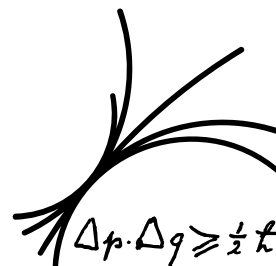




# Update on the event selection for l+jets channel

reducing QCD contamination

Giorgio Cortiana




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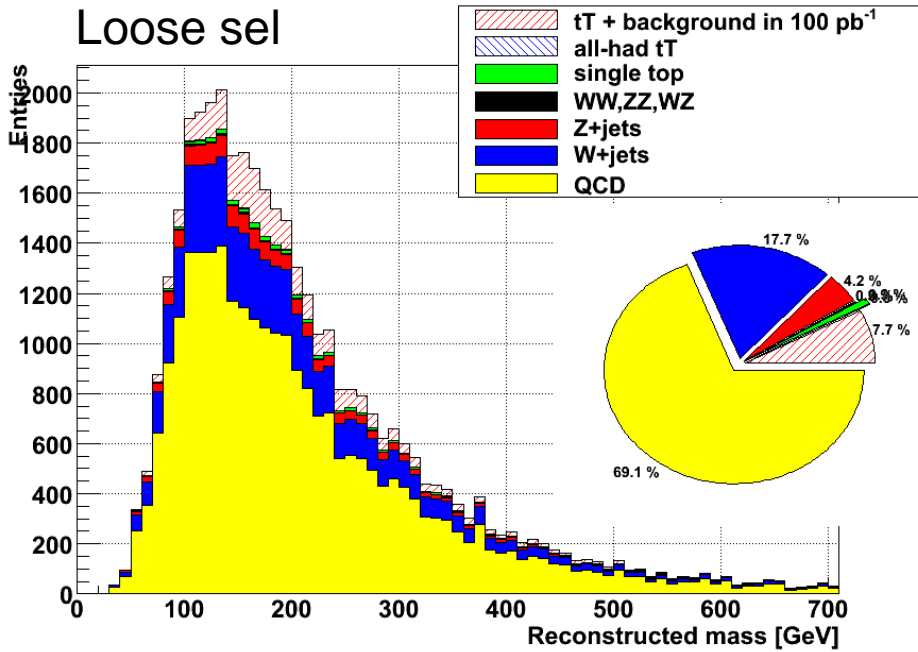
Max-Planck-Institut für Physik  
(Werner-Heisenberg-Institut)

# Event selection so far

- In our previous event selection lepton-jet overlap removal was wrong for muons, because it allowed muons from semi-lep decay to be kept, while rejecting the jet in which the muon was found. This faked our hadronic top reconstruction.
- The proposal was to revisit our jet-lepton overlap removal procedure as in the following:
  - Look for electrons above 20 GeV
  - Look for jets above 20 GeV
    - If a selected electron is found inside a jet, drop the jet from the list.
    - This could be improved by looking at the EM fraction of the jet (will be implemented in the future).
  - Look for muons above 20 GeV
    - If a selected muon is found inside a jet, drop the muon from the list
  - The outcome should be:
    - List of good isolated electrons
    - List of good jets, including those with a muon from semi-leptonic decays
    - List of good isolated muons (not inside jets)
    - (\*) isolated leptons could be defined using `etcone40` instead of `etcone20`

