



Measurement of $t\bar{t}$ production cross section in the lepton + tau + jet +MET channel

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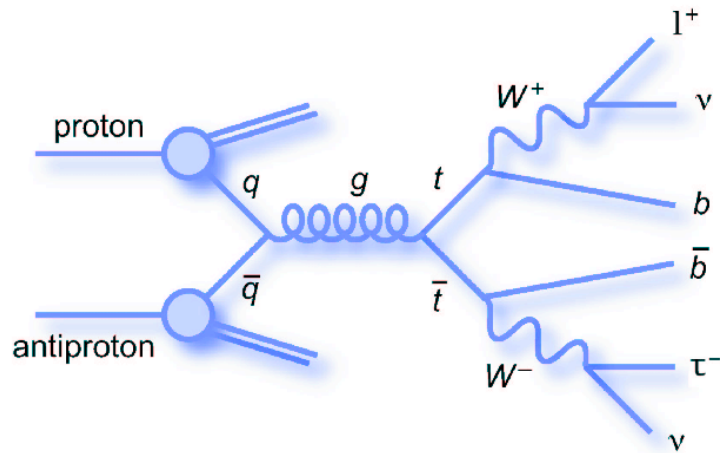
LPC Clermont-Fd

May 31, 2011

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- analysis strategy
 - skims triggers and background
 - first look at the preselection
 - outlook

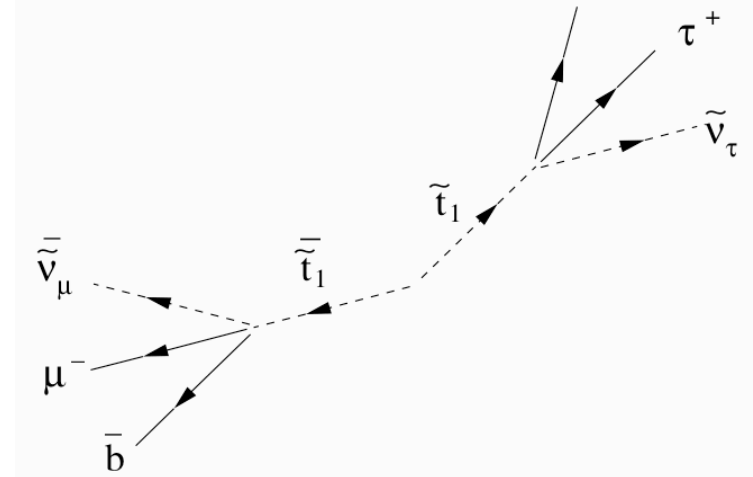
Analysis strategy

$t\bar{t}$: Frédérique



same final state :
lepton (electron or muon)
+ jets

stop search : Philippe



+ tau
+ MET

up to now : only the mu+tau channel.



common preselection : 1 muon and 1 tau
advantage : trees production is done only once.

Skims, triggers and background

- Data skim: Muinclusive $\mathcal{L} \sim 7.2 \text{ fb}^{-1}$: RunIIa, RunIIb1-RunIIb3
- Trigger: single mu or triggers

Back.	Kfactor	$\sigma(p\bar{p})$
Z-> $\mu\mu$	1.29	390.7/184.8/99.7
Z-> $\tau\tau$	1.28	390.7/184.8/99.7
<i>ttbar</i>	1.43	5.1
Wjets	1.27	6191
WW	1	11.62
WZ	1	3.2
ZZ	1	1.33

Period	$\mathcal{L} \text{ (fb}^{-1}\text{)}$	MC version
RunIIa	1.08	v10
RunIIb1	1.22	v10
RunIIb2	3.05	v4
RunIIb3	1.94	v4

$m_{\text{top}} = 172 \text{ GeV}$

In this talk : only results for Run IIb1-b2-b3
(6.21fb-1)

Vjets version : v05_05_12e

Object definitions

Muon

- *medium nseg3*
- $X^2 < 4$
- $DCA < 0.02$ (0.2), $SMT > 0$ (=0)
- $E_{trkcone}/Pt < 0.15$ (*top_scaled_medium*)
- $ET_{halo}/Pt < 0.15$
- $P_T > 15 \text{ GeV}$

Jet

- *standard jet-id cuts*
- *good JCCB jets*
- $P_T > 15 \text{ GeV}$

MET

Corrected for em calo cells, muons , JES and taus

Electron

- *LooseElectron selection*
- $P_T > 15 \text{ GeV}$

Tau

- *track_loose*

Type 1

- $P_T(\text{track}) > 7 \text{ GeV}$
- $NN > 0.9$
- $P_T > 12.5 \text{ GeV}$
- $E/P > 0.65$

Type 2:

- $P_T(\text{track}) > 5 \text{ GeV}$
- $NN_{elec} > 0.85$
- $NN > 0.9$
- $P_T > 12.5 \text{ GeV}$
- $E/P > 0.5$

Matching with loose muons

Type 3:

- $P_T(\text{lead. track}) > 7 \text{ GeV}$
- $\sum P_T(\text{tracks}) > 10 \text{ GeV}$
- $NN > 0.95$
- $P_T > 15 \text{ GeV}$
- $E/P > 0.5$

- *Good JCCB jets matching taus are removed from the jet list*
- $\Delta R(\text{tau}, \text{jet}) > 0.5$

