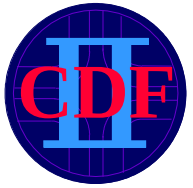


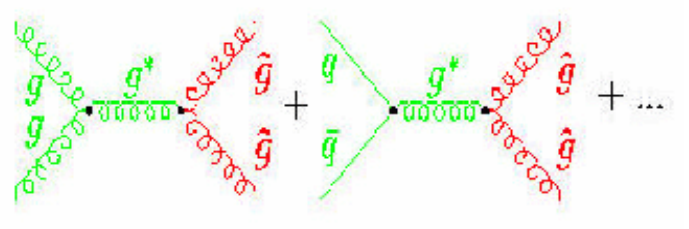
Missing Et + Jets: Search of squarks and gluinos

Xavier Portell
Mario Martínez
Carlos Sanchez

Dan MacQueen
Robert Orr

Status Report
December, 4th 2004

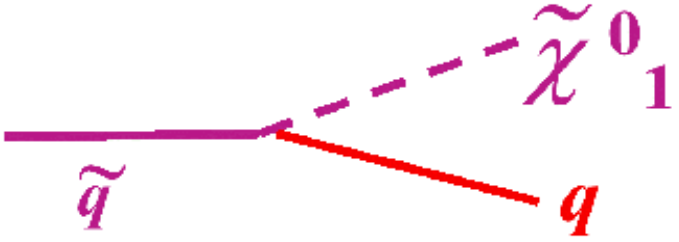
Outline

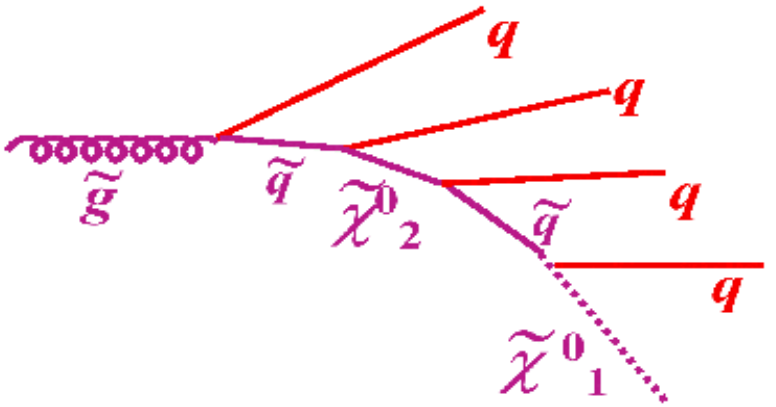


In this talk I will present two studies:

1. PROTOANALYSIS DATA (Xavier Portell)

2. STUDY OF SIGNAL MC vs BACKGROUND MCs: Justification of the cuts. (Mario Martínez)





A protoanalysis...

GOAL: To put all the mechanisms together and to obtain some preliminary results without looking into the Blind Box.

BB in Run I:
- MET>70 GeV
- H_T>150 GeV
- N_{iso_trks}=0

CUT	COMMENTS*
GoodRunList	Version 7.0
Trigger path MET35_2jets	Asking all levels: L1,L2,L3
MET > 40	Offline MET (trigger 100% eff.)
Vertex with z < 60 cm	ZVertex
$\geq$ 3 jets with $E_T^{jet} \geq$ 15 GeV and η < 2.3	At η = 3.0 exist the Beam Remnants
BLIND BOX	
MET > 50 GeV $H_T \equiv E_{T_2} + E_{T_3} +$ MET $\geq$ 100	No requirement for $N_{tracks}^{iso} = 0$ (not a continuous distribution)
$\geq$ 1 central jet (η < 1.1)	$\forall$ jet with prev. req.
EEMF** $\geq$ 0.1	$\forall$ jet with prev. req.
ECHF*** $\geq$ 0.175	$\forall$ jet with η < 1.1 (COT end)
$\Delta\phi$(MET,jets)$\geq$ 0.3	Only for the three main jets
$\Delta\phi$(MET,j)$\geq$ 0.5 if j is a jet pointing to a crack	$\eta_{det} \in [0.,0.1) \cup (0.9,1.3)$
$E_{T_1} \geq$ 70 GeV AND $E_{T2} \geq$ 35 GeV	Trigger 100% eff.
$EMF_1 <= 0.9$ AND $EMF_2 <= 0.9$	Not applied for the third jet

Numbers are preliminary and suggested by Run I studies.

