Status of ttbar background estimation

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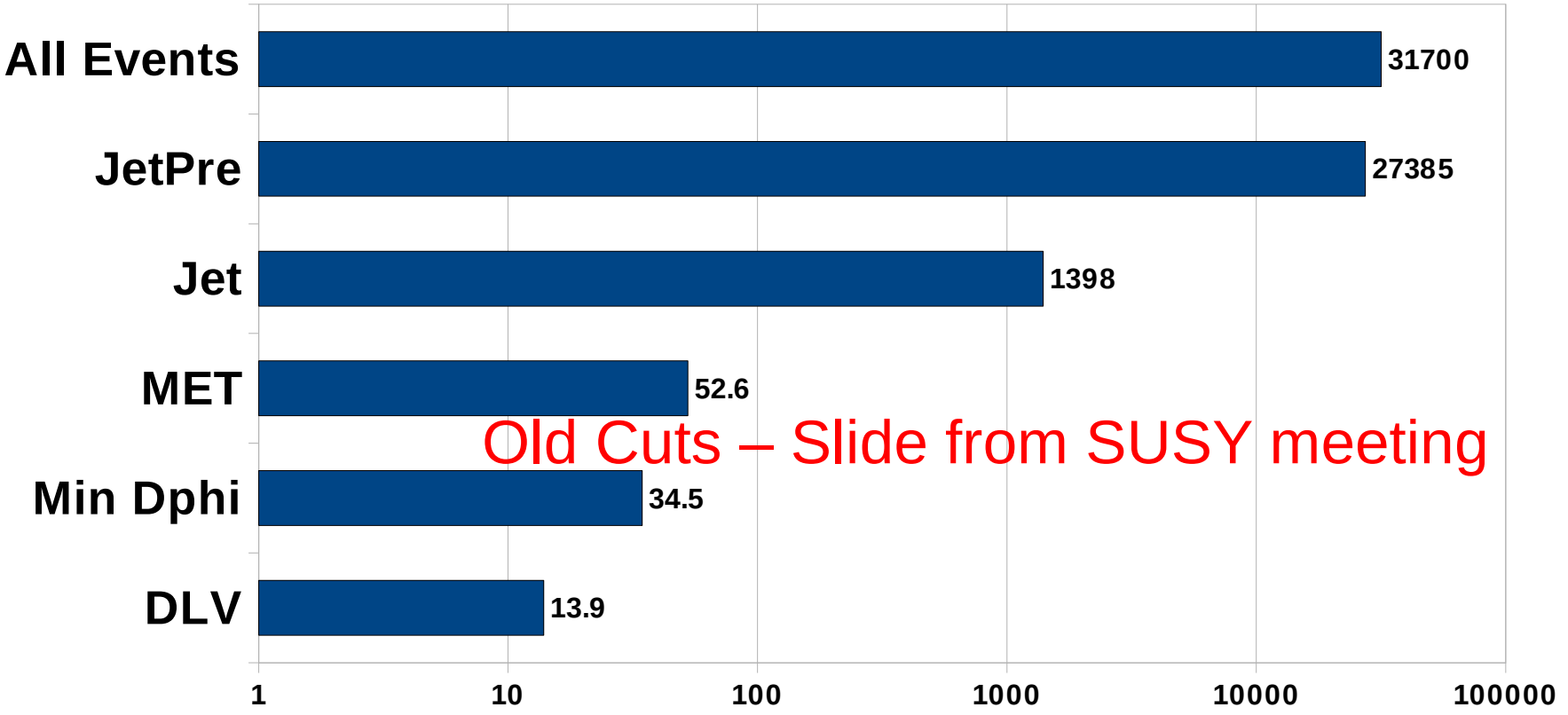
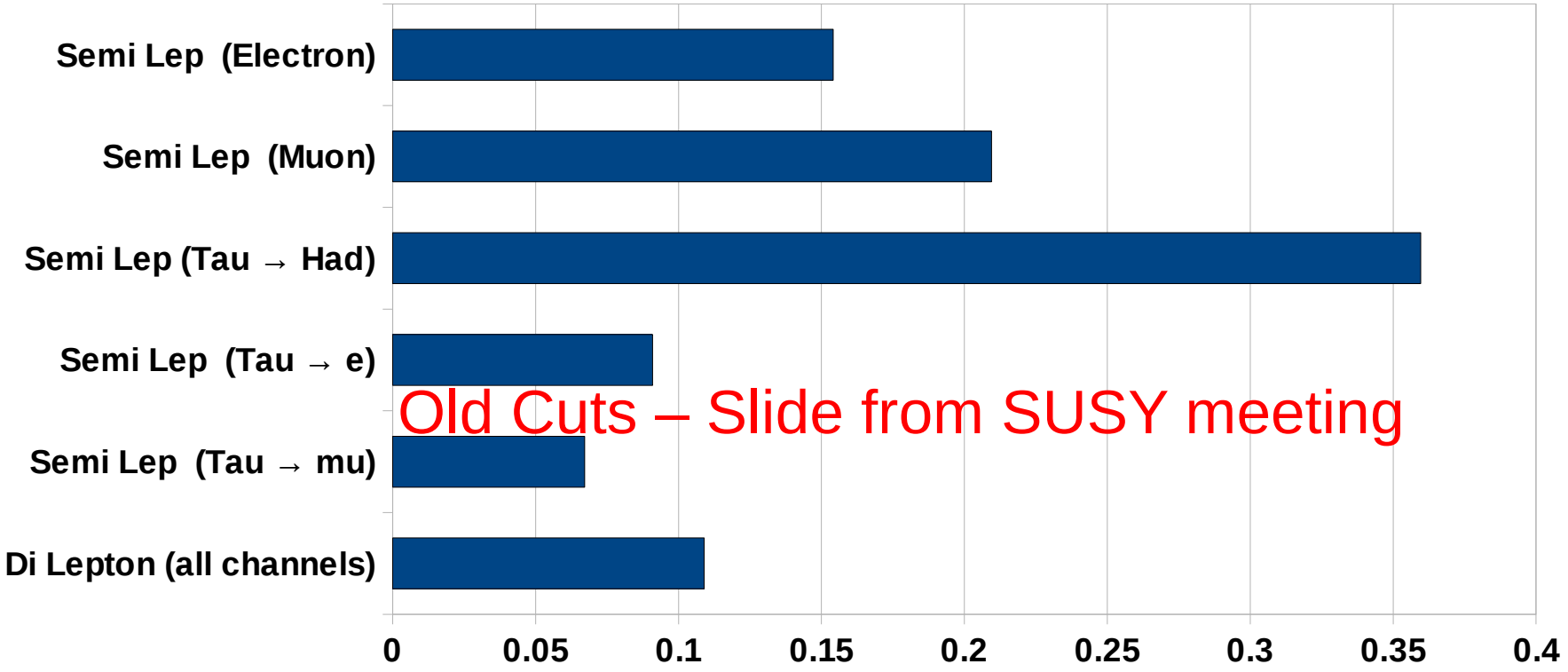
RA_2 Cut Flow for ttbar sample