# new sel: ele-channel

Loose sel



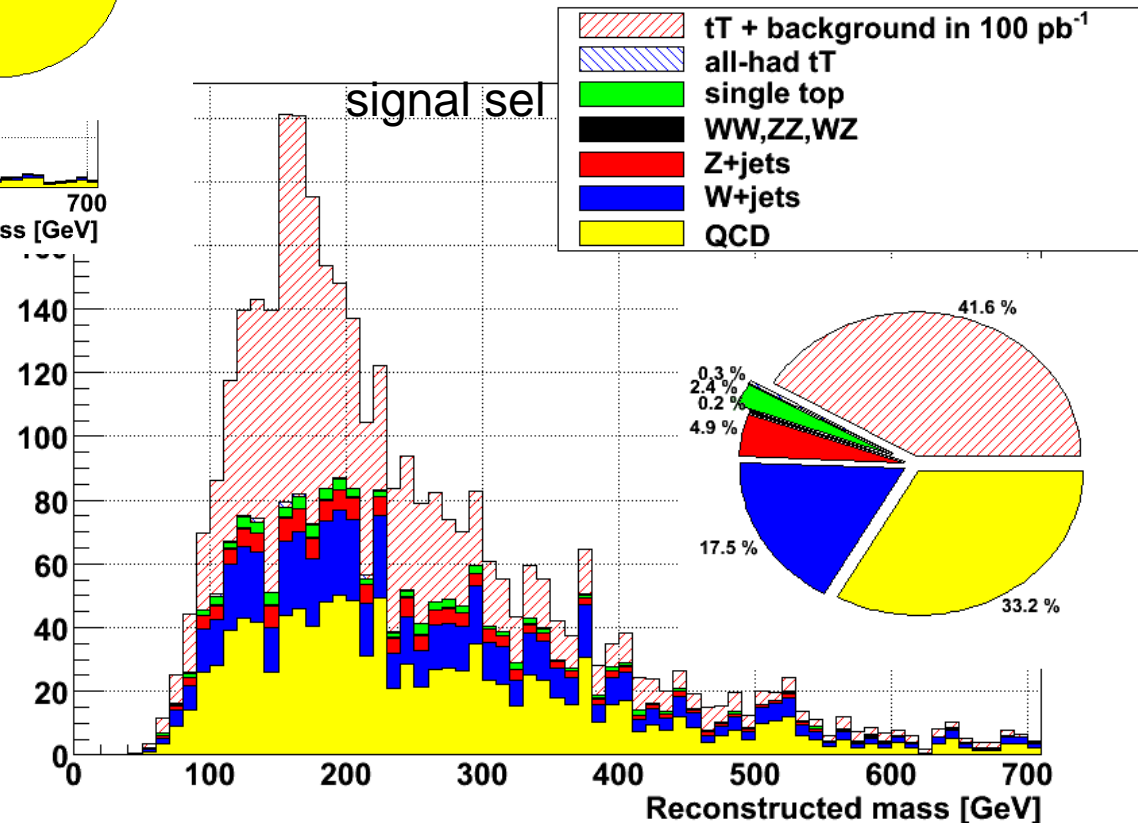
Reminder:

The loose selection was developed to apply the matrix-method to determine W/Z normalization in a semi-data-driven method (topmix exercise v1/v2):

