Muons and Taus in p13

- Luminosities for "example" trigger
- Muon acceptance
- Muon trigger efficiencies
- Muon reco efficiencies
- Muon isolation

Mostly wrt Serbans's $\boldsymbol{\mu}$-$\boldsymbol{\tau}$ selection (see later)

Luminosities for MU_2TRK3_L2M0/L2L0

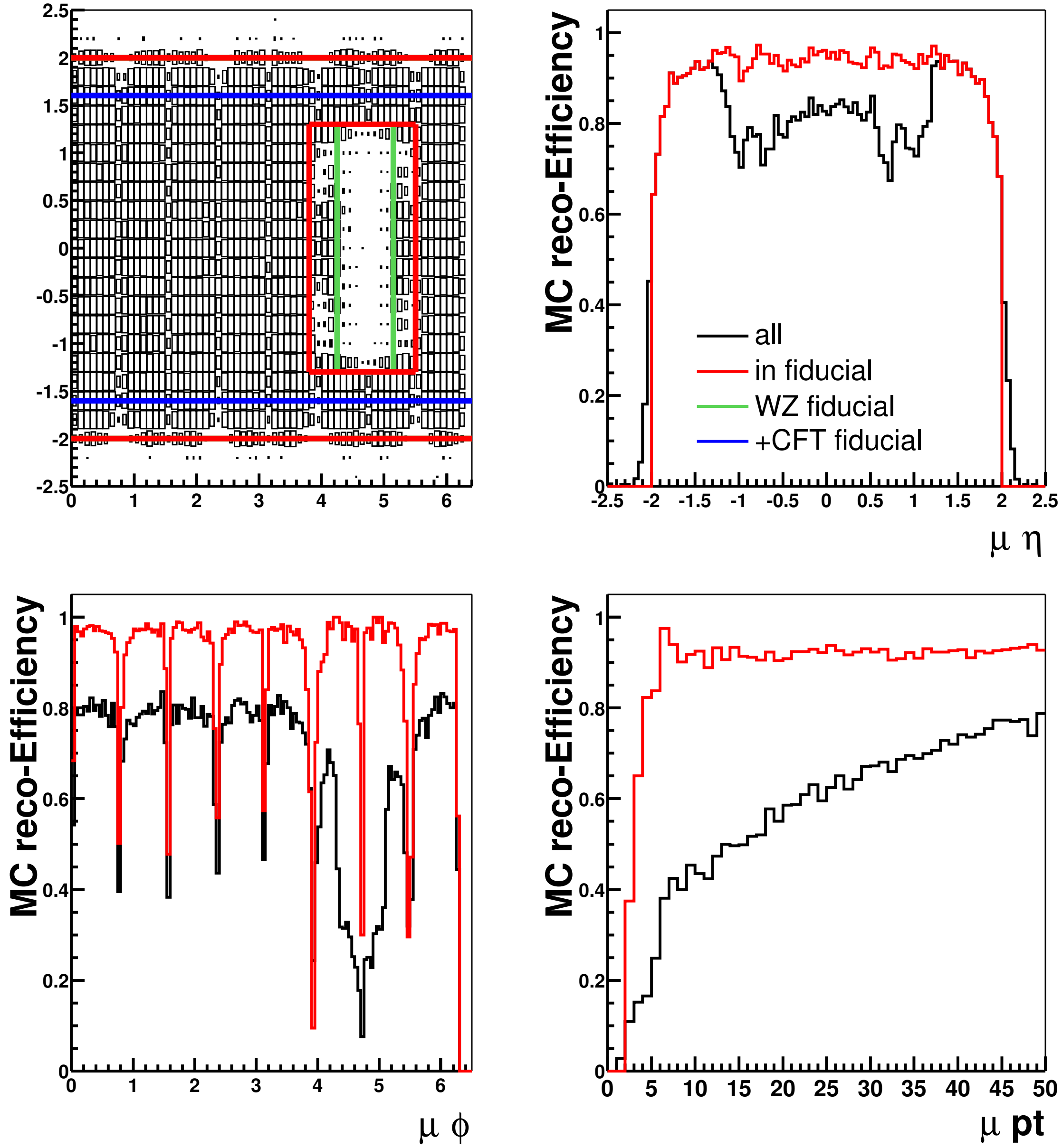
Luminosity taken from top-skim, assume NP skim has same luminosity

