Mesure de la section efficace de production ttbar dans le canal "tau+lepton+jets+met"

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Outline

- Etat des lieux
- Présentation de l'analyse
  - Préselection, normalisation du fond W+jets
  - Sélection, jets faking tau correction
  - Extraction de la section efficace
- Conclusion

Etat des lieux

Run IIa : La mesure de la section efficace de production a été réalisée dans les données du Run IIa (~1 fb^{-1}) par Haryo and Todd.

- "Preliminary result" approuvés l'été dernier (assuming SM Branching Ratios):
  - Muon+tau channel: $\sigma_{t\bar{t}} = 8.0^{+2.8}_{-2.4}(stat)^{+1.8}_{-1.7}(syst) \pm 0.5(lumi)pb$
  - Electron+tau channel: $\sigma_{t\bar{t}} = 8.6^{+3.1}_{-2.6}(stat)^{+1.6}_{-1.6}(syst) \pm 0.5(lumi)pb$
  - Combination: $\sigma_{t\bar{t}} = 8.3^{+2.0}_{-1.8}(stat)^{+1.4}_{-1.2}(syst) \pm 0.5(lumi)pb$
- Final result en EB (summer et publi): $\sigma_{t\bar{t}} = 8.2^{+2.2}_{-2.0}(stat)^{+1.7}_{-1.5}(syst + lumi)pb$

Run IIb :

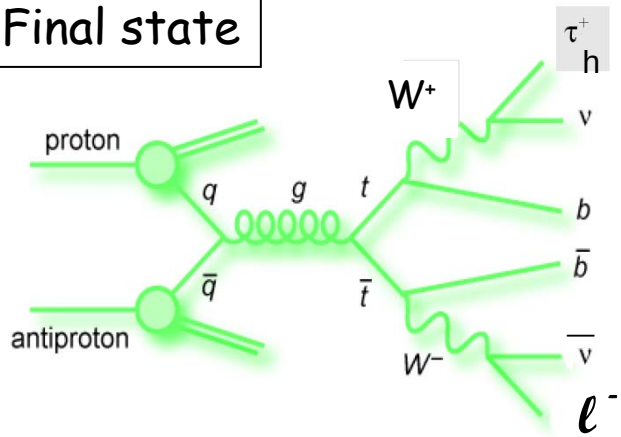
La mesure de la section efficace de production a été réalisée dans les données "preshutdown" (1,2 fb^{-1}) et approuvée ("preliminary result") pour HCP2008. Mais…

- Un bug dans caf_trigger, affectant le canal muon+tau, a été découvert récemment (runvstriglistX100.txt; 30% des données étaient manquantes).
- Les résultats doivent être approuvés à un niveau "publication result" pour être utilisés dans les analyses recherchant le boson de Higgs chargé.

→ **L'analyse des données de Run IIb doit être refaite.**

Signal and background

Final state



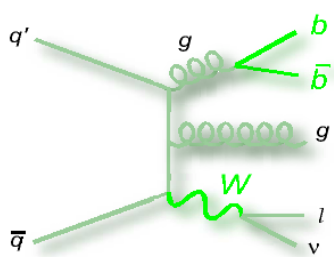
- 1 isolated lepton : muon or electron
- 1 hadronic tau
- opposite charge between the tau and the lepton
- 2 jets, at least 1 b-tagged
- MET >15 GeV

Background

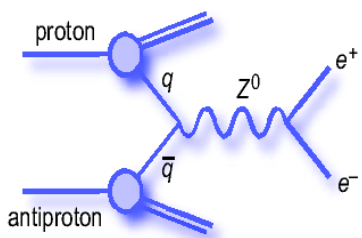
Mainly events where a jet fakes the tau or the lepton:

- W+jets, use shapes from Monte Carlo and normalize to data
- Z+jets, diboson and single top, estimated from Monte Carlo
- Multijets background (QCD), estimated from data

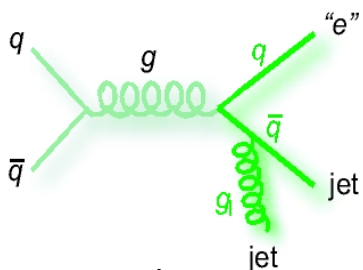
$$N^{OC}_{QCD} = N^{SC}_{QCD} = N^{SC}_{DATA} - N^{SC}_{W+jets} - N^{SC}_{Z+jets} - N^{SC}_{diboson} - N^{SC}_{single\ top} - N^{SC}_{t\bar{t}}$$



W+jets



Z+jets



multijet

OC:opposite charge

SC: same charge

Preselection cuts

▪ Common selection :

- triggers (superOR)
- at least 1 isolated lepton
- **2 jets** of 20 GeV, 30 GeV/c for the leading jet
- vertex requirements zPV < 60cm, NtrackPV ≥ 3, dz(lepton,PV) < 1 cm
- On MC, JSSR is applied with shifting, but **not propagated to the MET**
- data_quality
- beam reweighting, lumi RW

▪ Mu + tau :

- One 20 GeV tight muon:
  - Quality: MediumNSeg3
  - TrkQuality: Medium
  - IsoQuality: TopP14Tight
- veto electron
- $\Delta\phi(\mu,MET) > 2.1 - 0.035*MET$
- **MET > 15 GeV**

▪ E + tau :

- One 15 GeV tight electron
  - Quality: top_tight
  - version: 3
- veto muon
- $\Delta\phi(e,MET) > 2.2 - 0.045*MET$
- MET > 20 GeV

MC normalization: Z+jets background

- Z+jets normalization factor: (terminology from JF Grivaz V+jets meeting)
  - k'-factor (LL to NNLO): 1.3 for Z+lp, Z+bb and Z+cc
  - HF-factor: 1.5 for Z+bb
    1.7 for Z+cc
  - S-factor: 1.0 for Z+lp
  - S_HF-factor (from Shannon): 1.16±0.35 for Zbb and Zcc (for Medium btag)

- p20 Alpgen Jet Dependent Zpt ReWeighting: (cf D0note 5569)

```
Reweight pT using weight=(par0/2.)*(1.+Erf((pt-par1)/(par2*sqrt(2.))))+par3
Reweighting parameters  exclusive 0 jet bin :
par0 : 0+-0
par1 : 1+-0
par2 : 1+-0
par2 : 1.0277+-0.006
Reweighting parameters  exclusive 1 jet bin :
par0 : 0.5458+-0.314
par1 : 16.79+-0.68
par2 : 5.677+-0.814
par2 : 0.415+-0.025
Reweighting parameters  inclusive 2 jet bin :
par0 : 0.264+-0.0613
par1 : 26.99+-4.75
par2 : 4.311+-7.529
par2 : 0.66194+-0.4158
```

(parameters for ≥20 GeV jets)

Determination of the W normalization (1/3)

- HF-factors: etau: 2.0±0.4 mutau: 2.3±0.5

- To obtain the W normalization factor, we performed a fit of the distributions of the W+jets and the multijets background to the data at the preselection level.

  - **W+jets template:** given by the MC simulation.

  - **Multijet template:** derived by using data events with non-isolated leptons: muon loosely isolated but which fails the tight isolation, or electron which pass the loose criteria, but not the tight one. The contribution of W events passing these conditions are subtracted to the multijet template.

  - **data:** obtained after the preselection cuts. The contributions from Z and ttbar are subtracted from the data.

- An iterative fit is now performed: the results of the W normalization is propagated to the MC until a stable factor is obtained.

- This fit has been performed in both 1 jet and 2 jets inclusive samples.

- The following distributions have been used:

  - transverse mass of the lepton + missing transverse energy ("à la p17").

  - MET distribution ("à la CDF").

Determination of the W normalization (2/3)

- 1st iteration (factor=1.0 for the W sample subtracted to the data):

		Etau	Mutau
≥ 1 jet	m_T(lepton,MET)	1.42±0.01	1.30±0.02
	MET	1.43±0.02	1.33±0.02
≥ 2 jets	m_T(lepton,MET)	1.70±0.03	1.67±0.11
	MET	1.65±0.04	1.67±1.05

à refaire

- 2nd iteration (factor=(1.4, 1.7) or (1.3, 1.7)):

		Etau	Mutau
≥ 1 jet	m_T(lepton,MET)	1.43±0.01	1.31±0.01
	MET	1.44±0.02	1.33±0.02
≥ 2 jets	m_T(lepton,MET)	1.72±0.03	1.67±0.26
	MET	1.67±0.04	1.66±0.25

Etau: 1.4 (1 jet) and 1.7 (2 jets)