* Here, all requirements to jets are done with non-corrected energy (later we will study this more carefully)

$$**\text{EEMF} \equiv \frac{\sum_{j=1}^{N_{jet}} (E_{T_j} * EMF_j)}{\sum_{j=1}^{N_{jet}} E_{T_j}}$$

$$***\text{ECHF} \equiv \frac{1}{N_{cjets}} \sum_{j=1}^{N_{cjet}} \frac{\sum_i^{N_{trks}} P_T^i}{E_{T_j}}$$

where N_{cjet} are the number of central jets and N_{trks} are the number of tracks associated to the jet (def. in M.Spiropulu's thesis)

- We use dataset emet0d, software version 5.3.3 and IFAE's ntuples.
- Jet algorithm in use is JetClu07. We will normalize backgrounds to LO cross sections.
- For the moment, we will only use data previous to Feb 13th (COT compromised period)

Only a first estimation!!!

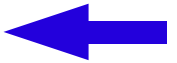
Trigger: MET35+2jets

As the signature is MET+ jets, the trigger we will use in this study is MET35+2jets

The trigger is quite stable in time

PATH: MET35_&_TWO_JETS_v3 (138809-143937)
L1_MET25
L2_JET15 (One jet of ET>15GeV)
L3_MET35

PATH: MET35_&_TWO_JETS_v4 143938-148907
L1_MET25
L2_JET15 (One jet of ET>15GeV and 0<eta<3.6)
L3_MET35



PATH: MET35_&_TWO_JETS_v5 (147873-158732)
L1_MET25
L2_TWO_JET10_L1_MET25 (Two jets of ET>15GeV and 0<eta<3.6)
L3_MET35

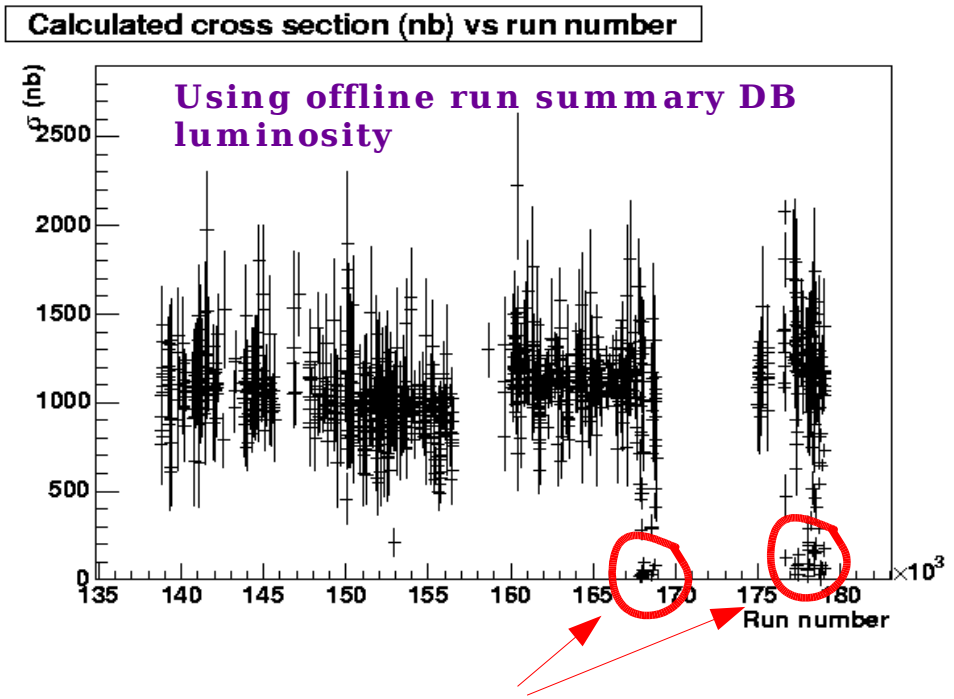
PATH: MET35_&_TWO_JETS_v6 (155368-END)
L1_MET25
L2_TWO_JET10_L1_MET25
L3_MET35 (minor change)

