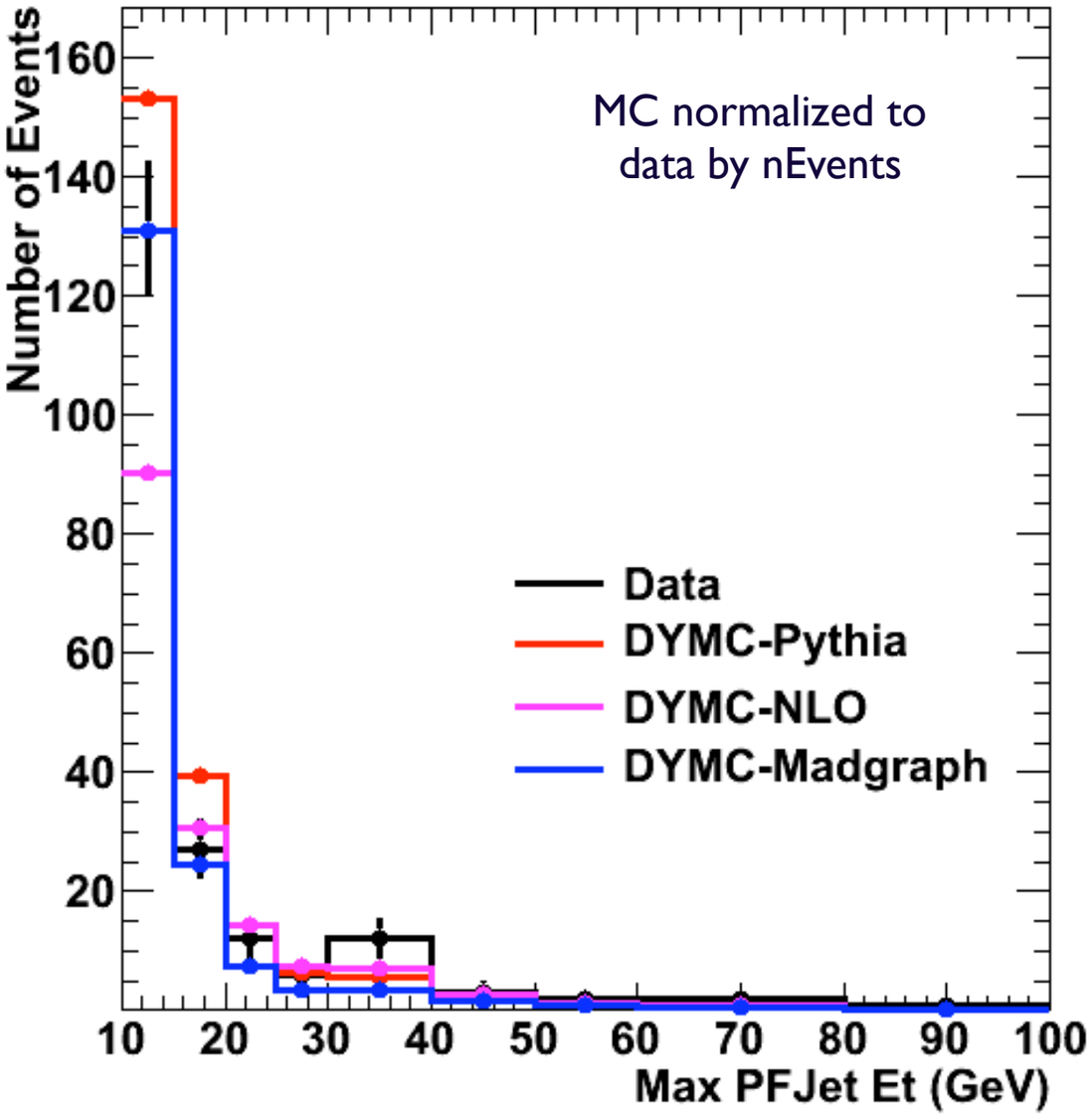
- NLO MC simulates too many soft jets
- Data/MC agreement is ~ 95% for Pythia and Madgraph at 20 GeV