end date: Jan28th

look at total + after rejection of "bad" runs

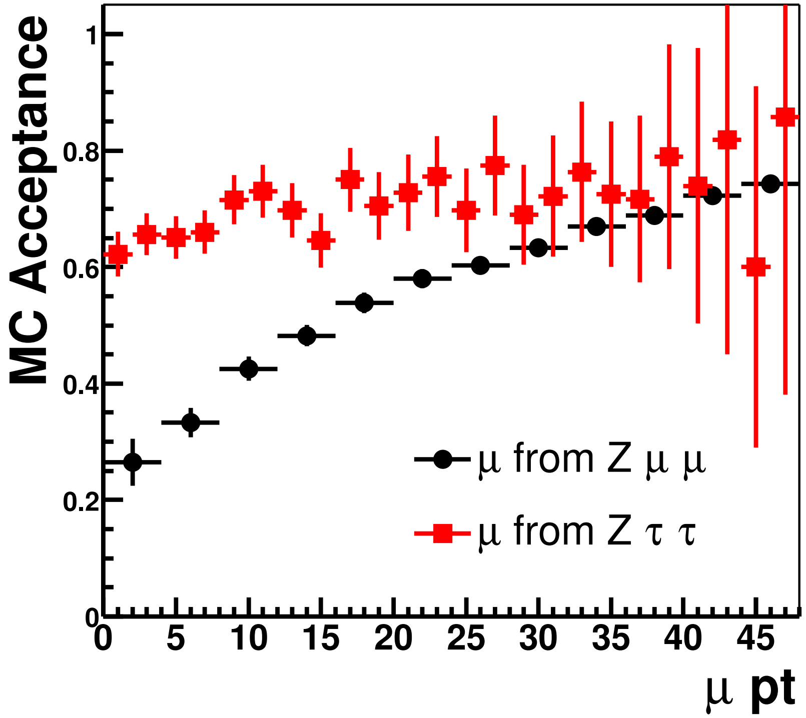
quality req.	p13.05	p13.04	N $Z \rightarrow \tau\tau$ evts
none	38.6	12	1737+540
mu	33.7	8.7	1516+391
mu+CFT	33.6	8.7	1512+391
mu+cal	32.3	8.7	1453+391

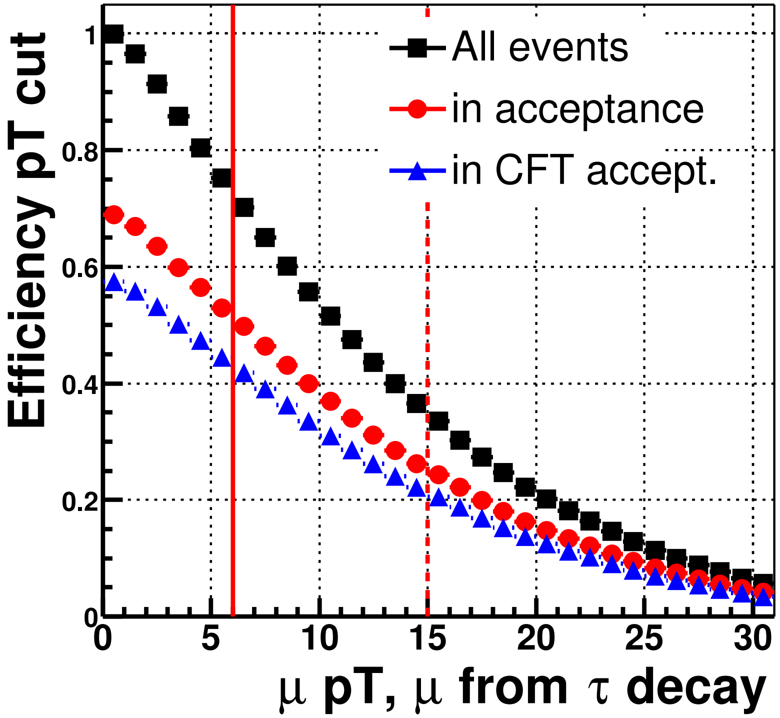
Muon Acceptance (I)