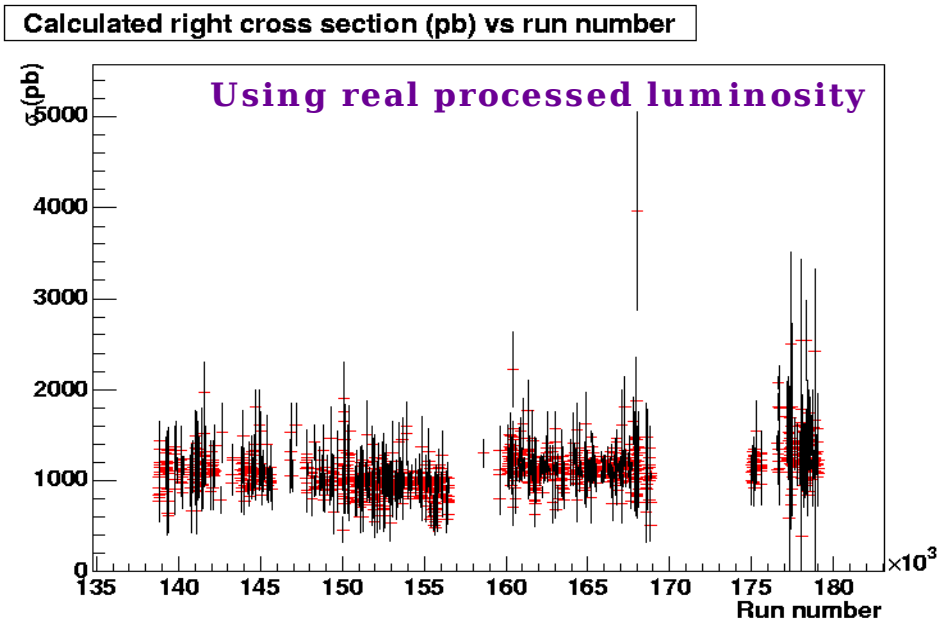
Study the stability of the trigger plotting events/luminosity:

Events -> Apply some clean up cuts: GoodRunList v7, pass complete trigger path, MET>35 GeV, one vertex (|z|<60cm), 3 jets with 15 GeV and |η|<2.3.

Luminosity -> Two sources: Database (web) or real processed luminosity (using logfiles or using DFCQuery).

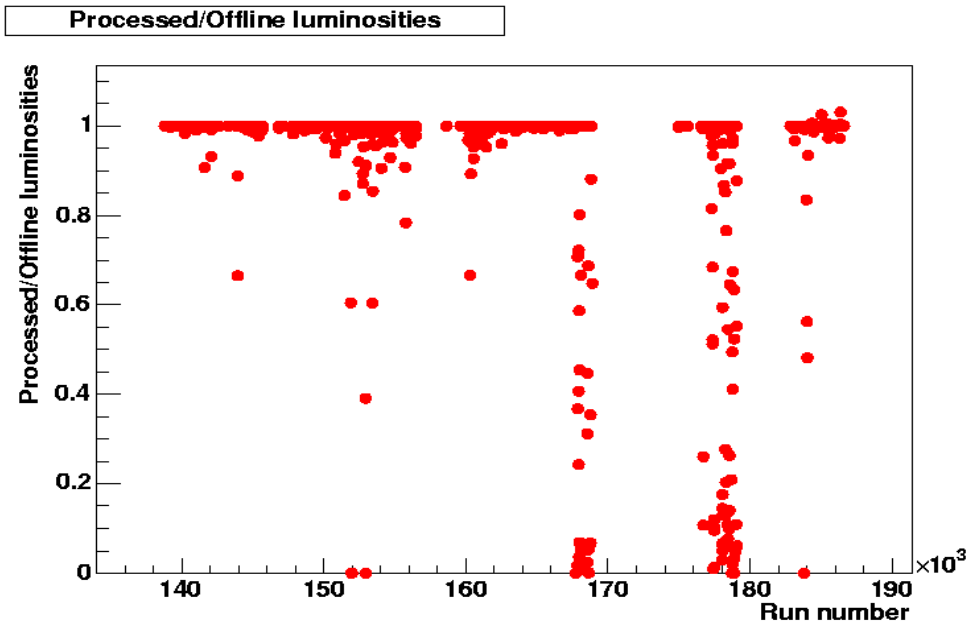
Trigger: MET35+2jets





Some drops at the end of run periods...