1 iso lep  $p_T > 20$  GeV

at least 3 jet  $p_T > 20$  GeV

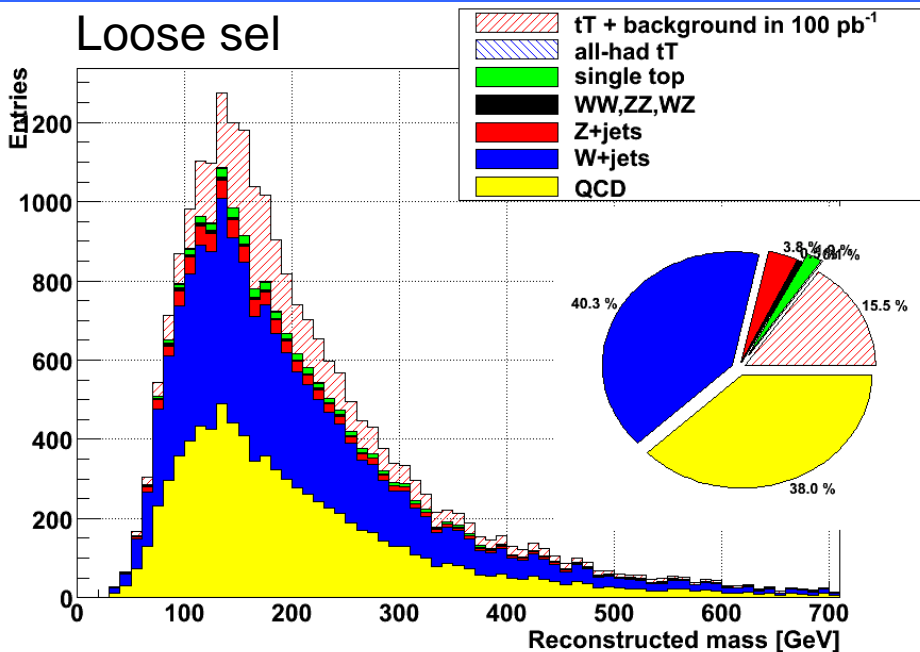
signal sel



Note: the QCD normalization taken from J2-J6 samples but the shape is from W+jets

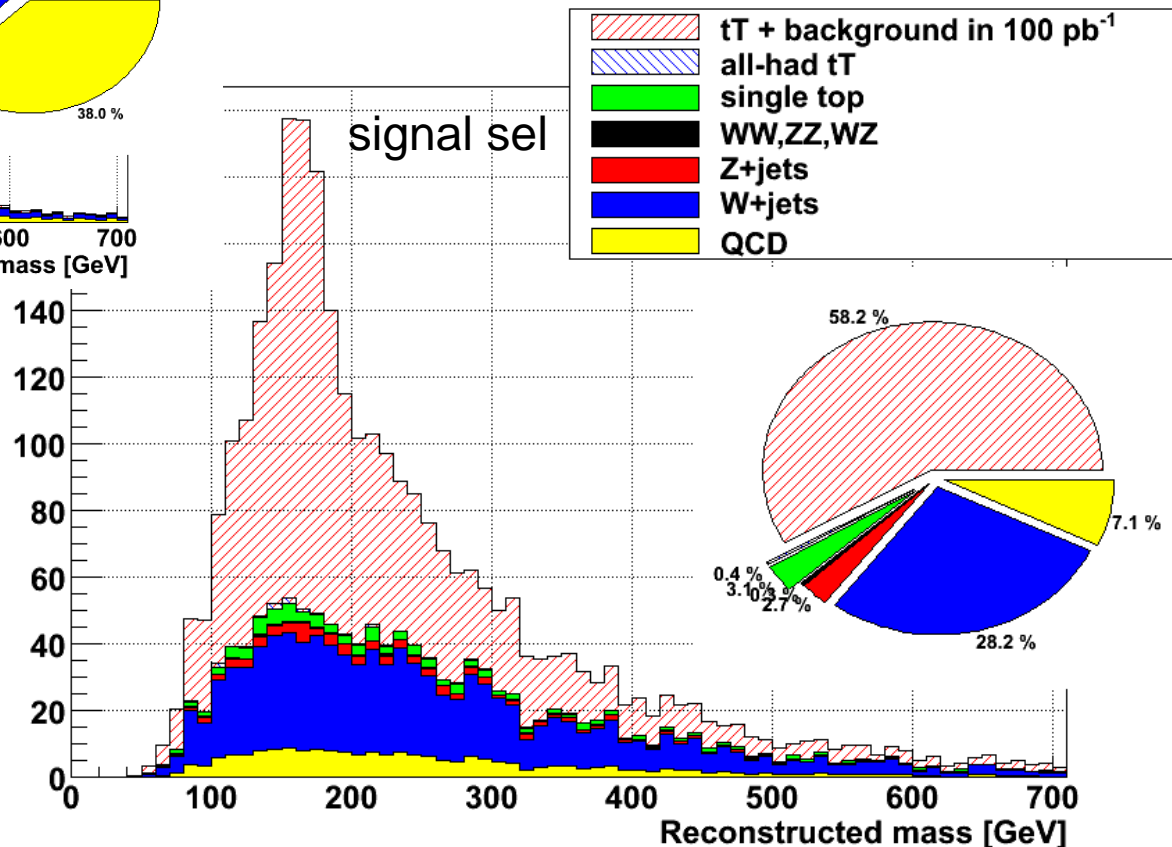
# new sel: muo-channel

Loose sel



QCD contamination is higher in the Ele-channel due to different isolation Criteria applied (muons inside a jet are dropped, while for electron the jet is dropped)

