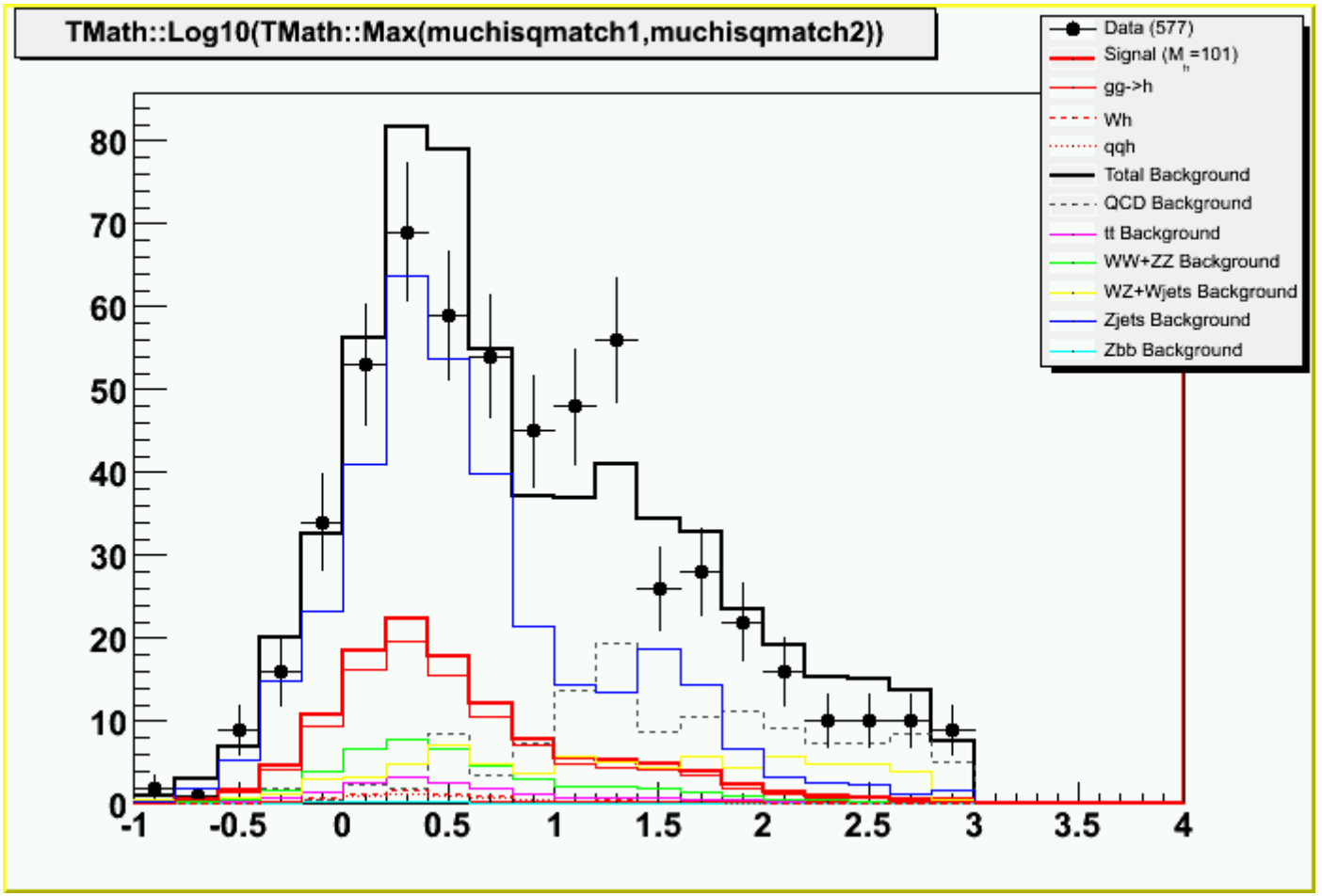
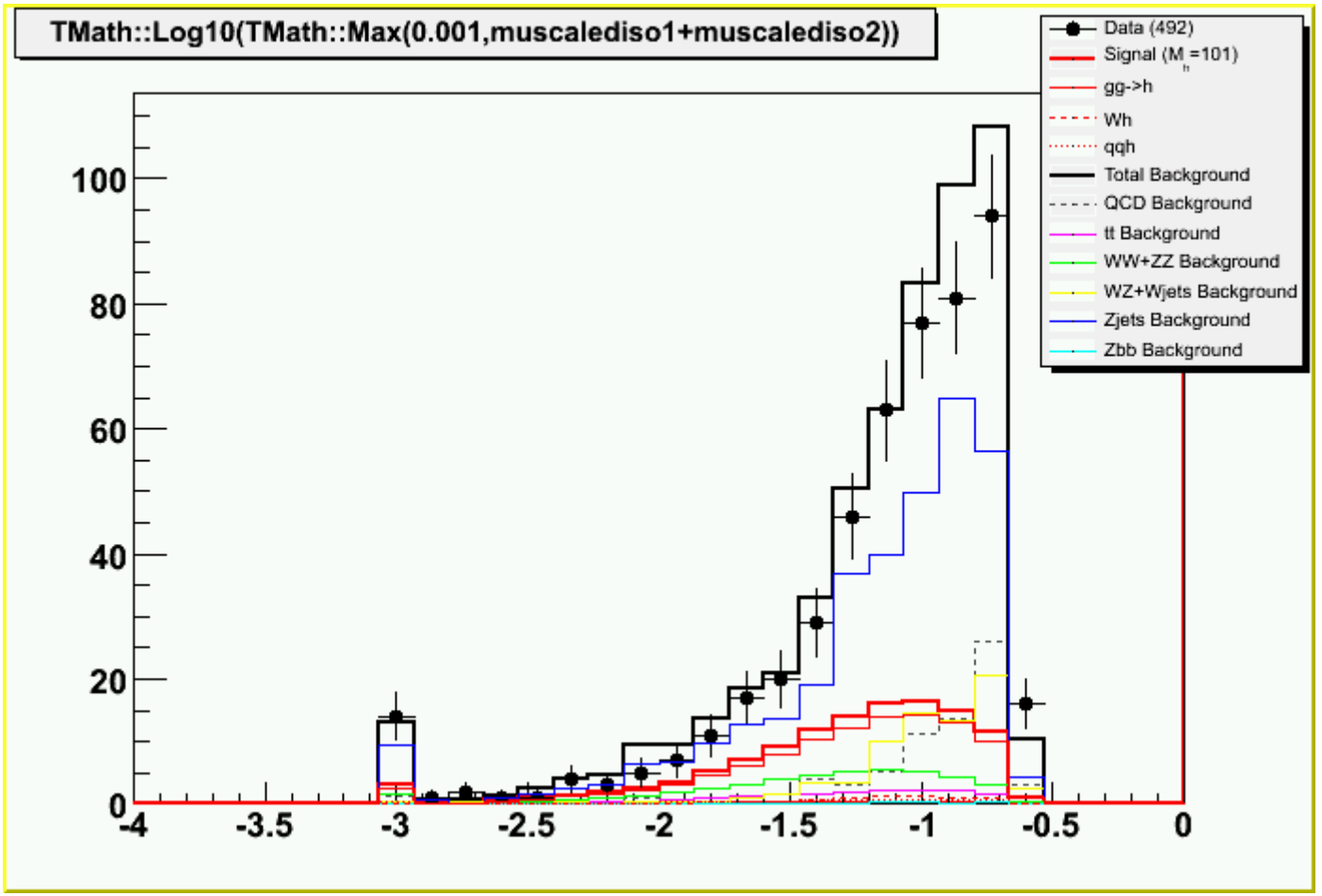
H->WW->mumu

W+jets and QCD have worse match between track+muon

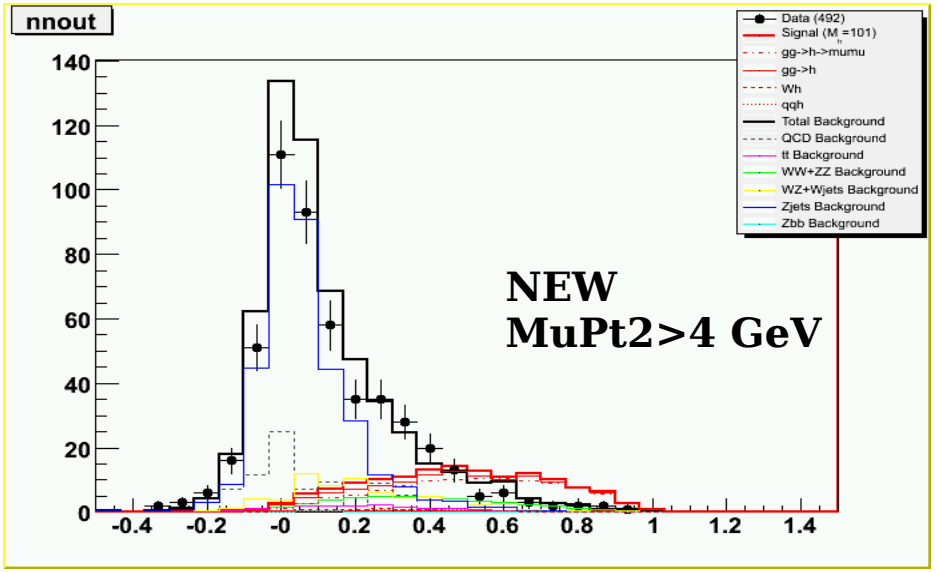


H->WW->mumu

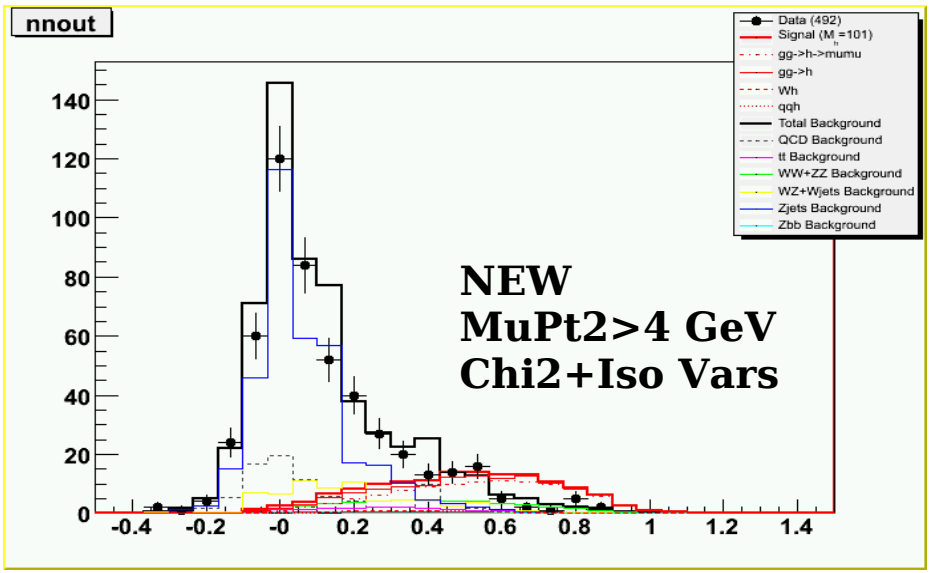
Can use isolation directly in NN now (since I'm using like-sign data for QCD)