RUN	Dataset	Database (pb-1)	Processed (pb-1)
167954	emet0d	0.639	0.008
167954	bhmu0d	0.639	0.639



SUMMARY:

For runs<179096 (pb^{-1}) --> **249.274** (DB: 267.829)
For all emet0d (pb^{-1}) --> **363.482** (DB: 382.858)

(5%-10% losses)

MCs for backgrounds

- QCD:

QCD pthat bin (GeV)	Events in the bin	Events passing clean up cuts	Events passing MET>35 GeV	Sigma of the bin (pb)	Estimated events ($400pb^{-1}$)
0<pthat<10	$7.86*10^4$	1	0	$3.38*10^{10}$	$1.35*10^{13}$
10<pthat<18	$8.84*10^5$	403	0	$5.01*10^8$	$2.00*10^{11}$
18<pthat<40	**$3.87*10^6$**	**$8.12*10^4$**	**6**	**$4.90*10^7$**	**$1.96*10^{10}$**
40<pthat<60	**$3.25*10^6$**	**$5.13*10^5$**	**576**	**$1.12*10^6$**	**$4.48*10^8$**
60<pthat<90	**$7.69*10^5$**	**$1.94*10^5$**	**1620**	**$1.56*10^5$**	**$6.24*10^7$**
90<pthat<120	$1.02*10^6$	$3.19*10^5$	$1.22*10^4$	$1.60*10^4$	$6.4*10^6$
Pthat>120	$1.79*10^6$	$6.53*10^5$	$7.49*10^4$	$4.10*10^3$	$1.64*10^6$

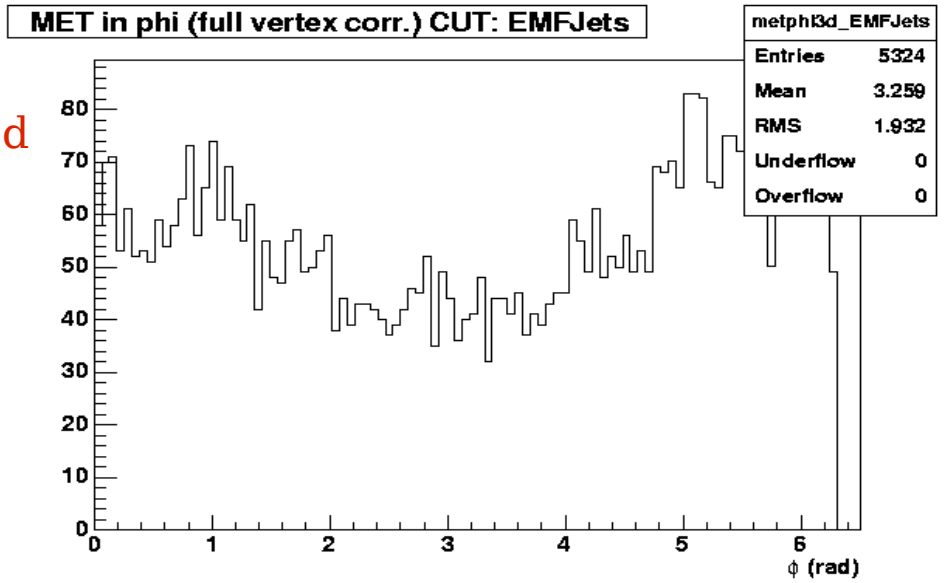
TAKES TIME!!!

- Already generated: Pythia pthat>60GeV with a MET cut of 30 GeV (luminosity ~ 7.8 pb^{-1})
- With Spanish Tier1, we are doubling pthat>120 GeV sample and we are generating $400pb^{-1}$ of pthat>90 with a MET cut of 25 GeV.