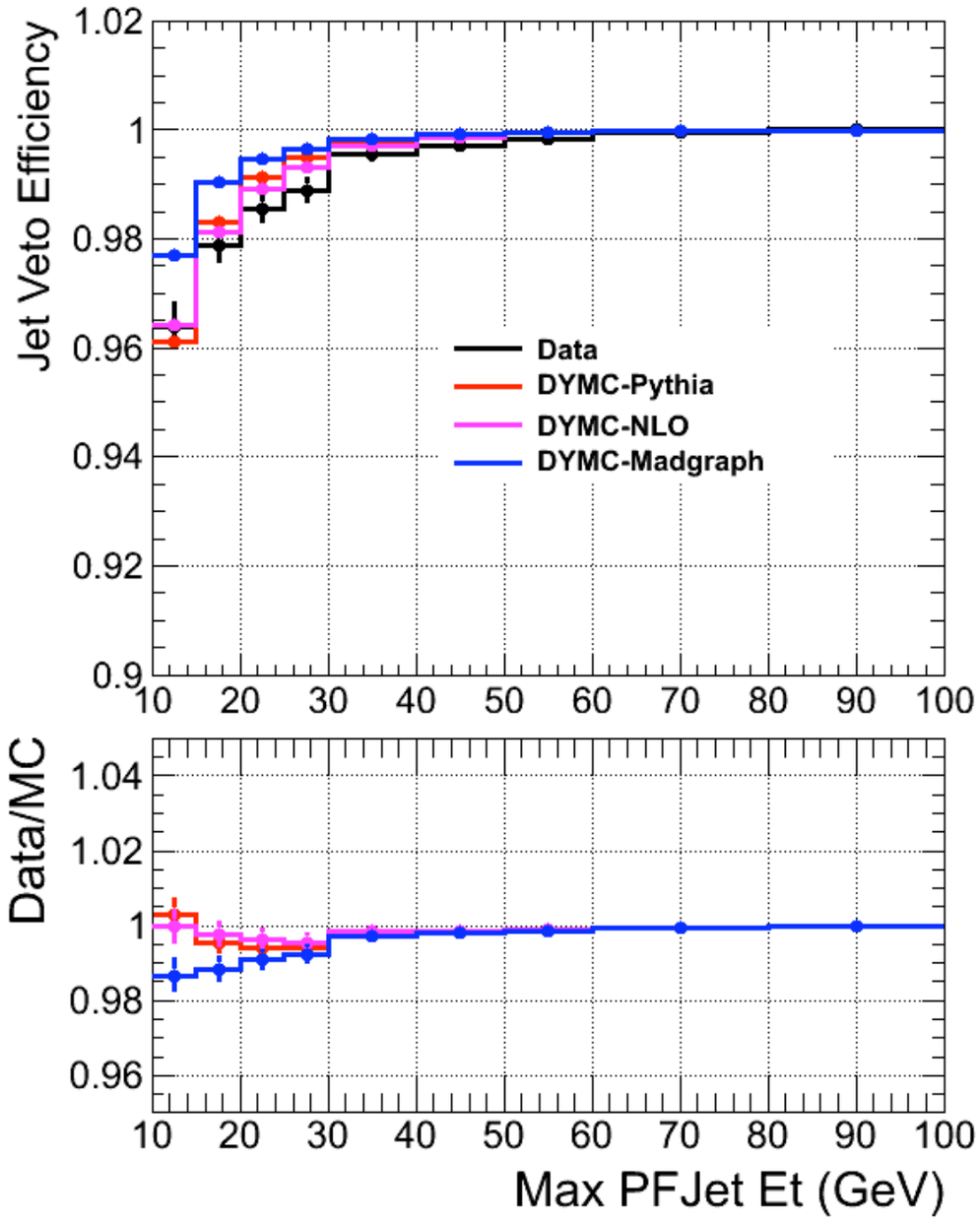
Compare 3 Jets |η|<5 (EE+MM)



- NLO MC simulates too many soft jets
- Data/MC agreement is > 95% for Pythia and Madgraph at 20 GeV
- JPT/PF perform similarly, while the trkJet Et is on a difference scale
- JEC should be checked

PF Jets 3|<η|<5 (EE+MM)