H->WW->mumu



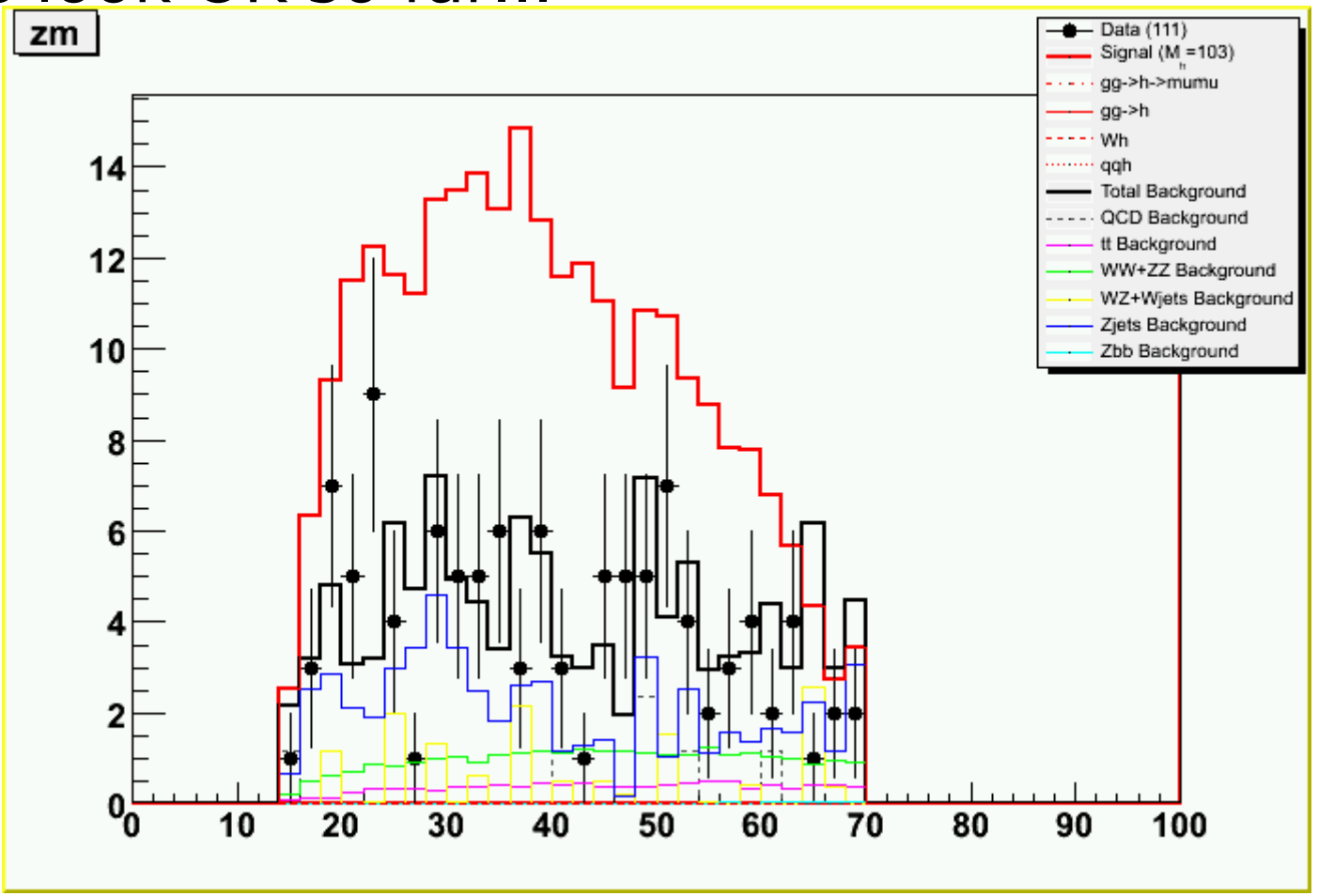
Data: 21
Signal: 63.6235 s/sqrt(b)=11.7459 at bin 0.5
  gg->h: 59.9682
  (gg->h->mumu: 57.0041)
  wh: 1.6357
  qqh: 2.01953
Tot Bgd: 29.3399
QCD: 2.65947
ttbar: 2.00978
WW+ZZ: 13.3984
WZ+Wj: 7.20127
Zj: 4.02791
Zbb: 0.0425777



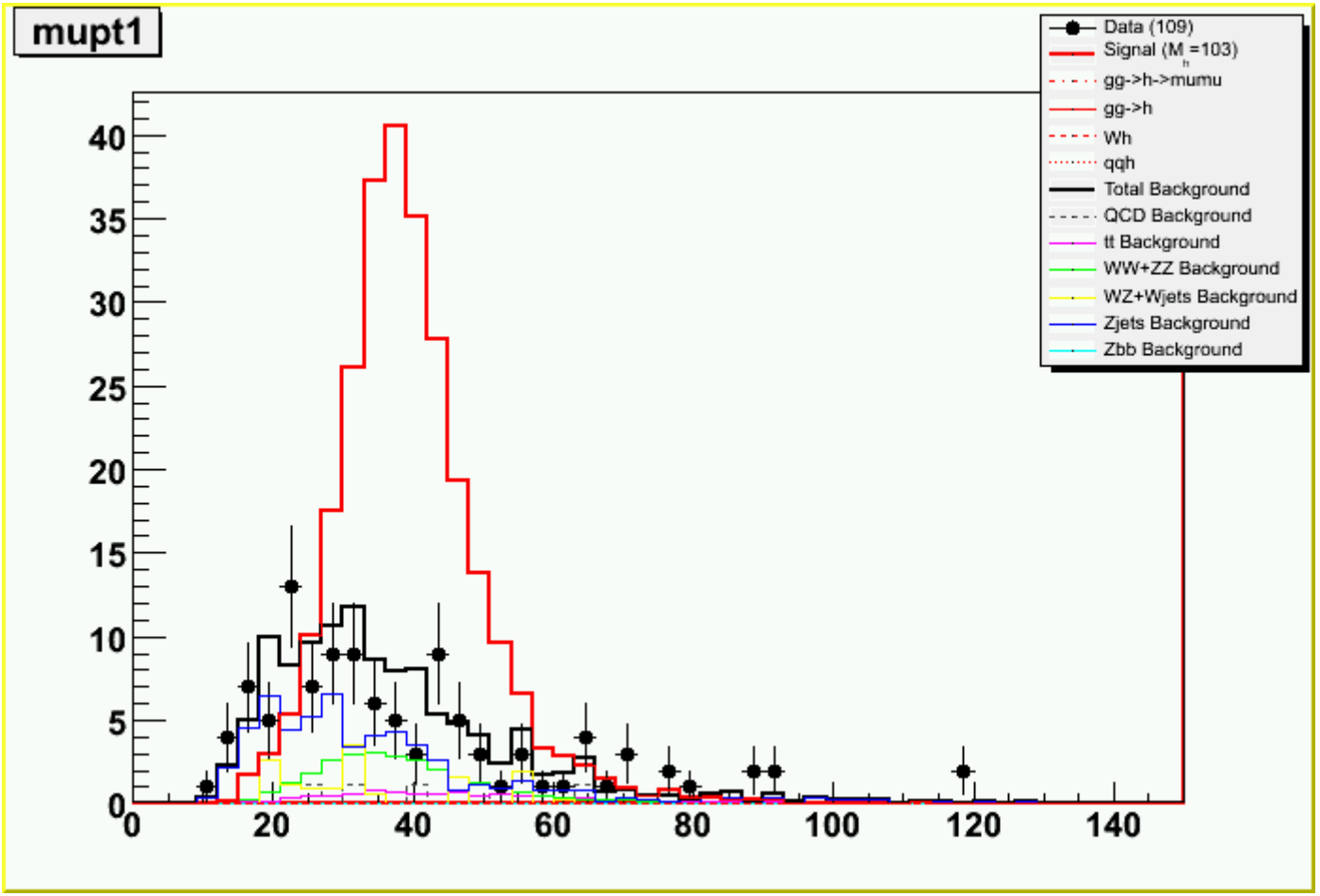
Data: 31
Signal: 70.1382 s/sqrt(b)=12.6734 at bin 0.5
  gg->h: 66.1264
  (gg->h->mumu: 61.4551)
  wh: 1.87703
  qqh: 2.13483
Tot Bgd: 30.6285
QCD: 1.87298
ttbar: 2.73402
WW+ZZ: 15.5592
WZ+Wj: 6.38368
Zj: 4.06429
Zbb: 0.0138503

H->WW->mumu

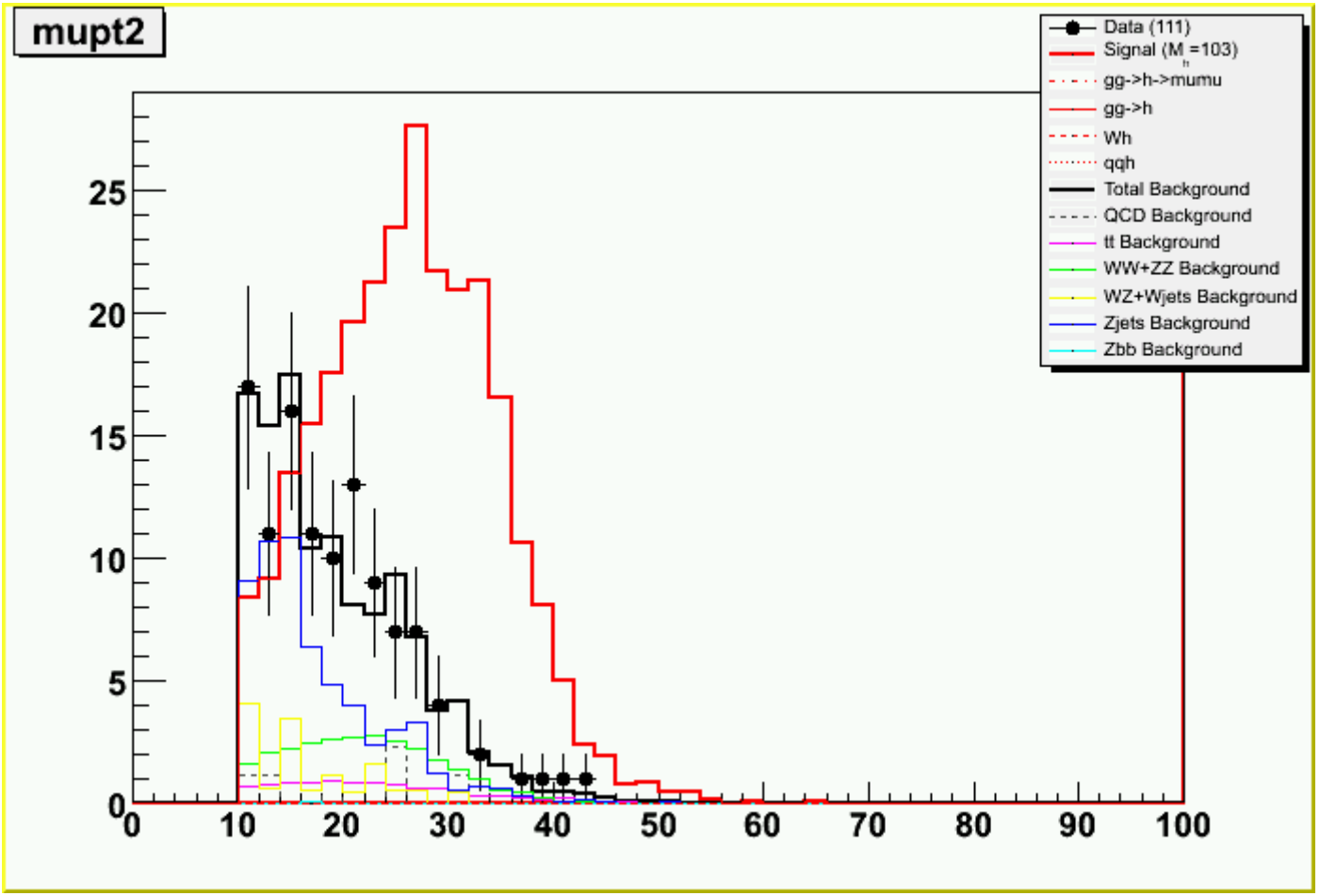
Now have p20 samples from Thomas
Variables look OK so far...



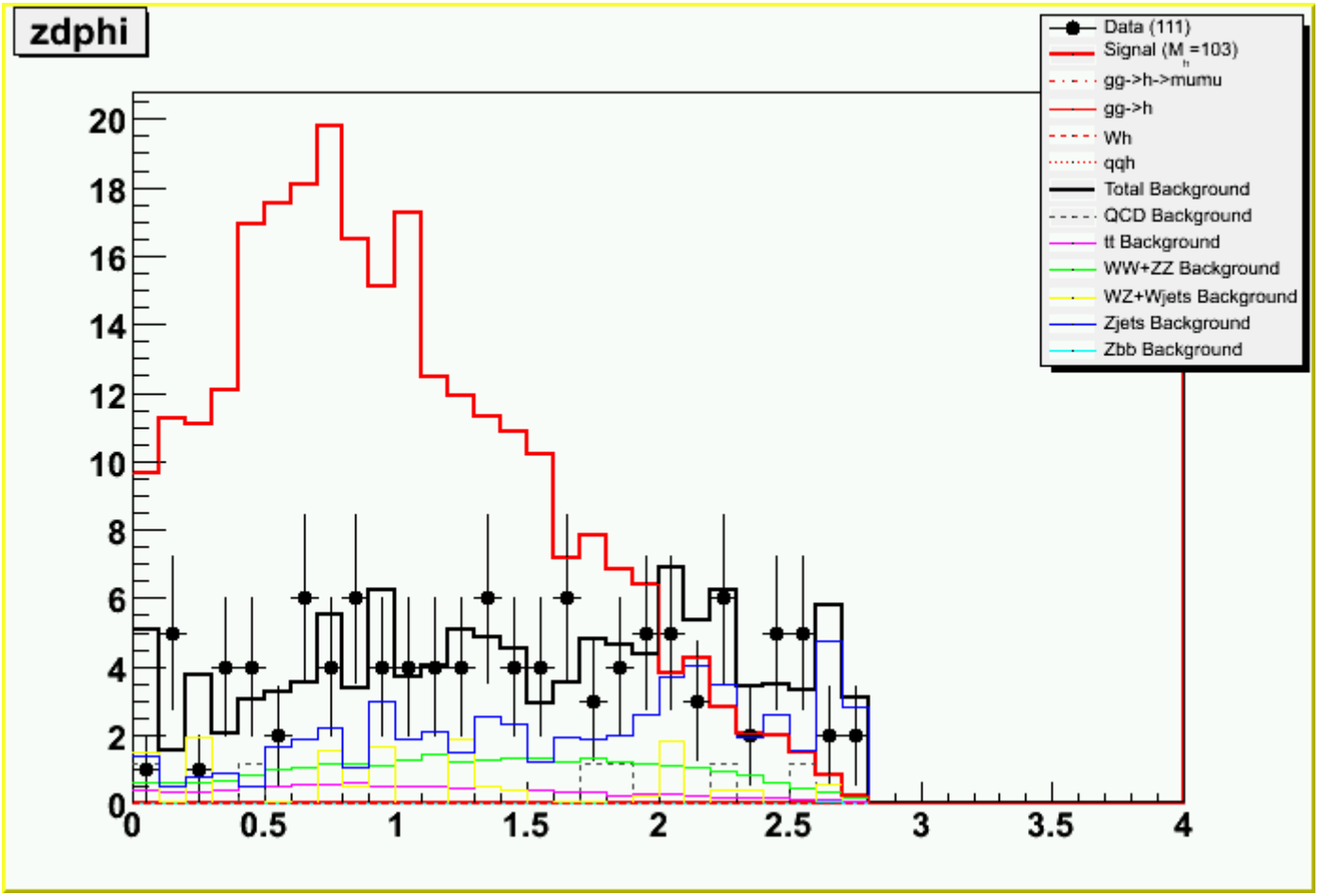
H->WW->mumu


mupt1
Data (109)
Signal (M =103)
h
gg->h->mumu
gg->h
Wh
qqh
Total Background
QCD Background
tt Background
WW+ZZ Background
WZ+Wjets Background
Zjets Background
Zbb Background
0
5
10
15
20
25
30
35
40
0
20
40
60
80
100
120
140