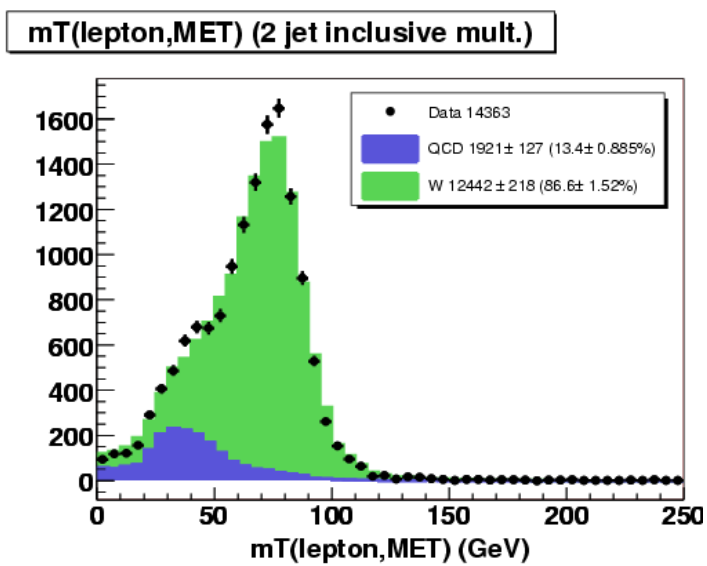
~~Mutau: 1.3 (1 jet) and 1.7 (2 jets)~~

Uncertainties: only the ones given by the fit

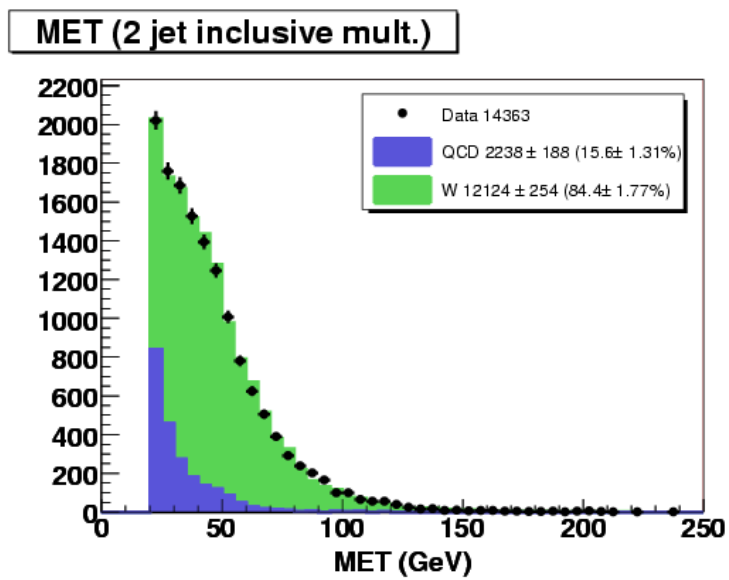
Determination of the W normalization (3/3)

ETAU
2 jets inclusive sample

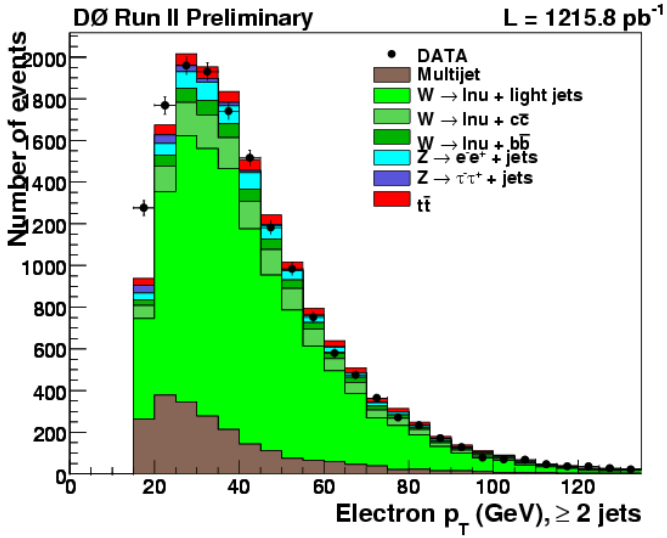
$m_T(\ell,MET)$

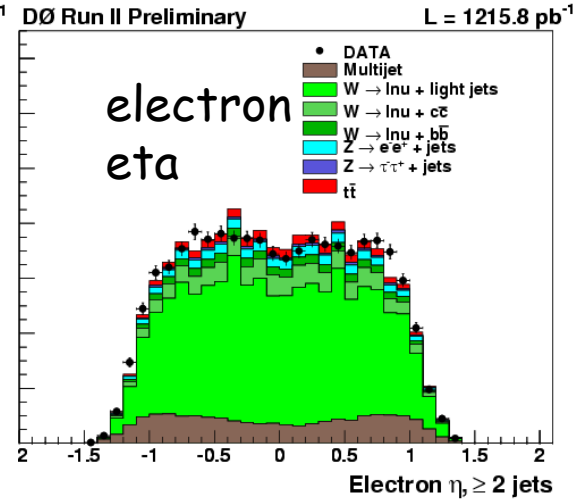


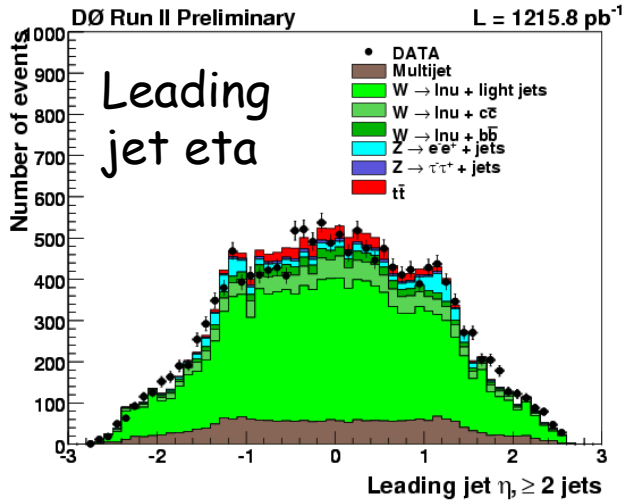
MET



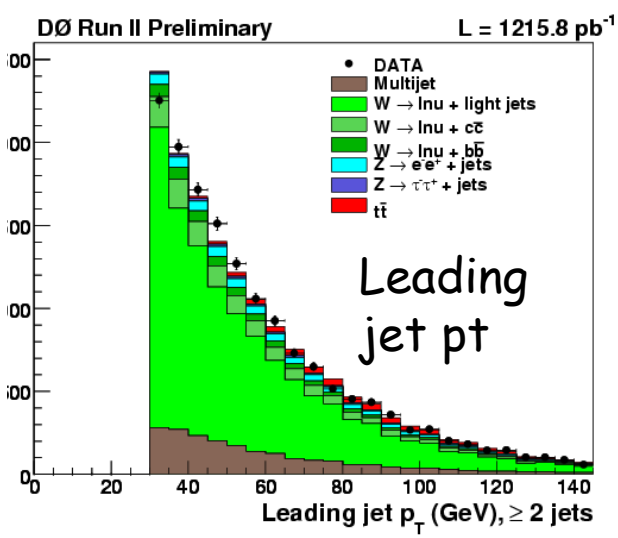
Etau: Some preselection plots

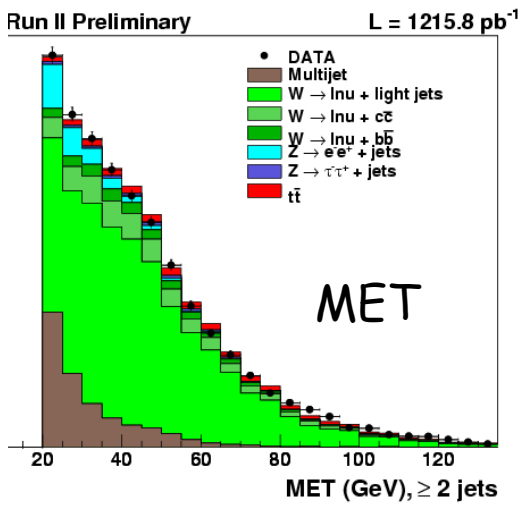






Sample	Number of events
Multijet	1900.9±48.6
W→ $\ell\nu$+light jets	10309.2±77.7
W→ $\ell\nu + c\bar{c}$	1395.1±10.9
W→ $\ell\nu + b\bar{b}$	617.5±3.5
Z→ e^+e^-	723.6±7.8
Z→ $\tau^+\tau^-$	185.8±3.9
ttbar	580.8±2.1
total	15712.9±92.8
data	15804





Selection

- E+tau and Mu+tau: $\geq$ 1 tau with:
  - Et 10/5/10 GeV
  - trk 7/5/5/7 GeV
  - $|\eta|<1.0$
  - p20NN > 0.8
  - $\Delta R(\tau,\ell)<0.5$
  - $\Delta z(\tau,\mu)<1.0$ cm
  - opposite sign wrt the lepton
  - tau energy correction is performed

- E+tau channel:
  - NNeCut 0.85
  - modPhiPSMin 0.1
  - modPhiPSMax 0.9

- MET cut:
- Mu+tau: met > 15 GeV E+tau: met > 20 GeV

The tau energy scale is propagated to the met.

- 2 jets: If a jet matched the tau with the highest NN output ($\Delta R<0.5$), it is discarded from the list of jets. The leading jet cut (pt>30GeV) is applied on the revised jet list.

- BTAG (using permuter): at least 1 btagged jet
  - medium operating point: NN>0.65
  - p20 TaggabilityRFs (follow d0wiki/physics/VPlusJets/MC/p20taggability)

Jets faking taus correction (1/3)

- The data/MC correction factor for the jets faking taus rate is determined with the comparison of the fraction of events with and without reconstructed tau in the MC and in the data.