MC corrections and Event selection

MC Corrections

- *muoncorr_id*
- *muoncorr_deltaR*
- *muoncorr_track*
- *Beamreweighting*
- *Luminosity reweighting*
- *Trigger*
- *Zpt reweighting: p20Alpgen_njet15*
- *Smearing for electrons and muons*
- *Tau correction factors (NN, track)*
- *Tau Energy Scale*

Event selection

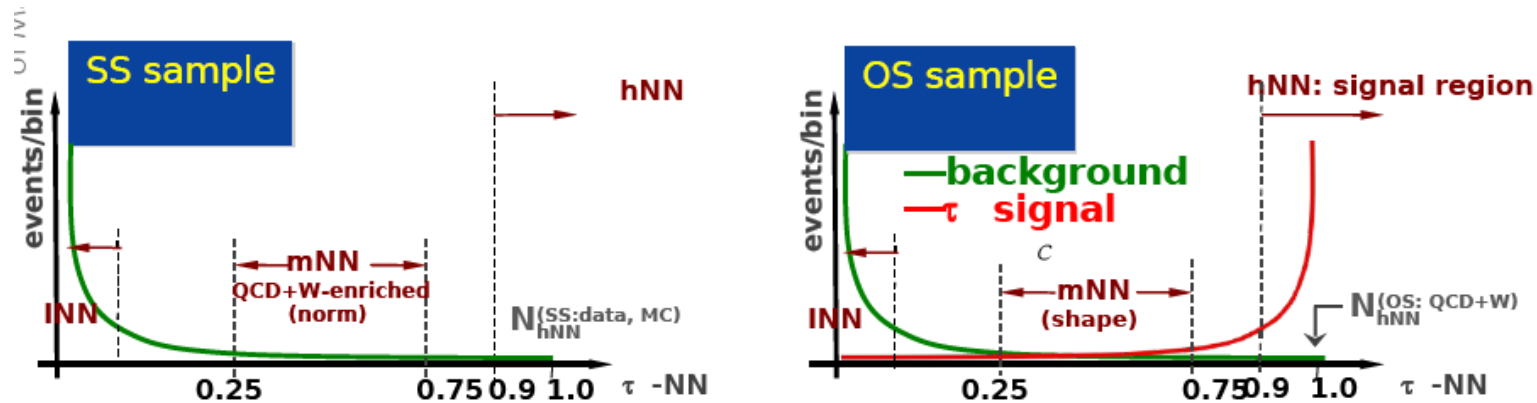
- *One muon, one central tau, no electron*
- *OS (muon, tau)*
- *$\Delta R(\text{muon}, \text{tau}) > 0.5$*
- *$\Delta R(\text{muon}, \text{jet}) > 0.5$*
- *~~$\Delta\Phi(\text{muon}, \text{Met}) > 0.5$~~*
- *~~$\Delta\Phi(\text{tau}, \text{Met}) > 0.5$~~*

I didn't apply the 2 last cuts in the following results

release p21.20.00

Instrumental background estimation

- Apply the same method as $h \rightarrow \tau\tau$ search (Tammy et al.)



see Tammy's presentation:

<http://www-do.hef.kun.nl/ask/Archive.php?base=agenda&categ=a091488&id=a091488s2t3/transparencies>

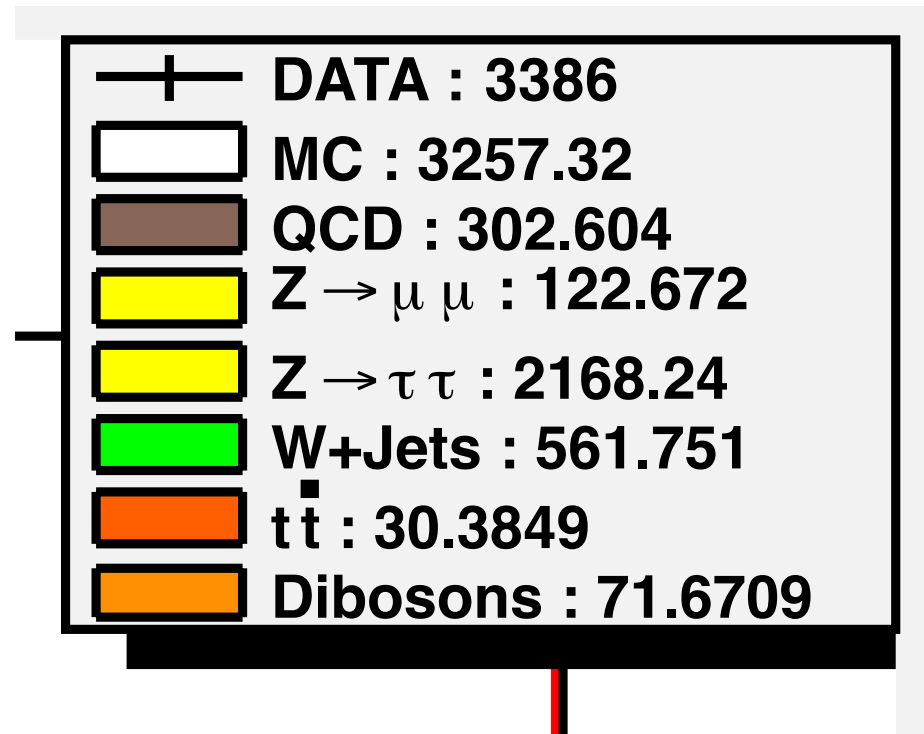
Shape: $N_{hNN}^{OS:QCD} = \rho_1 \times (N_{mNN}^{OS:data} - N_{mNN}^{OS:MC})$