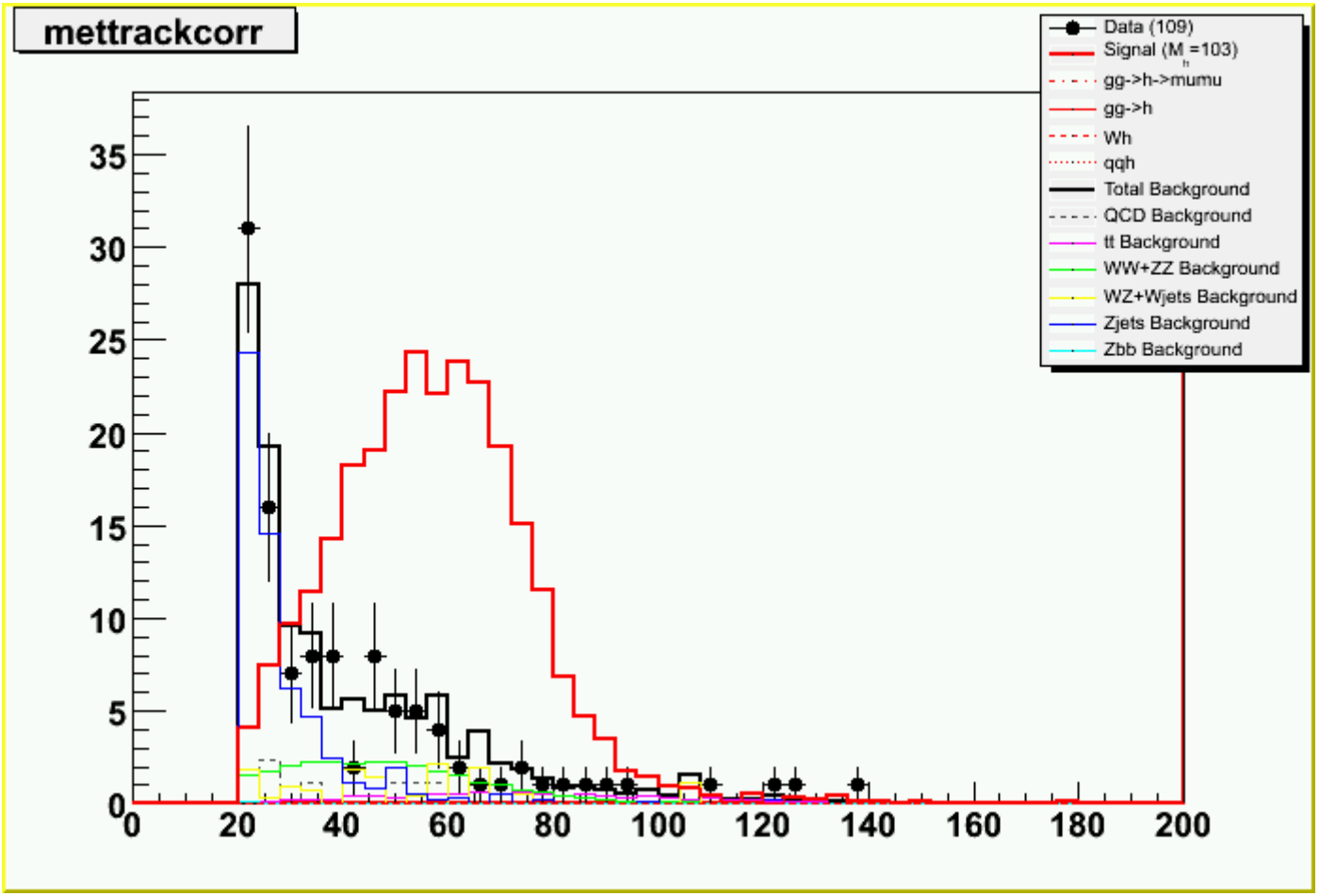
H->WW->mumu


mupt2
Data (111)
Signal (M =103)
h
gg->h->mumu
gg->h
Wh
qqh
Total Background
QCD Background
tt Background
WW+ZZ Background
WZ+Wjets Background
Zjets Background
Zbb Background
0
5
10
15
20
25
0
10
20
30
40
50
60
70
80
90
100

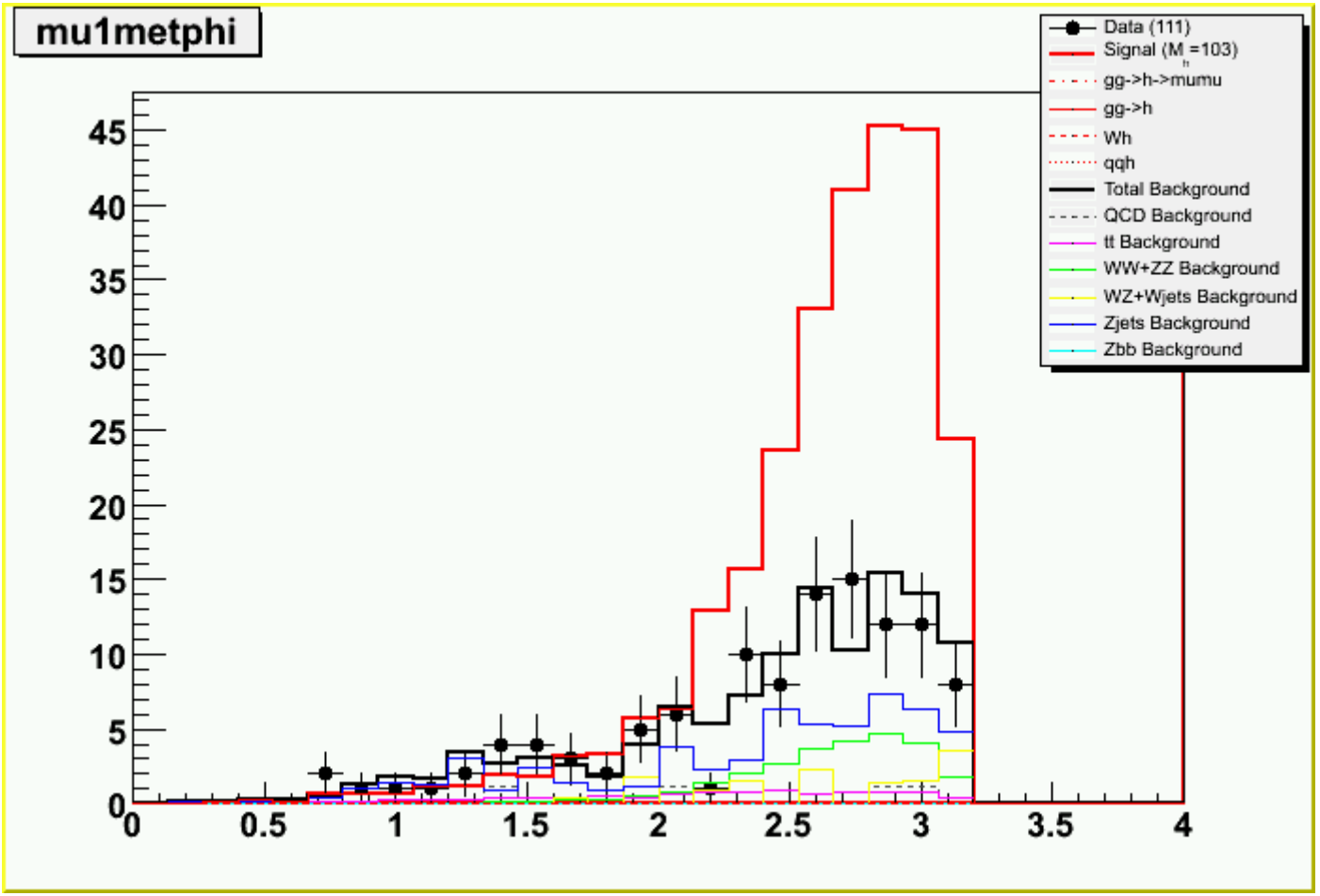
H->WW->mumu


zdphi
Data (111)
Signal (M =103)
h
gg->h->mumu
gg->h
Wh
qqh
Total Background
QCD Background
tt Background
WW+ZZ Background
WZ+Wjets Background
Zjets Background
Zbb Background
0
2
4
6
8
10
12
14
16
18
20
0
0.5
1
1.5
2
2.5
3
3.5
4

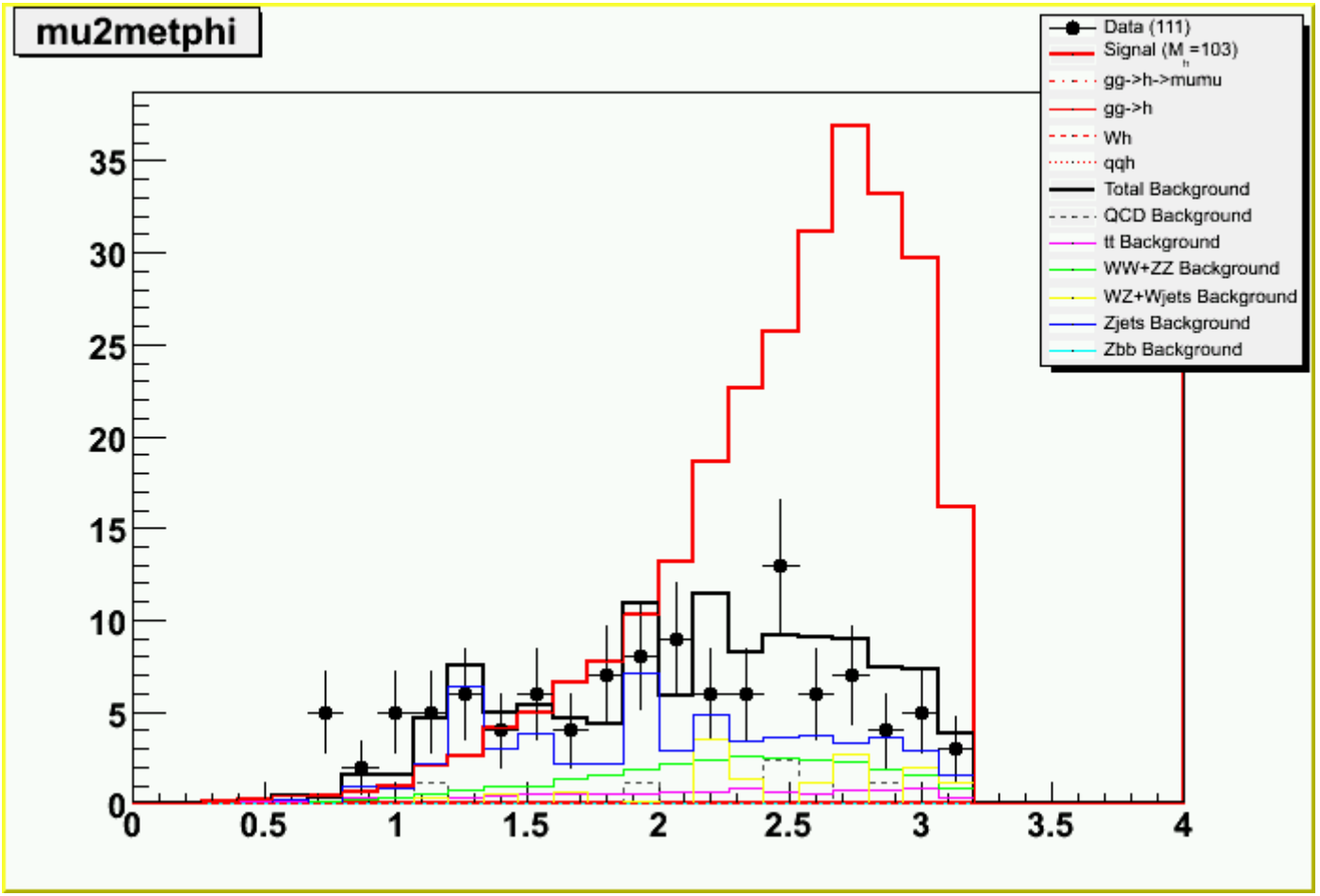
H->WW->mumu


mettrackcorr
Data (109)
Signal (M =103)
h
gg->h->mumu
gg->h
Wh
qqh
Total Background
QCD Background
tt Background
WW+ZZ Background
WZ+Wjets Background
Zjets Background
Zbb Background
0
5
10
15
20
25
30
35
0
20
40
60
80
100
120
140
160
180
200