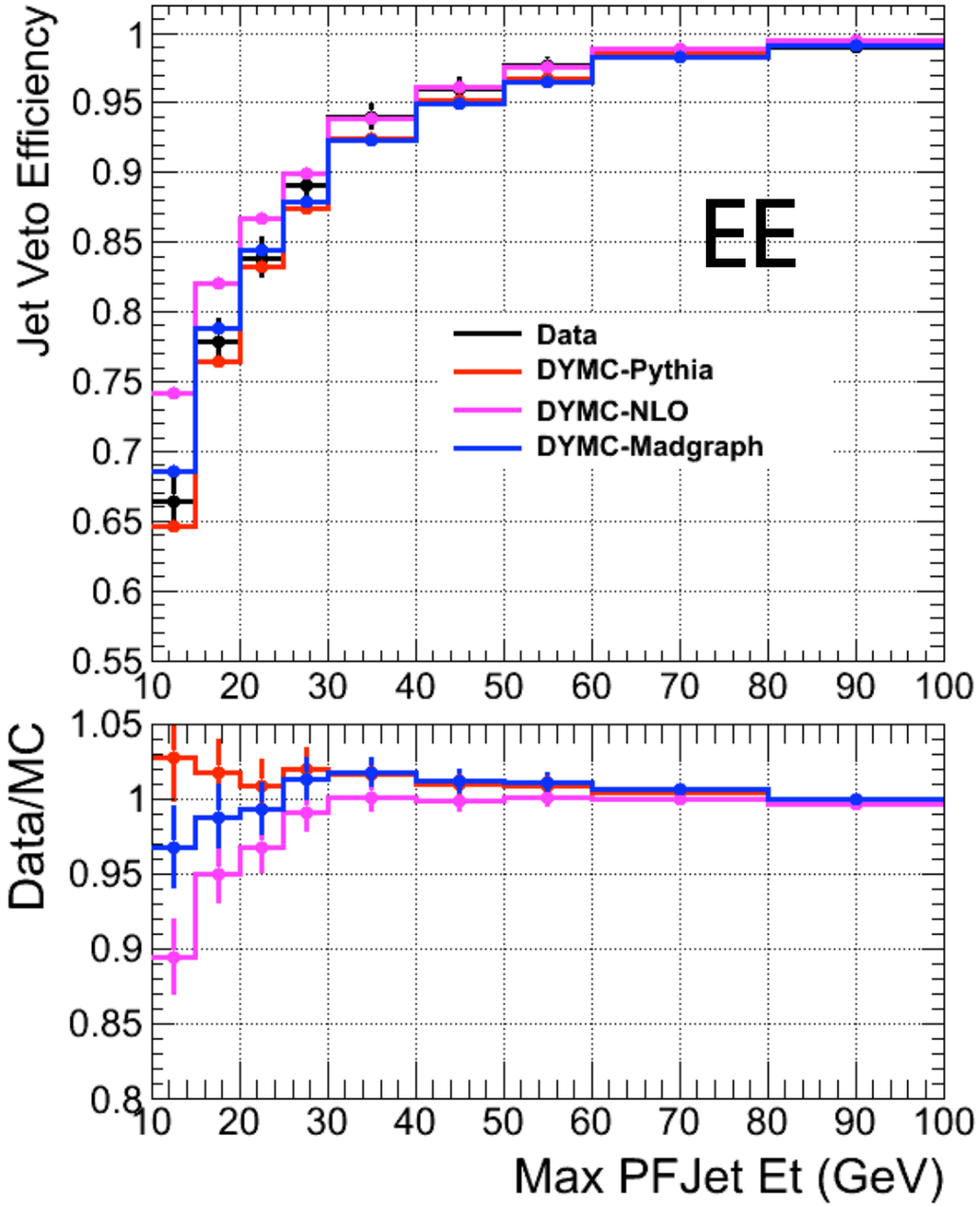


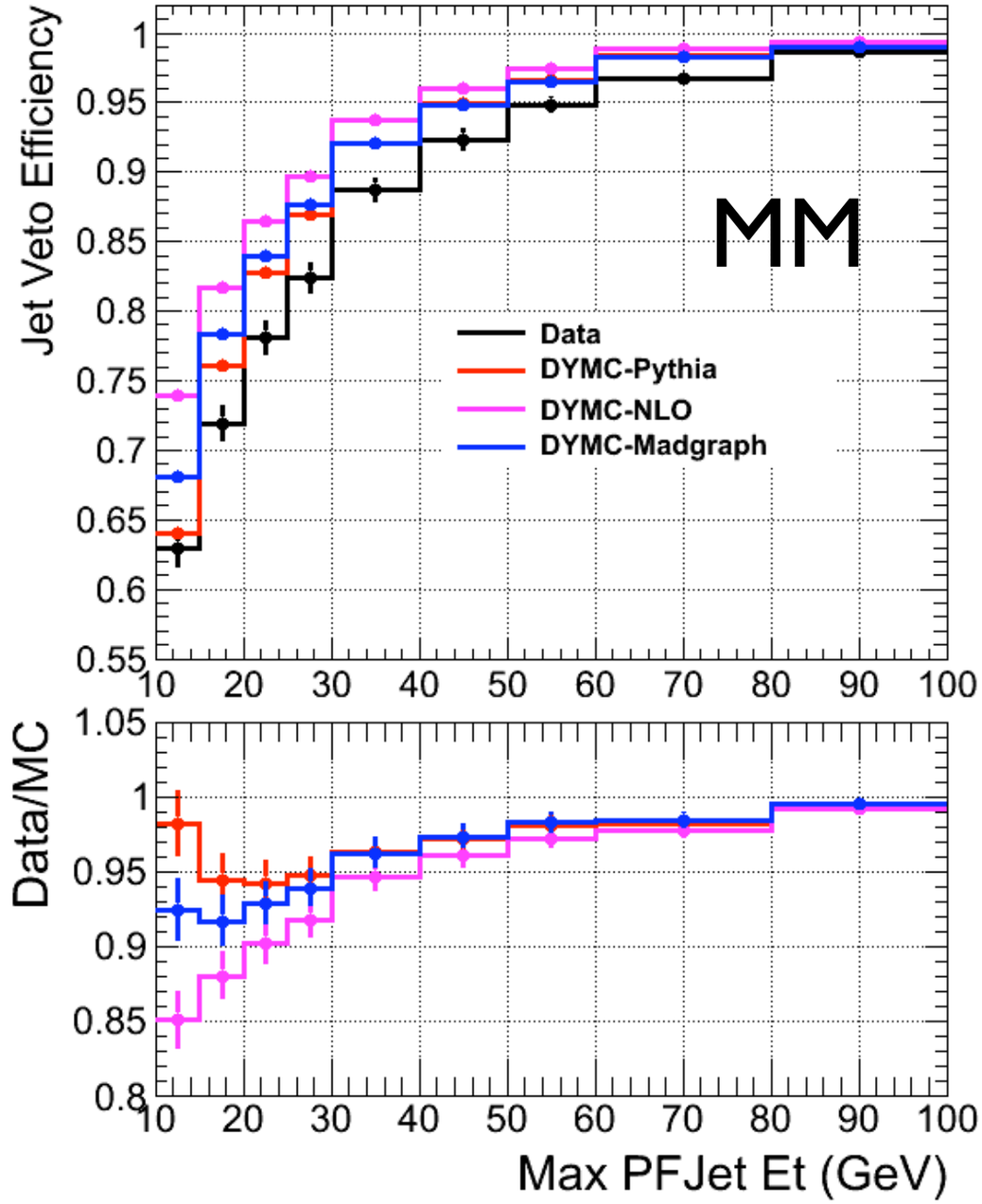


- Data/MC agreement is ~ 99% for Pythia and Madgraph at 20 GeV
- This is confirmed with JPT and Trk Jets
- It is safe to increase the jet veto to |eta|<5