signal sel

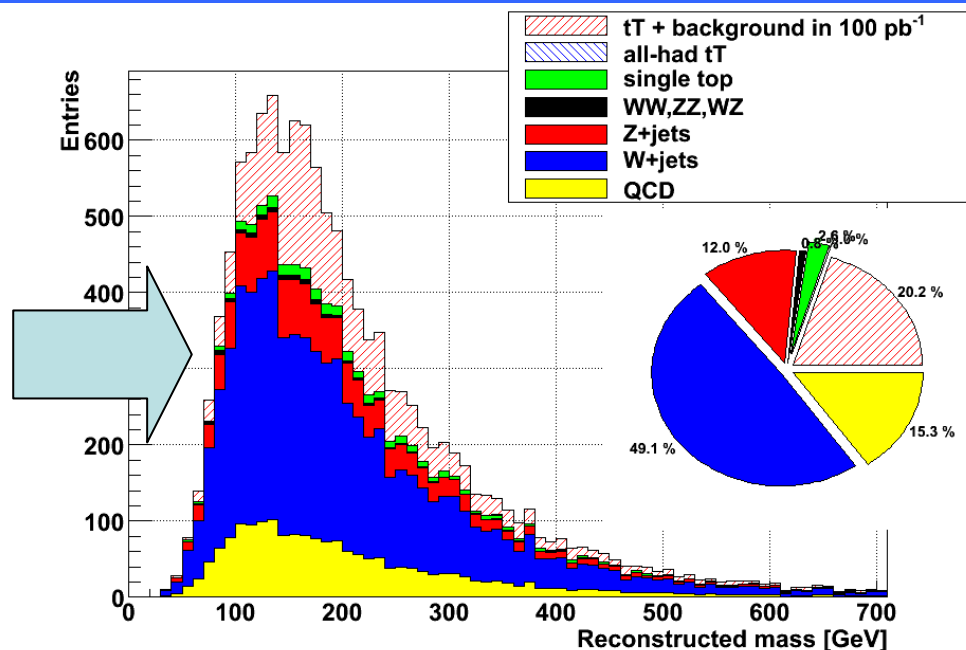
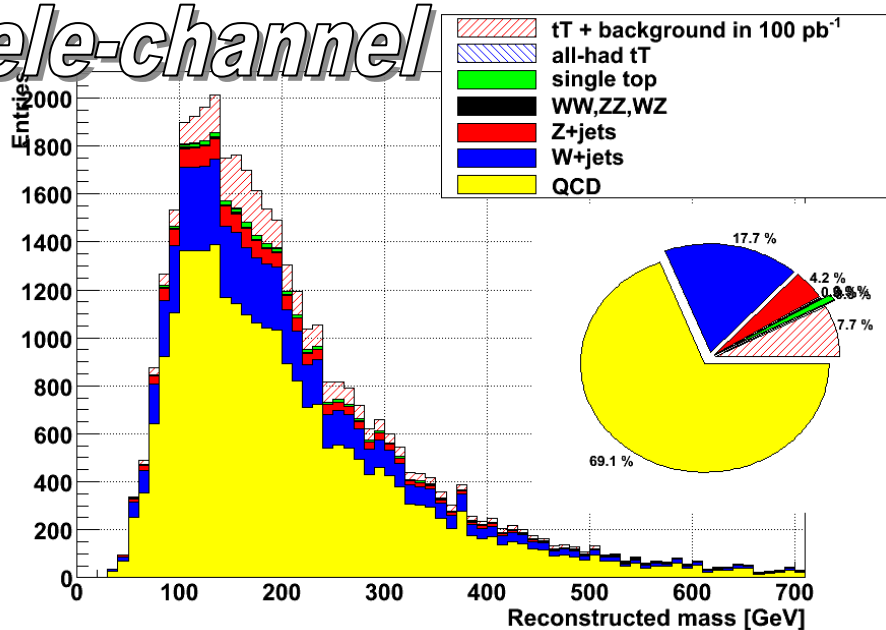