Look at a $Z \to \mu\mu$ MC file fiducial is indicates by red lines

Muon Acceptance (II)



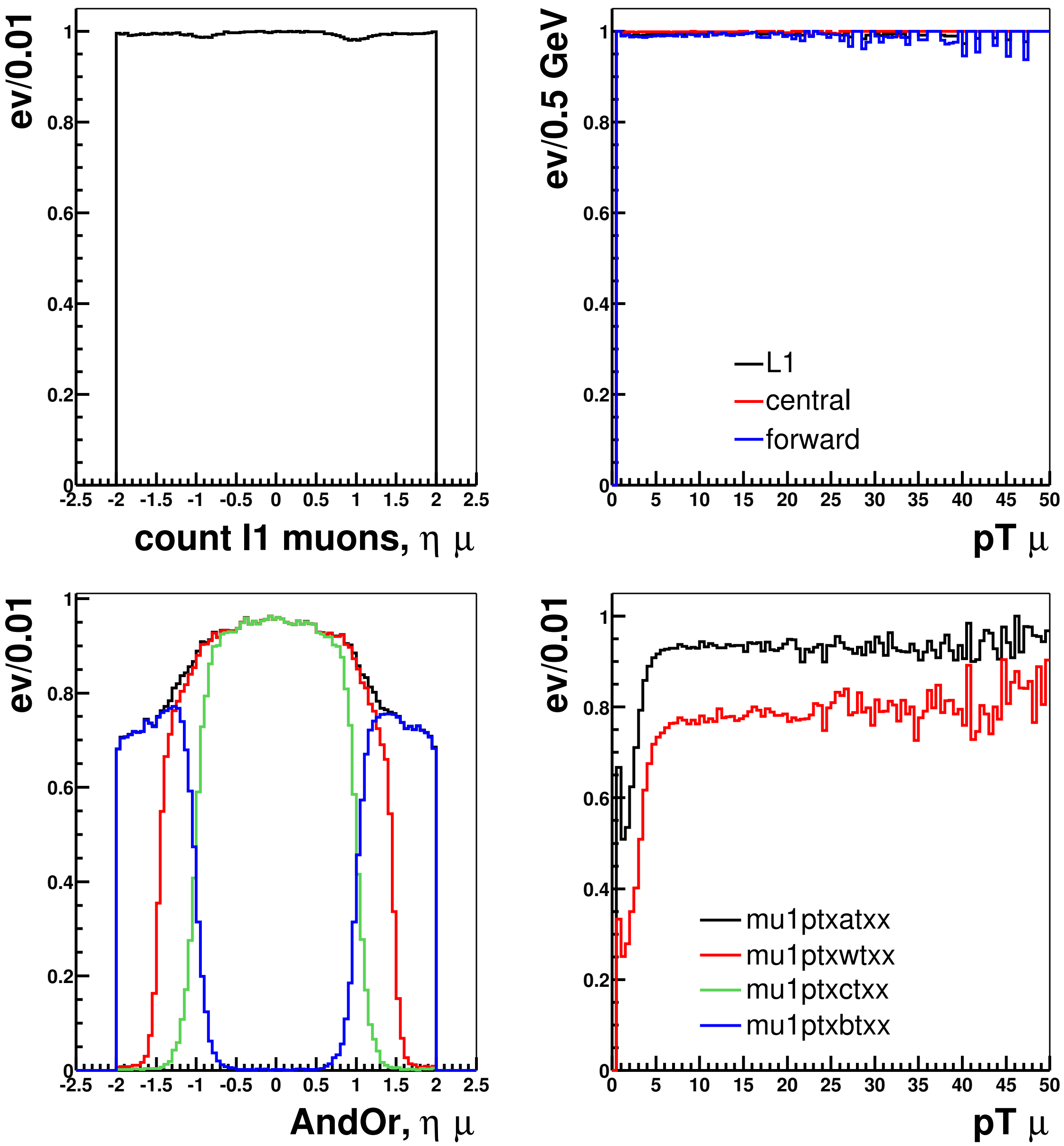


65% of all μ are in fiducial region

48% have a pT $>$ 6 GeV

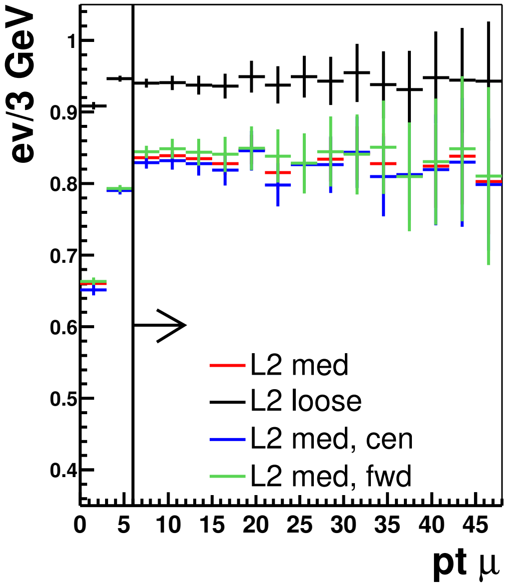
23% have a pT $>$ 15 GeV

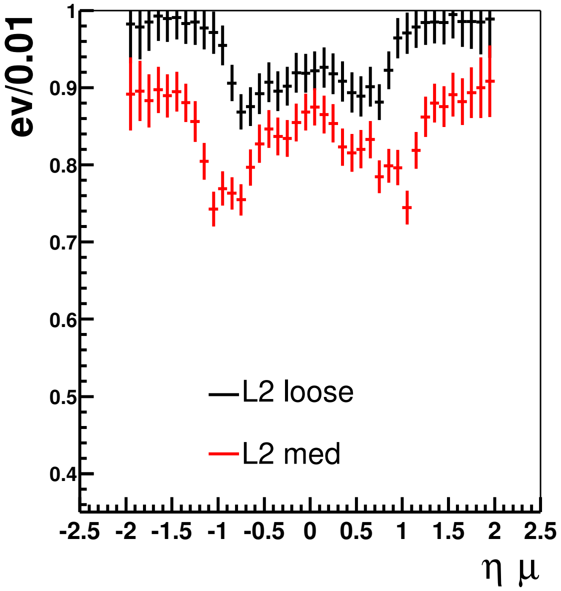