JetVeto Efficiency EE/MM Difference

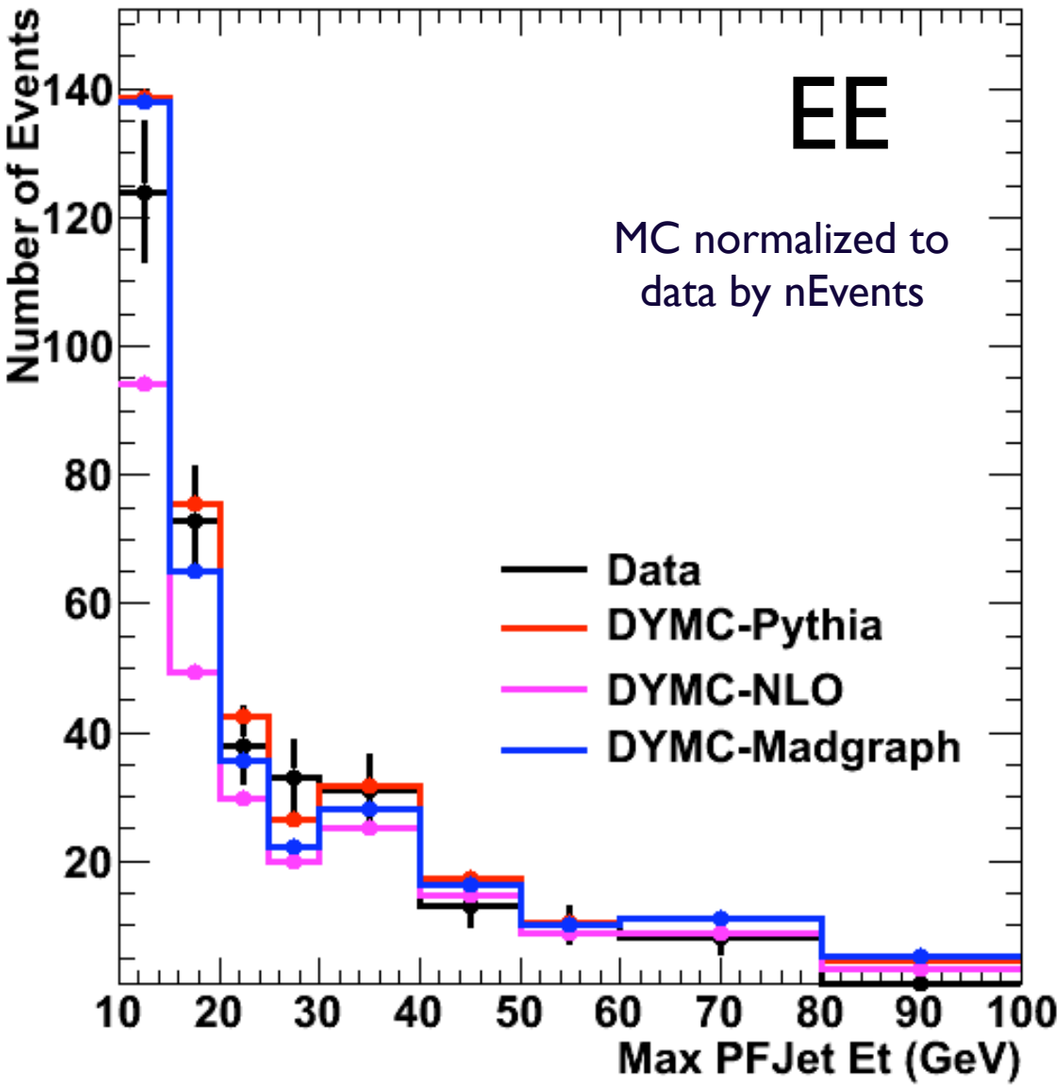
- The efficiency in MM is a few % less than the EE (?)
  - same behavior in JPT/TrkJet