# Selection results, with tighter lep iso

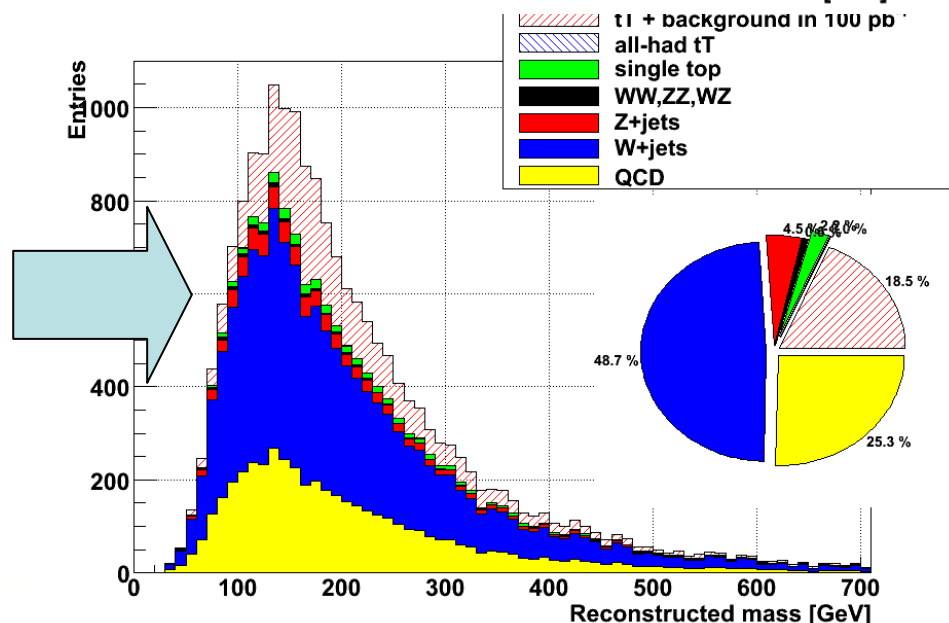
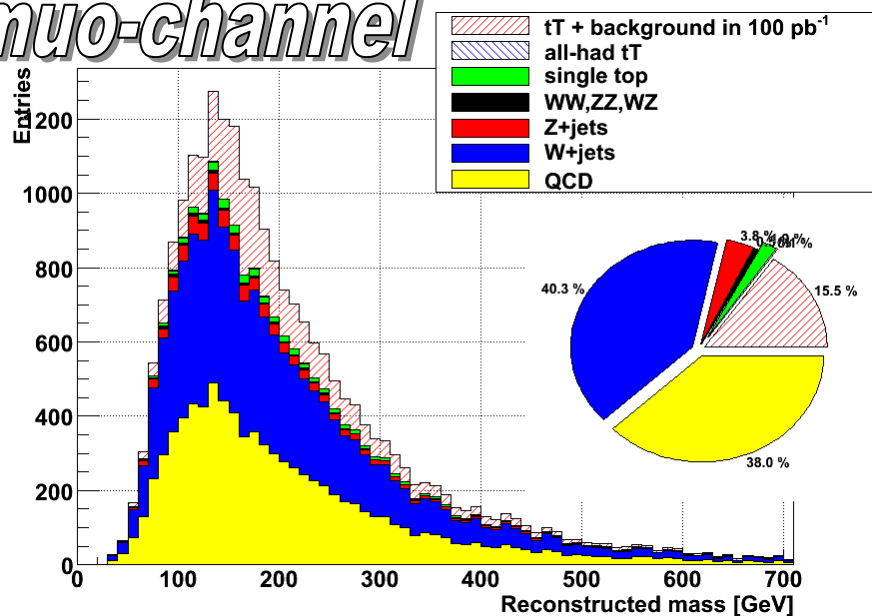
- We can tighten the isolation requirement for leptons. Using a  $\text{etcone40} < 6 \text{ GeV}$  (the default was  $\text{etcone20} < 6 \text{ GeV}$ )