- muon+jet samples obtained after the preselection (with the 1 jet inclusive sample).
- Reconstructed tau: NN>0.8
- In the data, the estimated multijet, Z and ttbar contributions have been subtracted.

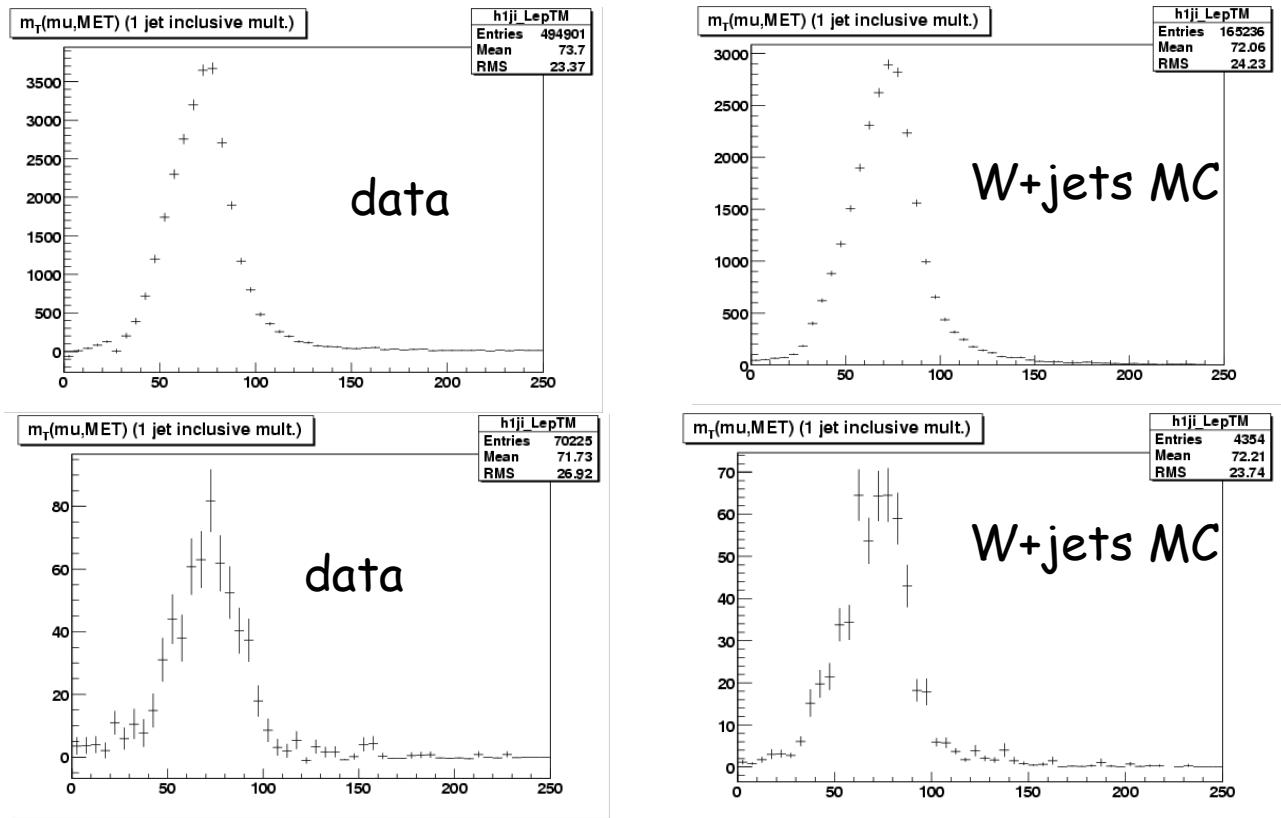
(Number of ttbar events subtracted in the sample with a tau: 41.5; total data ~700)

Jets faking taus correction (2/3)

Without tau

$m_T(\mu,MET)$

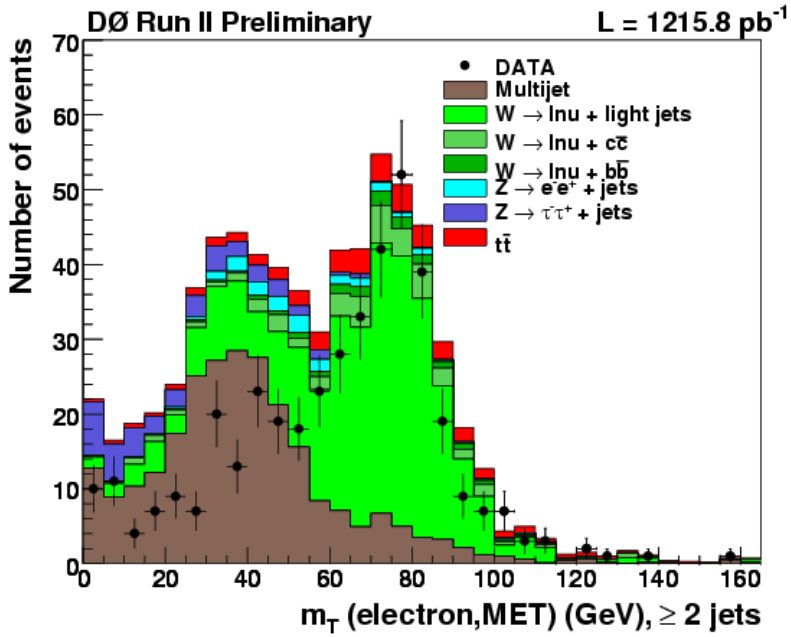
With tau



$$f = \frac{\frac{\#\,data \quad w/tau}{\#\,data}}{\frac{\#\,MC \quad w/tau}{\#\,MC}} = \frac{\frac{629.0}{29045.0}}{\frac{739.6}{32768.3}} = 0.96 \pm 0.08$$

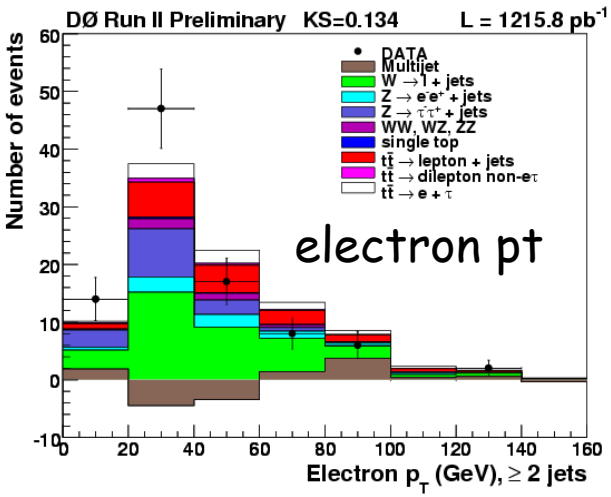
Jets faking taus correction (3/3)

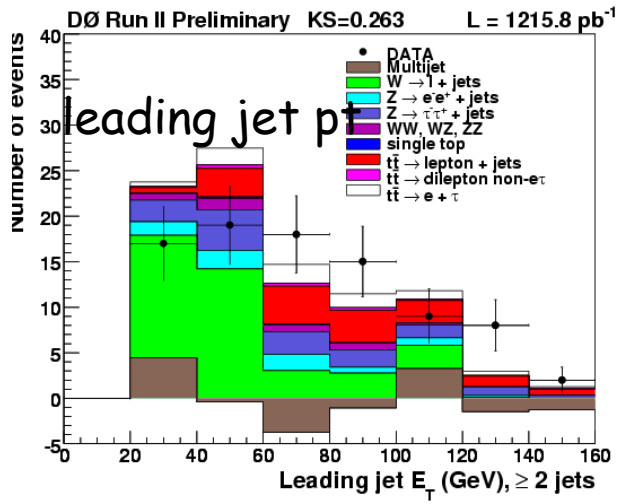
- The same thing in the etau channel :
  - The multijet background is no more negligible.
  - The multijet normalization factor obtained at the preselection seems no more valid after a tau requirement.

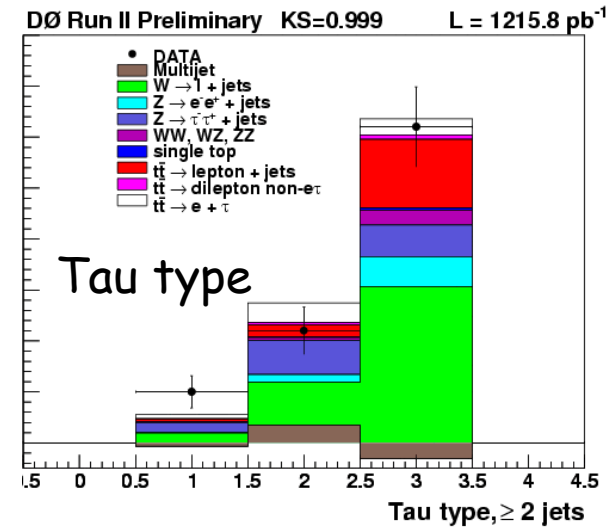


The factor obtained in the muon+tau channel has been used.