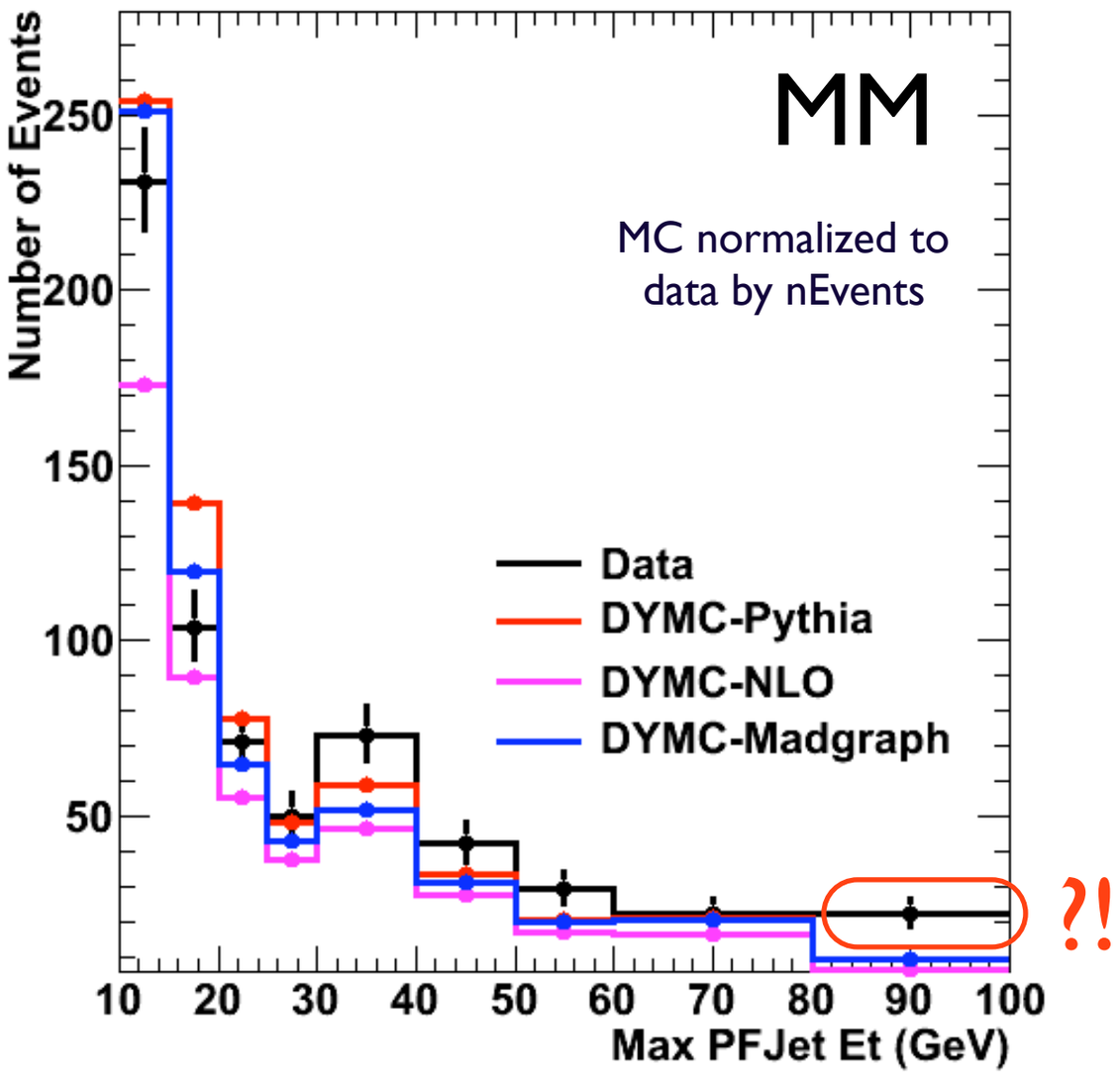




Jet Et in EE/MM

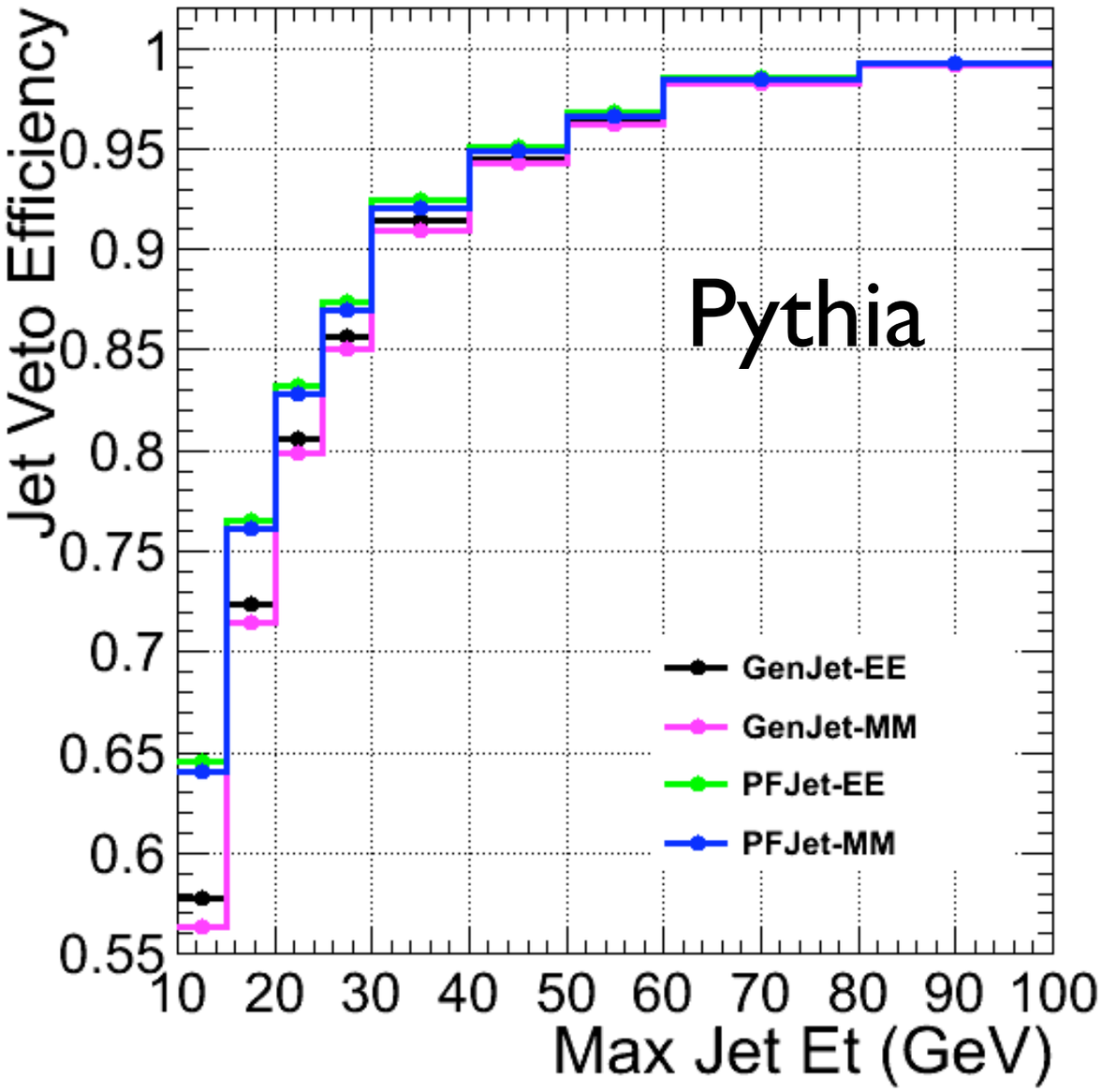
- EE selection is much tighter than MM
  - Number of Events after the Z selection: 633 (EE) 1157 (MM)
  - We see more energetic Jets in MM, especially the tails are suspicious
  - Will try to tighten the MM selection and investigate the events at the tails

