Status of ttbar background estimation

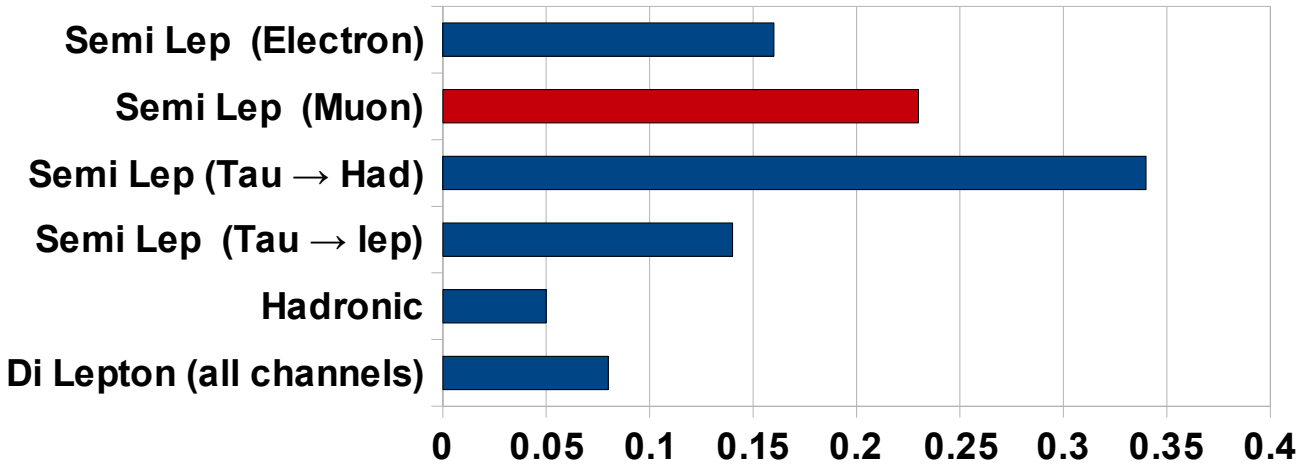
Jula Draeger, Jan Thomsen, Christian Autermann, Ulla Gebbert, Benedikt Mura, Friederike Nowak, Christian Sander, Peter Schleper, Matthias Schroeder, Torben Schum, Hartmut Stadie

University of Hamburg

GEFÖRDERT VOM

Bundesministerium
für Bildung
und Forschung

Reminder – Background Properties

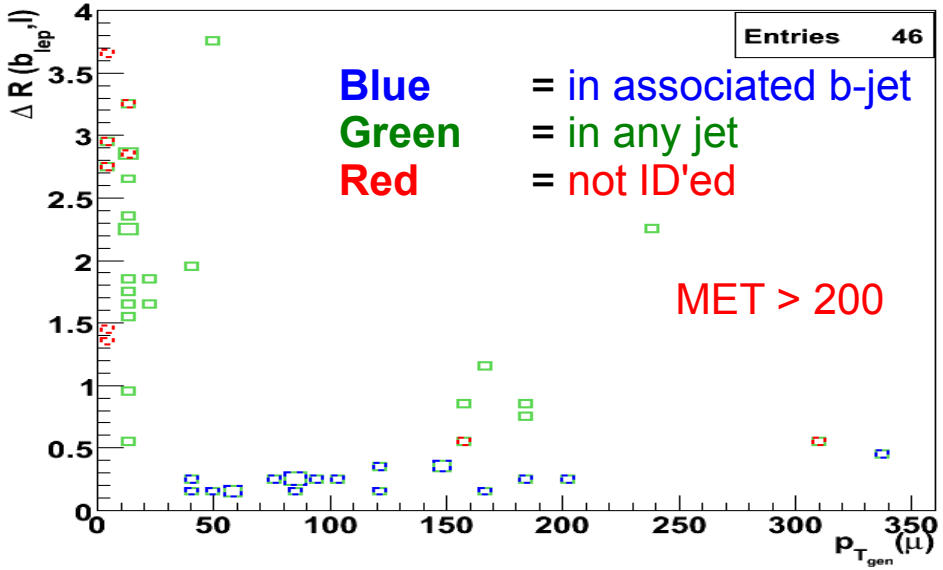


Treat decay channels independently to reduce systematics

So far only semileptonic muon channel is looked at

- Characteristics of ttbar events passing the DLV
- Leptons have either low pt
- or are not isolated
- Not isolated leptons are often inside associated b-jet ttbar specific