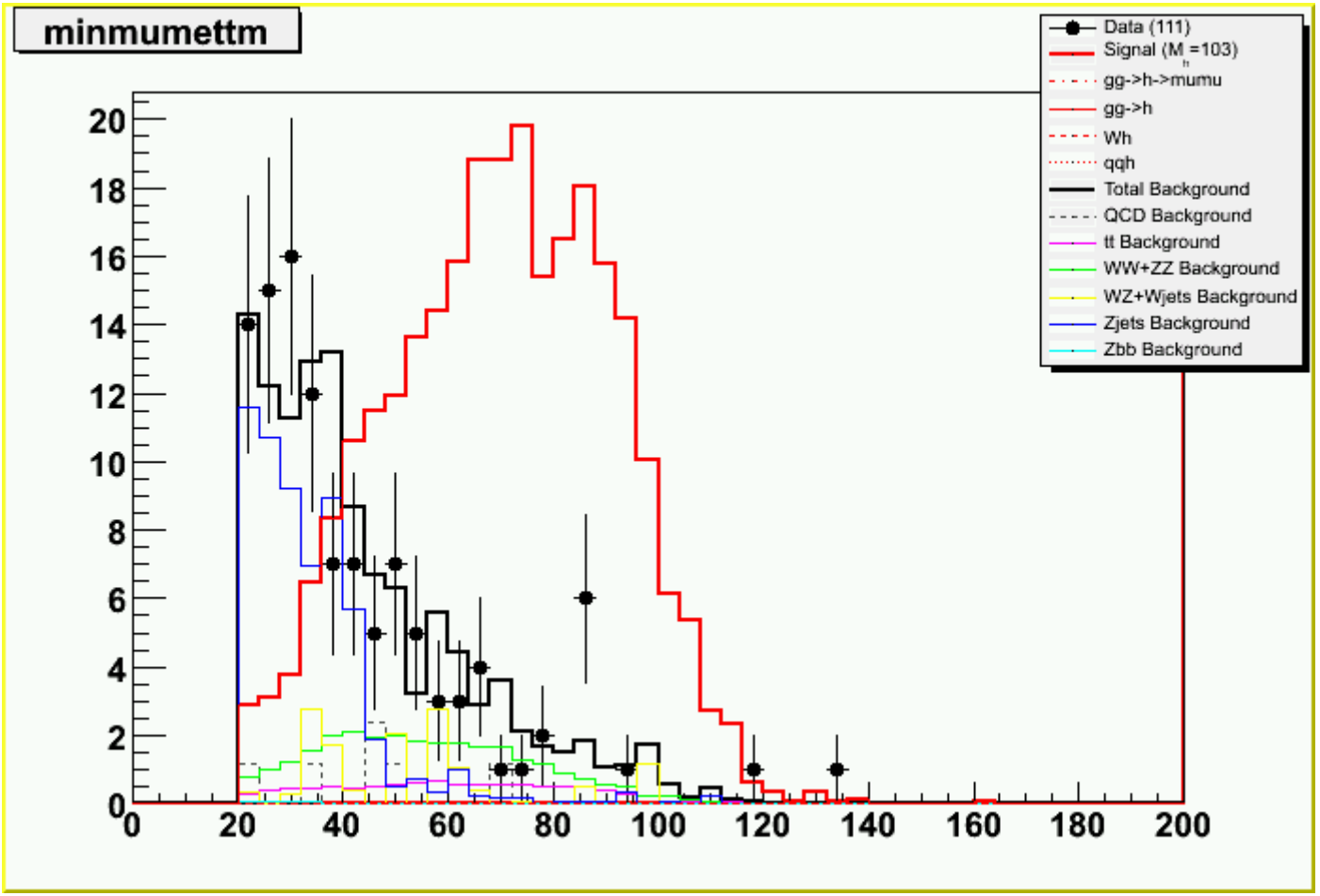
H->WW->mumu


mu1metphi
Data (111)
Signal (M =103)
h
gg->h->mumu
gg->h
Wh
qqh
Total Background
QCD Background
tt Background
WW+ZZ Background
WZ+Wjets Background
Zjets Background
Zbb Background
0
5
10
15
20
25
30
35
40
45
0
0.5
1
1.5
2
2.5
3
3.5
4

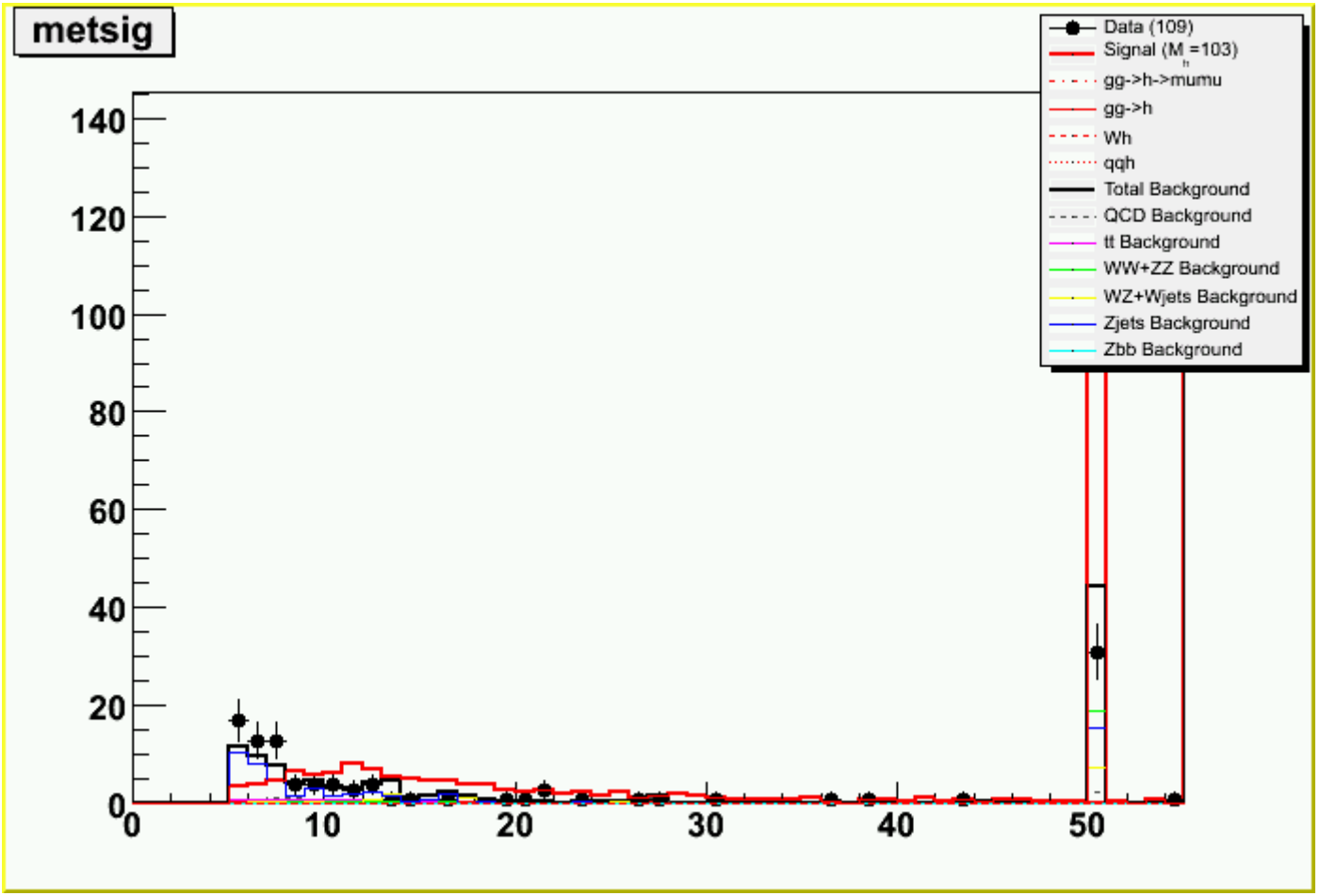
H->WW->mumu


mu2metphi
Data (111)
Signal (M_h=103)
gg->h->mumu
gg->h
Wh
qqh
Total Background
QCD Background
tt Background
WW+ZZ Background
WZ+Wjets Background
Zjets Background
Zbb Background
0
5
10
15
20
25
30
35
0
0.5
1
1.5
2
2.5
3
3.5
4

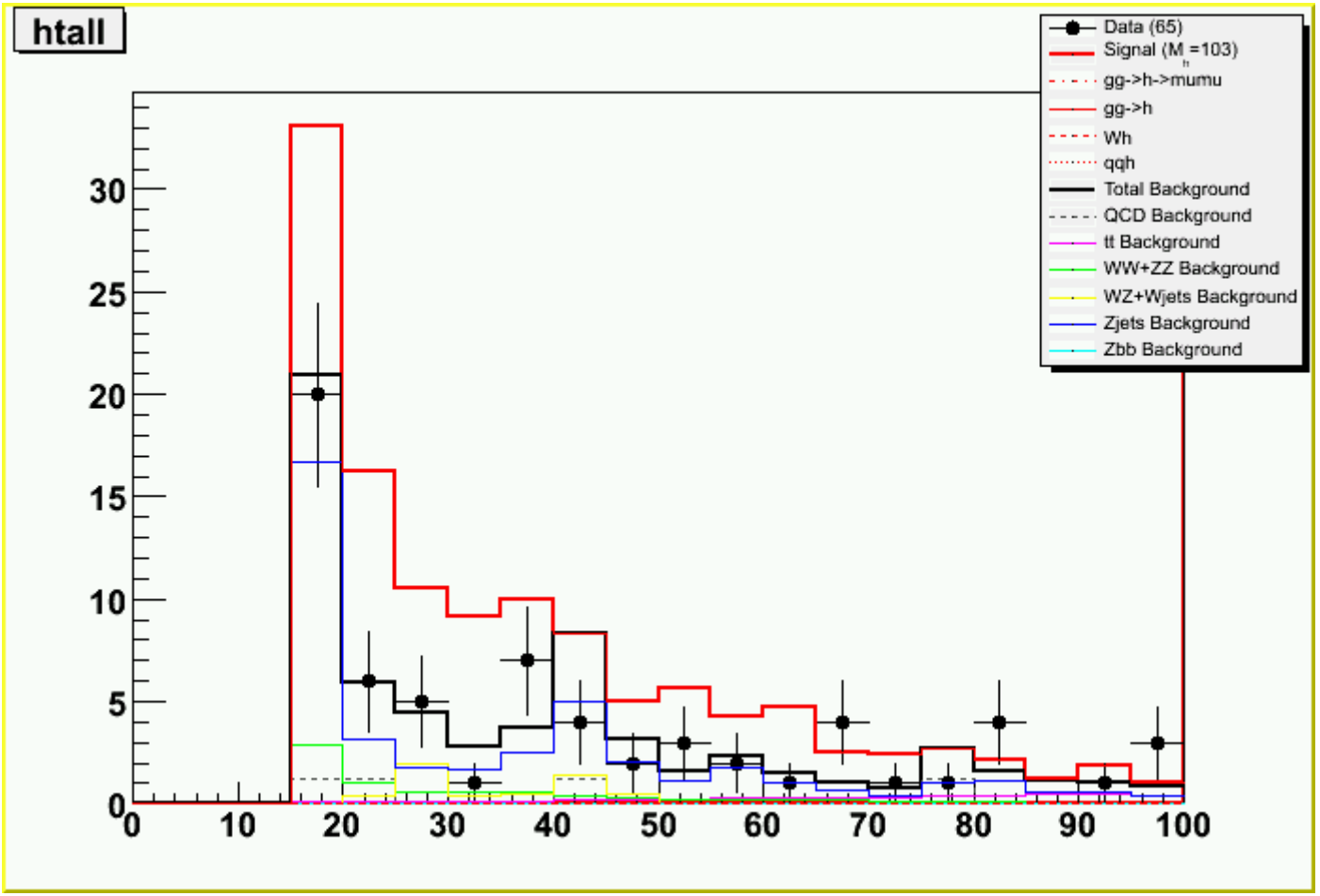
H->WW->mumu


minmumettm
Data (111)
Signal (M_h=103)
gg->h->mumu
gg->h
Wh
qqh
Total Background
QCD Background
tt Background
WW+ZZ Background
WZ+Wjets Background
Zjets Background
Zbb Background
0
2
4
6
8
10
12
14
16
18
20
0
20
40
60
80
100
120
140
160
180
200