Log scale!

- In agreement with other studies (UCSB)
- Still with MET cut of 200 GeV
- Direct Lepton Veto (DLV) rejects mainly ttbar and W+jet

Overview of background channels



- Shown are ttbar (madgraph) events passing RA_2 cuts
- Semileptonic channel dominant
- τ-channel gives most background, especially when decaying hadronically

Idea of Cut Inversion

Idea: Get numbers of different channels independently to reduce systematics
So far only Muons are looked at

Direct **L**epton **V**eto (muon): global promt tight, pt> 10, rel isolation < 0.1

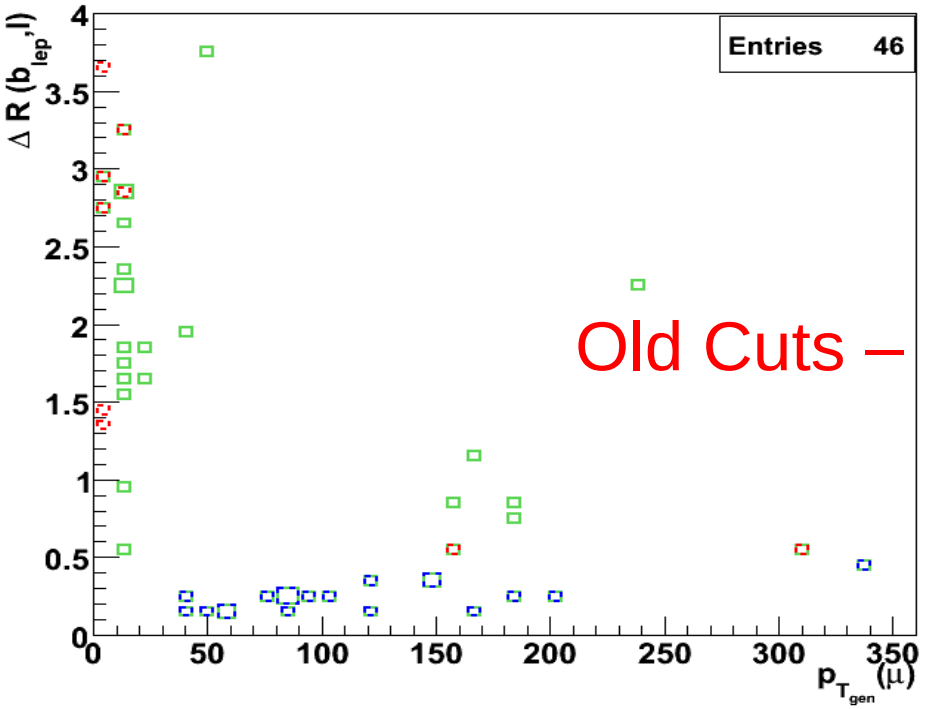
	Pt < 10	Pt > 10
Isolated	Background C	Contol Sample
Not Isolated	Background B	Background A

A = Control * (1 - iso Eff)/Iso Eff (incl Reco eff, but small effect)
B = A * Pt Ratio (Ratio for not isolated muons)
C = Control * Pt Ratio (Ratio for isolated muons)
Total Background: A + B + C

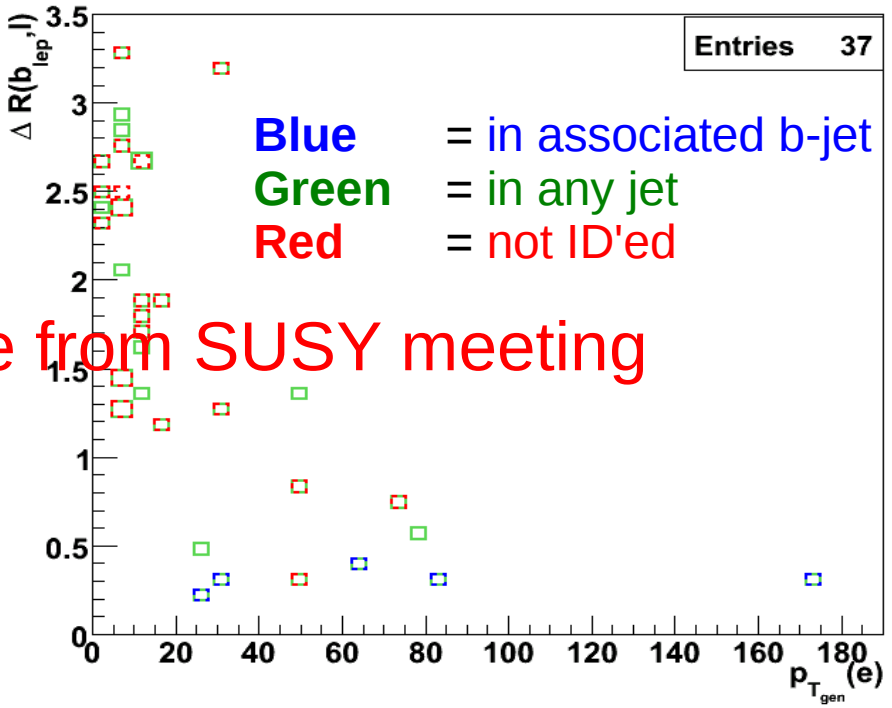
- Global promt tight efficiencies where found from tag and probe Z -> mu mu
- Isolation Efficiency from new tool similar to tag and probe methode (later slide)
- Pt distribution in Top sample (after SUSY cuts (no DLV)? Different for isolated/not isolated)