Muon



Reminder: Idea of DLV-Cut Inversion

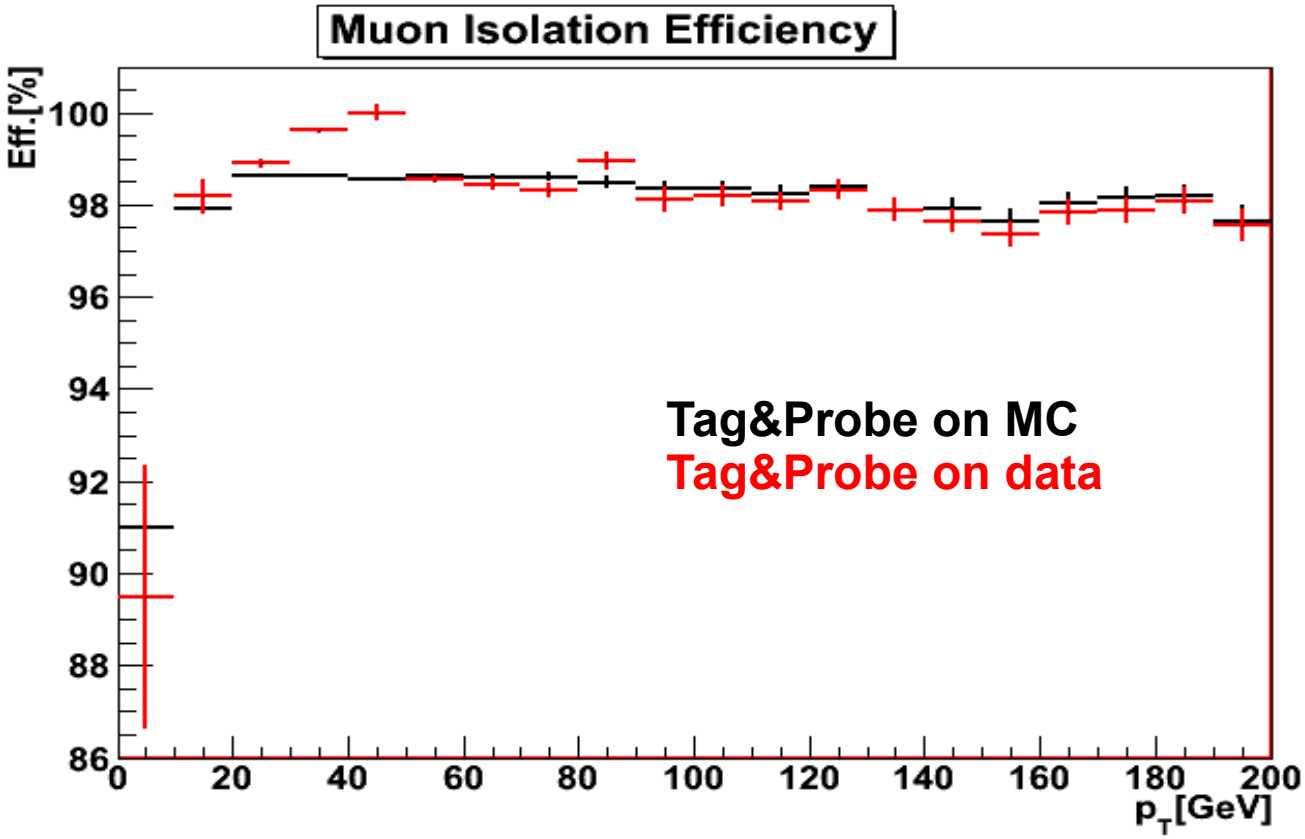
Direct **L**epton **V**eto (muon/electron): global promt tight, pt> 10, rel isolation < 0.1

	Pt < 10	Pt > 10
Isolated	Background C	Control Sample
Not Isolated	Background B	Background A (most important!)