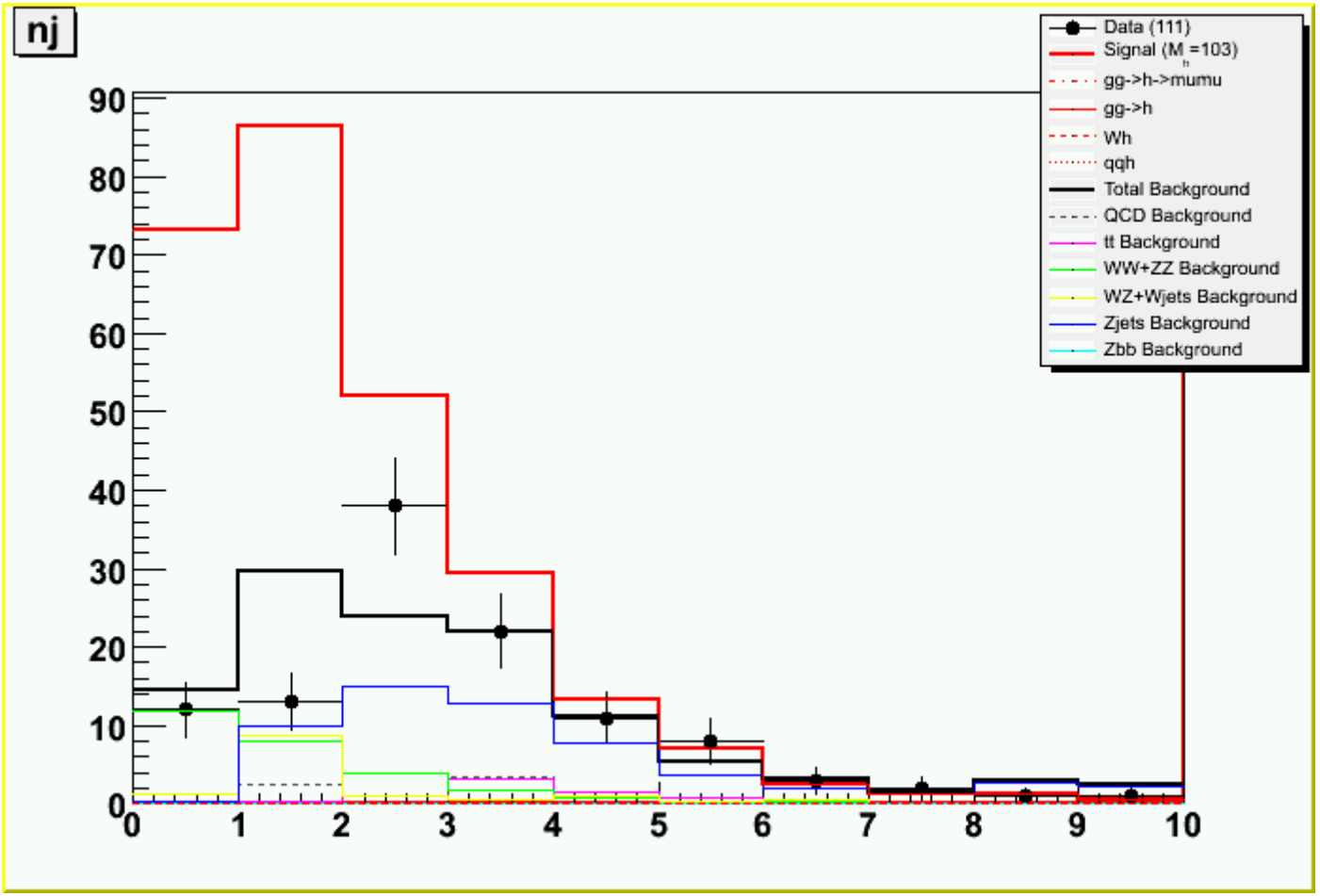
H->WW->mumu


metsig
Data (109)
Signal (M =103)
h
gg->h->mumu
gg->h
Wh
qqh
Total Background
QCD Background
tt Background
WW+ZZ Background
WZ+Wjets Background
Zjets Background
Zbb Background
140
120
100
80
60
40
20
0
0
10
20
30
40
50

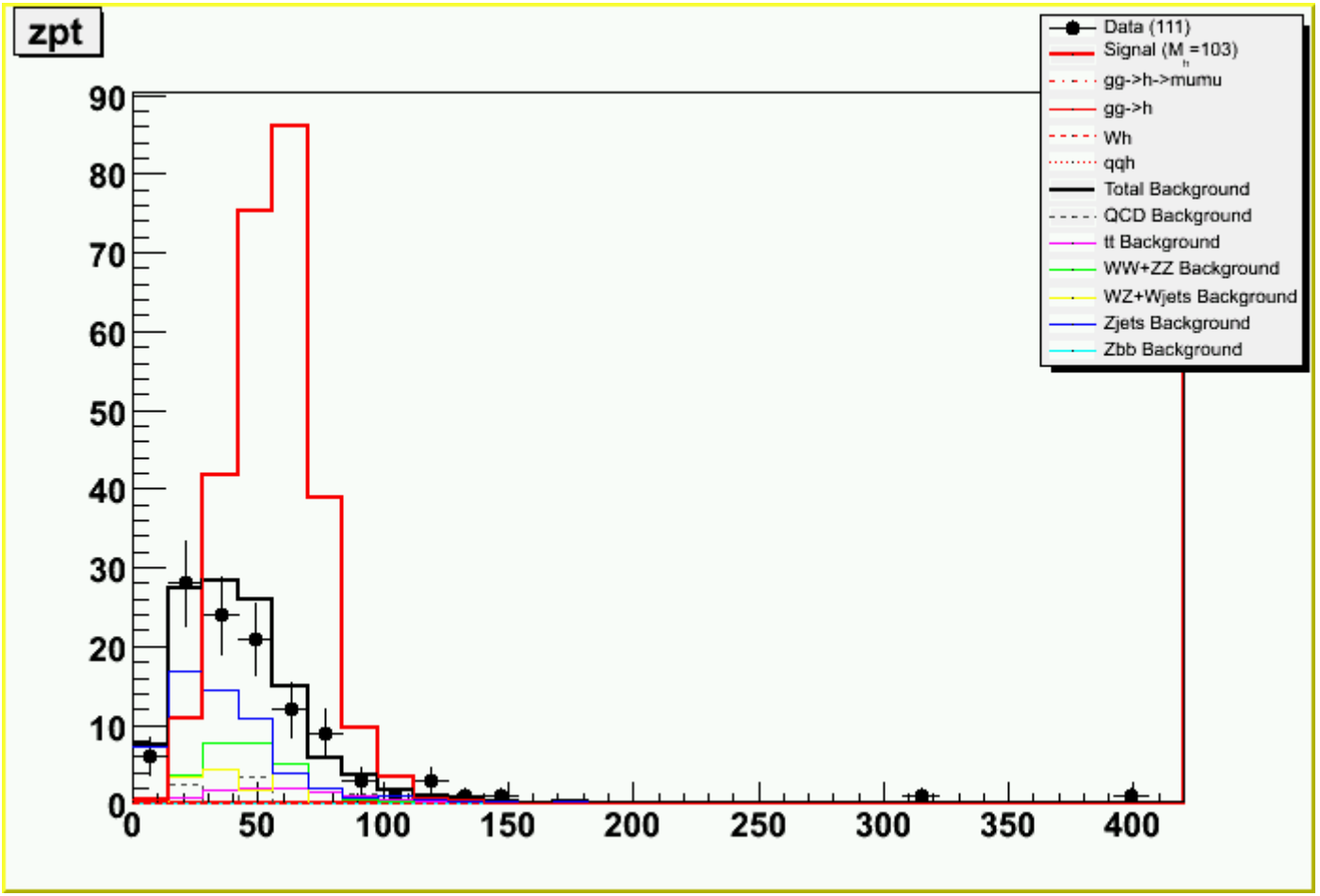
H->WW->mumu


htall
Data (65)
Signal (M =103)
h
gg->h->mumu
gg->h
Wh
qqh
Total Background
QCD Background
tt Background
WW+ZZ Background
WZ+Wjets Background
Zjets Background
Zbb Background
0
5
10
15
20
25
30
0
10
20
30
40
50
60
70
80
90
100

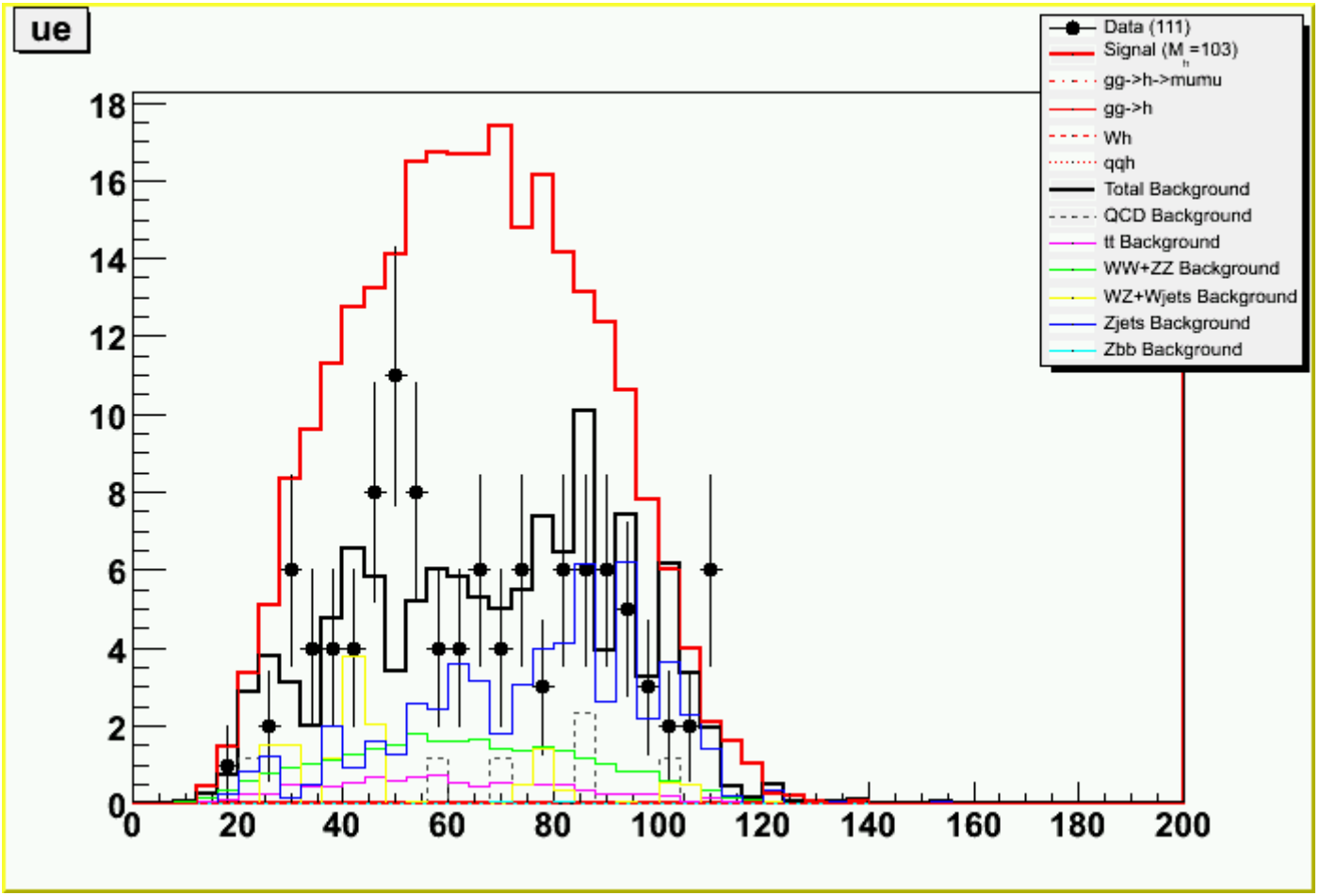
H->WW->mumu


nj
Data (111)
Signal (M_h=103)
gg->h->mumu
gg->h
Wh
qqh
Total Background
QCD Background
tt Background
WW+ZZ Background
WZ+Wjets Background
Zjets Background
Zbb Background
90
80
70
60
50
40
30
20
10
0
0
1
2
3
4
5
6
7
8
9
10