Muon Triggers - L1

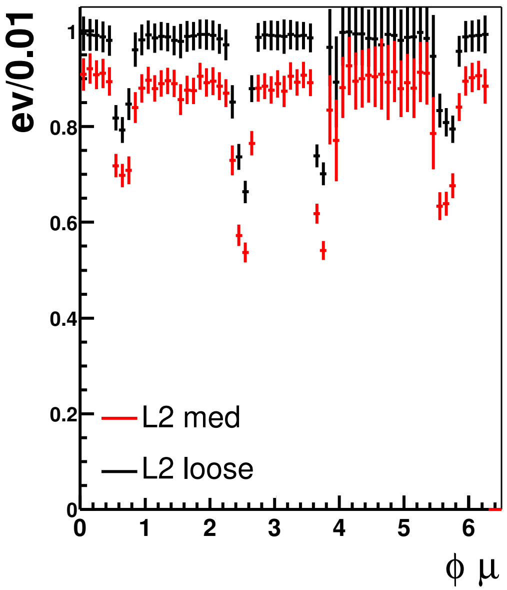


Use top mutrk sample: CAL trigger + med offline muon
require track match to muon
L1: look at central/N/S octants that have trigger, region as from muon
L1 AndOr terms: single mu have e.g mu1ptxatxx_fz, "tau" trigger have mu1ptxatxx_CJT/CEM
What about FastZ?