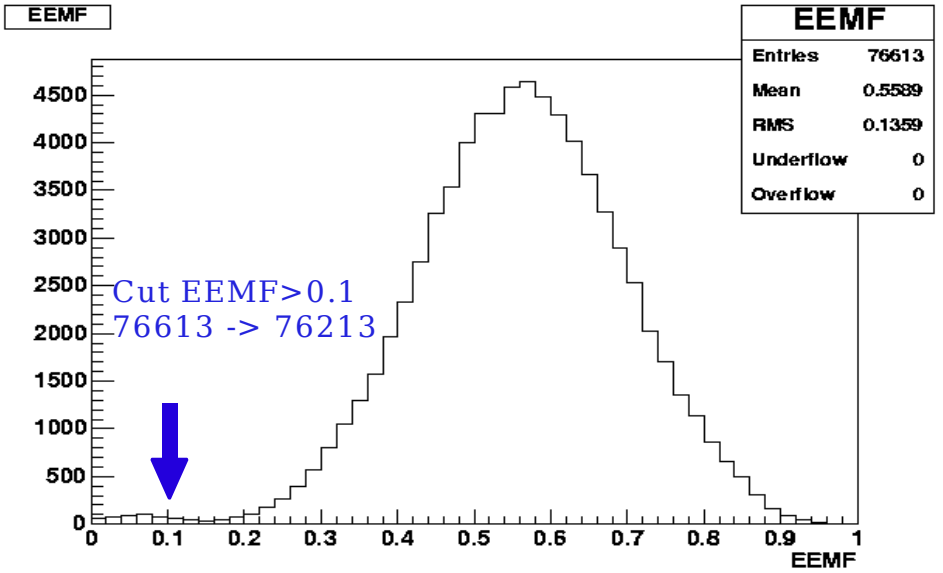
- W(->l ν)+ 3 jets (where l=e,μ)
- W(->τ ν) + 2 jets
- Z->νν + 3 jets (main intrinsic background)
- ttbar (m_t=175GeV)
- WW
- Others that will come: single top, Z->ee+jets... (less importants)

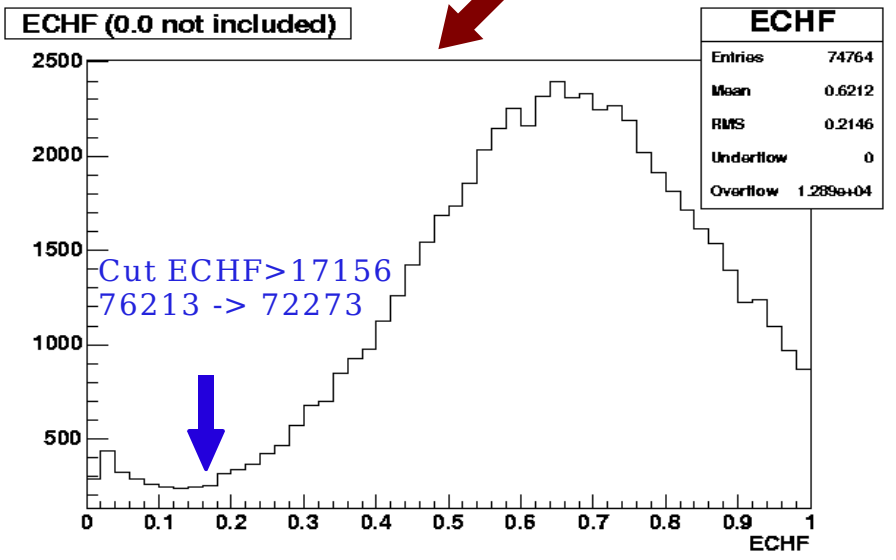
Data out of Blind Box and after cuts

Still some background to clean up!!!