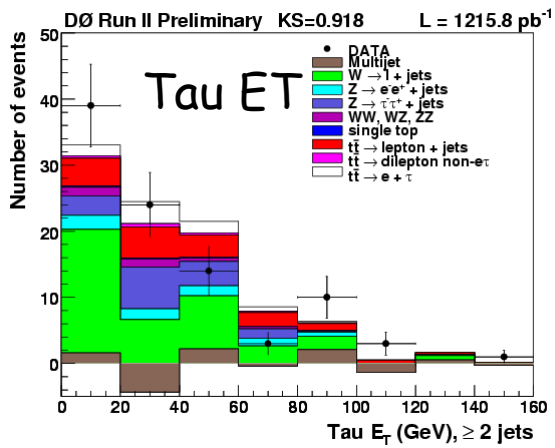
Etau : Pre-tagged plots



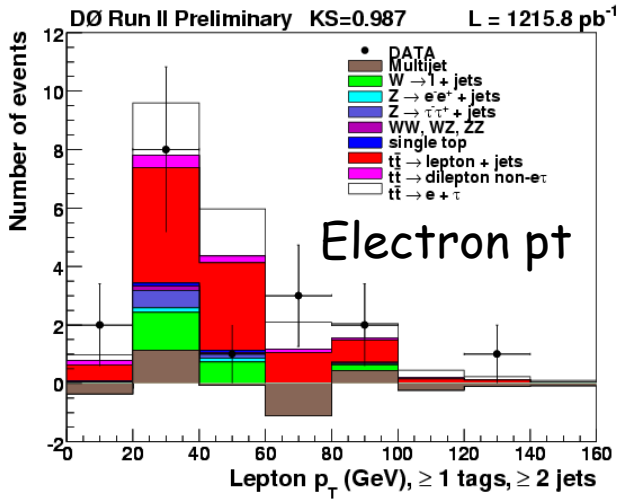


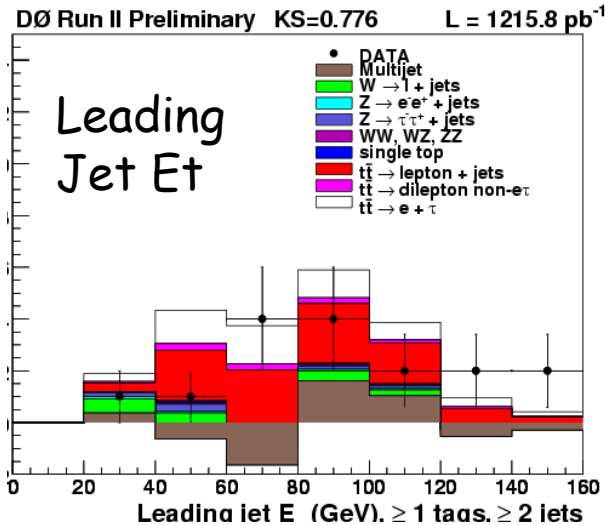


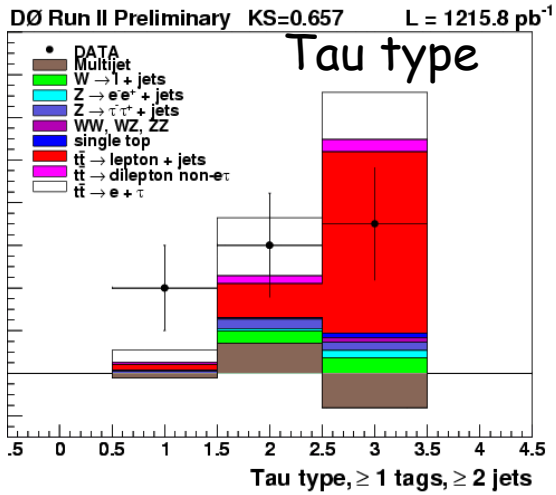
	$e+\tau$ channel			
Sample	type 1	type 2	type 3	all type
Multijet	-0.63±1.66	3.45±3.49	-2.87±6.92	-0.05±7.67
$W \to \ell\nu$	2.54±1.20	8.48±1.50	33.84±3.42	44.86±3.92
$Z \to \mu^-\mu^+(e^+e^-)$	0.17±0.06	1.51±0.25	5.83±0.43	7.51±0.51
$Z \to \tau^-\tau^+$	1.92±0.34	6.66±0.51	6.24±0.47	14.81±0.77
diboson	0.16±0.08	0.61±0.18	2.92±0.44	3.70±0.48
single top	0.02±0.00	0.06±0.01	0.41±0.01	0.49±0.01
$t\bar{t} \to$lepton+jets	0.42±0.03	2.30±0.08	12.88±0.20	15.61±0.22
$t\bar{t} \to$dilepton non-$\mu\tau$(non-eτ)	0.11±0.03	0.52±0.07	0.90±0.07	1.52±4.08
$t\bar{t} \to \mu\tau$(eτ)	0.83±0.02	3.81±0.05	3.18±0.05	7.82±0.07
total	5.55±2.08	27.40±3.85	63.33±7.76	96.28±9.59
data	10	22	62	94



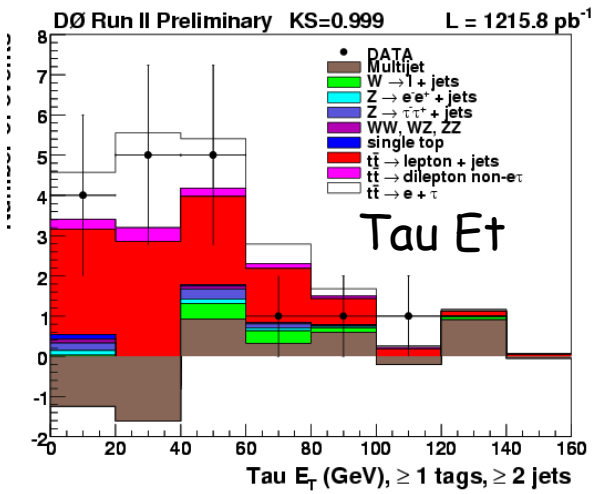
Etau : post btag plots







	$e+\tau$ channel			
Sample	type 1	type 2	type 3	all type
Multijet	-0.21±2.30	1.42±1.97	-1.45±2.78	-0.25±3.19
W→ $\ell\nu$	0.18±0.04	0.57±0.08	2.33±0.15	3.08±0.17
Z→ $\mu^-\mu^+(e^+e^-)$	0.01±0.00	0.11±0.01	0.35±0.02	0.47±0.03
Z→ $\tau^-\tau^+$	0.14±0.02	0.45±0.03	0.38±0.03	0.97±0.04
diboson	0.02±0.01	0.04±0.01	0.22±0.04	0.28±0.04
single top	0.01±0.00	0.03±0.00	0.21±0.01	0.26±0.01
$t\bar{t}$ →lepton+jets	0.28±0.03	1.52±0.06	8.15±0.15	9.95±0.16
$t\bar{t}$ →dilepton non-$\mu\tau$(non-eτ)	0.08±0.03	0.37±0.06	0.58±0.06	1.03±0.18
$t\bar{t}$ → $\mu\tau$(eτ)	0.59±0.02	2.72±0.04	2.22±0.04	5.52±0.06
total	1.08±2.30	7.24±1.97	13.00±2.79	21.32±3.20
data	4	6	7	17



Choice of the final selection cuts

- **1 hadronic tau**, $|\eta|<1.0$, Et>10GeV (5GeV for type 2), opposite charge wrt the lepton