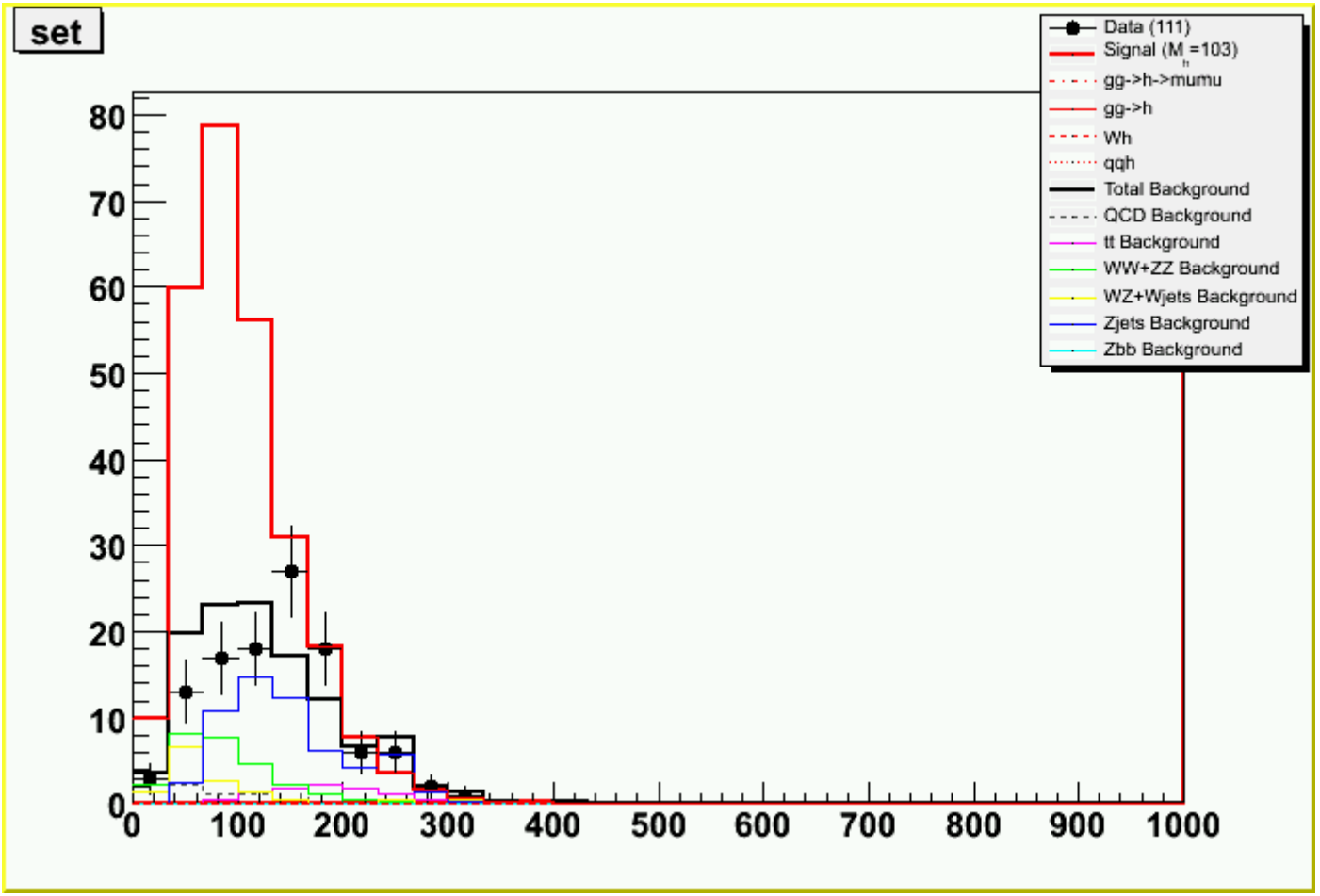
H->WW->mumu


zpt
Data (111)
Signal (M =103)
h
gg->h->mumu
gg->h
Wh
qqh
Total Background
QCD Background
tt Background
WW+ZZ Background
WZ+Wjets Background
Zjets Background
Zbb Background
90
80
70
60
50
40
30
20
10
0
0
50
100
150
200
250
300
350
400

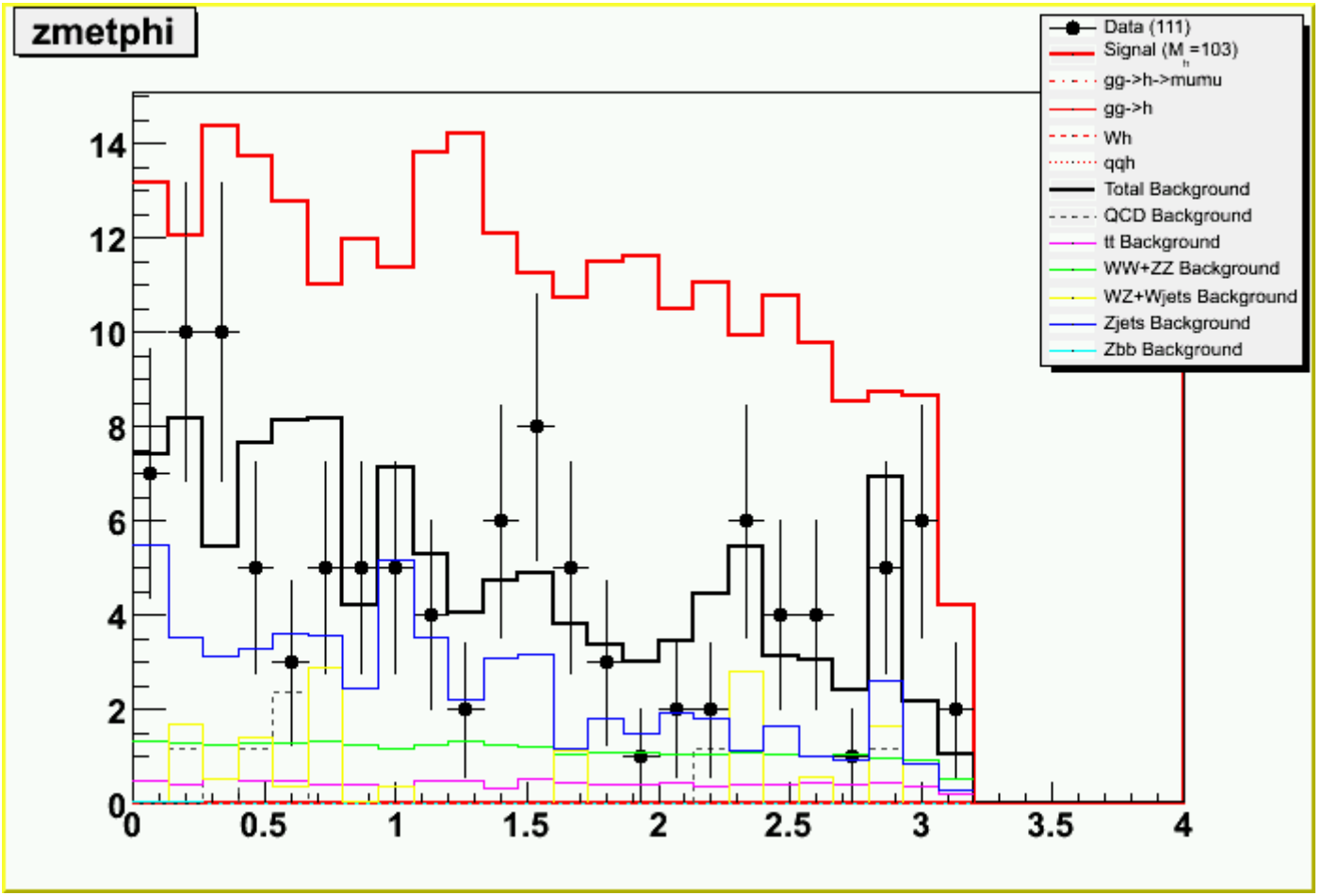
H->WW->mumu


ue
Data (111)
Signal (M_h=103)
gg->h->mumu
gg->h
Wh
qqh
Total Background
QCD Background
tt Background
WW+ZZ Background
WZ+Wjets Background
Zjets Background
Zbb Background
0
2
4
6
8
10
12
14
16
18
0
20
40
60
80
100
120
140
160
180
200

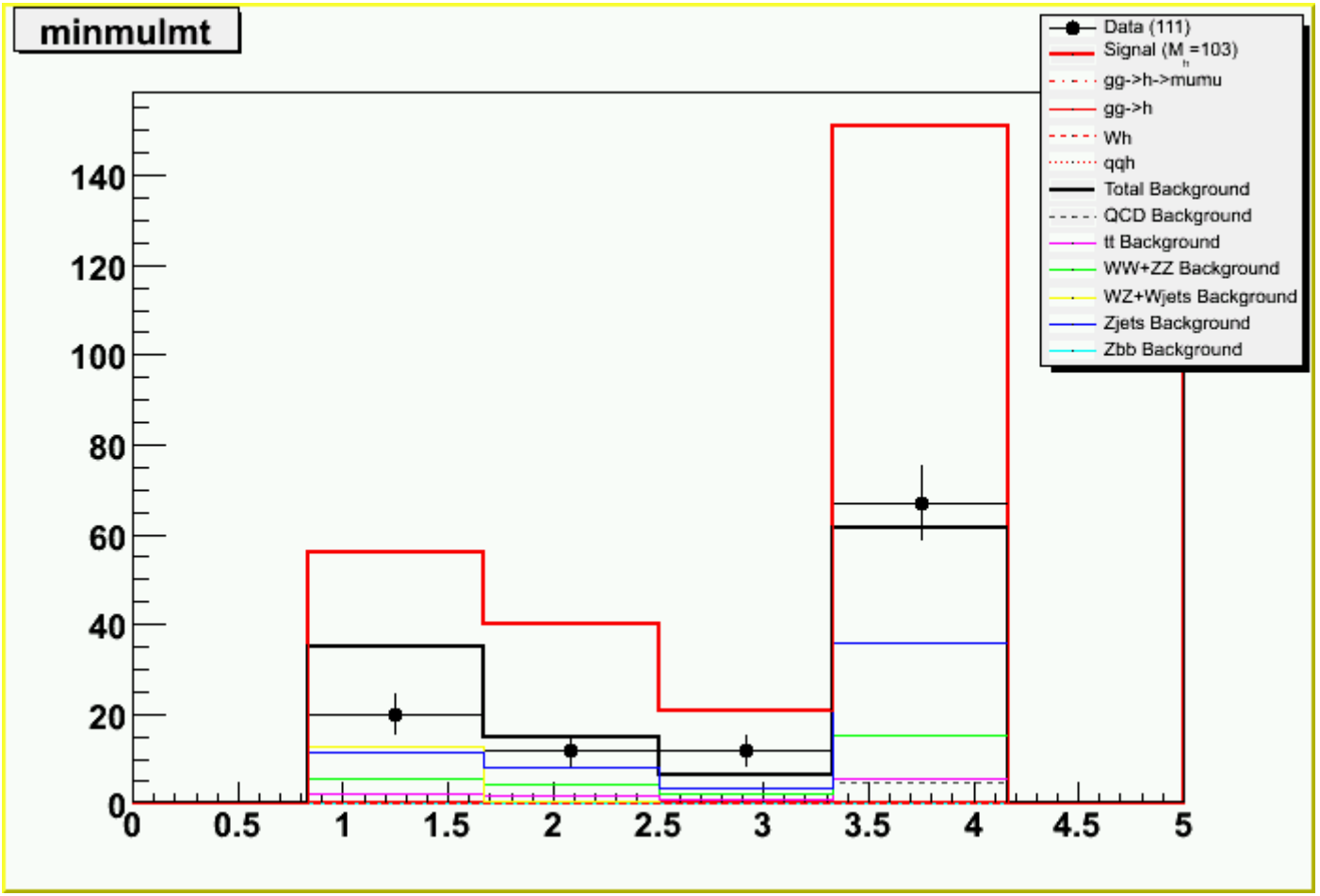
H->WW->mumu


set
Data (111)
Signal (M_h=103)
gg->h->mumu
gg->h
Wh
qqh
Total Background
QCD Background
tt Background
WW+ZZ Background
WZ+Wjets Background
Zjets Background
Zbb Background
0
10
20
30
40
50
60
70
80
0
100
200
300
400
500
600
700
800
900
1000