Warning!!! 0 bin not included (1449 events)

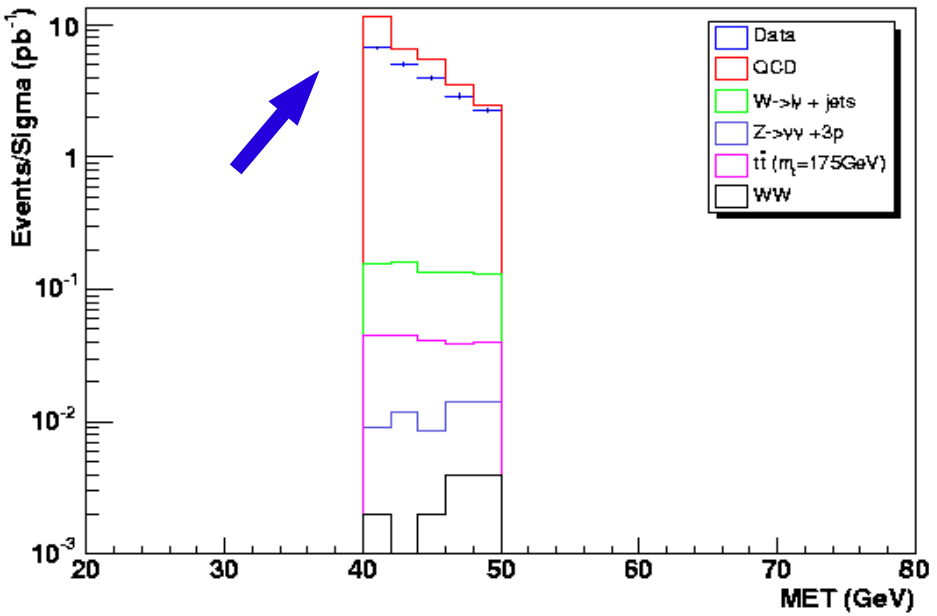




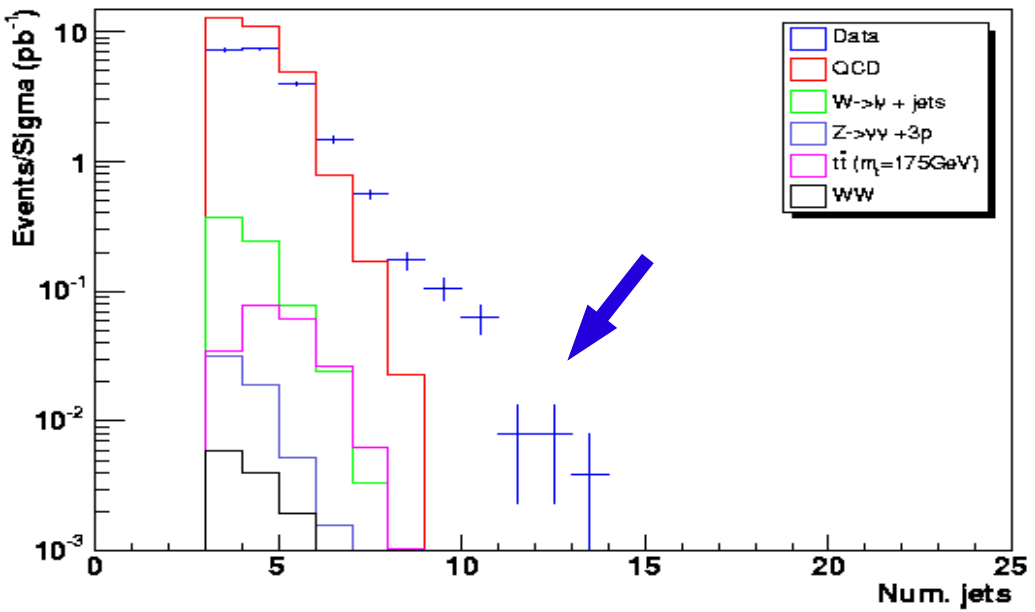
We need to further study the clean up cuts

Data and MCs out of the BB (1)