→ 4 NNcut values tested for each tau type: 0.7/0.8/0.9/0.95

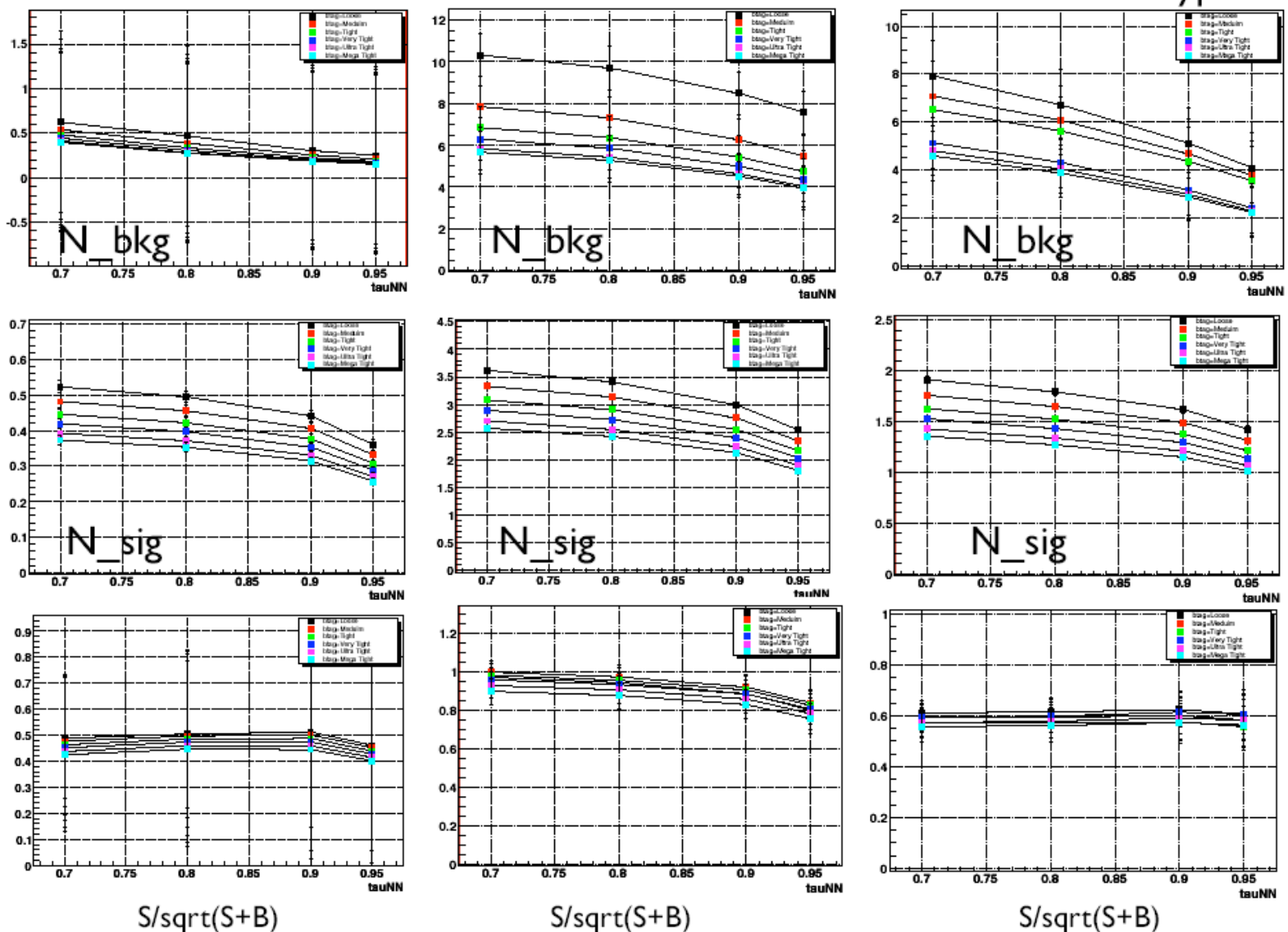
- At least **1 btag**:

→ 6 working points tested: Loose, medium, tight, very tight, ultra tight, mega tight.

Choice of the final selection cuts

Mu+tau

tau type 1 | tau type 2 | tau type 3



Cross section extraction

$$\sigma_{t\bar{t}} = \frac{N^{OC}_{DATA} - N^{SC}_{DATA} - (N^{OC}_{W} - N^{SC}_{W}) - (N^{OC}_{Z} - N^{SC}_{Z}) - (N^{OC}_{diboson} - N^{SC}_{diboson}) - (N^{OC}_{single-top} - N^{SC}_{single-top})}{(\varepsilon^{OC}_{t\bar{t}} - \varepsilon^{SC}_{t\bar{t}}) \times \mathcal{L}}$$

- To estimate the cross section, the following likelihood function is defined:

$$L(\sigma, \{N^{obs}, N^{bkg}, \epsilon, \mathcal{B}, \mathcal{L}\}) = \mathcal{P}(N^{obs}, \mu_j) = \frac{\mu_j^{N^{obs}}}{N^{obs}!} e^{-\mu_j}$$

where P(Nobs, μ_j) is the Poisson probability of observing Nobs events given an expected combined signal and background yield of : $\mu_j = \sigma\ \epsilon \mathcal{B} \mathcal{L} + N^{bkg}$

$$\begin{cases} N^{obs} = N^{OC}_{DATA} \\ N^{bkg} = N^{SC}_{DATA} + (N^{OC}_{W} - N^{SC}_{W}) + (N^{OC}_{Z} - N^{SC}_{Z}) + (N^{OC}_{Diboson} - N^{SC}_{Diboson}) + (N^{OC}_{single-top} - N^{SC}_{single-top}) \end{cases}$$

- The cross section is extracted by minimizing the negative log-likelihood function:

$$-logL(\sigma, \{N^{obs}, N^{bkg}, \epsilon, \mathcal{B}, \mathcal{L}\})$$

E+tau channel: $\sigma_{t\bar{t}} = 5.05^{+2.95}_{-2.51}(stat)^{+2.25}_{-2.23}(syst) \pm 0.31(lumi)pb$

Conclusion

La mesure de la section efficace de production ttbar a été réalisée dans les données du Run IIb et approuvée "preliminary result" pour HCP2008.

Mais…

- Un bug dans caf_trigger, affectant le canal muon+tau, a été découvert récemment (runvstriglistX100.txt; le nombre de donnée change de 30%).
- Les résultats doivent être approuvés à un niveau "publication result" pour être utilisés dans les analyses recherchant le boson de Higgs chargé.

⇒ Updated packages (new jetid eff, new muon trigger SPC files (muon eta up to 2.0), muon isolation in "pt drJet15", etc…)

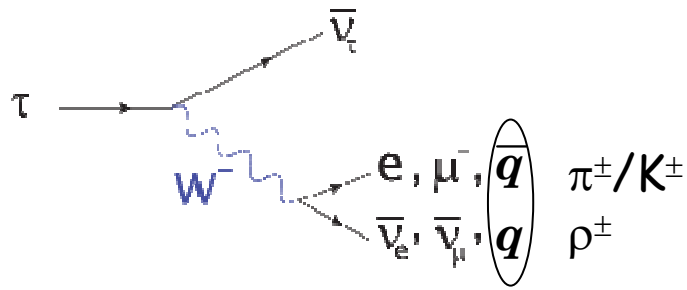
⇒ Some work on tau systematic uncertainties is also required for publication level (eg: uncertainty from tau energy scale: varying the tau p_T before selection).

Stay tuned, new results to come !

BACK UP SLIDES

tau decays

Mass = 1.78 GeV/c^2, $c\tau$ = 87.1 mm



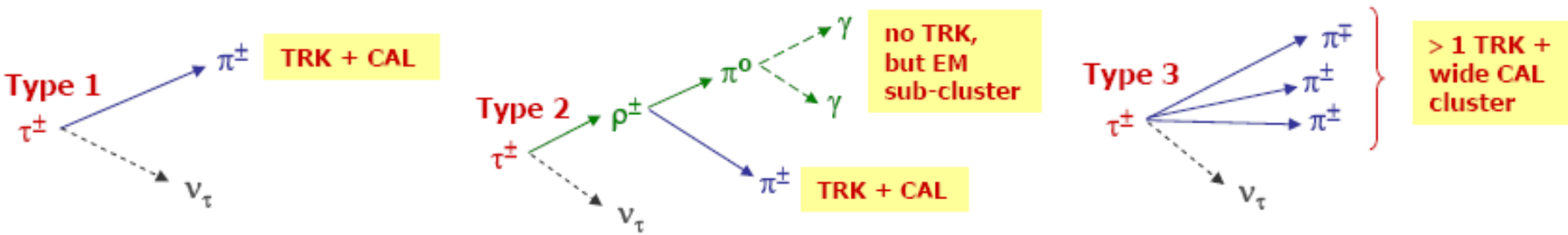
Final State	BR (%)	Decay type	
$e^\pm\nu_e\nu_\tau$	17.8	Leptonic 35.2%	
$\mu^\pm\nu_\mu\nu_\tau$	17.4		
$\pi^\pm/K^\pm\nu_\tau$	11.8	1-prong 48.7%	Hadronic 65%
$\pi^\pm/K^\pm\,\nu_\tau + n\pi^0$, $n\geq1$	36.9		
$\pi^\pm\pi^\mp\pi^\pm\nu_\tau + n\pi^0$, $n\geq0$	13.9	3-prong 16.1%	

Reconstructed with standard electron/muon ID

Hadronic tau:
→ dedicated tau ID

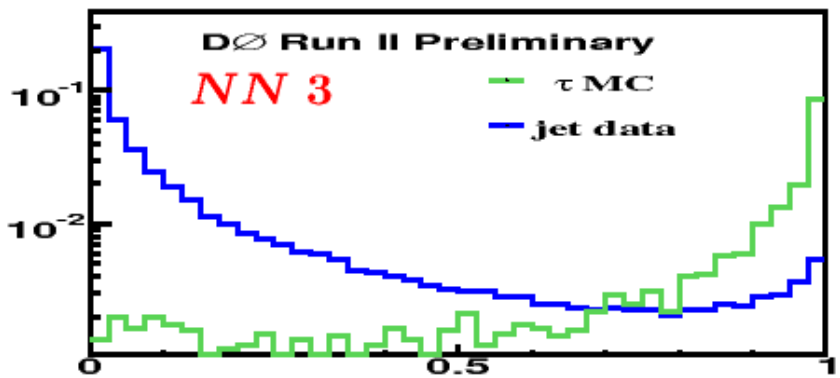
Tau identification at D0: 3 tau types

Type 1 | Type 2 | Type 3



- **CAL cluster:** Simple Cone algorithm R=0.5, core cone size 0.3, rms<0.25 (rms=energy weighted width of cluster).
- **EM sub-clusters:** Nearest Neighbour algorithm with seed in EM3 layer of the calorimeter with E>800 MeV.
- **TRK:** up to 3 tracks in a 0.3 cone around the CAL cluster with at least 1 with p_T>1.5 GeV/c. Invariant mass<1.8 GeV/c^2.