Muon Triggers - L2



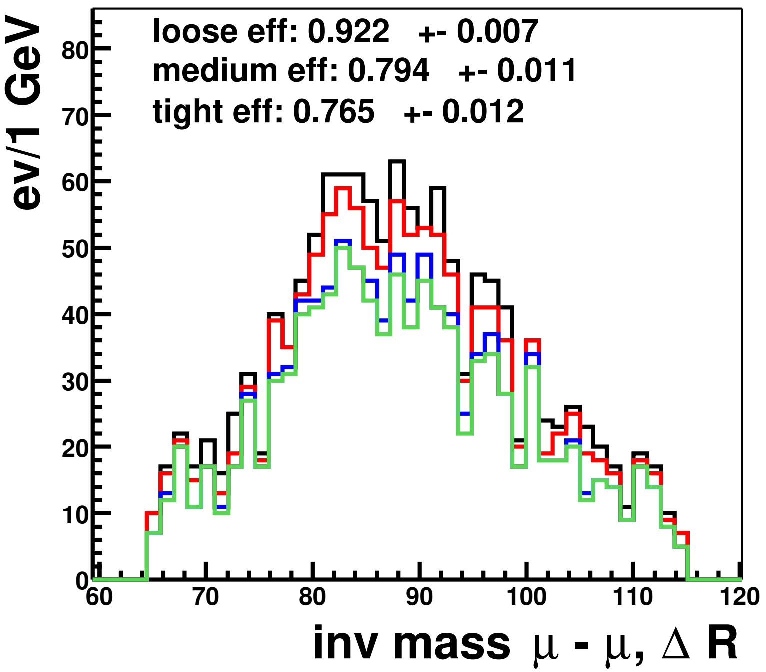


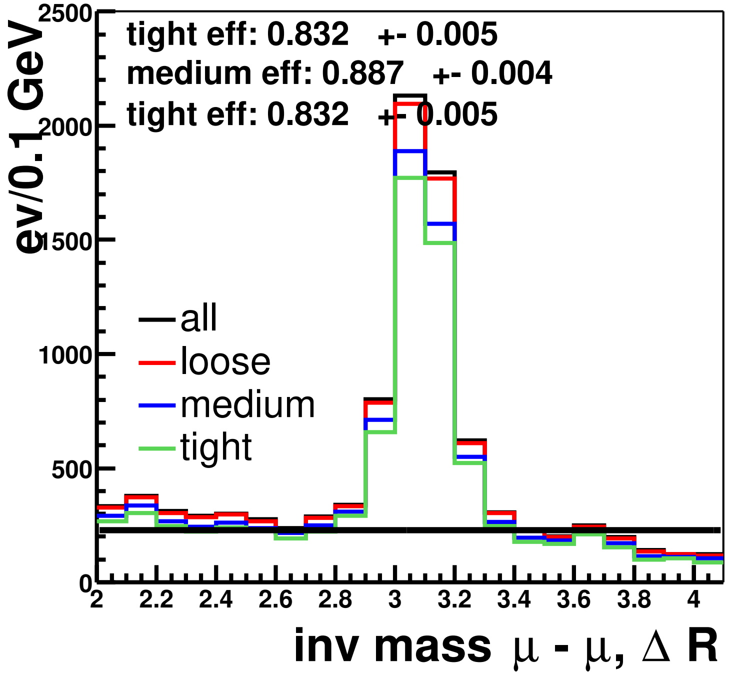


same sample, match offline mu to l2 trigger mu
look at quality
L2 efficiency (pT> 6 GeV, in acc, flod with η distribution: 83.6%

Muon Reco Efficiency

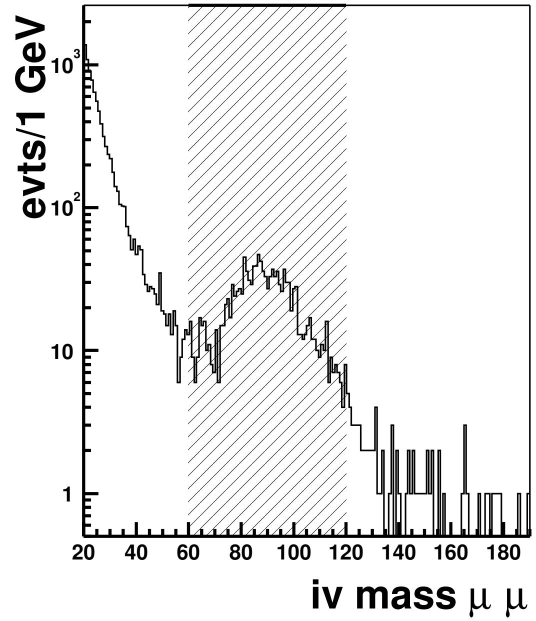
- Use single-μ sample
- tagging muon: medium local + track
- event triggered with a single L2 muon trigger
- match tagging mu to L2 muon of sufficient quality
- test muon: central track + MTC
- or central track with iv mass in Z peak