# Loose sel results, with tighter lep iso

*ele-channel*

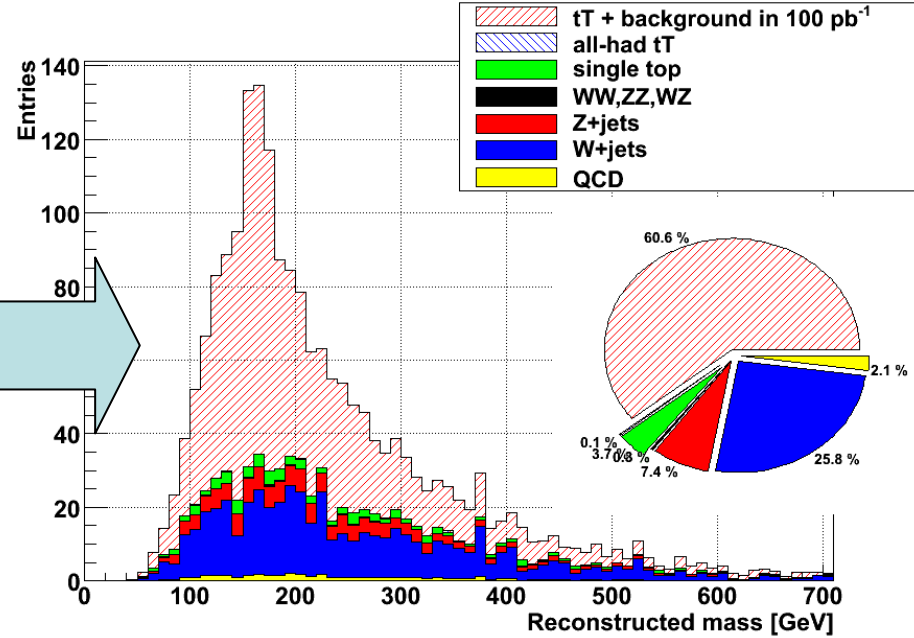
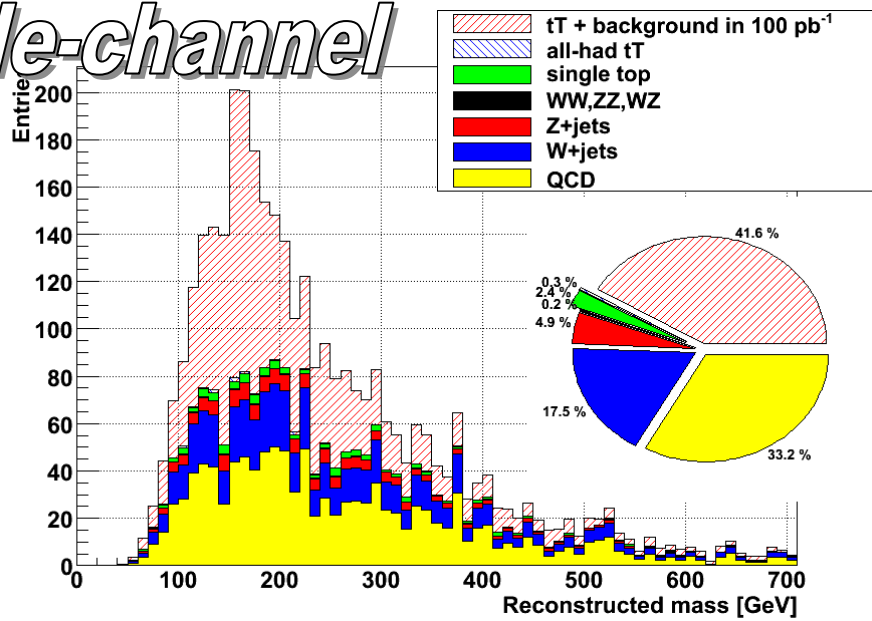