Norm: $\rho_1 = \frac{N_{hNN}^{SS:data} - N_{hNN}^{SS:MC}}{N_{mNN}^{SS:data} - N_{mNN}^{SS:MC}}$

Type	ρ_1
1	0.10 ± 0.02
2	0.23 ± 0.02
3	0.11 ± 0.01

Some distributions

- this is a first look, the plot are a bit old (april)



Event Yield : Run IIb1-b2-b3

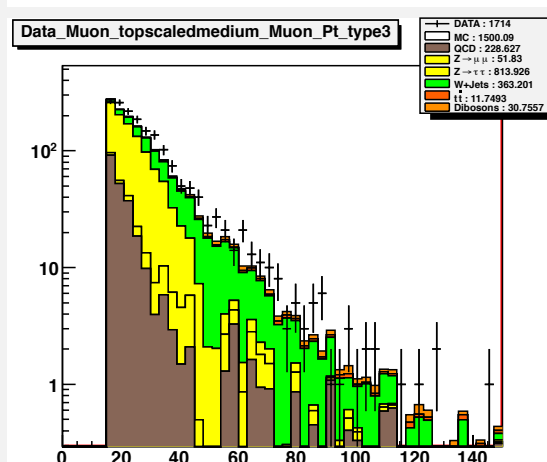
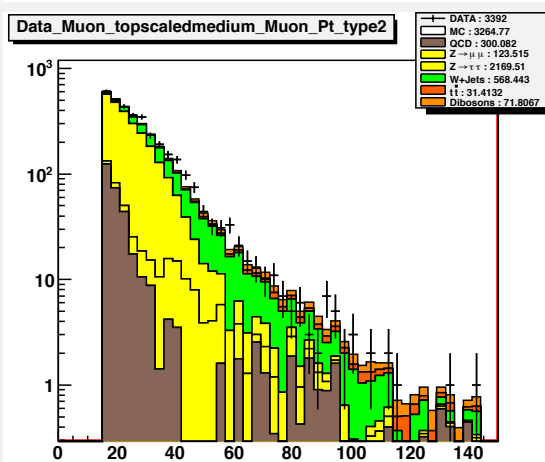
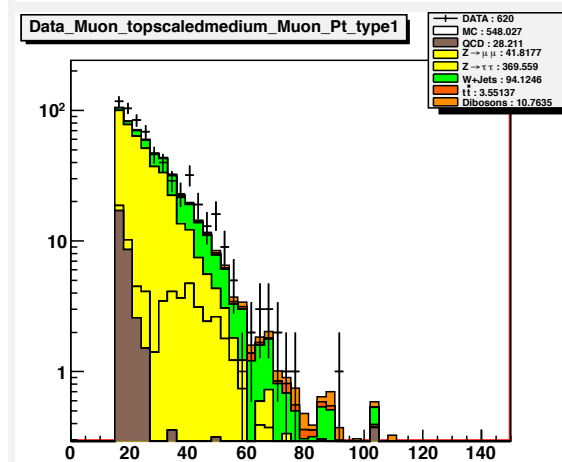
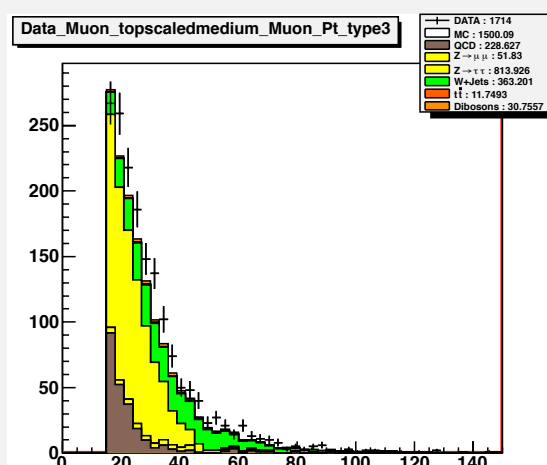
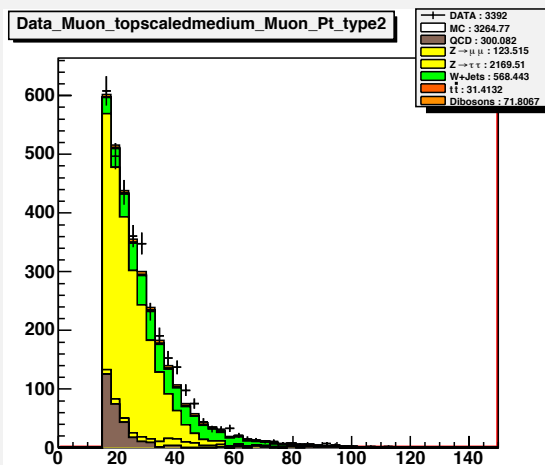
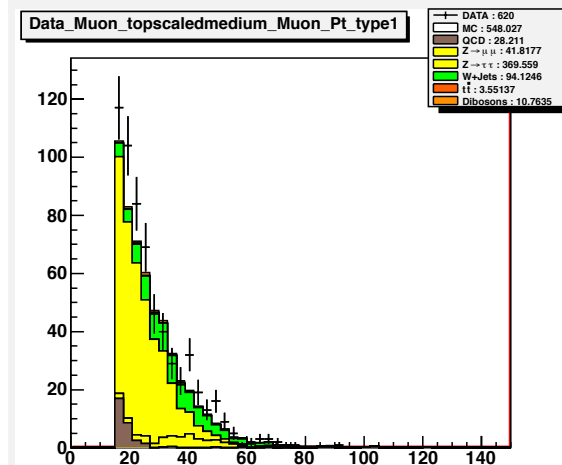
Processus	type 1	type 2	type 3
$W + \text{jets}$	94.3	570.4	364.6
$Z\mu\mu$	41.87	123.8	52.2
$Z\tau\tau$	369.6	2169.7	814.1
$t\bar{t}$	3.69	32.15	12.01
dibosons	10.86	73.3	31.2
QCD	28.4	306.9	233.9
Total background	548.7	3276.2	1507.9
DATA	621	3402	1719