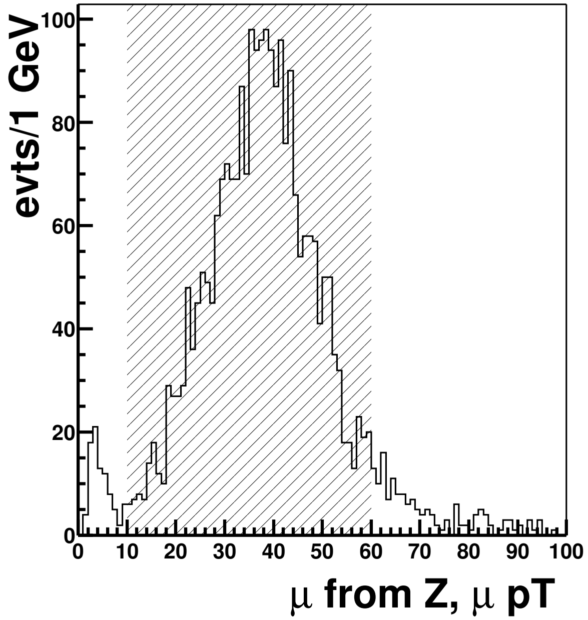


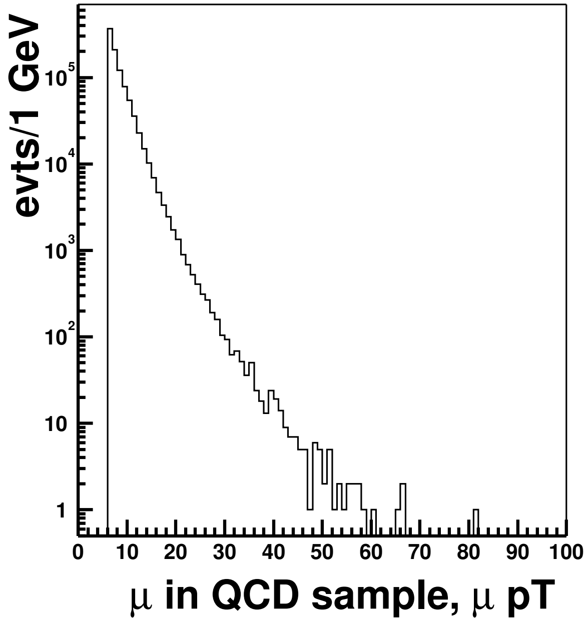


Muon Isolation Cut

- Use muons from Z decay (local+central) for isolated muon sample
- sample with MET < 10 GeV as QCD sample