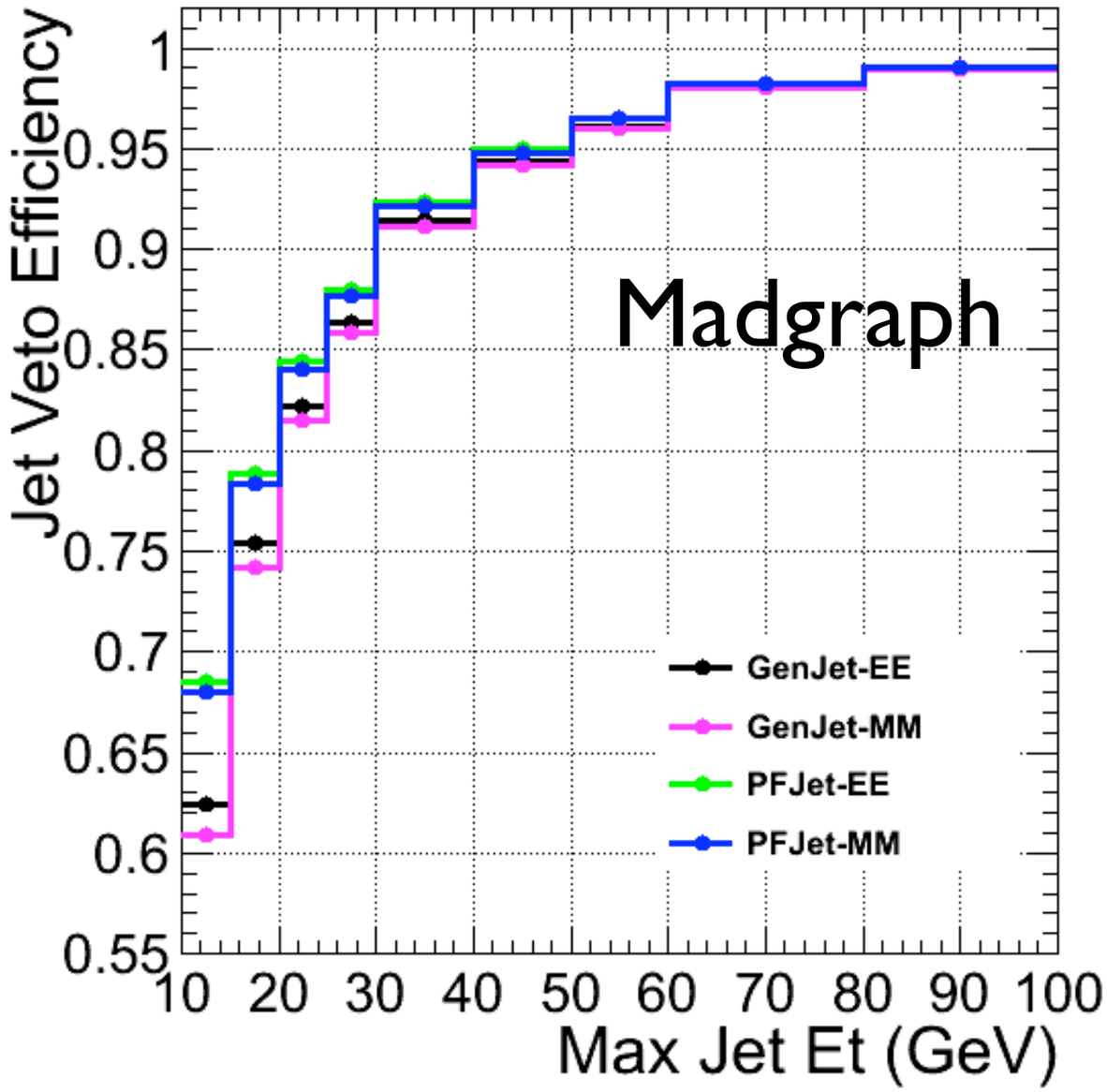




JetVeto Efficiency EE/MM difference in MC

- EE/MM difference is <1% for GenJet, and even smaller with PF
- This points more to the data/MC lepton selection difference
  - We will try to tighten up Mu selection, any other suggestions?





Summary and Plan

- Summary
  - We compared various jet (PF/JPT/TrkJet) energy spectrums with the Zjets between data and Pythia/NLO/Madgraph
    - The NLO MC simulates too many soft jets
  - The JetVeto efficiency disagreement between data/MC is within 5%
  - Some discrepancies between EE/MM in data need to be investigated