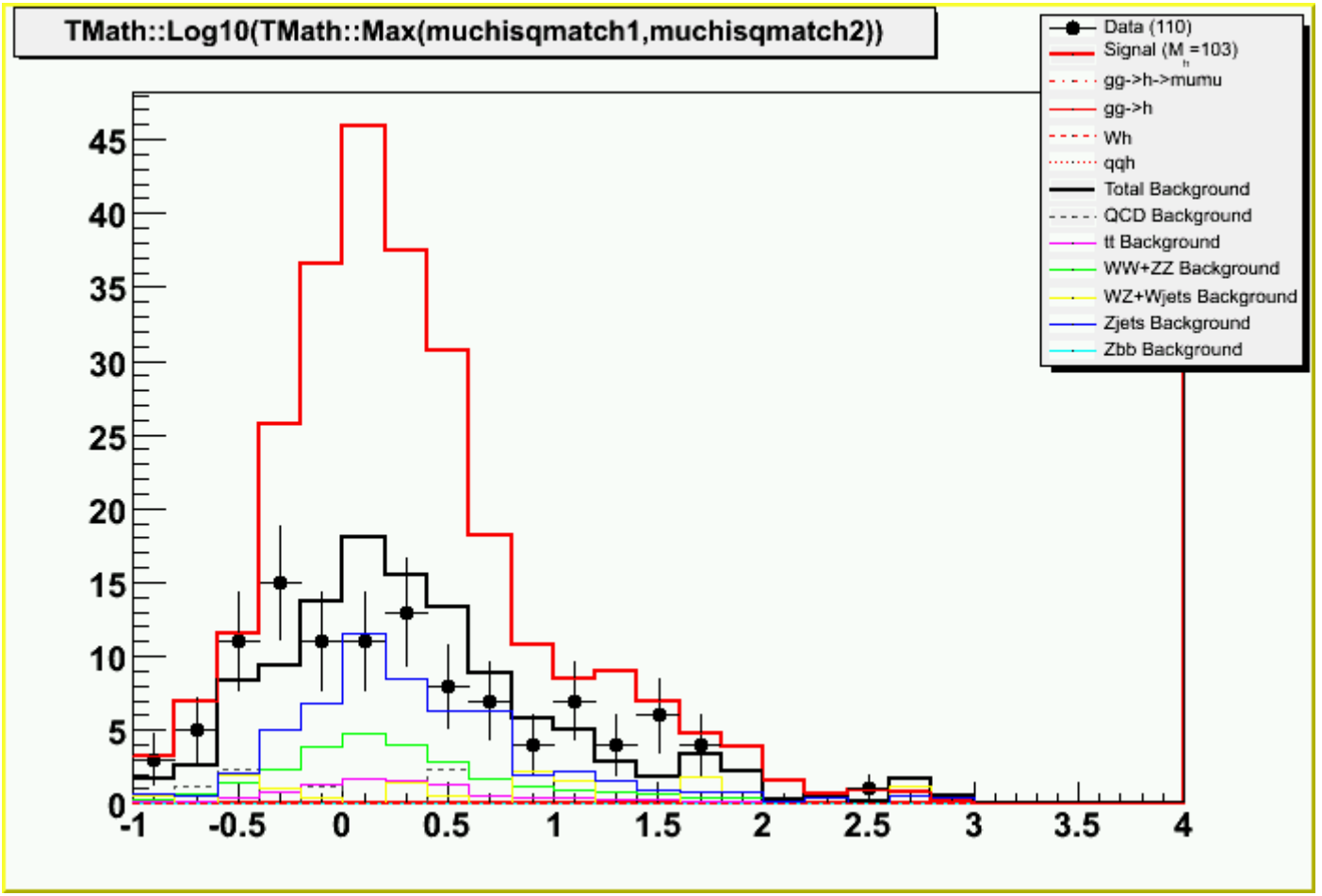
H->WW->mumu


zmetphi
Data (111)
Signal (M =103)
h
gg->h->mumu
gg->h
Wh
qqh
Total Background
QCD Background
tt Background
WW+ZZ Background
WZ+Wjets Background
Zjets Background
Zbb Background
0
2
4
6
8
10
12
14
0
0.5
1
1.5
2
2.5
3
3.5
4

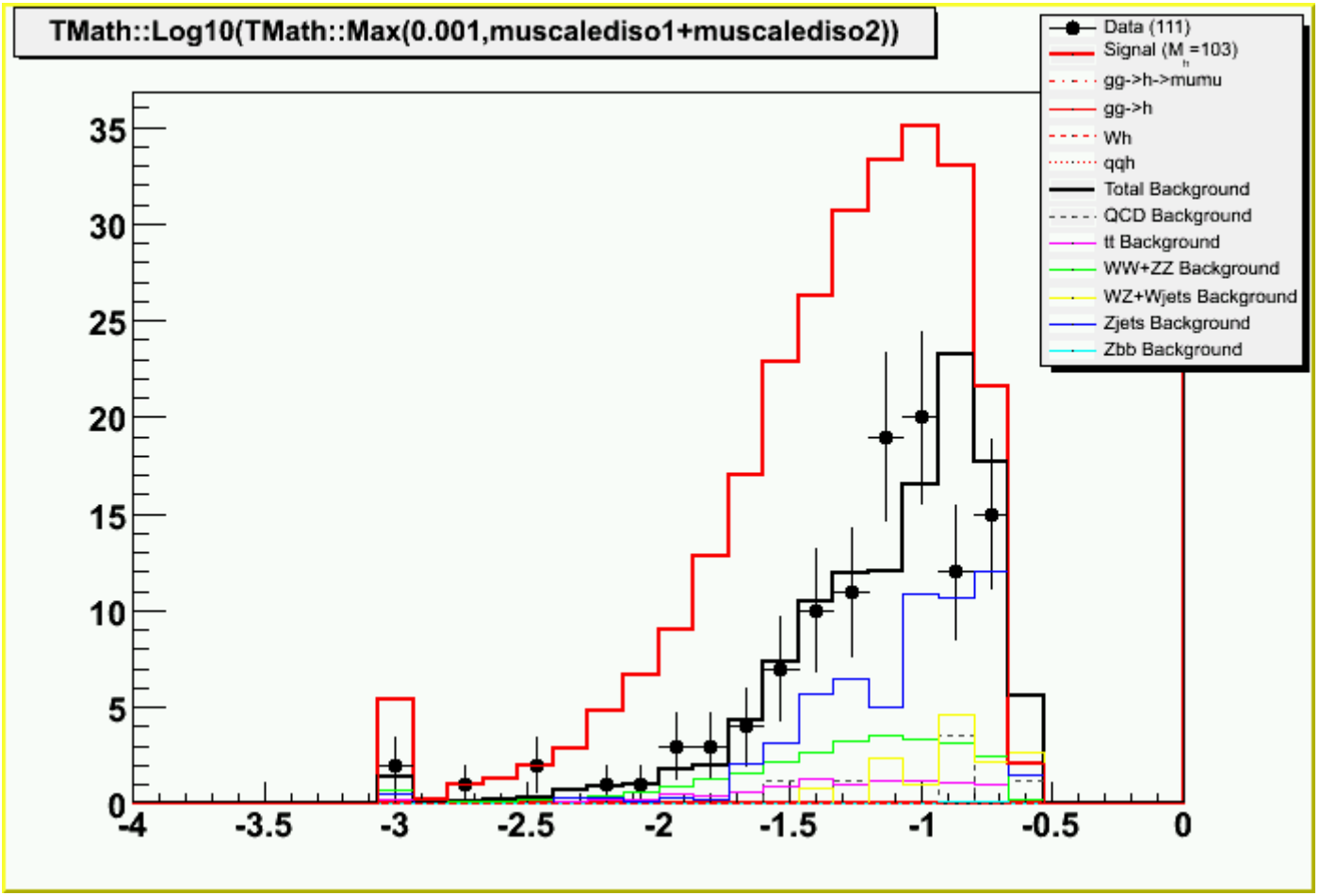
H->WW->mumu


minmulmt
Data (111)
Signal (M_h=103)
gg->h->mumu
gg->h
Wh
qqh
Total Background
QCD Background
tt Background
WW+ZZ Background
WZ+Wjets Background
Zjets Background
Zbb Background
0
20
40
60
80
100
120
140
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5

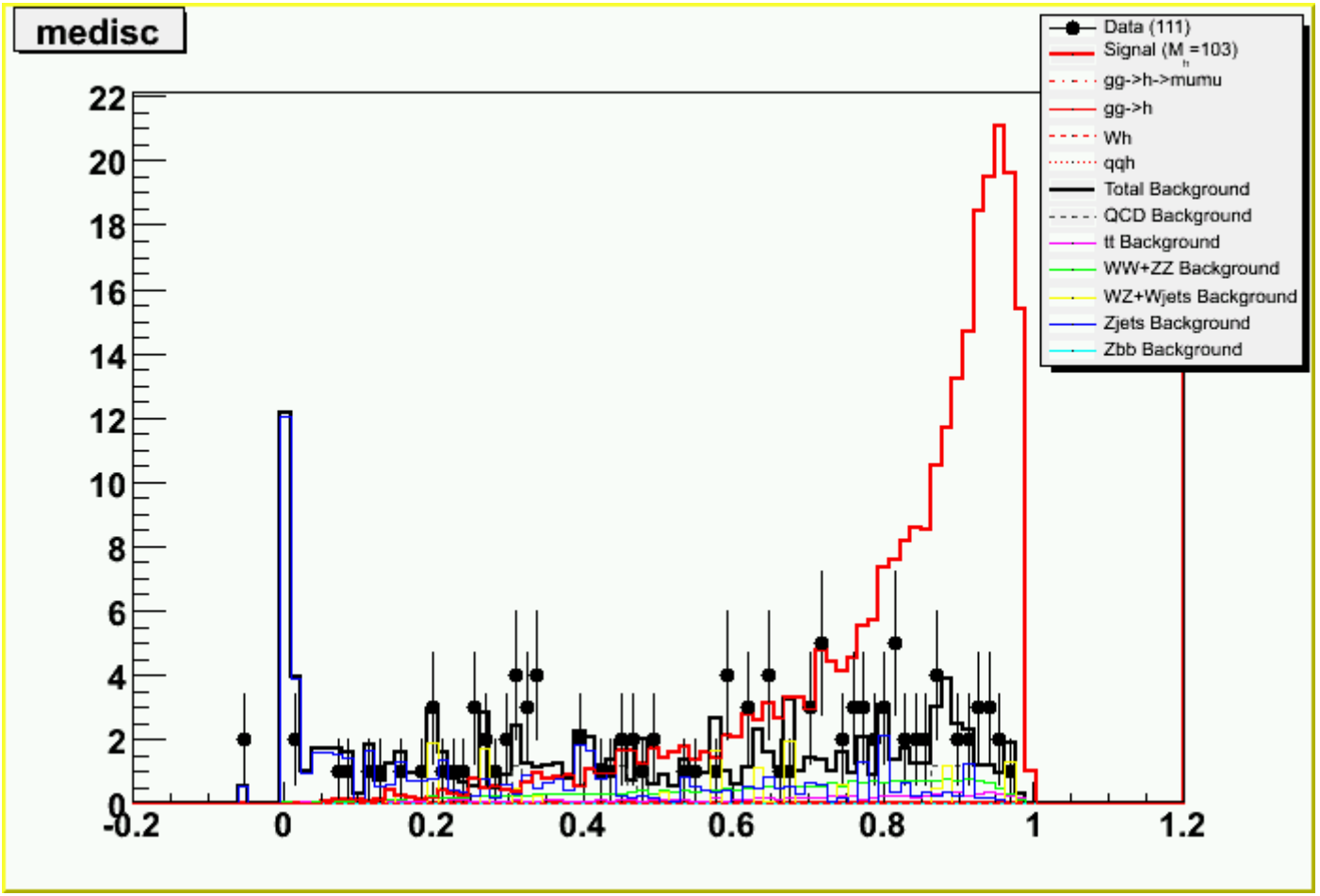
H->WW->mumu


TMath::Log10(TMath::Max(muchisqmatch1,muchisqmatch2))
Data (110)
Signal (M_h=103)
gg->h->mumu
gg->h
Wh
qqh
Total Background
QCD Background
tt Background
WW+ZZ Background
WZ+Wjets Background
Zjets Background
Zbb Background
45
40
35
30
25
20
15
10
5
0
-1
-0.5
0
0.5
1
1.5
2
2.5
3
3.5
4

H->WW->mumu

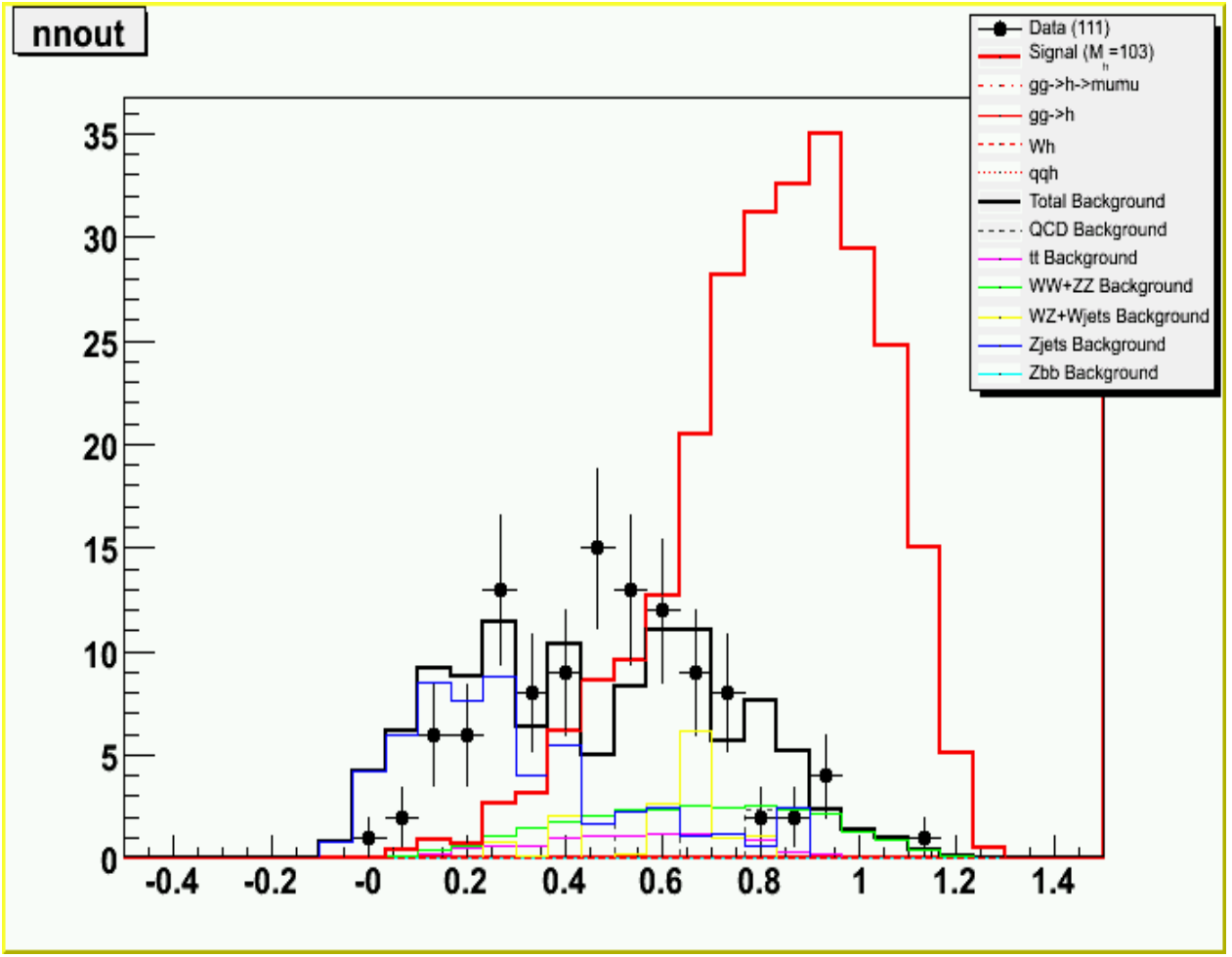

TMath::Log10(TMath::Max(0.001,muscalediso1+muscalediso2))
Data (111)
Signal (M_h=103)
gg->h->mumu
gg->h
Wh
qqh
Total Background
QCD Background
tt Background
WW+ZZ Background
WZ+Wjets Background
Zjets Background
Zbb Background
35
30
25
20
15
10
5
0
-4
-3.5
-3
-2.5
-2
-1.5
-1
-0.5
0