*muo-channel*

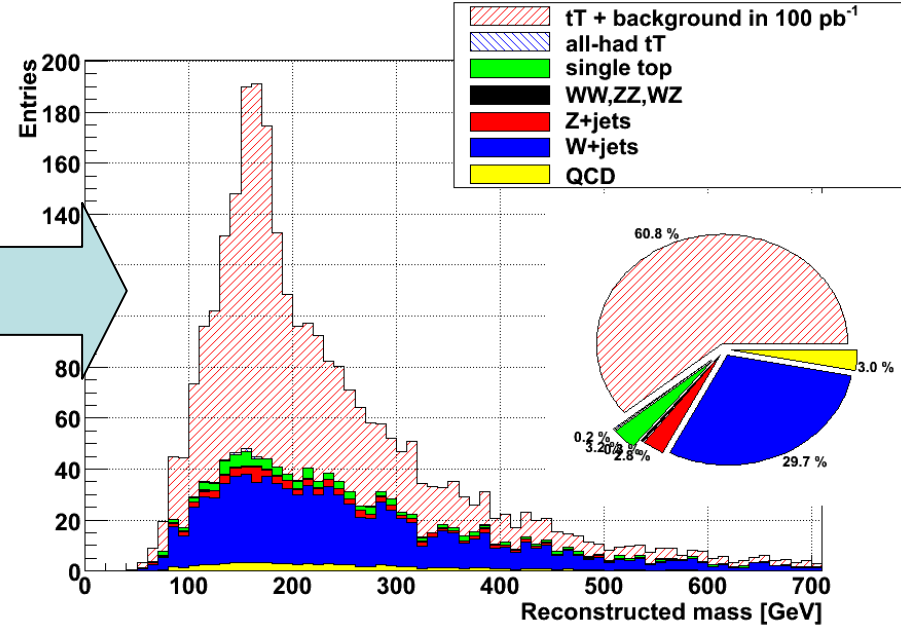
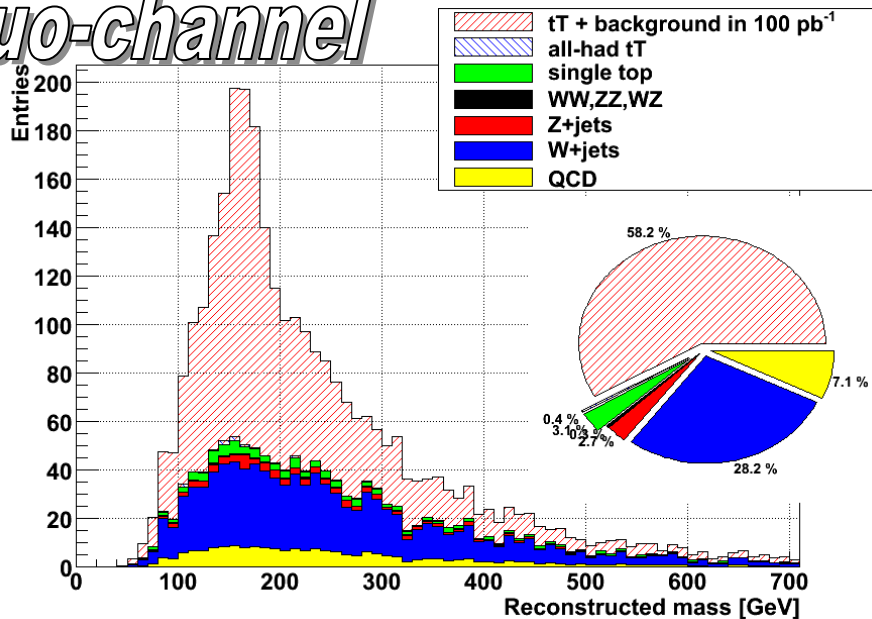