Muon Pt

Tau type 1

Tau type 2

Tau type 3

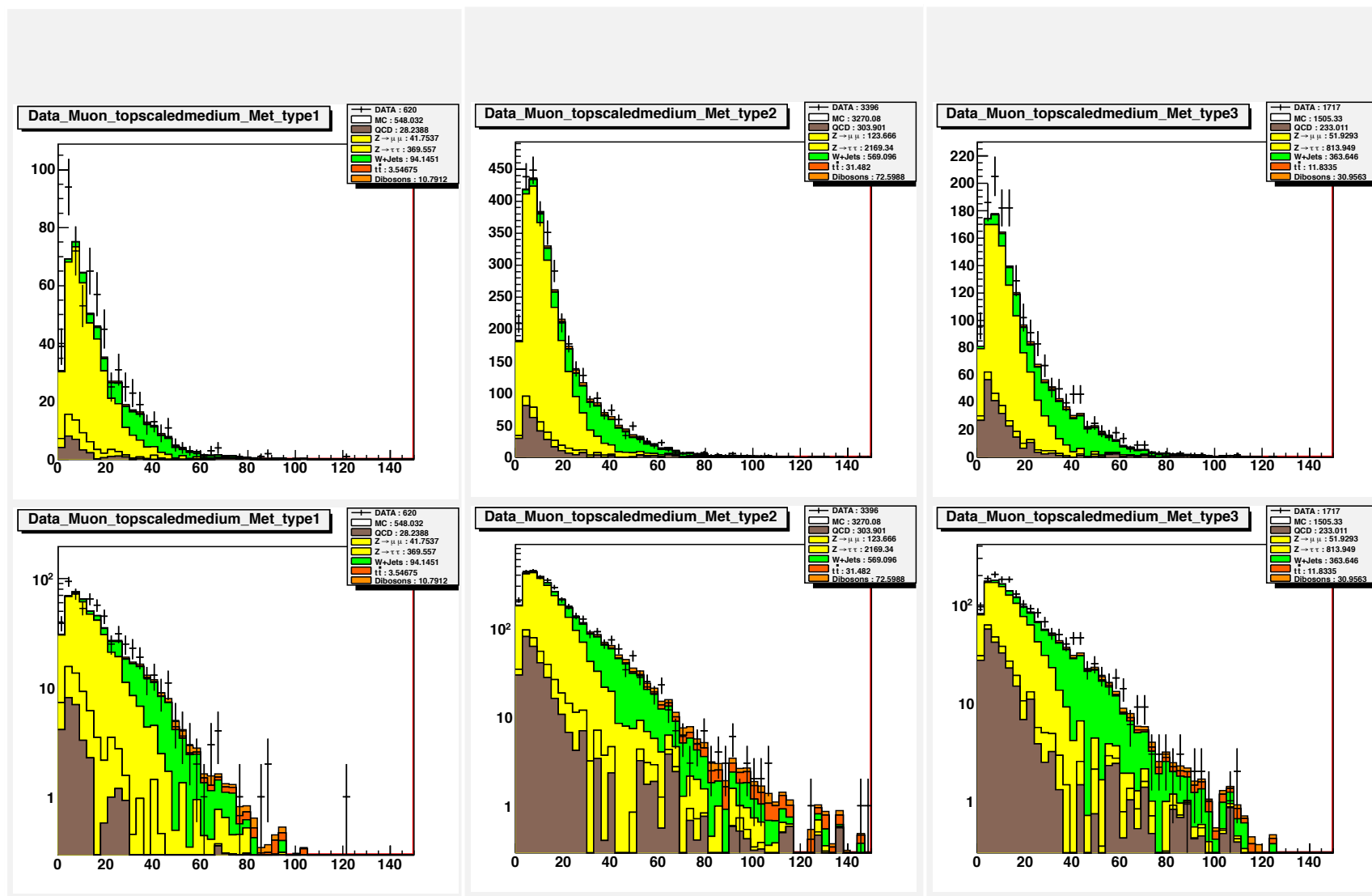


Met

Tau type 1

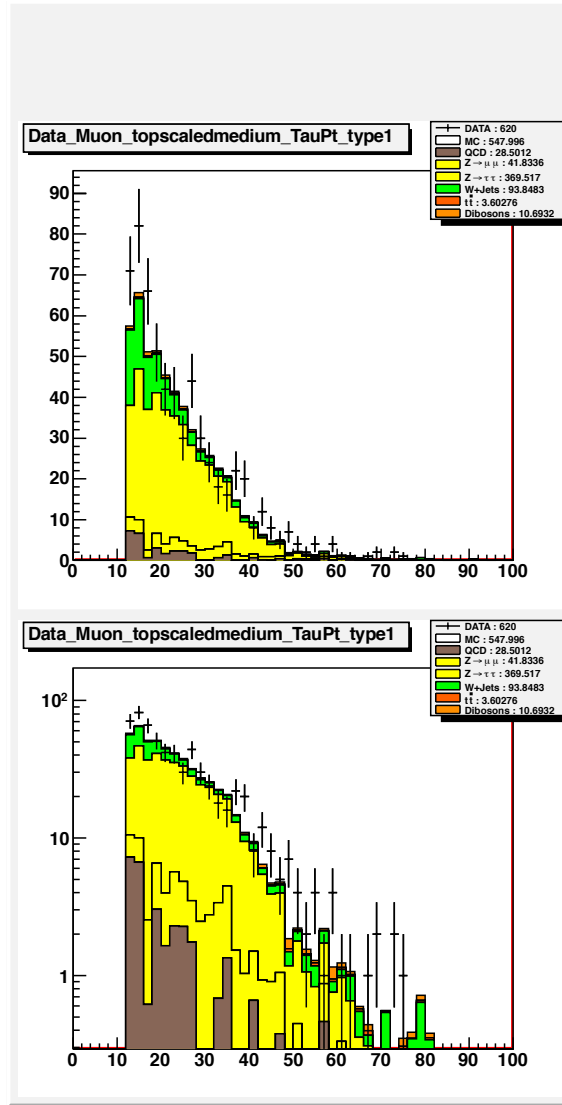
Tau type 2

Tau type 3

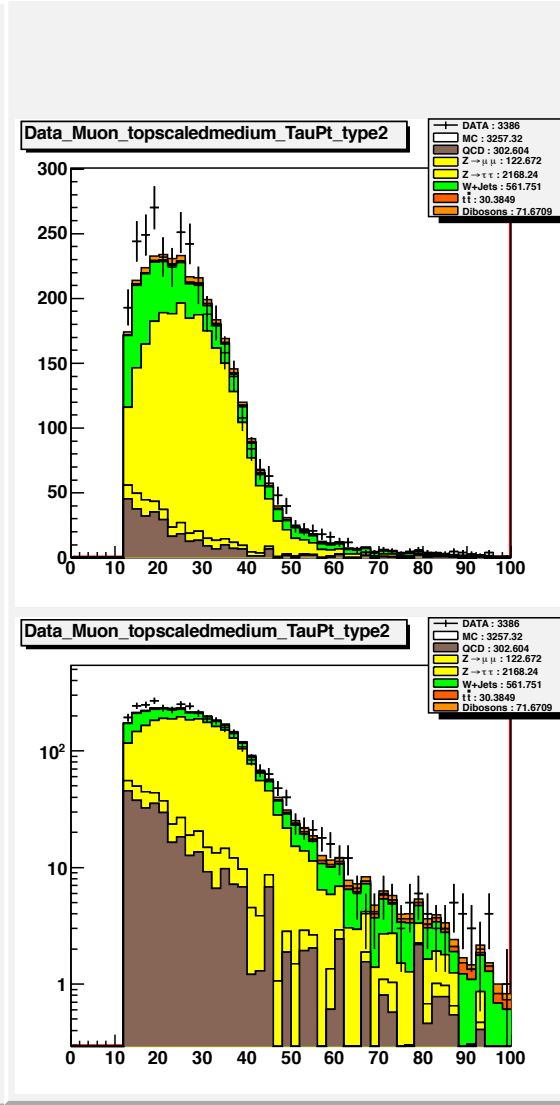


Tau Pt

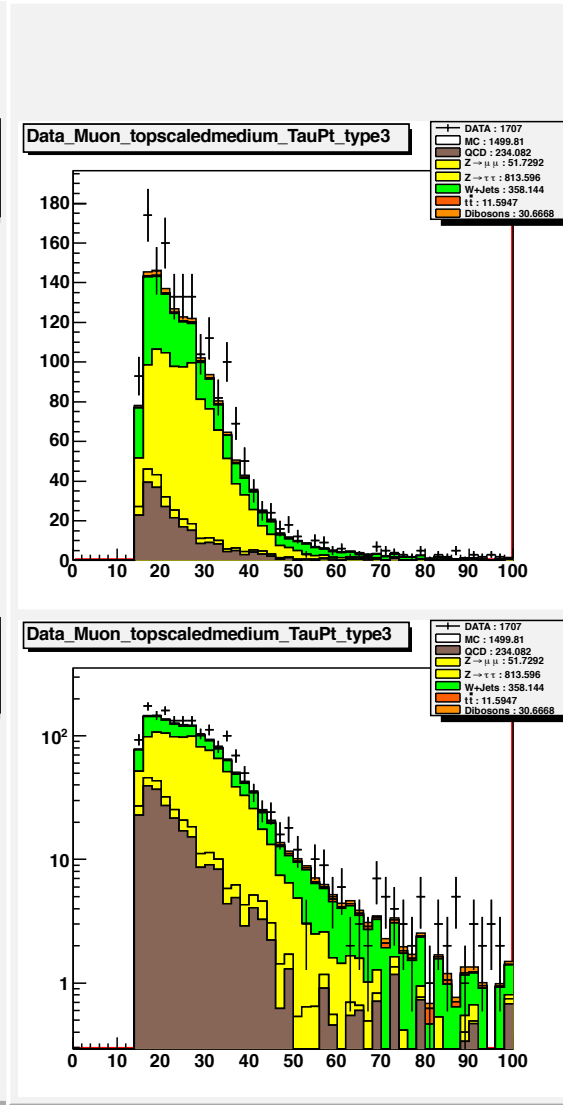
Tau type 1



Tau type 2



Tau type 3



Outlook

Summary : a first pass for a preselection is done, with QCD estimation

The results have been compared with Philippe : in agreement.
They are a bit different from what I have shown today

Outlook

preselection for Run IIa and RunIIb

preselection + 2 jets

preselection + 2 jets + at least 1 btagged-jet.