For each type : 1 anti-jet NN has been trained using mainly isolation variables, shower shape variables and Cal-track correlations variables.



tau NN: input variables

- Caliso = $(E_T^{R=0.5} - E_T^{R=0.3}) / E_T^{R=0.3}$
- Trkiso = $\Sigma p_T^{\text{trks in } R=0.5} / \Sigma p_T^{\text{tau trks}}$
- Profile = $(E_T^{\text{Tower 1}} + E_T^{\text{Tower 2}}) / E_T$
- EM Isolation Fraction = $(E^{EM1} + E^{EM2}) / E$
- Tau RMS
- EM fraction
- Hadronic fraction
- EM profile = $E_T^{\text{EM subclusters}} / E_T^{EM3}$
- Angle between sum of tau tracks and sum of EM-subcluster(s)
- Calorimeter-Track Correlation = $E_T / (E_T + \Sigma p_T^{\text{tau trks}})$

Run IIa results

- Cross section (assuming SM Branching Ratios):

- Muon+tau channel: $\sigma_{t\bar{t}} = 8.0^{+2.8}_{-2.4}(stat)^{+1.8}_{-1.7}(syst) \pm 0.5(lumi)pb$
- Electron+tau channel: $\sigma_{t\bar{t}} = 8.6^{+3.1}_{-2.6}(stat)^{+1.6}_{-1.6}(syst) \pm 0.5(lumi)pb$
- Combination: $\sigma_{t\bar{t}} = 8.3^{+2.0}_{-1.8}(stat)^{+1.4}_{-1.2}(syst) \pm 0.5(lumi)pb$

- Cross section x branching ratio:

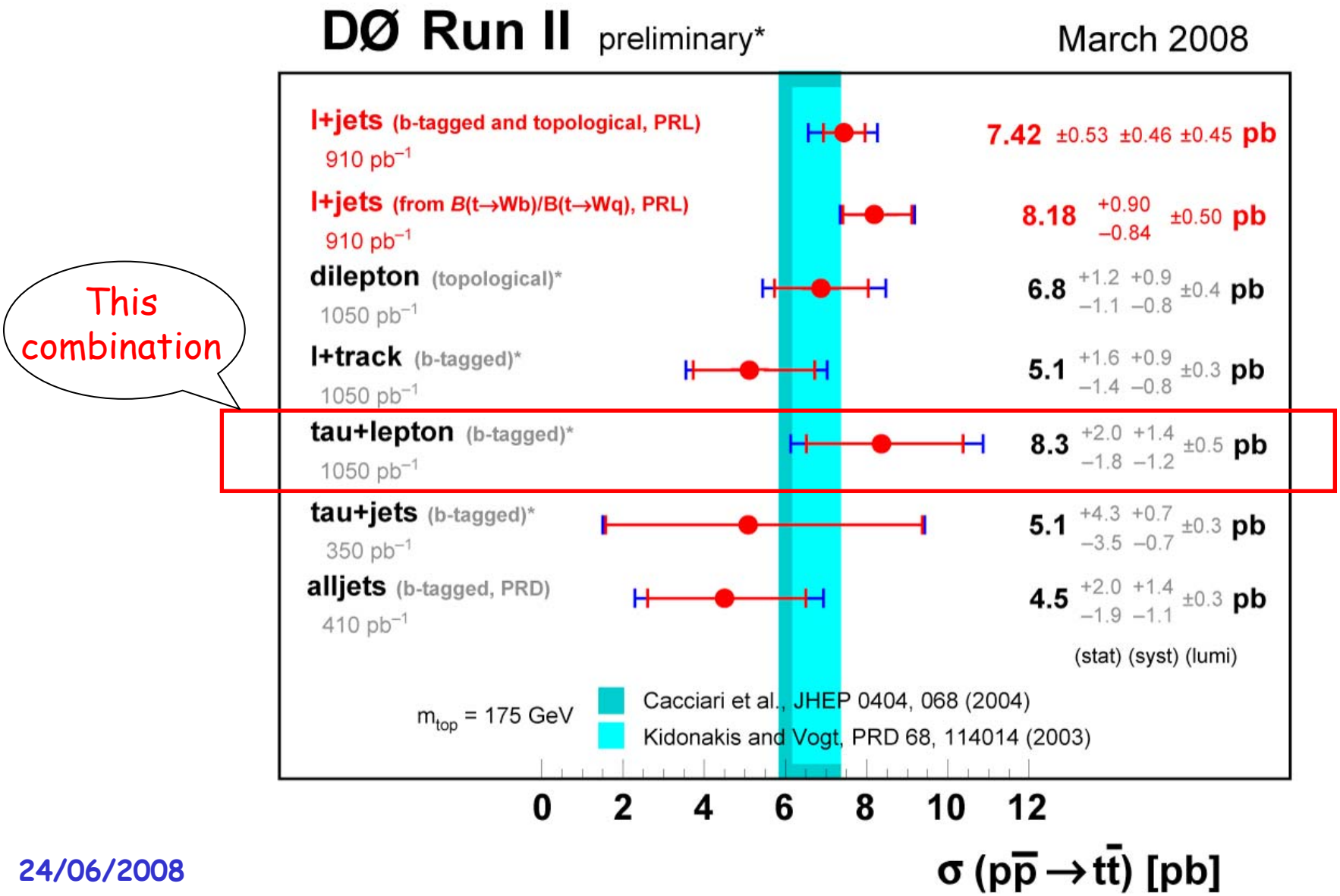
$$\sigma_{t\bar{t}} \times BR(t\bar{t} \to \mu + \tau + 2\nu + 2b) = 0.18^{+0.13}_{-0.11}(stat)^{+0.09}_{-0.09}(syst) \pm 0.01(lumi)pb$$

$$\sigma_{t\bar{t}} \times BR(t\bar{t} \to e + \tau + 2\nu + 2b) = 0.19^{+0.12}_{-0.10}(stat)^{+0.07}_{-0.07}(syst) \pm 0.01(lumi)pb$$

$$\sigma_{t\bar{t}} \times BR(t\bar{t} \to \ell + \tau + 2\nu + 2b) = 0.19^{+0.08}_{-0.08}(stat)^{+0.07}_{-0.07}(syst) \pm 0.01(lumi)pb$$

For a top mass of 175 GeV/c^2, the standard model expectation is 0.12 pb

Comparison with other DØ measurements



Run IIa: Systematic uncertainties

	$\mu\tau$ $\Delta\sigma$	$e\tau$ $\Delta\sigma$	combined $\Delta\sigma$
Jet energy calibration	$+0.30\ -0.50$	$+0.33\ -0.36$	$+0.43\ -0.35$
PV identification	$+0.36\ -0.34$	$+0.23\ -0.37$	$+0.38\ -0.21$
Muon identification	$+0.21\ -0.20$	–	$+0.12\ -0.12$
Electron identification	–	$+0.59\ -0.53$	$+0.25\ -0.24$
Tau identification	$+0.16\ -0.15$	$+0.15\ -0.15$	$+0.16\ -0.16$
Trigger	$+0.00\ -0.00$	$+0.12\ -0.07$	$+0.14\ -0.13$
Fakes	$+0.45\ -0.42$	$+0.59\ -0.53$	$+0.50\ -0.49$
b-tagging	$+0.31\ -0.34$	$+0.44\ -0.41$	$+0.45\ -0.37$
MC normalization	$+0.18\ -0.18$	$+0.15\ -0.15$	$+0.13\ -0.13$
Background/MC statistics	$+1.46\ -1.46$	$+1.19\ -1.19$	$+1.00\ -0.91$
Other	$+0.08\ -0.08$	$+0.09\ -0.10$	$+0.19\ -0.18$
Subtotal	$+1.76\ -1.67$	$+1.64\ -1.59$	$+1.40\ -1.24$
Luminosity	±0.49	±0.52	±0.51
Total	$+1.83\ -1.95$	$+1.72\ -1.67$	$+1.49\ -1.34$

Run IIb: Systematic uncertainties

	$\mu\tau$ $\Delta\sigma$ (pb)	$e\tau$ $\Delta\sigma$ (pb)
Jet energy calibration	$+0.16\ -0.23$	$+0.20\ -0.17$
PV identification	$+0.08\ -0.07$	$+0.06\ -0.06$
Muon identification	$+0.20\ -0.20$	–
Electron identification	–	$+0.38\ -0.34$
Tau identification	$+0.28\ -0.26$	$+0.17\ -0.16$
Trigger	$+0.35\ -0.32$	$+0.16\ -0.06$
Jet-tau fake rate	$+0.29\ -0.28$	$+0.27\ -0.25$
Opposite charge	$+0.18\ -0.18$	$+0.13\ -0.1$
b-tagging	$+0.48\ -0.42$	$+0.37\ -0.33$
MC normalization	$+0.31\ -0.31$	$+0.30\ -0.30$
Background/MC statistics	$+1.14\ -1.14$	$+2.12\ -2.12$
Luminosity profile	$+0.18\ -0.18$	$+0.13\ -0.13$
Total	$+1.43\ -1.41$	$+2.25\ -2.23$

Systematic uncertainties

- Data quality: a 0.5% uncertainty is used for all MC samples, from p17 analysis.