# Signal sel results, with tighter lep iso

*ele-channel*



*muo-channel*



# Signal sel results, with tighter lep iso

*ele-channel*

Expected events in 100 pb<sup>-1</sup>

Looser  
iso

Process	DPD filter	Trigger	$N_{lep}$	HEC veto	$N_{jet}^{Pr20} \geq 3$	$N_{jet}^{Pr20} \geq 4$	$N_{jet}^{Pr40} \geq 3$	$N_{jet}^{Pr40} \geq 3$
ttbar ACER MC	16461±0	5842±27	3339±23	2870±22	2497±20	1726±17	1219±15	1477±16
Wenu	117139±0	88130±195	70388±226	62869±232	5698±62	1292±31	472±17	567±19
Wmunu	57088±0	902±21	11±3	10±3	3±2	0±2	0±2	0±2
Wtaunu	31042±0	4836±48	3375±41	2992±39	332±13	79±7	42±5	46±6
Wbb	779±0	257±3	181±2	157±2	56±1	21±1	10±1	12±1
Zee	28610±0	25548±27	12751±46	11205±45	1353±9	332±4	134±2	157±3
Zmumu	5567±0	112±3	0±1	0±1	0±1	0±1	0±1	0±1
Ztautau	5797±0	1316±15	865±13	773±13	126±3	35±1	15±1	17±1
dibos	1755±0	780±6	545±6	487±6	98±3	20±1	6±1	7±1
single top	3072±0	1074±10	759±9	667±9	323±7	130±4	76±3	87±4
all had top	14927±0	567±11	3±1	3±1	3±1	3±1	2±1	11±2
QCD	315487136±0	2919003±1783	121483±130	105050±130	1893±93	83±80	42±64	1187±130

*muo-channel*

Expected events in 100 pb<sup>-1</sup>

Process	DPD filter	Trigger	$N_{lep}$	HEC veto	$N_{jet}^{Pr20} \geq 3$	$N_{jet}^{Pr20} \geq 4$	$N_{jet}^{Pr40} \geq 3$	$N_{jet}^{Pr40} \geq 3$
ttbar ACER MC	16461±0	6099±28	4516±25	3906±24	3502±23	2455±20	1771±18	1797±18
Wenu	117139±0	81±14	3±5	2±4	1±4	0±4	0±4	0±4
Wmunu	57088±0	33858±84	30340±84	27061±84	8590±59	2057±32	798±21	805±21
Wtaunu	31042±0	1910±28	1671±26	1487±25	536±17	127±9	52±6	52±6
Wbb	779±0	216±2	181±2	159±2	92±2	35±1	17±1	17±1
Zee	28610±0	5±1	0±0	0±0	0±0	0±0	0±0	0±0
Zmumu	5567±0	4366±14	2056±15	1838±14	675±8	170±4	63±3	63±3
Ztautau	5797±0	545±6	472±6	417±6	185±3	49±2	20±1	20±1
dibos	1755±0	456±6	358±5	318±5	121±3	29±2	10±1	10±1
single top	3072±0	967±10	797±10	691±9	424±8	173±5	93±4	95±4
all had top	14927±0	498±11	11±2	9±2	9±2	9±2	7±1	12±2
QCD	315487136±0	1240779±1742	112384±169	92333±157	4801±144	1937±104	86±80	222±113