A = Control * (1 - Iso Eff)/Iso Eff
B = A * Pt Ratio
C = Control * Pt Ratio
Total Background: A + B + C
(corrected with RECO Eff)

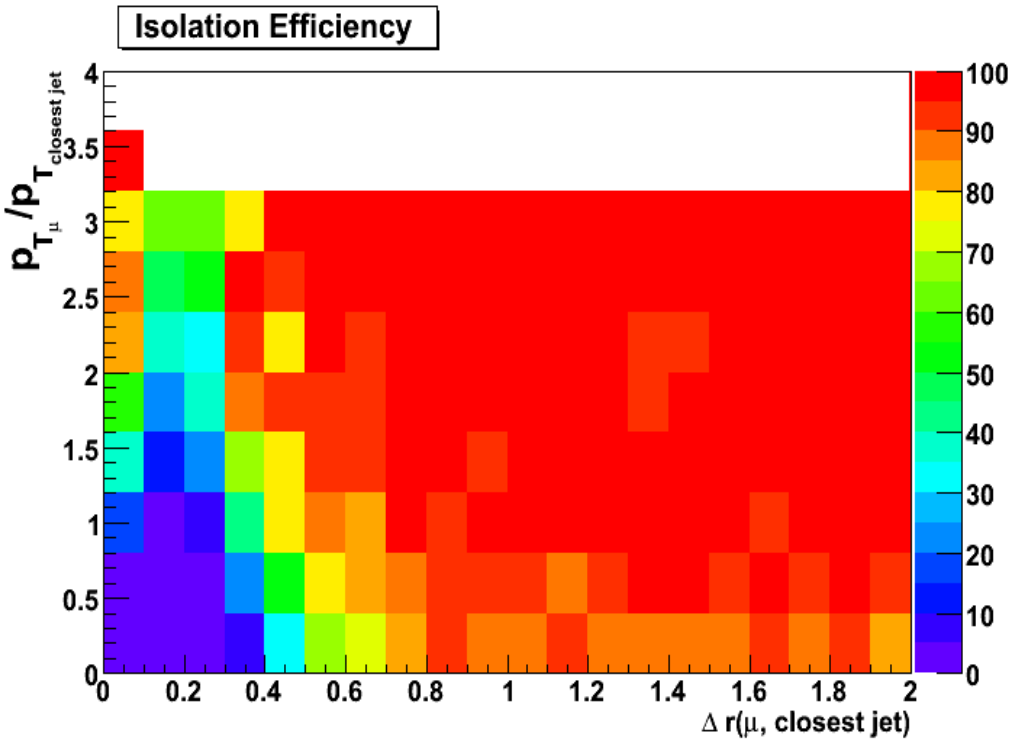
- Reconstruction efficiencies are found from tag and probe Z -> μ μ /Z—>ee
- Isolation Efficiency from new tool similar to tag and probe method usable on ttbar
- Muon acceptance taken from MC until now

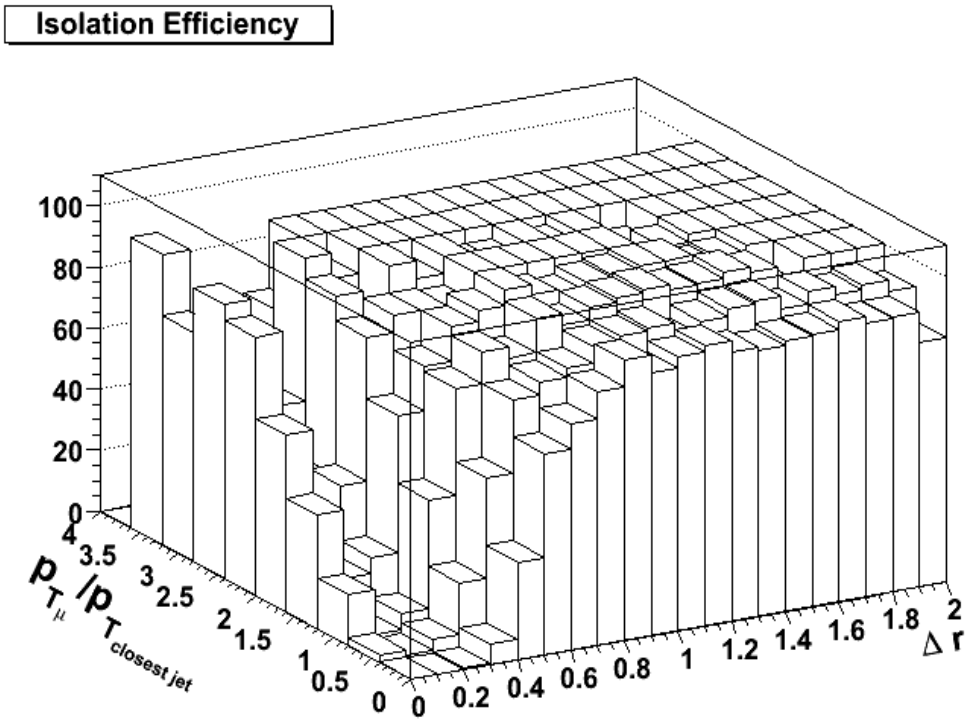
Reco Efficiencies



- Official tool (PhysicsTools/TagAndProbe) using $Z \rightarrow \mu\,\mu$
- Only available in 3_X_X
- Delivers efficiencies for: tracking, standalone, **global muons** (shown above)