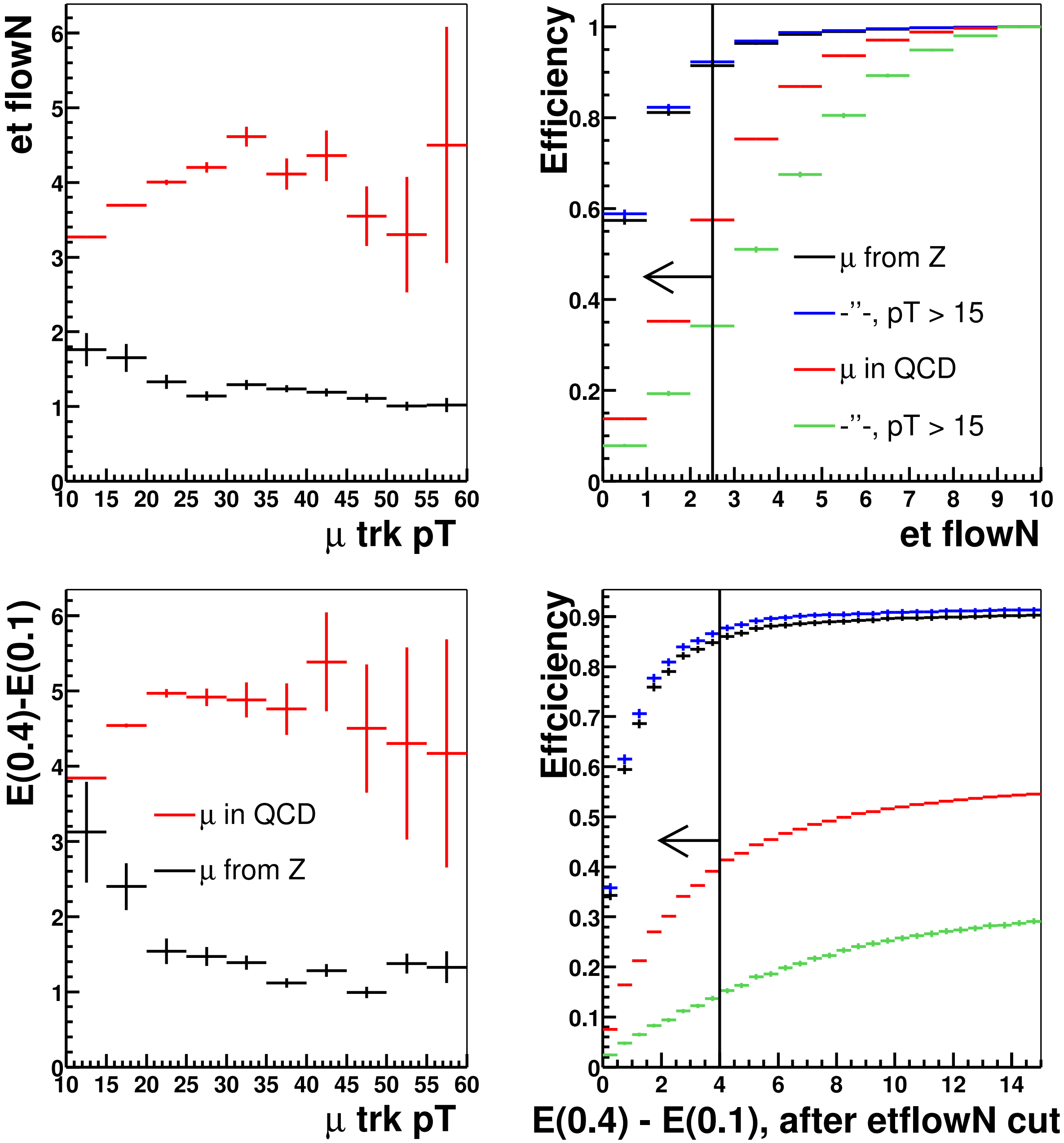






Muon Isolation Cut (II)

- look at etflow and E cone cuts



Before cutting on τ

$>$ 2200 events (depending on run quality cuts)

Muon Acceptance + pT cut at 6	40%
Muon Acceptance + pT cut at 15	20%
L1*L2 muon trigger	83%
Muon Reconstruction efficiency (tight)	75%
Track Matching efficiency	80%
Isolation Efficiency	86%