H->WW->mumu


medisc
Data (111)
Signal (M_h=103)
gg->h->mumu
gg->h
Wh
qqh
Total Background
QCD Background
tt Background
WW+ZZ Background
WZ+Wjets Background
Zjets Background
Zbb Background
22
20
18
16
14
12
10
8
6
4
2
0
-0.2
0
0.2
0.4
0.6
0.8
1
1.2

H->WW->mumu

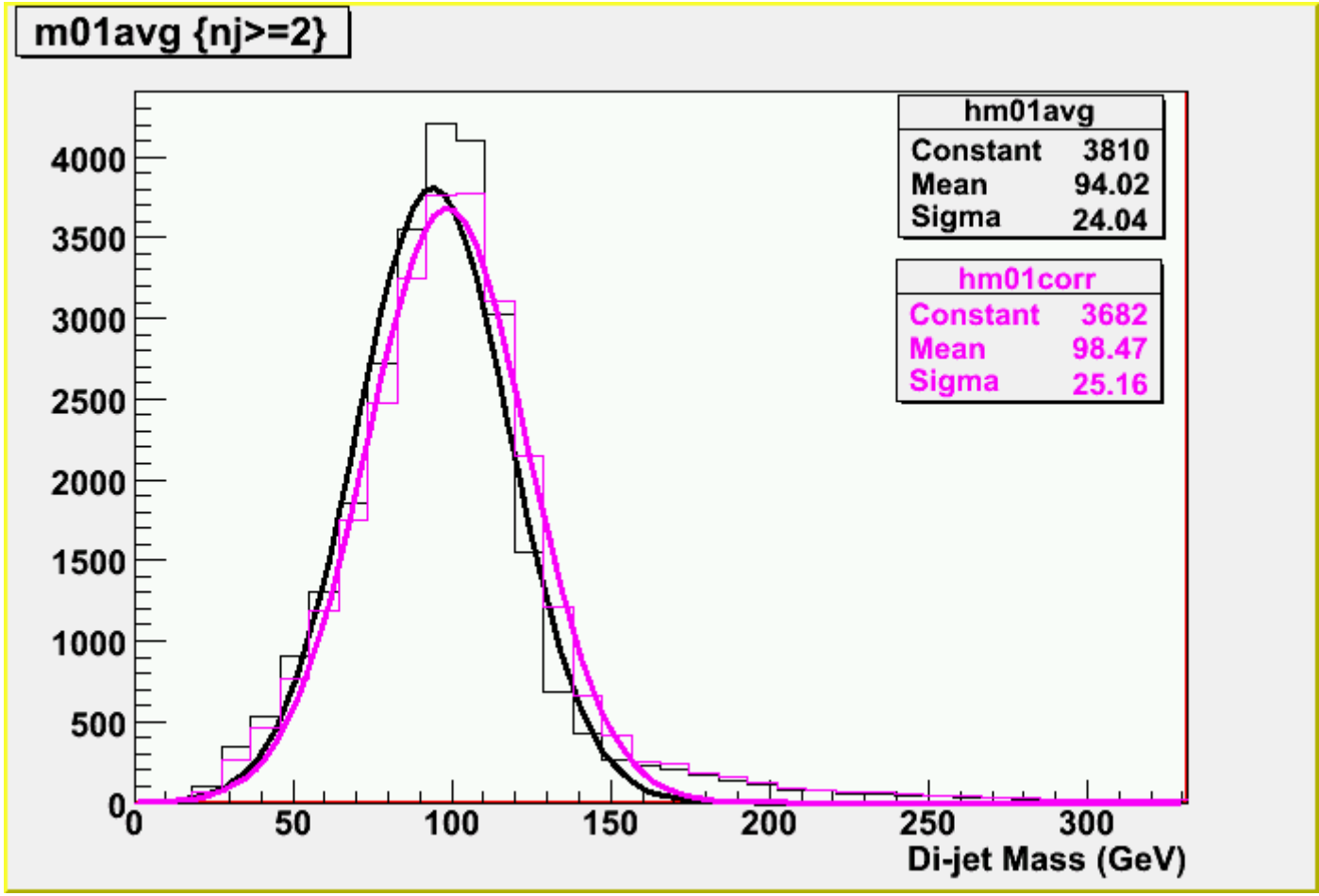
Have trained a NN on them for mH=160 GeV



Jet Resolution Processor

Plot leading-pt di-jet mass
ZH->mumubb signal (mh=115 GeV)

JCCAverage
JCCCorrected
(CPS+Averaged)



Jet Resolution Processor

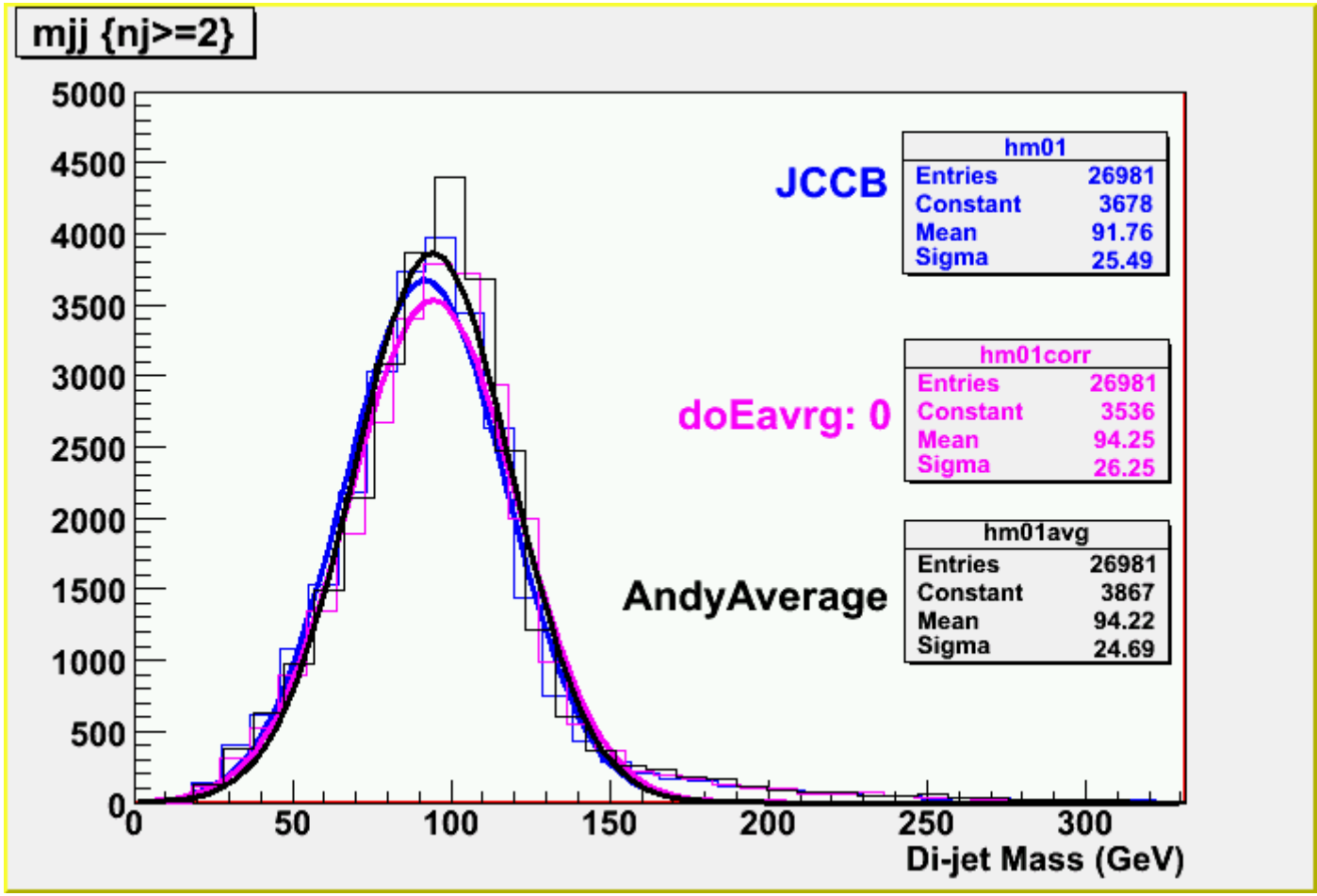
Plot leading-pt di-jet mass
ZH->mumubb signal (mh=115 GeV)

JCCB

JCCAverage

JCCCorrected
(CPS+Averaged)

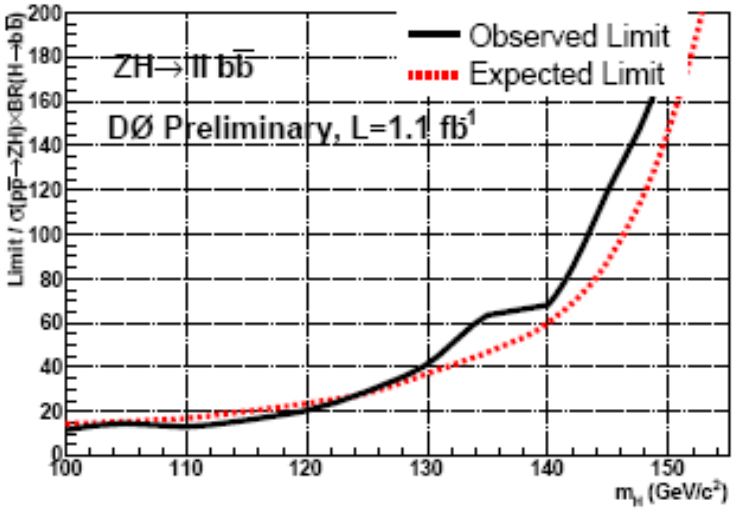
This time set
doEavrg: 0
so we only test
the CPS part.



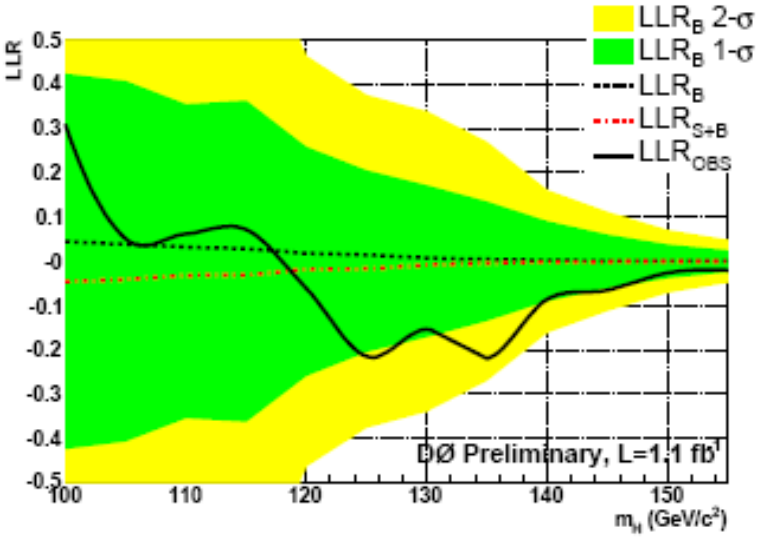
ZH->mumubb

Finished final p17 limits

Now run on 5 GeV steps of mH
from 100->155 GeV



(b)



(c)