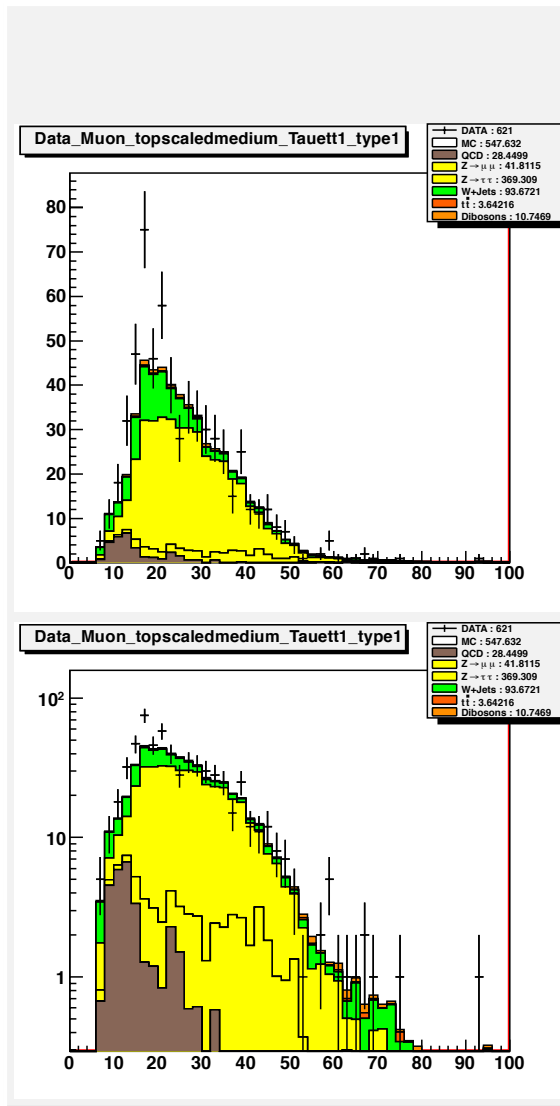
extraction of the cross-section

New

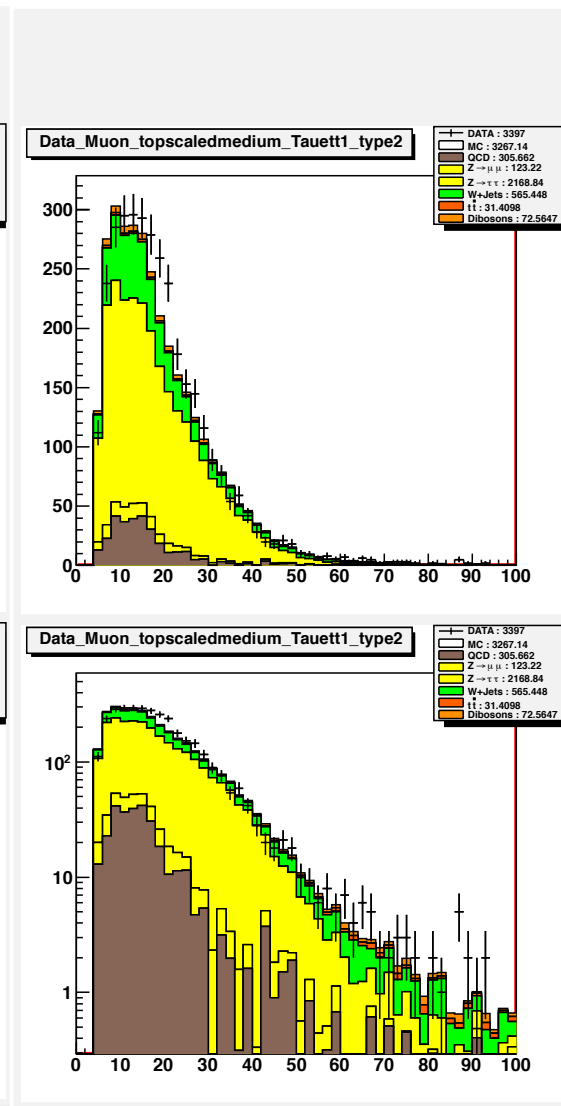
BACK-UP

Tau track ett1