- Plan
  - Apply JEC (to present at HWW mtg next Friday)
  - Understand the Jet spectrum difference between W/Z (theory side)
  - Monitor the Zs and study the jet energy response as data accumulates
  - Test the top-tagging

Backup Slides

Electron Selection

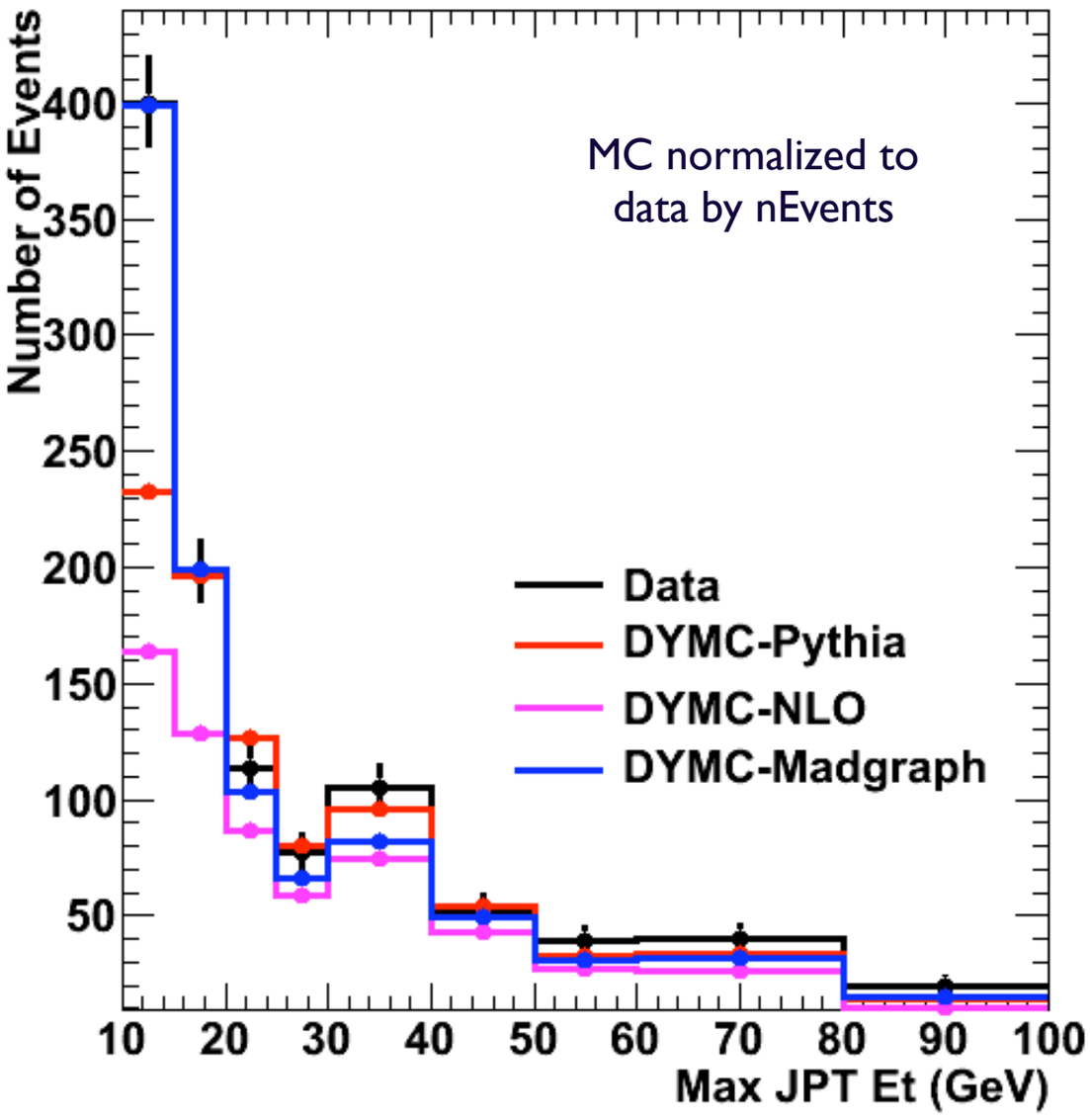
- Base
  - pt > 20 && |eta|<2.5
- ID
  - VBTF80
  - Conversion rejection, track partner with |dist|<0.02 && |dcot|<0.02
- Impact Parameter d0
  - |d0(PV)| < 0.02 cm
- Isolation
  - (Iso[Trk]+Max(0,Iso[Ecal--Jurassic]-1)+Iso[Hcal]) / pt < 0.1
  - deltaR cone size 0.3