- Primary vertex selection: the uncertainty in primary vertex selection between data and MC is 2%.
- Vertex z simulation: The "Cut40cm" parametrization (instead of the "Cut60cm") is used for the systematics estimation.

- Data MC luminosity profile: This uncertainty arises from differences in the luminosity profile of the zerobias overlay events used in MC from the data sample. A 2% uncertainty is taken for all MC samples.

- trigger: the systematic uncertainty is estimated by shifting turn-on curves up and down.

- K-factor: we assign an uncertainty of 0.1 on the K factor for both W and Z like in the p17 analysis.
- HF factor: we use the errors described previously scaled to the appropriate fraction of events which contain heavy flavor.

Systematic uncertainties (cont'd)

- Muon ID: (μ analysis) the systematic errors on muon ID are taken from the p17 muon certification note (0.7%).
- Muon track: (μ analysis) the systematic errors on muon track reconstruction are taken from the p17 muon certification note (0.7%).
- Muon isolation: (μ analysis) we use an estimate from the single top group (p17 results), but as a flat 2% rather than as a function of jet multiplicity.

- Electron ID: (e analysis) we use the uncertainty evaluted by the single top group (p17) using di-electron events (5.5%). This uncertainty is dominated by the uncertainty in number of jets and is probably an overestimate.
We plan to change em_corr (eta, phi) with (eta, pt) to obtain the systematics estimation.

- Tau reconstruction: the uncertainty in the data/MC agreement with respect to tau reconstruction is 3%.
- Jet-tau fake rate: A 8% uncertainty is applied to the W, Z ! μμ(ee), diboson and ttbar → l + jets.
- Opposite charge: A 2% uncertainty is applied like in p17 eμ analysis.

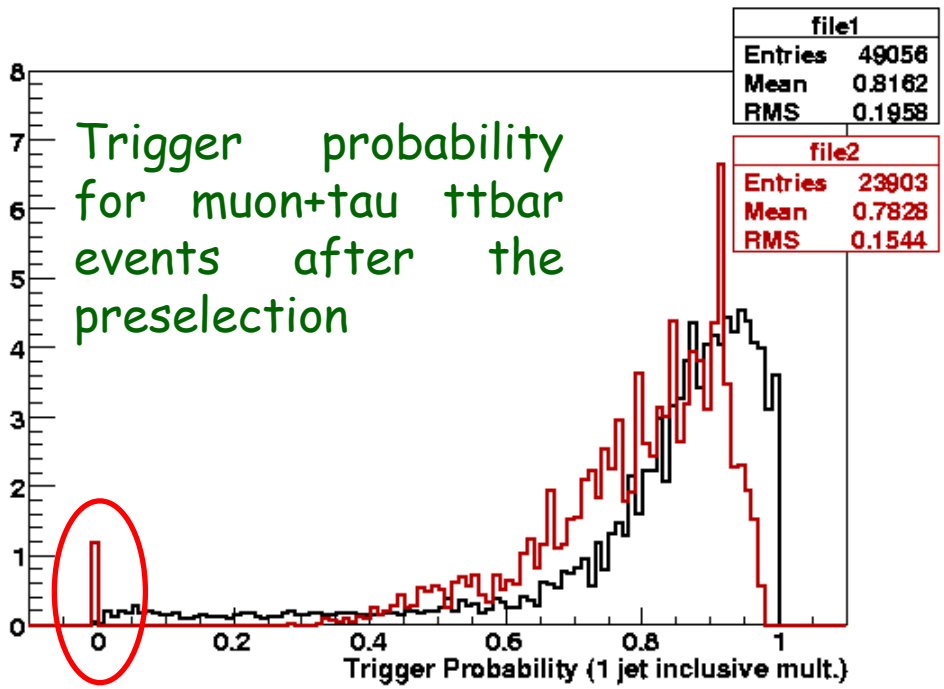
Systematic uncertainties (cont'd)

- Tag rate function: this uncertainty is evaluated by shifting the value of the tagging probability for each jet by ($\pm 1\sigma$) from the central value of the tag rate function.

- JES: this uncertainty is evaluated by shifting the jet energy scale in the JSSR processor by ($\pm 1\sigma$). A 2% uncertainty is also added in quadrature to take into account the fact that the MC has been generated with the wrong Zero-Bias overlay set.
- Jet energy resolution: this uncertainty is evaluated by shifting the jet energy correction by ($\pm 1\sigma$).
- Jet ID: this uncertainty is evaluated by shifting down the jet ID.

- Background Statistics: an uncorrelated combination of the statistical error on the Monte Carlo and same-sign data contributions to the background.

Mutau: Trigger probability: RunIIa vs RunIIb



RunIIa: MuJets

MU_JT20_L2M0
MU_JT25_L2M0
MUJ2_JT30_LM3
MUJ1_JT35_LM3

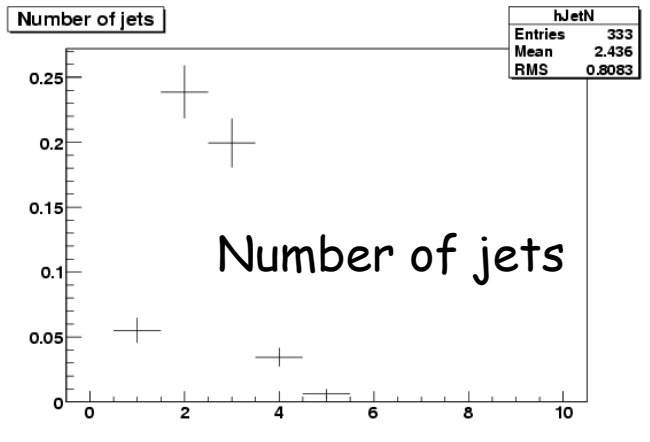
RunIIb: MuJets_TriggersOR (Super OR between Mujets and single muon triggers)

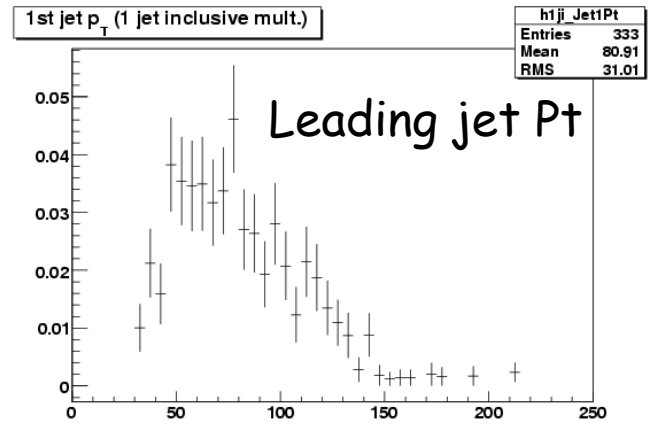
MUHI1_ILM15
MUHI1_ITLM10
MUHI1_TK12_TLM12
MUHI2_ILM15
MUHI2_ITLM10
MUHI2_TK12_TLM12
MUHI3_ILM15
MUHI3_ITLM10
MUHI3_TK12_TLM12
MUJ1_2J20LM3DR3
MUJ1_JT35_LM3
MUJ3_2J20LM3DR3
MUJ3_JT35_LM3