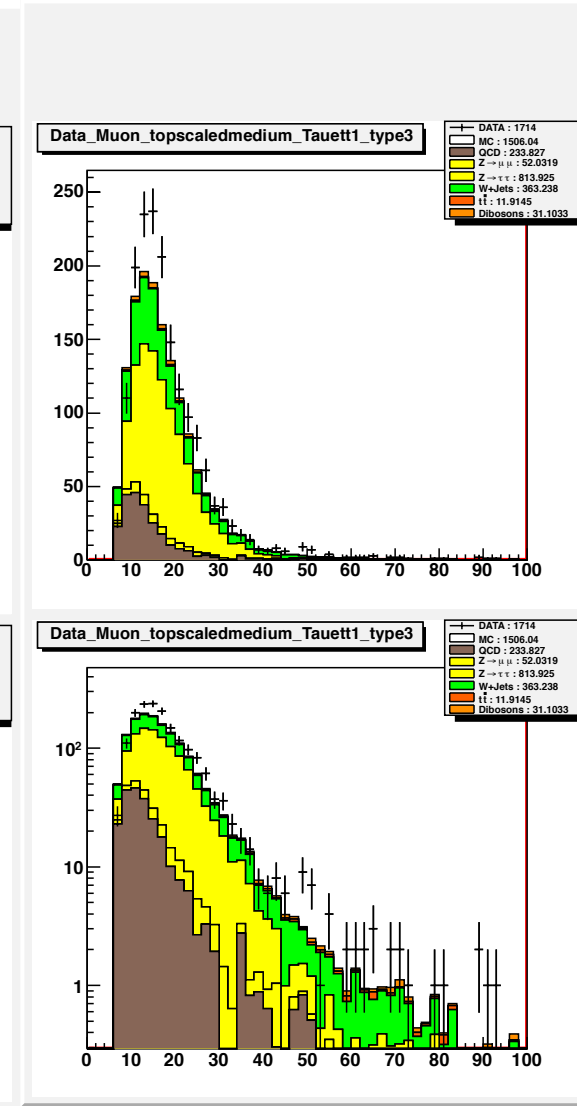
Tau type 1



Tau type 2



Tau type 3

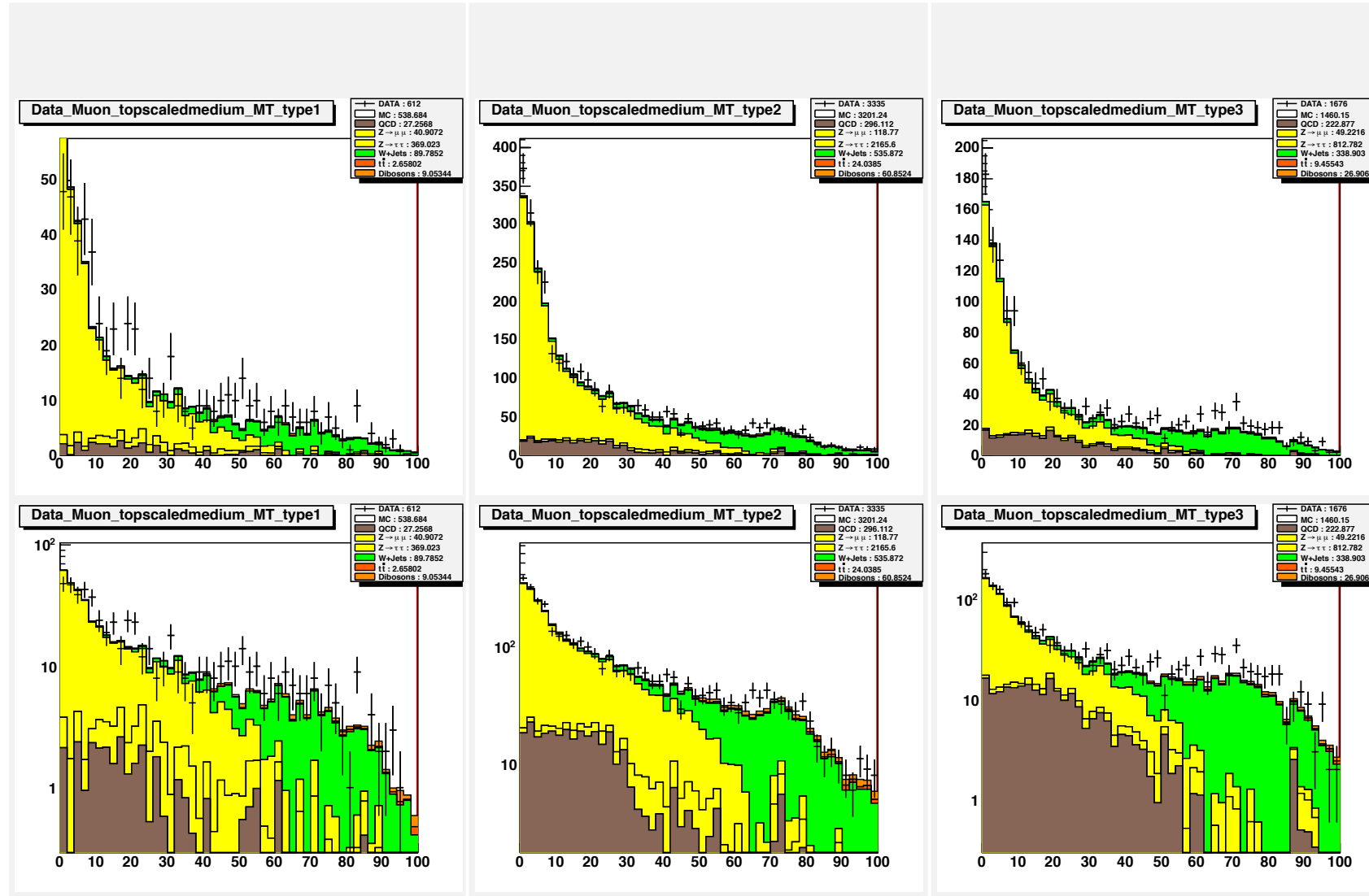


Transverse Mass

Tau type 1

Tau type 2