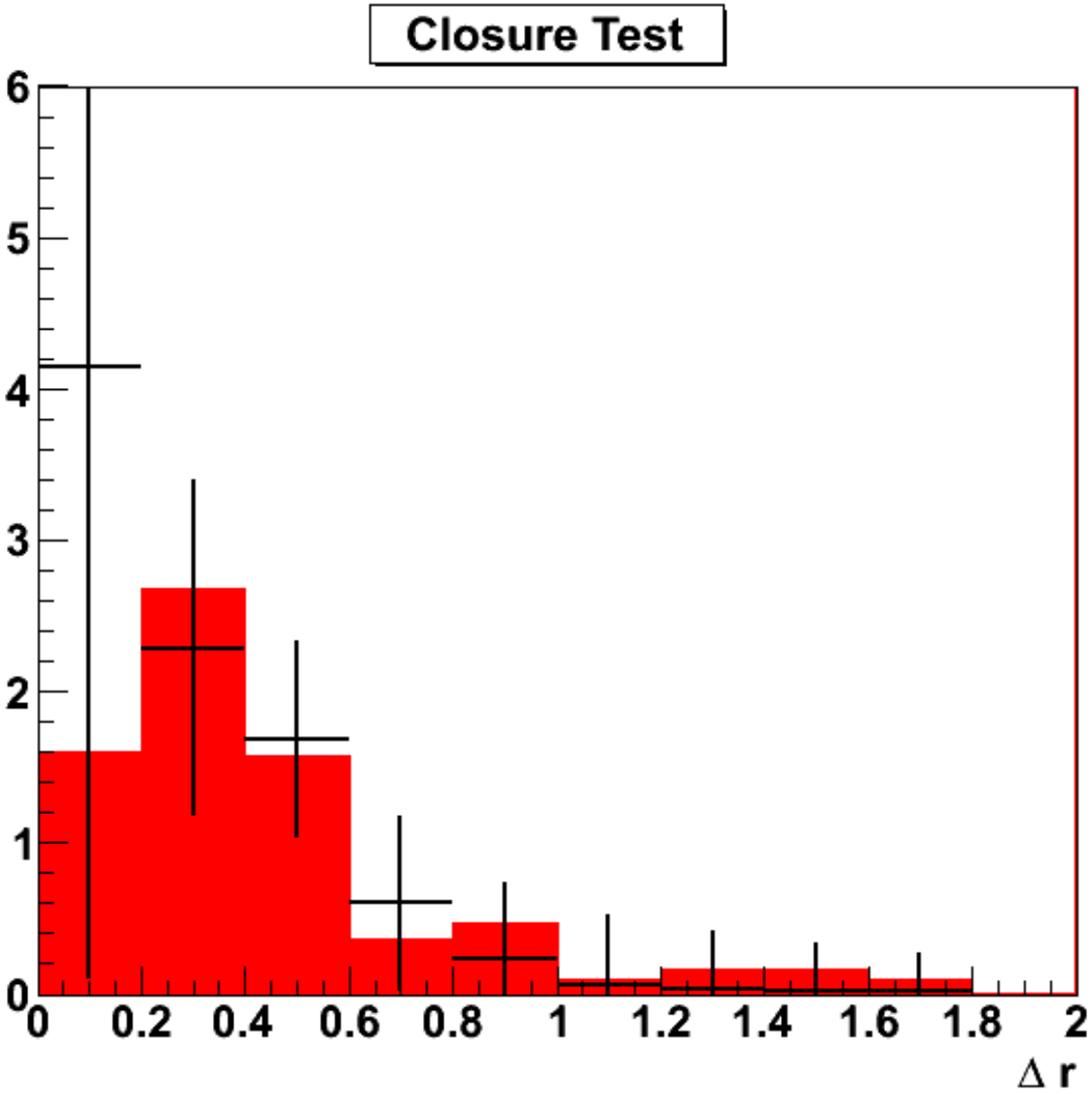
Isolation Efficiencies





- Customised tool to extract isolation efficiency from ttbar sample:
  - 'tag': 4 jets p_T > 30 GeV, 2 jets p_T > 60 GeV
  - 'probe': global muon with promt-tight quality tag
- Dependencies studied for **DR, Muon p_T relative to closest jet**