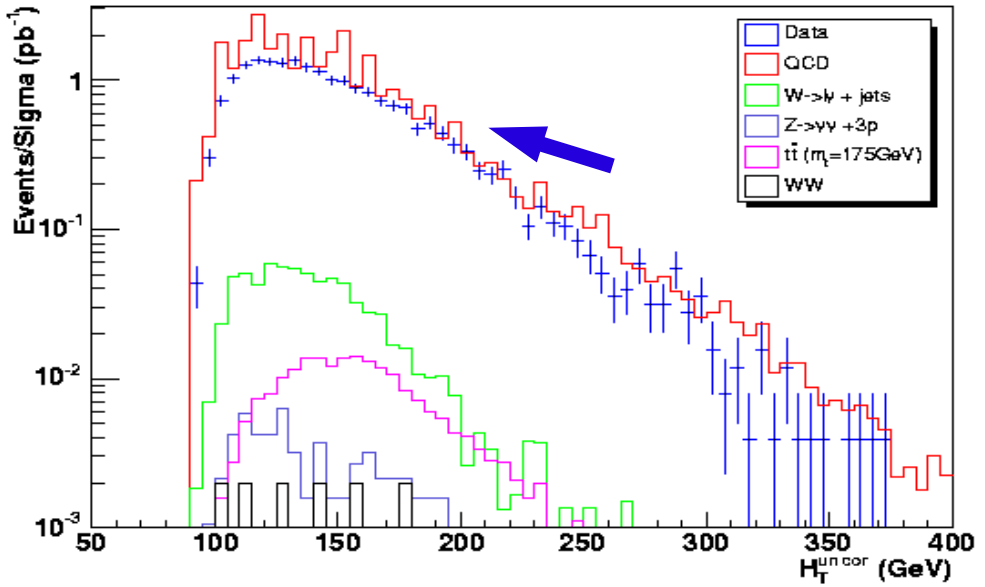
MET after all cuts



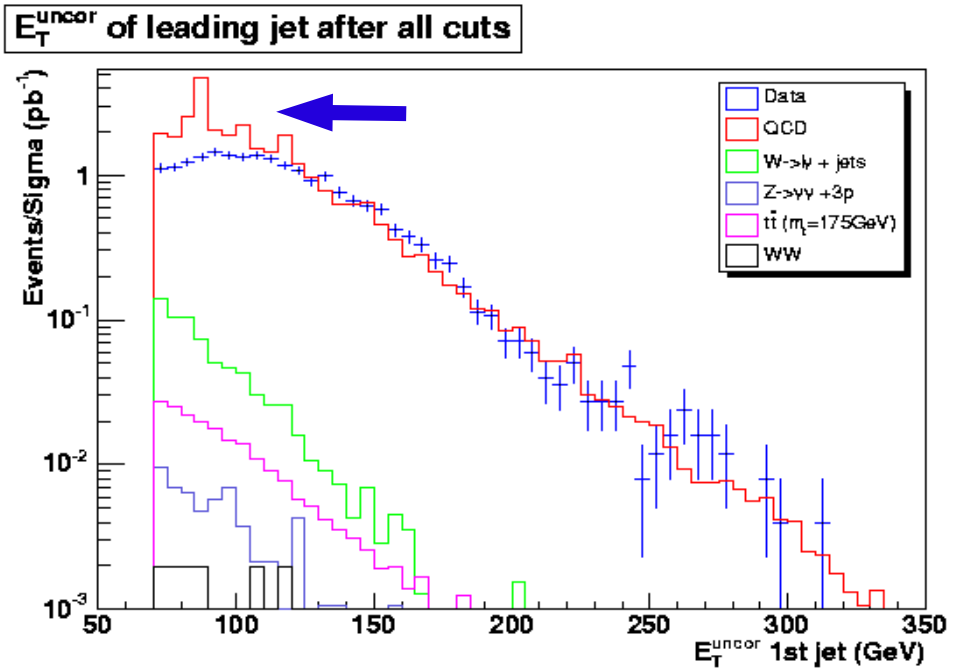
NJets after all cuts

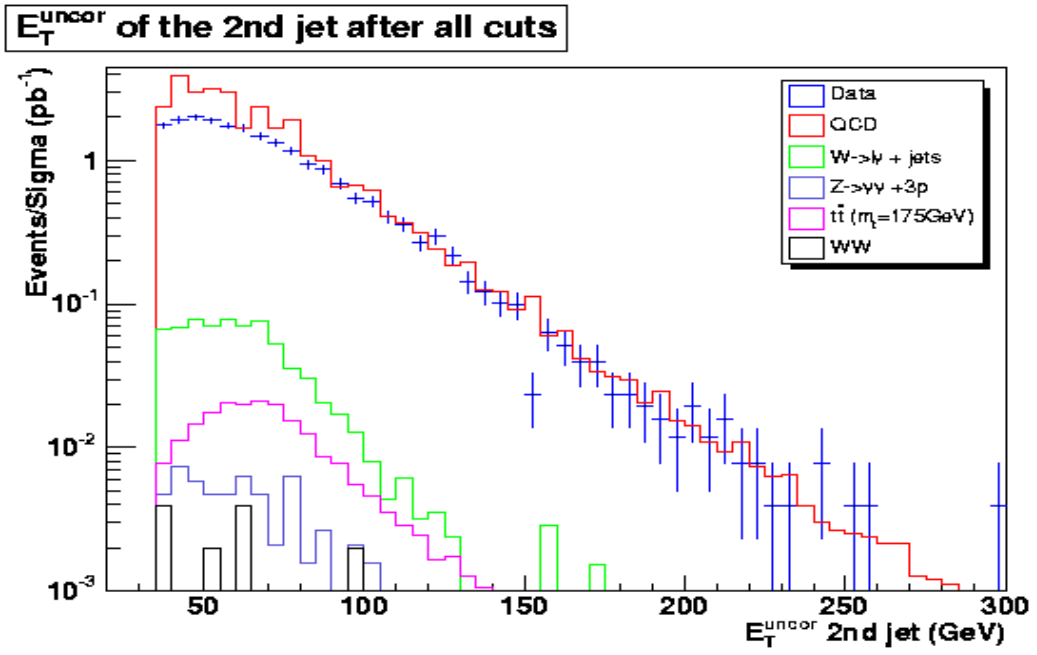


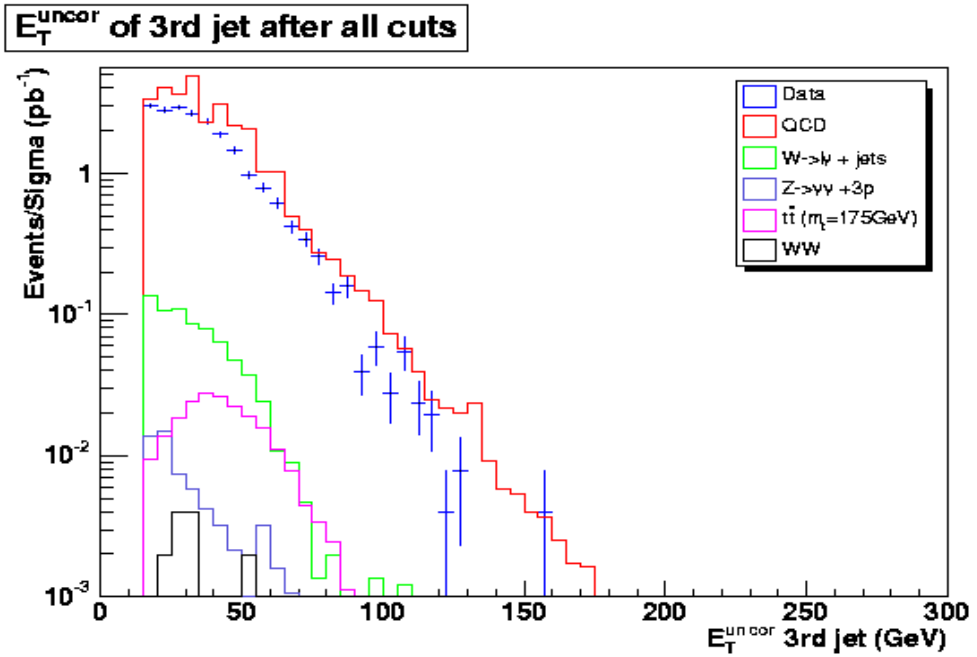
$H_T^{uncor} \equiv E_{T_2}^{uncor} + E_{T_3}^{uncor}$ + MET after all cuts



Data and MCs out of the BB (2)







Next...

- Finish the study with all MC samples (QCD, Z->ll, single top...) Try to find a better way to normalize them.

- Study the trigger efficiencies in more detail.

- Study the efficiency of the cuts and possibly introduce some more. Study which clean up cuts (muons, beam-halo) can be finally applied.

- Cross check all the results with the second analysis [Dan McQueen; he is using Sntuples]