Characteristics of semileptonic ttbar Events passing the Direct Lepton Veto

Muon



Electron



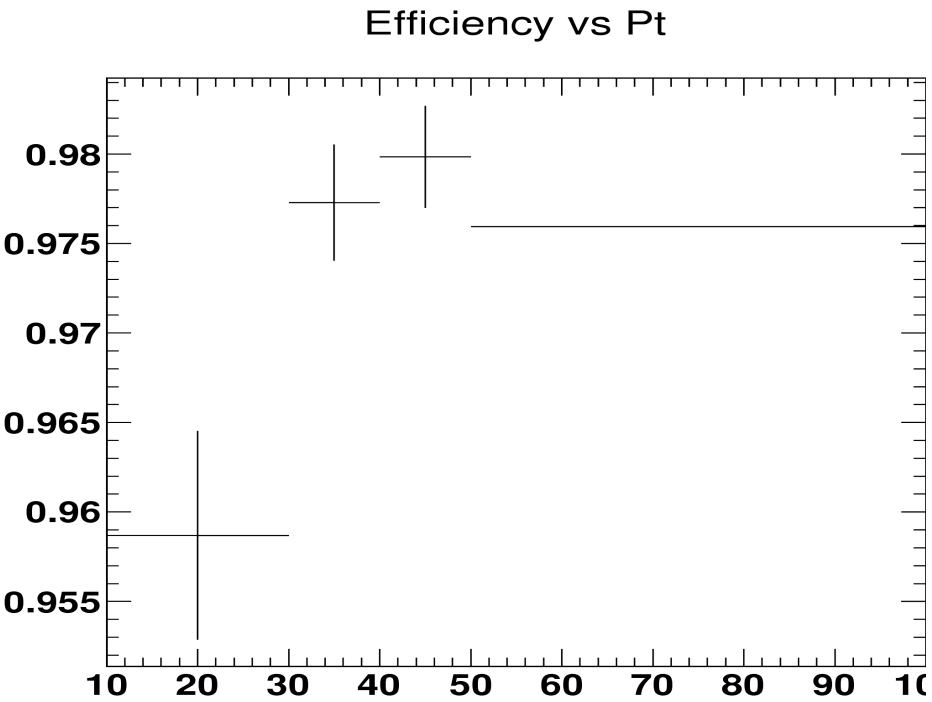
Old Cuts – Slide from SUSY meeting

- Only Events passing all RA2 SUSY cuts
- In jet means: $\Delta R < 0.5$
- All values on gen level except for η, Φ in “any jet”
- Pt cut 15 and 10 for Electrons and Muons, respectively