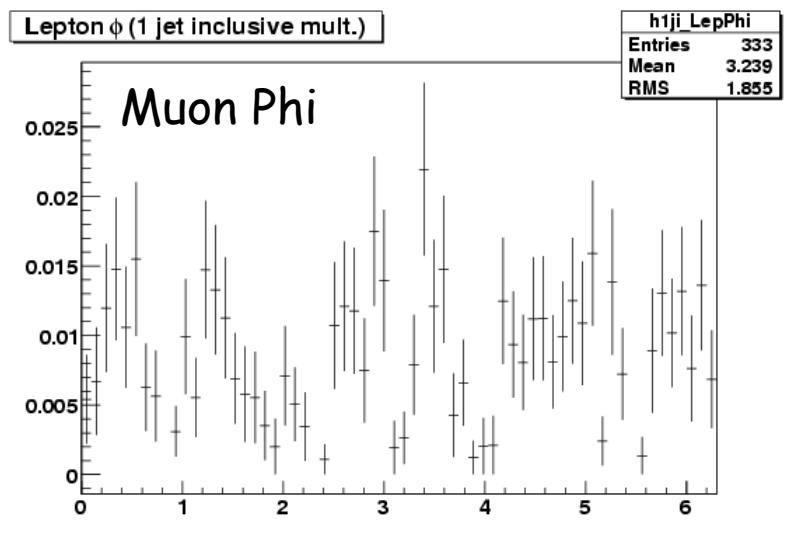
Only before v15.50

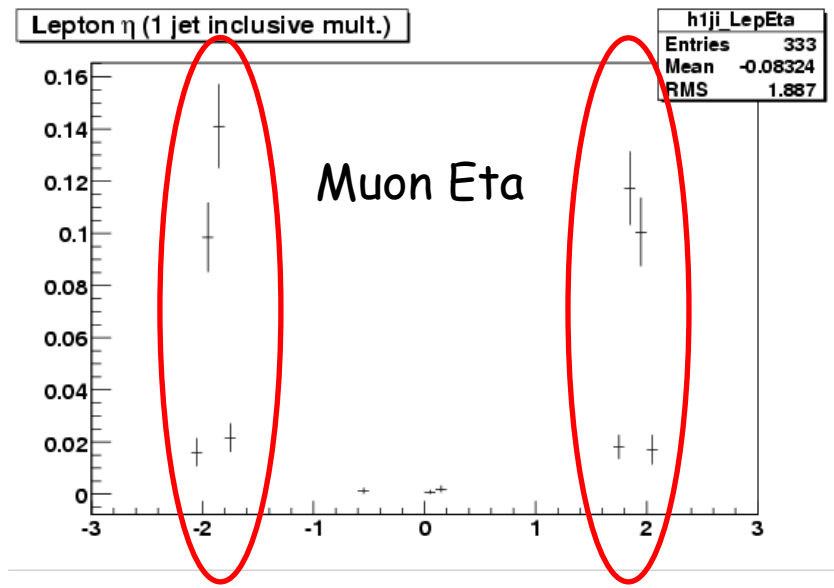
- I am using NPTight isolation for the muons in the trigger config because SPC for TopP14Tight (isolation used offline) is not yet available. The bias should be fairly small (Liang Li).
- The list of 15 GeV tight muon are used to compute the trigger probability.

Mutau: Events with trigger_probability=0



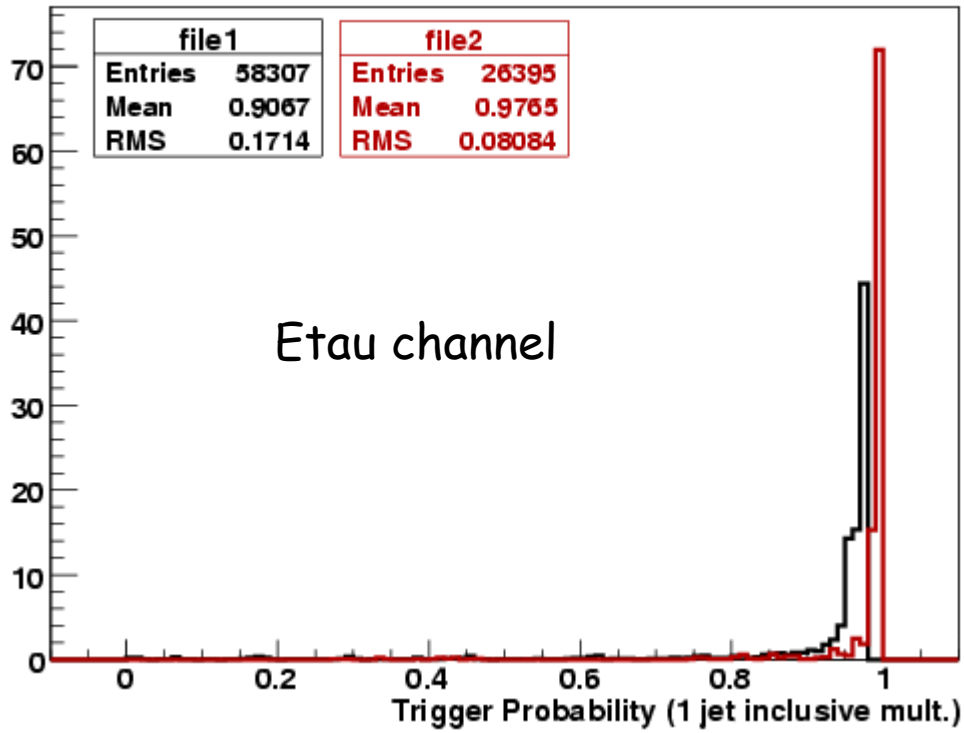






- All bins for |eta|>1.8 are set to 0 in the SPC files.

Etau: Trigger probability: RunIIa vs RunIIb



90.7% → 97.7%

MC normalization factor

JF Grivaz V+jets meeting 12 feb 08

Most of the misunderstandings are due to ambiguities in the terminology.
I therefore propose the following:

- K-factor is purely theoretical, and denotes a (N)NLO/LO ratio of cross sections;

- K'-factor is also theoretical, and denotes a (N)NLO/LL ratio of cross sections.
  According to Steve, ALPGEN cross sections are Leading Log;

- S-factor is empirical, and comes on top of K or K' to bring MC in agreement
  with data. MC should be initially normalized to luminosity, and all
  correction (a.k.a. scale) factors should be applied (trigger, ID…);

- HF-factor is, in principle, theoretical, but in practice only theory inspired.
  It tells you by how much heavy flavor production should be increased,
  on top of K or K', and possibly S;

- S_HF-factor is empirical, and comes on top of K or K', S, and HF, to bring MC
  in agreement with data, after b-tagging.

In the following, Z+(lp/HF) will be discussed. The same can be done for W+(lp/HF)

MET

The MET cut < 200 GeV has been removed. It was used to discard events with a straight muon track which give an arbitrarily large MET via the JES_MU correction. Since caf_util p21-br-50, the muon pt used in JES_MU has been capped at 60 GeV. So MET<200 GeV should now be obsolete.

Multijet templates

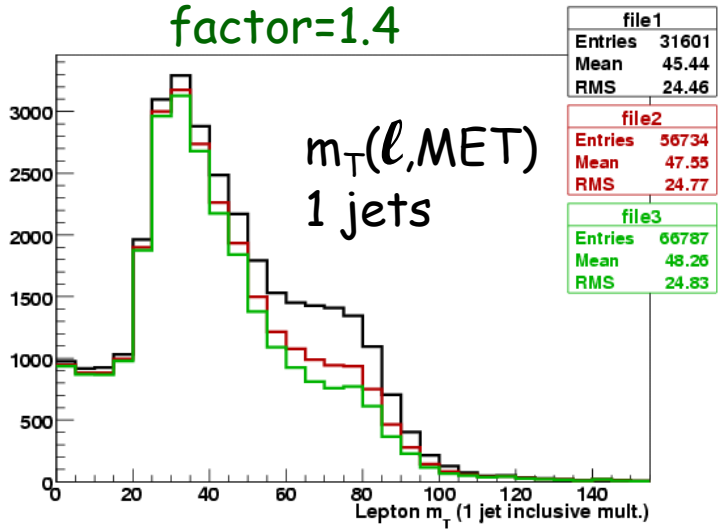
Without W subtraction
With W subtraction factor=1.0
With W subtraction factor=xx

≥ 1 jet

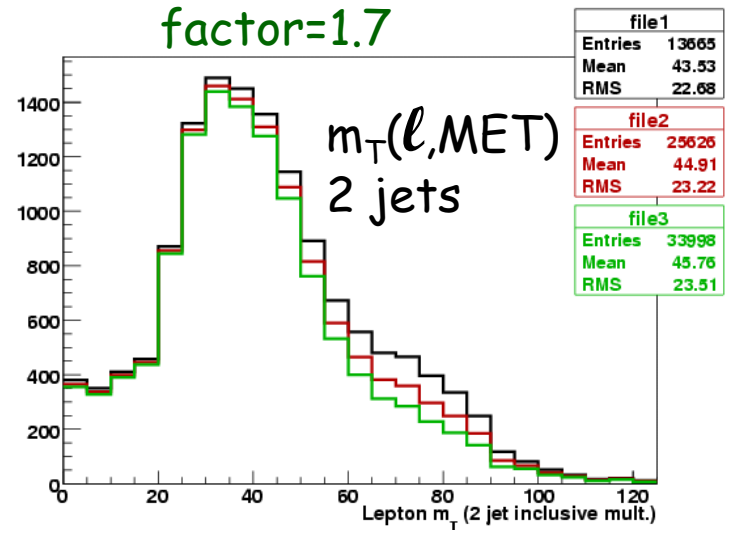
≥ 2 jet

Etau

factor=1.4

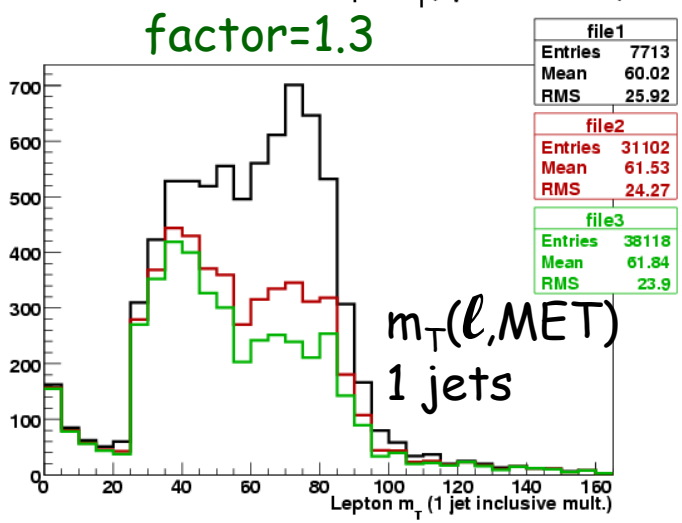


factor=1.7



Mutau

factor=1.3



factor=1.7