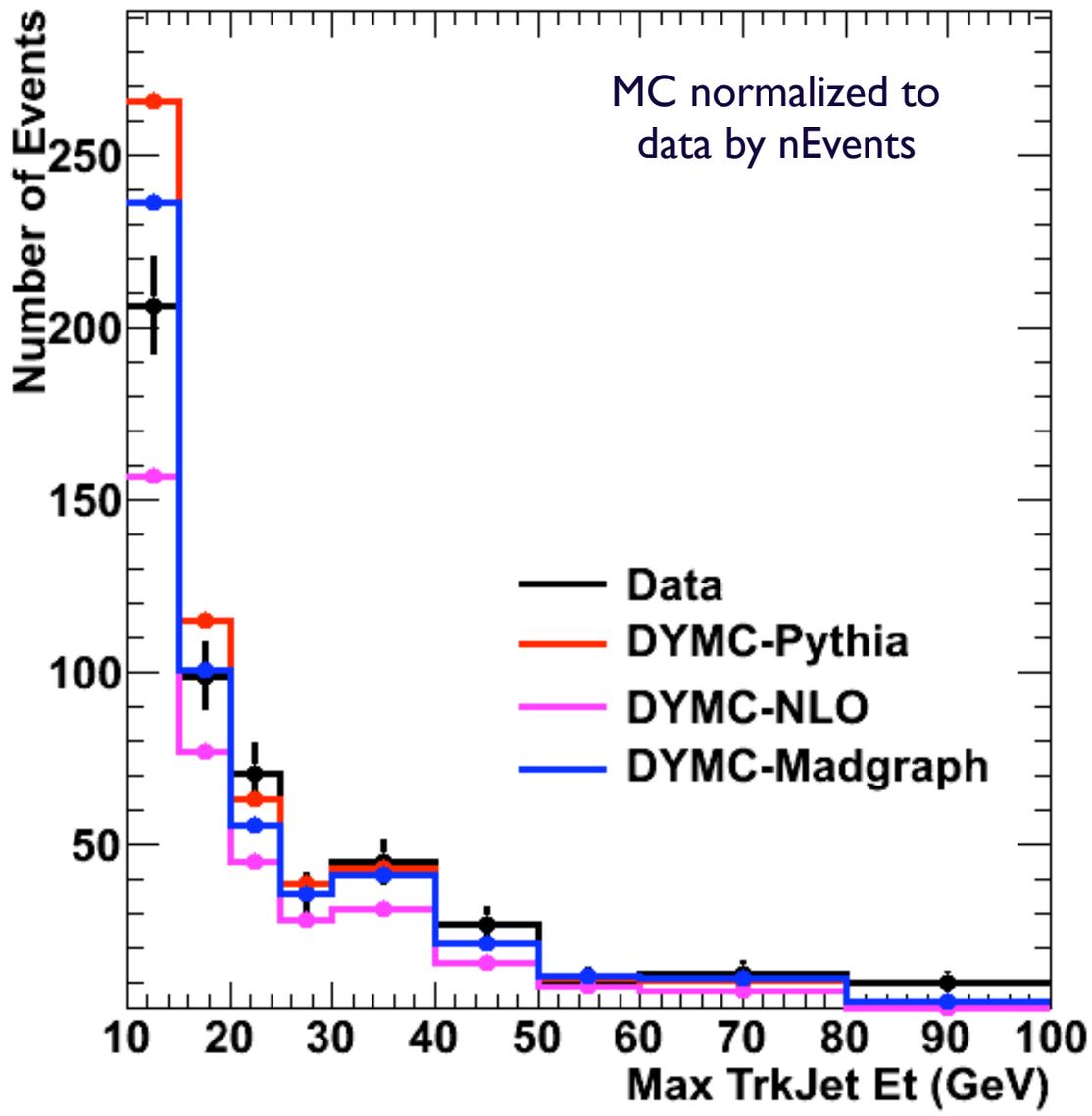
Muon Selection

- Base
  - pt > 20 && |eta|<2.4
- ID
  - Global&&Tracker
  - Norm Chi2 < 10
  - nHit(tracker)>10 && nHit(muon)>0
- Impact Parameter d0
  - |d0(PV)| < 0.02 cm
- Isolation
  - (Iso[Trk]+Max(0,Iso[Ecal--Jurassic]-1)+Iso[Hcal]) / pt < 0.15
  - deltaR cone size 0.3

JPT and TrkJet Et

- ..





CaloJet Performance

- The large efficiency is due to the large 0 bin value