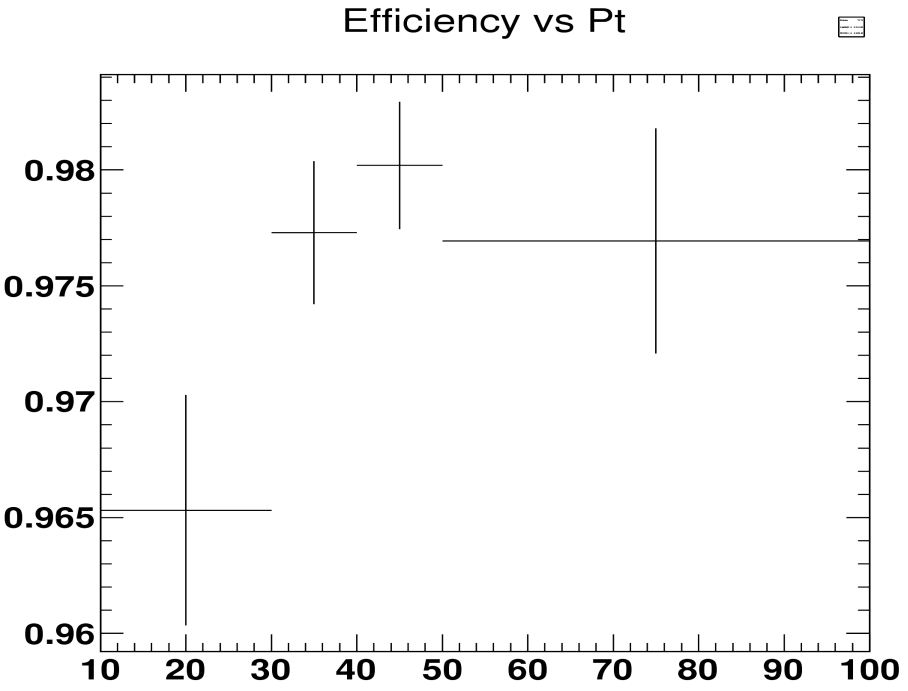
Reco Efficiencies

Reconstruction Efficiency – Tag and Probe

Official Tool



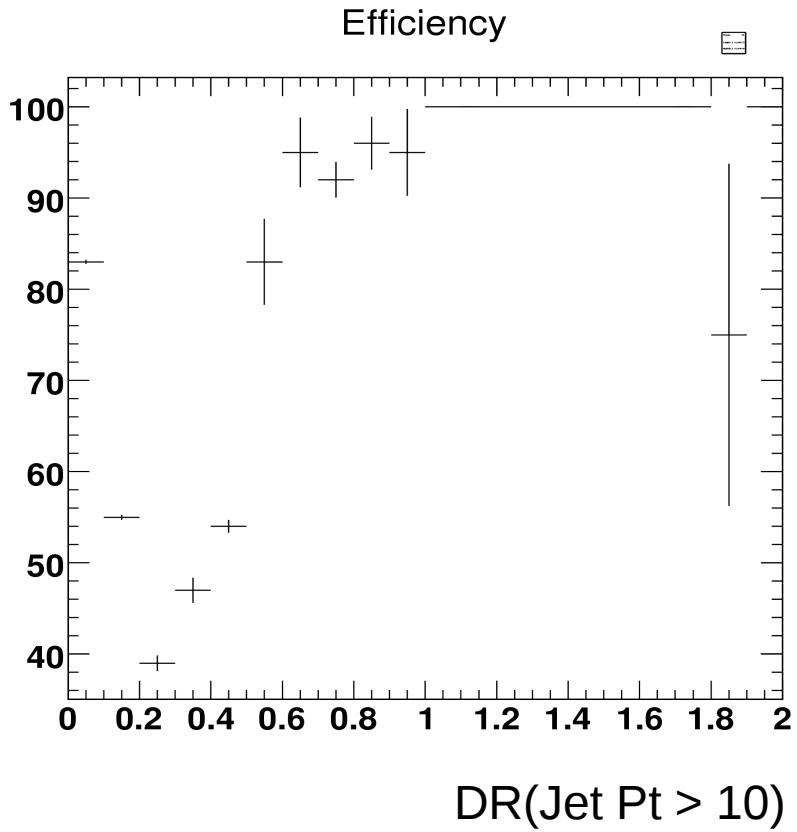
Reconstruction Efficiency – MC

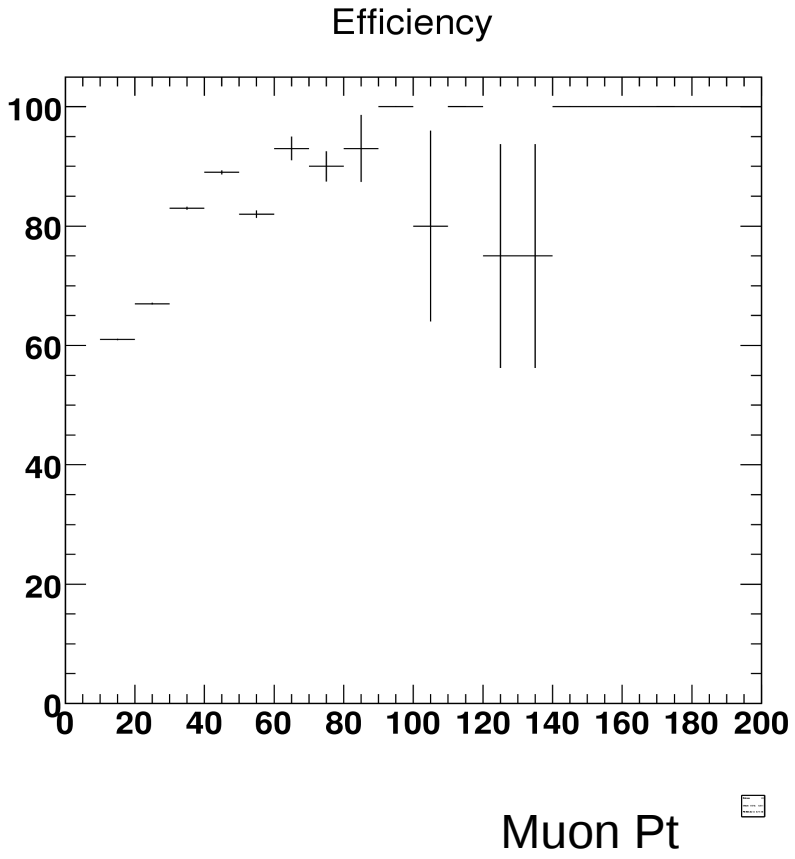


RelVal 3_1_0 (Z → mumu) Sample → low statistics

Availabe for:tracking eff, standalone eff, global eff, promt tight eff (not yet, but very easy)

Isolation Efficiencies





Ttbar sample, but tight Ttbar selector in place (two b tags etc.) to make it more realistic

Availabe vs: DR, Muon Pt, Muon Eta, Sum Et, Jet Multiplicity

Pt Distributions

Muon Pt

Ttbar sample, all SUSY cuts except DLV

Results Cut Inversion

Only Muon Channel!

Direct **L**epton **V**eto (muon): global promt tight, pt> 10, rel isolation < 0.1

	Pt < 10	Pt > 10
Isolated	0.8	14.67
Not Isolated	0.2	3.31

Background found by cut inversion = 4.31
Background from MC = 7.36

Last minute and not everywhere consistent. Just very first guess!
RecoEff ignored

Including W+Jet

Main background contribution to controll Sample (to be checked) is W + Jet
=> determine ttbar and W+Jet background together

\+ two important backgrounds will be covered
\+ similar events, as a lepton goes missing
\+ low background contamination in control samples
\- isolation Efficiency very different because of different topology
\- introduces again the need to divide the samples (ratio ttbar / W+jet needs To be known in control sample)

No detailed plan yet, but the general plan to either:

- treat both backgrounds equally but with different isolation efficiencies
- Find an overall isolation efficiency (in dependence of other variables?)

Summary

- All necessary tools in place for ttbar background estimation
- Very first Test in muon channel not yet in good shape – but soon

- include W+Jet background
- Study signal contamination
- Use efficiencies in a differential way
- Same procedure for electrons (more difficult)
- See what UCSB has done for Taus...

Idea of Cut Inversion

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Direct **L**epton **V**eto (muon): global promt tight, pt> 10, rel isolation < 0.1

	Pt < 10	Pt > 10
Isolated	0.8	14.67
Not Isolated	0.2	3.31

A = 14.67l * (1 – 0.83)/0.83 = 3,31 (incl Reco eff, but small effect)
B = A * 0.055 (Ratio for not isolated muons)
C = Control * 0.055 (Ratio for isolated muons)
Total Background: A + B + C

- Global promt tight efficiencies where found from tag and probe Z -> mu mu
- Isolation Efficiency from new tool similar to tag and probe methode (later slide)
- Pt distribution in Top sample (after SUSY cuts (no DLV)? Different for isolated/not isolated)