Tau type 3

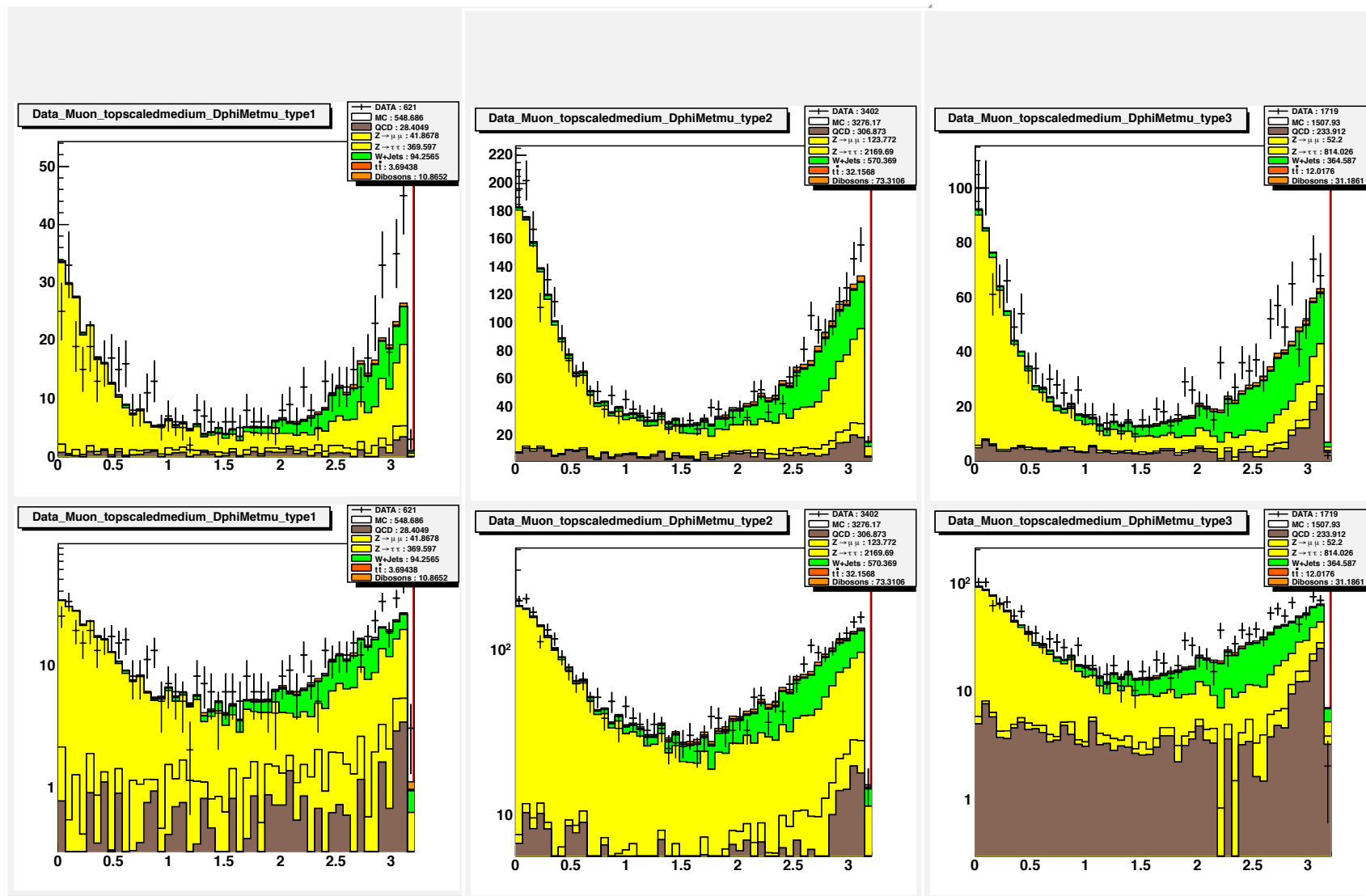


DPhi(Mu, MET)

Tau type 1

Tau type 2

Tau type 3



DPhi(tau, MET)

Tau type 1

Tau type 2

Tau type 3