Closure Test Isolation Efficiency (Muons)



- MC statistics : 216 (unweighted events)
- Agreement within uncertainties
- Uncertainties dominated by statistics of control sample

Preliminary “Final Numbers”

- Estimated background for ttbar only (W+Jets work ongoing):
  - Total Background MC = **11.6**
    - Incl. Gen Muon out of acceptance: 3.6
  - Bkgr A: 9.1 +- 4.4
  - Bkgr B : 1.0
  - Bkgr C : 2.7

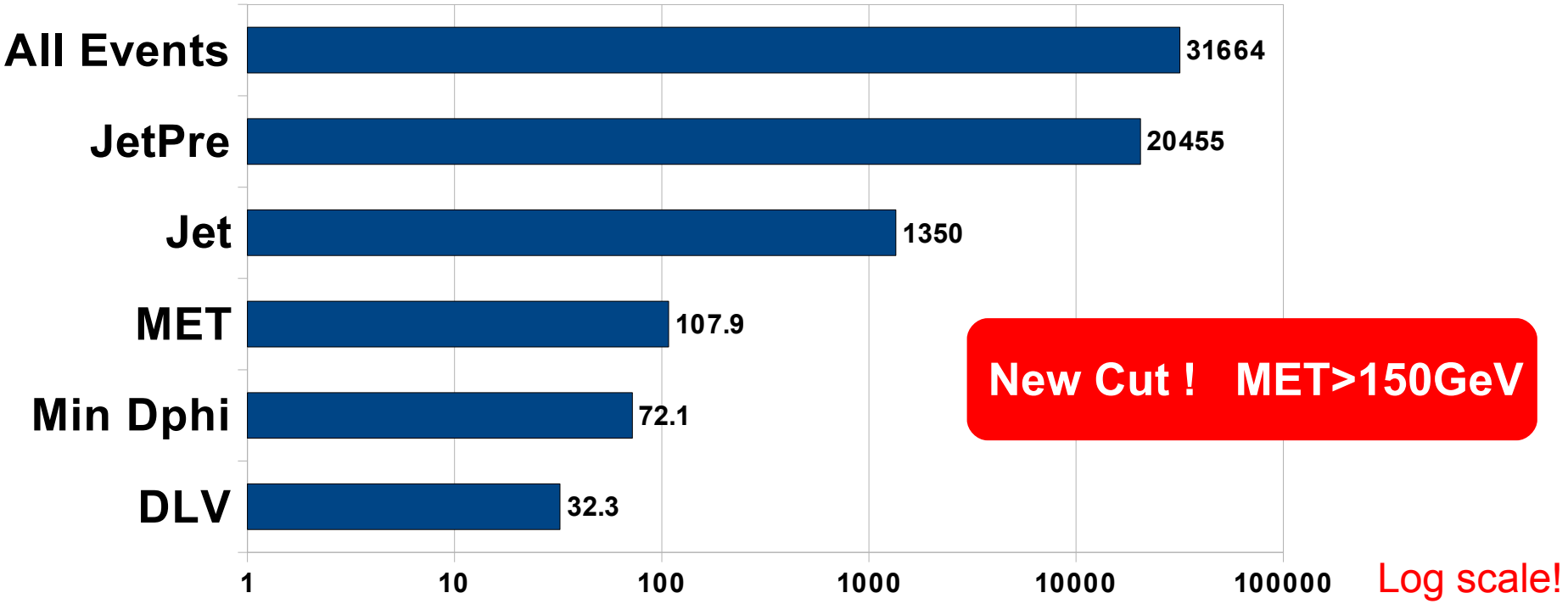
	Pt < 10	Pt > 10
Isolated	Background C	Control Sample
Not Isolated	Background B	Background A (most important!)

- Total Estimated Background (A+B+C) Mu = **12.74 +- 6.13**
- Same method applied to ttbar-->qqbbWeν
  - Validation ongoing

Outlook & Summary

- Full statistics efficiencies for **electron channel**
- Full Statistics lepton efficiencies on **W+jets** to cross check independence of isolation efficiency variables
- **Closure Test** for electrons with above efficiencies
- **Acceptance** cross checks / validation
- Final plots/estimate for **W+jets&TTbar(e+μ in final state)** with all uncertainties (dominated by statistics)

Backup: Reminder - RA_2 Cut Flow for ttbar



- In agreement with other studies (UCSB)
- Direct Lepton Veto (DLV) rejects mainly ttbar and W+jet