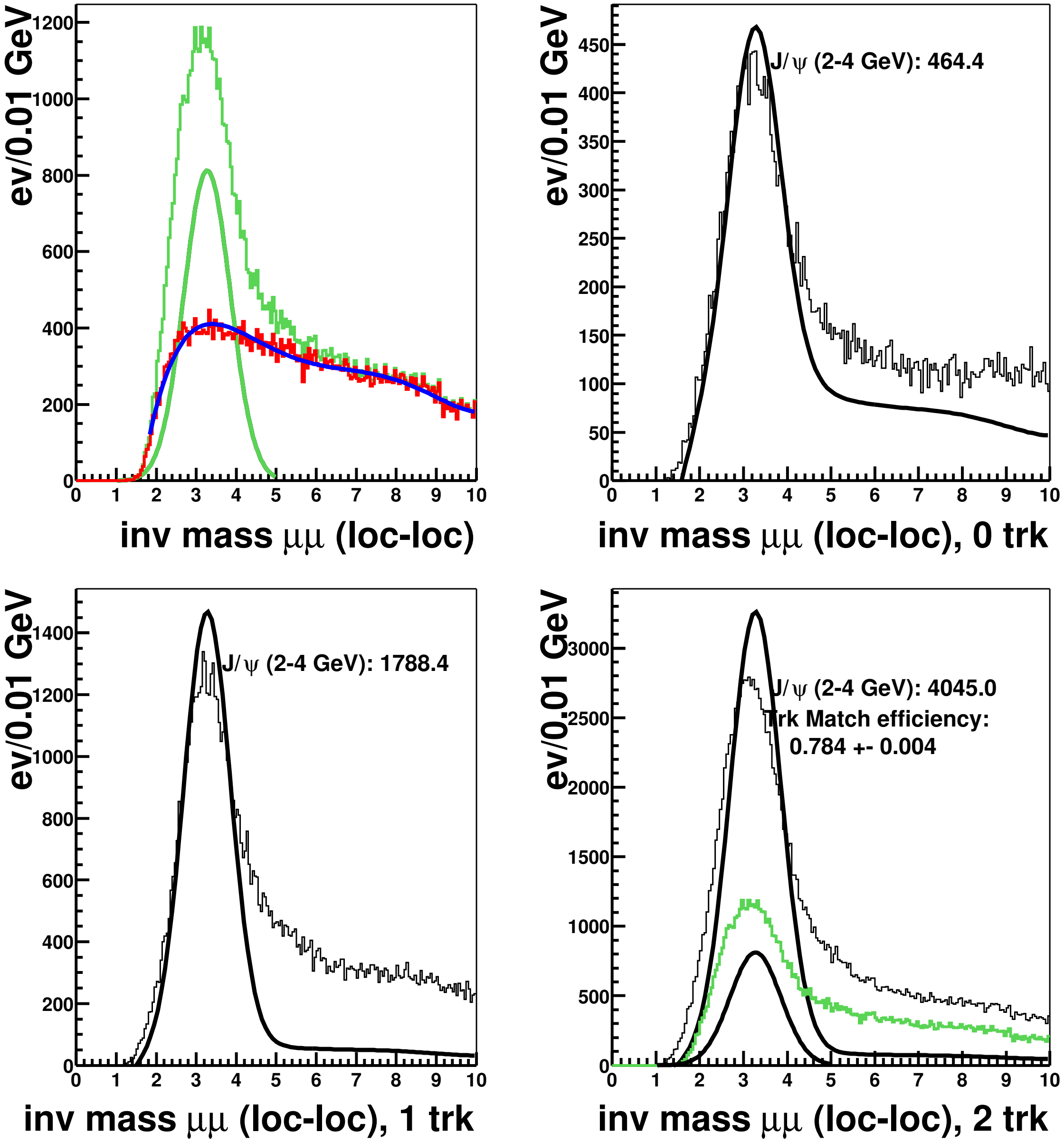
- Number of events after μ cuts: 188
- not contained: effect of τ pT cut on matched track
- matched track...

Coming:

- final muon efficiencies
  - reco-eff versus pT (practically done)
  - understand J/ψ track matching "problems"
  - add Z peak (tag-test method) for check (+high pT)
- fold efficiencies with η (mostly) to get numbers
- optimize mu-iso cuts for cen+fwd separately, for 6/15 GeV up
- for τ: track isolation should be like muon
- study of other variables: usefulness of MC (need p13.08 ...)
- first: hard pT cut, study signal (a la Serban), iv mass
- combine with electron (hard pT cut anyways- trigger)
- try to lower pT cut whe tau is understood (enough)

Muon Track Match Efficiency

- Use di-μ sample
- look at invariant mass of two local μ (energy corrected)
- count N events with 0,1 and 2 matched tracks in J/ψ



Muon Track Match Efficiency (II)

- Use di-μ sample
- check that efficiency with tagging+testing method
- with that method: make η and pT plots